Statewide Transportation Analysis & Research

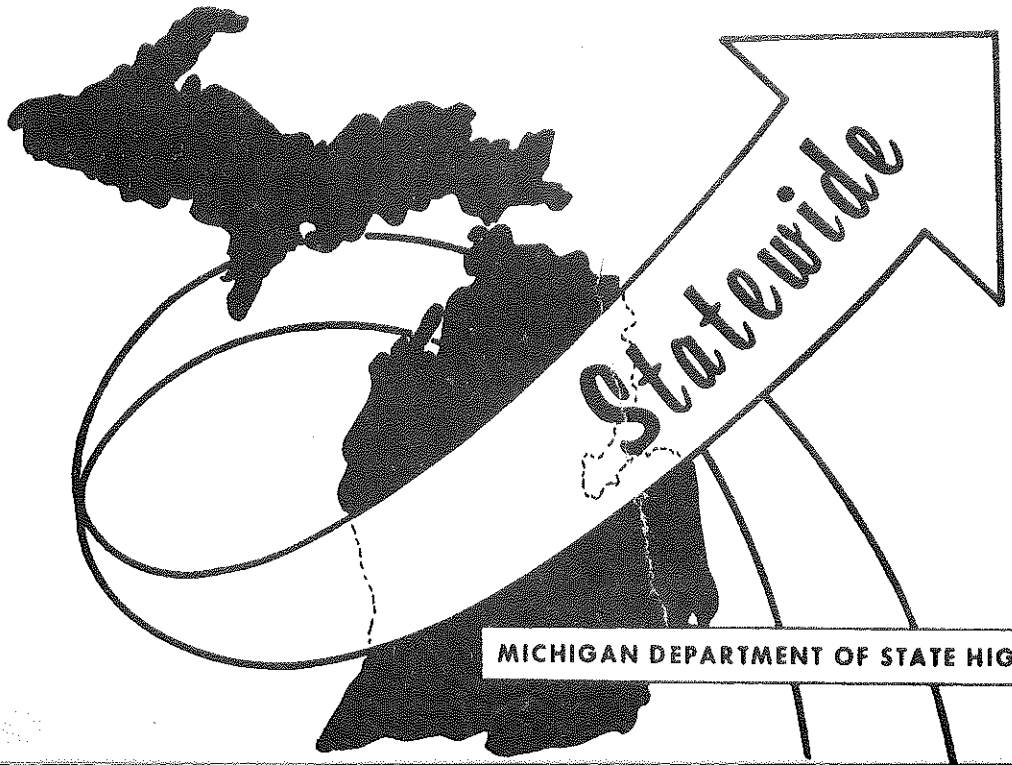
MICHIGAN'S STATEWIDE
TRANSPORTATION MODELING SYSTEM

Volume XVIII

CUTLINE ANALYSIS PROGRAM

STATEWIDE TRANSPORTATION
PLANNING PROCEDURES SECTION

March 4, 1976



MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

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BUREAU OF TRANSPORTATION PLANNING

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March 4, 1976

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, GOVERNOR

DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

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JOHN P. WOODFORD, DIRECTOR

March 4, 1976

Mr. Sam F. Cryderman, Deputy Director
Bureau of Transportation Planning
Department of State Highways and Transportation
State Highways Building
425 West Ottawa, P.O. Drawer K
Lansing, Michigan 48904

Dear Mr. Cryderman:

The Highway Planning Division is pleased to present Volume XVIII in the Statewide Transportation Modeling System Series. It documents the creation and application of the new cutline program which we feel can be of significant value to our Bureau in terms of travel model calibration and regional impact analysis.

A brief, but complete, outline and explanation of the cutline program process is included in the report for the benefit of those analysts who may wish to use it in their work.

This report was prepared by Mr. Lawrence J. Swick of the Statewide Transportation Planning Procedures Section, under the supervision of Mr. Richard E. Esch, Manager.

Sincerely,

R. J. Lilly, Administrator
Highway Planning Division

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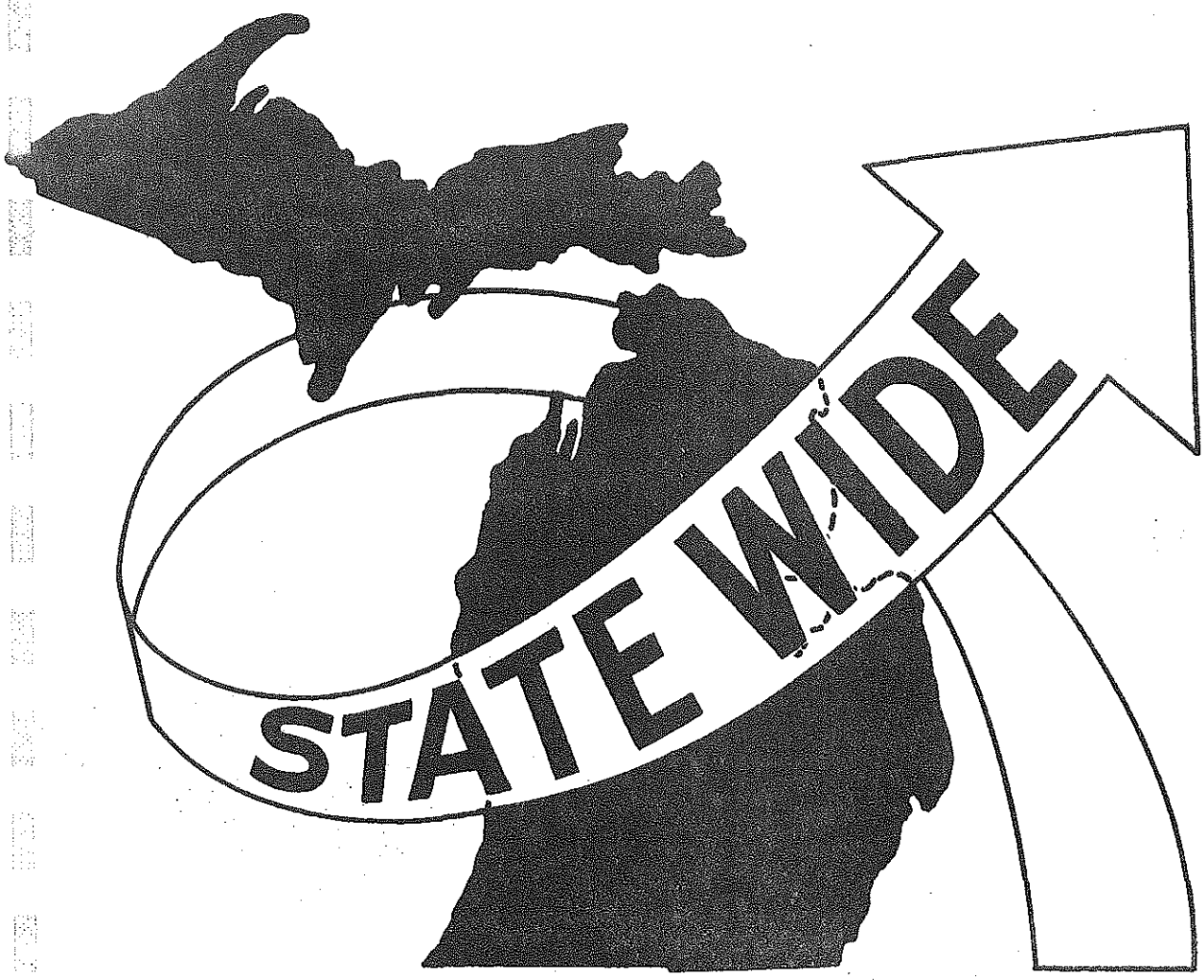
INTRODUCTION



