MAPRINT

A COMPUTER PROGRAM FOR ANALYZING CHANGING LOCATIONS OF NON-RESIDENTIAL ACTIVITIES

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Richard Dodge
C. Michael Walton

Research Memo 11

March 1974

COUNCIL FOR ADVANCED TRANSPORTATION STUDIES

THE UNIVERSITY OF TEXAS AT AUSTIN
MAPRINT

A COMPUTER PROGRAM FOR ANALYZING
CHANGING LOCATIONS OF NON-RESIDENTIAL ACTIVITIES

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Research Memo 11

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by the

Division of Research
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The University of Texas at Austin
PREFACE

This is the eleventh in a series of research memos describing activities and findings as part of the work done under the research project entitled "Transportation to Fulfill Human Needs in the Rural/Urban Environment." The project is divided into five topics, and this is the first research memo under the topic "The Influence of Inter-Urban Transportation Systems on the Rural Environment."

MAPRINT is a FORTRAN computer program developed to analyze the changing location of non-residential activities, including both businesses and public services. It is designed as an aid for the analysis of changes in community activity which are in part due to changes in transportation systems.

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ACKNOWLEDGMENTS

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The contents of this research memo reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views of policies of the Department of Transportation. This memo does not constitute a standard, specification, or regulation.

March 1974
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Development of MPRINT</td>
<td>3</td>
</tr>
<tr>
<td>Implementation of MPRINT</td>
<td>6</td>
</tr>
<tr>
<td>APPENDIX A: Sample Output Changing Locations of Road-related Retail Activity in Sealy, Texas - 1955-1970</td>
<td>A1</td>
</tr>
<tr>
<td>APPENDIX B: Flowchart and Program</td>
<td>B1</td>
</tr>
<tr>
<td>APPENDIX C: Organizing the Data Deck for Running MPRINT</td>
<td>C1</td>
</tr>
</tbody>
</table>
INTRODUCTION

This memorandum is intended to describe an analytic tool developed as an integral part of the research effort, "The Influence on the Rural Environment of Interurban Transportation Systems." It is the basic hypothesis of this research that changes in the operational and physical characteristics of elements of the transportation system, in particular those which can be classified as interurban, to some degree influence the growth and development of rural communities and that changes in the economic, physical and social characteristics of the community can be structured and interrelated to provide a clearer understanding of the dynamic relationship between transportation system change and the changing community.

The case study method is being used in the research. In this method, one particular community was selected to develop descriptive and analytic techniques which will be evaluated and refined when tested in relationship to other similar rural communities. The descriptive phase has been divided into two basic sub-efforts: (1) Community Description and (2) Transportation System Description. Each of these sub-efforts has been further subdivided into separate research efforts. The community description effort will describe the changing characteristics of land and people. Land is being described in terms of size, ownership, value and use. The people, or the socio/economic characteristics of the community, are being described in terms of political characteristics, e.g., the power structure; economic characteristics such as employment, income, job location etc.; and public services, e.g., schools, health care, etc. Two elements of the transportation system are being described: (1) highway and (2) railroad. Other modes were not sufficiently important to this area. Each of these elements is being described to display the changing use characteristics, i.e., traffic volume, frequency and quality of service, and boarding opportunity.

It was hypothesized that, as the operational and physical characteristics of the interurban transportation changed over time, certain types of business activity would be influenced in a variety of ways, that is, market areas would expand or contract, customers would be attracted or repelled, and new opportunities would develop. It was felt that these influences would be reflected to some
degree in the changing spatial relationship between business activity and the transportation systems upon which they depend. All business activity depends on transportation to some degree or another. The question is to what degree. Rather than begin with a preconception concerning this degree of dependence, the researchers have chosen to first examine the changing location of all business activity in the community. "Business activity" has been classified as all non-residential activity, including such public services as schools, court houses, etc.

Previous studies dealing with the influence of transportation systems on a community have focused primarily on the land immediately adjacent to a new element of the system, i.e., a highway. This influence is significant and should be understood. On the other hand, it does not account for the changes in the internal movement within the community as a whole which can be altered by a change in the transportation. For example, what was once a minor arterial may become a major linkage to a new highway. For a further discussion of impact studies, see the separate report entitled "Transportation Impact Research: A Review of Previous Studies and A Recommended Methodology for the Study of Rural Communities" (DOT 03 30093 II-I), March 1974.

Studying small rural communities provides a unique opportunity to deal with the totality of a community -- to be as inclusive as possible and not to rely on abstractions and generalization for the basis of the study. The amount of information which must be gathered and organized is manageable, thus making it possible for the researcher to develop a very intimate relationship with the area under study.

The original time frame for this research was the period from 1950 to 1970; during this time two significant changes occurred in the interurban transportation system: (1) the Interstate Highway system came into existence; (2) rail passenger service declined; and (3) motor trucks were increasingly used for the movement of goods. The recent lowering of the speed limit on the highway system from 70 to 55 mph is a significant change in the operational characteristics of the highway system. For this reason we have expanded the original study period in order to include the present.
DEVELOPMENT OF MAPRINT

So that the changes in the relationships between the transportation systems and business activity could be better understood, a computer program was developed which has the capability of mapping the locations of business activity and displaying simultaneously certain characteristics of the transportation system. All business activities were classified according to the Standard Industrial Code (SIC). The computer program has been written so as to make it possible to generate a map for any desired year displaying any desired combination of business activities according to the SIC Code. Four items of specific information are provided:

(1) The location of the business activity;
(2) The movement of an activity, showing the former and the new location;
(3) The closing of a business activity in the year called for;
(4) The opening of a business activity in the year called for.

The location and classification of each activity was obtained from back issues for the telephone book. This assumed that all important activities had telephones and were therefore listed. The address provided the location, and the heading and/or advertising provided the classification. An orthogonal grid was drawn on a street map of the town facilitating the assignment of an appropriate "X" "Y" coordinate for each address. In this study the grid did not provide an exact location of all activities because the scale of the map was too small to distinguish accurately between adjacent locations in the same block. This was particularly true in the downtown section. However, this would not exclude the use of this program for more detailed analysis if desired; it would merely require a larger scale base map. Because of the scale of the base map and the degree of accuracy required at this stage in the research, locations were referenced to the grid on the basis of their location on one side of a street or another and according to their proximity to the corner or the middle of a block. (See Figure 1, p. 4.)

In addition to the computer-generated map, a verbal printout is produced for each map, providing more detailed information by giving the name of each mapped activity which moved, closed, or opened during a particular period. The printout also lists the specific X and Y coordinates of each activity for reference to the map. (See Figure 2, p. 5.) A data card with the following data was prepared for each activity:
Figure 1

BASE MAP OF SEALY

(Showing the Orthogonal Grid and the Straight-line Sections of Road Plotted in MAPRINT)

SCALE : 1 IN. = 2000 FT.

