Statewide Transportation Analysis & Research

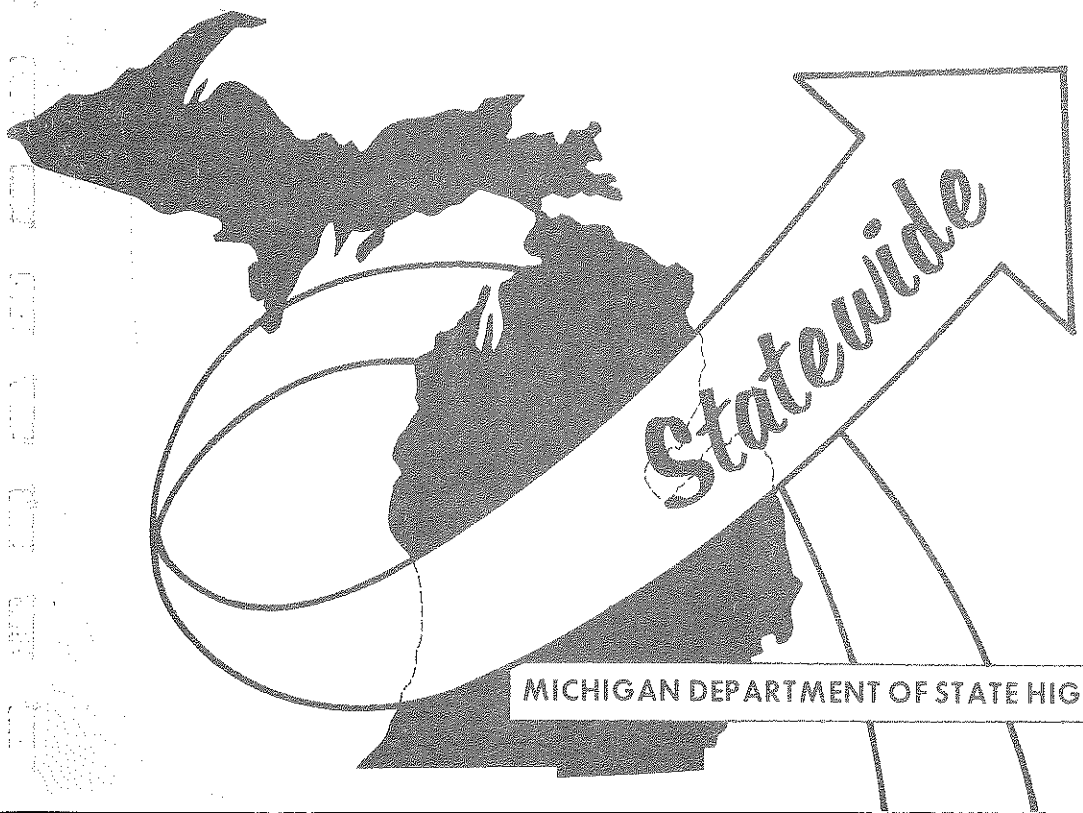
MICHIGAN'S STATEWIDE
TRANSPORTATION MODELING SYSTEM

VOLUME X-A-2

TRAFFIC FORECASTING FOR A SPECIAL GENERATOR

STATEWIDE TRANSPORTATION
PLANNING PROCEDURES

NOVEMBER, 1977



MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

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BUREAU OF TRANSPORTATION PLANNING

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TRAFFIC FORECASTING FOR A SPECIAL GENERATOR

BY

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JOHN P. WOODFORD, DIRECTOR

November 2, 1977

Mr. Sam F. Cryderman, Deputy Director
Michigan Department of State
Highways and Transportation
Bureau of Transportation Planning
P.O. Box 30050
Lansing, Michigan 48909

Dear Mr. Cryderman:

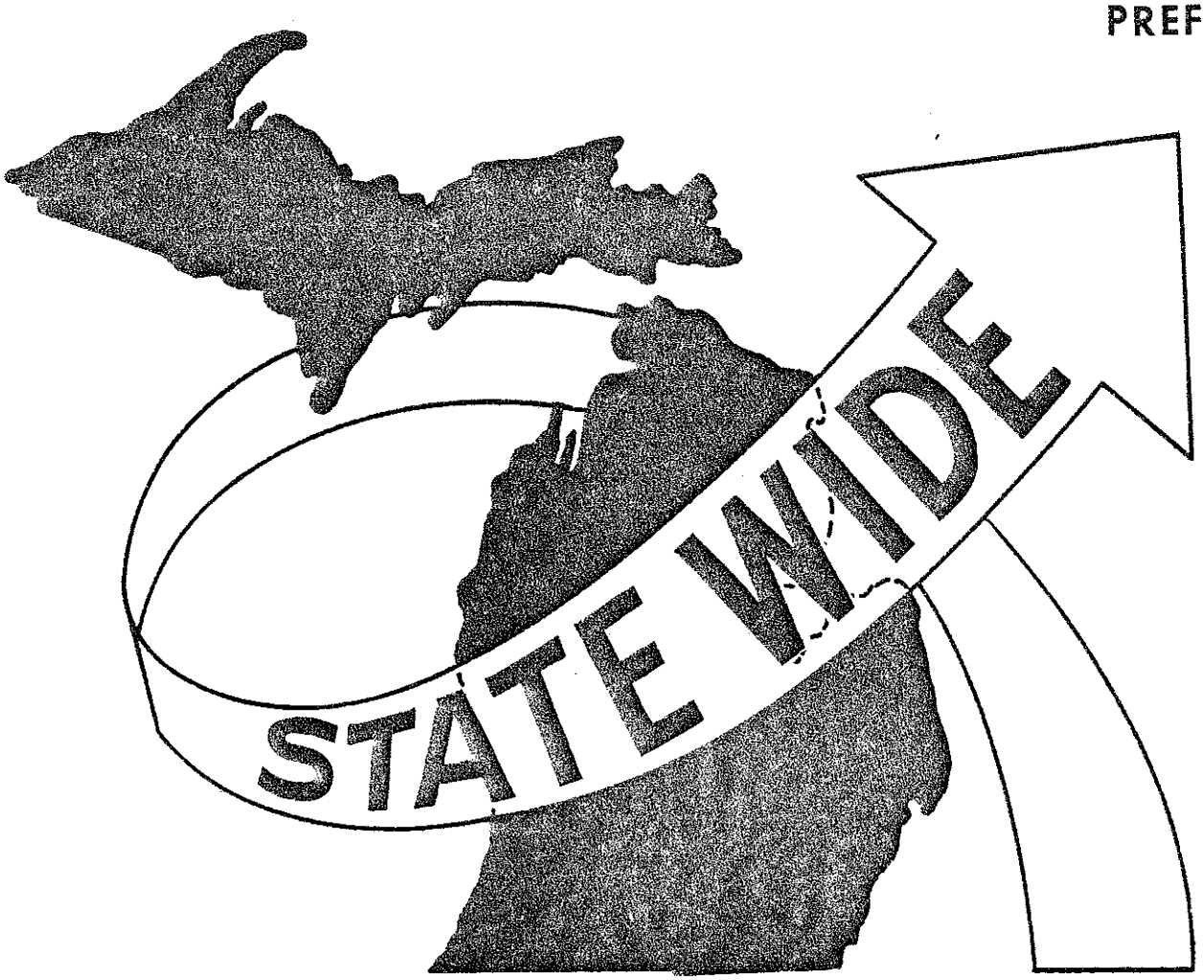
This letter introduces report Volume X-A-2, Traffic Forecasting for a Special Generator. As indicated by the title, this report deals with the analysis of future and present transportation planning relative to special generators by utilization of the Statewide Transportation Modeling System.

This report was prepared by George Liu of the Statewide Procedures Section under the supervision of Richard Esch. For further information regarding the Statewide Transportation Modeling System, please to not hesitate to contact Mr. Esch.

Sincerely,

William M. Lepczyk, Acting Administrator
Highway Planning Division

PREFACE



PREFACE

In the day-to-day operation of most any State Department of Transportation, the planning for an evaluation of "special generators" is a frequent occurence. The impact that these types of projects may have on the various state transportation networks is the very heart of the issue because many of these proposals often require a change in the existing design of future plans. During the last two years, several transportation impact analysis tools have been developed for the regional planning process which appear to have application in the analysis of special generators. This report, Volume I-Q in the Statewide Transportation Modeling Series, examines these tools. For further applications of the modeling system, see the following pages of this section.

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Report #2	-	Proximity of People to General Purpose Hospitals
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Report #4	-	Proximity of Automobile Injury Accidents to Hospitals
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Volume I-E	- Model Applications: Cost-Benefit Analysis
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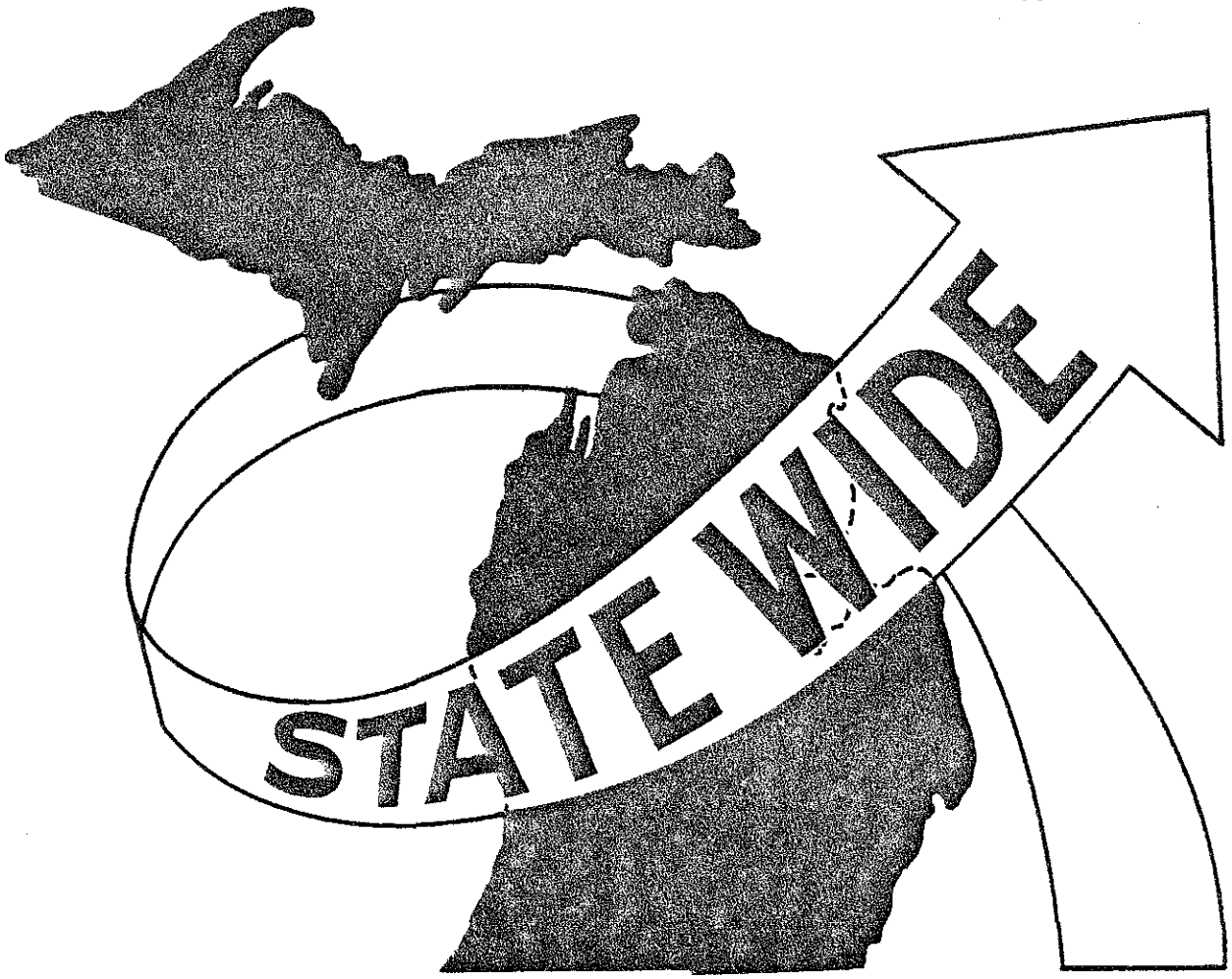
INTRODUCTION



INTRODUCTION

In the day-to-day operation of most any State Department of Transportation, the planning for an evaluation of "special generators" is a frequent occurrence. "Special generators" are often classified as those proposed construction projects that are large enough to have regional or statewide impact on the transportation system.

The impact that these types of projects may have on the various state transportation networks is the very heart of the issue because many of these proposals often require a change in the existing design of future plans. A systematic method of identifying both the location and magnitude of the travel impacts is required to identify the changes in the transportation network necessary to efficiently serve new facilities.

During the last two years, several transportation impact analysis tools have been developed for the regional planning process which appear to have application in the analysis of special generators.

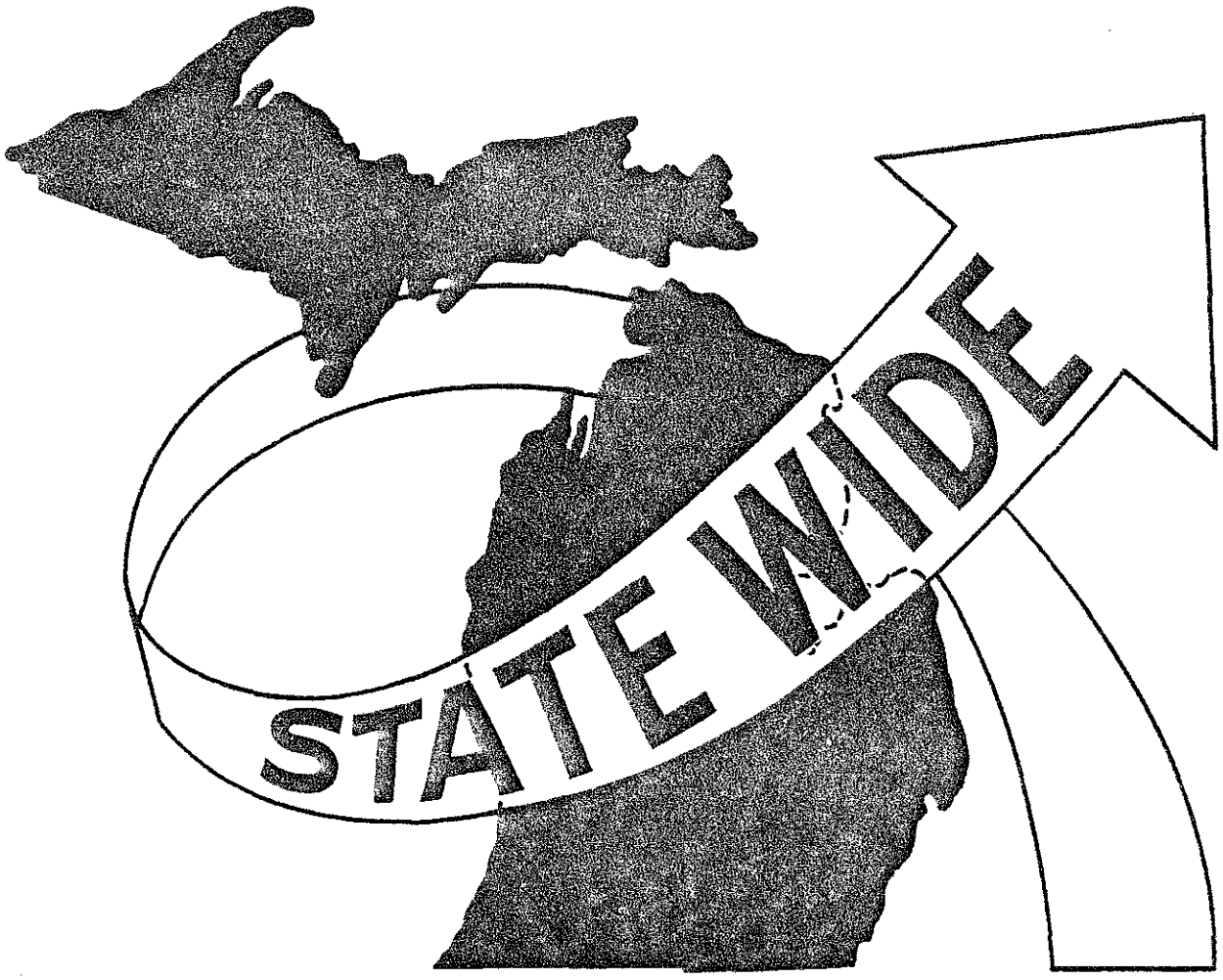
The multi modal analysis process developed for the Northwest Region of Michigan required the analysis of travel patterns in the State of Michigan by trip purpose and vehicle type. This analysis resulted in several trip length frequency distribution curves which became the basic input to the development of a gravity model-type trip distribution process oriented around the simulation of travel to and from "special generators". The user of Michigan's "special generator" impact analysis process must specify a few simple pieces of information in order to obtain an analysis of both regional and statewide impacts on Michigan's state trunkline system. The user must specify:

1. The statewide model travel analysis zone where the proposed project is located.
2. Total number of trips into and out of the special generator.
3. Which one of the trip length frequency distributions the proposed project is most likely to be.