INTRODUCTION

The Action Plan, as defined by Federal Legislation, requires the examination of many regional plans and impacts during the course of selecting a new highway corridor location. Because of this requirement, many alternates are studied beginning with the base year figures and incrementing to future year assignments including the required "do-nothing" plus correspondingly proposed illustrative alternatives. This usually amounts to a sizable number of alternate considerations which in turn demands a sizable and expedient mode of examining the impacts of these considerations upon the corridor and total "system plan" in question.

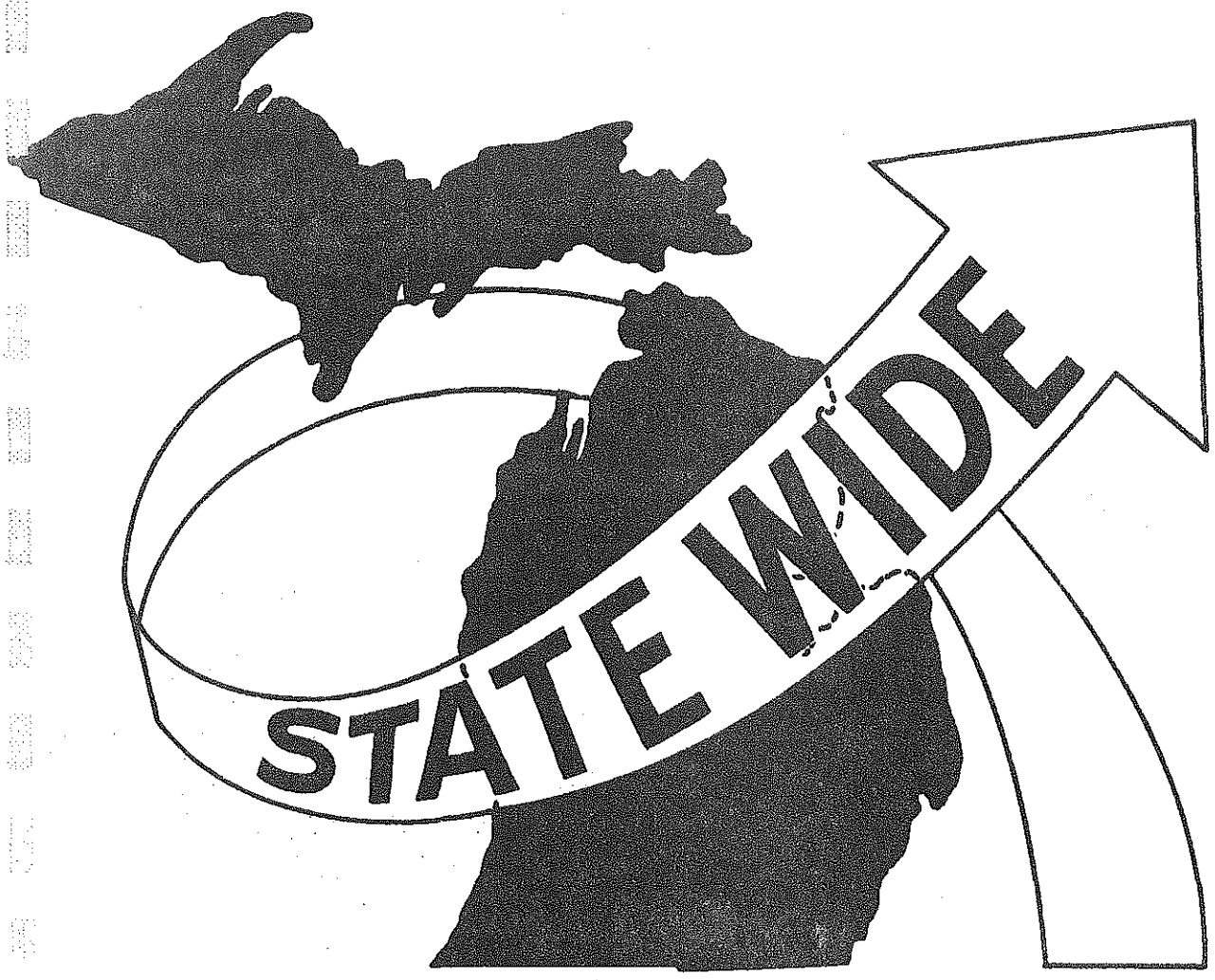
The pressure of these responsibilities requires that the modeling system to be used for impact analysis be of sufficient accuracy to assure confidence in the impact analysis results. This accuracy depends, in large part, on the continuing process of calibrating the model or models to yearly changes in base year traffic figures. To explain further, as time and years pass, traffic patterns change due to addition of new travel facilities and situational variables (gasoline prices, speed limit changes, etc.) Therefore, the modeling systems must be calibrated from time to time to compensate for these conditions. This "readjustment" or calibration process requires cutline analysis at many critical locations throughout the state. These cutlines would be located near or on bridges, state lines, city boundaries, major corridor locations, etc. A cutline, for example, could extend from one side of the state to the other and "cut" an enormous number of

highway links. The burden of manually totaling and analyzing these cutline figures hindered previous calibration efforts and subsequently led to the creation of a cutline program. This program eliminates the burden, not only on calibration analysis efforts but on cutline analysis connected with alternate highway planning impact efforts.

This program allows for a rapid revaluation of each new calibration or alternate assignment.

The intention of this report is to outline the basic principles and applications of the cutline program.

PROGRAM OPERATION



PROGRAM OPERATION

The cutline program is designed to run in conjunction with the Statewide Model 547 zone coordinate system appearing in Figure 1. Both endpoints of the selected cutline are to be defined in terms of the X and Y coordinates of this model. Cutline analysis will also operate for urban areas that have a coordinate system and link network similar to the Statewide model. The specific cutlines used to demonstrate this process can be seen in Figure 2. They are located at strategic points in the Upper Peninsula as an example in order to reflect general traffic movement trends within that regional study area.