CITY OF SEALY
Figure 2

SEALY YEAR 1967

REMMERTS GULF moved during the year from its old location at 105° 166° to a new location at 180° 70°. Its S.I.C. code is 5541 and is represented by symbol 23.

REMMERTS GULF opened at the coordinates 160° 70°. Its S.I.C. code is 5541 and is represented by the symbol 23.

HENDERSONS TxACO opened at the coordinates 164° 100°. Its S.I.C. code is 5541 and is represented by the symbol 23.

T BONES closed this year. It had been located at the coordinates 165° 500°. Its SIC code was 5541 and was represented by the symbol 23.

HAGLEY'S SHELL opened at the coordinates 123° 175°. Its S.I.C. code is 5541 and is represented by the symbol 23.

WUJINTON ENCO SER closed this year. It had been located at the coordinates 166° 100°. Its SIC code was 5541 and was represented by the symbol 23.

DURING THE YEAR 1967:

3 ACTIVITIES STARTED,
2 ACTIVITIES CLOSED,
1 ACTIVITIES MOVED TO NEW LOCATIONS.

TOTALS BY SYMBOL

4 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
4 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
2 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
5 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
(1) S.I.C. number
(2) X, Y, coordinates
(3) Name of activity
(4) Year activity started
(5) Year activity moved
(6) Year activity closed.

In the case of activities which were in existence and/or did not move throughout the study period, items 4, 5, and/or 6 would not appear on the data card.

Data categories 4, 5, and 6 above are important in the program since they represent changes in the pattern of activity. In the printed output, MAPRINT describes each change which occurs. In the plotted output, MAPRINT plots a special symbol at the location of an opening (a square around the regular symbol) or a closing (an octogon), and, in the case of a move, draws a line from the old location to the new location, the latter enclosed by a square (showing that an activity started at that location.)

Road data input is reasonably simple. Each end of straight stretches of road are given X and Y coordinates, and the annual ADT $X \times 10^3$ is entered on the data card. A subroutine, ROADPLT, within MAPRINT takes the data, plots a line from one end of the map to the other and plots marks (in this case a hexagon) roughly proportional to the ADT (number marks per inch $X 1000 = \text{ADT}$). Figures 3a, 3b illustrate the combined plotting of the two routines for a particular year, in this case, 1967.

**IMPLEMENTATION OF MAPRINT**

MAPRINT allows the investigator a number of options. He can study any year or series of years he wants, or he can look at any number of codes, either in ranges (Code X - Code Z) or in series (Code A and Code B and Code F). At the same time, he can have the codes represented in the output by a number of the systems' (CDC 6600) graphic symbols.

The ability to produce a graphic display makes it possible to observe shifting patterns in business activity. The verbal printout which accompanies each graphic display provides the required detail information necessary for a more refined description of the changing spatial relationships of business activity.
LEGEND

- Activity Started
- Activity Ended
- Code 7538
- Code 5541
- Code 5813 5812
- Code 7011
- Code 6022

SCALE: 1 IN. = 2000 FT.

1. Activity Closing
2. Activity Starting
3. Activity Moving
4. A.D.T. = Number of Marks/Inch X 1000 (approximate)
SEALY YEAR 1967

REMMERTS GULF MOVED DURING THE YEAR FROM ITS OLD LOCATION AT 165° 166 TO A NEW LOCATION AT 140° 70°. ITS SIC CODE IS 5541 AND IS REPRESENTED BY SYMBOL 23.

REMMERTS GULF OPENED AT THE COORDINATES 140° 70°. THE SIC CODE IS 5541 AND IS REPRESENTED BY THE SYMBOL 23.

HENDERSUNS TXACO OPENED AT THE COORDINATES 164° 100°. THE SIC CODE IS 5541 AND IS REPRESENTED BY THE SYMBOL 23.

T BONES CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES 165° 500°. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

BAGLEYS SHELL OPENED AT THE COORDINATES 123° 175°. THE SIC CODE IS 5541 AND IS REPRESENTED BY THE SYMBOL 23.

QUINTON ENCO SER CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES 166° 100°. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

DURING THE YEAR 1967:

3 ACTIVITIES STARTED,
2 ACTIVITIES CLOSED,
1 ACTIVITY MOVED TO NEW LOCATIONS.

14 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
4 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
2 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
5 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
Other data being collected is also being programmed for graphic display. In particular, data on land use, land market value, parcel size, land ownership, economic intensity of specific business activities and spatial data related to the study of the power base of the community are being programmed for graphic display, compatible with the MAPRINT program. This capability will make it possible to better understand the possible relationships between these various data areas as they have changed over time.

The advantages of MAPRINT can be greatly augmented with the increased data handling capability of a management system such as System 2000. This system allows the researcher to use any piece of data as the control for input to MAPRINT. For example, he could ask for all highway related activities ending in year 1970 that are within a geographic area definable by the coordinates of the map-grid. He can then enter the resulting data sets into MAPRINT to be plotted. If economic data is available, the investigator could split businesses into strata and be able to determine effects on businesses of different sizes. Other forms of data (e.g., land use or land sales) could be chosen at will and plotted.

It is conceivable that this technique may be useful in Public Hearings where feasible impacts can be presented to the community in visual form for their evaluation.

The following sections of this memorandum consist of three appendices. The first contains the computer-generated maps and the accompanying printout for each year from 1955 to 1970. Appendix B contains both the flow-chart for the program and the program itself. The final section presents a set of specific instructions as an aid to anyone wishing to develop a similar program.

Appendix A, the sample output, shows only the activities of road-related retail and of financial services. The following is a description of the activities plotted, their associated SIC codes, and the symbols used in the graphic display.

<table>
<thead>
<tr>
<th>Activity</th>
<th>SIC code(s)</th>
<th>Symbol no.</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garages (automotive)</td>
<td>7538</td>
<td>17</td>
<td>A</td>
</tr>
<tr>
<td>Gas stations</td>
<td>5541</td>
<td>23</td>
<td>G</td>
</tr>
<tr>
<td>Restaurants and inns</td>
<td>5813, 5812</td>
<td>34</td>
<td>R</td>
</tr>
<tr>
<td>Motels</td>
<td>7011</td>
<td>29</td>
<td>S</td>
</tr>
<tr>
<td>Financial services</td>
<td>6022</td>
<td>59</td>
<td>$</td>
</tr>
</tbody>
</table>
APPENDIX A

SAMPLE OUTPUT
CHANGING LOCATION OF ROAD-RELATED RETAIL

SEALY, TEXAS
1955 - 1970
EINKAUF GULF CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, -0°, -0°. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

JOUSANS GULF CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, -0°, -0°. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

VICENIK SER STA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, -0°, -0°. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

CHARLES GARAGE CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, -0°, -0°. ITS SIC CODE WAS 7538 AND WAS REPRESENTED BY THE SYMBOL 17.

