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# Transportation Analysis & Research

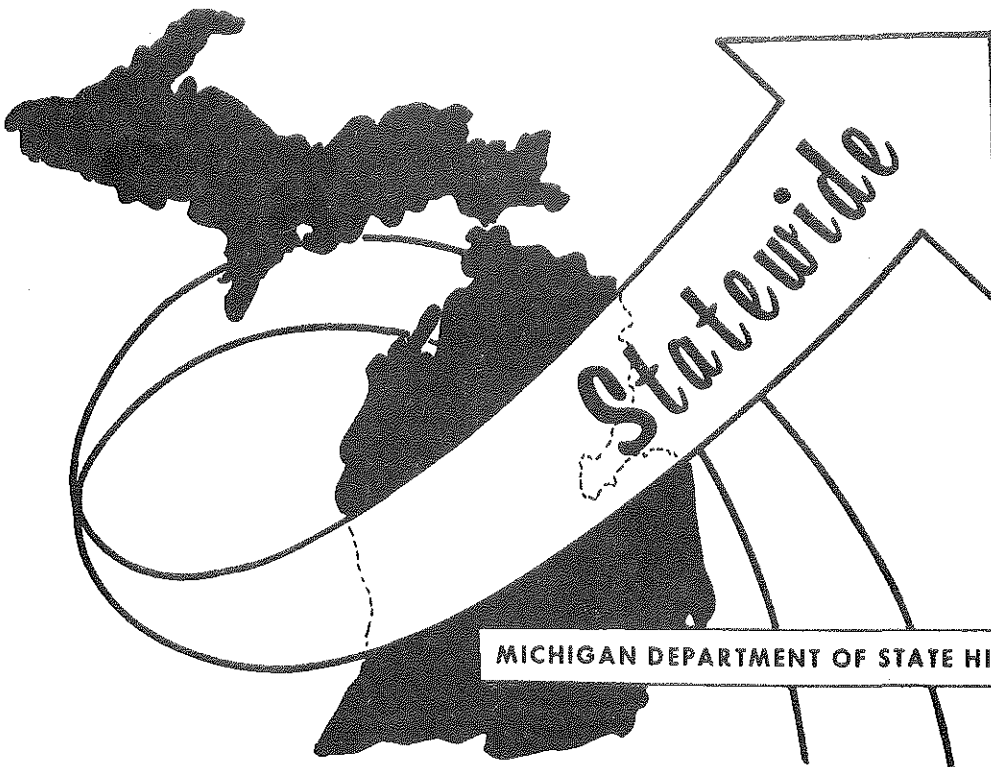
MICHIGAN'S TRANSPORTATION  
MODELING SYSTEM

STATEWIDE SOCIO-ECONOMIC AND  
TRANSPORTATION RESOURCES AND  
THEIR ROLE IN INTERCITY  
TRANSPORTATION DECISIONS

*Vol. I - I*

STATEWIDE STUDIES

NOVEMBER, 1974



MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

# MICHIGAN DEPARTMENT

OF

## STATE HIGHWAYS AND TRANSPORTATION

BUREAU OF TRANSPORTATION PLANNING

MICHIGAN'S TRANSPORTATION  
MODELING SYSTEM

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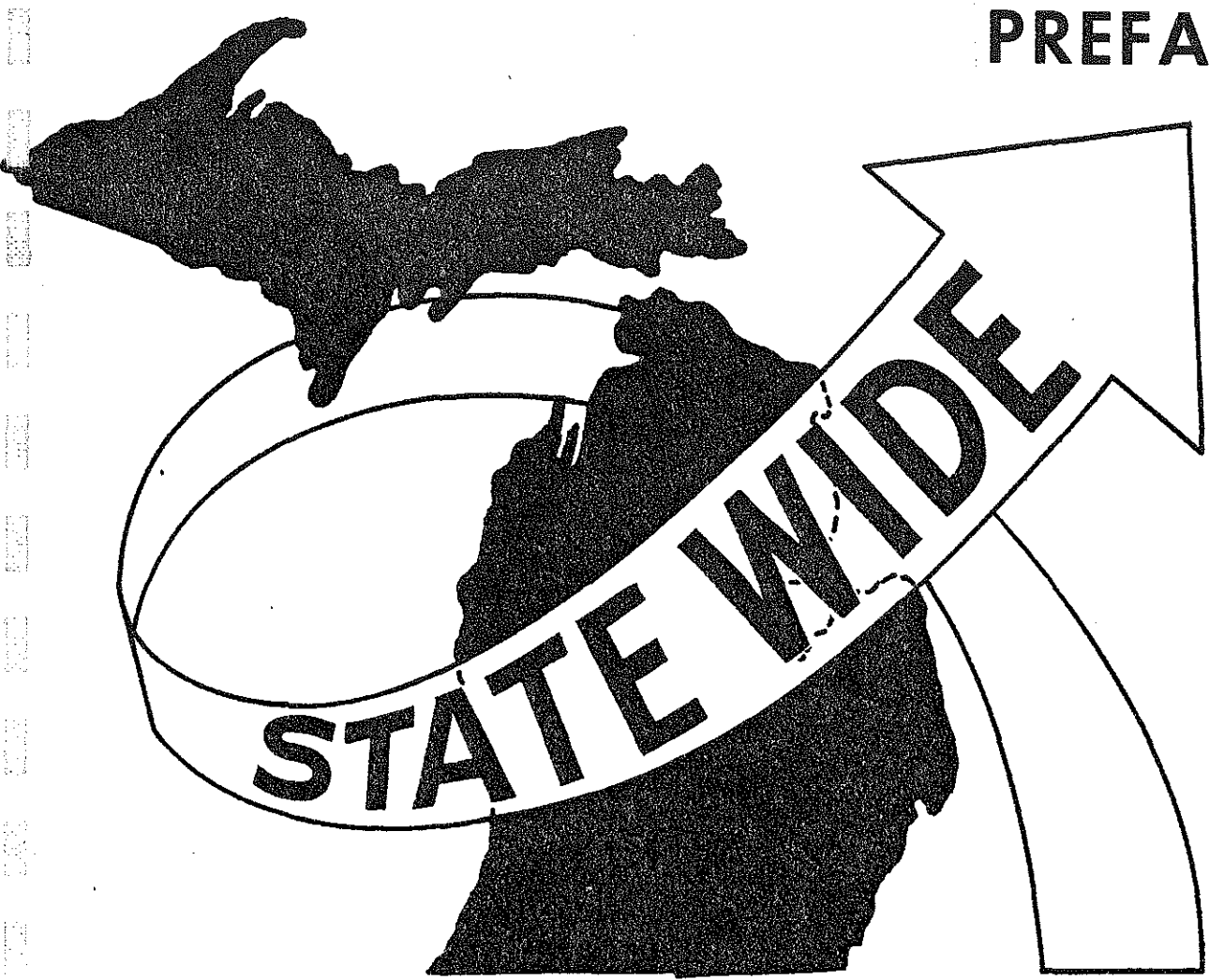
## STATEWIDE SOCIO-ECONOMIC AND TRANSPORTATION RESOURCES AND THEIR ROLE IN INTERCITY TRANSPORTATION DECISIONS

by

Lillian Randolph

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**PREFACE**



# PREFACE

If planning and financing of multi-modal transportation systems is to be effective, it is necessary to identify the extent of mobility of all population groups in the state. Once the geographic distribution of various mobility groups in the state is identified and defined, rational planning of transportation systems can proceed. The allocation of present and future transport development funds must emerge from sound decision making processes derived from transportation need and existing service.

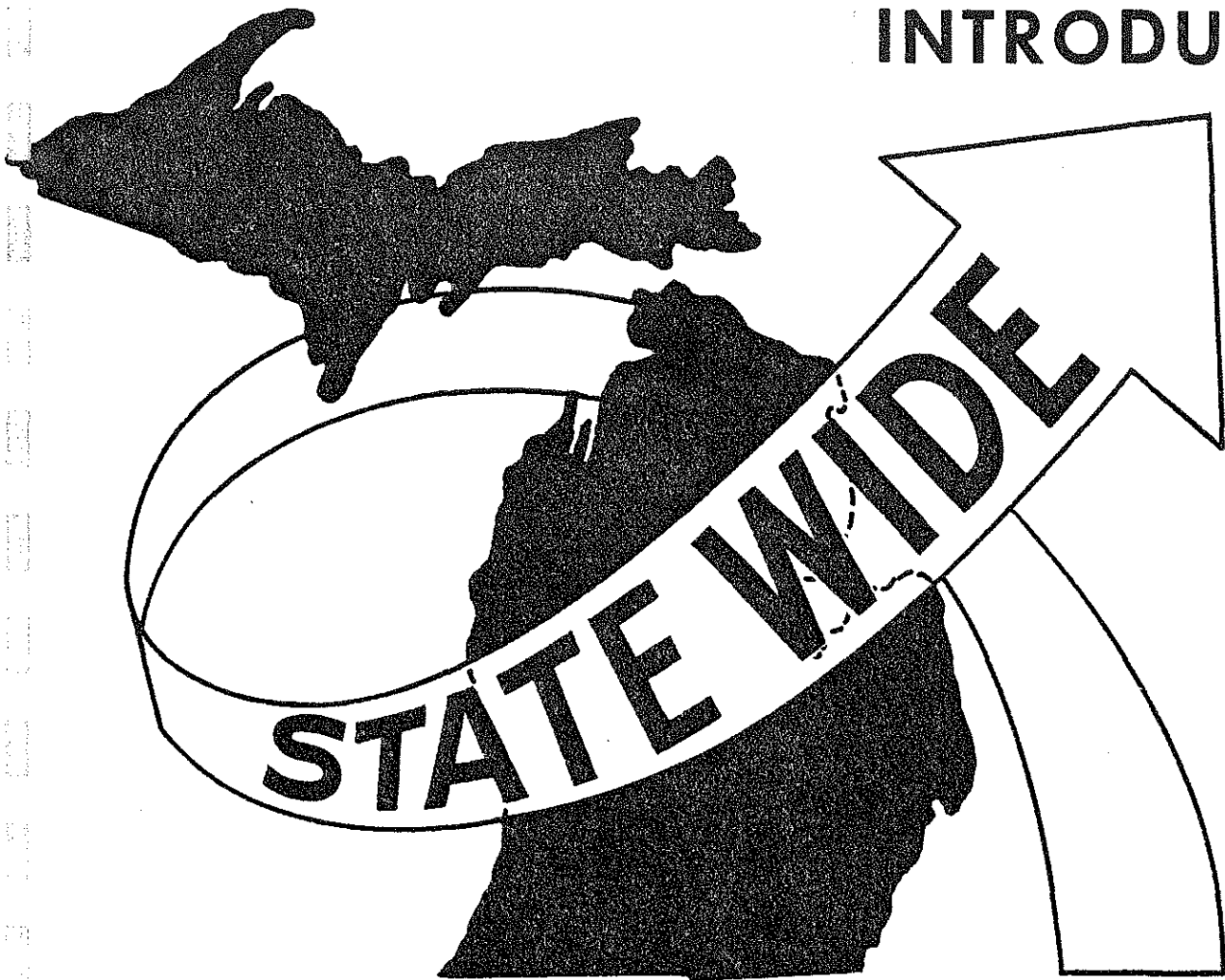
The current transportation modeling systems are built to forecast demand for travel based on predicted levels of population and surrounding population. Due to changing social priorities, as the result of the political process, there is a need for the transportation modeling to be flexible if statewide and regional goals are to be effectively met. This report deals with the discussion of mobility impact variables in the application of the statewide transportation modeling system to changing needs and priorities. The statewide mobility analysis concept is an outgrowth of the following reports: Social Impacts of Alternative Highway Plans on Public Facilities, Statewide Socio-Economic Data File and Statewide Public and Private Facility File. The first report deals with a program called "Proximity Analysis", which can be used to determine the availability or accessibility of each mobility and it's spatial relationship to the socio-economic and transportation facilities inventory. This technique is most often used in the analysis of social impact of alternative transport development

programs and can also be used to identify opportunities to increase mobility. The development of statewide mobility analysis process is composed of two major categories:

- (1) Socio-economic factors related to mobility
- (2) Transportation facilities related to mobility

This report will discuss the development and analysis of a potential statewide mobility index using these two basic elements.

# INTRODUCTION



# INTRODUCTION

Mobility is a relative concept, defined by societal goals and objectives which change over time. Ideally, mobility is a fundamental right, expressed in the "commerce" clause of the U.S. Constitution. Mobility may be defined as a latent function of national goals and priorities to maximize individual accessibility to opportunities to increase national productivity. Operationally, mobility is a function of the socio-economic status of the individual and the geographic distribution of socio-economic wealth. Mobility or the change in mobility characteristic of population groups for which several governmental agencies have been delegated responsibility to enhance. The enhancement of mobility or increasing the ease of accessibility to opportunities may often be a primary goal of many transportation agencies.

The planning process must establish a procedure which will be able to delineate varying degrees of population mobility at the statewide and regional level. Regional distribution of multi-modal transportation opportunities and their relationship to socio-economic characteristics may also be identified so as to determine possible areas of latent demand.