Figure 3 illustrates an individual county within the Statewide system and the detail of coordinates which are available to all analysts for cutline study purposes. Actual user instructions are also available and are detailed for cutline use as programs Q01447 and Q01448 in Appendix A.

547 ZONE COORDINATE SYSTEM

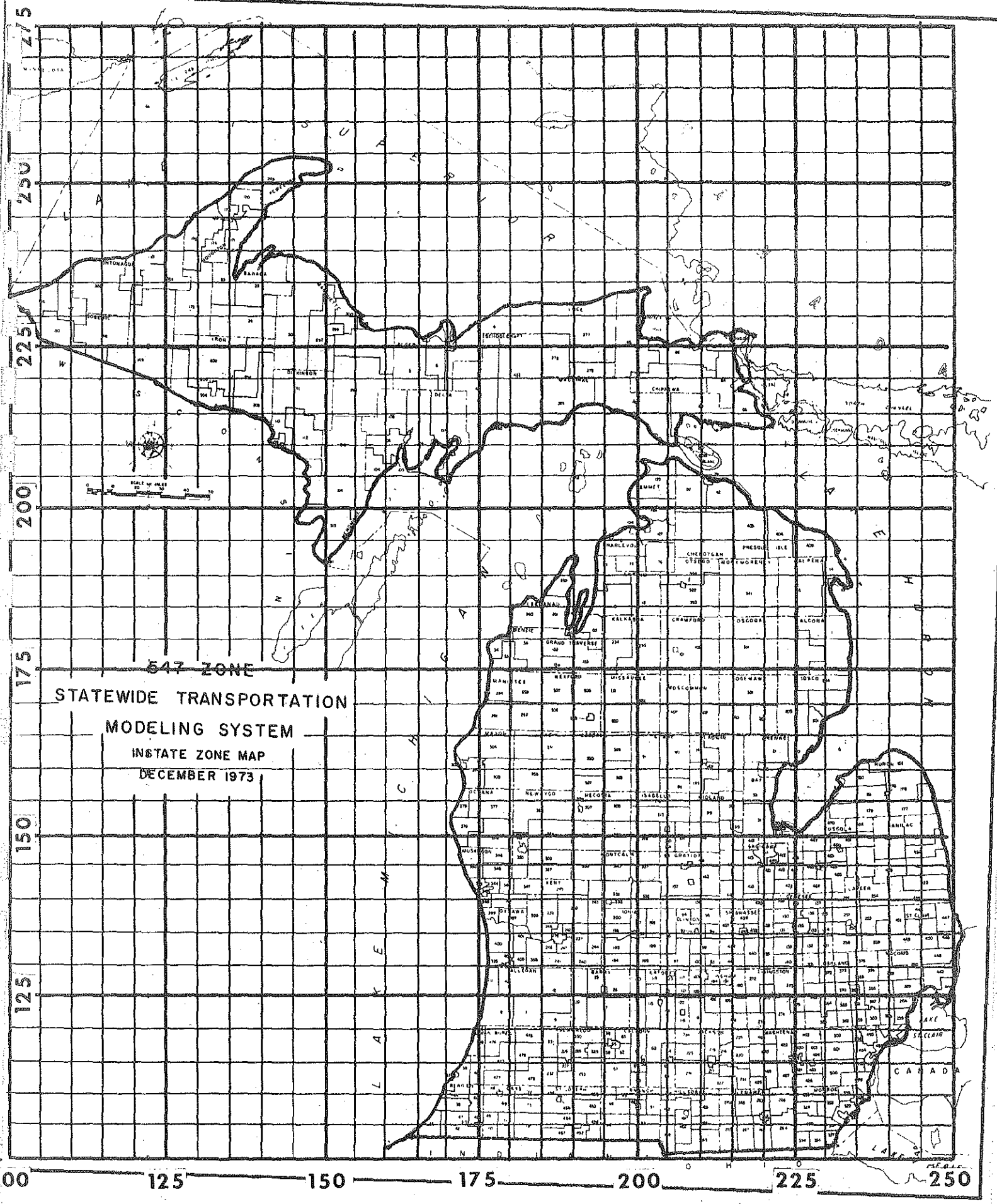


FIGURE 1

EXAMPLES OF CUTLINE PLACEMENT

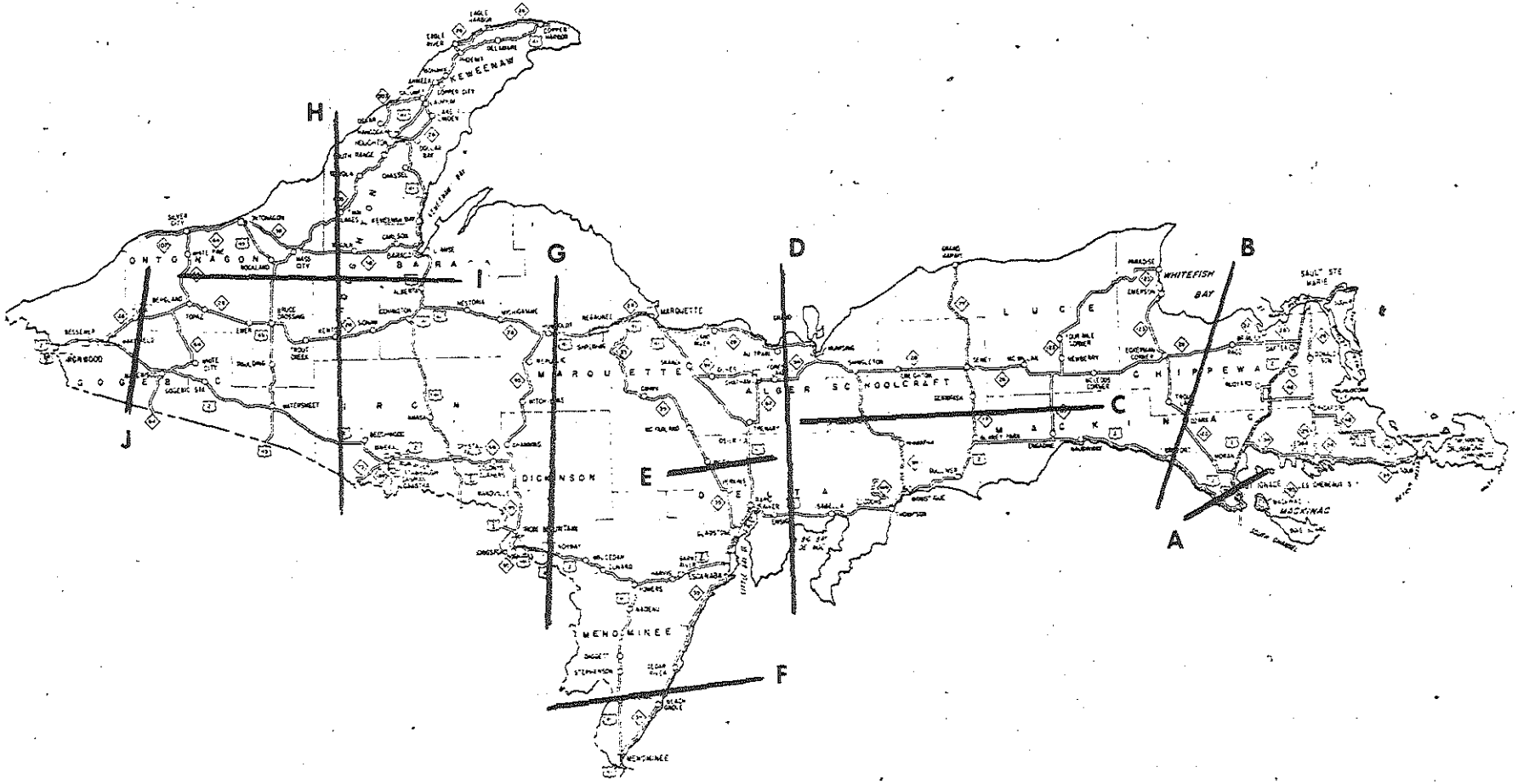


FIGURE 2

EXAMPLE OF STATEWIDE 547 ZONE 'COUNTY COORDINATE SYSTEM'

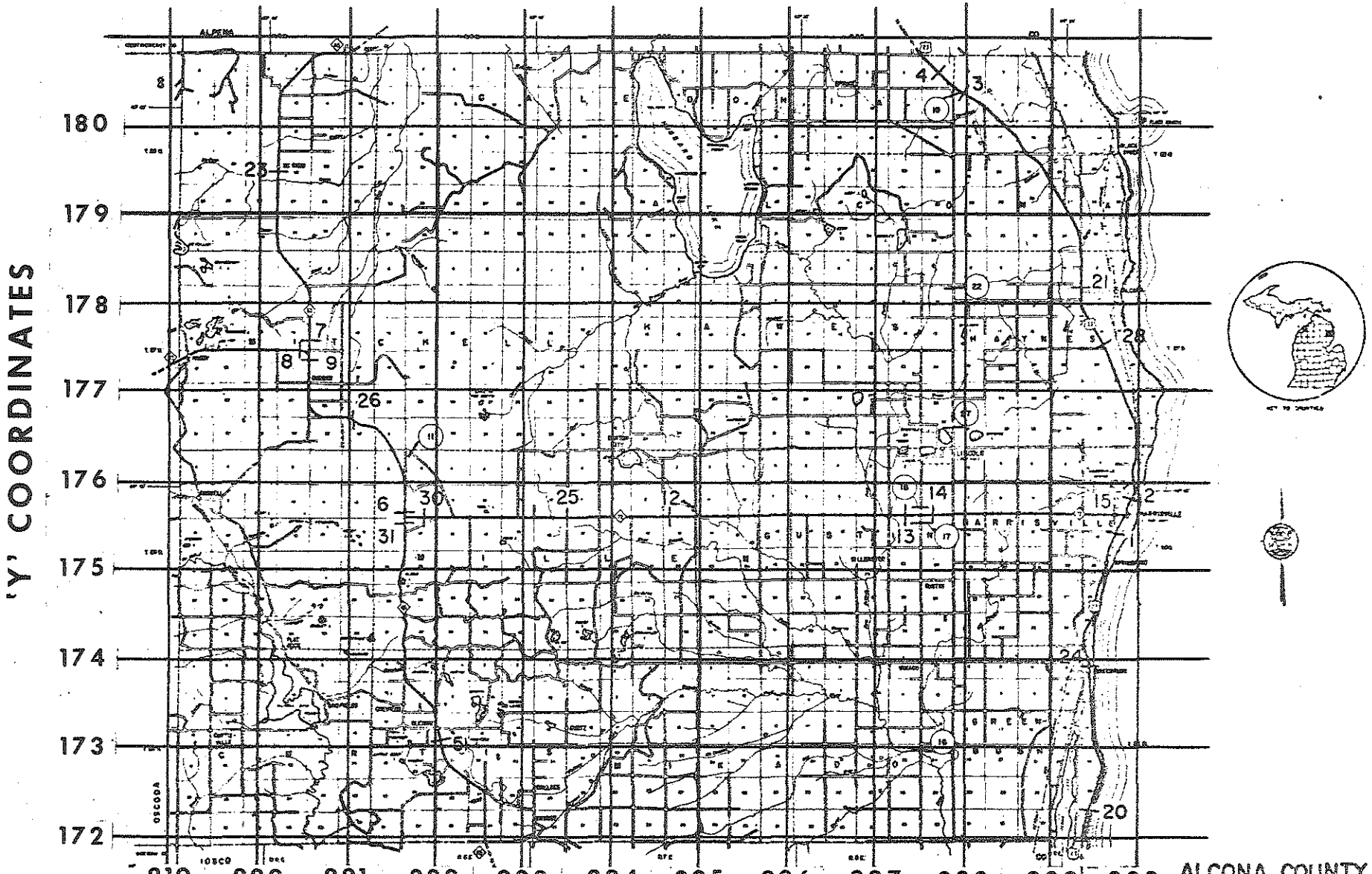
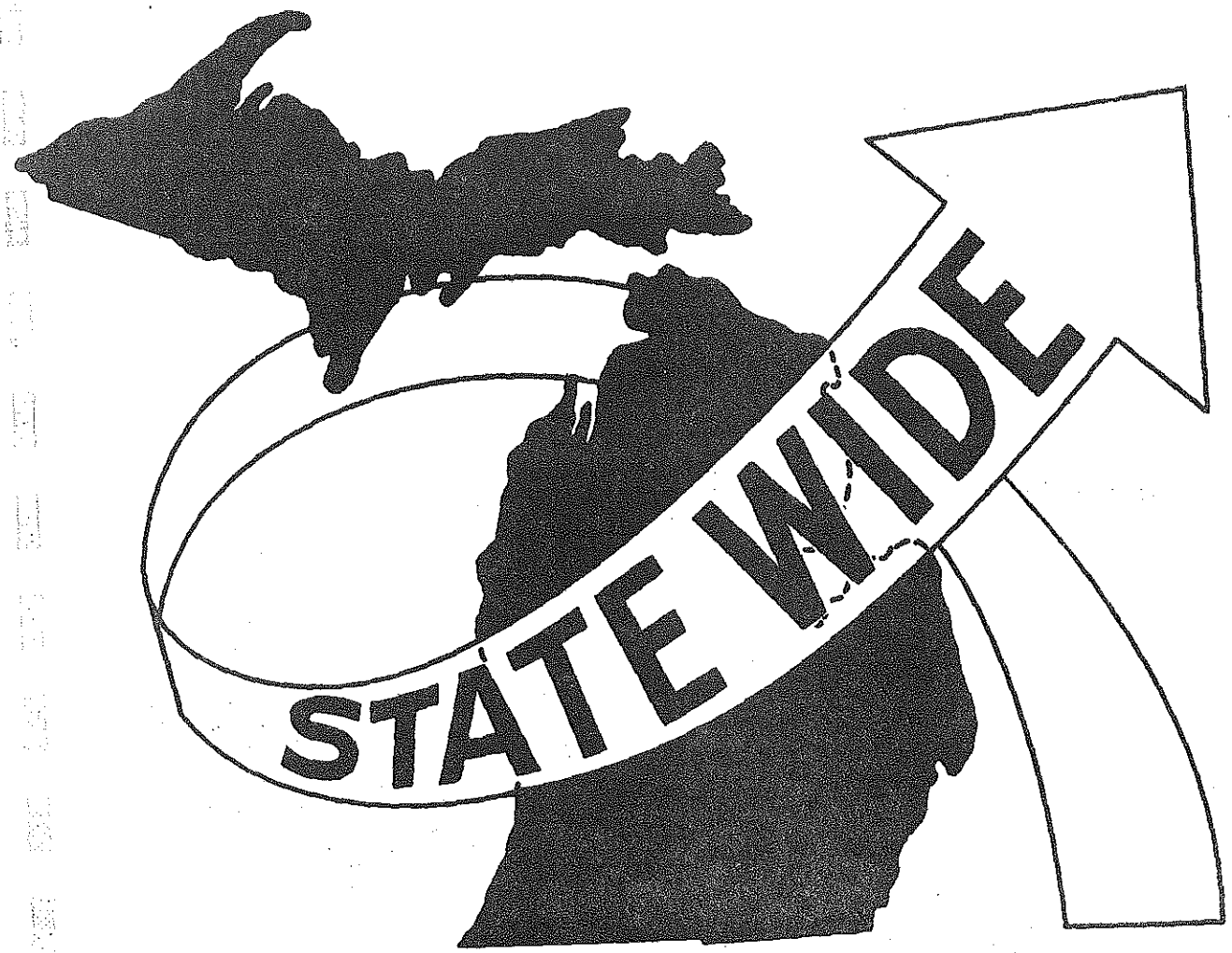