Once the user has specified these three elements, the "special generator" gravity model process creates a zone-to-zone travel matrix for the 547 zone system using the "special generator" zone as the origin and destination of all trips. One of the key elements in this process is the fact that the input and output from this process is compatible with the statewide transportation modeling system. Therefore, the zone-to-zone travel times required in the gravity model are available directly from the modeling process. Once the special generator trip matrix has been created, it can also be assigned directly on the state trunkline system. The assignment of the "special generator" trips can be easily compared with the existing travel pattern and the magnitude and location of travel pattern changes can be identified.

Finally, the development of a graphic display, referred to as desireline plotting, can be used to display the distribution of trips to all zones in the state. Further analysis may also be made by plotting the trip length frequency distribution.

TRAFFIC FORECASTING FOR A SPECIAL GENERATOR



TRAFFIC FORECASTING FOR A SPECIAL GENERATOR

The establishment of a recreational center, an office tower, an industrial park, or any such large attractor may cause a significant increase in traffic. The increase not only may require changes in the transportation system, but also may have impacts on land use and the overall environment. Therefore, in planning and locating such an attractor, called special generator, future traffic must be estimated.

This report deals with one process for the estimation. It describes a trip distribution model specially developed for the single attractor case and the total traffic forecasting process of which it is a part. A case study is included.

A. A Trip Distribution Model

1. General Method

A suitably bounded area is divided into N zones. A single trip generator is located at the centroid of one zone, say zone k. The total number of trips, T, attracted from all N zones to the generator is given. The number of trips, t_i, attracted from zone i to the generator is assumed to be directly proportional to the mass M_i and the accessibility R_i of zone i, i.e.:

$$t_i = c M_i R_i \qquad (1)$$

where

$$c = T \Big/ \sum_1^N m_i R_i \qquad (2)$$

so that

$$\sum_1^N t_i = T \qquad (3)$$

The mass M_i may be defined as the population, the employment, or any other suitable value associated with zone i. The accessibility, R_i, is a function of separation d_i:

$$R_i = f(d_i) \tag{4}$$

where d_i is defined as the shortest travel time or distance (or their linear combination) from the centroid of zone i to the generator. The function $f(d_i)$ may be defined in many ways. Some examples are:

a) Inverse Power Function

If we define:

$$f(d_i) = 1/d_i^{\alpha} \tag{5}$$

where α is a parameter, then Eq(1) becomes

$$t_i = c \frac{M_i}{d_i^{\alpha}} \tag{6}$$

This is the so called gravity model for trip distribution.

b) Probability Distribution Functions

A simple probability distribution function is the exponential function:

$$f(d_i) = e^{-\beta d_i} \tag{7}$$

where β is a parameter. Eq(1) then becomes:

$$t_i = c\ m_i\ e^{-\beta d_i} \tag{8}$$

Other probability distribution functions may also be used where applicable.

c) Discrete Functions

Sometimes one may wish to define a set of f values that are based directly on actual surveys with some smoothing. This definition does not allow the values to be varied using a parameter as above, but has the advantage of not having to have any closed functional form.

In actual application, trips are often stratified according to trip purpose (work, shopping, vacation, etc.) and vehicle type (auto, truck, bus, etc.). Together with the type of trip generator (shopping center, recreation park, etc.), they determine the appropriate choice of definitions for zonal mass and accessibility function.

2. The Model

A computer model is developed according to the above trip distribution process with the following special characteristics:

a) Number of Zones: N = 547

b) Computation of $f(d_i)$

Given:

1. The skim tree with origin at generator, i.e., the shortest travel time in minutes, d_i, ($i = 1,2,...547$)
2. A set of values Z_n ($n = 1,2,...100$) where Z_n is a value associated with n-th 10-minute time band about the generator (Figure 1).

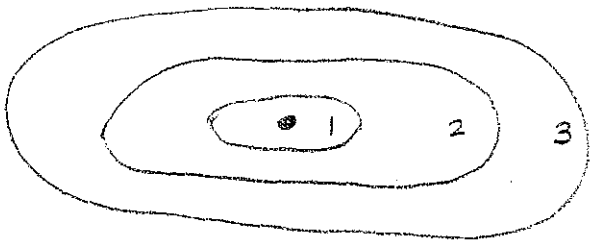


Figure 1

Then the band number for zone i is:

$$n = \left[\frac{d_i}{10}\right] + 1 \qquad (9)$$

where $[a]$ denotes the integral part of a, and

$$f(d_i) = Z_n \qquad (10)$$

c) Input/Output

The input to the model are:

k = zone number in which the generator is located

T = total number of trips attracted to the generator

M_i = zonal mass (e.g. population), $i = 1,2,...547$

d_i = zonal separation in minutes, $i = 1,2,...547$

Z_n = value associated with n-th 10-minute time band, $n = 1,2,...100$

The output trip distribution (i.e. zonal interchanges), t_i, $i = 1,2,...547$, between zone i and origin zone k, is given in the form of a 547 x 547 trip table:

$$U = (u_{ij}) \qquad i,j = 1,2,...547 \qquad (11)$$

where

$$u_{ij} = o \qquad \text{if } i,j \neq k \qquad (12)$$

and

$$u_{ik} = u_{ki} = \begin{cases} t_i/2 & \text{if } i \neq k \\ t_i & \text{if } i = k \end{cases} \qquad (13)$$

in which u_{kk} or t_k is intrazonal trip interchange at the origin zone k.

3. Output Display and Analysis

Zonal interchanges t_i are displayed in two ways:

a) Printer output (Figures 7, 11)

b) Desireline plot on CRT (Figures 8, 12)

The latter display consists of lines of different band widths drawn from zonal centroids to the origin zone centroid. Up to 10 band widths may be

specified, each corresponding to a magnitude range of t_i. Zonal boundaries form the background.

Zonal interchanges t_i are analyzed by trip length frequency distribution. The zonal trips within each 10-minute time bands are plotted against the band numbers. The plot with statistical analysis are output by printer (Figures 9, 13).

B. The Traffic Forecasting Process

1. Traffic Assignment

To obtain the induced traffic caused by the trip generator, zonal trips u_i from the trip distribution model above are loaded onto the transportation network using a traffic assignment model. The input is:

a) trip table (u_{ij})

b) base network file with present traffic

c) tree file

The output is a new network file with:

a) present (or "before") traffic

b) induced traffic

c) total (or "after") traffic

The output is displayed by:

a) printer output

b) network plot on CRT (Figures 10, 14) - Within a user-defined rectangular area, all links with their traffic values are plotted. Three separate plots for present, induced and final traffic values are displayed. Note for centroid link, the induced traffic is 1/2 times (total number of trips attracted - intrazonal trips).

2. Summary

The traffic forecasting process which consists of (1) trip distribution and (2) traffic assignment may be summarized by the following flow chart:

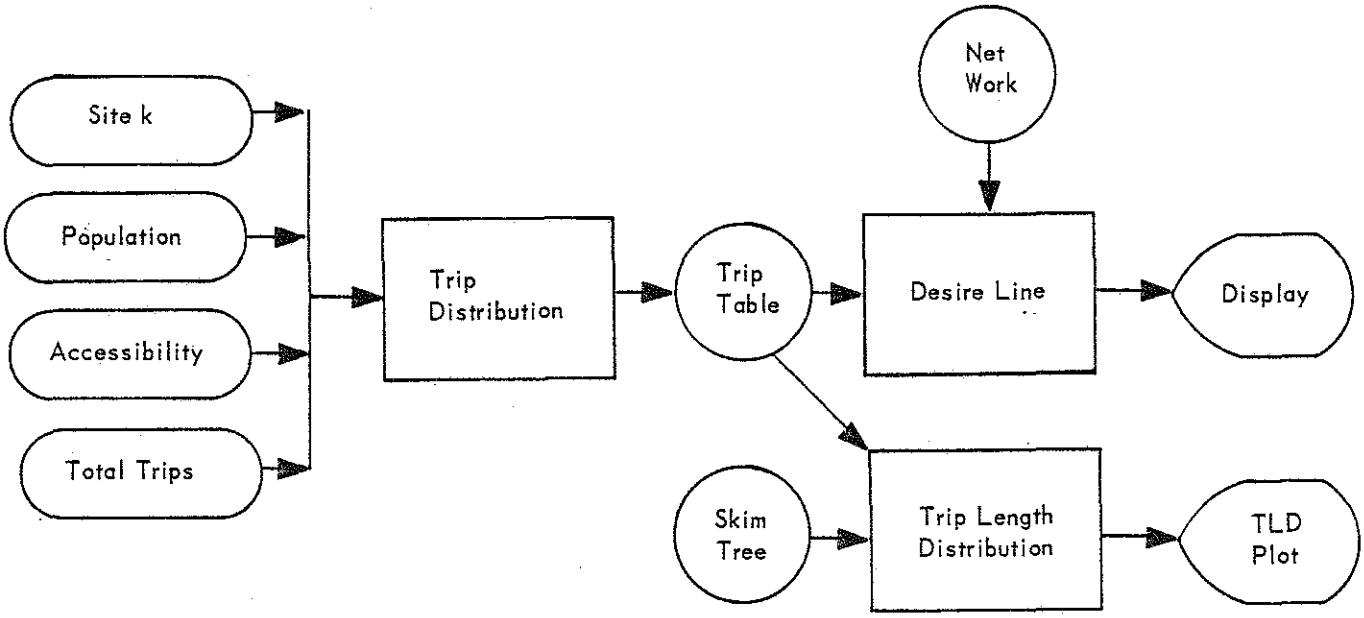


Figure 2(a)

TRIP DISTRIBUTION

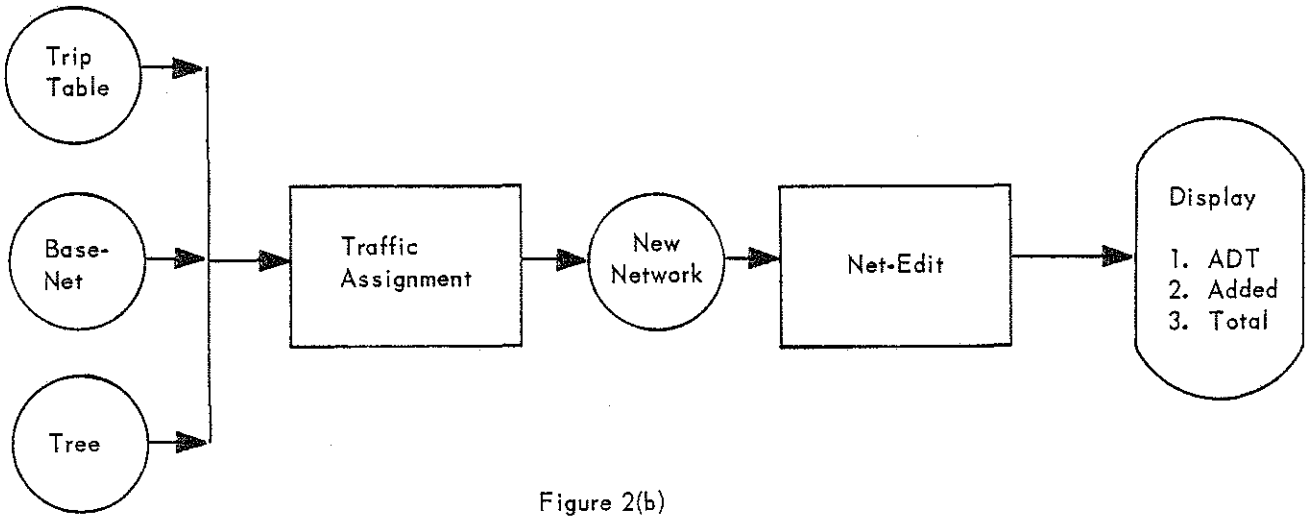


Figure 2(b)

TRAFFIC ASSIGNMENT

C. A Case Study

A recreational park known as "The Little Michigan" is to be constructed somewhere in the State of Michigan. Preliminary studies identified Genesee County as one of the several possible locations for consideration (Figure 3). The total number of trips attracted from all parts of Michigan and its surrounding to the park is estimated to be 8,000 per day, 4,000 each way. It is desirable to forecast the resulting new traffic on the roads, especially near the park.

