

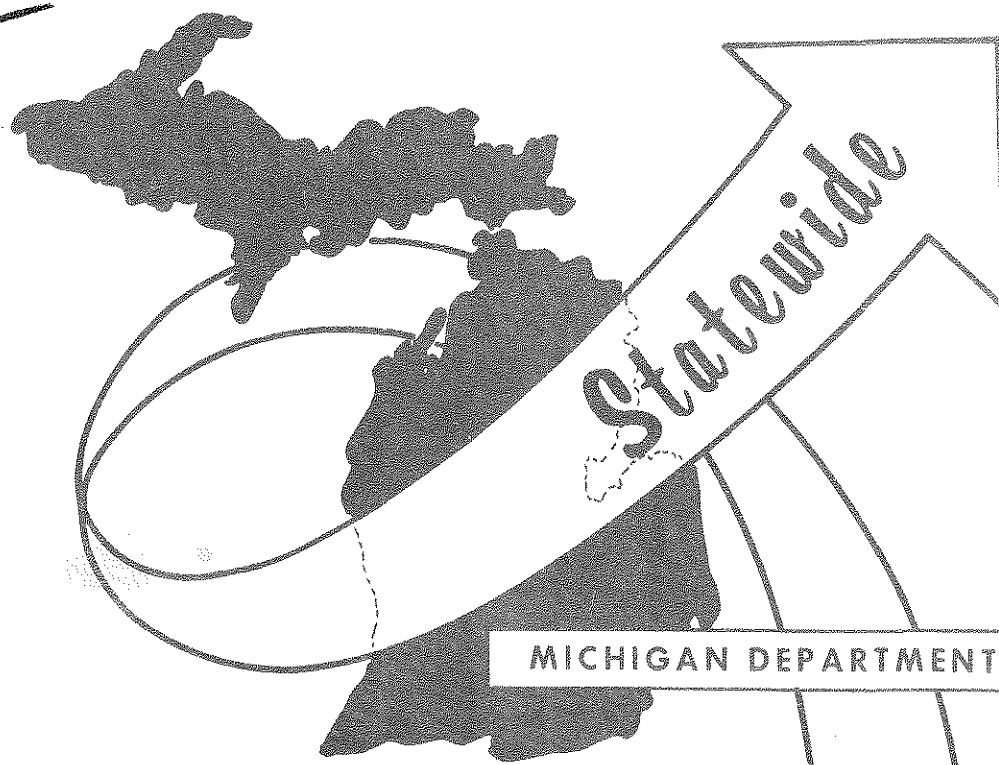
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Statewide Transportation Analysis & Research

MICHIGAN STATEWIDE
MODELING SYSTEM

SYNOPSIS.

RICHARD E. ESCH
Vol. IV-A
JUNE, 1973



MICHIGAN DEPARTMENT OF STATE HIGHWAYS

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

COMMISSION:

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DIRECTOR

JOHN P. WOODFORD

**MICHIGAN STATEWIDE
MODELING SYSTEM**

SYNOPSIS.

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Vol. IV-A
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**PREPARED FOR AASHO COMMITTEE
ON COMPUTER TECHNOLOGY
NATIONAL CONFERENCE**

JUNE, 1973

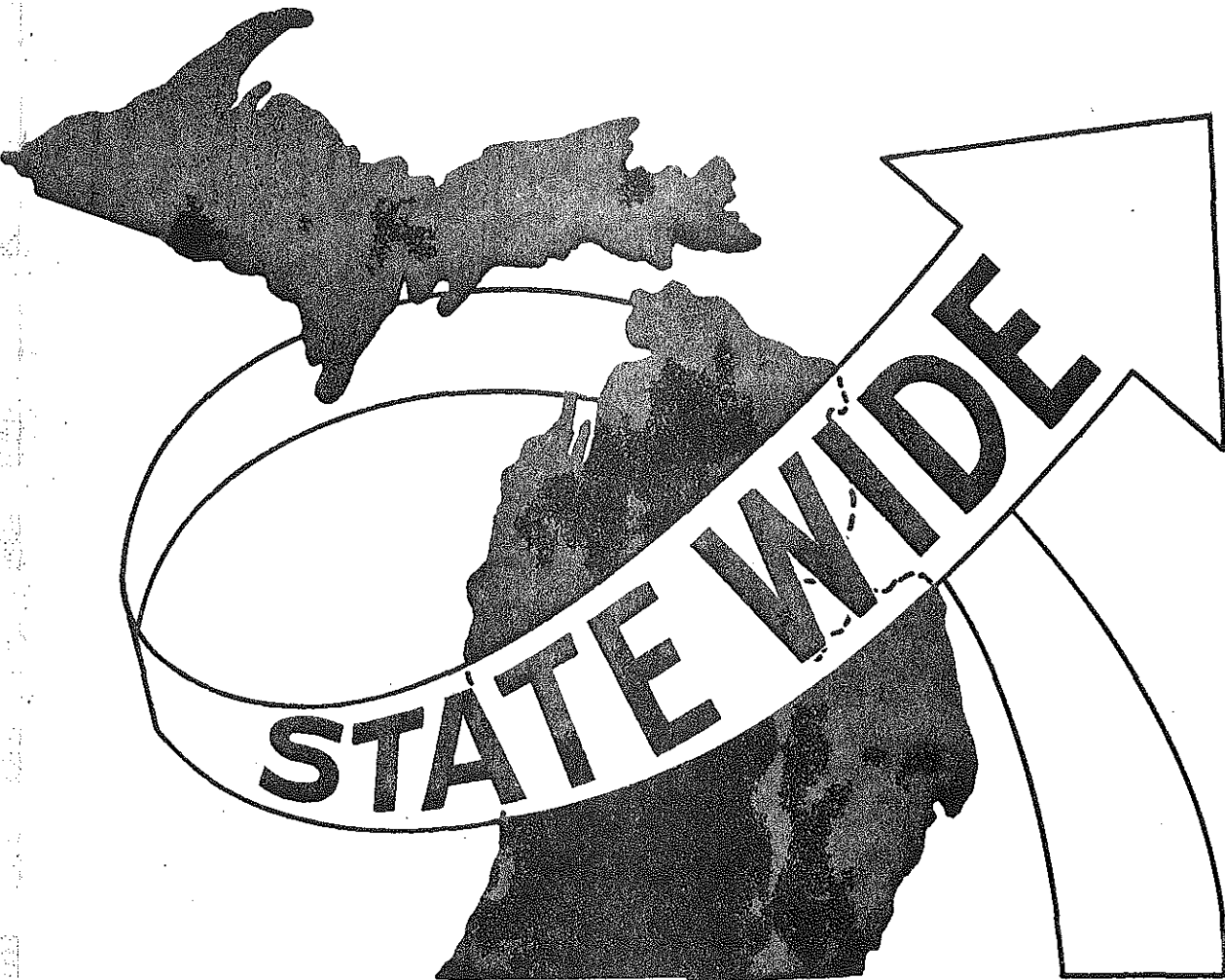
**With the Participation of:
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**

THE RESPONSIBILITIES OF TRANSPORTATION PLANNING EFFORTS
HAVE BEEN DEFINED. THE TOOLS TO BE USED IN THE PROCESS HAVE
NOT.

THE PURPOSE OF THIS PRESENTATION IS TO SUGGEST AN
ALTERNATIVE SYSTEM OF TECHNIQUES WHICH WE FEEL MAY OPEN
NEW AVENUES OF ANALYSIS TO THE STATES CURRENTLY FACING
THESE RESPONSIBILITIES.

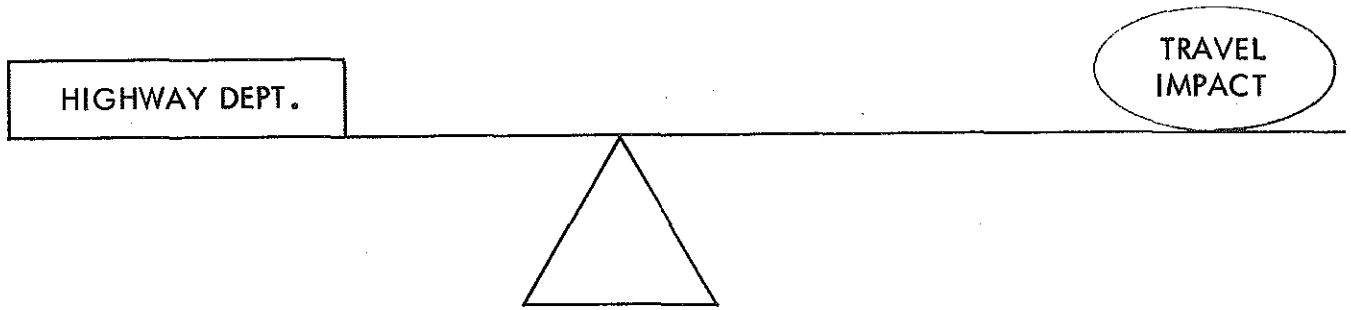
INTRODUCTION

THE RESPONSIBILITIES AND STRUCTURE OF STATE HIGHWAY DEPARTMENTS ARE CHANGING DRAMATICALLY. THESE RESPONSIBILITIES HAVE CREATED NEW CHALLENGES WHICH CAN ONLY BE MET BY THE DEVELOPMENT OF NEW TOOLS.



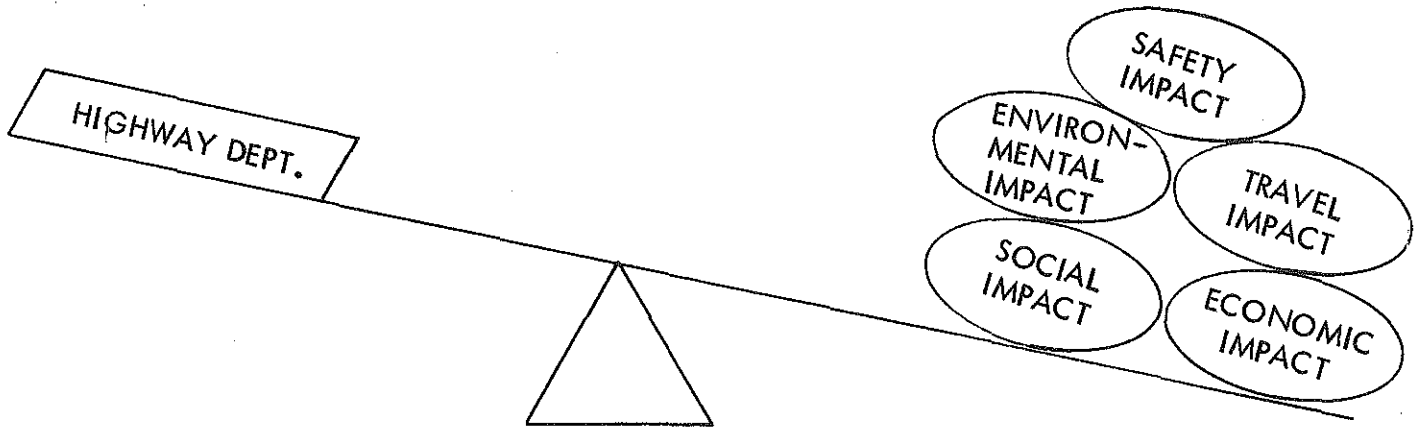
CHANGING RESPONSIBILITIES

PAST



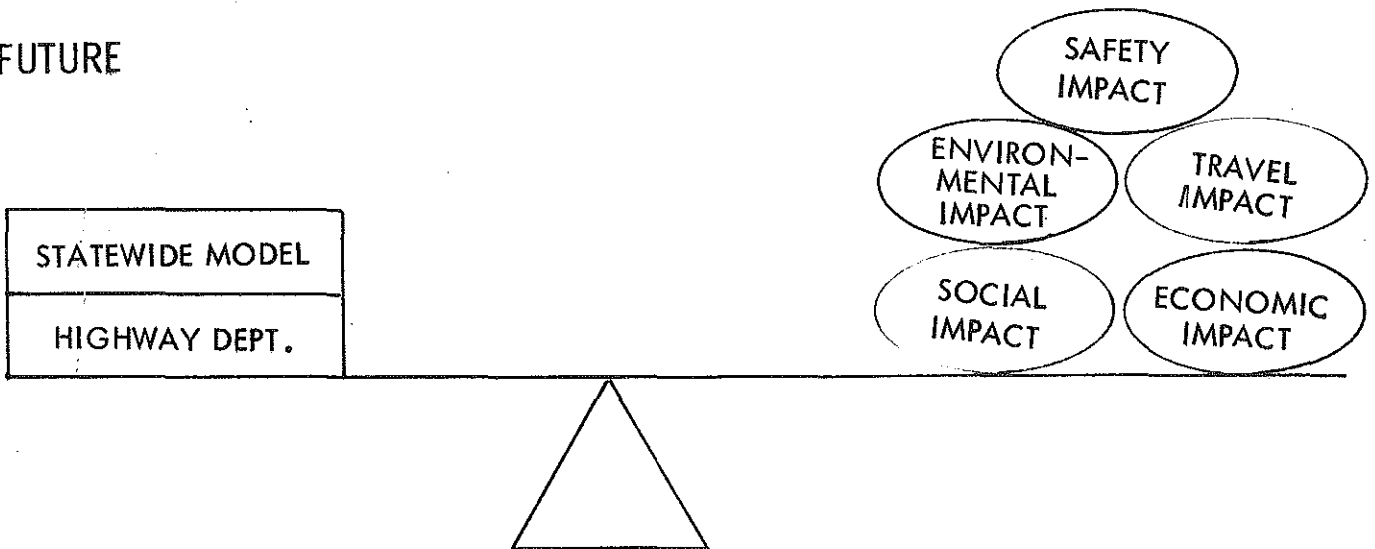
SCALE OF RESPONSIBILITY AND EFFECTIVENESS