Due to changing priorities in recent years, the socio-economic differences in the opportunities to be mobile have been illuminated by increasing dissatisfaction in deficient areas. Many of these issues have often been related to the lack of accessibility to opportunities. These opportunities are often listed as



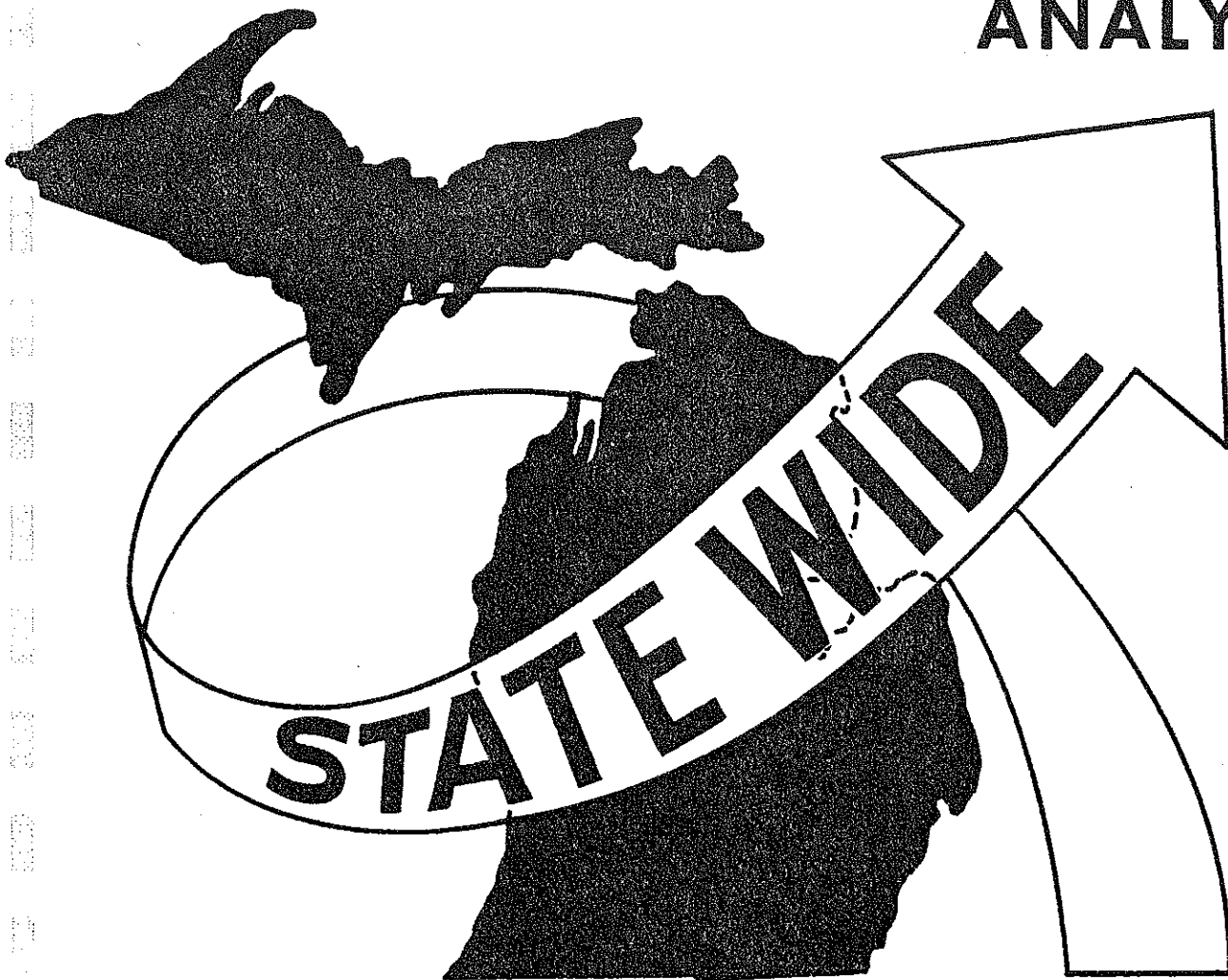
employment, health facilities, recreational facilities and educational opportunities.

Since mobility is important to the basic survival and subsistence of the American population, the agencies whose primary functions are the enhancement of transportation opportunities should be concerned with the processes of evaluating different mobility opportunities, their distribution, and factors which hinder their distribution. To fulfill these primary directives, a statewide mobility analysis system has been developed. The mobility analysis components discussed in this report are part of the statewide transportation modeling system which possesses the following essential qualities:

- (1) The ability to be continuously updated to provide up-to-date information of changing mobility factors.
- (2) Mobility impact analysis should be able to be completed quickly, so that impact information keeps pace with the process of planning alternative courses of action and impacts of different alternative can be measured.
- (3) The mobility indicators would provide information requested by the Federal-Aid Highway Act of 1970, which requires that the evaluation of each proposed Federal-Aid Highway project must include an analysis of the social effects of the projects.

# **MOBILITY INDEX**

## **ANALYSIS**



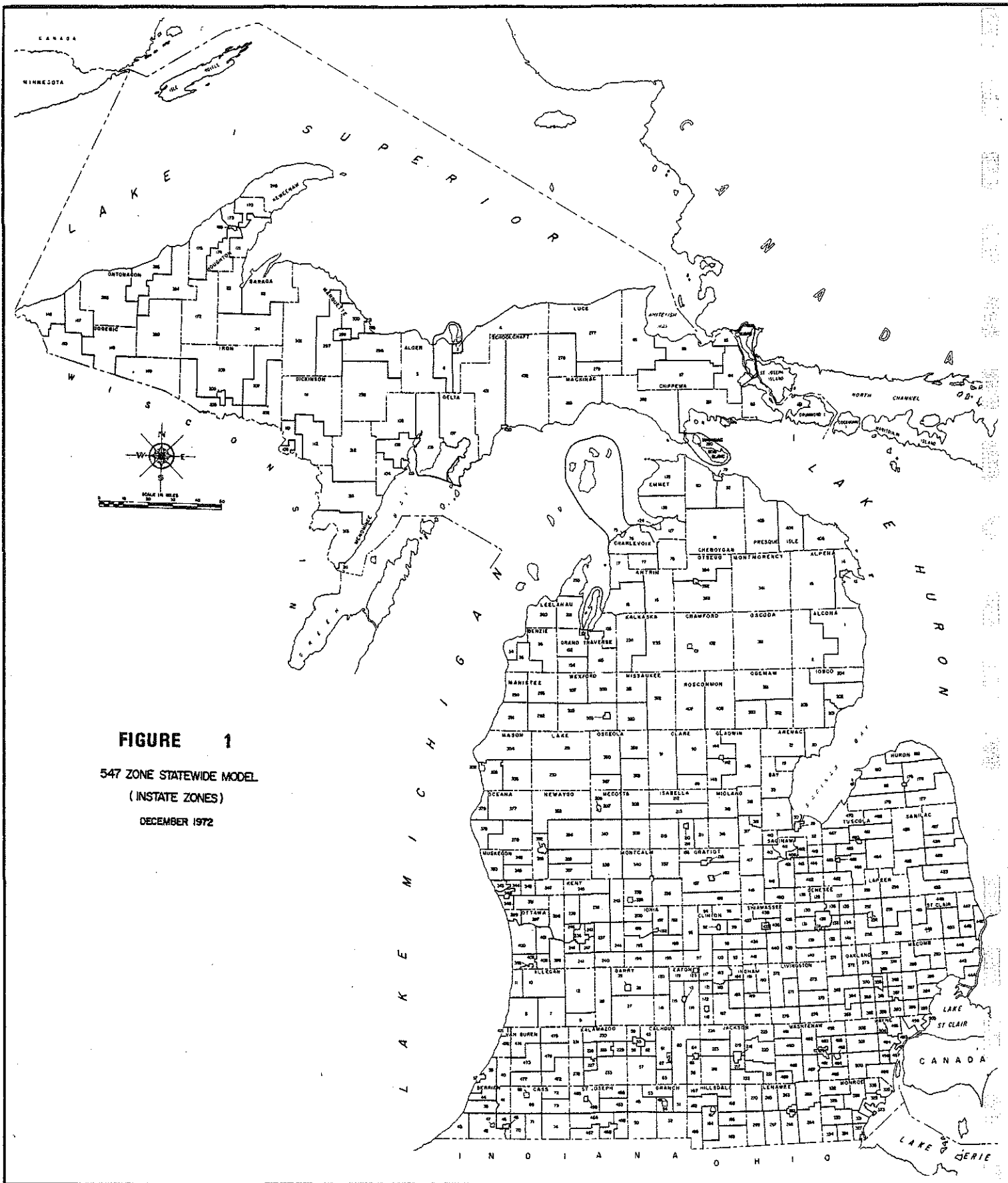
# MOBILITY INDEX ANALYSIS

The Statewide Mobility Indices System is an outgrowth of the Statewide Transportation Modeling System. The modeling system is composed of three major data components: The Statewide Socio-economic Data File, the Statewide Transportation Network and the Statewide Public and Private Facility File. These three files are defined in the modeling system as representing society. Each file is extensive and therefore responsive to the information needs of the varying goals of each user. Each of these data files then provide information which can be integrated into an analysis to aid the transportation planning process. The Statewide Model divides the state into 508 analysis zones as shown in Figure 1 and these are the zones to which the data files are summarized.

The Statewide Public and Private Facility File shown in Figure 2 contains information about the physical environment. Selected elements of this file such as the bus, rail, truck and port facilities deal with mobility considerations which will also be integrated into the statewide mobility analysis system.

The Statewide Transportation Network link file contains the physical description of each highway segment or link. This second file was created by developing a program referred to as "automated data-bank interface" which allows the travel modeling process to access and summarized information residing in any of the following department files:

- A. Trunkline Vehicle-Miles Master File
- B. Michigan Highways Yearly Sufficiency Rating File
- C. Accident Master File
- D. State Trunkline Control Section Log Record File
- E. State Trunkline Needs File



**FIGURE 1**  
**547 ZONE STATEWIDE MODEL**  
 (INSTATE ZONES)  
 DECEMBER 1972

# STATEWIDE FACILITY FILE

AIRPORTS  
AMBULANCE SERVICE  
BUS TERMINALS  
CAMP GROUNDS, PUBLIC AND PRIVATE  
CERTIFIED INDUSTRIAL PARKS  
CITIES OVER 30,000 POPULATION  
CITIES OVER 5,000 POPULATION  
CIVIL DEFENSE TERMINALS  
COLLEGES, NON-PUBLIC  
COLLEGES, PUBLIC COMMUNITY  
COLLEGES AND UNIVERSITIES, PUBLIC 4 YEAR  
CONVENTION CENTERS  
GAME AREAS  
GOLF COURSES  
HIGH SCHOOLS  
HISTORIC SITES  
HOMES FOR THE AGED  
HOSPITALS  
MAJOR COMMERCIAL CENTERS  
MANUFACTURERS  
MENTAL HEALTH CENTERS  
NEWSPAPERS, DAILY  
NEWSPAPERS, WEEKLY AND BIWEEKLY  
NURSING HOMES  
PORTS  
RAIL TERMINALS  
SECRETARY OF THE STATE OFFICES  
SEWAGE TREATMENT FACILITIES  
SKI RESORTS  
SNOWMOBILE TRAILS  
STATE PARKS  
STATE POLICE POSTS  
TOURIST ATTRACTIONS  
TREASURY OFFICES  
TRUCK TERMINALS  
UNEMPLOYMENT OFFICES  
WEATHER SERVICE STATIONS-NATIONAL  
WHOLESALE TRADE CENTERS

Combinations of data from the above files make up the final highway network line file appearing in Figure 3.

The third component of the Statewide Transportation Modeling System is the Socio-economic File. This file contains 888 pieces of selected census information concerning the overall population characteristics within that zone from the 1970 census of population and housing. The socio-economic file can be used to locate special groups of people, but even more important, the relationship of these people to existing facilities or opportunities. Selected information from this file is shown in Figure 4.

Majority of the variables used in this report were obtained from the socio-economic file and the public facility file. The socio-economic file is accessible through the Statewide Information Retrieval Program either from remote terminal or on site. Specific information can then be obtained for each zone. The socio-economic file can be continuously updated to accommodate new material.

Information retrieved from the socio-economic file may be graphically displayed on an outline of the State of Michigan through the use of a line-printer mapping program developed by the Laboratory for Computer Graphics and Spatial Analysis, Harvard Center for Environmental Design Studies, Harvard University. The program is called SYMAP. An example of symapping is the mean income map of Michigan appearing in Figure 5. All data generated from the socio-economic or public facility file may be graphically displayed in a similiar manner.

# STATEWIDE HIGHWAY NETWORK

## LINK FILE

### CONTENTS OF EACH HIGHWAY SEGMENT OR LINK

AVERAGE SPEED

DISTANCE

URBAN-RURAL DESIGNATION

TYPE OF ROUTE

TRAFFIC VOLUME CAPACITY

AVERAGE ANNUAL DAILY TRAFFIC VOLUME

COMMERCIAL TRAFFIC VOLUME

DESIGN HOUR VOLUME

ACCIDENT FATAL RATE

ACCIDENT INJURY RATE

ACCIDENT RATE

NUMBER OF LANES

LANE WIDTH

SURFACE CONDITION

RIGHT OF WAY

SIGHT RESTRICTION

FIGURE 3

# STATEWIDE SOCIO-ECONOMIC DATA FILE

## GENERAL CHARACTERISTICS OF POPULATION

SCHOOL ENROLLMENT BY TYPE OF SCHOOL  
YEARS OF SCHOOL COMPLETED  
CITIZENSHIP BY AGE

## INCOME CHARACTERISTICS OF POPULATION

FAMILY INCOME  
INCOME BY OCCUPATION AND SEX  
RATIO OF FAMILY INCOME TO POVERTY LEVEL

## LABOR FORCE CHARACTERISTICS OF POPULATION

EMPLOYMENT BY AGE  
EMPLOYMENT BY OCCUPATION AND SEX  
EMPLOYMENT BY INDUSTRY AND SEX

## SOCIAL CHARACTERISTICS OF POPULATION

AGE BY SEX  
TYPE OF FAMILY  
MARITAL STATUS

## STRUCTURAL CHARACTERISTICS OF HOUSING

YEAR STRUCTURE BUILT  
UNITS IN STRUCTURE  
STORIES IN STRUCTURE

## EQUIPMENT CHARACTERISTICS OF HOUSING

AIR CONDITIONING  
TYPE OF HEATING FUEL  
SOURCE OF WATER

## OCCUPANCY CHARACTERISTICS OF HOUSING

OCCUPANCY / VACANCY STATUS  
NUMBER OF PERSONS IN UNIT  
NUMBER OF PERSONS PER ROOM

FIGURE 4

## AREA CHARACTERISTICS

LAKE FRONTAGE  
ASSESSED VALUATION  
WATER AREA

\*THOSE ITEMS LISTED HERE ARE SAMPLES TAKEN FROM THE COMPLETE  
FILE WHICH CONTAINS 76 CATEGORIES WITH OVER 800 ITEMS



Another method of analysis of information generated by the use of mobility indicators is through the proximity analysis process. The proximity analysis program attempts to define the relationship of special groups of people to existing facilities or socio-economic factors. In general, the process includes a zone-to-zone driving-time matrix (used in the Statewide Transportation Model) to accumulate socio-economic information within specified driving-time bands for user-supplied facilities. For the details of this process, the reader is referred to the report "Proximity Analysis: Social Impacts of Alternate Highway Plans on Public Facilities". For actual applications of proximity analysis, the reader is referred to the following publications:

1. "Proximity of Population to General Purpose Hospitals"
2. "Proximity of Airports with Scheduled Service to Population"
3. "Impact of Transportation Systems on the Proximity of Airports and Labor force to Industrial Parks".

A more detailed discussion of this process will follow in the transportation resource component section.

The basic structure of the mobility analysis system in this report deals with two components. They are the socio-economic component and the transportation resource component. The integration of the socio-economic component and transportation resource component could make up a single value for statewide mobility at the 508 zone level. A statewide mobility indicator system can systematically be generated if states develop transportation modeling systems similar to Michigan's.