1. Input

The State of Michigan and its surroundings are divided into 547 zones. The trip generator is located in zone 139 (Figure 4). Thus the input is:

a) number of zones - 547

b) location of trip generator - zone 139

c) total number of trips attracted - 8000

d) zonal mass - population based on Bureau of Budgets 1975 survey

e) base network file - with zonal boundaries, centroid and node coordinates, network, and present traffic

f) tree file - all zone-to-zone minimum time routes

g) skim tree - all zone-to-zone minimum time in minutes

h) accessibility function - for comparison purposes, two curves are used, both based on an actual trip length survey:

Curve A - Auto-Recreation (Figure 5)

Curve B - Auto Vacation (Figure 6)

2. Output

The output is:

a) trip distribution (Figures 7, 11)

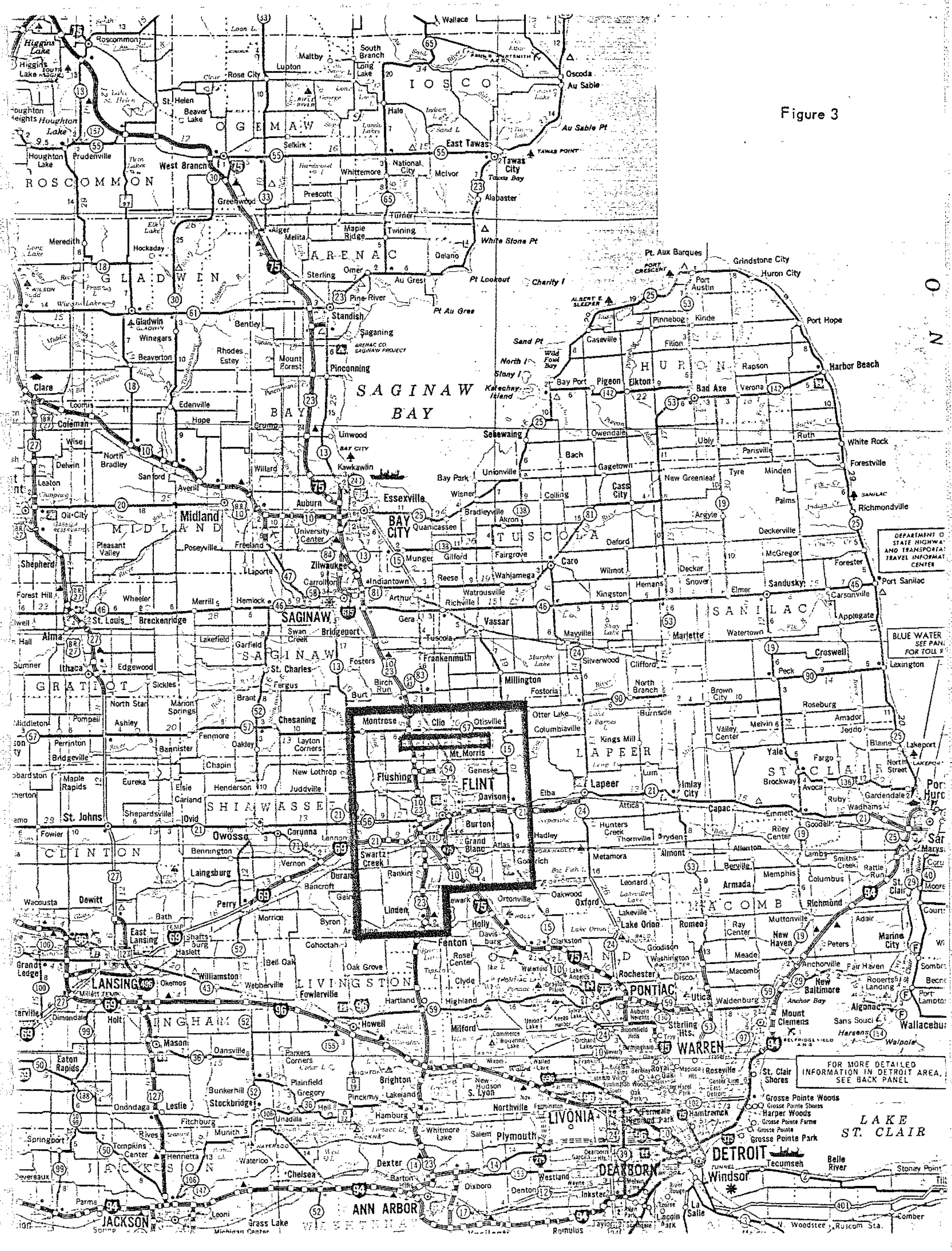

ROSCOMMON
OGEMAW
IOSCO
ARENAC
GLADWIN
MIDLAND
BAY
SAGINAW BAY
TUSCOLA
HURON
SANILAC
SAGINAW
GRATIOT
CLINTON
SHIAWASSEE
GENESEE
LAPEER
ST. CLAIR
MACOMB
OAKLAND
LIVINGSTON
INGHAM
JACKSON
LAKE ST. CLAIR
FLINT
SAGINAW
BAY CITY
Midland
LANSING
PONTIAC
DETROIT
WARREN
LIVONIA
DEARBORN
ANN ARBOR
JACKSON
Windsor
Houghton Lake
West Branch
Tawas City
East Tawas
Oscoda
Au Sable
Standish
Pinconning
Gladwin
Clare
Alma
St. Louis
Ithaca
St. Johns
Owosso
Corunna
Flushing
Mt. Morris
Clio
Montrose
Davison
Burton
Grand Blanc
Swartz Creek
Fenton
Linden
Holly
Lapeer
Caro
Vassar
Frankenmuth
Bad Axe
Harbor Beach
Port Austin
Sandusky
Port Huron
Howell
Brighton
Mason
Okemos
East Lansing
Birch Run
Chesaning
Saginaw Project
DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION TRAVEL INFORMATION CENTER
BLUE WATER
FOR MORE DETAILED INFORMATION IN DETROIT AREA, SEE BACK PANEL

Figure 3

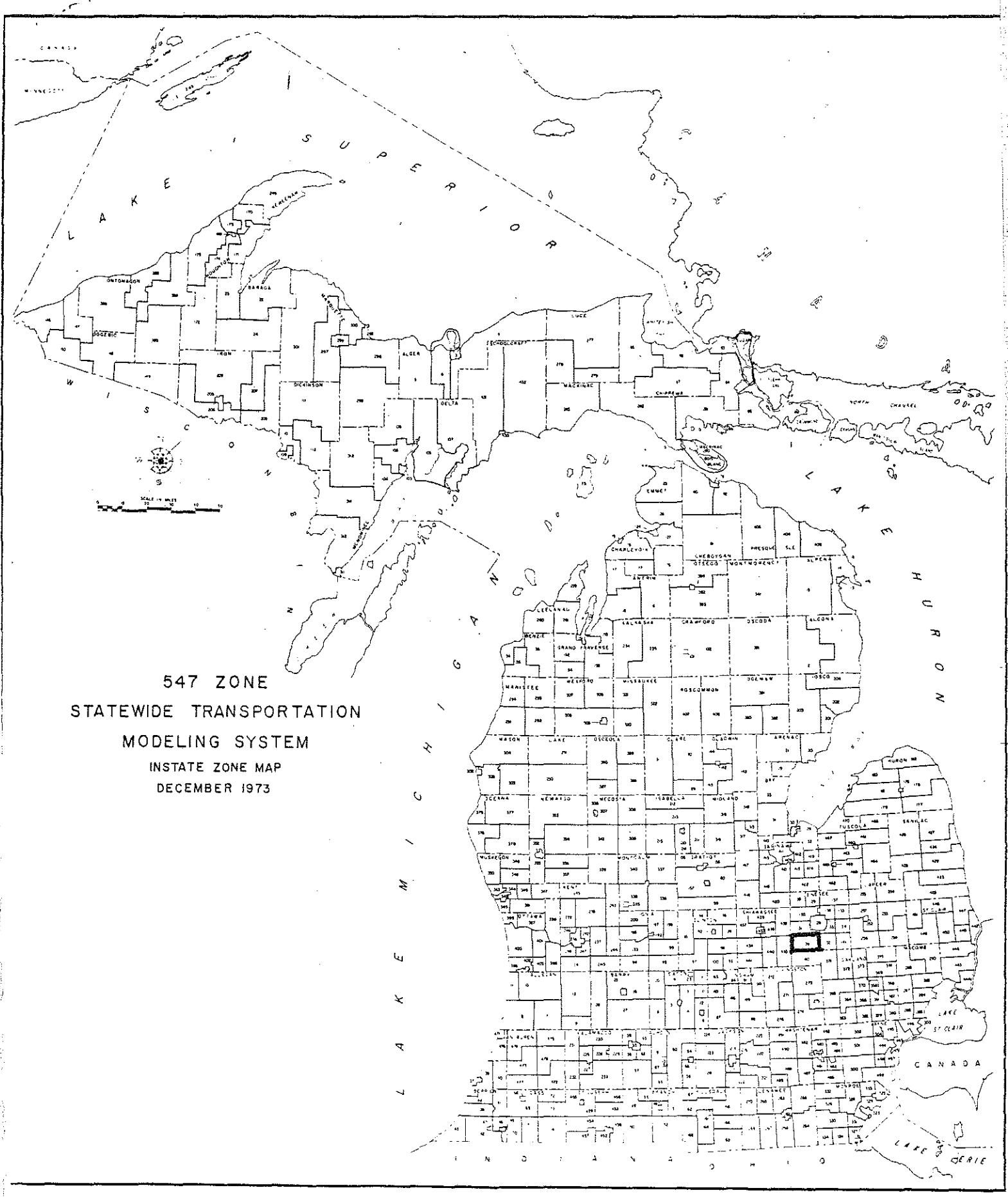

547 ZONE
STATEWIDE TRANSPORTATION
MODELING SYSTEM
INSTATE ZONE MAP
DECEMBER 1973
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ST CLAIR
LAKE ERIE
CANADA
WISCONSIN
INDIANA
OHIO

Figure 4

b) desireline plot on CRT (Figures 8, 12)

c) trip length distribution (TLD) plots (Figures 9, 13)

d) new network file - with induced and total traffic

e) network plot on CRT (Figures 10, 14)

3. Comments

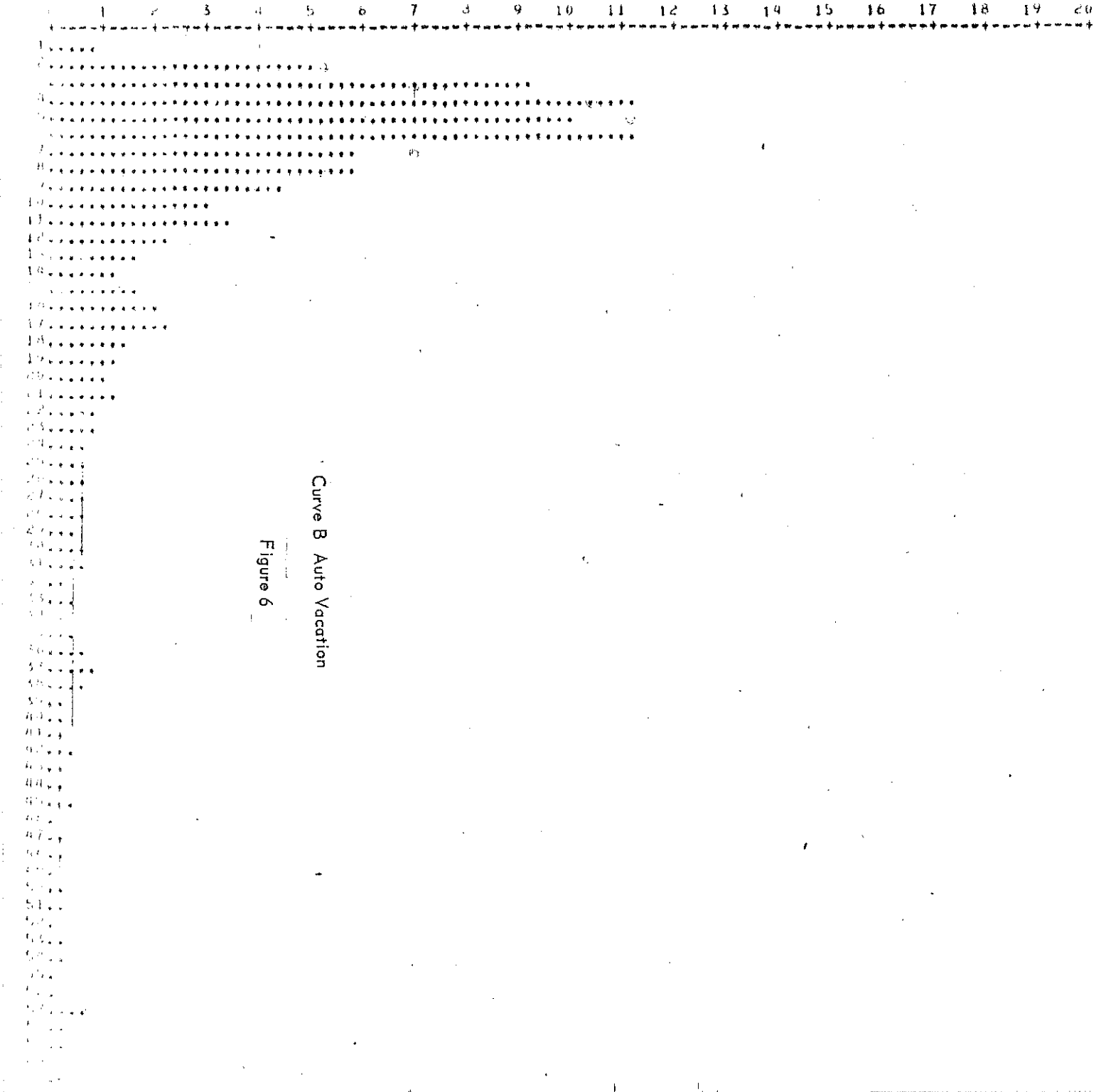
Curve A is much steeper than Curve B (Figures 5, 6). Thus the trip distribution model using Curve A as input distributes proportionally more trips to the nearby zones, as shown clearly by the desireline (Figures 8, 12) and the TLD plots (Figures 9, 13).

Since the trip generator is a recreational park, the estimated new traffic pattern based on the auto-recreational curve is assumed to be more reliable (Figure 10).

P.C.	CUM.	ACTUAL
9.527	9.527	45107
38.295	47.821	175260
29.581	77.402	135641
10.527	87.929	47605
4.934	92.857	22524
2.363	95.220	10888
1.136	96.356	5150
0.859	97.215	3867
0.550	97.765	2599
0.369	98.111	1668
0.278	98.390	1260
0.219	98.609	991
0.185	98.794	838
0.141	98.936	641
0.159	99.095	719
0.106	99.201	489
0.122	99.325	553
0.089	99.414	403
0.071	99.485	321
0.057	99.542	259
0.068	99.610	308
0.041	99.651	186
0.051	99.703	233
0.043	99.746	194
0.020	99.766	91
0.016	99.782	74
0.014	99.797	65
0.020	99.817	92
0.016	99.833	73
0.010	99.843	45
0.013	99.855	57
0.007	99.862	30
0.014	99.876	62
0.013	99.889	61
0.007	99.896	31
0.006	99.902	27
0.008	99.910	38
0.003	99.913	12
0.005	99.918	23
0.003	99.921	12
0.005	99.926	22
0.005	99.931	24
0.008	99.938	34
0.003	99.941	12
0.004	99.945	16
0.001	99.946	6
0.004	99.950	19
0.002	99.952	9
0.004	99.956	18
0.004	99.960	18
0.009	99.969	40
0.002	99.971	8
0.003	99.974	15
0.004	99.978	17
0.001	99.979	6
0.003	99.982	15
0.004	99.986	16
0.001	99.987	4
0.002	99.989	9
0.001	99.990	6
0.000	99.991	1

Curve A Auto-Recreation

Figure 5



Curve B Auto Vacation

Figure 6

P.C.	CUM.	ACTUAL
0,765	0,765	251
4,998	5,763	1641
9,279	15,042	3046
11,243	26,285	3691
10,049	36,335	3299
11,220	47,563	3686
5,852	53,415	1921
5,788	59,203	1900
4,444	63,647	1459
3,068	66,714	1007
3,451	70,166	1133
2,248	72,414	738
1,581	73,995	519
1,264	75,259	415
1,654	76,913	543
1,968	78,881	646
2,260	81,141	742
1,429	82,570	469
1,185	83,755	389
0,998	84,748	328
1,185	85,933	389
0,832	86,764	273
0,847	87,611	278
0,585	88,196	192
0,512	88,708	168
0,640	89,348	210
0,538	89,884	176
0,575	90,459	189
0,442	90,901	145
0,506	91,407	166
0,661	92,068	217
0,299	92,366	98
0,460	92,826	151
0,377	93,201	123
0,305	93,506	100
0,670	94,176	220
0,740	94,916	243
0,533	95,449	175
0,177	95,626	58
0,137	95,763	45
0,143	95,906	47
0,426	96,332	140
0,225	96,558	74
0,225	96,783	74
0,472	97,255	155
0,073	97,329	24
0,210	97,539	69
0,107	97,645	35
0,088	97,734	29
0,143	97,877	47
0,228	98,105	75
0,040	98,145	13
0,146	98,291	48
0,128	98,419	42
0,082	98,501	27
0,052	98,553	17
0,545	99,098	179
0,119	99,217	39
0,137	99,354	45
0,030	99,385	10
0,042	99,427	14