PRESENT



SCALE OF RESPONSIBILITY AND EFFECTIVENESS

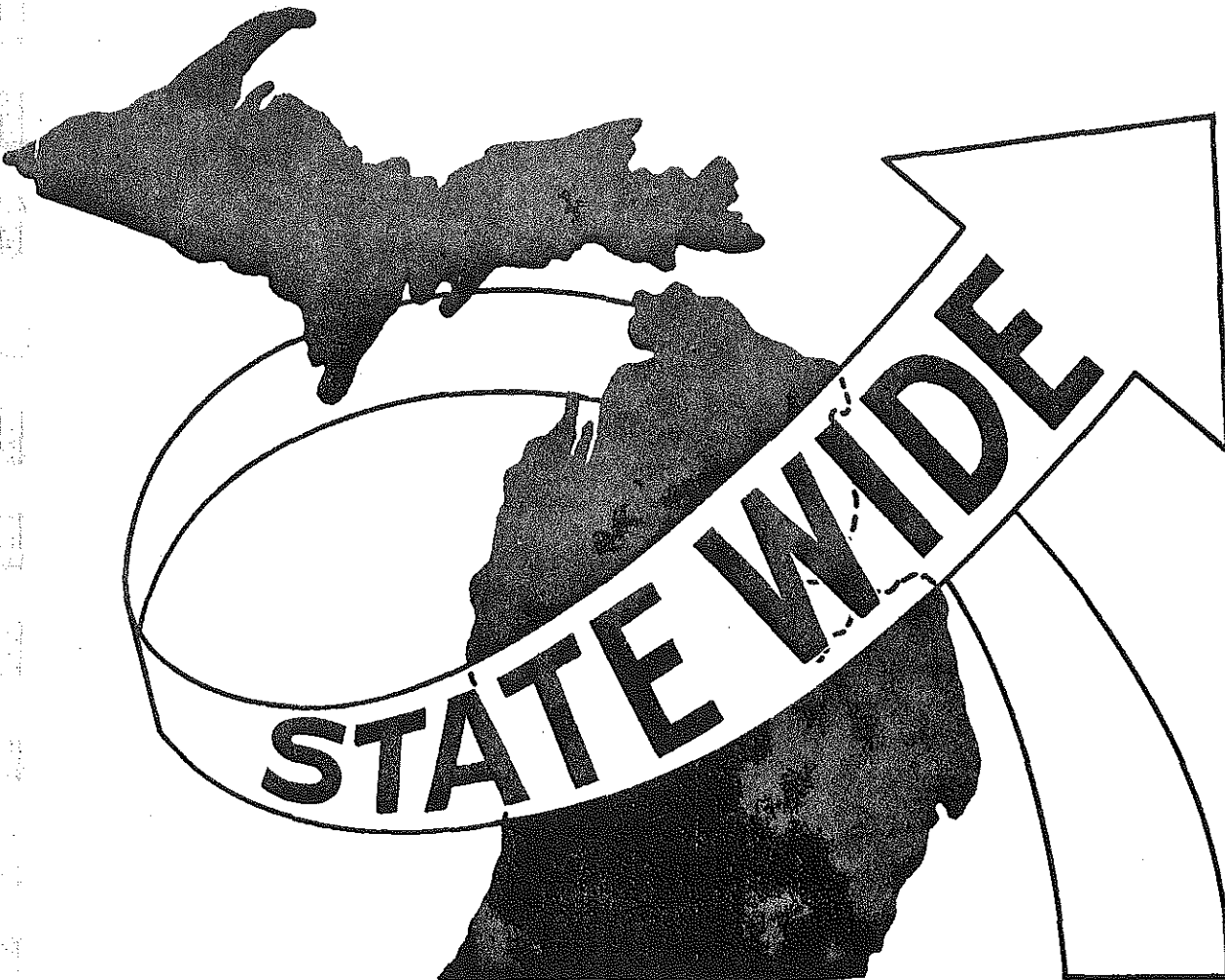
FUTURE



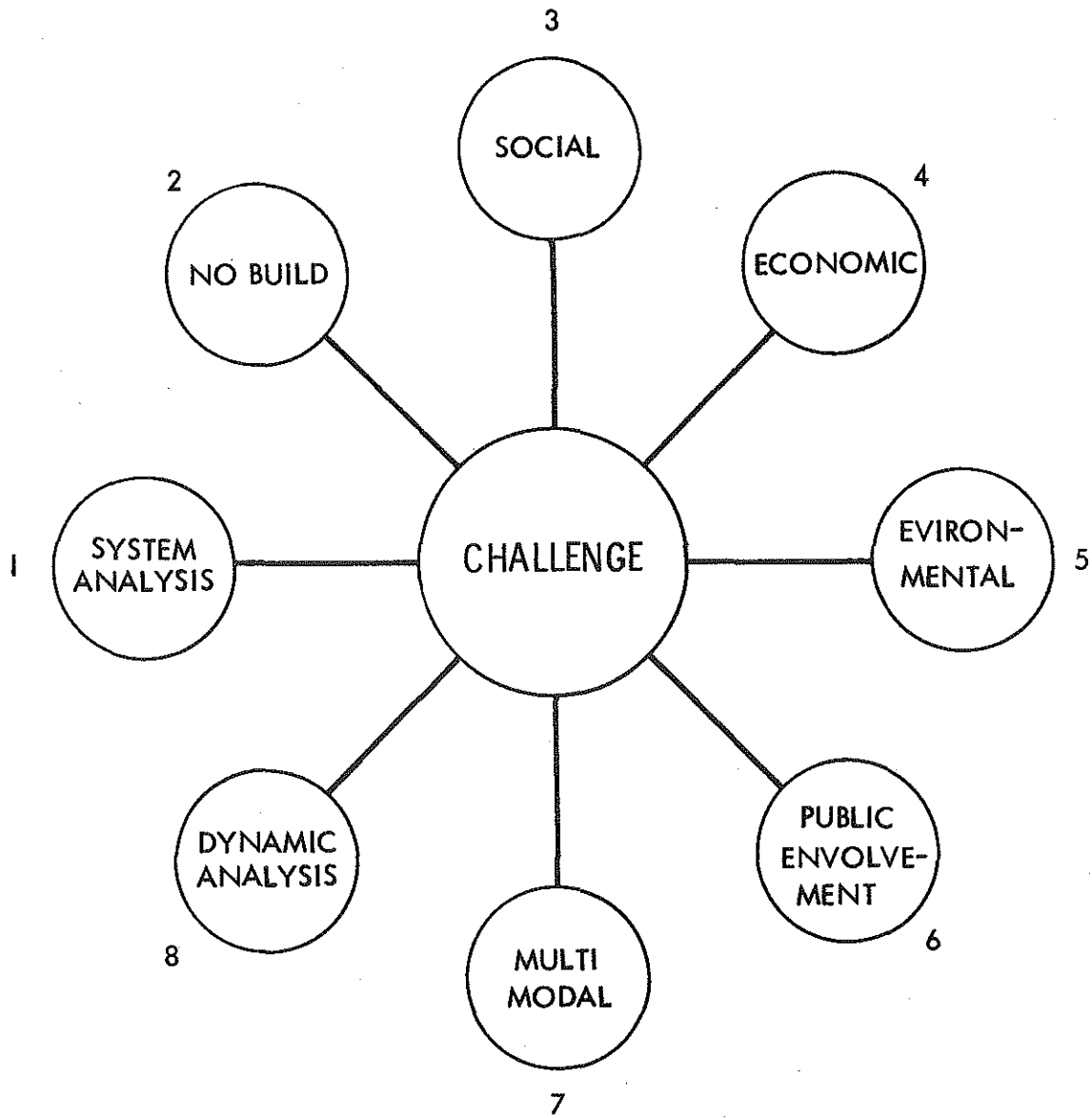
SCALE OF RESPONSIBILITY AND EFFECTIVENESS

CHALLENGE

AS A RESULT OF REVIEWING VARIOUS LITERATURE AND FEDERAL AND STATE LEGISLATION, WE PERCEIVE THE CHALLENGES OF THE 70'S FOR COMPREHENSIVE STATEWIDE TRANSPORTATION PLANNING TO BE REPRESENTED BY THE DIAGRAM ON THE FOLLOWING PAGE.