**FIGURE 5**

MICHIGAN DEPT OF STATE HIGHWAYS  
STATISTICAL STUDY UNIT  
INCOME DATA

MEAN FAMILY INCOME

DATA VALUE EXTREMES ARE 5718.74 29184.24

ABSOLUTE VALUE RANGE (COUNTS BY LEVEL ONLY)

MINIMUM 8249.00 10440.00 10884.00 10978.00 11800.00 10704.00 15049.00 12745.00 12000.00 10200.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

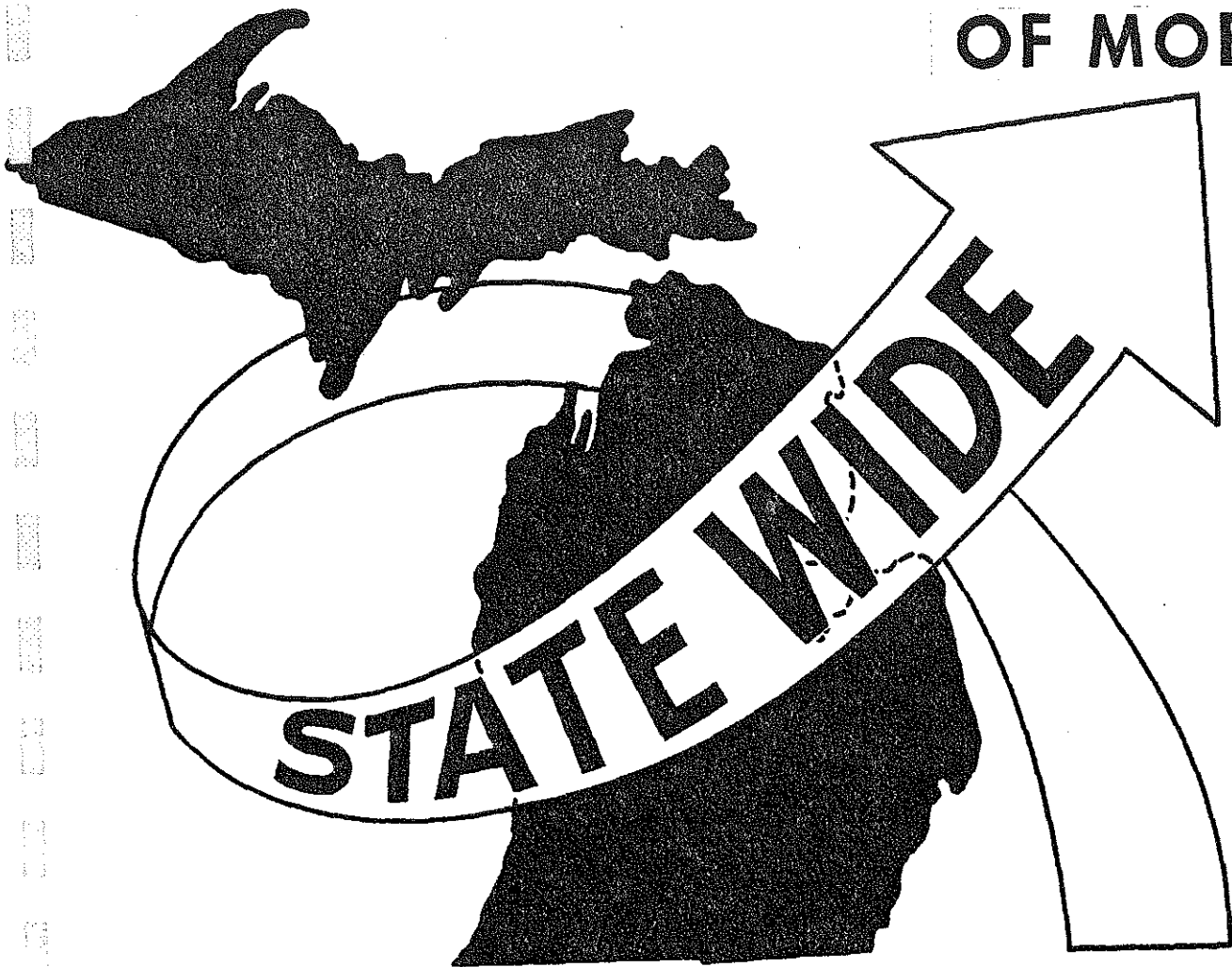
10.00 5.00 2.50 2.50 2.50 5.00 5.00 5.00 59.00

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5	6	7	8	9	10
SYMBOLS	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
FREQ.	120	60	51	30	43	42	24	12	12	12
TOTAL	1818.24									

The following sections will describe the application of the Statewide modeling system and the development component systems and their various factor groupings in depth.

**SOCIO-ECONOMIC  
COMPONENTS  
OF MOBILITY**



# **SOCIO-ECONOMIC COMPONENTS OF MOBILITY**

The typical statewide mobility index developed in this document consists of two basic components: The socio-economic component and the transportation resource component. Together the components will provide measures or indicators of mobility at the zonal level for the State of Michigan. For example, a zone may have a high socio-economic propensity to be mobile, but lack alternative modes of transportation such as a bus system. Therefore, the socio-economic indicators may show selected areas as being more likely candidates when allocating transportation resource dollars. This section of the report deals with the development of the socio-economic component.

The following list might make up a set of typical socio-economic factors which identify the existing mobility characteristics for each zone in the state:

1. Carless households
2. Elderly
3. Handicapped
4. Youth
5. Income level
6. Density
7. Auto ownership
8. Family size

All of the data in each group is available from the statewide socio-economic data file.

These variables describe those people which may be identified as transit-dependent or immobile because of a lack of personal means of transport. This data provides insight into the relative mobilities of different socio-economic groups at the statewide level. It is of great importance to determine the location of mobility variations within specified homogenous groups throughout the state.

At the zone level, carless households exhibit a different type of mobility than car owning households. The Nationwide Personal Transportation Survey in 1969-1970 identified 80% of the carless families living in central cities and 20% living in outlying suburban areas. Members of the carless group take one trip less per person than do people with the same income with one car. Below the poverty level, the carless depend on public transportation intensively. An income rises in these households, there is more ride sharing, less use of public transportation and car borrowing. Carlessness is associated with reduced participation of shopping and leisure trips, and inconvenience. The 1970 Housing Census identified 322,589 households in Michigan as being carless.

The elderly indicator consists of all people of the age of 65 and older per zone. The aged have various constraints on mobility; most of these constraints are related to income and

physiological factors. Age-related physiological, psychological and social changes interact with transportation changes and disproportionately increases the hazards and discomforts of traveling from one place to another. As people age, sensory acuity diminishes, strength and agility decline, and responses become slow. Perceptual-motor changes decrease the ability for a correct response to complex stimuli. Body balance becomes less secure when walking and standing, with tendencies to lose equilibrium.

The main concern for increasing the mobility of the elderly as a group is not always for humane factors but for its economic value to society. Transportation supports the individual's capacity for independent living, and thus assists in postponing or avoiding institutional care. In analyzing the travel behavior of the elderly, there is a substitution of work trips to shopping and recreational trips as being more important.

The following counties in Michigan contain a large portion of the elderly population: Gogebic, Iron, Dickinson, Montmorency, Oscoda, Alcona, Roscommon and Lake. Considering the income and physiological constraints of the transportation needs of the elderly, obstacles to adequate provisions for their needs are relatively greater in the rural areas than in urban area.

The handicapped are the most neglected in a transportation system where the prevalence of stairs obstructs effective use of the existing system. Again, many handicapped receive small incomes and the majority are not licensed drivers. The handicapped category encompasses a population of both physical and mental disabilities

and an increasing number of multiple disabilities. The greatest impediment to mobility is the stairs and steps of transport system, designed with little attention to people with ambulatory problems. The vertical element of the transport system, coupled with the corresponding vertical element of buildings, further limits employment opportunities, as well as transportation opportunities. Trips for recreation, shopping and visitation are also limited by these factors.

The design needs of the handicapped are varied. For example, the multi-handicapped need individualized services and facilities in terms of vehicle speed, interior vehicle design and mechanical supports. Obviously, the variation of needs hinders the use of a standard type of input into the main transport system.

Any planning process should identify groups who are ineligible to drive because of age and therefore depend upon others for transportation. Eligibility to drive affects the trip-making in many households. Trip-making of children and adolescents are further constrained by socio-economic factors. It must be noted that children and adolescents are a substantial proportion of the persons who occupy the lowest income households. The children of the poor will exhibit the travel behavior of the group. Travel by the young increases with rising family income.

Indicators which identify the location of low and high income groups have important connotations for trip behavior. The lower income groups are often more dependent on public transportation whereas the high income group may rely on air travel. The greatest

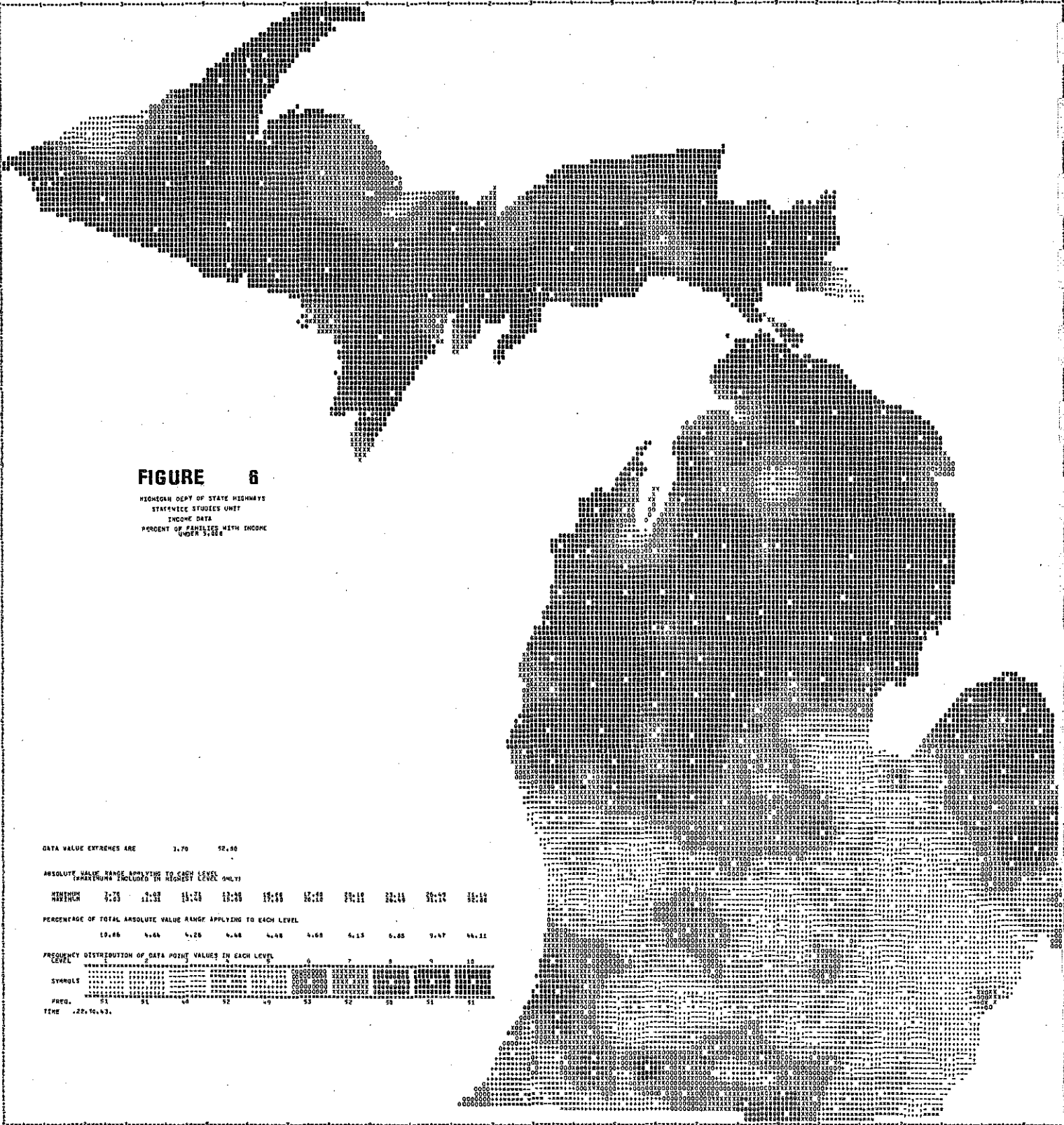


reason for increasing the mobility of the poor is so that they may have a better opportunity for socio-economic gains. This category will overlap the variables of the elderly, the children and the handicapped. For the most part, the poor do have cars available for some of their trip making. But poor car owners may often have unreliable cars for their trip needs.

The work trip may consist of public transportation, ride-sharing or car sharing. Because of the lack of the economic means to support and operate a car, the poor may take fewer trips for shopping and recreation. Symapping has been used to portray the spatial distribution of the poor or families with income under 5,000 (see Figure 6).

The indicator system also provides measures of mobility based on population density. John B. Lansing, in his study of Residential Location and Urban Mobility,<sup>1</sup> points out the association of population density with automobile ownership. The level of automobile ownership is higher in areas of low density than areas of higher density. Density of the area has a strong effect on the choice of mode. The density indicator, zonal population per square miles of the area, not only indicates suburban, rural or urban population, but will indicate where the higher trips are made. Low density areas with high auto-ownership will indicate more trip-making. This category may also be included in the household mobility factor.

The number of cars per household provides a relative indication of the level of trip making among households. The data was derived



**FIGURE 6**

MICHIGAN DEPT. OF STATE HIGHWAYS  
 STATEWIDE STUDIES UNIT  
 INCOME DATA  
 PERCENT OF FAMILIES WITH INCOME  
 UNDER \$3,000

DATA VALUE EXTREMES ARE 1.70 52.00

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL  
 (RANGE END INCLUDED IN HIGHEST LEVEL ONLY)

MINIMUM	2.25	3.51	4.78	6.05	7.32	8.58	9.85	11.12	12.38	13.65
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PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	10.85	4.64	4.26	4.44	4.48	4.68	4.15	6.05	9.47	14.11
--	-------	------	------	------	------	------	------	------	------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5	6	7	8	9	10
SYMBOLS	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
FREQ.	51	51	46	52	49	53	52	58	51	51

TIME .22, 10.43.

TIME .22, 30.42.

from the 1970 Census of Housing Detailed Housing Characteristics and also available on the socio-economic file. The data was gathered according to the number of families with no cars, 1 car, 2 cars, and 3 cars per household. According to the census, Michigan has 1,296,177 households with 1 car, 874,132 households with 2 cars, and 160,157 households with 3 cars or more. The mobility index reflects the average number of cars per households for each zone.

The National Personal Transportation Survey uses this variable to describe car-deficient households. Car deficiency is defined as households containing 4 or more members and having one car available. Other studies on modal choice, such as "The Automobile Use in Patterns in New York City,"<sup>2</sup> indicate longer distance travel in households of two cars and more. Data on availability per household provide insight for car deficiency, car saturation and modal split consideration. This same socio-economic variable could also be used as a transportation resource component.

Household size data is also a statistic similiar to auto ownership which could provide indications of trip-making among families in a zone. The mobility literature draws connections between higher trip-making and more household members per family. The older the household members, the more trips are needed. John B. Lansing's study on "Residential Location and Urban Mobility", reports the relationship between families with two or more adults and car ownership. A Study on Passenger Transportation<sup>3</sup> directed

attention to a decline in trip production per capita with each increase in family size. The study indicates a larger number of trips are generated by each increase in family size, but the rate of increase generally declines. The indicators system provides average household size per zone.