FIGURE 3

EXAMPLE OF APPLICATION



EXAMPLE OF APPLICATION

For purposes of illustration, three Upper Peninsula alternates (62,67,68) were used as examples. Each cutline is designated by letter (A,B,C, etc. - see Figure 4). The alternate numbers are listed either to the side or the bottom of the analysis data for easy reference. To create the desired cutlines, the user has merely to submit, in card form, the X and Y coordinates of the endpoints of each proposed cutline. As each cutline crosses a link segment, this volume is referred to as a "station" number (1,2,3, etc). For example, the analyst may wish to study cutlines A through C (Figure 4). The resulting output is normally presented in two forms as illustrated in Figures 4 and 5. The example in Figure 4 shows the assigned AADT for each alternate at the stations (links) that it crosses. It also shows the total number of vehicles crossing that line. The examples in Figure 5 shows the traffic assignments expressed in bar-graph form per station, etc. The output is easy to read and readily available for alternate to alternate comparison. Figure 6 details the Statewide Model coordinates for each cutline A,B,C, etc.

TEST OF CUTLINE VOLUME SUMMARY - UPPER PENINSULA

TRAFFIC VOLUME ACROSS CUTLINE A

	TOTAL	STA 1	STA 2
ALT62	25740	846	24894
ALT67	23983	13551	10432
ALT68	24932	14486	10446

TEST OF CUTLINE VOLUME SUMMARY - UPPER PENINSULA

TRAFFIC VOLUME ACROSS CUTLINE B

	TOTAL	STA 1	STA 2	STA 3	STA 4	STA 5	STA 6
ALT62	4790	432	3078	468	0	740	22
ALT67	13437	1296	11485	0	152	480	24
ALT68	9168	538	2808	0	5404	346	22

TEST OF CUTLINE VOLUME SUMMARY - UPPER PENINSULA

TRAFFIC VOLUME ACROSS CUTLINE C

	TOTAL	STA 1	STA 2	STA 3	STA 4
ALT62	15852	0	0	14768	1084
ALT67	17641	6480	0	0	11161
ALT68	15104	13482	0	0	1622

FIGURE 4

TEST OF CUTLINE VOLUME SUMMARY - UPPER PENINSULA

TRAFFIC VOLUME ACROSS CUTLINE A

AT STATION NO. 1

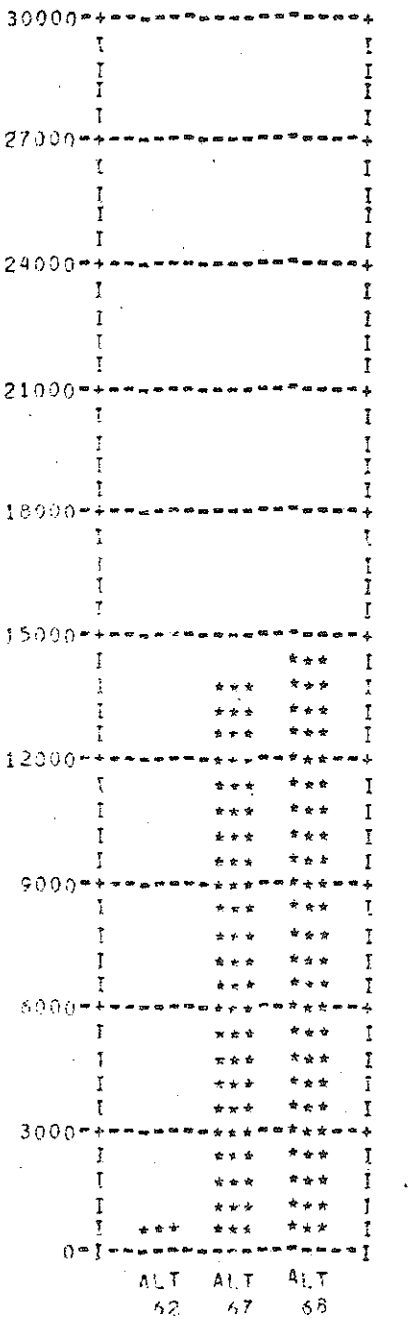


FIGURE 5

THE FOLLOWING STATIONS ARE ON OUTLINE A:

STATION	X-COORD	Y-COORD
1	201.60	207.52
2	203.30	207.86

THE FOLLOWING STATIONS ARE ON OUTLINE B:

STATION	X-COORD	Y-COORD
1	198.23	216.16
2	188.90	215.59
3	182.12	215.19
4	182.07	215.18
5	174.19	214.71
6	170.34	214.48

THE FOLLOWING STATIONS ARE ON OUTLINE C:

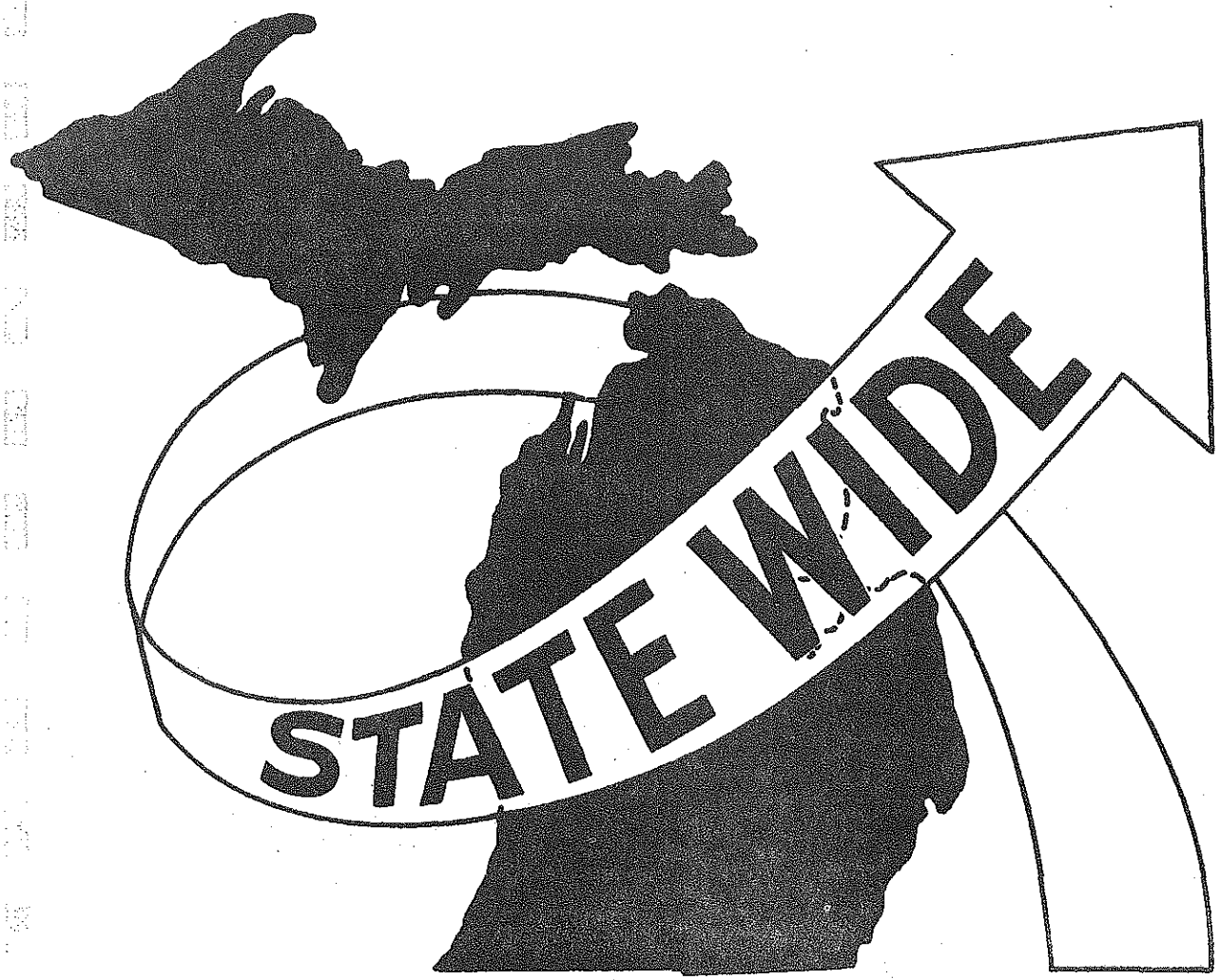
STATION	X-COORD	Y-COORD
1	186.75	212.29
2	186.68	212.59
3	186.52	213.31
4	185.41	215.18

THE FOLLOWING STATIONS ARE ON OUTLINE D:

STATION	X-COORD	Y-COORD
1	168.45	207.46
2	166.85	212.32
3	165.03	217.85
4	164.81	216.51
5	163.63	222.08

FIGURE 6

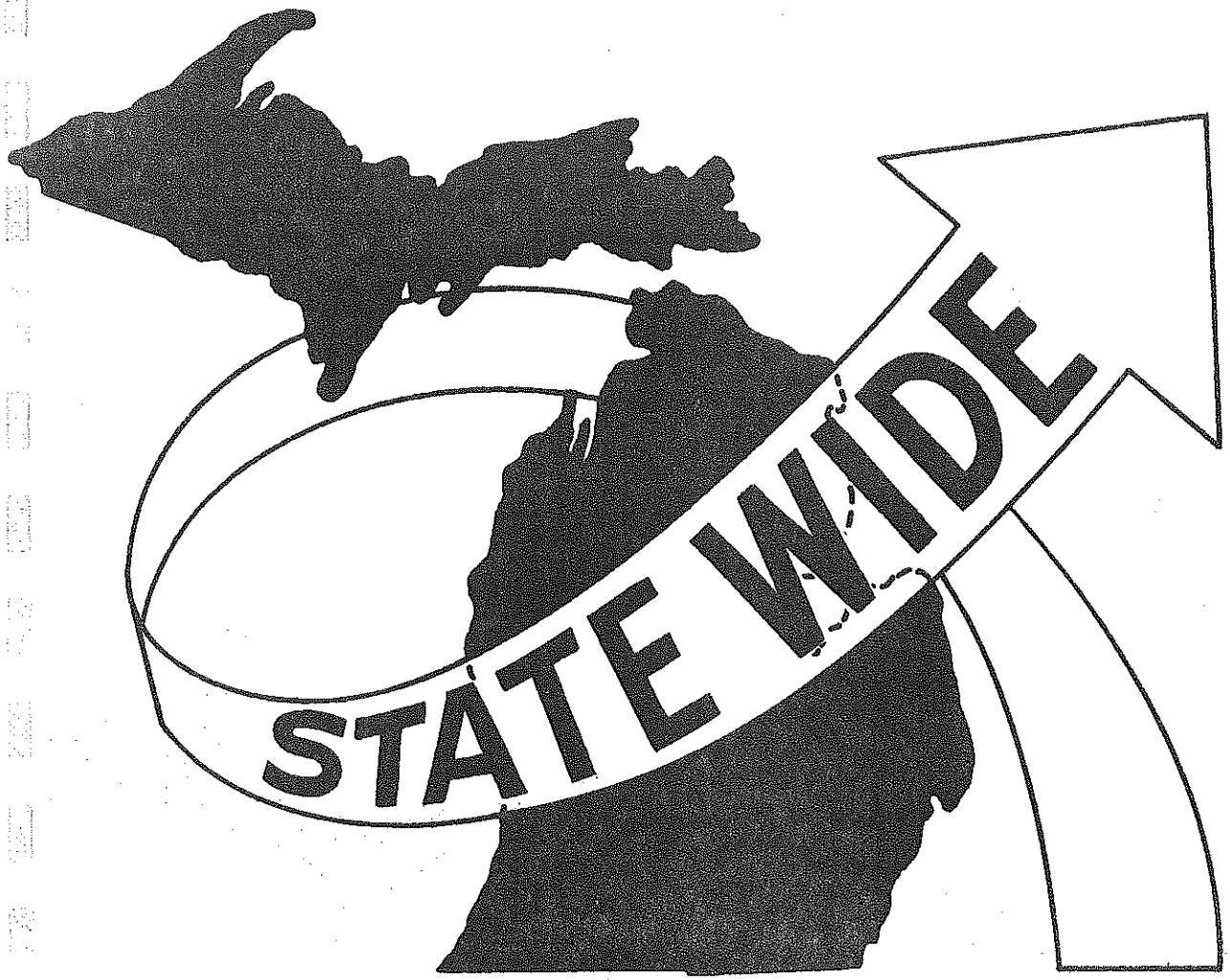
CONCLUSION



CONCLUSION

The primary purpose of the cutline program is to eliminate the manual and sometimes tedious operation normally associated with extensive cutline analysis. The program is currently operational and available to those who may wish to use it. For further information, consult Mr. Richard Esch of the Statewide Transportation Planning Procedures Section or Mr. Vic Whittier of the Computer Programming Section.

APPENDIX A



The following files are involved with this program:

1. A small input file of parameter cards.

2. Three input files from a network tape.

3. A time sharing (TSS) disk file which is created by the first run in a given study. Subsequent runs (alternates) of that study add to this file. The file consists of summary information about the stations along each cut line of each run.

4. A print file which prints back parameter card information for user verification. It also prints pertinent information about the network files. Finally, it prints the summary information which is stored in the disk file described above.

5. There are several other files which this program creates and uses but they are program work files and the user normally is not concerned with them.

In order to use this program the user must prepare the parameter cards as described below. Except for the Title Card, all cards must be prepared according to a fixed format.

Card 1: Title Card.

This is a title card for this particular run. It may contain any descriptive information which the user wishes to use. It is not used programmatically, but is simply printed out on the print file for identification purposes.

Card 2: Disk File Card.

Cols. 1-5. Run ID. Normally this will be ALTXX, where XX is some number. (Normally, runs will be numbered in this fashion while cut lines will be given letter designations.)

Cols. 11-16. Disk MFID. For a "NEW" run (see cols. 31-33, below), this may be any file name the user chooses for use among his TSS disk files. For an "OLD" run, of course, the name must be the same as the name used in previous runs of this study. If the name contains less than 6 characters it must be left justified.

Cols. 21-26. User Code. For simplicity in managing the disk file created by this program, it is created as a time sharing (TSS) file. Therefore, the appropriate user code is needed as part of the file name. If less than 6 characters, it must be left justified.

Cols. 31-33. "NEW" or "OLD". If this is the first run of a new study, this field must contain the word "NEW" in order to cause the program to create a new disk file. On subsequent runs of the same study, this field may contain the word "OLD" (or be left blank) since the "OLD" disk file will be used.

Card 3: Network File Card.

Cols. 1-7. Network tape MFID. If this is less than 7 characters, it must be left justified.

Cols. 11-17. Network header FID. If this is less than 7 characters, it must be left justified. This FID together with the above MFID make it possible for the program to internally label equate the file to the one called for by the program. A label equation card is not needed. Also, the program can output the actual file name on the print file.

Cols. 21-22. Control section. This field must contain (right justified) the number of the volume field in the link file which contains the control section in which the link lies.

Cols. 26-27. Traffic volume. This field must contain (right justified) the number of the volume field in the link file which contains the traffic volume along the link.

Card 4: Cut Line Cards. (There will be one of these cards for each cut line and there may be as many as 15 cut lines.)

Cols. 1-5. Cut Line ID. This will consist of the word "CUT" in cols. 1-3. Col. 4 will be blank. Col. 5 will contain a letter identifying the particular cut line. (As mentioned in the description of card 2, above, cut lines will normally be identified by letters while runs [alternates] will be identified by numbers.)

Cols. 7-12. X1. Coordinate of this cut line. Decimal point will be in col. 10.

Cols. 14-19. Y1. Coordinate of this cut line. Decimal point will be in col. 17.

Cols. 21-26. X2. Coordinate of this cut line. Decimal point will be col. 24.

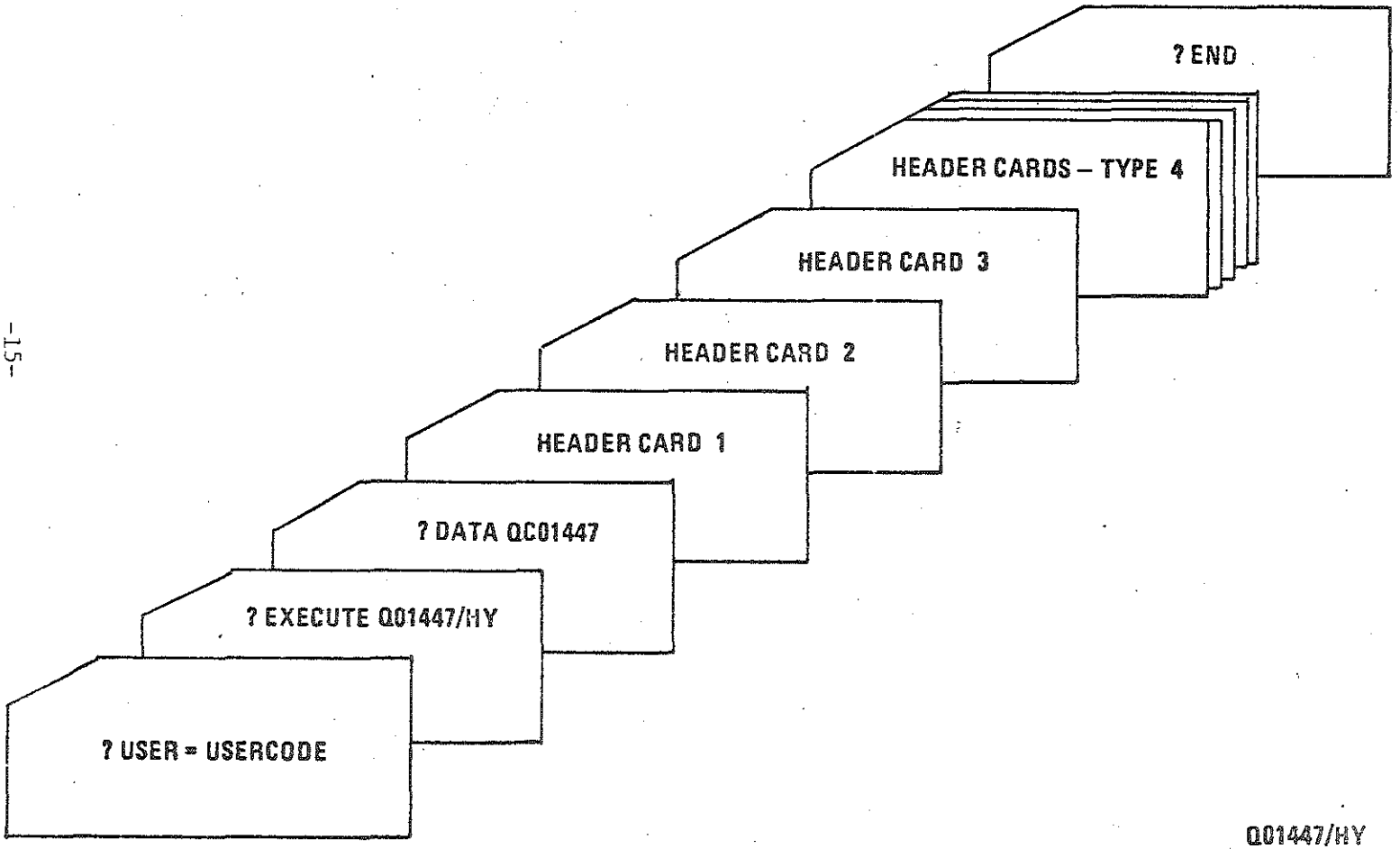
Cols. 28-33. Y2. Coordinate of this cut line. Decimal point will be in col. 31.