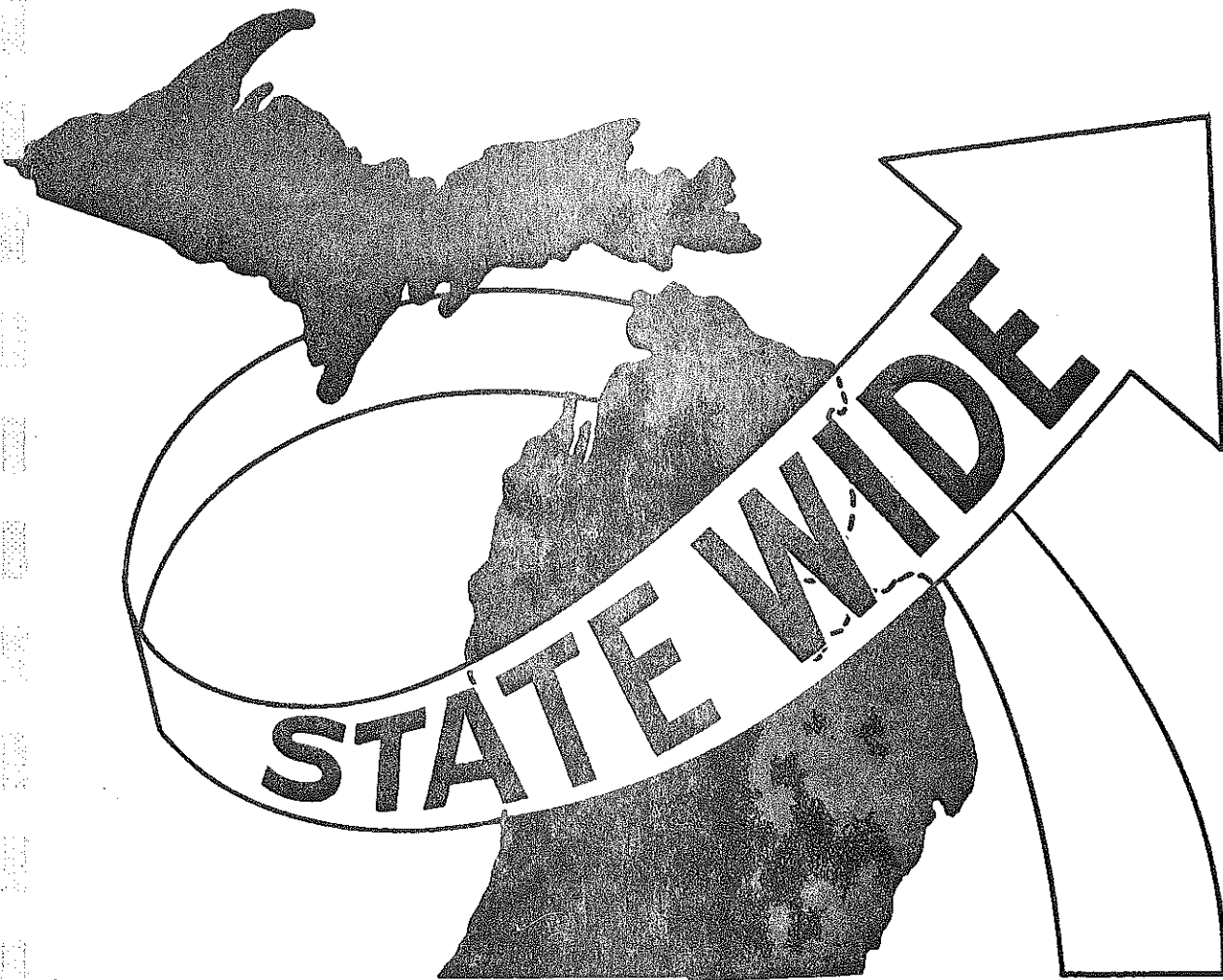


CHALLENGE OF THE 70's

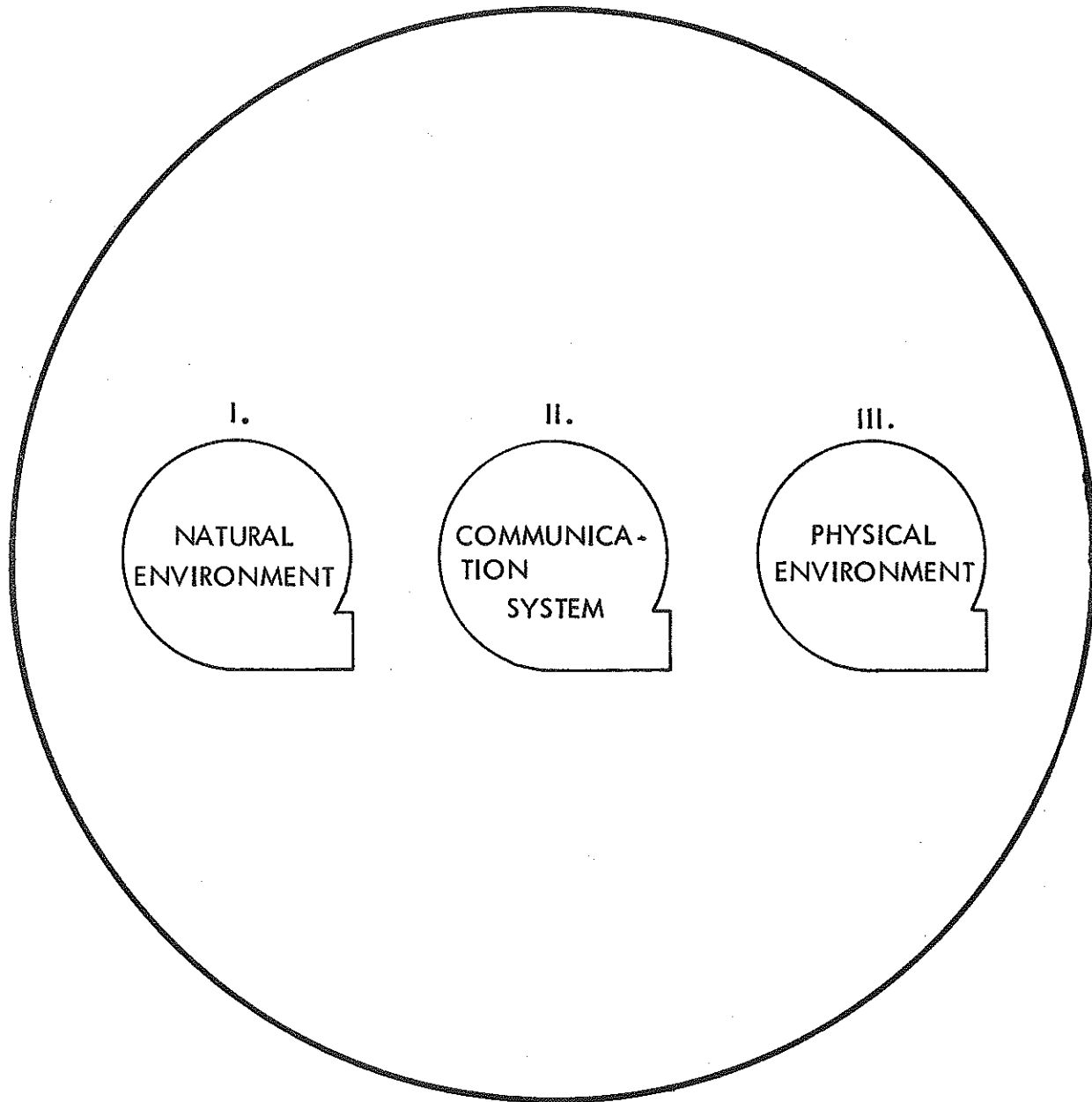


A STATEWIDE MODELING SOLUTION

THREE BASIC FILES PROVIDE THE GROUNDWORK FOR THE DEVELOPMENT OF A STATEWIDE MODELING SYSTEM AS ONE SOLUTION TO THE CHALLENGE OF THE 70's. INCLUDED IN THIS SECTION IS A DIAGRAM OF THE COMPONENT ELEMENTS OF SUCH A SYSTEM.



SOCIETY



I. STATEWIDE
SOCIO-ECONOMIC
DATA FILE

II. STATEWIDE
TRANSPORTATION
NETWORK

III. STATEWIDE
PUBLIC & PRIVATE
FACILITY FILE

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

STATEWIDE FACILITY FILE

HISTORIC SITES
HOSPITALS
AIRPORTS
WHOLESALE TRADE CENTERS
MAJOR PARKS
NON-PUBLIC COLLEGES
PUBLIC COMMUNITY COLLEGES
CITIES OVER 30,000 POPULATION
UNEMPLOYMENT OFFICES
MENTAL HEALTH CENTERS
CERTIFIED INDUSTRIAL PARKS
MICHIGAN'S UNIVERSITIES
SKI AREAS
SNOWMOBILE TRAILS
CBD w/5,000 POPULATION
TRUCK TERMINALS
STATE POLICE POSTS
DAILY NEWSPAPERS
WEEKLY NEWSPAPERS
SEWAGE TREATMENT FACILITIES
TOURIST ATTRACTIONS
BUS TERMINALS
MANUFACTURERS
CAMPSITES

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

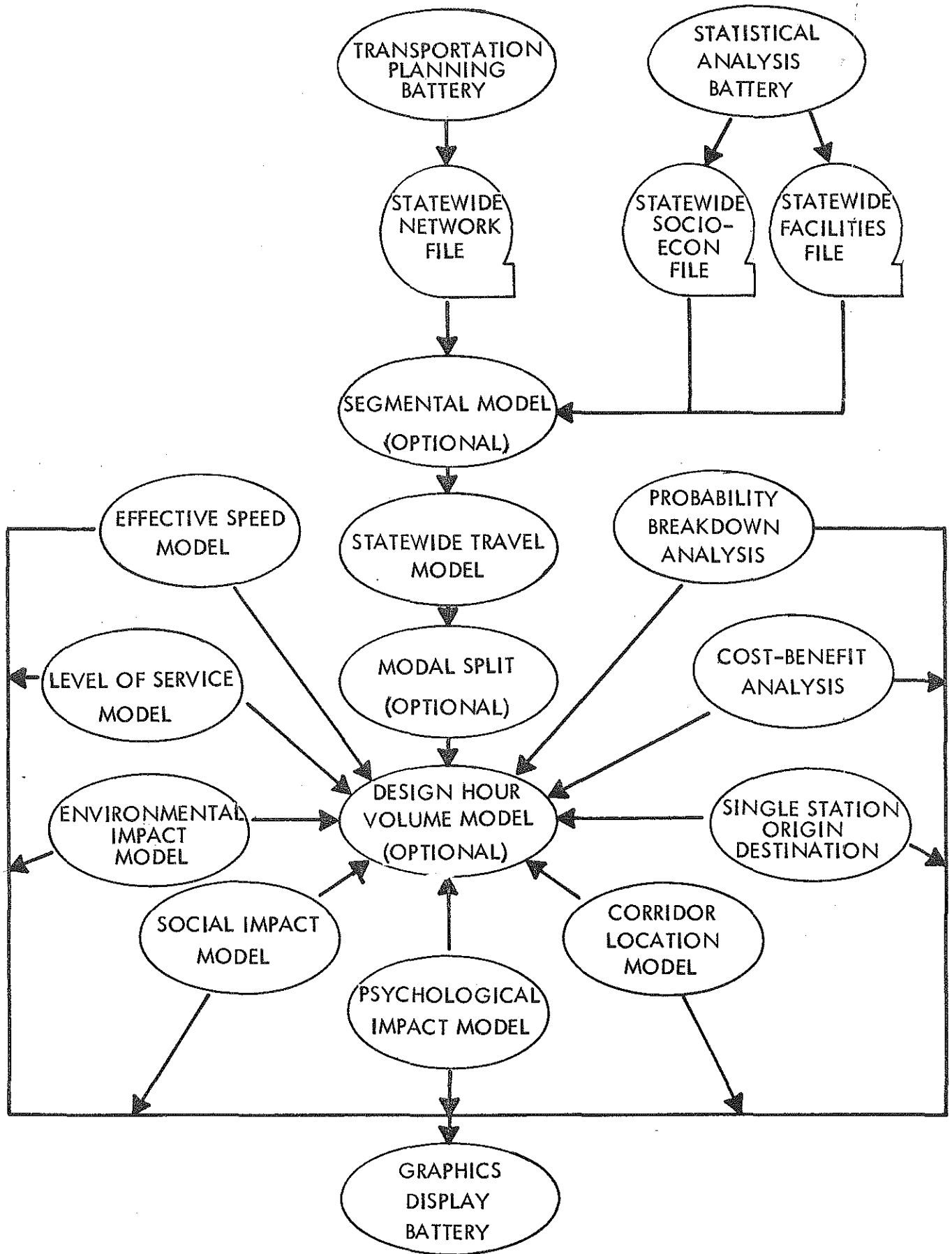
AGE BY SEX
TYPE OF FAMILY
MARITAL STATUS