RUN 1

SPECIAL GENERATOR TRIP DISTRIBUTION MODEL

ATTRACTOR LOCATED IN ZONE NUMBER 139
TOTAL NUMBER OF TRIPS ATTRACTED 8000

ZONAL TRIP DISTRIBUTION

ZONE	POP	TIME(MIN)	R-FAC	TRIPS	%
1	7173	178	0.089	0	0.00
2	1433	177	0.089	0	0.00
3	3516	462	0.000	0	0.00
4	1947	456	0.000	0	0.00
5	2174	487	0.000	0	0.00
6	551	473	0.000	0	0.00
7	11565	181	0.071	0	0.00
8	8740	204	0.052	0	0.00
9	14888	174	0.089	0	0.01
10	14058	182	0.071	0	0.00
11	5557	184	0.071	0	0.00
12	15476	170	0.089	0	0.01
13	15286	207	0.052	0	0.00
14	11762	210	0.052	0	0.00
15	6948	216	0.052	0	0.00
16	4125	215	0.052	0	0.00
17	4287	257	0.014	0	0.00
18	6418	246	0.014	0	0.00
19	3892	94	0.369	0	0.01
20	3358	118	0.219	0	0.00
21	5116	102	0.278	0	0.01
22	4305	618	0.000	0	0.00
23	2356	625	0.000	0	0.00
24	923	604	0.000	0	0.00
25	7109	125	0.185	0	0.01
26	12547	133	0.142	1	0.01
27	11923	112	0.219	1	0.01
28	10170	146	0.130	0	0.01
29	56204	64	1.138	21	0.26
30	16415	67	1.138	6	0.08
31	22400	64	1.138	8	0.10
32	15374	65	1.138	6	0.07
33	10758	86	0.530	2	0.02
34	2684	235	0.052	0	0.00
35	4070	228	0.052	0	0.00
36	2219	229	0.052	0	0.00
37	27709	203	0.052	0	0.01
38	14479	215	0.052	0	0.00
39	33660	198	0.052	1	0.01
40	13570	187	0.071	0	0.00
41	6380	207	0.052	0	0.00
42	9537	228	0.052	0	0.00
43	12413	224	0.052	0	0.00
44	16165	202	0.052	0	0.00
45	13107	215	0.052	0	0.00
46	13567	219	0.052	0	0.00
47	4677	224	0.052	0	0.00
48	9582	144	0.130	0	0.01
49	4459	161	0.130	0	0.00

Figure 7

91	4455	150	0.130	0	0.00
92	4563	152	0.130	0	0.00
93	4671	150	0.130	0	0.00
94	6152	146	0.130	0	0.00
95	38654	122	0.185	2	0.03
96	4270	128	0.185	0	0.00
97	7611	143	0.130	0	0.00
98	25596	128	0.185	2	0.02
99	10740	130	0.142	1	0.01
100	6779	118	0.219	0	0.01
101	4919	117	0.219	0	0.00
102	10796	125	0.185	1	0.01
103	8231	118	0.219	1	0.01
104	2452	114	0.219	0	0.00
105	1677	130	0.142	0	0.00
106	12022	115	0.219	1	0.01
107	7202	115	0.219	1	0.01
108	6442	197	0.052	0	0.00
109	10757	202	0.052	0	0.00
110	7070	216	0.052	0	0.00
111	6794	214	0.052	0	0.00
112	2929	181	0.071	0	0.00
113	2886	197	0.052	0	0.00
114	5510	199	0.052	0	0.00
115	3696	256	0.014	0	0.00
116	2069	240	0.014	0	0.00
117	3871	239	0.052	0	0.00
118	7742	264	0.014	0	0.00
119	6758	253	0.014	0	0.00
120	5443	272	0.014	0	0.00
121	5058	236	0.052	0	0.00
122	2910	253	0.014	0	0.00
123	18784	356	0.000	0	0.00
124	2428	364	0.000	0	0.00
125	1082	402	0.000	0	0.00
126	1821	385	0.000	0	0.00
127	9138	337	0.014	0	0.00
128	2250	359	0.000	0	0.00
129	6600	115	0.219	0	0.01
130	7679	131	0.142	0	0.00
131	6688	129	0.185	0	0.01
132	6691	65	1.138	3	0.03
133	4843	53	2.362	4	0.05
134	4012	76	0.855	1	0.01
135	5009	83	0.530	1	0.01
136	3856	64	1.138	1	0.02
137	5976	85	0.530	1	0.01
138	3438	73	0.855	1	0.01
139	3024	59	2.362	2	0.03
140	11783	80	0.530	2	0.03
141	2495	171	0.089	0	0.00
142	5053	180	0.071	0	0.00
143	17002	484	0.000	0	0.00
144	3385	489	0.000	0	0.00
145	2465	476	0.000	0	0.00
146	12373	478	0.000	0	0.00
147	1680	461	0.000	0	0.00
148	2833	484	0.000	0	0.00
149	14591	551	0.000	0	0.00
150	3540	549	0.000	0	0.00
151	1963	595	0.000	0	0.00
152	4698	540	0.000	0	0.00
153	8960	86	0.536	2	0.02
154	6782	85	0.530	1	0.01

116	4077	106	0.278	0	0.00
117	20200	68	1.138	8	0.09
118	4004	87	0.530	1	0.01
119	4678	84	0.530	1	0.01
120	3742	100	0.278	0	0.00
121	4872	73	0.855	1	0.02
122	4680	85	0.530	1	0.01
123	6557	79	0.855	2	0.02
124	7212	245	0.014	0	0.00
125	3132	288	0.014	0	0.00
126	5813	255	0.014	0	0.00
127	4687	250	0.014	0	0.00
128	198756	18	38.293	2507	31.34
129	12064	32	10.522	42	0.52
130	40624	31	10.522	169	2.11
131	39621	20	29.581	386	4.83
132	25043	17	38.293	316	3.95
133	33452	20	29.581	326	4.07
134	13892	35	10.522	48	0.60
135	5712	41	4.934	9	0.12
136	26323	28	29.581	256	3.21
137	9597	43	4.934	16	0.19
138	6672	37	10.522	23	0.29
139	13435	9	9.527	42	0.53
140	20610	15	38.293	260	3.25
141	3199	32	10.522	11	0.14
142	2521	119	0.219	0	0.00
143	6206	118	0.219	0	0.01
144	3092	123	0.185	0	0.00
145	4587	108	0.278	0	0.01
146	10652	719	0.000	0	0.00
147	3114	704	0.000	0	0.00
148	615	688	0.000	0	0.00
149	689	650	0.000	0	0.00
150	4992	712	0.000	0	0.00
151	22850	237	0.052	0	0.00
152	10359	231	0.052	0	0.00
153	6055	224	0.052	0	0.00
154	1280	224	0.052	0	0.00
155	2712	228	0.052	0	0.00
156	14107	101	0.278	1	0.02
157	9228	101	0.278	1	0.01
158	8323	109	0.278	1	0.01
159	5399	88	0.530	1	0.01
160	2789	93	0.369	0	0.00
161	8509	141	0.130	0	0.00
162	4737	137	0.142	0	0.00
163	3837	145	0.130	0	0.00
164	4966	144	0.130	0	0.00
165	4446	160	0.130	0	0.00
166	4225	135	0.142	0	0.00
167	4896	138	0.142	0	0.00
168	5293	124	0.185	0	0.00
169	11831	657	0.000	0	0.00
170	13221	679	0.000	0	0.00
171	2861	686	0.000	0	0.00
172	1031	629	0.000	0	0.00
173	1799	662	0.000	0	0.00
174	2801	660	0.000	0	0.00
175	4112	680	0.000	0	0.00
176	3157	136	0.142	0	0.00
177	7415	171	0.089	0	0.00
178	4351	149	0.130	0	0.00
179	5876	119	0.219	0	0.01
180	3919	138	0.142	0	0.00

183	198770	63	1.138	75	0.93	
184	25031	59	2.362	19	0.24	
185	14491	75	0.855	4	0.05	
186	10374	75	0.855	3	0.04	
187	7959	84	0.530	1	0.02	
188	4199	77	0.855	1	0.01	
189	2497	74	0.855	1	0.01	
190	4171	57	2.362	3	0.04	
191	6971	60	1.138	3	0.03	
192	6832	106	0.278	1	0.01	
193	5334	106	0.278	0	0.01	
194	5009	108	0.278	0	0.01	
195	2753	101	0.278	0	0.00	
196	5216	115	0.219	0	0.00	
197	3960	110	0.219	0	0.00	
198	4349	90	0.369	1	0.01	
199	6871	92	0.369	1	0.01	
200	8957	127	0.185	1	0.01	
201	4104	138	0.142	0	0.00	
202	6532	139	0.142	0	0.00	
203	5329	131	0.142	0	0.00	
204	14280	160	0.130	1	0.01	
205	3807	610	0.000	0	0.00	
206	4210	626	0.000	0	0.00	
207	3635	596	0.000	0	0.00	
208	793	589	0.000	0	0.00	
209	1908	627	0.000	0	0.00	
210	23631	119	0.219	2	0.02	
211	6173	110	0.219	0	0.01	
212	4050	120	0.185	0	0.00	
213	6054	125	0.185	0	0.00	
214	6784	119	0.219	0	0.01	
215	4708	137	0.142	0	0.00	
216	45991	98	0.369	6	0.07	
217	21987	101	0.278	2	0.03	
218	11906	112	0.219	1	0.01	
219	19915	96	0.369	2	0.03	
220	17105	90	0.369	2	0.03	
221	7372	111	0.219	1	0.01	
222	6430	109	0.278	1	0.01	
223	4939	105	0.278	0	0.01	
224	3751	99	0.369	0	0.01	
225	5446	91	0.369	1	0.01	
226	114299	152	0.130	5	0.06	
227	34953	152	0.130	1	0.02	
228	10882	145	0.130	0	0.01	
229	4214	139	0.142	0	0.00	
230	16522	147	0.130	1	0.01	
231	8995	156	0.130	0	0.00	
232	4130	157	0.130	0	0.00	
233	15683	156	0.130	1	0.01	
234	5288	205	0.052	0	0.00	
235	1778	198	0.052	0	0.00	
236	215936	137	0.142	10	0.13	
237	10006	129	0.185	1	0.01	
238	29091	143	0.130	1	0.02	
239	15631	147	0.130	1	0.01	
240	5404	130	0.142	0	0.00	
241	16720	143	0.130	1	0.01	
242	7009	132	0.142	0	0.00	
243	5657	139	0.142	0	0.00	
244	6797	126	0.185	0	0.01	
245	8748	166	0.130	0	0.00	
246	11822	143	0.130	1	0.01	

249	2297	715	0.000	0	0.00
250	4834	191	0.052	0	0.00
251	2220	207	0.052	0	0.00
252	6746	47	4.934	11	0.14
253	6055	62	1.138	2	0.03
254	5603	76	0.855	2	0.02
255	7962	66	1.138	3	0.04
256	10392	60	1.138	4	0.05
257	9393	50	2.362	7	0.09
258	10164	76	0.855	3	0.04
259	4621	274	0.014	0	0.00
260	3117	252	0.014	0	0.00
261	5317	248	0.014	0	0.00
262	20896	109	0.278	2	0.02
263	5628	106	0.278	1	0.01
264	10630	106	0.278	1	0.01
265	4073	112	0.219	0	0.00
266	18550	100	0.278	2	0.02
267	5235	146	0.130	0	0.00
268	7728	119	0.219	1	0.01
269	5344	133	0.142	0	0.00
270	5553	114	0.219	0	0.01
271	12987	42	4.934	21	0.26
272	8794	50	2.362	7	0.09
273	12958	37	10.522	45	0.56
274	16461	51	2.362	13	0.16
275	16537	39	10.522	57	0.72
276	6479	62	1.138	2	0.03
277	4274	405	0.000	0	0.00
278	1085	400	0.000	0	0.00
279	2757	398	0.000	0	0.00
280	3992	308	0.014	0	0.00
281	3240	349	0.000	0	0.00
282	1728	351	0.014	0	0.00
283	2250	369	0.000	0	0.00
284	94715	76	0.855	27	0.33
285	221971	84	0.530	39	0.48
286	263884	70	0.855	57	0.72
287	101438	65	1.138	38	0.48
288	20166	83	0.530	4	0.04
289	15662	75	0.855	4	0.06
290	14385	98	0.369	2	0.02
291	14576	224	0.052	0	0.00
292	1415	204	0.052	0	0.00
293	1863	221	0.052	0	0.00
294	3961	246	0.014	0	0.00
295	24087	521	0.000	0	0.00
296	10225	517	0.000	0	0.00
297	4800	553	0.000	0	0.00
298	9694	529	0.000	0	0.00
299	14792	537	0.000	0	0.00
300	3795	536	0.000	0	0.00
301	3524	570	0.000	0	0.00
302	10259	237	0.052	0	0.00
303	4103	222	0.052	0	0.00
304	5857	235	0.052	0	0.00
305	5494	234	0.052	0	0.00
306	13889	179	0.089	0	0.01
307	6064	180	0.071	0	0.00
308	3740	152	0.130	0	0.00
309	4349	150	0.130	0	0.00
310	4369	163	0.130	0	0.00
311	11092	559	0.000	0	0.00
312	4211	518	0.000	0	0.00

315	56295	84	0.530	6	0.08
316	5572	106	0.278	1	0.01
317	10417	89	0.530	2	0.02
318	6103	86	0.530	1	0.01
319	7879	99	0.369	1	0.01
320	4182	175	0.089	0	0.00
321	1545	181	0.071	0	0.00
322	2410	157	0.130	0	0.00
323	25865	106	0.278	2	0.03
324	22595	106	0.278	2	0.03
325	5962	101	0.278	1	0.01
326	5321	83	0.530	1	0.01
327	6347	116	0.219	0	0.01
328	7553	94	0.369	1	0.01
329	26024	105	0.278	2	0.03
330	7809	92	0.369	1	0.01
331	4488	107	0.278	0	0.01
332	5591	77	0.855	2	0.02
333	6283	105	0.278	1	0.01
334	4398	97	0.369	1	0.01
335	7948	130	0.142	0	0.00
336	8608	106	0.278	1	0.01
337	6884	133	0.142	0	0.00
338	6909	136	0.142	0	0.00
339	5735	154	0.130	0	0.00
340	5996	141	0.130	0	0.00
341	5948	204	0.052	0	0.00
342	66208	178	0.089	2	0.02
343	5451	197	0.052	0	0.00
344	13770	175	0.089	0	0.01
345	26469	175	0.089	1	0.01
346	2221	191	0.052	0	0.00
347	3371	168	0.130	0	0.00
348	6837	182	0.071	0	0.00
349	6696	176	0.089	0	0.00
350	11848	195	0.052	0	0.00
351	14684	168	0.130	1	0.01
352	3692	195	0.052	0	0.00
353	3999	207	0.052	0	0.00
354	5754	194	0.052	0	0.00
355	5601	199	0.052	0	0.00
356	5359	184	0.071	0	0.00
357	5440	179	0.089	0	0.00
358	87710	48	4.934	143	1.78
359	90792	67	1.138	34	0.43
360	282568	66	1.138	106	1.32
361	74726	57	2.362	58	0.73
362	64078	60	1.138	24	0.30
363	19989	52	2.362	16	0.19
364	25313	54	2.362	20	0.25
365	30824	44	4.934	50	0.63
366	36335	56	2.362	28	0.35
367	40559	61	1.138	15	0.19
368	32506	58	2.362	25	0.32
369	13637	45	4.934	22	0.28
370	62863	41	4.934	102	1.28
371	10181	28	29.581	99	1.24
372	7192	30	10.522	25	0.31
373	20736	38	10.522	72	0.90
374	22511	56	2.362	18	0.22
375	11582	56	2.362	9	0.11
376	5520	206	0.052	0	0.00
377	7721	227	0.052	0	0.00
378	5466	211	0.052	0	0.00