DURING THE YEAR 1955:

0 ACTIVITIES STARTED,
4 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

12 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

7 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY LEGEND YEAR 56

ACTIVITY STARTED A CODE 7538
ACTIVITY ENDED

G CODE 5541
R CODE 5813 5812
M CODE 7011
S CODE 6022

THE MARK ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE: 1 IN. = 2000 FT.
ADOLPHS GULF
OPENED AT THE COORDINATES, 169, 325.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

Hears Gulf
OPENED AT THE COORDINATES, 105, 166.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

EZ Place
OPENED AT THE COORDINATES, 322, 168.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

Engelke Humble
OPENED AT THE COORDINATES, 119, 172.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

Kuchara Texaco
OPENED AT THE COORDINATES, 169, 296.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

Chesters Garage
OPENED AT THE COORDINATES, 166, 246.
THE S.I.C. CODE IS, 7538 AND IS REPRESENTED BY THE SYMBOL 17.

Machala Garage
OPENED AT THE COORDINATES, 215, 296.
THE S.I.C. CODE IS, 7538 AND IS REPRESENTED BY THE SYMBOL 17.

During the year 1956:
7 ACTIVITIES STARTED,
0 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

14 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
7 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
7 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY

LEGEND

ACTIVITY STARTED A CODE 7538
ACTIVITY ENDED 
G CODE 5541
R CODE 5813 5812
M CODE 7011
$ CODE 6022

YEAR 57

THE MARKS ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE: 1 IN. = 2000 FT.
REMMERTS GULF OPENED AT THE COORDINATES, 105° 166. THE S.I.C. CODE IS 5541 AND IS REPRESENTED BY THE SYMBOL 23.

HIWAY 90 SFR STA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 150° 162. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

GERHARDTS GARAGE CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 302° 175. ITS SIC CODE WAS 7538 AND WAS REPRESENTED BY THE SYMBOL 17.

DURING THE YEAR 1957:
1 ACTIVITIES STARTED,
2 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

13 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
7 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
7 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY

LEGEND

YEAR 58

ACTIVITY STARTED

ACTIVITY ENDED

G CODE 5541

R CODE 5813 5812

M CODE 7011

$ CODE 6022

THE MARK ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE : 1 IN. = 2000 FT.
SEALY YEAR 1958

SHELL SER STA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES, 303, 191. ITS SIC CODE WAS
5541 AND WAS REPRESENTED BY THE SYMBOL 23.

HENRY'S GULF OPENED AT THE COORDINATES, 169, 325.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

SCHOPPE OIL CO OPENED AT THE COORDINATES, 284, 160.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

SEALY MOTEL CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES, 150, 170. ITS SIC CODE WAS
7011 AND WAS REPRESENTED BY THE SYMBOL 29.

DURING THE YEAR 1958:

2 ACTIVITIES STARTED,
2 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

14 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
7 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
MAURLAND SERV STA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES , 180, 58. ITS SIC CODE WAS
5541 AND WAS REPRESENTED BY THE SYMBOL 23.

WRIGHTS SER STA OPENED AT THE COORDINATES , 303, 191.
THE S.I.C. CODE IS , 5541 AND IS REPRESENTED BY THE SYMBOL 23.

HENRYS GULF CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES , 169, 325. ITS SIC CODE WAS
5541 AND WAS REPRESENTED BY THE SYMBOL 23.

VICTORIA OIL CO OPENED AT THE COORDINATES , 342, 160.
THE S.I.C. CODE IS , 5541 AND IS REPRESENTED BY THE SYMBOL 23.

DURING THE YEAR 1959:

2 ACTIVITIES STARTED,

2 ACTIVITIES CLOSED,

0 ACTIVITIES MOVED TO NEW LOCATIONS.

14 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

6 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY

LEGEND

ACTIVITY STARTED
ACTIVITY ENDED
G CODE 5541
R CODE 5813 5812
M CODE 7011
$ CODE 6022

THE MARKS ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE: 1 IN. = 2000 FT.
KUCHARA TEXACO CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES, 169°, 296°. ITS SIC CODE WAS
5541 AND WAS REPRESENTED BY THE SYMBOL 23.

MILLERS GULF OPENED AT THE COORDINATES, 169°, 325°.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

KEY OIL OPENED AT THE COORDINATES, 342°, 160°.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

MAZOCHE HUMBLE OPENED AT THE COORDINATES, 50°, 175°.
THE S.I.C. CODE IS, 5541 AND IS REPRESENTED BY THE SYMBOL 23.

DURING THE YEAR 1960:

3 ACTIVITIES STARTED,
1 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

14 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 7 APPEAR THIS YEAR.
SEALY

YEAR 61

LEGEND

ACTIVITY STARTED
ACTIVITY ENDED

G CODE 5541
R CODE 5813 5812
M CODE 7011
S CODE 6022

THE MARKS ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE : 1 IN. = 2000 FT.
DURING THE YEAR 1961:

0 ACTIVITIES STARTED,
0 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

11 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY  LEGEND  YEAR 62

G  ACTIVITY STARTED  A  CODE 7538
C  ACTIVITY ENDED
G  CODE 5541
R  CODE 5813  5812
M  CODE 7011
$  CODE 6022

THE MARK 0 ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE: 1 IN. = 2000 FT.
CAMPBELL'S SERV
OPENED AT THE COORDINATES: 169, 296.

T L TRUCK STOP
OPENED AT THE COORDINATES: 5, 189.

ZAPALACS PLACE
CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES: 205, 320. ITS SIC CODE WAS
5813 AND WAS REPRESENTED BY THE SYMBOL 34.

SISKAS PLACE
OPENED AT THE COORDINATES: 258, 160.
THE S.I.C. CODE IS: 5813 AND IS REPRESENTED BY THE SYMBOL 34.

JOHNNIES AUTO
CLOSED THIS YEAR. IT HAD BEEN LOCATED AT
THE COORDINATES: 192, 243. ITS SIC CODE WAS
7538 AND WAS REPRESENTED BY THE SYMBOL 17.