AREA CHARACTERISTICS

LAKE FRONTAGE
ASSESSED VALUATION
WATER AREA

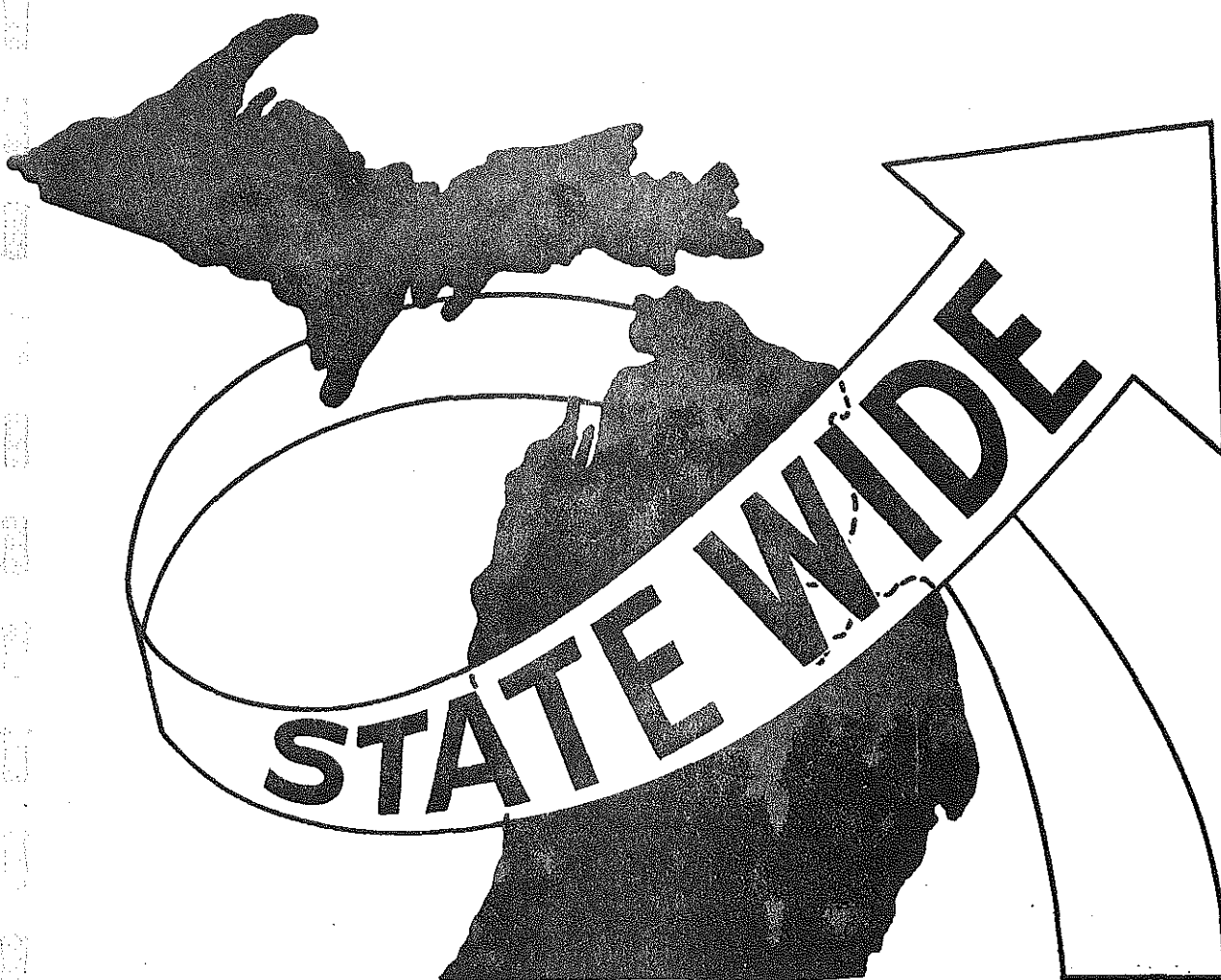
*THOSE ITEMS LISTED HERE ARE SAMPLES TAKEN FROM THE COMPLETE
FILE WHICH CONTAINS OVER 700 ITEMS.

STATEWIDE MODELING SYSTEM COMPONENTS



COMPONENT DETAILS

THE STATEWIDE MODELING SYSTEM CONTAINS FOUR BASIC TYPES OF PROCESSES. WHENEVER POSSIBLE, THE RESULTS OF THESE PROCESSES ARE DISPLAYED GRAPHICALLY, AS THE EXAMPLES ON THE FOLLOWING PAGES ILLUSTRATE.



COMPONENT DETAIL

1. GENERAL UTILITY

- A. TP PACKAGE
- B. STATISTICAL BATTERY
- C. GRAPHIC DATA PRESENTATION BATTERY

2. BASIC TRAFFIC FORECASTING AND EVALUATION TOOLS

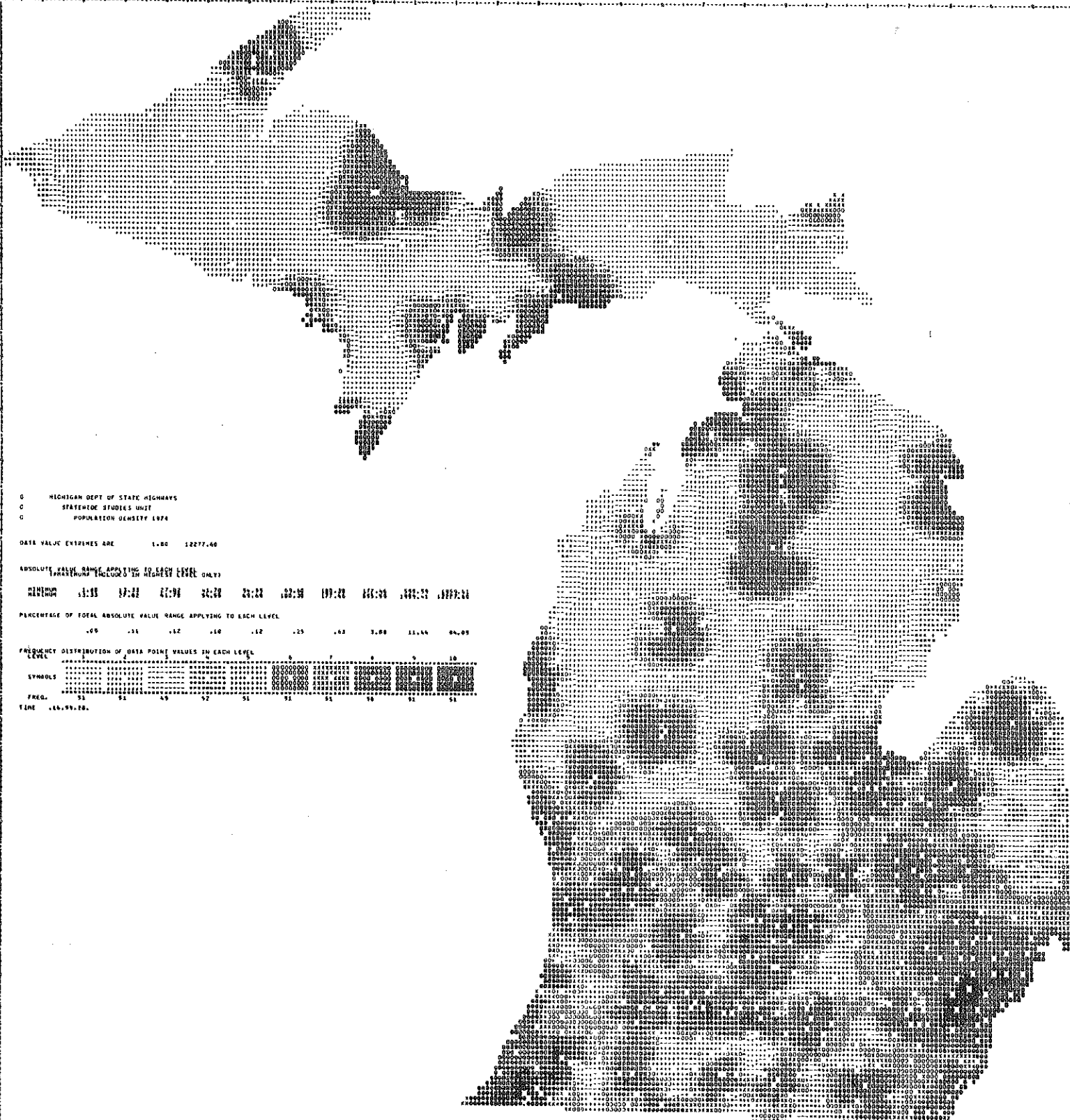
- A. TRIP GENERATION-DISTRIBUTION MODEL
- B. SEGMENTAL MODEL
- C. DHV MODEL
- D. MASS TRANSIT MODEL

3. SPECIFIC-IMPACT MODELING PROCESSES

- A. COST-BENEFIT ANALYSIS
- B. SOCIAL IMPACT ANALYSIS
- C. PSYCHOLOGICAL IMPACT ANALYSIS
- D. LEVEL OF SERVICE ANALYSIS
- E. EFFECTIVE SPEED ANALYSIS
- F. ENVIRONMENTAL IMPACT ANALYSIS
- G. HIGHWAY BREAKDOWN PROBABILITY MODEL

4. CONTINUING PROCESSES

- A. SINGLE-STATION O & D ANALYSIS
- B. CORRIDOR LOCATION MODEL



O MICHIGAN DEPT. OF STATE HIGHWAYS
 C STATEWIDE STUDIES UNIT
 C POPULATION DENSITY 1974

DATE VALUE EXTREMES ARE 1.00 12277.66

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL (ONLY)

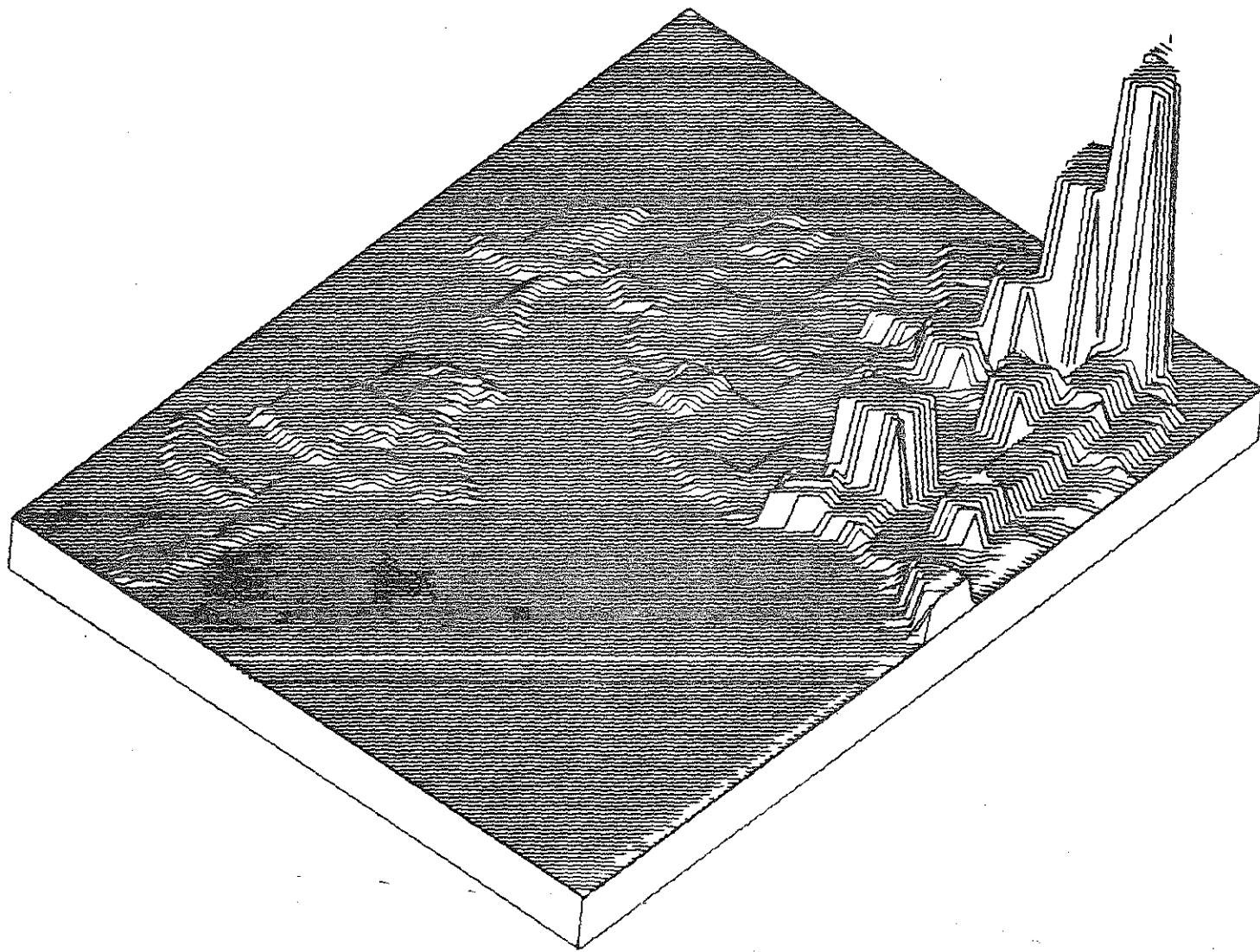
MINIMUM 1.00 17.42 21.96 24.28 29.24 32.56 39.22 45.28 52.22 59.22