380	6130	124	0.185	0	0.00
381	3889	131	0.142	0	0.00
382	3643	129	0.185	0	0.00
383	3898	688	0.000	0	0.00
384	1742	670	0.000	0	0.00
385	2727	653	0.000	0	0.00
386	2591	714	0.000	0	0.00
387	5369	169	0.130	0	0.00
388	4798	157	0.130	0	0.00
389	3748	154	0.130	0	0.00
390	4106	184	0.071	0	0.00
391	5962	171	0.089	0	0.00
392	3851	198	0.052	0	0.00
393	5229	204	0.052	0	0.00
394	4247	215	0.052	0	0.00
395	25106	170	0.089	1	0.01
396	10538	151	0.130	0	0.01
397	7585	159	0.130	0	0.00
398	26286	151	0.130	1	0.01
399	24070	169	0.130	1	0.01
400	11671	175	0.089	0	0.00
401	7081	156	0.130	0	0.00
402	19242	170	0.089	1	0.01
403	8368	164	0.130	0	0.00
404	7482	245	0.014	0	0.00
405	3662	233	0.052	0	0.00
406	2883	233	0.052	0	0.00
407	9150	154	0.130	0	0.00
408	4523	153	0.130	0	0.00
409	93716	52	2.362	73	0.91
410	4101	73	0.855	1	0.01
411	38954	60	1.138	15	0.18
412	16182	50	2.362	13	0.16
413	8763	65	1.138	3	0.04
414	4886	49	4.934	8	0.10
415	13156	42	4.934	21	0.27
416	7867	65	1.138	3	0.04
417	7934	75	0.855	2	0.03
418	4953	80	0.550	1	0.01
419	1905	60	1.138	1	0.01
420	7979	55	2.362	6	0.08
421	5760	52	2.362	4	0.06
422	7979	36	10.522	28	0.35
423	7214	127	0.185	0	0.01
424	5070	138	0.142	0	0.00
425	7258	94	0.369	1	0.01
426	5437	115	0.219	0	0.00
427	4168	141	0.130	0	0.00
428	4750	102	0.278	0	0.01
429	4333	122	0.185	0	0.00
430	4604	416	0.000	0	0.00
431	1703	428	0.000	0	0.00
432	2448	423	0.000	0	0.00
433	18169	39	10.522	63	0.79
434	4427	45	4.934	7	0.09
435	10809	27	29.581	105	1.32
436	7528	36	10.522	26	0.33
437	6688	48	4.934	11	0.14
438	4914	29	29.581	48	0.60
439	2980	49	4.934	5	0.06
440	4047	31	10.522	14	0.18
441	7121	40	4.934	12	0.14
442	60358	110	0.219	4	0.05
443	16761	115	0.219	1	0.02
444	18079	108	0.278	2	0.02

447	6293	125	0.185	0	0.00
448	3644	98	0.369	0	0.01
449	5156	95	0.369	1	0.01
450	3463	96	0.369	0	0.01
451	3463	78	0.855	1	0.01
452	11427	172	0.089	0	0.00
453	5315	154	0.130	0	0.00
454	6721	178	0.089	0	0.00
455	7472	173	0.089	0	0.00
456	3189	161	0.130	0	0.00
457	4555	189	0.071	0	0.00
458	3889	176	0.089	0	0.00
459	7820	173	0.089	0	0.00
460	3910	81	0.530	1	0.01
461	4593	93	0.369	1	0.01
462	6376	58	2.362	5	0.06
463	4963	84	0.530	1	0.01
464	4691	90	0.369	1	0.01
465	4917	64	1.138	2	0.02
466	4670	109	0.278	0	0.01
467	3062	84	0.530	1	0.01
468	6598	77	0.855	2	0.02
469	2964	63	1.138	1	0.01
470	4639	98	0.369	1	0.01
471	7216	197	0.052	0	0.00
472	11129	178	0.089	0	0.00
473	10624	181	0.071	0	0.00
474	8024	185	0.071	0	0.00
475	5155	176	0.089	0	0.00
476	6771	198	0.052	0	0.00
477	3789	192	0.052	0	0.00
478	9935	169	0.130	0	0.01
479	105399	59	2.362	82	1.02
480	3783	57	2.362	3	0.04
481	8654	68	1.138	3	0.04
482	9718	57	2.362	8	0.09
483	31207	66	1.138	12	0.15
484	35065	67	1.138	13	0.16
485	5865	59	2.362	5	0.06
486	14614	71	0.855	4	0.05
487	8110	75	0.855	2	0.03
488	3486	92	0.369	0	0.01
489	3016	90	0.369	0	0.00
490	7171	75	0.855	2	0.03
491	3808	71	0.855	1	0.01
492	7369	54	2.362	6	0.07
493	471644	84	0.530	82	1.03
494	196647	78	0.855	55	0.69
495	583507	72	0.855	164	2.05
496	465974	79	0.855	131	1.64
497	208760	85	0.530	36	0.46
498	67782	86	0.530	12	0.15
499	71135	92	0.369	9	0.11
500	45102	82	0.530	8	0.10
501	173967	76	0.855	49	0.61
502	146905	77	0.855	41	0.52
503	76287	87	0.530	13	0.17
504	69586	65	1.138	26	0.33
505	10698	172	0.089	0	0.00
506	5491	174	0.089	0	0.00
507	2073	196	0.052	0	0.00
508	2850	189	0.071	0	0.00
509	356000	113	0.219	26	0.32
510	147460	153	0.130	6	0.08
511	[illegible]	493	0.000	0	0.00

513	5081900	230	0.052	87	1.09
514	6816	728	0.000	0	0.00
515	32603	750	0.000	0	0.00
516	35330	669	0.000	0	0.00
517	8520	647	0.000	0	0.00
518	3635	563	0.000	0	0.00
519	38965	580	0.000	0	0.00
520	839987	789	0.000	0	0.00
521	3973553	769	0.000	0	0.00
522	894941	562	0.000	0	0.00
523	2470605	461	0.000	0	0.00
524	469054	570	0.000	0	0.00
525	7889014	341	0.000	0	0.00
526	2406017	303	0.014	11	0.14
527	1721576	357	0.000	0	0.00
528	681767	285	0.014	3	0.04
529	141375	268	0.014	1	0.01
530	308085	240	0.014	1	0.02
531	190687	217	0.052	3	0.04
532	433965	191	0.052	7	0.09
533	1317841	208	0.052	23	0.28
534	2550631	204	0.052	44	0.55
535	72614	165	0.130	3	0.04
536	62383	162	0.130	3	0.03
537	617605	118	0.219	45	0.56
538	990236	155	0.130	42	0.53
539	4722553	146	0.130	202	2.53
540	5095406	155	0.130	218	2.73
541	1755009	400	0.000	0	0.00
542	3373016	339	0.014	16	0.19
543	4922126	717	0.000	0	0.00
544	2903729	638	0.000	0	0.00
545	4041817	824	0.000	0	0.00
546	9999999	370	0.000	0	0.00
547	9999999	386	0.000	0	0.00
SUM	92997585			8000	100.00

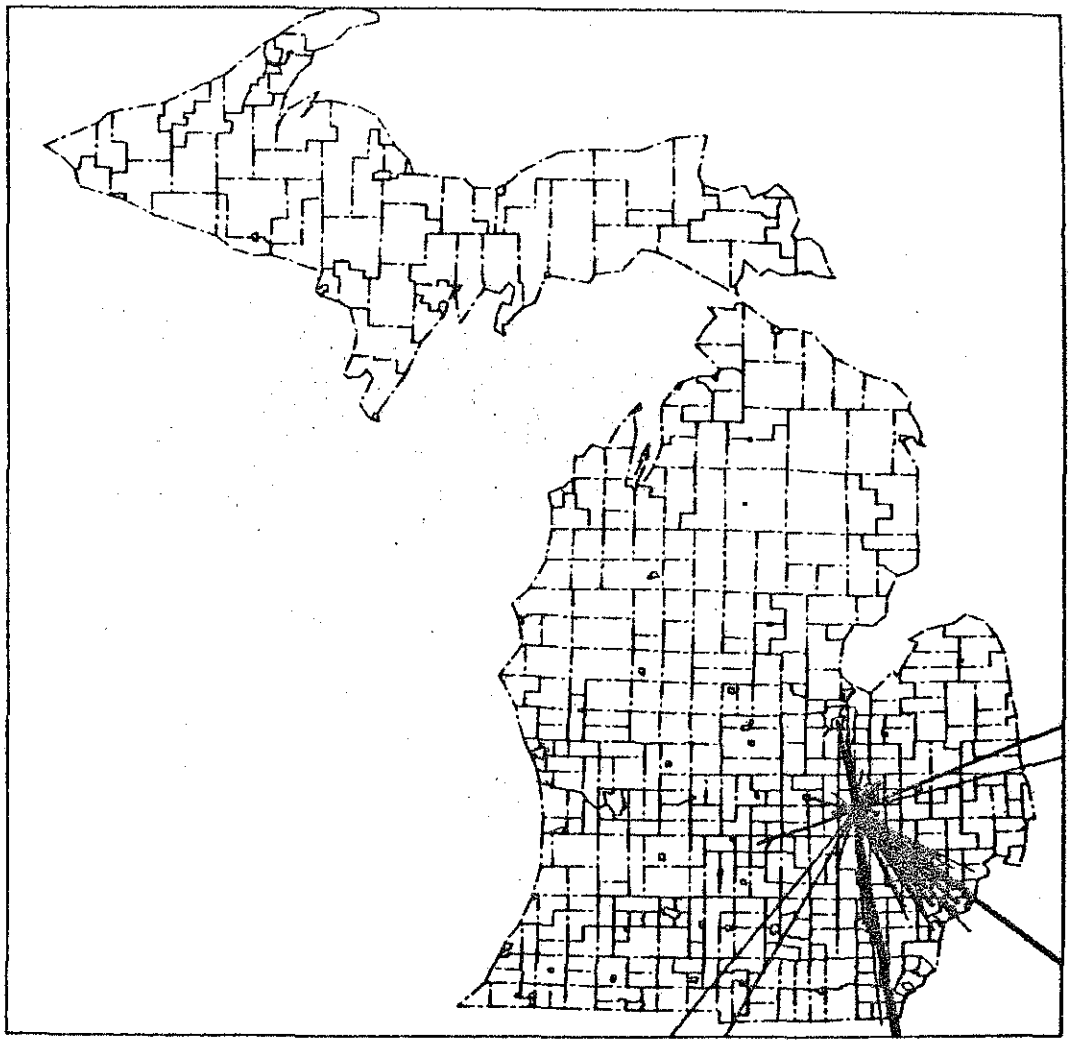
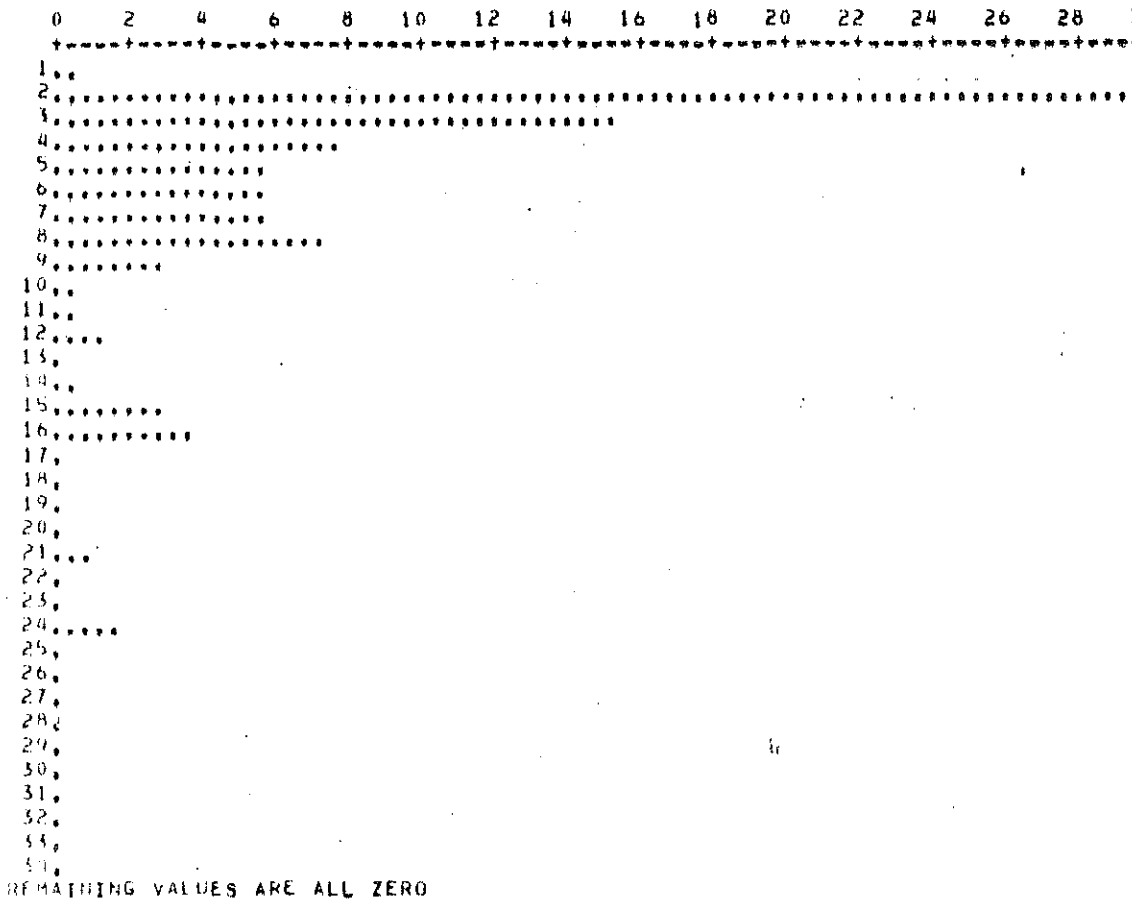


Figure 8

ENTER 0 TO QUIT,1 TO ENTER NEW ORIGIN ZONE,

OR 2 TO CHANGE PARAMETERS WITH PRESENT ORIG. ZONE



	P.C.	CUM.	ACTUAL
1	0.527	0.527	42159
2	38.536	39.063	3082710
3	15.261	54.325	1220840
4	7.781	62.105	622420
5	5.472	67.577	437698
6	5.415	72.992	433196
7	5.468	78.460	437428
8	7.072	85.532	565706
9	2.756	88.288	220448
10	0.409	88.697	32708
11	0.339	89.036	27116
12	1.108	90.144	88662
13	0.131	90.275	10472
14	0.256	90.531	20480
15	2.619	93.150	209506
16	3.487	96.637	278944
17	0.134	96.771	10700
18	0.116	96.887	9278
19	0.030	96.916	2388
20	0.117	97.033	9356
21	0.853	97.886	68208
22	0.059	97.945	4754
23	0.015	97.961	1208
24	1.636	99.596	130848
25	0.020	99.616	1564
26	0.002	99.618	136
27	0.009	99.626	684
28	0.001	99.627	44
29	0.039	99.666	3156
30	0.000	99.666	0
31	0.139	99.805	11112
32	0.000	99.805	0
33	0.000	99.805	0
51	0.195	100.000	15602