This variable would be very useful in studies in car ownership, trip generation and vacation trip studies. The household on trip making as well as other behavioral factors relevant to population movement. The analyst could attempt to explore alternatives optimizing this factor.

These socio-economic components of the mobility indicator system can all easily be manipulated for various research and statistical uses in mass transit behavioral surveys for future adaption of the Statewide Transportation Modeling System. The details of such a sample mobility indicator analysis appear in Appendix A.

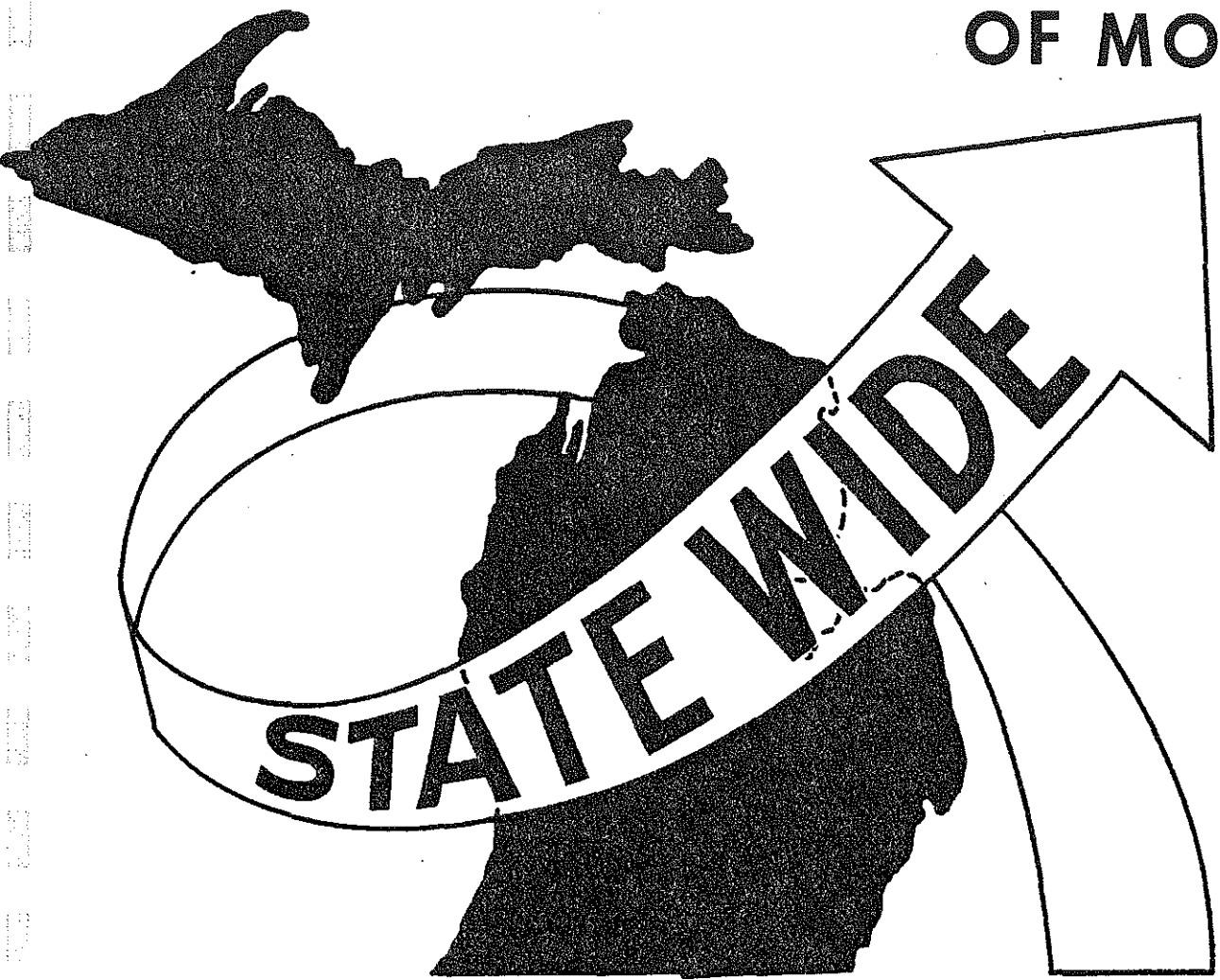
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<sup>1</sup>John B. Lansing, "Residential Location and Urban Mobility", Economic Forecasting, Highway Research Record, No. 106, 1965.

<sup>2</sup>"Automobile Use in Patterns in New York City and its Environs: Choice of Travel Mode and Considerations in Travel Forecasting," Highway Research Record, No. 369.

<sup>3</sup>F. Houstin Wynn and Herbert S. Levinson, Wilbur Smith & Associates, "Some Considerations in Appraising Bus Transit Potentials," Highway Research Record, Passenger Transportation, N. 197.

**TRANSPORTATION  
COMPONENTS  
OF MOBILITY**



# TRANSPORTATION COMPONENTS OF MOBILITY

The transportation resource component, which is the second major component of mobility, addresses the distribution of transportation facilities in the state. In this report, the transportation resource variables consider only those facilities in which all purposes of trips are generally made. Bicycling, trucking, water and recreational vehicles were excluded because they are primarily used for single-purpose travel (work, leisure, shopping, etc.). The transportation resource components can be used to provide a statewide view of the existing distribution of transportation resources. The system is designed to permit expansion of the index by adding selected transport facilities in the future.

The transportation resource component further allows any transportation agency the opportunity to more completely address the issues related to the mobility of all citizens in the state. While the socio-economic component mainly exhibits the status or conditions of people on statewide basis, the transportation resource component will portray deficiency or saturation of resources.

The following list is the set of transportation facilities used for the mobility analysis in this report.

- (1) Auto Ownership
- (2) Bus Terminals (Intercity)
- (3) Rail Terminals

(4) Airports

(5) Ports

In this section the first variable, dealing with auto ownership, will be treated differently than the others. This is due to the fact that in most analysis the total number of autos or the ratio of autos to persons is sufficient to reach a reliable decision. With the four types of transportation the analysis often required that management know the spatial relationship of these resources to the person being served.

The major factor groupings are composed of several descriptive variables which indicate mobility. Most of the data is available from the Public and Private Facility File.

Michigan's transportation resource is heavily dominated by the automobile. The 1970 count of vehicle registration was 5.2 million.

Auto ownership data from the Statewide Transportation Modeling System consists of the number and distribution of auto registration on a zone level. Using the socio-economic file to obtain population, auto-to-person ratio per zone has been obtained; this data is available in Appendix B.

The bus transportation facilities constitute a much smaller input to the entire system. The accessibility of citizens in Michigan to bus service will be documented in the final paragraphs of this section and also in Appendix B. There are presently 23 intra-urban bus operations in Michigan. The southeast Michigan

area has the highest use in public transportation, the total annual passenger ridership in 1970 being 123.5 million. Also included in this factor is data on some taxi services around the state.

The state's 12 inter-urban lines account for around 16 million vehicle miles. A listing of each station is available from the facility file.

The railroad terminal variable was included to provide a distribution of both past and present rail facilities which have the potential to be converted to passenger service. Presently there is only one operating passenger route with the possibility of service expansion during the next few years. A listing of all railroad stations inventoried is available for anyone wishing to complete stateion by station analysis.

As mentioned previously, the public facility file provides a listing of all county, private and public air fields. The index provides insight for future studies on commuter work-travel and modal split considerations.

The previous section investigated the socio-economic characteristics of individual zones. By contrast, the travel resource component of mobility deals with the degree of accessibility of each zone to various modes of transportation-- particularly in the case of air, rail, bus, and port-- and the availability of automobiles to the residents of a zone. One tool used to measure this accessibility is Proximity Analysis, a computer program developed in Michigan to measure the concentration of facilities



socio-economic characteristics about areas of interest.

As a by-product of the Statewide Traffic Forecasting Model, a matrix is created which gives the driving time from each zone to every other zone along the shortest-time path, using speeds on highway links derived from MDSH&T speed studies. The times are calculated between zone "centroids", or approximate centers of population. With this information, one can accumulate the number of bus terminals, or airports, or rail terminals within an hour's driving time of each zone of Michigan.

Two facts should be noted here. First, zone-to-zone travel times do not include so-called "terminal times." Terminal time is the average additional time needed to reach one's ultimate destination once the zone centroid is reached. For example, a person driving to Detroit Metropolitan Airport must spend extra minutes in finding a parking place and walking to the terminal.

Second, the process does not subdivide zones. If a zone contains three bus stations and the zone centroid happens to lie within 30 minutes' driving time of zone 100, then all three stations are assumed to lie within 30 minutes of zone 100.

For example, consider the following schematic of some of the shortest-time paths from zone 344 in Muskegon County:

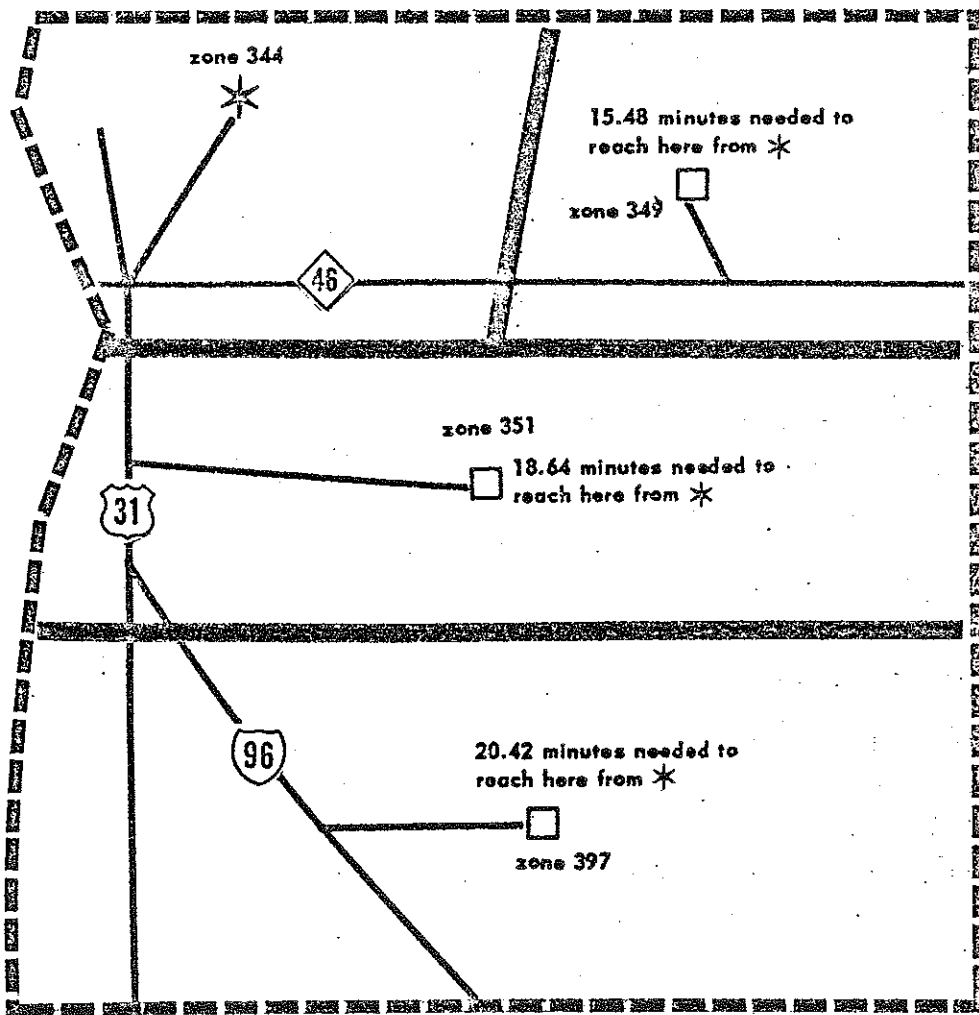


FIGURE 7: PORTION OF TREE

The boxes denote centroids, and the links connecting centroids to the highway system are called "centroid links". Centroid links need not physically exist as highways, but the time and distance assigned to each reflects the average time and distance needed to access the highway system from various points within that zone.

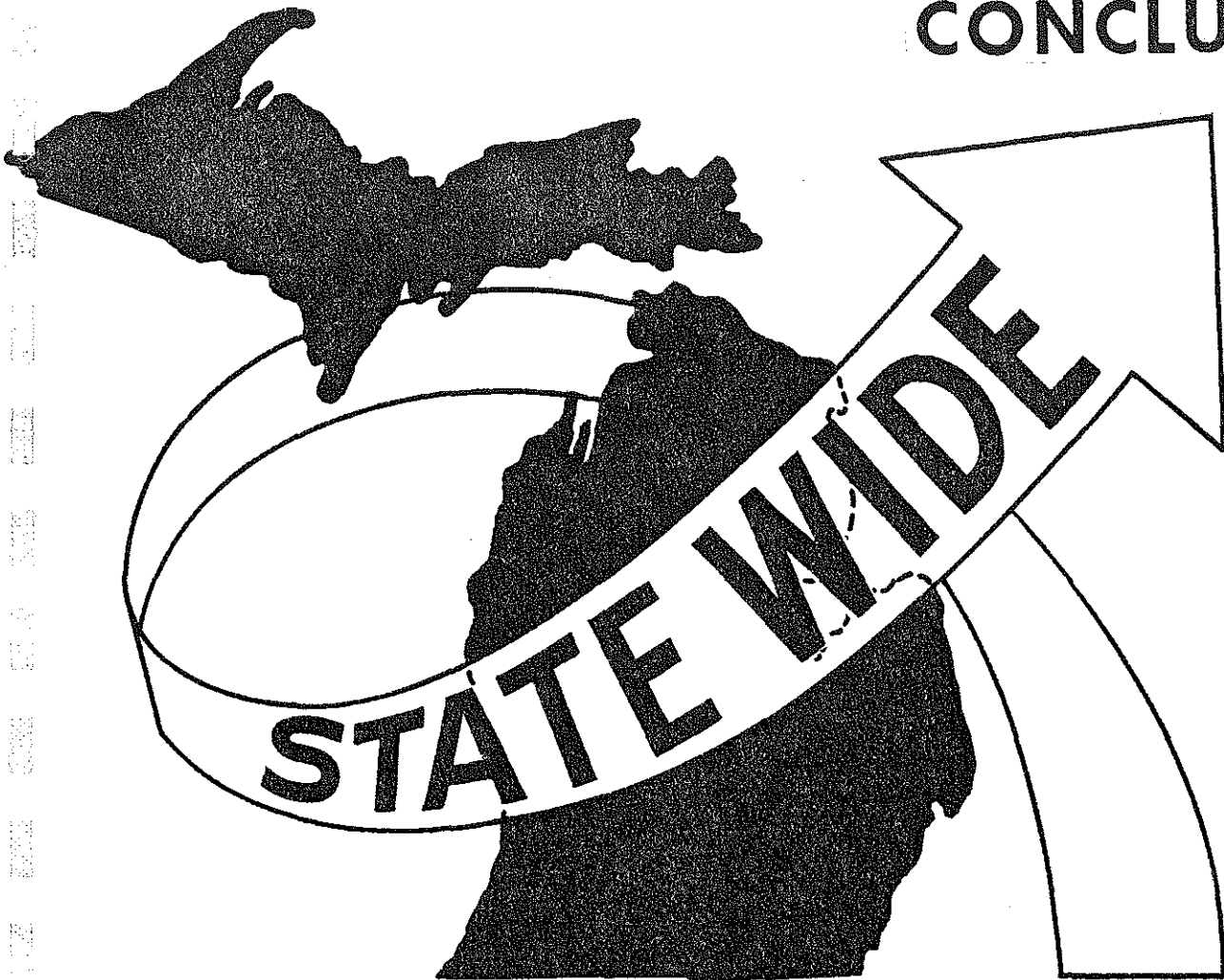
If a user desired to know how many intercity bus stops, say, are within twenty minutes' driving time of zone 344, all the stops within zones 349 and 351 would be accumulated, regardless of their geographical distribution within the zones. By the same rule,

none of the stops in zone 397 would be accumulated, because the centroid of zone 397 lies more than twenty minutes away from zone 344. This simplifying rule has apparently not significantly detracted from the accuracy of the results of the Proximity Analysis process in many interdepartmental applications. If extremely delicate calculations must be made, it is possible to create a "zone" at each facility of a given set. In that case, no approximation or simplification need be made.