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

.05 .11 .12 .16 .12 .23 .62 3.08 11.44 24.09

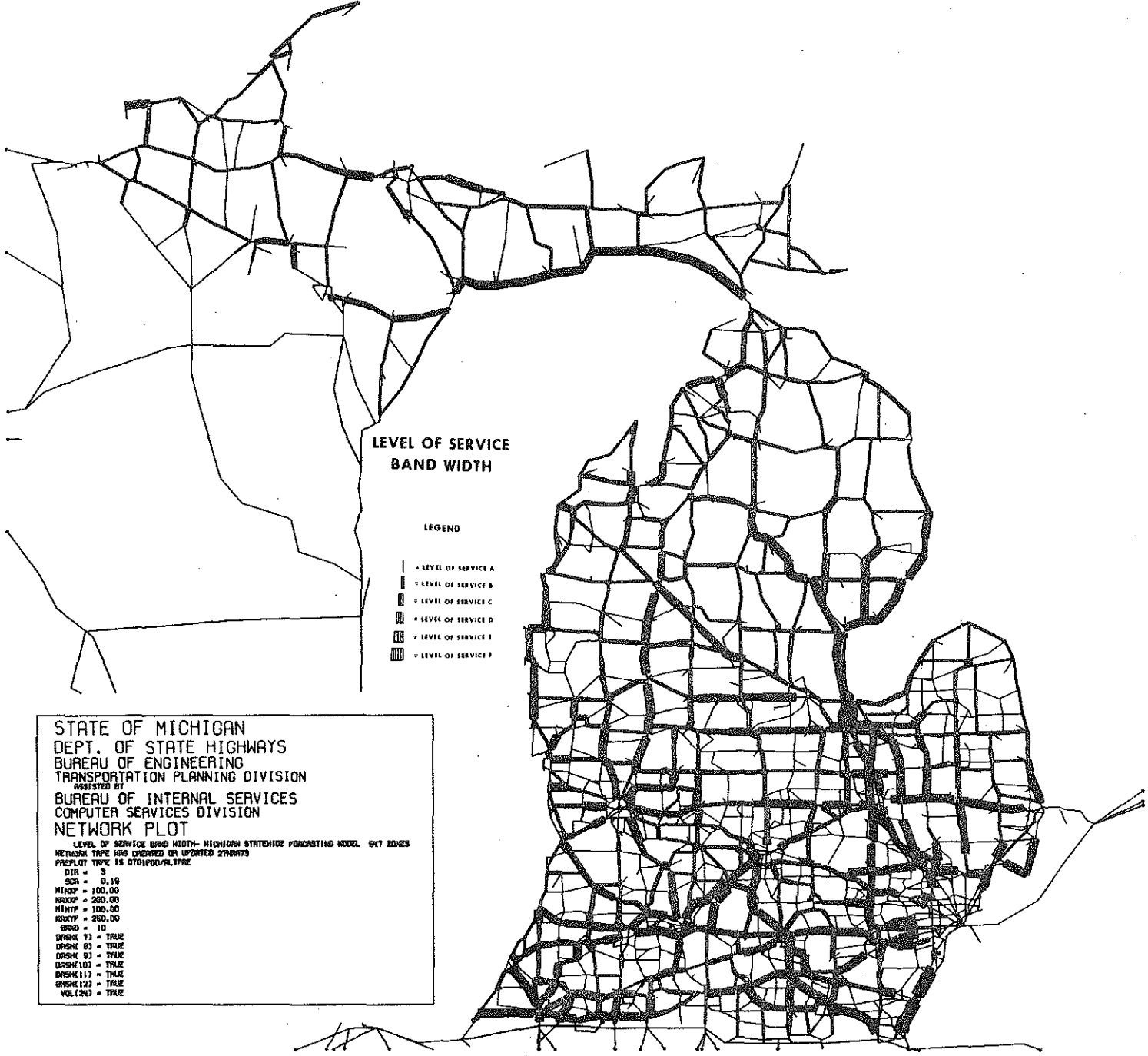
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

| LEVEL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SYMBOLS | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| FREQ. | 51 | 91 | 49 | 92 | 51 | 51 | 51 | 51 | 51 | 51 |
| TOTAL | 14,99,78 | | | | | | | | | |



| | |
|------|------------|
| 2.12 | 7620223.10 |
| 2.00 | 7184415.24 |
| 1.50 | 5388311.43 |
| 1.00 | 3592207.62 |
| 0.50 | 1796103.81 |
| 0.00 | 0.00 |

RETAIL SALES TAX BY COUNTY

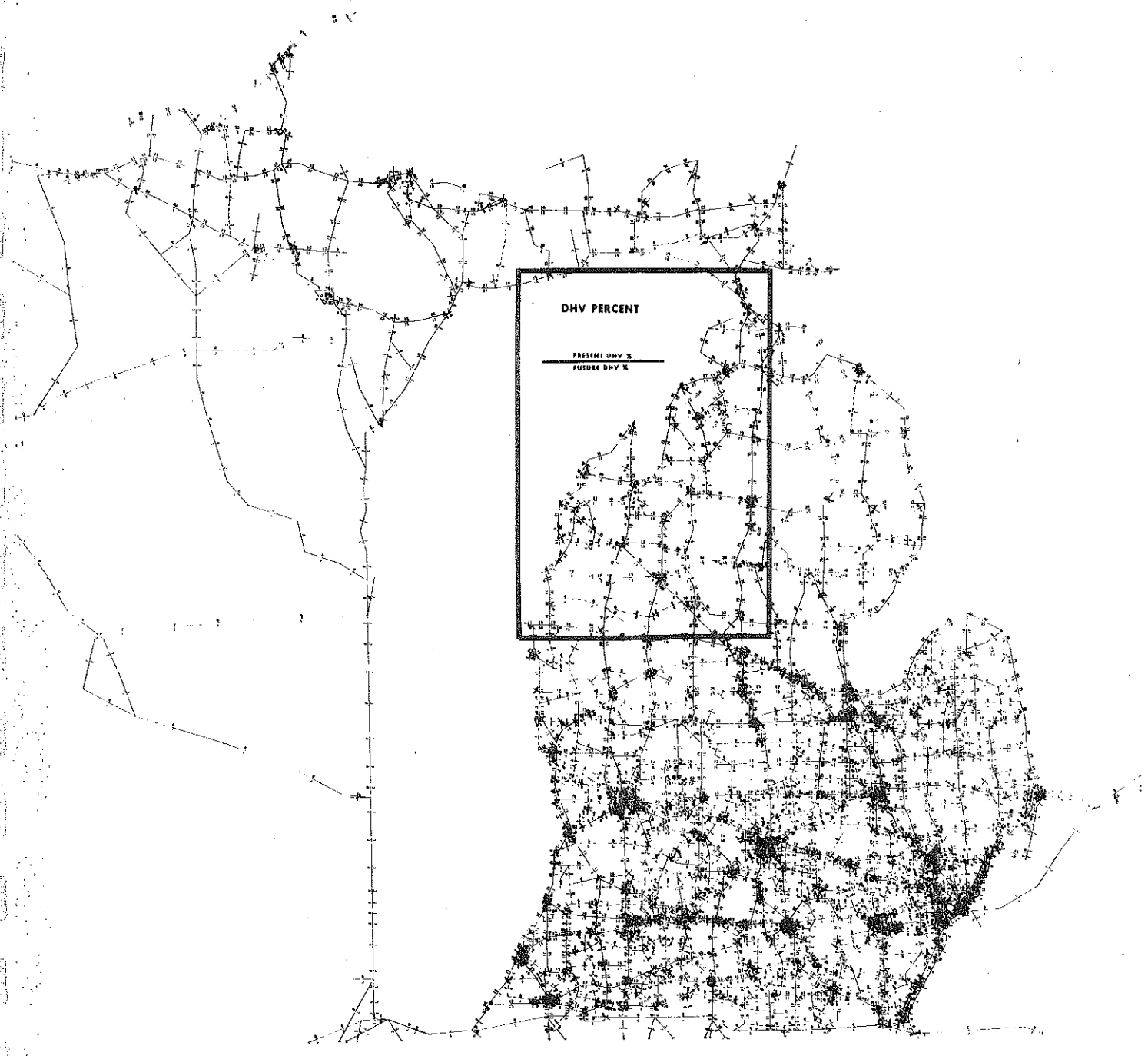


**LEVEL OF SERVICE
BAND WIDTH**

LEGEND

- LEVEL OF SERVICE A
- ▬ LEVEL OF SERVICE B
- ▨ LEVEL OF SERVICE C
- ▧ LEVEL OF SERVICE D
- ▩ LEVEL OF SERVICE E
- LEVEL OF SERVICE F

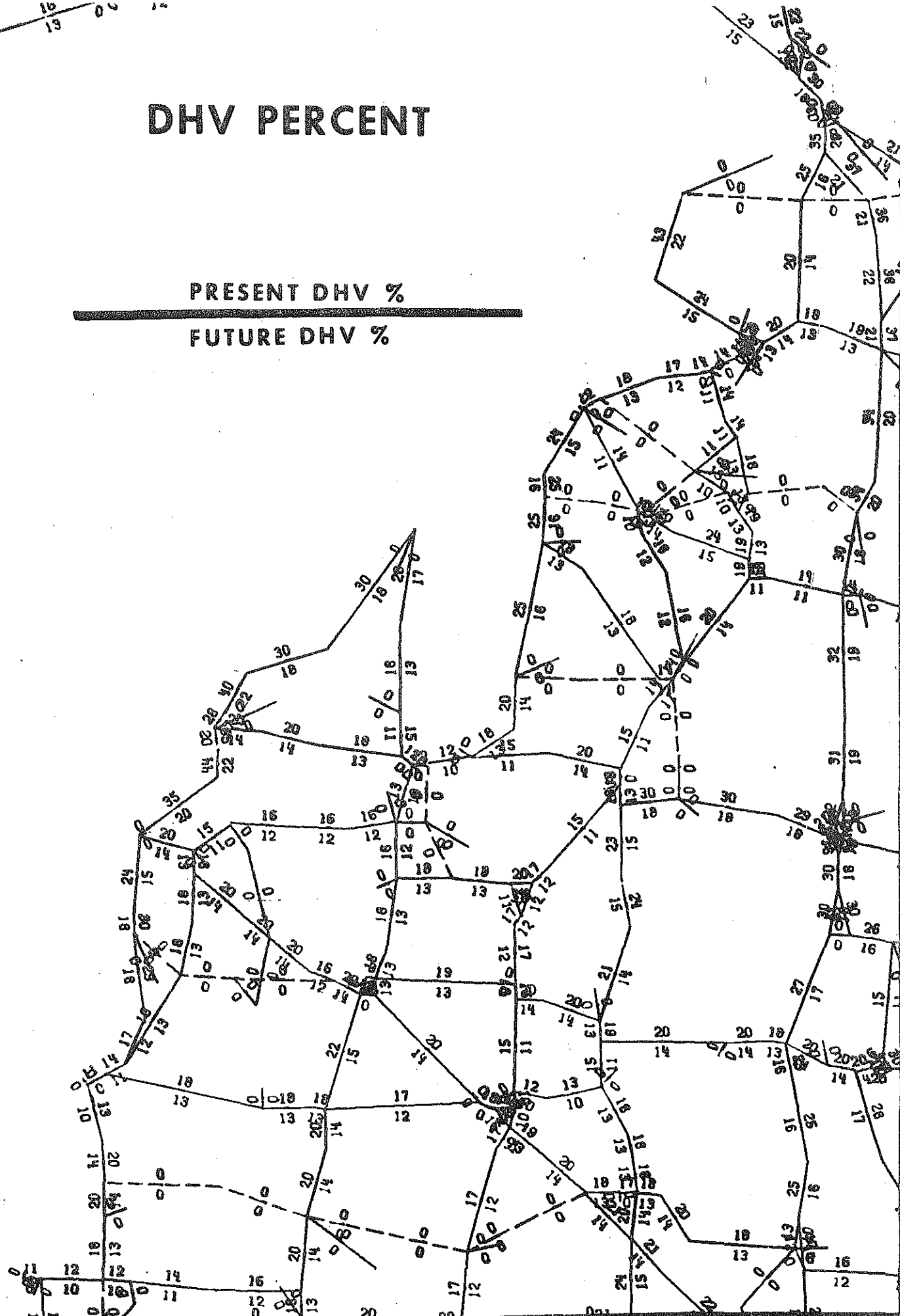
STATE OF MICHIGAN
 DEPT. OF STATE HIGHWAYS
 BUREAU OF ENGINEERING
 TRANSPORTATION PLANNING DIVISION
 ASSISTED BY
 BUREAU OF INTERNAL SERVICES
 COMPUTER SERVICES DIVISION
NETWORK PLOT
 LEVEL OF SERVICE BAND WIDTH- HIGHWAY STATEWIDE FORECASTING MODEL, 547 EDGES
 METADATA TABLE WAS CREATED ON UPDATED 27/06/73
 PROJ.PLOT TYPE IS STDHPLOT.LTYPE
 DTR = 3
 SCR = 0.10
 MINOP = 100.00
 MAXOP = 250.00
 MINTP = 100.00
 MAXTP = 250.00
 BRWD = 10
 CRASH 71 = TRUE
 CRASH 81 = TRUE
 CRASH 83 = TRUE
 CRASH 101 = TRUE
 CRASH 111 = TRUE
 CRASH 122 = TRUE
 VOL.243 = TRUE