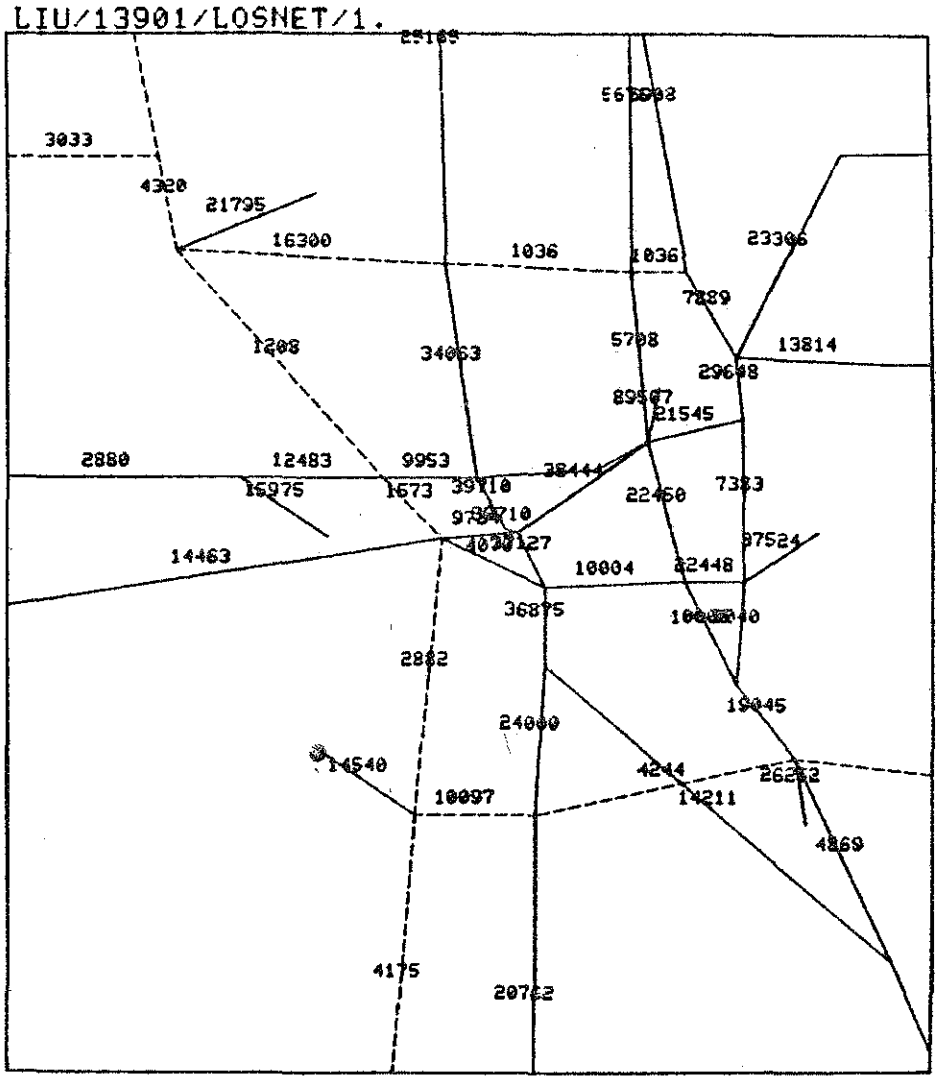
REMAINING VALUES ARE ALL ZERO
NUMBER OF OBSERVATIONS= 7999531 SUM= 42752259, MEAN= 5.344 VAR= 25.324 SD= 5.032

TOTAL TRIPS OVER MAXP = 0
TOTAL TRIPS OVER 255 = 0
VOLUME TABLE NUMBER = 201
SKIM TREE NUMBER = 101

Figure 9

COMMAND-
PARA,25#

COMMAND-

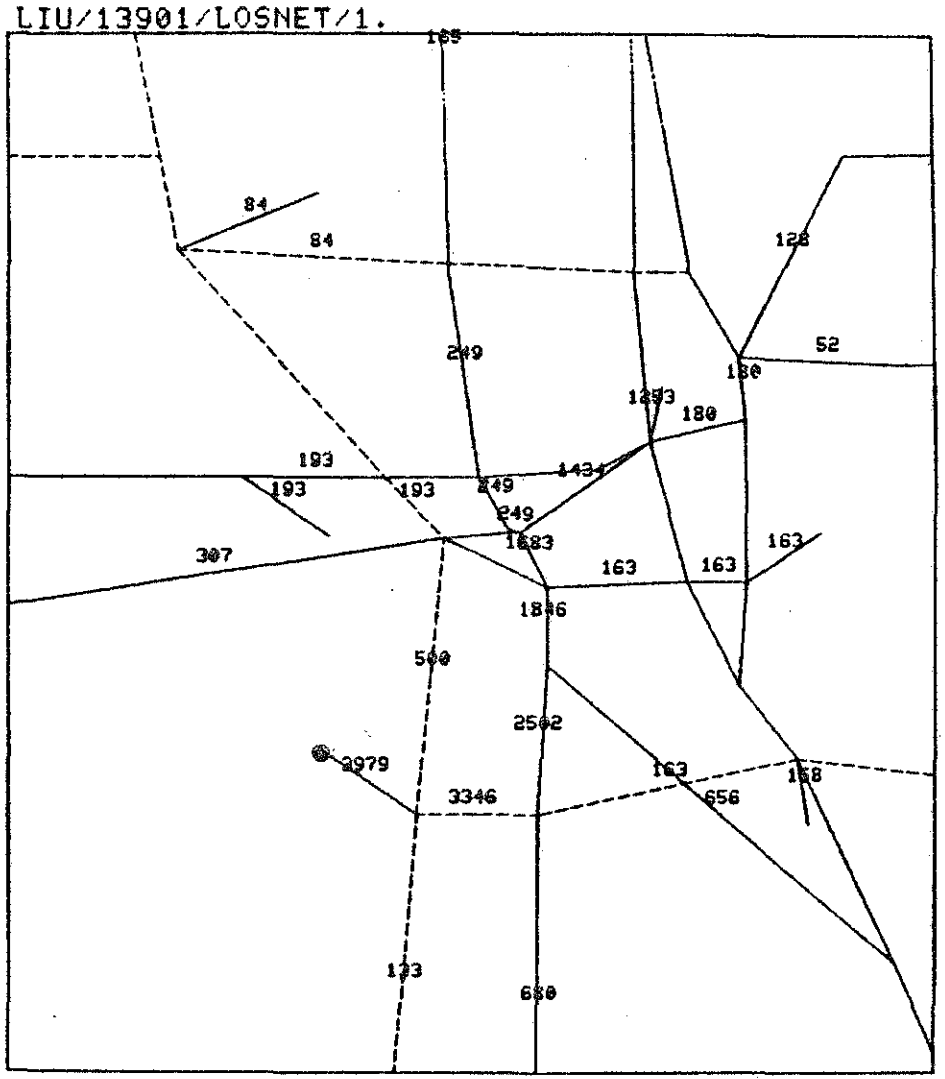


Present Traffic

Figure 10

** COMMAND-
PARA,291

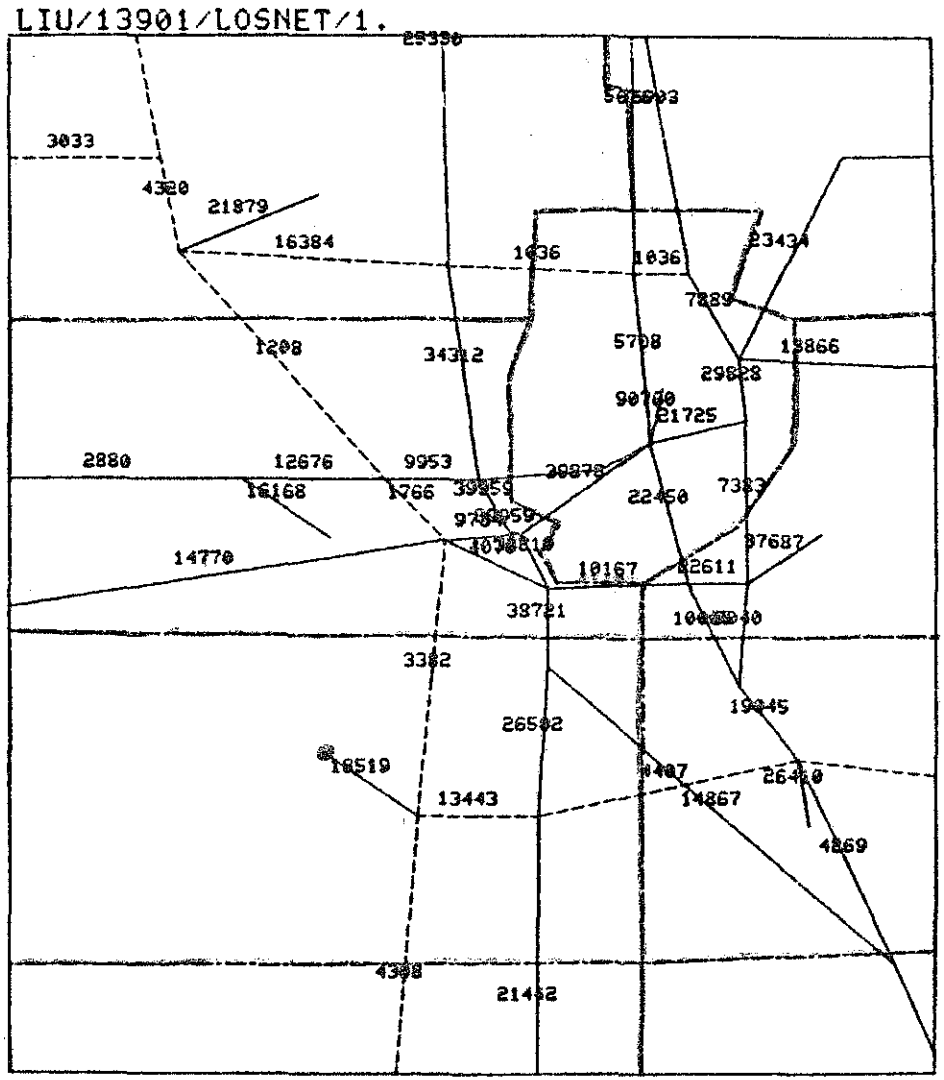
** COMMAND-



Induced Traffic

Figure 10(b)

```
$$ COMMAND-
PADEL
PARA 30DEL
PARA,30$
$$ COMMAND-
```



Total Traffic

Figure 10(c)

RUN 2

SPECIAL GENERATOR TRIP DISTRIBUTION MODEL

ATTRACTOR LOCATED IN ZONE NUMBER 139
TOTAL NUMBER OF TRIPS ATTRACTED 8000

ZONAL TRIP DISTRIBUTION

ZONE	POP	TIME(MIN)	R-FAC	TRIPS	%
1	7173	178	1,200	1	0,01
2	1433	177	1,200	0	0,00
3	3516	462	0,200	0	0,00
4	1947	456	0,200	0	0,00
5	2174	487	0,200	0	0,00
6	551	473	0,200	0	0,00
7	11565	181	1,100	1	0,01
8	8740	204	0,900	1	0,01
9	14888	174	1,200	2	0,02
10	14038	182	1,100	1	0,02
11	5557	184	1,100	1	0,01
12	15476	170	1,200	2	0,02
13	15286	207	0,900	1	0,02
14	11762	210	0,800	1	0,01
15	6948	216	0,800	0	0,01
16	4125	215	0,800	0	0,00
17	4287	257	0,600	0	0,00
18	6418	246	0,600	0	0,00
19	3892	94	3,400	1	0,01
20	3338	118	2,600	1	0,01
21	5116	102	3,000	1	0,02
22	4265	618	0,040	0	0,00
23	2356	625	0,040	0	0,00
24	923	604	0,040	0	0,00
25	7109	125	2,200	1	0,02
26	12547	133	2,100	2	0,03
27	11923	112	2,600	3	0,03
28	10170	146	1,800	2	0,02
29	56204	64	7,000	35	0,43
30	16415	67	7,000	10	0,13
31	22400	64	7,000	14	0,17
32	15374	65	7,000	9	0,12
33	10758	86	4,000	4	0,05
34	2684	235	0,700	0	0,00
35	4070	228	0,800	0	0,00
36	2219	229	0,800	0	0,00
37	27769	203	0,900	2	0,03
38	14479	215	0,800	1	0,01
39	33660	198	1,000	3	0,04
40	13570	187	1,100	1	0,02
41	6380	207	0,900	1	0,01
42	9537	228	0,800	1	0,01
43	12413	224	0,800	1	0,01
44	16165	202	0,900	1	0,02
45	13107	215	0,800	1	0,01
46	14537	219	0,800	1	0,01
47	4677	224	0,800	0	0,00
48	9582	144	1,800	2	0,02
49	6439	161	1,400	1	0,01

Figure 11

51	4455	150	1,600	1	0,01
52	4563	152	1,600	1	0,01
53	4671	150	1,600	1	0,01
54	6152	146	1,800	1	0,01
55	38654	122	2,200	8	0,09
56	4270	128	2,200	1	0,01
57	7611	143	1,800	1	0,02
58	25596	128	2,200	5	0,06
59	10740	130	2,100	2	0,02
60	6779	118	2,600	2	0,02
61	4919	117	2,600	1	0,01
62	10796	125	2,200	2	0,03
63	8231	118	2,600	2	0,02
64	2452	114	2,600	1	0,01
65	1677	130	2,100	0	0,00
66	12022	115	2,600	3	0,03
67	7202	115	2,600	2	0,02
68	6442	197	1,000	1	0,01
69	10757	202	0,900	1	0,01
70	7070	216	0,800	0	0,01
71	6794	214	0,800	0	0,01
72	2929	181	1,100	0	0,00
73	2886	197	1,000	0	0,00
74	5510	199	1,000	0	0,01
75	3696	256	0,600	0	0,00
76	2069	240	0,600	0	0,00
77	3871	239	0,700	0	0,00
78	7742	264	0,600	0	0,01
79	6758	253	0,600	0	0,00
80	5443	272	0,600	0	0,00
81	5058	236	0,700	0	0,00
82	2910	253	0,600	0	0,00
83	18784	356	0,436	1	0,01
84	2428	364	0,436	0	0,00
85	1082	402	0,200	0	0,00
86	1821	385	0,436	0	0,00
87	9138	337	0,436	0	0,00
88	2250	359	0,436	0	0,00
89	6600	115	2,600	2	0,02
90	7679	131	2,100	1	0,02
91	6688	129	2,200	1	0,02
92	6691	65	7,000	4	0,05
93	4843	53	10,400	4	0,06
94	4012	76	5,200	2	0,02
95	5009	83	4,000	2	0,02
96	3856	64	7,000	2	0,03
97	5976	85	4,000	2	0,03
98	3438	73	5,200	2	0,02
99	3024	59	10,400	3	0,03
100	11783	80	4,000	4	0,05
101	2495	171	1,200	0	0,00
102	5053	180	1,100	0	0,01
103	17002	484	0,200	0	0,00
104	3385	489	0,200	0	0,00
105	2463	476	0,200	0	0,00
106	12373	478	0,200	0	0,00
107	1680	461	0,200	0	0,00
108	2833	484	0,200	0	0,00
109	14591	551	0,150	0	0,00
110	3540	549	0,150	0	0,00
111	1963	595	0,150	0	0,00
112	4698	540	0,150	0	0,00
113	8960	86	4,000	3	0,04
114	6789	85	4,000	2	0,03
115	6115	91	3,400	2	0,02

117	20200	68	7,000	12	0,16
118	4004	87	4,000	1	0,02
119	4678	84	4,000	2	0,02
120	3742	100	3,000	1	0,01
121	4872	73	5,200	2	0,03
122	4880	85	4,000	2	0,02
123	6557	79	5,200	3	0,04
124	7212	245	0,600	0	0,00
125	3132	288	0,600	0	0,00
126	5813	255	0,600	0	0,00
127	4687	250	0,600	0	0,00
128	198756	18	5,200	91	1,14
129	12064	32	10,400	11	0,14
130	48624	31	10,400	45	0,56
131	39621	20	7,000	24	0,31
132	25043	17	5,200	11	0,14
133	33452	20	7,000	21	0,26
134	13892	35	10,400	13	0,16
135	5712	41	11,200	6	0,07
136	26323	28	7,000	16	0,20
137	9597	43	11,200	9	0,12
138	6672	37	10,400	6	0,08
139	13435	9	4,000	5	0,06
140	20610	15	5,200	9	0,12
141	3199	32	10,400	3	0,04
142	2521	119	2,600	1	0,01
143	6206	118	2,600	1	0,02
144	3092	123	2,200	1	0,01
145	4587	108	3,000	1	0,02
146	10632	719	0,020	0	0,00
147	3114	704	0,020	0	0,00
148	615	688	0,040	0	0,00
149	689	650	0,040	0	0,00
150	4992	712	0,020	0	0,00
151	22850	237	0,700	1	0,02
152	10359	231	0,700	1	0,01
153	6055	224	0,800	0	0,01
154	1280	224	0,800	0	0,00
155	2712	228	0,800	0	0,00
156	14107	101	3,000	4	0,05
157	9228	101	3,000	2	0,03
158	8323	109	3,000	2	0,03
159	5399	88	4,000	2	0,02
160	2789	93	3,400	1	0,01
161	8509	141	1,800	1	0,02
162	4737	137	2,100	1	0,01
163	3837	145	1,800	1	0,01
164	4966	144	1,800	1	0,01
165	4446	160	1,400	1	0,01
166	4225	135	2,100	1	0,01
167	4896	138	2,100	1	0,01
168	5293	124	2,200	1	0,01
169	11831	657	0,040	0	0,00
170	13221	679	0,040	0	0,00
171	2861	686	0,040	0	0,00
172	1031	629	0,040	0	0,00
173	1799	662	0,040	0	0,00
174	2801	660	0,040	0	0,00
175	4112	680	0,040	0	0,00
176	3157	136	2,100	1	0,01
177	7415	171	1,200	1	0,01
178	4351	149	1,800	1	0,01
179	5876	118	2,600	1	0,02
180	3959	138	2,100	1	0,01
181	7218	123	2,200	1	0,02