HENRYS GARAGE

DURING THE YEAR 1962:

4 ACTIVITIES STARTED.

2 ACTIVITIES CLOSED.

0 ACTIVITIES MOVED TO NEW LOCATIONS.

13 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

2 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

6 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

7 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY

LEGEND

ACTIVITY STARTED

ACTIVITY ENDED

CODE 7538

G CODE 5541

R CODE 5813 5812

M CODE 7011

$ CODE 6022

THE MARKS ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE : 1 IN. = 2000 FT.

LODGE MOTEL CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES 50, 175. ITS SIC CODE WAS 7011 AND WAS REPRESENTED BY THE SYMBOL 29.

DURING THE YEAR 1963:

1 ACTIVITIES STARTED,
1 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

14 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

6 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY
LEGEN D
YEAR 64

ACTIVITY STARTED
ACTIVITY ENDED

G CODE 5541
R CODE 5813 5812
M CODE 7011
$ CODE 6022

THE MARK © ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE : 1 IN. = 2000 FT.
EZ PLACE CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 322, 168. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

MAIN ST SERV STA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 183, 312. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

CAMPRELLS SERV CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 169, 296. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.


SISKAS PLACE MOVED DURING THE YEAR FROM ITS OLD LOCATION AT 258, 160 TO A NEW LOCATION AT -0, -0. ITS S.I.C. CODE IS 5813 AND IS REPRESENTED BY SYMBOL 34.

DURING THE YEAR 1964:

2 ACTIVITIES STARTED;
3 ACTIVITIES CLOSED;
1 ACTIVITIES MOVED TO NEW LOCATIONS.

15 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY

LEGEND YEAR 65

A ACTIVITY STARTED CODE 7538
O ACTIVITY ENDED
G CODE 5541
R CODE 5813 5812
M CODE 7011
$ CODE 6022

THE MARK @ ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE: 1 IN. = 2000 FT.
HIGHWAY SER STA CLOSING THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 169, 320. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.


VICTORIA CLOSING THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 118, 165. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.


RAINBOW INN OPENED AT THE COORDINATES, 170, 500. THE S.I.C. CODE IS 5813 AND IS REPRESENTED BY THE SYMBOL 34.

TOM'S TAVERN OPENED AT THE COORDINATES, 170, 498. THE S.I.C. CODE IS 5813 AND IS REPRESENTED BY THE SYMBOL 34.

CITY AUTO MOVED DURING THE YEAR FROM ITS OLD LOCATION AT 205, 306 TO A NEW LOCATION AT 180, 328. ITS SIC CODE IS 7538 AND IS REPRESENTED BY SYMBOL 17.

CITY AUTO OPENED AT THE COORDINATES, 180, 328. THE S.I.C. CODE IS 7538 AND IS REPRESENTED BY THE SYMBOL 17.


DURING THE YEAR 1965:

6 ACTIVITIES STARTED,

2 ACTIVITIES CLOSED,

1 ACTIVITIES MOVED TO NEW LOCATIONS.

13 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

4 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

1 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

7 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
Legend

- N: Activity Started
- A: Activity Ended
- G: Code 5541
- R: Code 5813 5812
- M: Code 7011
- $: Code 6022

The marks on the road lines indicate relative traffic counts.

Scale: 1 in. = 2000 ft.
RIVERSIDE SER STA moved during the year from its old location at 166, 360 to a new location at 160, 100. Its S.I.C. code is 5541 and is represented by Symbol 23.

RIVERSIDE SER STA opened at the coordinates, 160, 100. The S.I.C. code is 5541 and is represented by the symbol 23.

WRIGHTS SER STA closed this year. It had been located at the coordinates, 303, 191. Its SIC code was 5541 and was represented by the symbol 23.

SEALY SERVICE opened at the coordinates, 116, 165. The S.I.C. code is 5541 and is represented by the symbol 23.

T BONES opened at the coordinates, 165, 500. The S.I.C. code is 5541 and is represented by the symbol 23.

ZAPALAC'S TEXACO opened at the coordinates, 183, 310. The S.I.C. code is 5541 and is represented by the symbol 23.

QUINTON ENCO SER opened at the coordinates, 166, 100. The S.I.C. code is 5541 and is represented by the symbol 23.

WESTERN TOWN opened at the coordinates, 110, 170. The S.I.C. code is 7511 and is represented by the symbol 29.

CITIZENS BANK moved during the year from its old location at 169, 312 to a new location at 177, 312. Its S.I.C. code is 6022 and is represented by Symbol 59.

CITIZENS BANK opened at the coordinates, 177, 312. The S.I.C. code is 6022 and is represented by the symbol 59.

CHESTERS GARAGE closed this year. It had been located at the coordinates, 168, 246. Its SIC code was 7538 and was represented by the symbol 17.

HENRYS GARAGE closed this year. It had been located at the coordinates, 260, 160. Its SIC code was 7538 and was represented by the symbol 17.

During the year 1966:

7 activities started.
3 activities closed.
2 activities moved to new locations.

14 activities corresponding to Symbol 23 appear this year.

4 activities corresponding to Symbol 34 appear this year.

6 activities corresponding to Symbol 29 appear this year.

1 activity corresponding to Symbol 59 appears this year.

7 activities corresponding to Symbol 17 appear this year.
SEALY
LEGEND

ACTIVITY STARTED A  CODE 7538
ACTIVITY ENDED  
G  CODE 5541
R  CODE 5813 5812
M  CODE 7011  THE MARK ON THE ROAD
$  CODE 6022  LINES INDICATE RELATIVE
TRAFFIC COUNTS.

SCALE : 1 IN. = 2000 FT.

[Diagram with various symbols and lines indicating traffic counts]
REMMERTS GULF moved during the year from its old location at 105° 16' to a new location at 180° 70'. Its S.I.C. code is 5541 and is represented by symbol 23.

REMMERTS GULF opened at the coordinates 180° 70'. The S.I.C. code is 5541 and is represented by the symbol 23.

HENDERSONS TXACO opened at the coordinates 164° 100'. The S.I.C. code is 5541 and is represented by the symbol 23.

T RONES closed this year. It had been located at the coordinates 165° 500'. Its SIC code was 5541 and was represented by the symbol 23.

BAGLEYS SHELL opened at the coordinates 123° 175'. The S.I.C. code is 5541 and is represented by the symbol 23.

QUINTON ENCO SER closed this year. It had been located at the coordinates 166° 100'. Its SIC code was 5541 and was represented by the symbol 23.

During the year 1967:

3 activities started,
2 activities closed,
1 activity moved to new locations.

14 activities corresponding to symbol 23 appear this year.
4 activities corresponding to symbol 34 appear this year.
5 activities corresponding to symbol 29 appear this year.
2 activities corresponding to symbol 59 appear this year.
5 activities corresponding to symbol 17 appear this year.
JOES FINA
OPENED AT THE COORDINATES: 342, 160.
The S.I.C. Code Is: 5541 and is represented by the symbol 23.