DHV PERCENT

PRESENT DHV %

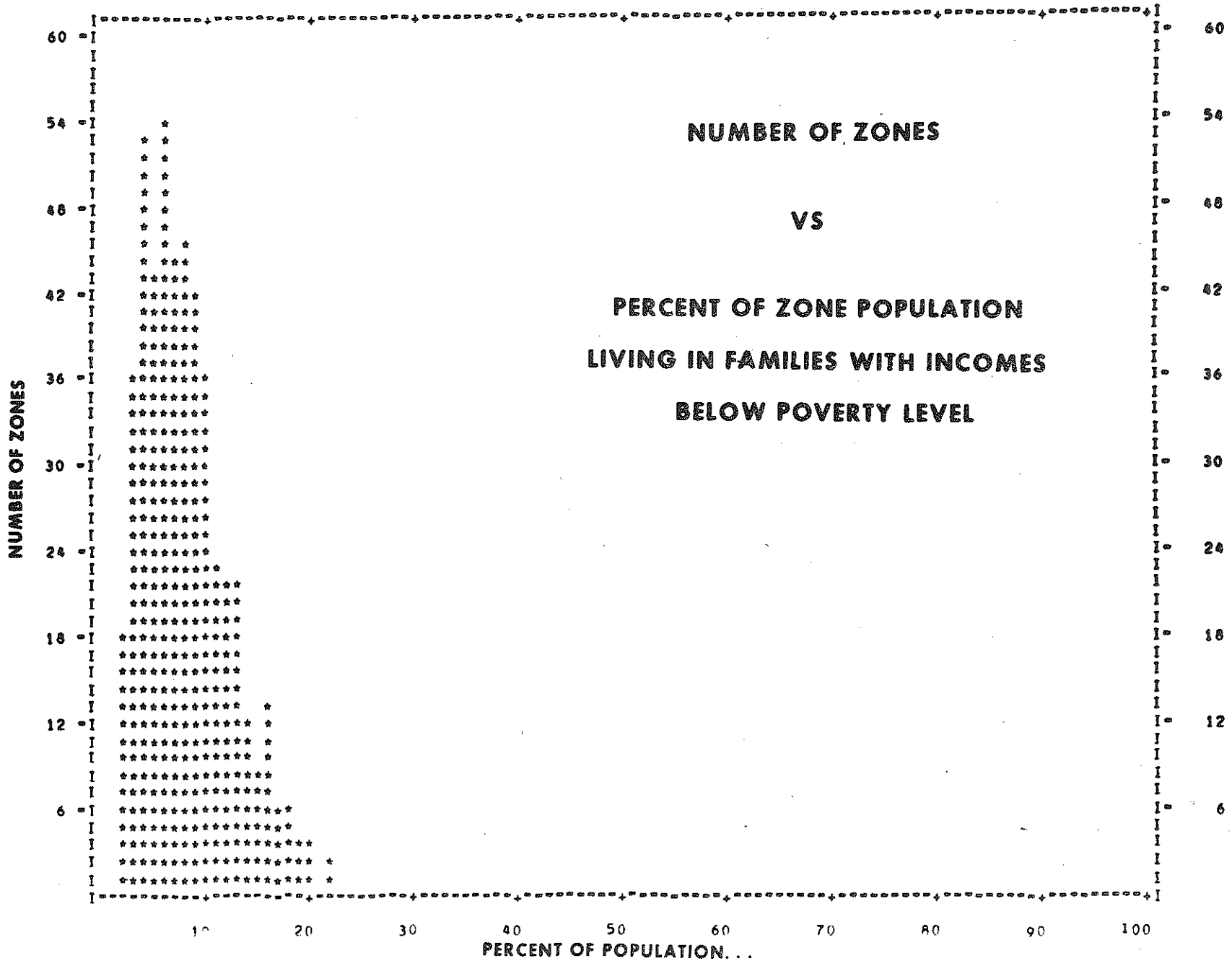
FUTURE DHV %



JOB DEF= *****
PROC DEF= POUF
DATA DEF= POVT

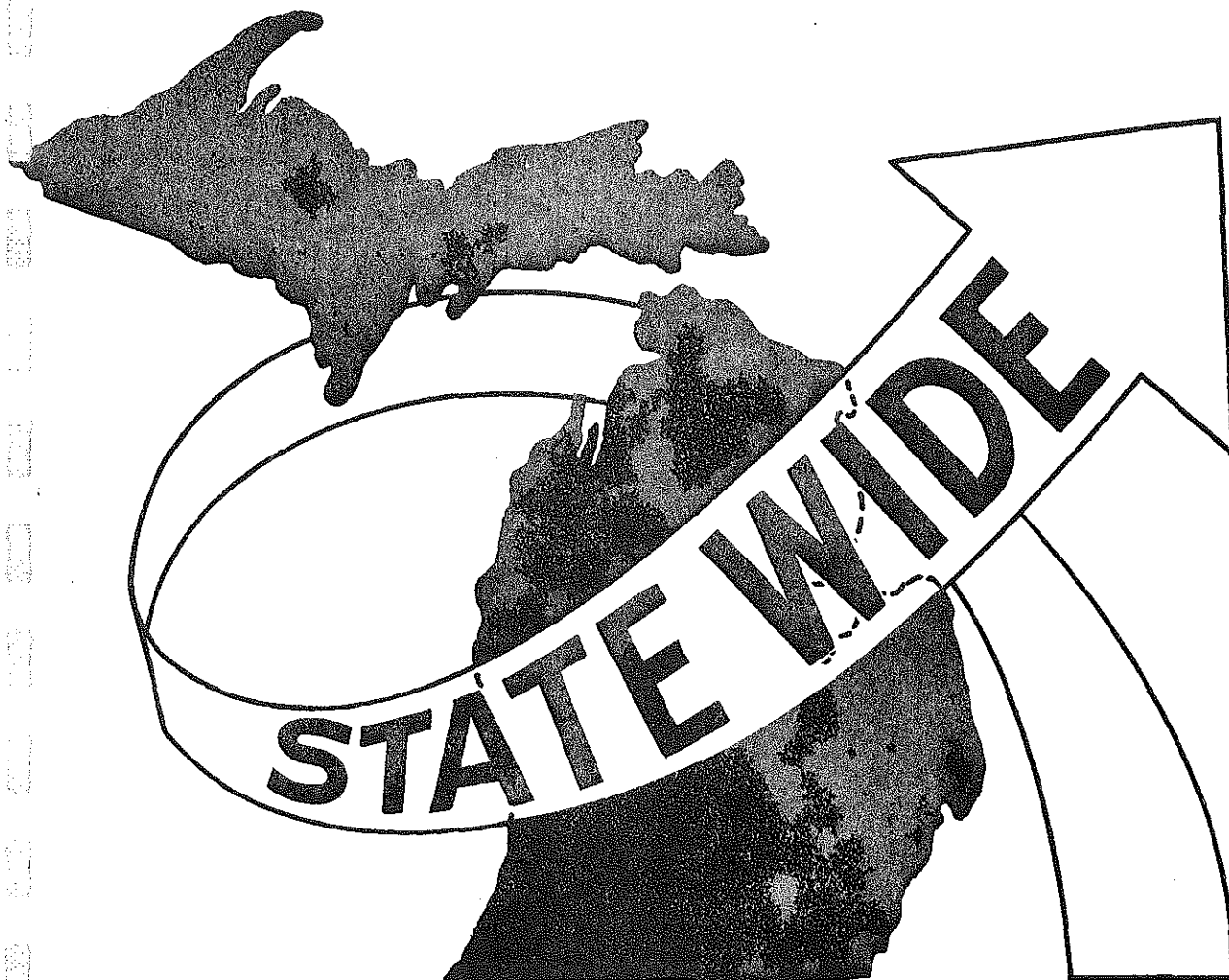
FREQUENCY OF PERCENT OF POP IN POVERTY FAMILIES
PERSONS IN FAMILIES BELOW POVERTY LEVEL