183	174770	63	7,000	123	1,54
184	25031	59	10,400	23	0,29
185	14491	75	5,200	7	0,08
186	10374	75	5,200	5	0,06
187	7959	84	4,000	3	0,04
188	4199	77	5,200	2	0,02
189	2497	74	5,200	1	0,01
190	4171	57	10,400	4	0,05
191	6971	60	7,000	4	0,05
192	6832	106	3,000	2	0,02
193	5334	106	3,000	1	0,02
194	5009	108	3,000	1	0,02
195	2753	101	3,000	1	0,01
196	5216	115	2,600	1	0,01
197	3960	110	2,600	1	0,01
198	4349	90	3,400	1	0,02
199	6871	92	3,400	2	0,03
200	8937	127	2,200	2	0,02
201	4104	138	2,100	1	0,01
202	6532	139	2,100	1	0,02
203	5329	131	2,100	1	0,01
204	14280	160	1,400	2	0,02
205	3807	610	0,040	0	0,00
206	4210	626	0,040	0	0,00
207	3635	596	0,150	0	0,00
208	793	589	0,150	0	0,00
209	1908	627	0,040	0	0,00
210	23631	119	2,600	5	0,07
211	6173	110	2,600	1	0,02
212	4050	120	2,200	1	0,01
213	6054	125	2,200	1	0,01
214	6784	119	2,600	2	0,02
215	4708	137	2,100	1	0,01
216	45991	98	3,400	14	0,17
217	21987	101	3,000	6	0,07
218	11906	112	2,600	3	0,03
219	19915	96	3,400	6	0,07
220	17105	90	3,400	5	0,06
221	7372	111	2,600	2	0,02
222	6430	109	3,000	2	0,02
223	4939	105	3,000	1	0,02
224	3751	99	3,400	1	0,01
225	5446	91	3,400	2	0,02
226	114299	152	1,600	16	0,20
227	34953	152	1,600	5	0,06
228	10882	145	1,800	2	0,02
229	4214	139	2,100	1	0,01
230	16522	147	1,800	3	0,03
231	8995	156	1,600	1	0,02
232	4130	157	1,600	1	0,01
233	15683	156	1,600	2	0,03
234	5288	205	0,900	0	0,01
235	1778	198	1,000	0	0,00
236	215936	137	2,100	40	0,50
237	10006	129	2,200	2	0,02
238	29091	143	1,800	5	0,06
239	15031	147	1,800	2	0,03
240	5404	130	2,100	1	0,01
241	16720	143	1,800	3	0,03
242	7009	132	2,100	1	0,02
243	5657	139	2,100	1	0,01
244	6797	126	2,200	1	0,03
245	8740	166	1,400	1	0,01
246	11822	143	1,800	2	0,02
247	[illegible]	134	2,100	4	0,05

249	2297	715	0,020	0	0,00
250	4834	191	1,000	0	0,01
251	2220	207	0,900	0	0,00
252	6746	47	11,200	7	0,08
253	6053	62	7,000	4	0,05
254	5603	76	5,200	3	0,03
255	7962	66	7,000	5	0,06
256	10392	60	7,000	6	0,08
257	9393	50	10,400	9	0,11
258	10164	76	5,200	5	0,06
259	4621	274	0,600	0	0,00
260	3117	252	0,600	0	0,00
261	5317	248	0,600	0	0,00
262	20896	109	3,000	6	0,07
263	5628	106	3,000	1	0,02
264	10630	106	3,000	3	0,04
265	4073	112	2,600	1	0,01
266	18550	100	3,000	5	0,06
267	5235	146	1,800	1	0,01
268	7728	119	2,600	2	0,02
269	5344	133	2,100	1	0,01
270	5553	114	2,600	1	0,02
271	12987	42	11,200	13	0,16
272	8794	50	10,400	8	0,10
273	12958	37	10,400	12	0,15
274	16461	51	10,400	15	0,19
275	16537	39	10,400	15	0,19
276	6479	62	7,000	4	0,05
277	4274	405	0,200	0	0,00
278	1085	400	0,200	0	0,00
279	2757	398	0,436	0	0,00
280	3992	308	0,436	0	0,00
281	3240	349	0,436	0	0,00
282	1728	331	0,436	0	0,00
283	2250	369	0,436	0	0,00
284	94715	76	5,200	43	0,54
285	221971	84	4,000	78	0,98
286	203804	70	5,200	94	1,17
287	101438	65	7,000	63	0,78
288	20166	83	4,000	7	0,09
289	15662	75	5,200	7	0,09
290	14385	98	3,400	4	0,05
291	14576	224	0,800	1	0,01
292	1415	204	0,900	0	0,00
293	1863	221	0,800	0	0,00
294	3961	246	0,600	0	0,00
295	24087	521	0,150	0	0,00
296	10225	517	0,150	0	0,00
297	4800	553	0,150	0	0,00
298	9694	529	0,150	0	0,00
299	14792	537	0,150	0	0,00
300	3793	536	0,150	0	0,00
301	3524	570	0,150	0	0,00
302	10259	237	0,700	1	0,01
303	4103	222	0,800	0	0,00
304	5857	235	0,700	0	0,00
305	5494	234	0,700	0	0,00
306	13889	179	1,200	1	0,02
307	6064	180	1,100	1	0,01
308	3740	152	1,600	1	0,01
309	4349	150	1,600	1	0,01
310	4369	163	1,400	1	0,01
311	11692	559	0,150	0	0,00
312	4212	518	0,150	0	0,00
313	7560	548	0,150	0	0,00

315	36295	84	4,000	13	0,16
316	5572	106	3,000	1	0,02
317	10417	89	4,000	4	0,05
318	6103	86	4,000	2	0,03
319	7879	99	3,400	2	0,03
320	4182	175	1,200	0	0,01
321	1545	181	1,100	0	0,00
322	2410	157	1,600	0	0,00
323	25865	106	3,000	7	0,09
324	22595	106	3,000	6	0,07
325	5962	101	3,000	2	0,02
326	5321	83	4,000	2	0,02
327	6347	116	2,600	1	0,02
328	7553	94	3,400	2	0,03
329	26024	105	3,000	7	0,09
330	7809	92	3,400	2	0,03
331	4488	107	3,000	1	0,01
332	5591	77	5,200	3	0,03
333	6283	105	3,000	2	0,02
334	4398	97	3,400	1	0,02
335	7948	130	2,100	1	0,02
336	8608	106	3,000	2	0,03
337	6884	133	2,100	1	0,02
338	6909	136	2,100	1	0,02
339	5735	154	1,600	1	0,01
340	5996	141	1,800	1	0,01
341	5948	204	0,900	0	0,01
342	66208	178	1,200	7	0,09
343	5451	197	1,000	0	0,01
344	13770	175	1,200	1	0,02
345	26469	175	1,200	3	0,04
346	2221	191	1,000	0	0,00
347	3371	168	1,400	0	0,01
348	6837	182	1,100	1	0,01
349	6696	176	1,200	1	0,01
350	11848	195	1,000	1	0,01
351	14684	168	1,400	2	0,02
352	3692	195	1,000	0	0,00
353	3999	207	0,900	0	0,00
354	5734	194	1,000	1	0,01
355	5601	199	1,000	0	0,01
356	5359	184	1,100	1	0,01
357	5440	179	1,200	1	0,01
358	87710	48	11,200	87	1,08
359	40792	67	7,000	56	0,70
360	282568	66	7,000	175	2,18
361	74726	57	10,400	69	0,86
362	64078	60	7,000	40	0,49
363	19989	52	10,400	18	0,23
364	25313	54	10,400	23	0,29
365	30824	44	11,200	30	0,38
366	36335	56	10,400	33	0,42
367	40539	61	7,000	25	0,31
368	32508	58	10,400	30	0,37
369	13837	45	11,200	13	0,17
370	62863	41	11,200	62	0,78
371	10181	28	7,000	6	0,08
372	7192	30	10,400	7	0,08
373	20736	38	10,400	19	0,24
374	22511	56	10,400	21	0,26
375	11582	56	10,400	11	0,13
376	5520	206	0,900	0	0,01
377	7721	227	0,800	1	0,01
378	5406	211	0,800	0	0,00
379	5566	234	0,700	0	0,00

381	3665	131	2,100	1	0,01
382	3643	129	2,200	1	0,01
383	3898	688	0,040	0	0,00
384	1742	670	0,040	0	0,00
385	2727	653	0,040	0	0,00
386	2591	714	0,020	0	0,00
387	5369	169	1,400	1	0,01
388	4798	157	1,600	1	0,01
389	3748	154	1,600	1	0,01
390	4106	184	1,100	0	0,00
391	5962	171	1,200	1	0,01
392	3851	198	1,000	0	0,00
393	5229	204	0,900	0	0,01
394	4247	215	0,800	0	0,00
395	25106	170	1,200	3	0,03
396	10538	151	1,600	1	0,02
397	7585	159	1,600	1	0,01
398	26286	151	1,600	4	0,05
399	24070	169	1,400	3	0,04
400	11671	175	1,200	1	0,02
401	7081	156	1,600	1	0,01
402	19242	170	1,200	2	0,03
403	8368	164	1,400	1	0,01
404	7482	245	0,600	0	0,00
405	3662	233	0,700	0	0,00
406	2883	233	0,700	0	0,00
407	9150	154	1,600	1	0,02
408	4523	153	1,600	1	0,01
409	93716	52	10,400	86	1,08
410	4101	73	5,200	2	0,02
411	38954	60	7,000	24	0,30
412	16182	50	10,400	15	0,19
413	8763	65	7,000	5	0,07
414	4886	49	11,200	5	0,06
415	13156	42	11,200	13	0,16
416	7867	65	7,000	5	0,06
417	7934	75	5,200	4	0,05
418	4953	80	4,000	2	0,02
419	1905	60	7,000	1	0,01
420	7979	55	10,400	7	0,09
421	5760	52	10,400	5	0,07
422	7979	36	10,400	7	0,09
423	7214	127	2,200	1	0,02
424	5070	138	2,100	1	0,01
425	7258	94	3,400	2	0,03
426	5437	115	2,600	1	0,02
427	4168	141	1,800	1	0,01
428	4730	102	3,000	1	0,02
429	4333	122	2,200	1	0,01
430	4604	416	0,200	0	0,00
431	1703	428	0,200	0	0,00
432	2448	423	0,200	0	0,00
433	18169	39	10,400	17	0,21
434	4427	45	11,200	4	0,05
435	10809	27	7,000	7	0,08
436	7528	36	10,400	7	0,09
437	6688	48	11,200	7	0,08
438	4914	29	7,000	3	0,04
439	2980	49	11,200	3	0,04
440	4047	31	10,400	4	0,05
441	7121	40	11,200	7	0,09
442	60358	110	2,600	14	0,17
443	16761	115	2,600	4	0,05
444	18079	108	3,000	5	0,06
445	6616	111	2,600	2	0,02

447	6293	125	2,200	1	0,02
448	3644	98	3,400	1	0,01
449	5156	95	3,400	2	0,02
450	3463	96	3,400	1	0,01
451	3463	78	5,200	2	0,02
452	11427	172	1,200	1	0,02
453	5315	154	1,600	1	0,01
454	6721	178	1,200	1	0,01
455	7472	173	1,200	1	0,01
456	3189	161	1,400	0	0,00
457	4555	189	1,100	0	0,01
458	3889	176	1,200	0	0,01
459	7820	173	1,200	1	0,01
460	3910	81	4,000	1	0,02
461	4593	93	3,400	1	0,02
462	6376	58	10,400	6	0,07
463	4963	84	4,000	2	0,02
464	4691	90	3,400	1	0,02
465	4917	64	7,000	3	0,04
466	4670	109	3,000	1	0,02
467	3062	84	4,000	1	0,01
468	6598	77	5,200	3	0,04
469	2964	63	7,000	2	0,02
470	4639	98	3,400	1	0,02
471	7216	197	1,000	1	0,01
472	11129	178	1,200	1	0,01
473	10624	181	1,100	1	0,01
474	8024	185	1,100	1	0,01
475	5155	176	1,200	1	0,01
476	6771	198	1,000	1	0,01
477	3789	192	1,000	0	0,00
478	9935	169	1,400	1	0,02
479	105399	59	10,400	97	1,21
480	3783	57	10,400	3	0,04
481	8654	68	7,000	5	0,07
482	9718	57	10,400	9	0,11
483	31207	66	7,000	19	0,24
484	35065	67	7,000	22	0,27
485	5885	59	10,400	5	0,07
486	14614	71	5,200	7	0,08
487	8110	75	5,200	4	0,05
488	3486	92	3,400	1	0,01
489	3016	90	3,400	1	0,01
490	7171	75	5,200	3	0,04
491	3808	71	5,200	2	0,02
492	7369	54	10,400	7	0,08
493	471644	84	4,000	167	2,08
494	196647	78	5,200	90	1,13
495	583507	72	5,200	268	3,35
496	465974	79	5,200	214	2,67
497	208760	85	4,000	74	0,92
498	67782	86	4,000	24	0,30
499	71133	92	3,400	21	0,27
500	45102	82	4,000	16	0,20
501	173967	76	5,200	80	1,00
502	146905	77	5,200	67	0,84
503	76287	87	4,000	27	0,34
504	69586	65	7,000	43	0,54
505	10698	172	1,200	1	0,01
506	5491	174	1,200	1	0,01
507	2073	196	1,000	0	0,00
508	2850	189	1,100	0	0,00
509	356000	113	2,600	82	1,02
510	142400	153	1,600	20	0,25
511	53600	393	0,436	32	0,40