Cols. 34-78. County numbers. These 45 columns actually consist of fifteen 3-column fields. As many as 15 county numbers may be entered, right justified, into fields ending in columns 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, and 78.

The county number of any county which is crossed (or partially crossed) by this cut line should be entered into one of these fields. The county numbers do not need to be entered in any particular order. Also, blank fields may be left before, between or after county numbers.

These county numbers, in conjunction with the control sections in the link file are used to reduce the number of links which will require processing for a given cut line.

The file of parameter cards is made up of the four types of cards described above. The deck set up for using these cards to execute the program is presented on the last page of this write up. Note, especially, that since this program operates on a time sharing (TSS) file, the first card in the deck is a usercode card. Also, the Computer Service Request card should warn the operators that a TSS disk file will be used. On the first run of a study a dump card should be submitted to assure that the new disk file will be saved.



Q01447/HY

DECK SET UP

Q01448 - CUT LINE VOLUME SUMMARY

User Instructions

There are two input files for this program. One is a card file (2 cards). The other is a time sharing (TSS) disk file. The output of the program consists of tables and bar graphs printed on the line printer.

Card 1: Title Card.

The first card is a title card for the entire study. It may contain any descriptive information which the user wishes to use. It is not used programmatically, but is simply printed out with the tables and bar graphs for identification purposes.

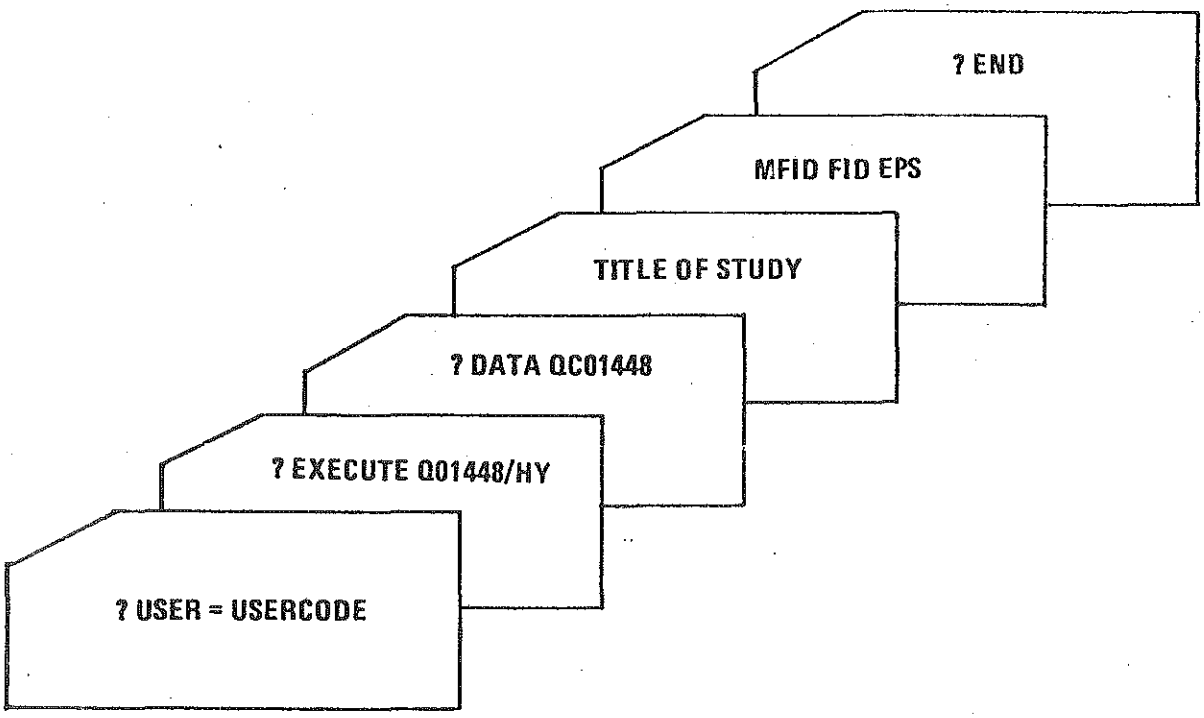
Card 2: Disk File Card.

Cols. 1-6. Disk MFID. This identifies the time sharing (TSS) file which was created and updated by program Q01447. If the name consists of less than 6 characters, it must be left justified.

Cols. 11-16. User code. For simplicity in managing the disk file created by program Q01447, it was created as a time sharing (TSS) files. Therefore, the appropriate user code is needed as part of the file name. If less than 6 characters, it must be left justified.

Cols. 20-24. EPS (epsilon). The value of EPS is expressed as a real number having a decimal point in column 21. If this field is left blank, EPS will be given a default value of 0.030. EPS is a variable which specifies the "tolerance" in coordinates of two potential stations which determines whether the two will be considered as the same station or separate stations.

The deck set up for using these cards to execute the program is presented on the last page of this write up. Note, especially, that since this program operates on a time sharing (TSS) file, the first card in the deck is a usercode card. Also, the Computer Service Request card should warn the operators that a TSS disk file will be used.



Q01448/HY

DECK SET UP