MORRIS ENCO SER STA
OPENED AT THE COORDINATES: 166, 100.
The S.I.C. Code Is: 5541 and is represented by the symbol 23.

KEY TRUCK STOP
OPENED AT THE COORDINATES: 142, 95.
The S.I.C. Code Is: 5541 and is represented by the symbol 23.

GRANNYS TAVERN
OPENED AT THE COORDINATES: 170, 497.
The S.I.C. Code Is: 5813 and is represented by the symbol 34.

DURING THE YEAR 1968:

4 ACTIVITIES STARTED,

O ACTIVITIES CLOSED.

O ACTIVITIES MOVED TO NEW LOCATIONS.

15 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

2 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
SEALY

LEGEND

YEAR 69

1) ACTIVITY STARTED  R  CODE 7538

2) ACTIVITY ENDED

G  CODE 5541

R  CODE 5813 5812

M  CODE 7011

$  CODE 6022

THE MARK @ ON THE ROAD LINES INDICATE RELATIVE TRAFFIC COUNTS.

SCALE : 1 IN. = 2000 FT.
JOES FINA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 342, 160. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

T L TRUCK STOP CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 9, 189. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

MORRIS ENCO SER STA CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 160, 100. ITS SIC CODE WAS 5541 AND WAS REPRESENTED BY THE SYMBOL 23.

RAINROW INN CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 170, 500. ITS SIC CODE WAS 5813 AND WAS REPRESENTED BY THE SYMBOL 34.

GRANNYS TAVERN CLOSED THIS YEAR. IT HAD BEEN LOCATED AT THE COORDINATES, 170, 497. ITS SIC CODE WAS 5813 AND WAS REPRESENTED BY THE SYMBOL 34.

DURING THE YEAR 1969:

0 ACTIVITIES STARTED,
5 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS.

15 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.

2 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.

5 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
LEGEND

E  ACTIVITY STARTED   A  CODE 7538
G  ACTIVITY ENDED
C  CODE 5541
R  CODE 5813 5812
M  CODE 7011  THE MARK* ON THE ROAD  LINES INDICATE RELATIVE TRAFFIC COUNTS.
$  CODE 6022

SCALE : 1 IN. = 2000 FT.
Krupala EnCo Ser
OPENED AT THE COORDINATES  166, 100.
THE S.I.C. CODE IS  5541 AND IS REPRESENTED BY THE SYMBOL 23.

CharlieS ConOCO
OPENED AT THE COORDINATES  243, 160.
THE S.I.C. CODE IS  5541 AND IS REPRESENTED BY THE SYMBOL 23.

Zapalacs ArCO
OPENED AT THE COORDINATES  169, 310.
THE S.I.C. CODE IS  5541 AND IS REPRESENTED BY THE SYMBOL 23.

Fishers ShEll
OPENED AT THE COORDINATES  175, 349.
THE S.I.C. CODE IS  5541 AND IS REPRESENTED BY THE SYMBOL 23.

Midway Bar SErV
OPENED AT THE COORDINATES  165, 403.
THE S.I.C. CODE IS  5541 AND IS REPRESENTED BY THE SYMBOL 23.

Sealy Shamrock
OPENED AT THE COORDINATES  169, 320.
THE S.I.C. CODE IS  5541 AND IS REPRESENTED BY THE SYMBOL 23.

Midway Bar SErV
OPENED AT THE COORDINATES  165, 403.
THE S.I.C. CODE IS  5813 AND IS REPRESENTED BY THE SYMBOL 34.

Highway Inn
OPENED AT THE COORDINATES  320, 163.
THE S.I.C. CODE IS  5813 AND IS REPRESENTED BY THE SYMBOL 34.

Longhorn LoUnGe
OPENED AT THE COORDINATES  166, 322.
THE S.I.C. CODE IS  5813 AND IS REPRESENTED BY THE SYMBOL 34.

Starlite Inn
OPENED AT THE COORDINATES  165, 485.
THE S.I.C. CODE IS  5813 AND IS REPRESENTED BY THE SYMBOL 34.

EinkaufS RFePaIr
OPENED AT THE COORDINATES  300, 160.
THE S.I.C. CODE IS  7538 AND IS REPRESENTED BY THE SYMBOL 17.

DURING THE YEAR 1970:

11 ACTIVITIES STARTED,
0 ACTIVITIES CLOSED,
0 ACTIVITIES MOVED TO NEW LOCATIONS,

18 ACTIVITIES CORRESPONDING TO SYMBOL 23 APPEAR THIS YEAR.
7 ACTIVITIES CORRESPONDING TO SYMBOL 34 APPEAR THIS YEAR.
5 ACTIVITIES CORRESPONDING TO SYMBOL 29 APPEAR THIS YEAR.
2 ACTIVITIES CORRESPONDING TO SYMBOL 59 APPEAR THIS YEAR.
6 ACTIVITIES CORRESPONDING TO SYMBOL 17 APPEAR THIS YEAR.
APPENDIX B

FLOWCHART AND PROGRAM
SUBROUTINE ROADSIN

COMMON/BK/RD1(20), RDY1(20), RD2(20), RDY2(20), COUNT(20,21)

NUMRDS

I = 1
I = I + 1

I ≤ NUMRDS

RDX1(I), RDY1(I), RD2(I), RDY2(I), COUNT(I,J), J = 1, 21

RETURN

I = 2
I = I + 1

I ≤ NUM

MOVE(I-1)
NE. 0

F
T

START(I) = MOVE(I-1)

II ≤ I YEAR2
II = II + 1

F
T

CALL BGNPLT

PRINT HEADINGS
TOWN NAME, II

STOP
END

YHOLD = 9.1
FYEAR=FLOAT(II)
CALL SYMBOL (WRITES THE WORD "YEAR")
CALL NUMBER (WRITES YEAR (FYEAR))
CALL SYMBOL (WRITES SCALE NOTATION, EXPLAINS ROAD MARKINGS)
SCAL=80./.3.
CALL AXIS (DRAWS X AND Y AXES)
CALL PLT (COMPLETES BOX)
CALL ROADPLT (NUMRDS,II,SCAZ,SCAL)
SUBROUTINE ROADPLT
COMMON/BLKR/RDX(20),RDY(20)
RDX2(20),RDY2(20),COUNT(20,21)
DIMENSION XX(50),YY(50)
I=1
I=I+1
T
I NUMRDS
J=II-49
COUNT(I,J)
EQ. 0
CN=COUNT(I,J)*TLENGTH*SCAZ
XLENGTH=RDX1(I)-RDX2(I)
YLENGTH=RDY1(I)-RDY2(I)
CN=CN+1
N=CN
DELTX=XLENGTH/N
DELTY=YLENGTH/N
N=N+1
L ≤ N
L=1
L=L+1
XX(L)=RDX2(I)+(L-1)*DELTX)*SCAL
YY(L)=(RDY2(I)+(L-1)*DELTY)*SCAL
XX(N+1)=0.
YY(N+1)=0.
XX(N+2)=2000.
YY(N+2)=2000.
START(I) .EQ. 0
START(I) = 50

START(I) .GT. II

NSTART = NSTART + 1

CALL SYMBOL
(DRAWS A SQUARE AT LOCATION XMAP(I), YMAP(I).)