Finally, it is possible to test the effects of alternative transportation plans on the degree of accessibility of various socio-economic groups to public transportation. If desired, distance or driving cost can be used as a measure of zone separation instead of driving time.

In this analysis, the program was instructed to scan sixty minutes around each zone of Michigan and to determine the number of bus stations, airports, rail stations, and ports which occur within that radius. In addition, the number of households having at least one automobile. The results for each zone are printed in appendix B. It should be mentioned that a user may elect to investigate driving-time bands other than 60 minutes; the program allows up to ten time bands to be specified.

# CONCLUSION

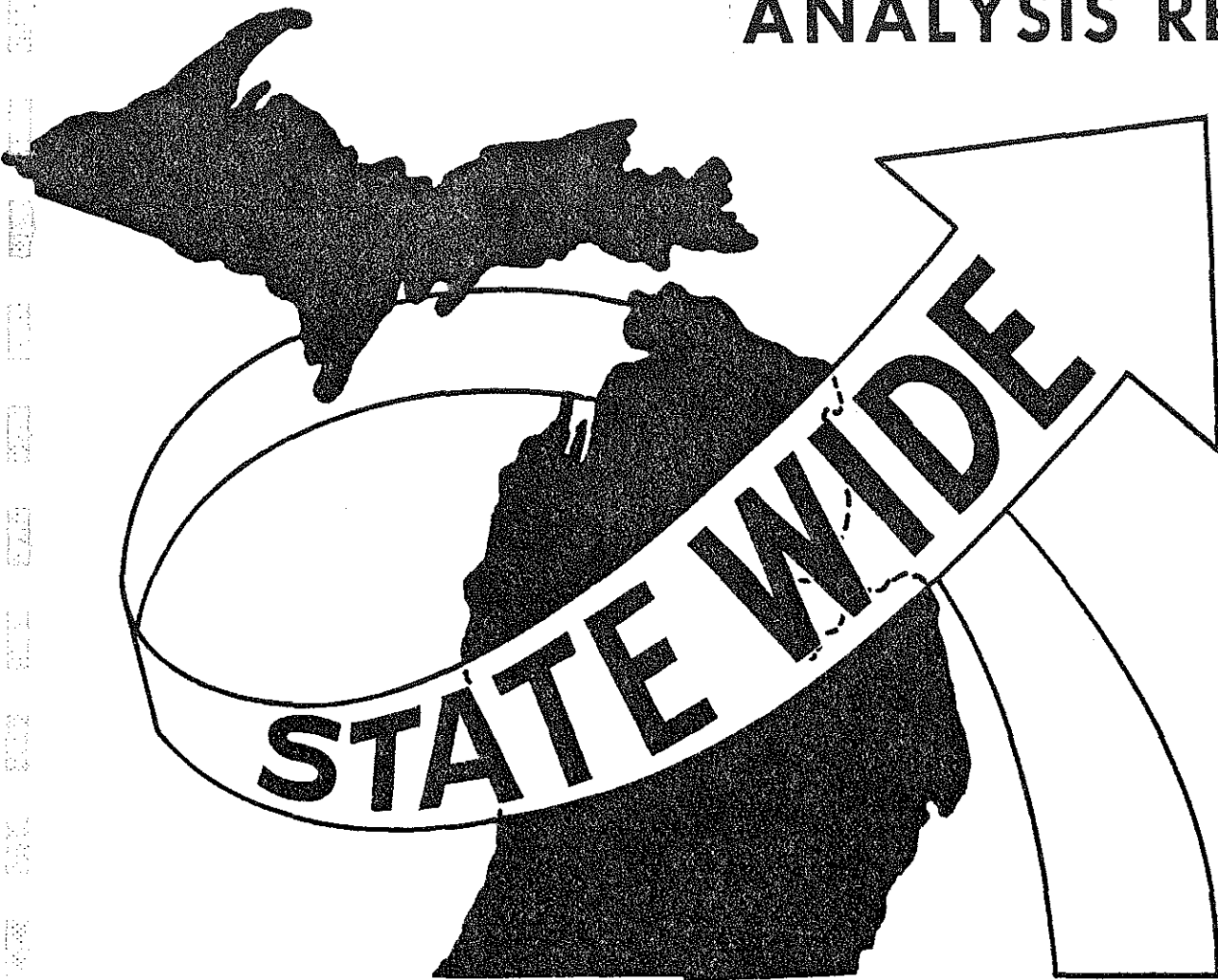


## CONCLUSION

Mobility indicators can be of considerable value in assessing current and projected mobility conditions, as well as the efficiency and effectiveness of public agency plans and programs. One major use lies in the possible development of a regularly-published account showing where accessibility to opportunities has progressed or decreased as the result of capital spending. Another lies in strengthening of the planning process itself by being able to monitor the impact on mobility. A third area of possible application involves the more rigorous evaluation of plans and programs of appropriate mobility objectives. Most of these uses are already possible in conjunction with other computer analysis the Statewide Transportation Modeling System.

Finally, the application of the Statewide Transportation Modeling System proximity analysis process would allow any state agency the ability to determine the accessibility to employment, education or recreation opportunities by mode. This could lead to the effective evaluation of statewide or region transportation plan and their impact on mobility.

**APPENDIX A:  
SOCIO-ECONOMIC COMPONENT  
ANALYSIS RESULTS**



ZONE	FAMILIES POVERTY LEVEL	% OF ZONE POP.	NO. HANDI- CAPPED PEOPLE	% OF ZONE POP.
1	365	6.2	131	2.2
2	78	6.3	59	4.8
3	102	2.7	105	2.8
4	114	5.9	28	1.5
5	84	3.6	71	3.0
6	19	3.8	45	9.0
7	272	2.5	323	2.9
8	339	3.9	409	4.7
9	424	3.0	417	3.0
10	224	2.6	261	2.8
11	135	2.6	168	3.2
12	358	2.4	364	2.4
13	340	2.5	390	2.8
14	262	2.5	154	1.4
15	281	4.5	116	1.8
16	101	2.7	106	2.8
17	110	3.0	104	2.8
18	158	3.0	131	2.5
19	100	2.8	100	2.8
20	113	4.2	76	2.8
21	177	3.7	136	2.8
22	165	3.7	95	2.2
23	108	4.5	23	1.0
24	31	3.1	0	0.0
25	169	2.6	133	2.0
26	317	2.8	686	6.0
27	253	2.3	486	4.4
28	190	2.0	387	4.2
29	1199	2.2	1508	2.8
30	194	1.2	466	2.9
31	320	1.5	551	2.6
32	260	1.8	492	3.3
33	220	2.1	207	2.0
34	78	3.0	115	4.5
35	131	3.3	179	4.5
36	87	4.2	62	3.0
37	1109	4.0	862	3.1
38	298	2.1	569	3.9
39	947	2.8	802	2.4
40	298	2.2	431	3.2
41	209	3.3	71	1.1
42	218	2.3	252	2.7
43	320	2.6	296	2.4
44	360	2.3	346	2.2
45	339	2.6	416	3.2

46	277	2.1	383	2.9
47	69	1.5	196	4.2
48	251	2.8	412	4.5
49	101	2.4	90	2.1
50	167	2.9	152	2.6
51	59	1.4	142	3.3
52	135	3.2	105	2.5
53	151	3.5	64	1.5
54	53	0.9	60	1.0
55	1469	3.4	1541	3.6
56	107	2.5	158	3.8
57	165	2.1	290	3.8
58	153	0.7	830	3.8
59	100	0.9	191	1.8
60	112	1.7	66	1.0
61	86	1.7	192	3.8
62	222	2.0	531	4.9
63	148	1.8	319	3.8
64	27	1.0	105	4.1
65	58	3.5	42	2.5
66	318	2.6	188	1.6
67	128	1.8	179	2.5
68	156	2.4	272	4.1
69	305	2.7	340	3.1
70	137	1.9	115	1.6
71	131	1.9	112	1.7
72	74	2.6	143	5.0
73	133	4.5	21	0.7
74	120	2.1	125	2.2
75	80	2.3	127	3.6
76	98	6.1	41	2.5
77	85	2.3	120	3.3
78	245	3.2	275	3.6
79	173	2.9	192	3.2
80	203	4.6	213	4.8
81	192	4.6	72	1.7
82	97	4.8	0	0.0
83	608	3.5	548	3.2
84	115	4.6	81	3.2
85	37	3.8	0	0.0
86	31	2.0	44	2.8
87	298	3.7	83	1.0
88	134	6.1	19	0.9
89	141	2.7	90	1.7
90	307	5.2	130	2.2
91	268	4.9	213	3.9
92	68	1.0	158	2.4
93	45	0.9	124	2.6
94	105	2.6	79	2.0
95	68	1.4	81	1.7
96	115	2.9	153	3.8
97	87	1.5	179	3.0
98	55	1.6	81	2.3
99	55	1.9	93	3.1
100	67	0.6	311	2.6



101	70	3.2	37	1.7
102	182	4.2	236	5.5
103	361	2.3	392	2.5
104	88	2.9	19	0.6
105	77	3.9	28	1.4
106	272	2.4	159	1.4
107	72	4.7	48	3.1
108	139	5.0	156	5.6
109	362	2.6	425	3.0
110	66	2.0	77	2.3
111	81	4.4	40	2.2
112	179	3.9	97	2.1
113	148	1.8	312	3.7
114	89	1.4	249	4.0
115	111	2.0	210	3.8
116	138	3.8	34	0.9
117	116	0.7	491	2.8
118	66	1.9	83	2.4
119	61	1.4	124	2.8
120	74	2.1	109	3.1
121	54	1.2	80	1.8
122	76	1.7	151	3.4
123	91	1.5	122	2.0
124	137	2.2	181	2.9
125	137	4.5	70	2.3
126	161	3.4	264	5.6
127	112	2.6	63	1.5
128	5046	2.6	5637	2.9
129	165	1.4	153	1.3
130	682	1.4	1887	4.0
131	340	0.8	1017	2.5
132	149	0.6	669	2.7
133	453	1.4	1290	4.0
134	101	0.7	336	2.5
135	65	1.2	197	3.6
136	415	1.6	814	3.2
137	75	0.8	229	2.5
138	141	2.2	210	3.2
139	144	1.3	222	1.9
140	212	1.1	697	3.5
141	35	1.1	123	4.0
142	28	1.2	22	1.0
143	193	4.0	106	2.2
144	107	3.9	54	1.9
145	105	2.9	129	3.6
146	386	3.5	462	4.2
147	126	3.9	130	4.0
148	18	2.9	18	2.9
149	39	9.5	0	0.0
150	266	4.9	241	4.4
151	388	1.9	380	1.8
152	134	1.4	454	4.8
153	171	3.3	326	6.2
154	72	5.7	0	0.0
155	61	2.4	102	4.1
156	297	2.1	397	2.9

157	293	3.2	345	3.8
158	199	2.4	216	2.6
159	155	2.9	203	3.8
160	80	2.9	110	4.0
161	135	1.7	241	3.1
162	57	1.4	123	2.9
163	127	3.7	135	3.9
164	130	2.9	200	4.5
165	122	3.0	211	5.2
166	116	3.0	260	6.7
167	140	3.1	133	3.0
168	132	2.7	206	4.1
169	428	3.9	168	1.5
170	923	7.5	153	1.3
171	158	6.0	46	1.7
172	54	4.8	136	12.2
173	171	10.8	123	7.7
174	324	12.6	60	2.3
175	266	7.4	72	2.0
176	85	2.8	33	1.1
177	337	4.9	399	5.7
178	215	5.1	181	4.3
179	237	4.1	115	2.0
180	126	3.3	63	1.6
181	281	4.1	154	2.3
182	207	5.9	156	4.5
183	3304	1.7	6371	3.3
184	207	0.9	455	1.9
185	166	1.2	465	3.4
186	117	1.2	304	3.1
187	150	2.0	283	3.7
188	118	3.0	106	2.7
189	84	3.6	108	4.7
190	54	1.3	73	1.8
191	95	1.5	261	4.0
192	101	1.6	205	3.2
193	115	2.3	170	3.5
194	144	3.1	115	2.5
195	54	2.1	134	5.2
196	82	1.7	77	1.6
197	83	2.3	225	6.3
198	109	2.7	100	2.5
199	78	1.2	166	2.6
200	144	1.7	257	3.0
201	88	2.5	34	1.0
202	188	3.6	204	3.9
203	222	5.0	90	2.0
204	301	2.6	253	2.2
205	163	4.0	158	3.9
206	112	4.2	44	1.6
207	124	3.3	118	3.1
208	016	2.1	0	0.0
209	94	3.7	103	4.1
210	245	1.2	217	1.1
211	163	3.0	60	1.1
212	139	4.1	41	1.2