HISTOGRAM OF VARIABLE PPOVER

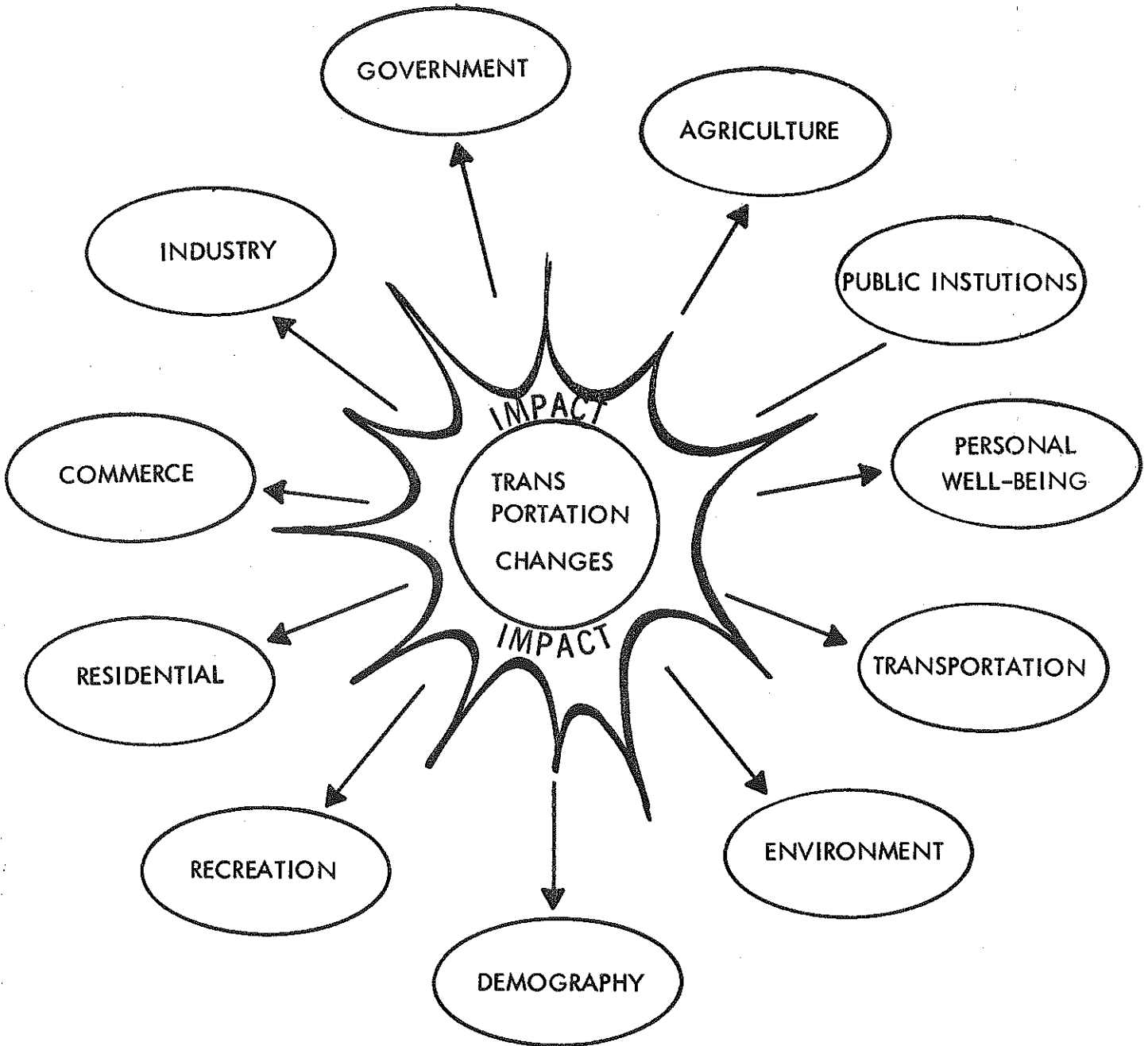


SYSTEM IMPACT INDICATORS

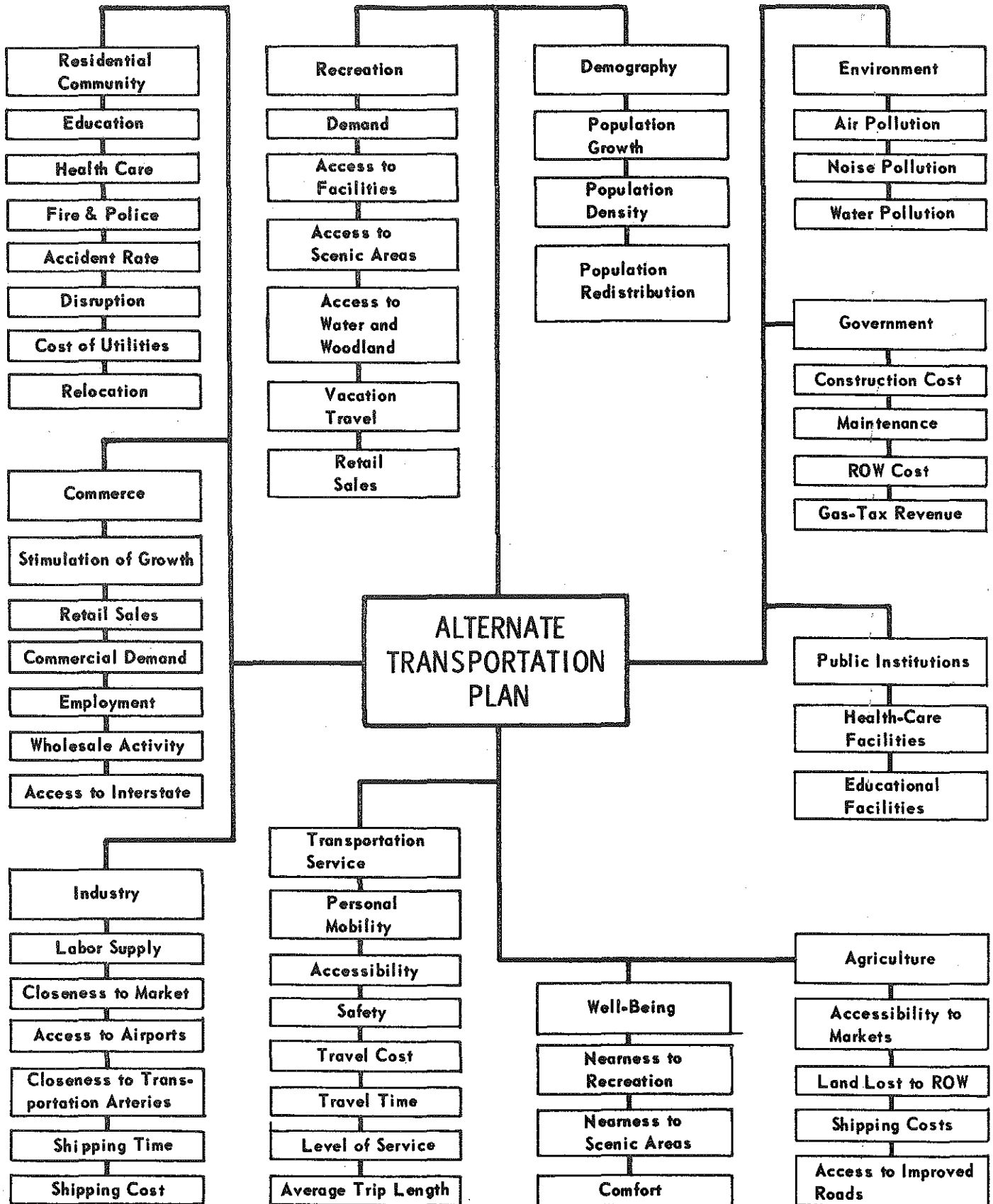
A LIST OF THE VARIOUS IMPACTS WHICH THE SYSTEM COMPONENTS COULD MEASURE IS PRESENTED IN THE FOLLOWING DIAGRAMS. FOR SOME LISTED IMPACTS, THE RESEARCH NECESSARY FOR ADEQUATE MEASUREMENT IS STILL IN PROGRESS IN MICHIGAN.