PRINTS EXPLANATION:
(NAME OF ACTIVITY OPENING, LOCATION, CODE, AND SYMBOL.)

DIED(I) .EQ. 0
DIED(I) = 75

DIED(I) .LT. II

NCLOSE = NCLOSE + 1

CALL SYMBOL
(DRAWS OCTAGON AT (XMAP(I), YMAP(I).)

(PRINTS EXPLANATION: NAME OF ACTIVITY WHICH CLOSED, LOCATION, CODE, AND SYMBOL.)

MOVE(I) .EQ. II

F

12

13

14
CALL SYMBOL

\[ \text{NEXIST}(J) = \text{NEXIST}(J) + 1 \]
\[ M = M + 1 \]
\[ \text{XARA}(M) = \text{XMAP}(I) \times \text{SCAL} \]
\[ \text{YARA}(M) = \text{YMAP}(I) \times \text{SCAL} \]
\[ \text{MM}(M, J) = 1 \]

CALL PLT

\[ \text{NMOVE} = \text{NMOVE} + 1 \]
\[ \text{PLT} \text{ (PLACES PEN DOWN AT } (\text{XMAP}(I), \text{YMAP}(I)) \text{.)} \]
\[ \text{IMV} = I + 1 \]

CALL SYMBOL

\[ \text{PLT} \text{ (MOVES PEN TO NEW LOCATION } (\text{XMAP}(\text{IMV}), \text{YMAP}(\text{IMV}), \text{AND DRAWS } (\text{SYM}(J)) \text{.)} \]