213	148	2.8	134	2.5
214	138	2.5	113	2.1
215	126	2.8	58	1.3
216	1245	2.7	1491	3.3
217	238	1.1	527	2.4
218	139	1.2	246	2.1
219	277	1.4	364	1.9
220	295	1.7	625	3.7
221	105	1.5	400	5.5
222	91	1.4	165	2.5
223	161	3.3	111	2.2
224	74	2.0	151	4.0
225	100	1.9	146	2.7
226	1939	1.8	2546	2.3
227	245	0.7	577	1.7
228	158	1.5	291	2.8
229	74	1.8	88	2.2
230	251	1.6	646	4.0
231	65	0.7	233	2.7
232	62	1.6	150	3.8
233	259	1.7	689	4.6
234	239	5.8	65	1.6
235	70	3.8	46	2.5
236	5002	2.4	5558	2.6
237	50	0.5	372	3.9
238	325	1.1	778	2.7
239	212	1.4	573	3.9
240	64	1.2	282	5.4
241	190	1.2	401	2.4
242	36	0.5	274	3.9
243	140	2.5	204	3.7
244	100	1.5	273	4.2
245	237	2.8	144	1.7
246	99	0.9	454	3.9
247	163	0.8	469	2.3
248	800	1.2	1987	3.0
249	190	8.1	55	2.3
250	229	5.7	160	4.0
251	106	6.8	61	3.9
252	104	1.7	167	2.7
253	138	2.5	271	4.8
254	195	3.8	103	2.0
255	131	1.8	245	3.3
256	119	1.2	116	1.2
257	152	1.7	318	3.6
258	209	2.2	420	4.4
259	120	3.1	145	3.7
260	68	3.1	43	2.0
261	152	3.2	101	2.1
262	358	1.8	487	2.4
263	89	1.6	282	5.2
264	190	1.8	277	2.7
265	97	2.2	90	2.0
266	204	1.1	563	3.1
267	81	1.6	149	2.9
268	187	2.5	194	2.6

269	197	3.8	259	5.0
270	134	2.7	38	0.8
271	119	1.2	249	2.4
272	150	2.2	305	4.4
273	173	1.7	330	3.2
274	119	0.9	673	5.1
275	154	1.2	404	3.1
276	51	1.0	161	3.0
277	100	2.8	138	3.9
278	38	3.9	0	0.0
279	34	1.5	0	0.0
280	87	2.6	105	3.1
281	90	3.2	93	3.3
282	54	4.0	21	1.5
283	106	5.0	65	3.1
284	1106	1.3	2455	2.8
285	1770	0.9	5255	2.5
286	1518	0.8	5136	2.7
287	544	0.6	2016	2.1
288	285	1.5	510	2.6
289	218	1.5	470	3.2
290	280	2.0	270	2.0
291	420	3.1	222	1.7
292	68	5.4	39	3.1
293	108	6.4	0	0.0
294	124	3.3	129	3.5
295	453	2.1	526	2.4
296	244	2.6	259	2.8
297	81	1.8	136	3.1
298	254	2.9	201	2.3
299	289	2.1	415	3.1
300	38	1.1	138	4.0
301	104	3.3	76	2.4
302	249	2.8	224	2.5
303	127	3.4	133	3.6
304	168	3.4	80	1.6
305	109	2.2	174	3.6
306	264	2.2	176	1.5
307	154	2.8	203	3.7
308	203	6.7	104	3.4
309	178	4.7	171	4.5
310	84	2.2	124	3.3
311	311	2.9	204	1.9
312	192	5.0	84	2.2
313	243	3.5	134	1.9
314	196	6.4	43	1.4
315	316	0.9	760	2.2
316	140	2.6	142	2.6
317	129	1.3	233	2.3
318	114	1.9	219	3.7
319	192	2.5	219	2.9
320	205	5.7	154	4.3
321	62	4.2	35	2.4
322	107	5.2	78	3.8
323	434	1.8	710	3.0

324	164	0.8	426	2.0
325	91	1.7	202	3.7
326	94	1.9	176	3.6
327	130	2.2	148	2.5
328	95	1.4	217	3.1
329	427	1.8	937	3.9
330	128	1.8	156	2.2
331	81	2.0	80	1.9
332	66	1.5	118	2.6
333	62	1.1	24	0.4
334	87	2.1	94	2.3
335	179	2.4	128	1.7
336	209	3.1	276	4.1
337	268	4.0	228	3.4
338	208	2.7	353	4.6
339	201	3.5	115	2.0
340	118	2.2	194	3.7
341	279	5.3	263	5.0
342	2125	3.2	3081	4.7
343	52	1.0	272	5.0
344	267	2.0	396	2.9
345	294	1.1	853	3.2
346	69	4.6	21	1.4
347	85	2.6	45	1.4
348	191	2.8	315	4.6
349	147	2.1	247	3.6
350	197	1.7	320	2.7
351	226	1.6	451	3.1
352	30	0.9	130	3.8
353	180	4.7	111	2.9
354	257	4.7	161	3.0
355	213	4.0	66	1.3
356	110	2.2	124	2.5
357	167	3.3	162	3.2
358	2360	2.8	2435	2.9
359	387	0.4	2303	2.6
360	2639	1.0	7501	2.7
361	269	0.4	1547	2.1
362	366	0.6	1250	2.0
363	211	1.0	560	2.7
364	183	0.9	592	2.8
365	333	1.1	876	2.9
366	197	0.6	520	1.6
367	286	0.7	843	2.1
368	302	1.0	774	2.5
369	164	1.2	187	1.4
370	624	1.0	1611	2.6
371	219	2.2	223	2.3
372	74	1.1	132	1.9
373	166	0.7	688	3.1
374	155	0.7	753	3.4
375	141	1.2	241	2.1
376	172	3.7	151	3.3
377	389	5.7	318	4.7
378	182	3.9	125	2.7
379	76	4.0	101	5.4

380	253	4.6	111	2.0
381	221	6.7	20	0.6
382	201	6.6	98	3.2
383	66	1.7	101	2.6
384	23	1.6	27	1.9
385	149	5.5	75	2.8
386	26	1.1	289	11.7
387	139	2.9	77	1.6
388	162	4.5	194	5.4
389	150	5.0	11	0.4
390	161	4.7	74	2.2
391	257	5.4	275	5.8
392	38	1.3	103	3.4
393	81	2.0	28	0.7
394	120	3.6	85	2.5
395	420	1.6	584	2.2
396	135	1.4	306	3.2
397	132	1.9	180	2.6
398	213	0.9	536	2.2
399	288	1.3	966	4.4
400	121	1.1	347	3.3
401	113	1.7	44	0.7
402	196	1.1	604	3.4
403	123	1.6	98	1.3
404	225	3.3	138	2.0
405	174	5.1	119	3.5
406	110	4.2	59	2.2
407	315	4.9	252	3.9
408	100	2.9	48	1.4
409	2698	2.9	2753	3.0
410	22	0.5	121	3.0
411	249	0.7	1126	2.9
412	261	1.6	541	3.4
413	118	1.4	257	3.0
414	18	0.4	113	2.4
415	150	1.2	308	2.4
416	150	1.9	192	2.5
417	239	3.1	213	2.7
418	197	4.1	213	4.4
419	51	2.8	72	4.0
420	134	1.7	383	4.9
421	118	2.1	165	2.9
422	132	1.7	287	3.7
423	188	2.9	200	3.1
424	93	2.1	174	3.9
425	234	3.6	263	4.0
426	237	4.6	260	5.0
427	173	4.6	291	7.8
428	113	2.5	122	2.7
429	117	2.9	119	3.0
430	163	3.8	128	3.0
431	98	6.1	0	0.0
432	84	3.6	79	3.4
433	305	1.8	591	3.4
434	127	3.0	162	3.9
435	147	1.4	319	3.1

436	128	1.8	130	1.8
437	129	2.0	98	1.6
438	108	2.3	180	3.9
439	83	2.9	172	6.1
440	53	1.4	76	2.0
441	148	2.2	422	6.2
442	1237	2.2	1611	2.9
443	248	1.7	329	2.2
444	460	2.8	391	2.3
445	121	2.0	191	3.2
446	144	2.9	112	2.2
447	119	2.0	181	3.1
448	215	6.3	61	1.8
449	107	2.3	204	4.5
450	69	2.1	42	1.3
451	101	3.1	58	1.8
452	197	1.8	450	4.2
453	83	1.6	184	3.6
454	109	1.7	336	5.3
455	142	2.0	136	2.0
456	156	5.2	143	4.8
457	98	2.4	64	1.5
458	62	1.7	197	5.2
459	170	2.3	177	2.4
460	111	2.2	89	1.8
461	93	2.2	207	4.9
462	115	1.9	145	2.4
463	193	5.8	192	5.8
464	150	3.4	44	1.0
465	65	1.4	40	0.9
466	148	3.4	104	2.4
467	38	1.2	82	2.7
468	162	2.6	238	3.8
469	47	1.7	131	4.7
470	104	2.4	23	0.5
471	256	4.0	151	2.3
472	297	2.9	276	2.7
473	334	3.9	162	1.9
474	328	4.0	306	3.8
475	107	2.4	161	3.6
476	204	3.4	120	2.0
477	137	4.1	177	5.3
478	222	2.5	394	4.4
479	969	1.0	1868	1.9
480	42	1.2	97	2.7
481	73	0.9	125	1.5
482	70	0.8	271	3.0
483	481	1.6	675	2.3
484	416	1.3	1090	3.3
485	95	1.7	162	3.0
486	187	1.3	203	1.4
487	83	1.1	104	1.3
488	54	1.7	21	0.7
489	41	1.5	43	1.6
490	87	1.3	100	1.5
491	67	1.8	67	1.8

492	113	1.6	330	4.7
493	14785	3.0	15886	3.3
494	1702	0.9	4961	2.7
495	18117	3.0	19693	3.3
496	14408	3.0	15795	3.3
497	2758	1.3	6414	3.0
498	743	1.1	2106	3.0
499	600	0.8	1536	2.1
500	765	1.6	1459	3.1
501	2050	1.0	5361	2.7
502	637	0.4	3189	2.1
503	406	0.5	1712	2.2
504	444	0.6	1653	2.3
505	259	2.6	283	2.8
506	208	4.1	47	0.9
507	102	5.3	21	1.1
508	170	6.3	0	0.0



ZONE	65 & OVER	% of ZONE POP.	15 & OVER	% of ZONE POP.
1	964	16.4	1679	28.6
2	251	20.3	373	30.2
3	437	11.5	1214	32.0
4	167	8.7	637	33.2
5	250	10.6	723	30.7
6	95	19.0	149	29.9
7	1171	10.7	3718	33.9
8	909	10.5	3164	36.4
9	1260	8.9	4770	33.8
10	751	8.1	3241	34.8
11	696	13.2	1624	30.9
12	1209	8.1	5703	38.3
13	1398	10.1	4507	32.6
14	650	6.1	4191	39.4
15	559	8.9	2474	39.4
16	372	9.9	1393	36.9
17	600	16.4	1096	30.0
18	780	15.0	1662	32.1
19	471	13.1	1213	33.7
20	493	18.2	770	28.4
21	431	8.9	1699	35.2
22	567	12.9	1356	30.8
23	279	11.7	838	35.0
24	157	15.8	270	27.2
25	944	14.5	1892	29.1
26	1259	11.0	3854	33.8
27	928	8.5	3638	33.1
28	714	7.7	3212	34.6
29	5669	10.4	17242	31.7
30	858	5.4	5659	35.4
31	1099	5.1	8102	37.5
32	1116	7.6	5255	35.6
33	749	7.3	3958	38.5
34	460	17.8	755	29.3
35	595	15.1	1227	31.1
36	177	8.5	686	33.1
37	3280	11.9	8695	31.6
38	1182	8.2	4358	30.1
39	2640	7.9	11400	34.1
40	1187	8.8	4459	33.2
41	665	10.6	2143	34.0
42	762	8.1	3216	34.0
43	1658	13.5	3757	30.5
44	1027	6.4	5694	35.7
45	1510	11.6	3766	29.0
46	806	6.0	4604	34.3
47	441	9.5	1438	31.0

48	1127	12.4	2859	31.4
49	388	9.2	1395	33.1
50	765	13.1	1932	33.1
51	433	10.0	1376	31.8
52	356	8.4	1290	30.3
53	484	11.2	1489	34.3
54	341	5.8	1790	30.6
55	5493	12.8	12710	29.6
56	351	8.3	1480	35.2
57	604	7.8	2589	33.6
58	1437	6.6	7039	32.3
59	817	7.6	3106	28.7
60	671	10.0	2335	34.8
61	357	7.0	1700	33.4
62	865	8.0	3337	30.8
63	545	6.6	2688	32.4
64	136	5.3	986	38.2
65	165	10.0	624	37.9
66	1039	8.6	3529	29.1
67	833	11.5	2262	31.2
68	687	10.4	2088	31.7
69	1051	9.5	3613	32.5
70	515	7.1	2399	33.2
71	543	8.0	2233	33.0
72	407	14.1	922	32.0
73	461	15.6	860	29.2
74	555	9.6	1763	30.4
75	371	10.6	1110	31.6
76	187	11.6	618	38.3
77	478	13.0	1265	34.3
78	845	10.9	2569	33.2
79	675	11.3	2025	34.0
80	528	11.9	1439	32.4
81	539	13.0	1395	33.6
82	213	10.5	738	36.5
83	1775	10.3	5323	31.0
84	228	9.1	846	33.7
85	100	10.4	269	27.8
86	119	7.6	457	29.2
87	249	3.1	3148	39.3
88	241	10.9	825	37.5
89	538	10.1	1775	33.5
90	893	15.0	1947	32.7
91	769	14.1	1588	29.2
92	711	10.7	2284	34.2
93	225	4.7	1912	39.6
94	293	7.4	1640	41.1
95	325	6.7	2090	43.0
96	322	8.1	1440	36.1
97	399	6.7	2267	38.0
98	242	6.9	1363	38.9
99	303	10.3	988	33.4
100	550	4.7	4333	36.9
101	263	12.0	764	34.9
102	441	10.3	1408	32.8

103	1964	12.8	4767	31.0
104	297	9.7	1104	36.2
105	264	13.3	604	30.5
106	1043	9.3	4188	37.4
107	268	17.6	448	29.4
108	320	11.4	957	34.2
109	2373	17.0	4015	28.7
110	433	12.8	1128	33.4
111	259	14.2	559	30.6
112	681	14.9	1347	29.5
113	826	9.9	2758	33.0
114	404	6.5	2307	37.0
115	399	7.1	1752	31.4
116	372	10.1	1308	35.7
117	633	3.7	6559	37.9
118	301	8.6	1254	35.7
119	330	7.5	1511	34.5
120	331	9.5	1271	36.6
121	258	5.7	1523	33.4
122	502	11.2	1561	34.7
123	548	9.1	1943	32.2
124	906	14.4	1882	30.0
125	353	11.6	1071	35.3
126	665	14.1	1403	29.9
127	301	7.0	1664	38.5
128	16966	8.8	65125	33.7
129	667	5.7	4393	37.5
130	2231	4.7	18527	39.2
131	1780	4.4	14814	36.9
132	892	3.7	9090	37.3
133	1653	5.1	11791	36.1
134	573	4.2	5129	38.0
135	290	5.3	2039	37.1
136	1200	4.7	10067	39.4
137	548	5.9	3485	37.5
138	407	6.3	2548	39.4
139	535	4.7	4516	39.4
140	1448	7.2	7051	35.2
141	187	6.1	1126	36.5
142	271	12.0	727	32.2
143	725	15.1	1473	30.6
144	440	15.9	763	27.5
145	303	8.3	1347	37.1
146	1914	17.5	2931	26.7
147	546	17.0	862	26.8
148	94	15.3	151	24.6
149	88	21.4	112	27.3
150	731	13.4	1593	29.1
151	2661	12.9	5743	27.8
152	719	7.6	3389	35.6
153	482	9.2	1711	32.6
154	139	11.0	484	38.4
155	254	10.2	833	33.5
156	1583	11.4	4164	30.0