STATEWIDE SYSTEM IMPACT ANALYSIS CATEGORIES

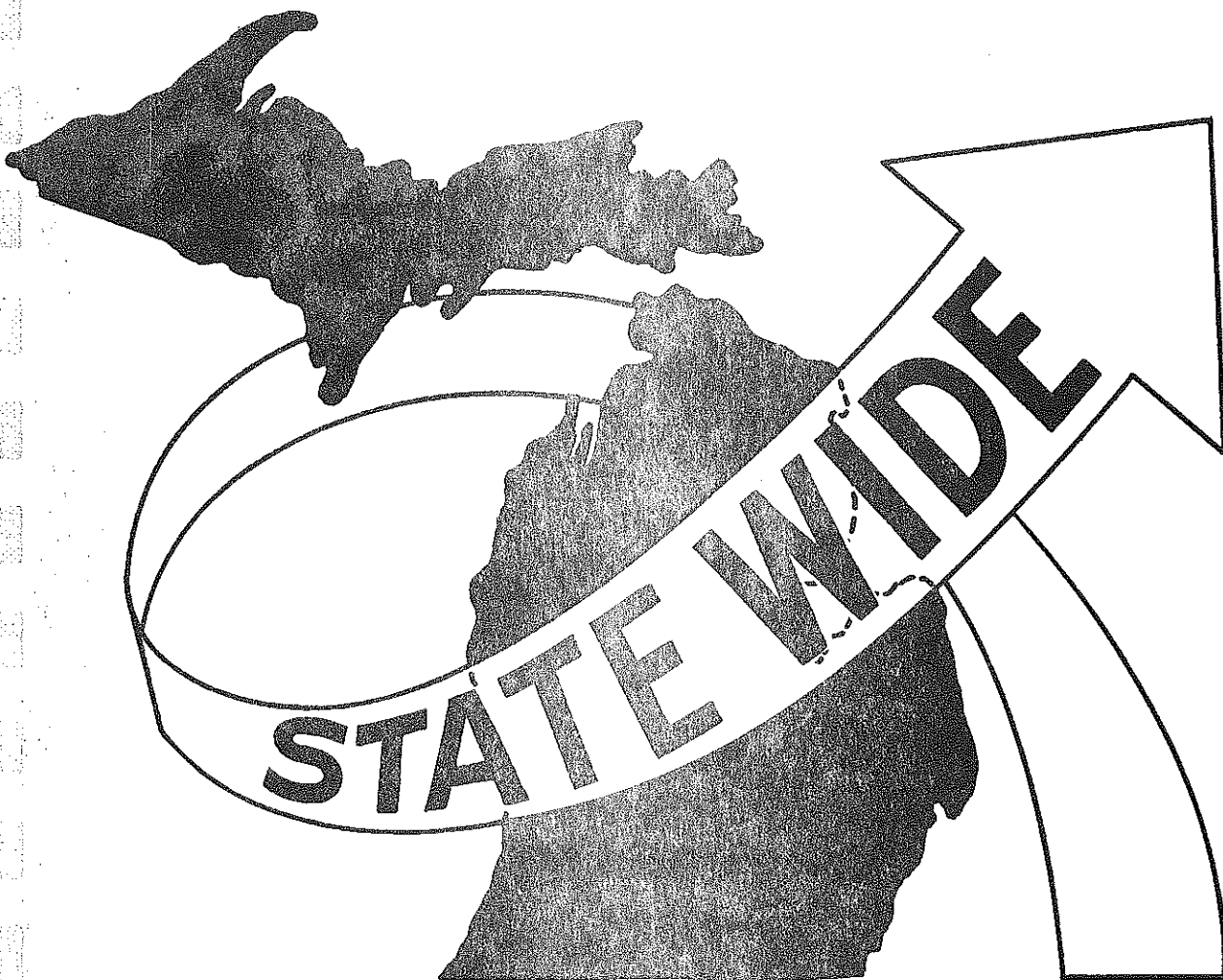


STATEWIDE SYSTEM IMPACT ANALYSIS

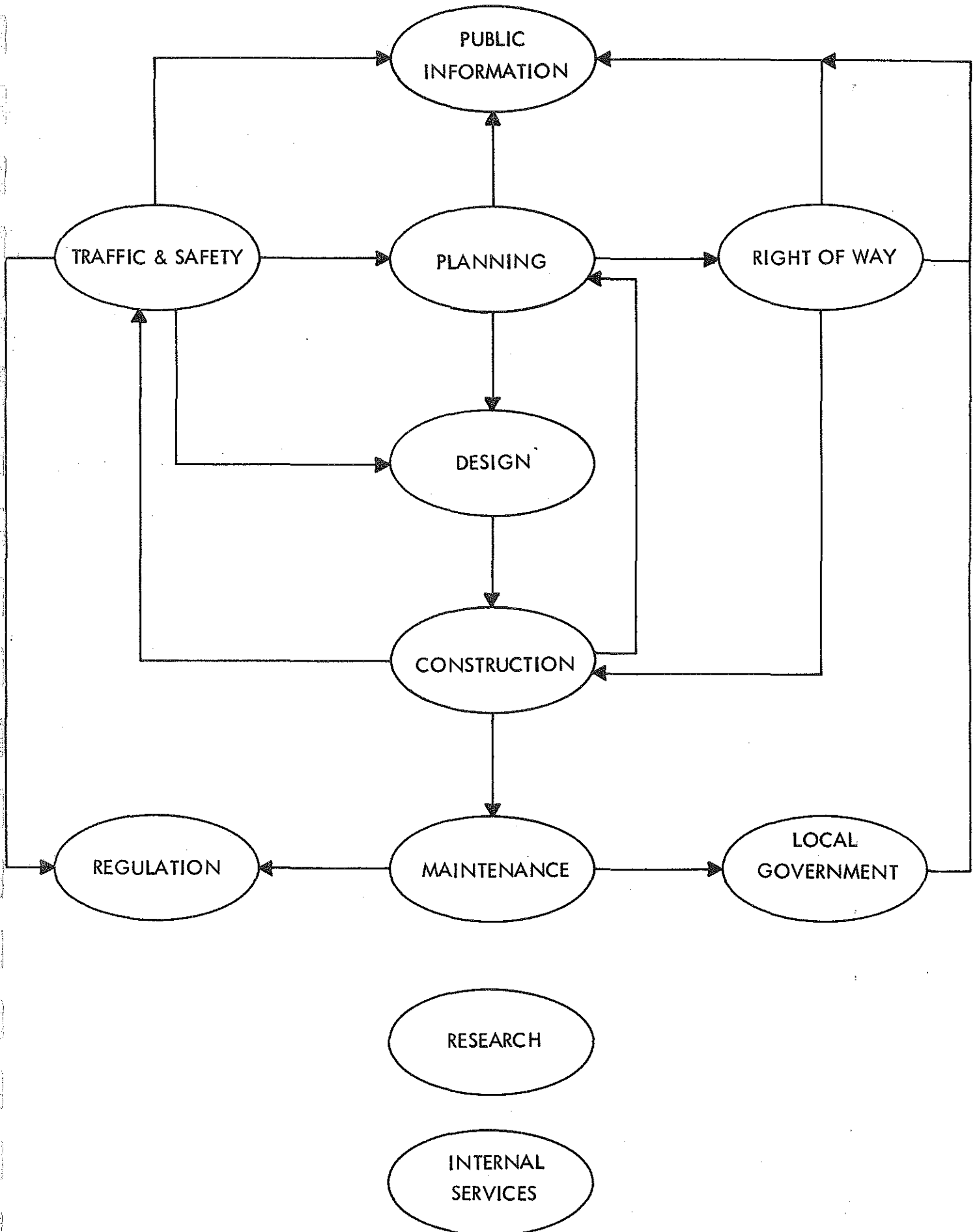


FUNCTIONAL APPLICATIONS OF THE
STATEWIDE MODELING SYSTEM

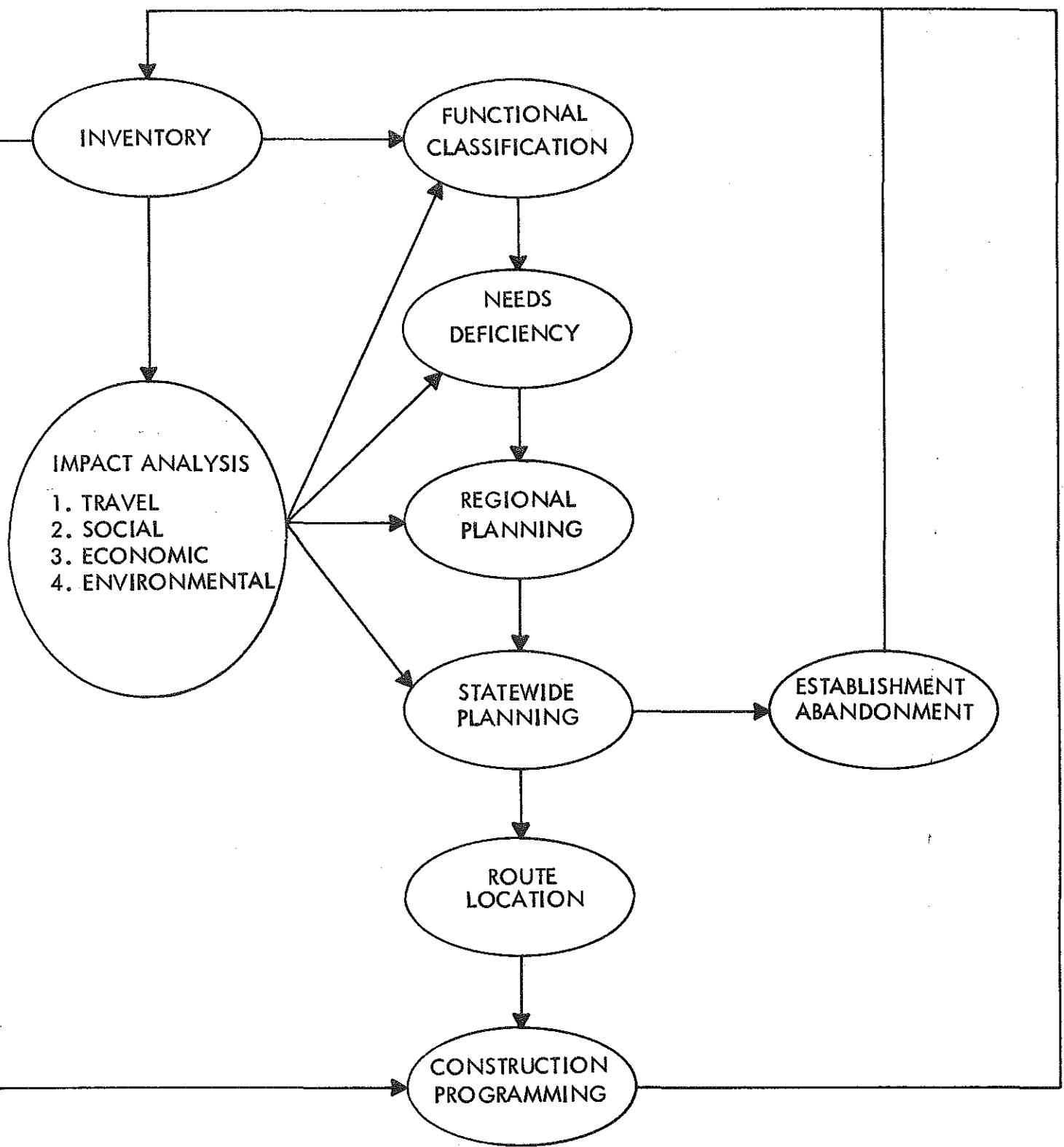
THE STATEWIDE MODELING PROCESSES CAN BE USED IN THE DAILY OPERATIONS OF MANY AREAS WITHIN A HIGHWAY DEPARTMENT. SPECIAL EMPHASIS IS PLACED UPON THE PLANNING AREA, SINCE IT IS THERE THAT STATEWIDE MODELING EFFORTS TYPICALLY ORIGINATE.



TYPICAL HIGHWAY AGENCY FUNCTIONAL ACTIVITY RELATIONSHIP

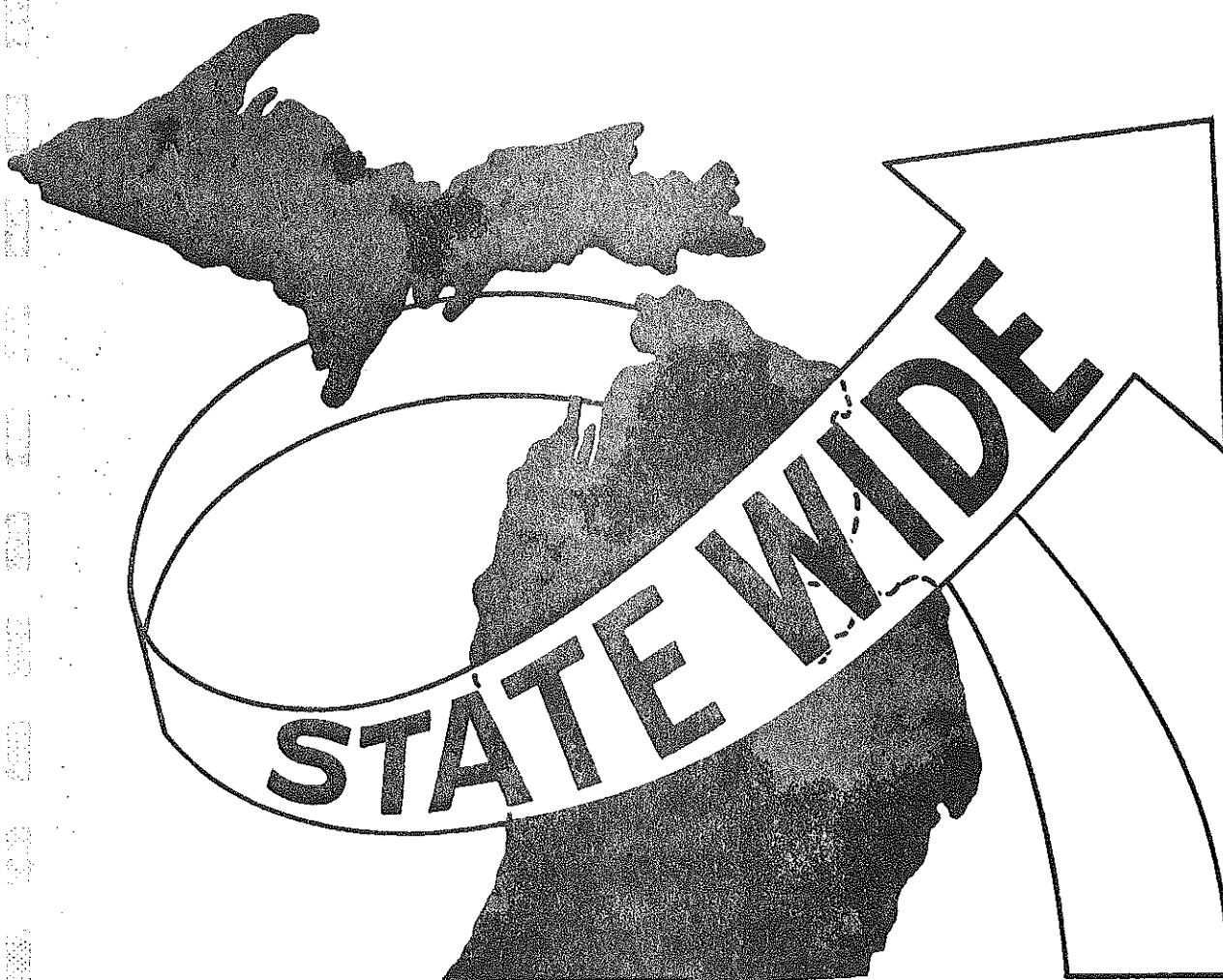


TYPICAL PLANNING ACTIVITY RELATIONSHIPS

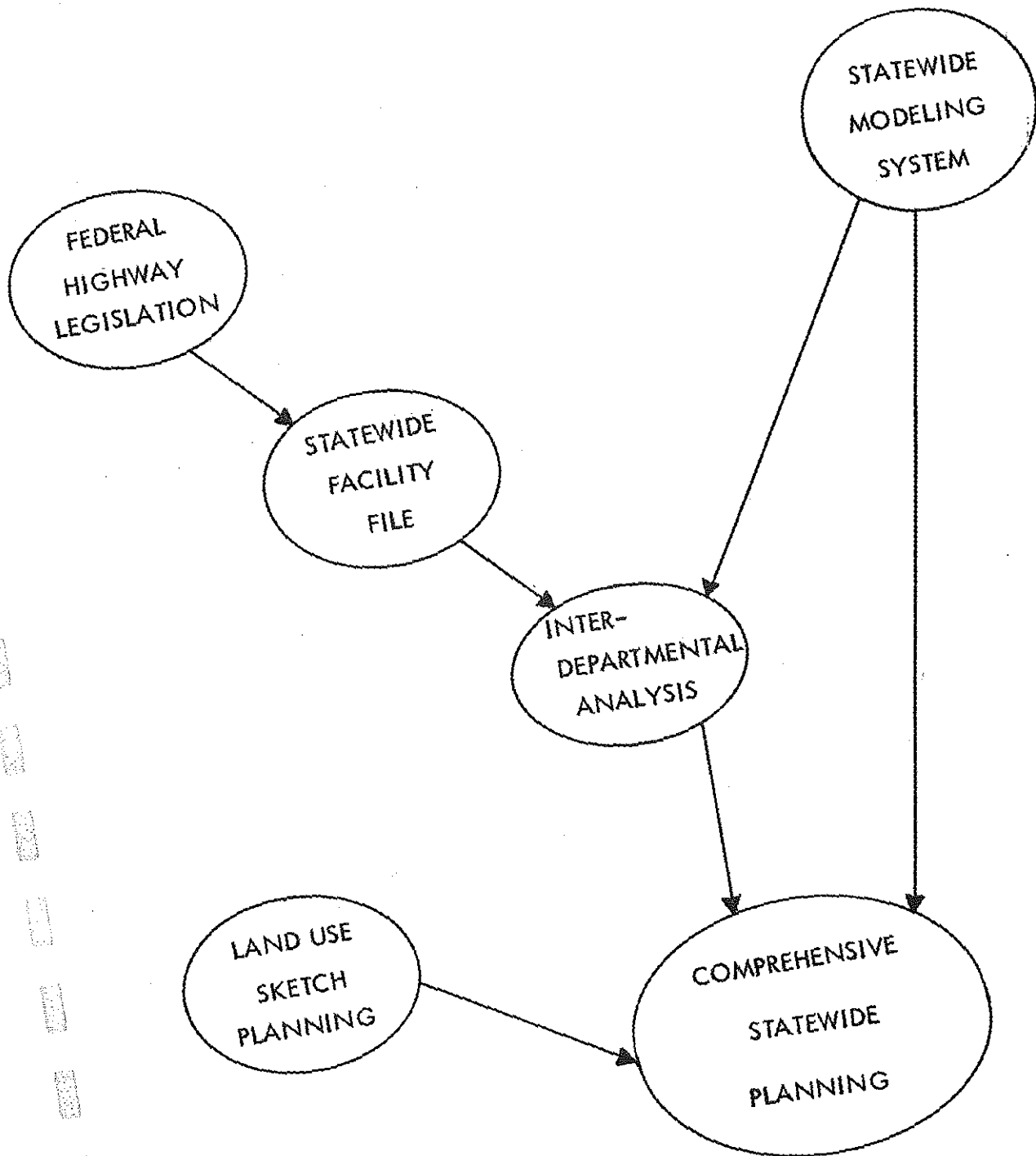


COMPREHENSIVE STATEWIDE PLANNING

THE STATEWIDE TRANSPORTATION MODELING SYSTEM HAS BEEN USED EFFECTIVELY IN ANALYSIS EFFORTS REQUIRING COOPERATION BETWEEN THE HIGHWAY DEPARTMENT AND OTHER STATE AGENCIES. THESE INITIAL SUCCESSES HAVE LED TO MORE DETAILED INVESTIGATION OF WAYS IN WHICH THE MODELING SYSTEM -- INCLUDING THE STATEWIDE LAND USE MODEL -- COULD BE APPLIED TO COMPREHENSIVE STATEWIDE PLANNING.



EVENTS WHICH HAVE GENERATED INTEREST IN COMPREHENSIVE STATEWIDE PLANNING



COMPREHENSIVE STATEWIDE PLANNING