(DPEATS EXPLANATION:
NAME OF ACTIVITY, OLD LOCATION, NEW LOCATION, CODE, AND SYMBOL.)
PROGRAM MAPRINT (INPUT, OUTPUT)
INTEGER ICODE (1000), XMAP (1000), YMAP (1000), NAME (3, 1000), START (1000)
INTEGER MOVE (1000), DIED (1000), NCODE (10, 10), IHETW (10)
INTEGER NCODE (10), SYM (10), NEXIST (10), TOWNCOD, TOWNNAME
DIMENSION XARA (500), YARA (500), MM (500, 10)
READ 190, TOWNNAME, TOWNCOD
190 FORMAT (A10, 13)
READ 10, IYEAR, IYEAR2
READ 104, NSYMBOL
DO 7 I = 1, NSYMBOL
  READ 104, KCODE
  READ 106, SYM (I), KKK, (NCODE (J, I), J = 1, KCODE)
  NCODE (I) = KCODE
  READ 108, IHETW (I)
7 CONTINUE
DO 5 I = 1, 1000
  READ 102, ICODE (I), XMAP (I), YMAP (I), NAME (1, I), NAME (2, I), NAME (3, I),
  START (I), MOVE (I), DIED (I)
  IF (ICODE (I), EQ, 9999) GO TO 150
5 CONTINUE
150 NUM = I - 1
CALL ROADSIN (NUMRDS)
DO 85 I = 2, NUM
  IF (MOVE (I - 1), NE, 0) START (I) = MOVE (I - 1)
85 CONTINUE
DO 8 II = IYEAR1, IYEAR2
  PRINT 86, TOWNNAME, II
86 FORMAT (1H1, 10X, A10, 2X, U10, 3U10, 4.0, 12, /)
CALL BGNPLT
CALL PLT (.5* 50, -3)
CALL SYMHOL (.2*7.9,5*, 14, 6HLEGEND* 0 , 6)
CALL SYMHOL (.6*9.5*, 21, TOWNNAME* 0 , 10)
CALL SYMHOL (.25*9.4*, 14, 2*0 , 0 , 1)
CALL SYMHOL (.75*9.3*, 14, 16ACTIVITY STARTED, 0, 15)
CALL SYMHOL (.25*9.2*, 14, 16ACTIVITY ENDED, 0, 14)
YHOLD = 9.1
DO 8 J = 1, NSYMBOL
  IF (J, EQ, 5) YHOLD = 9.5
  YS = YHOLD - .2
  IF (J, LE, 4) X5 = .25
  IF (J, GT, 4) X5 = 3.25
  CALL SYMHOL (X5, YS, 14, SYM (J) , 0 , -1)
  YS = YS + .08
  X5 = X5 + .5
  CALL SYMHOL (X5, YS, 14, 4HCODE* 0 , 4)
  NONN = NOCOD (J)
  DO 9 JJ = 1, NONN
    X5 = X5 + .75
    FCODE = FLOAT (NCODE (J* JJ))
    CALL NUMBER (X5, YS, 14, FCODE, 0 , 1)
  IF (JJ, EQ, NONN) YHOLD = YS
9 CONTINUE
8 CONTINUE
FYEAR = FLOAT (II)
CALL SYMHOL (.4*2,9,5*, 21, 4HYEAR* 0 , 4)
CALL NUMBER (.5*5, 9, 5*, 21, FYEAR* 0 , 1)
CALL SYMHOL (.1*2,7,6*, 14, 25HS SCALE: 1 IN = 2000 FT. 0 , 25)
CALL SYM80L(3.5,8.2,14.8) THE MARK,0.8)
CALL SYM80L(4.7,8.3,14.0,0.0,-1)
CALL SYM80L(4.9,8.5,14,11) MON THE ROAD,0.0,11)
CALL SYM80L(3.5,8.0,14.23) LINES INDICATE RELATIVE,0.0,23)
CALL SYM80L(3.5,7.8,14.15) TRAFFIC COUNTS,0.0,15)
SCAL=80./3.
CALL AXIS(0.,0.,15) SCALE-DIVISIONS=-15,6.0,0.,0.,75.)
CALL AXIS(0.,0.,22) NORTH SCALE-DIVISIONS,22.75,590,0.,75.)
CALL PLT(0.,7.5,2)
CALL PLT(6.,7.5,2)
CALL ROADPLOT(NUMROS,II,SCAZ,SCAL)
NSTART=O
NCLOSE=0
NMOVE=0
DO 41 J=1,NSYMBOL
NEXIST(J)=0
NONN=NCODE(J)
M=0
DO 40 I=1,NUM
Ibetwn=Ibetwn(J)
IF(JBETWN=1)12,12,14
IF((ICODE(I).GE.NCODE(1,J)).AND.(ICODE(I).LE.NCODE(2,J))) GO TO 18
GO TO 40
12 CONTINUE
NOO=NCODE(J)
DO 16 K=1,NOO
IF(ICODE(I).EQ.NCODE(K,J)) GO TO 18
GO TO 40
16 CONTINUE
18 IF(START(I).EQ.0)START(I)=50
IF(START(I).GT.0) GO TO 40
IF(START(I).EQ.0) IGO TO 20
IF(DIED(I).EQ.0) DIED(I)=75
IF(DIED(I).LT.0) GO TO 40
IF(DIED(I).EQ.0) IGO TO 22
IF(MOVE(I).EQ.0) IGO TO 24
GO TO 26
20 CONTINUE
NSTART=NSTART+1
CALL SYM80L((XMAP(I),SCAZ),(YMAP(I),SCAZ),14,2,0.0,-1)
PRINT 21,NAME(1,I),NAME(2,I),NAME(3,I),XMAP(I),YMAP(I),ICODE(I),
ISYM(J)
21 FORMAT(12X,2A10,1*,OPENED AT THE COORDINATES *,I5*,*,I5,*,*/
1*,I5*,THE SIC CODE IS *,I5,*,AND IS REPRESENTED BY THE SYMBOL *
*,I2,*,*)
GO TO 26
22 CONTINUE
NCLOSE=NCLOSE+1
CALL SYM80L((XMAP(I),SCAZ),(YMAP(I),SCAZ),14,1,0.0,-1)
PRINT 23,NAME(1,I),NAME(2,I),NAME(3,I),XMAP(I),YMAP(I),ICODE(I),
ISYM(J)
23 FORMAT(12X,2A10,1*,CLOSED THIS YEAR. IT HAD BEEN LOCATED AT *
*,I15X*,THE COORDINATES *,I5,*,*,I5,*,IT S SIC CODE WAS *
*,I2,*,*)
GO TO 26
24 CONTINUE
NMOVE=NMOVE+1
CALL PLT((XMAP(I)*SCAZ),(YMAP(I)*SCAZ),3)
IMV=I+1
CALL SYMBOL((XMAP(IMV)*SCAZ),(YMAP(IMV)*SCAZ),14,SYM(J),0,0)
PRINT 25,NAME(I),NAME(2+I),NAME(3+I),XMAP(I),YMAP(I),XMAP(IMV),
YMAP(IMV),ICODE(I),SYM(J)
25 FORMAT(12X,2A10,1,A1,* MOVED DURING THE YEAR FROM ITS OLD LOCATION
1AT*,*/15X,15*,*,15,*,15,*,*,15,*,15,*,*/15X,*, ITS S.I.C. CODE IS *,15,* AND IS REPRESENTED BY SYMBOL*.
3I?*,*?*/)
GO TO 40
26 CONTINUE
NEXIST(J)=NEXIST(J)+1
M=M+1
XARA(M)=XMAP(I)*SCAL $ YARA(M)=YMAP(I)*SCAL
MM(M,J)=I
40 CONTINUE
XARA(M+1)=0. $ XARA(M+2)=2000.
YARA(M+1)=0. $ YARA(M+2)=2000.
CALL LINE(XARA(1),YARA(1),M+1,-1,SYM(J))
41 CONTINUE
CALL PLT(.5,.5,.999)
CALL ENDPLT
PRINT 27,II,NSTART,NCLOSE,NMOVE
27 FORMAT(12X,12X,*DURING THE YEAR 19**,12*,*,12**,20X,12,** ACTIVITIES
IS STARTED,*,12**,20X,12**, ACTIVITIES CLOSED,*,12**,20X,12,** ACTIVITIES
2S MOVED TO NEW LOCATIONS,*,12**)
DO 28 J=1,NSYMBOL
PRINT 29,NEXIST(J),SYM(J)
29 FORMAT(15X,I2,* ACTIVITIES CORRESPONDING TO SYMBOL *,12,* APPEAR
1THIS YEAR,*12**)
28 CONTINUE
10 CONTINUE
100 FORMAT(15)
102 FORMAT(3X,2A10,1A1,2I3,2I3,2I3,2I3)
104 FORMAT(15)
106 FORMAT(15,15,14I5)
108 FORMAT(15)
110 FORMAT(2I2)
STOP
END
SUBROUTINE ROADPLT(NUMRDS,XX,SCAL,SCAL)
COMMON/BLKR/RDX1(20),RDY1(20),RDX2(20),RDY2(20),COUNT(20,21)
DIMENSION XX(50),YY(50)
DO 1 I=1,NUMRDS
  10 TLENGTH=SQR((RDX1(I)-RDX2(I))**2+(RDY1(I)-RDY2(I))**2)
   J=I-49
   IF(COUNT(I,J).EQ.0.)GO TO 3
   CN=COUNT(I,J)*TLENGTH*SCAL
   XLENGTH=RDX1(I)-RDX2(I)
   YLENGTH=RDY1(I)-RDY2(I)
   CN=CN+1
   GO TO 4
   4 N=CN
   DELTX=XLENGTH/N
   DELTY=YLENGTH/N
   N=N+1
   DO 2 L=1,N
     XX(L)=(RDX2(I)+(L-1)*DELTX)*SCAL
     YY(L)=(RDY2(I)+(L-1)*DELTY)*SCAL
     XX(N+1)=0.
     YY(N+1)=0.
     XX(N+2)=2000.
     YY(N+2)=2000.
     CALL LINE(XX,YY,N,1,1,0)
   CONTINUE
   1 CONTINUE
   RETURN
   END

SUBROUTINE ROADSIN(NUMRDS)
COMMON/BLKR/RDX1(20),RDY1(20),RDX2(20),RDY2(20),COUNT(20,21)
READ 101,NUMRDS
  101 FORMAT(I5)
    READ 102,(RDX1(I),RDY1(I),RDX2(I),RDY2(I),(COUNT(I,J),J=1,21),I=1,NUMRDS)
    102 FORMAT(5X,4F3.0,21F3.1)
    DO 1 I=2,NUMRDS
      DO 1 J=1,21
        IF(COUNT(I,J).EQ.0.) COUNT(I,J)=COUNT(I-1,J)
      CONTINUE
      RETURN
    END
APPENDIX C

ORGANIZING THE DATA DECK FOR RUNNING MAPRINT
The data deck is divided into three parts.