157	872	9.6	3152	34.6
158	674	8.2	2985	36.4
159	536	10.1	1973	37.2
160	314	11.4	918	33.4
161	937	12.1	1998	25.9
162	477	11.4	1336	31.8
163	375	10.8	1255	36.3
164	537	12.2	1429	32.4
165	488	12.0	1271	31.3
166	475	12.2	1242	32.0
167	408	9.2	1574	35.3
168	490	9.9	1756	35.4
169	1286	11.8	2215	20.3
170	2008	16.4	3432	28.1
171	396	15.0	708	26.9
172	144	12.9	340	30.4
173	261	16.4	440	27.7
174	648	25.1	1614	62.6
175	456	12.6	1090	30.2
176	377	12.6	1016	33.9
177	811	11.7	2560	36.9
178	464	11.1	1421	34.0
179	688	11.9	1842	31.9
180	582	15.0	1222	31.5
181	927	13.6	2222	32.5
182	500	14.4	1006	28.9
183	13368	7.0	53171	27.9
184	1138	4.8	6587	27.7
185	722	5.3	4761	34.7
186	711	7.1	3390	34.1
187	510	6.7	2911	38.3
188	331	8.3	1472	36.9
189	186	8.0	773	33.4
190	300	7.3	1635	40.0
191	562	8.6	2316	35.5
192	883	13.9	2074	32.6
193	459	9.3	1508	30.6
194	543	11.8	1575	34.1
195	190	7.4	956	37.3
196	298	6.2	1105	23.1
197	289	8.1	1227	34.3
198	475	11.7	1561	38.6
199	481	7.4	2533	39.1
200	817	9.6	2938	34.6
201	595	16.7	1089	30.5
202	728	13.9	1572	30.0
203	670	15.2	1365	31.0
204	432	3.7	4315	36.9
205	759	18.6	978	24.0
206	432	16.1	766	28.6
207	702	18.7	890	23.0
208	62	8.1	177	23.0
209	333	13.2	710	28.0
210	1106	5.4	3905	19.0

211	370	6.9	2074	38.7
212	313	9.1	1245	36.3
213	427	8.0	2081	39.0
214	278	5.1	1706	31.4
215	378	8.3	1676	37.0
216	5968	13.1	14124	31.1
217	1666	7.7	7077	32.5
218	890	7.6	3938	33.7
219	1065	5.4	5035	25.6
220	1352	8.0	5752	34.0
221	592	8.2	2390	33.1
222	445	6.9	2204	34.1
223	454	9.2	1794	36.2
224	285	7.6	1413	37.4
225	409	7.6	1898	35.3
226	10466	9.5	27835	25.3
227	1160	3.5	12943	38.7
228	678	6.6	3567	34.7
229	326	8.1	1344	33.3
230	1088	6.8	5647	35.3
231	530	6.1	3001	34.6
232	273	6.9	1401	35.3
233	1170	7.8	5162	34.3
234	526	12.8	1391	33.7
235	244	13.1	361	19.4
236	25177	12.0	63990	30.5
237	548	5.7	3435	35.9
238	1599	5.6	10784	38.1
239	948	6.5	5639	38.5
240	465	8.9	1847	35.4
241	1118	6.8	5875	35.9
242	518	7.3	2423	34.1
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250	846	21.0	1156	28.7
251	289	18.6	470	30.3
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253	420	7.5	2188	38.9
254	497	9.6	1922	37.2
255	481	6.5	2944	39.6
256	524	5.4	3102	32.1
257	567	6.5	3364	38.5
258	854	9.0	3363	35.6
259	520	13.2	1285	32.7
260	302	13.8	673	30.7
261	501	10.5	1576	33.2
262	2174	10.7	5778	28.3
263	348	6.4	1956	36.2
264	1133	11.0	3302	31.9
265	342	7.6	1564	34.7

266	1338	7.4	6258	34.7
267	491	9.5	1738	33.6
268	512	6.8	2711	35.8
269	567	10.9	1689	32.4
270	543	10.9	1477	29.5
271	958	9.4	3442	33.6
272	715	10.3	2566	36.9
273	652	6.4	3803	37.1
274	749	5.7	4713	36.0
275	1049	8.0	4542	34.6
276	419	7.9	1966	37.1
277	395	11.0	1178	33.0
278	119	12.4	283	29.4
279	412	18.3	454	20.2
280	376	11.1	1206	35.7
281	321	11.5	975	34.9
282	180	13.2	490	35.8
283	298	14.0	613	28.9
284	4747	5.4	31844	36.1
285	11602	5.6	72398	35.0
286	7535	4.0	71184	37.5
287	2628	2.8	38674	40.9
288	1154	5.9	7193	37.1
289	1104	7.6	5273	36.2
290	1213	8.9	4949	36.2
291	1686	12.6	4278	31.9
292	216	17.2	396	31.5
293	312	18.4	529	31.2
294	506	13.6	1176	31.7
295	1791	8.2	5354	24.4
296	432	4.6	2988	32.0
297	288	6.5	1503	33.9
298	308	3.5	3687	41.7
299	1773	13.1	3712	27.5
300	270	7.8	1211	35.0
301	327	10.4	949	30.3
302	1375	15.2	2571	28.5
303	516	14.0	1243	33.7
304	599	12.0	1557	31.1
305	475	9.7	1617	33.0
306	740	6.2	1947	16.2
307	356	6.6	1869	34.5
308	517	17.0	911	30.0
309	501	13.2	1350	35.5
310	335	8.9	1148	30.6
311	1507	14.0	3237	30.1
312	506	13.2	1282	33.4
313	765	11.0	2331	33.5
314	431	14.1	1043	34.2
315	1762	5.0	12687	36.0
316	274	5.1	2123	39.6
317	501	5.0	3738	37.3
318	228	3.9	2425	41.1
319	597	7.9	2659	35.2
320	390	10.9	1152	32.2

321	168	11.3	482	32.4
322	363	17.6	712	34.6
323	2598	10.9	7367	30.8
324	1117	5.4	7984	38.3
325	374	6.8	2099	38.1
326	398	8.1	1650	33.6
327	395	6.7	2221	37.6
328	557	8.0	2629	37.7
329	1458	6.1	8631	35.9
330	551	7.6	2769	38.3
331	287	6.9	1619	39.0
332	348	7.8	1691	37.9
333	352	6.1	2123	36.6
334	261	6.4	1553	38.3
335	931	12.4	2267	30.3
336	695	10.3	2233	33.0
337	621	9.2	2444	36.4
338	758	9.8	2604	33.8
339	666	11.7	1898	33.4
340	751	14.2	1636	30.9
341	829	15.8	1601	30.5
342	7956	12.0	20883	31.5
343	271	5.0	1883	34.7
344	828	6.1	5059	37.0
345	1561	5.9	9528	35.8
346	156	10.5	807	54.3
347	237	7.3	1220	37.5
348	353	5.1	2593	37.6
349	293	4.3	2796	40.8
350	1022	8.6	4182	35.3
351	776	5.4	5648	39.1
352	411	11.9	1124	32.4
353	516	13.5	1314	34.5
354	610	11.3	1919	35.4
355	511	9.7	1953	37.1
356	758	15.4	1565	31.8
357	456	8.9	1841	36.1
358	7355	8.6	28864	33.8
359	6071	6.9	27608	31.4
360	21090	7.7	86283	31.4
361	5478	7.5	23315	32.1
362	3397	5.4	21251	34.0
363	1297	6.2	7668	36.4
364	853	4.1	8111	38.8
365	1739	5.8	10976	36.7
366	1449	4.4	12216	36.9
367	1863	4.7	13015	33.0
368	1706	5.4	10614	33.7
369	608	4.6	4571	34.3
370	3263	5.3	21558	35.2
371	820	8.3	3507	35.4
372	410	5.9	2737	39.3
373	961	4.3	8727	39.3
374	1237	5.7	8230	37.6
375	737	6.5	4056	35.9

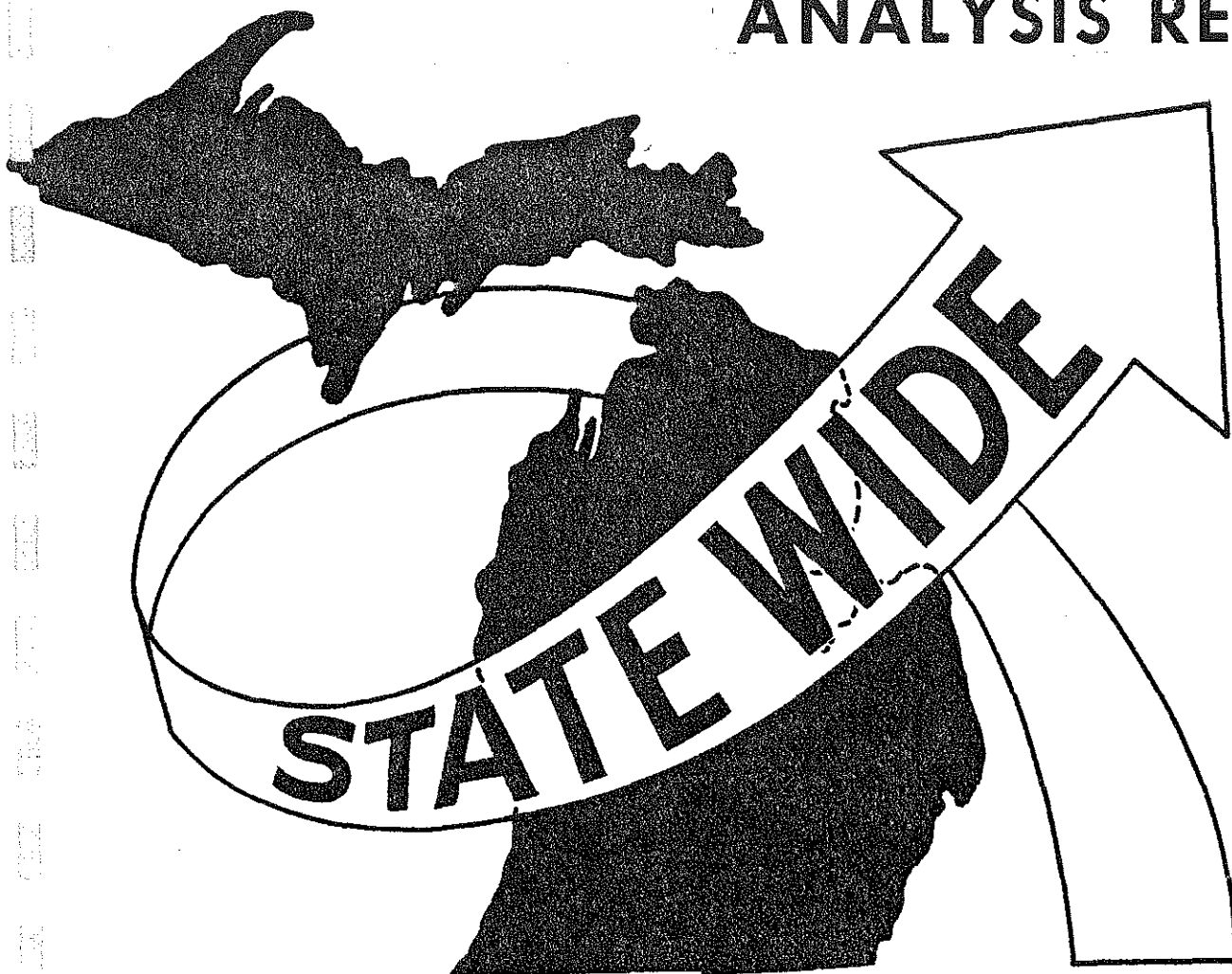
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377	785	11.5	2423	35.6
378	463	9.9	1630	34.9
379	373	19.8	539	28.6
380	757	13.6	1929	34.7
381	537	16.3	938	28.5
382	495	16.2	934	30.5
383	410	10.4	1390	35.4
384	212	14.8	405	28.3
385	307	11.3	865	31.8
386	73	3.0	960	38.9
387	494	10.2	1641	33.9
388	524	14.6	1079	30.1
389	317	10.6	1049	35.2
390	461	13.4	1075	31.3
391	804	17.0	1398	29.6
392	322	10.7	1084	36.0
393	366	9.0	1422	35.0
394	299	8.9	1182	35.3
395	2918	11.1	7746	29.4
396	806	8.4	3695	38.3
397	591	8.5	2595	37.3
398	895	3.7	10152	42.2
399	1950	8.8	7119	32.3
400	567	5.3	3954	37.1
401	385	5.9	2299	35.3
402	941	5.3	6543	37.1
403	867	11.3	2423	31.6
404	773	11.4	2295	33.8
405	431	12.7	1176	34.6
406	281	10.6	895	33.9
407	1062	16.4	1733	26.7
408	638	18.7	932	27.3
409	9001	9.8	30856	33.6
410	240	6.0	1506	37.4
411	2360	6.2	13479	35.3
412	924	5.8	5868	36.9
413	340	3.9	3590	41.4
414	407	8.6	1588	33.5
415	751	5.8	4908	38.1
416	493	6.4	2902	37.5
417	657	8.4	3034	39.0
418	360	7.4	1928	39.7
419	147	8.1	673	37.2
420	519	6.6	3161	40.4
421	310	5.5	2144	37.8
422	506	6.5	3121	40.2
423	766	11.7	2112	32.4
424	635	14.1	1399	31.1
425	796	12.2	2237	34.4
426	544	10.6	1823	35.4
427	407	10.8	1322	35.2
428	479	10.7	1524	34.0
429	554	13.9	1325	33.4
430	686	15.9	1300	30.1