Part 1: Output Control Cards: years of investigation, codes to be analyzed and symbols to be used in output.

Part 2: Town Data: SIC code; X, Y; name; years started, moved and/or closed for each activity.

Part 3: Road Data: name of road, X's and Y's, ADT from 1950 - 1970.

Part 1: Output Control Cards.

Card no. 1: TOWNAM and TOWNCOD

Town Name (TOWNAM) is used in the output.
Town Code (TOWNCOD) is not utilized at present.

Card no. 2: IYEARI, IYEAR2

IYEARI is the first year to be looked at.
IYEAR2 is the last year to be looked at.

MAPRINT will look at the range of years from IYEARI to IYEAR2.

Card no. 3: NSYBOL

NSYBOL is the number of system symbols to appear in the output.

Subsequent Output Control Cards: These are cards read in during a do-loop which is controlled by the variable NSYBOL (output control card no. 3). If NSYBOL = 1, three cards follow; if NSYBOL = 5, 15 cards follow. Cards 4...n describe the specific SIC codes in which the researcher is interested and the way they are to be represented. For each graphic symbol that will appear in the output three separate cards are required. The information on any card whose rank order in the output card portion is equal to 3(I) +1(from I=1 to I=NSYBOL) is the equivalent of the description of card number 4. Those which equal 3(I) + 2 correspond to card number 5, and those which equal 3(I) + 3 correspond to card number 6. Thus card number n, the last card in the output control card portion is equal, in rank order, to 3 X NSYBOL + 3.

Card no. 4: KCODE

KCODE is the number of SIC codes which will appear on the next card.
Card no. 5: SYM (I), KKK, NCODE (1 through KCODE)

SYM is the call number for the system symbol used to represent the SIC codes under study.

KKK is a dummy.

KCODE (1 through KCODE) are SIC codes to be looked at, which will be represented by system symbol SYM (I).

Card no. 6. IBETW(I)

IBETW(I) determines whether a series of specific SIC codes (e.g., 5812 and 5850 and 6324) or a range (e.g., 5812 through 6324) is to be represented.

The following chart diagrams the format for the output cards.

DATA CARD FORMAT: OUTPUT CONTROL CARDS

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Format</th>
<th>Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card no. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOWNNAME</td>
<td>A10</td>
<td>1-10</td>
</tr>
<tr>
<td>TOWNCOD</td>
<td>I3</td>
<td>11-13</td>
</tr>
<tr>
<td>Card no. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IYEAR1</td>
<td>I2</td>
<td>1-2</td>
</tr>
<tr>
<td>IYEAR2</td>
<td>I2</td>
<td>3-4</td>
</tr>
<tr>
<td>Card no. 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSYMBOL</td>
<td>I5</td>
<td>1-5</td>
</tr>
<tr>
<td>Card no. 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KCODE</td>
<td>I5</td>
<td>1-5</td>
</tr>
<tr>
<td>Card no. 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYM (I)</td>
<td>I5</td>
<td>1-5</td>
</tr>
<tr>
<td>KKK</td>
<td>I5</td>
<td>6-10</td>
</tr>
<tr>
<td>NCODE(I)</td>
<td>I5</td>
<td>11-15</td>
</tr>
<tr>
<td>NCODE (KCODE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Card no. 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBETW(I)</td>
<td>I5</td>
<td>1-5</td>
</tr>
</tbody>
</table>
Part 2: Town Data. Town data is entered on a series of individual cards. The computer reads the information into seven arrays, ICODE, XMAP, YMAP, NAME, START, MOVE, and DIED.

ICODE is the SIC code for the activity.
XMAP and YMAP are the "X" and "Y" coordinates.
NAME is the listing in the phone book.
START is the year it first appeared.
MOVE is the year it changed location.
DIED is the last year it appeared in the phone book.

There are only two major points to remember when setting up the town data deck.

First: if an activity moves, MAPRINT assumes that the new location is listed on the next card. Thus it is extremely important that the new location card for any moving activity follows immediately the old location card.

Second: a card with 9999 as the value for ICODE (there is no activity with SIC code 9999) is used to terminate the town data reading do-loop. This card separates the town data part from the road data part.

DATA CARD FORMAT: TOWN DATA

<table>
<thead>
<tr>
<th>All cards</th>
<th>Variable Name</th>
<th>Variable Form</th>
<th>Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICODE</td>
<td>I4</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>XMAP</td>
<td>I4</td>
<td>5-8</td>
<td></td>
</tr>
<tr>
<td>YMAP</td>
<td>I4</td>
<td>9-12</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>2A10,A1</td>
<td>13-33</td>
<td></td>
</tr>
<tr>
<td>START</td>
<td>I3</td>
<td>34-36</td>
<td></td>
</tr>
<tr>
<td>MOVE</td>
<td>I3</td>
<td>37-39</td>
<td></td>
</tr>
<tr>
<td>DIED</td>
<td>I3</td>
<td>61-63</td>
<td></td>
</tr>
</tbody>
</table>
Part 3: Road Data. Road data is read in using the subroutine ROADSIN.

Card no. 1: NUMRDS

NUMRDS is the number of segments of road for which data is available.

All subsequent cards are read in a do-loop controlled by NUMRDS and are the equivalent of card no. 2.

Card no. 2: RDXI(I), RDYI(I), RDX2(I), RDYZ(I), COUNT (I,J(J=1,21))

RDXI(I), RDYI(I) are the "X" and "Y" coordinates of one end of a segment of road.

RDX2(I), RDYZ(I) are the "X" and "Y" coordinates of the other end of the same segment.

COUNT (I,J(J=1,21)) is the yearly average daily traffic on that segment of road. In the study we used data from 1950 to 1970, twenty one years in all, which accounts for the twenty one COUNT's for each road segment.

DATA CARD FORMAT: ROAD DATA

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Format</th>
<th>Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card no. 1</td>
<td>NUMRDS</td>
<td>I5</td>
</tr>
<tr>
<td>Card no. 2</td>
<td>RDXI(I)</td>
<td>F3.0</td>
</tr>
<tr>
<td></td>
<td>RDYI(I)</td>
<td>F3.0</td>
</tr>
<tr>
<td></td>
<td>RDX2(I)</td>
<td>F3.0</td>
</tr>
<tr>
<td></td>
<td>RDYZ(I)</td>
<td>F3.0</td>
</tr>
<tr>
<td></td>
<td>COUNT(I,J(J=1,21))</td>
<td>21F3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Council for Advanced Transportation Studies
THE UNIVERSITY OF TEXAS AT AUSTIN