431	239	14.9	550	34.3
432	203	8.8	842	36.6
433	1721	10.0	5560	32.4
434	281	6.7	1582	37.7
435	824	8.1	3734	36.5
436	549	7.7	2459	34.5
437	466	7.4	2233	35.4
438	330	7.1	1811	38.9
439	227	8.0	1057	37.4
440	274	7.3	1464	38.8
441	429	6.3	2634	38.9
442	5427	9.7	18332	32.6
443	1662	11.3	4844	33.0
444	1959	11.7	5176	31.0
445	391	6.6	2236	37.5
446	427	8.5	1769	35.2
447	401	6.9	2147	36.7
448	568	16.8	1036	30.6
449	404	8.9	1793	39.3
450	304	9.1	1212	36.2
451	326	10.1	1142	35.5
452	1275	11.9	3238	30.2
453	611	12.1	1549	30.6
454	522	8.2	2160	33.9
455	803	11.5	2089	30.0
456	310	10.3	1009	33.6
457	416	10.0	1338	32.3
458	332	8.8	1290	34.4
459	928	12.6	2238	30.4
460	438	8.6	1538	30.4
461	542	12.8	1373	32.5
462	388	6.4	2412	40.0
463	766	23.0	2605	78.2
464	389	8.8	1681	37.9
465	379	8.1	1679	36.1
466	467	10.6	1508	34.2
467	229	7.5	1155	37.8
468	511	8.2	2454	39.2
469	291	10.4	914	32.6
470	371	8.6	1446	33.4
471	835	12.9	2099	32.4
472	1102	10.9	3293	32.7
473	1009	11.7	2984	34.7
474	1067	13.2	2743	33.8
475	468	10.3	1558	34.4
476	798	13.1	2040	33.6
477	290	8.8	1202	36.3
478	981	10.9	2785	30.9
479	5369	5.4	23302	23.3
480	274	7.7	893	25.0
481	430	5.1	2628	31.2
482	615	6.8	2984	33.2
483	1662	5.6	5128	17.4
484	1003	3.0	11967	36.0
485	257	4.7	2113	38.7

486	1366	9.4	4077	28.0
487	412	5.2	2880	36.7
488	236	7.3	1028	31.8
489	368	13.4	836	30.5
490	827	12.2	2150	31.7
491	308	8.4	1102	29.9
492	547	7.8	2367	33.9
493	56705	11.6	141753	29.1
494	15723	8.5	54762	29.7
495	69594	11.5	175715	29.1
496	56747	11.8	138308	28.7
497	14440	6.7	67761	31.4
498	2132	3.0	28043	40.0
499	3526	4.8	26813	36.4
500	2368	5.1	16542	35.6
501	8468	4.3	75972	38.1
502	7793	5.0	57283	37.1
503	9461	12.0	21884	27.8
504	4649	6.5	24025	33.4
505	1235	12.3	3387	33.7
506	512	10.2	1718	34.2
507	282	14.6	592	30.8
508	346	12.7	949	34.9

**APPENDIX B:  
TRANSPORTATION COMPONENT  
ANALYSIS RESULTS**



# ACCESSIBILITY TO ALTERNATIVE MODES OF TRAVEL (60 MINUTES)

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
1	6	5	15	4
2	9	4	11	1
3	0	5	32	2
4	1	0	4	1
5	0	6	42	3
6	0	4	31	2
7	26	42	97	5
8	15	24	56	5
9	26	41	93	2
10	19	28	71	5
11	20	30	77	6
12	26	39	93	2
13	9	9	20	6
14	9	9	20	6
15	13	10	20	6
16	23	16	46	9
17	13	9	28	7
18	19	8	30	8
19	17	20	44	5
20	11	14	25	4
21	16	17	33	5
22	3	7	25	2
23	4	11	28	3
24	1	8	38	2
25	26	40	78	0
26	15	26	49	0
27	21	34	77	0
28	21	34	64	0
29	22	42	78	5
31	21	38	71	4
32	18	37	73	4
33	19	22	49	5
34	11	11	37	7
35	14	12	42	7
36	13	12	42	7
37	17	28	63	4
38	10	24	45	3
39	17	32	65	5
40	21	38	82	5
41	17	30	64	4
42	12	27	47	2
43	9	22	35	3
44	17	27	59	4
45	12	28	55	3
46	12	27	54	3
47	12	27	54	3
48	14	30	73	0
49	11	29	60	0
50	12	24	55	0
51	16	30	65	0
52	11	24	50	0

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
53	15	32	68	0
54	14	30	72	0
55	29	47	115	0
56	19	33	73	0
57	16	37	77	0
58	31	46	115	0
59	28	41	96	0
60	21	41	95	0
61	23	42	106	0
62	29	44	108	0
63	25	40	99	0
64	23	46	97	0
65	20	36	85	0
66	23	46	99	0
67	24	42	105	0
68	20	38	78	3
69	19	35	79	3
70	12	28	54	2
71	14	27	57	2
72	22	40	95	2
73	18	36	78	2
74	15	30	68	1
75	16	13	36	6
76	14	12	29	5
77	18	13	35	6
78	13	8	23	6
79	16	26	43	10
80	13	17	32	6
81	11	21	29	12
82	10	17	23	6
83	7	5	10	5
84	5	4	9	3
85	1	0	3	1
86	2	0	0	3
87	8	9	13	7
88	6	5	10	3
89	24	28	49	1
90	17	16	29	0
91	21	29	35	0
92	35	33	93	1
93	36	31	93	1
94	28	28	77	0
95	31	27	84	0
96	30	30	81	2
97	28	20	66	0
98	27	23	71	0
99	31	32	87	1
100	27	20	70	0
101	21	14	29	0
102	14	11	18	0
103	2	14	44	3
104	2	14	44	3
105	2	7	38	2
106	2	13	52	3
107	2	7	30	2
108	2	7	38	2

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
109	4	10	29	0
110	4	10	29	0
111	4	5	17	0
112	4	9	24	1
113	31	32	92	0
114	29	27	82	0
115	30	32	74	0
116	27	38	87	0
117	35	33	109	0
118	29	31	80	0
119	28	24	68	0
120	24	28	67	0
121	34	30	103	0
122	30	31	89	0
123	32	32	95	0
124	19	21	35	10
125	8	9	15	4
126	19	21	35	10
127	21	23	39	10
128	33	57	146	3
129	27	43	111	3
130	27	37	99	3
131	36	42	133	3
132	29	50	123	2
133	33	43	137	3
134	30	46	120	2
135	23	38	103	3
136	26	36	104	2
137	26	43	111	3
138	26	41	105	3
139	30	42	127	3
140	34	51	120	2
141	26	56	98	2
142	25	28	42	1
143	18	25	30	1
144	22	22	31	0
145	21	27	38	1
146	1	4	14	1
147	1	5	24	1
148	1	5	19	1
149	3	5	40	0
150	1	4	14	1
151	19	13	40	9
152	18	13	42	9
153	19	14	39	9
154	18	13	41	5
155	20	15	42	13
156	26	28	79	1
157	25	16	61	0
158	22	24	66	1
159	28	19	76	0
160	26	20	69	1
161	17	21	72	0
162	16	23	71	0
163	14	19	58	0

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
164	14	18	60	0
165	9	14	46	0
166	16	20	65	0
167	19	24	67	0
168	16	24	73	0
169	4	11	19	3
170	3	10	10	7
171	1	8	6	2
172	3	6	33	1
173	2	11	13	3
174	4	11	19	3
175	3	8	12	2
176	11	13	38	5
177	8	3	18	4
178	7	6	29	5
179	9	12	40	6
180	4	2	20	4
181	6	6	29	5
182	7	4	26	5
183	35	35	113	0
184	41	37	117	1
185	33	30	96	0
186	36	31	97	0
187	31	32	85	0
188	26	31	94	0
189	32	31	92	0
190	40	41	107	1
191	39	35	101	1
192	36	30	98	0
193	37	31	91	0
194	29	30	71	0
195	33	35	87	0
196	26	28	76	0
197	28	26	78	0
198	25	16	72	0
199	36	33	97	0
200	22	24	72	0
201	11	11	24	4
202	11	11	24	4
203	11	10	20	3
204	12	5	13	4
205	5	6	32	0
206	3	4	22	0
207	5	5	27	0
208	5	8	30	0
209	3	4	22	0
210	21	25	55	0
211	25	27	68	1
212	25	25	47	0
213	18	23	41	0
214	18	23	50	0
215	16	16	47	0
216	34	44	110	0
217	30	41	101	0
218	23	37	84	0

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
219	43	46	116	0
220	37	45	113	0
221	27	29	92	0
222	29	35	103	0
223	29	45	101	0
224	27	34	73	0
225	38	44	104	0
226	27	46	107	1
227	27	51	111	2
228	25	44	96	0
229	25	39	86	0
230	24	37	93	0
231	31	58	121	4
232	26	48	103	2
233	22	42	88	0
234	21	17	49	8
235	20	15	34	5
236	31	45	104	4
237	29	40	103	3
238	24	39	84	3
239	30	43	98	4
240	21	33	69	0
241	31	45	105	4
242	29	42	104	4
243	21	28	75	1
244	27	27	79	1
245	21	30	69	2
246	29	44	96	5
247	29	42	97	4
248	33	46	110	4
249	2	4	3	6
250	15	19	50	3
251	14	18	50	2
252	25	53	105	2
253	18	34	67	1
254	21	33	67	0
255	20	37	81	1
256	20	48	81	1
257	22	50	97	1
258	20	44	72	3
259	9	3	14	7
260	13	8	25	9
261	18	12	37	9
262	25	29	97	2
263	26	29	94	1
264	26	26	82	2
265	27	31	95	1
266	34	36	114	3
267	12	11	38	0
268	22	28	82	1
269	16	17	62	0
270	29	31	96	0
271	41	66	138	4
272	41	55	125	1
273	35	61	121	1



ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
274	30	55	114	0
275	41	78	168	6
276	29	47	99	0
277	2	3	10	2
278	2	3	10	2
279	2	3	10	2
280	16	18	36	9
281	8	5	7	6
282	6	9	14	6
283	6	6	21	4
284	30	61	97	9
285	38	65	109	9
286	34	63	110	8
287	32	67	110	9
288	22	52	84	9
289	22	56	84	8
290	18	40	55	6
292	9	13	47	3
293	9	12	34	4
294	6	8	26	4
295	1	10	67	3
296	1	10	67	3
297	1	7	38	2
298	2	5	38	1
299	1	9	49	2
300	1	9	49	2
301	1	9	44	2
302	5	10	25	3
303	7	11	27	3
304	6	11	30	5
305	7	13	28	4
306	19	21	55	0
307	15	16	41	0
308	17	10	50	0
309	21	17	56	0
310	25	27	73	0
311	1	11	12	2
312	2	20	41	3
313	1	13	21	2
314	2	16	35	4
315	24	34	68	2
316	17	23	35	2
317	19	31	58	2
318	22	30	61	2
319	19	25	42	2
320	13	14	31	0
321	11	10	30	0
322	16	14	29	0
323	26	48	93	6
324	23	28	76	5
325	29	62	112	8
326	35	47	116	5
327	26	32	82	6
328	30	47	99	6
329	26	56	98	7

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
330	31	41	96	5
331	26	40	88	6
332	38	56	133	6
333	28	55	104	8
334	31	33	92	3
335	24	27	80	0
336	25	17	63	0
337	14	17	54	0
338	19	22	68	0
339	30	30	81	0
340	19	23	58	0
341	10	10	12	2
342	22	30	61	5
343	11	11	30	3
344	24	32	63	5
345	20	26	55	5
346	15	21	49	5
347	24	30	67	3
348	23	30	61	6
349	25	34	67	5
350	14	15	38	5
351	26	34	67	5
352	15	24	53	3
353	13	17	37	0
354	14	22	47	2
355	13	19	43	3
356	24	29	63	3
357	22	27	60	2
358	35	70	132	8
359	34	67	127	7
360	37	70	126	8
361	36	67	135	6
362	35	68	131	7
363	34	67	127	6
364	31	67	122	6
365	33	71	132	6
366	30	66	119	6
367	35	73	118	9
368	29	63	110	7
369	35	69	131	8
370	35	72	137	7
371	33	61	116	3
372	32	63	125	7
373	30	64	122	6
374	20	59	97	5
375	20	59	97	5
376	14	18	38	5
377	11	17	40	5
378	14	16	31	4
379	7	13	31	4
380	17	16	24	3
381	18	15	21	2
382	15	15	23	3
383	3	0	17	1
384	4	6	35	2

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
385	3	4	30	1
386	3	0	12	1
387	15	19	53	0
388	15	10	43	0
389	19	15	38	0
390	10	11	34	0
391	13	7	9	0
392	26	24	38	7
393	21	19	33	4
394	14	16	29	4
395	26	33	85	6
396	24	38	83	4
397	23	35	71	5
398	25	41	86	5
399	26	33	69	6
400	22	26	61	6
401	24	37	81	6
402	25	31	81	6
403	23	27	75	5
404	4	12	23	7
405	13	18	25	6
406	2	6	16	5
407	25	14	29	0
408	19	13	17	0
409	27	51	106	3
410	24	39	74	2
411	19	41	83	3
412	23	48	97	3
413	24	40	78	3
414	21	38	86	3
415	26	50	109	3
416	23	32	82	3
417	18	31	68	2
418	23	23	66	2
419	19	38	79	3
420	29	34	91	2
421	23	32	86	3
422	27	44	101	3
423	16	23	31	3
424	16	15	30	3
425	18	29	48	1
426	18	23	53	5
427	16	15	40	5
428	18	29	47	1
429	14	24	37	1
430	3	9	25	4
431	2	4	9	1
432	3	6	11	2
433	36	39	104	2
434	32	30	95	1
435	32	34	91	2
436	32	35	93	2
437	33	37	100	2
438	31	35	98	2
439	31	32	92	2

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINAL	PORTS
440	36	34	98	2
441	40	36	112	1
442	20	29	34	6
443	17	32	26	5
444	14	30	29	5
445	26	34	35	6
446	20	40	51	7
447	17	19	27	4
448	21	31	50	4
449	22	36	42	5
450	24	36	45	6
451	23	37	55	4
452	13	30	61	0
453	17	35	72	0
454	13	28	52	0
455	22	40	93	0
456	16	34	64	0
457	13	25	56	0
458	11	21	46	0
459	23	42	95	0
460	16	32	77	4
461	12	26	60	4
462	17	30	76	3
463	14	32	68	4
464	20	35	76	4
465	18	35	76	3
466	11	22	53	5
467	12	24	61	5
468	18	33	79	3
469	21	41	89	4
470	12	19	60	6
471	21	35	73	6
472	22	42	91	2
473	22	45	94	5
474	22	38	87	4
475	23	38	90	4
476	21	35	76	6
477	17	23	58	2
478	26	44	105	2
479	43	67	163	5
480	41	75	166	6
481	40	69	156	7
482	42	69	166	5
483	38	67	148	7
484	42	71	154	8
485	39	72	152	6
486	40	67	146	7
487	39	56	131	5
488	29	32	87	0
489	30	37	93	0
490	42	54	131	3
491	33	43	100	0
492	39	69	155	6
493	30	62	112	8
494	35	65	130	8
495	35	67	132	8

ZONE	AIRPORTS	BUS TERMINALS	RAIL TERMINALS	PORTS
496	37	74	130	11
497	33	65	119	8
498	32	63	121	8
499	31	64	112	8
500	32	64	128	8
501	36	65	137	8
502	32	60	120	7
503	34	67	105	10
504	35	68	130	8
505	18	16	51	0
506	15	15	50	1
507	17	17	65	7
508	20	17	50	1