513	5061900	230	0,700	314	3,93
514	6816	728	0,020	0	0,00
515	32603	750	0,020	0	0,00
516	35330	669	0,040	0	0,00
517	8520	647	0,040	0	0,00
518	3635	563	0,150	0	0,00
519	38965	580	0,150	1	0,01
520	839987	789	0,020	1	0,02
521	3973553	769	0,020	7	0,09
522	894941	562	0,150	12	0,15
523	2478005	461	0,200	44	0,55
524	469054	570	0,150	6	0,08
525	7889014	341	0,436	304	3,80
526	2406017	303	0,436	93	1,16
527	1721576	357	0,436	66	0,83
528	681767	285	0,600	36	0,45
529	141375	268	0,600	7	0,09
530	308085	240	0,600	16	0,20
531	190687	217	0,800	13	0,17
532	433965	191	1,000	38	0,48
533	1317841	208	0,900	105	1,31
534	2550631	204	0,900	203	2,53
535	72614	165	1,400	9	0,11
536	62383	162	1,400	8	0,10
537	617605	118	2,600	142	1,77
538	996236	155	1,600	140	1,75
539	4722553	146	1,800	750	9,38
540	5098406	155	1,600	720	9,00
541	1755009	400	0,200	31	0,39
542	3373016	339	0,436	130	1,62
543	4922126	717	0,020	9	0,11
544	2903729	638	0,040	10	0,13
545	4041817	824	0,000	0	0,00
546	9999999	370	0,436	385	4,81
547	9999999	386	0,436	385	4,81
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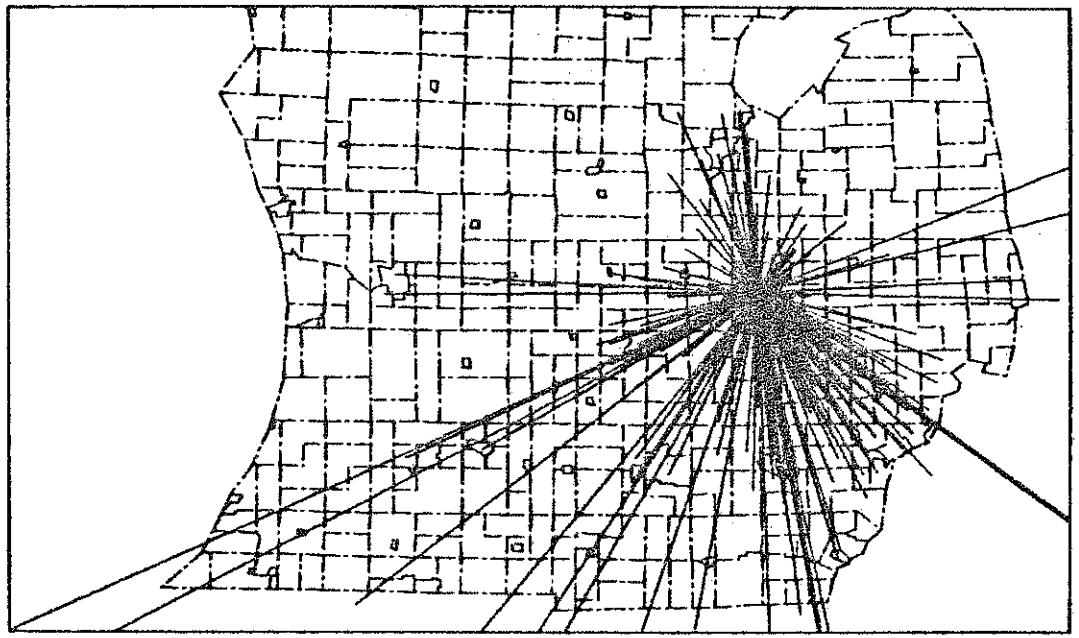
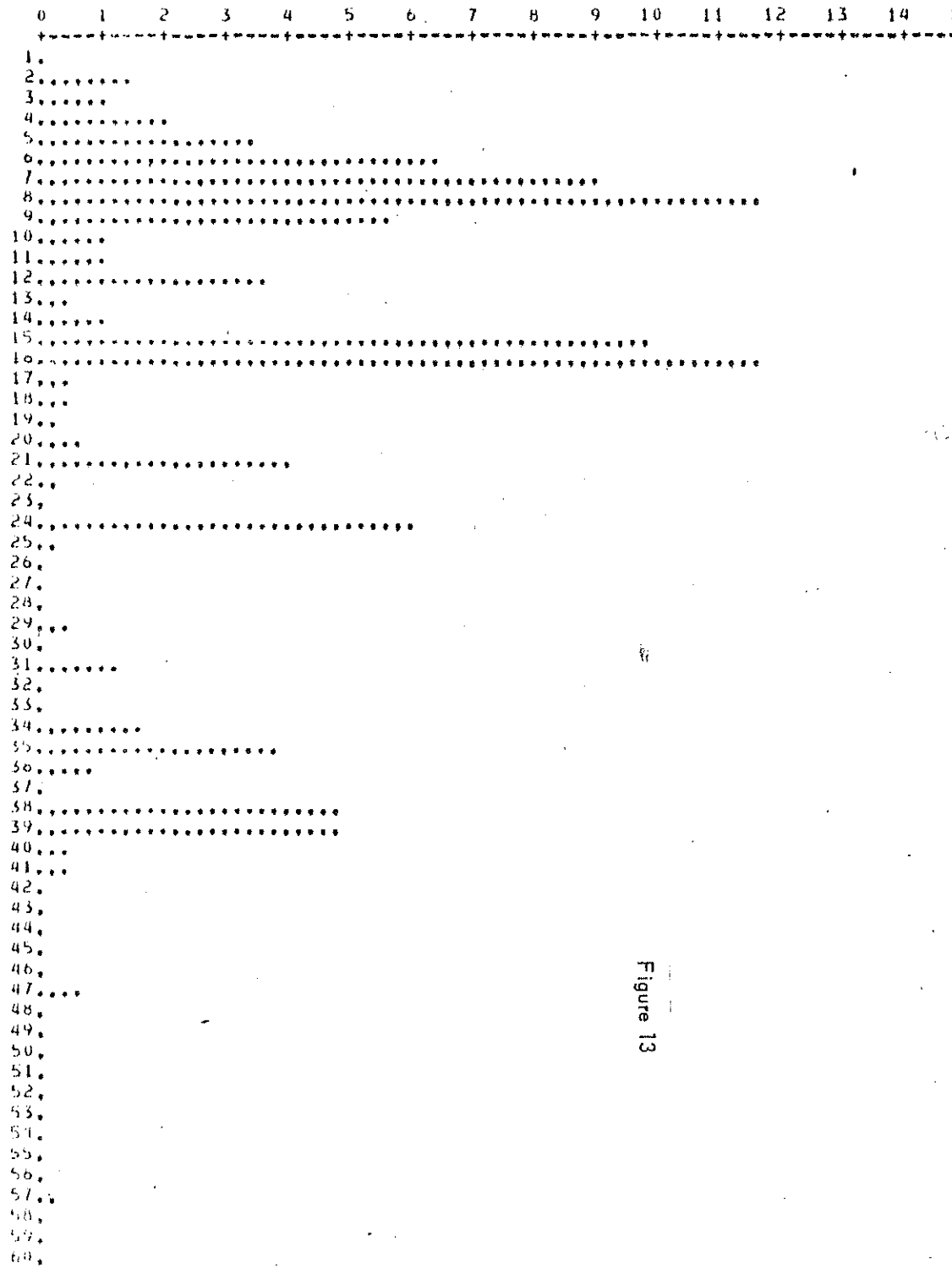


Figure 12

ENTER 0 TO QUIT,1 TO ENTER NEW ORIGIN ZONE, OR 2 TO CHANGE PARAMETERS WITH PRESENT ORIG. ZONE



	P.C.	CUM.	ACTUAL
1.	0.059	0.059	4743
2.	1.402	1.462	112182
3.	0.968	2.429	77416
4.	2.061	4.490	164858
5.	3.328	7.819	266252
6.	6.390	14.209	511162
7.	9.014	23.223	721088
8.	11.526	34.749	922040
9.	5.574	40.323	445892
10.	1.010	41.333	80806
11.	0.981	42.314	78468
12.	3.527	45.841	282168
13.	0.418	46.259	33416
14.	1.016	47.275	81268
15.	9.719	56.994	777440
16.	11.502	68.496	920110
17.	0.386	68.882	30910
18.	0.420	69.302	33584
19.	0.124	69.427	9956
20.	0.604	70.030	48294
21.	3.956	73.986	316426
22.	0.245	74.231	19628
23.	0.063	74.294	5016
24.	5.901	80.195	472074
25.	0.225	80.421	18026
26.	0.021	80.441	1648
27.	0.099	80.540	7896
28.	0.007	80.546	552
29.	0.453	81.000	36270
30.	0.000	81.000	0
31.	1.159	82.159	92748
32.	0.000	82.159	0
33.	0.000	82.159	0
34.	1.628	83.787	130228
35.	3.797	87.584	303736
36.	0.838	88.423	67062
37.	0.002	88.425	178
38.	4.811	93.236	384854
39.	4.812	98.048	384924
40.	0.404	98.451	32302
41.	0.389	98.840	31092
42.	0.001	98.841	80
43.	0.001	98.842	72
44.	0.000	98.842	0
45.	0.000	98.842	0
46.	0.000	98.842	34
47.	0.546	99.389	43694
48.	0.003	99.392	268
49.	0.006	99.398	446
50.	0.000	99.398	0
51.	0.000	99.398	0
52.	0.002	99.400	188
53.	0.006	99.406	488
54.	0.003	99.409	244
55.	0.003	99.412	208
56.	0.005	99.417	408
57.	0.149	99.565	11896
58.	0.078	99.644	6256
59.	0.007	99.650	524
60.	0.001	99.651	72
61.	0.000	99.651	2

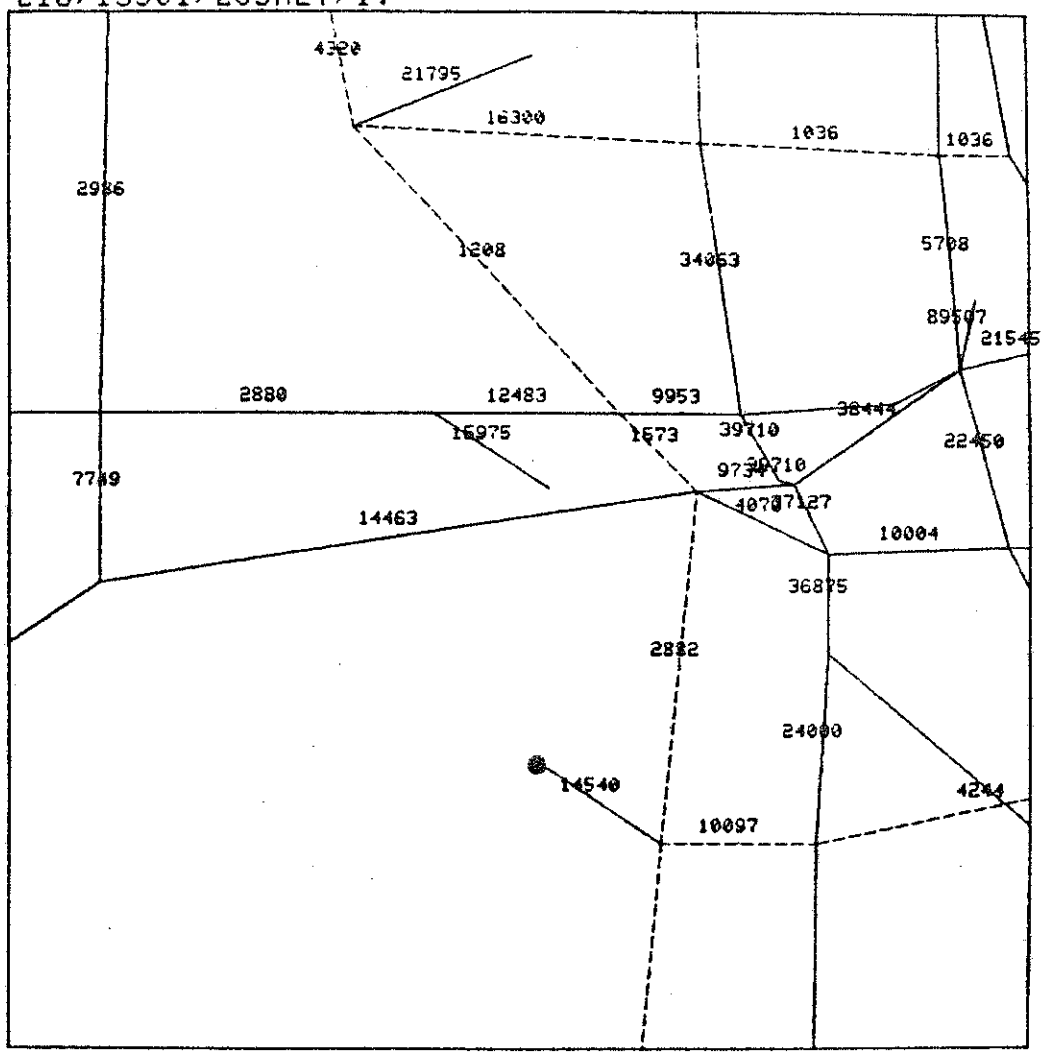
Figure 13

```
** COMMAND-
PARA,25

$ENTER 3 ATTRIBUTE POSITIONS
PARA,25
PARA,25
** COMMAND-
PARA,25

** COMMAND-
```

LIU/13901/LOSNET/1.



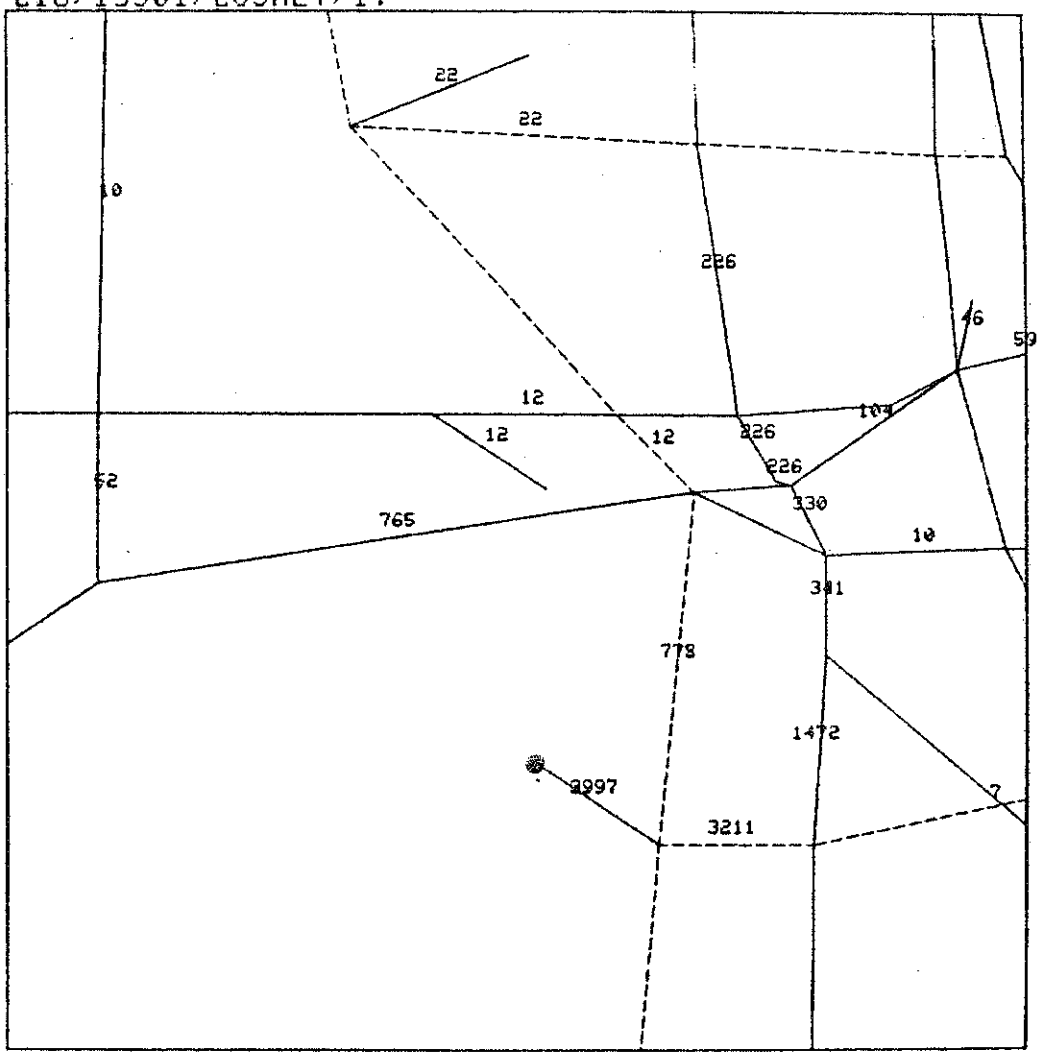
Present Traffic

Figure 14(a)

$$ COMMAND-
PARA,29

$$ COMMAND-

LIU/13901/LOSNET/1.



Induced Traffic

Figure 14(b)

** COMMAND-
PARA,30

** COMMAND-

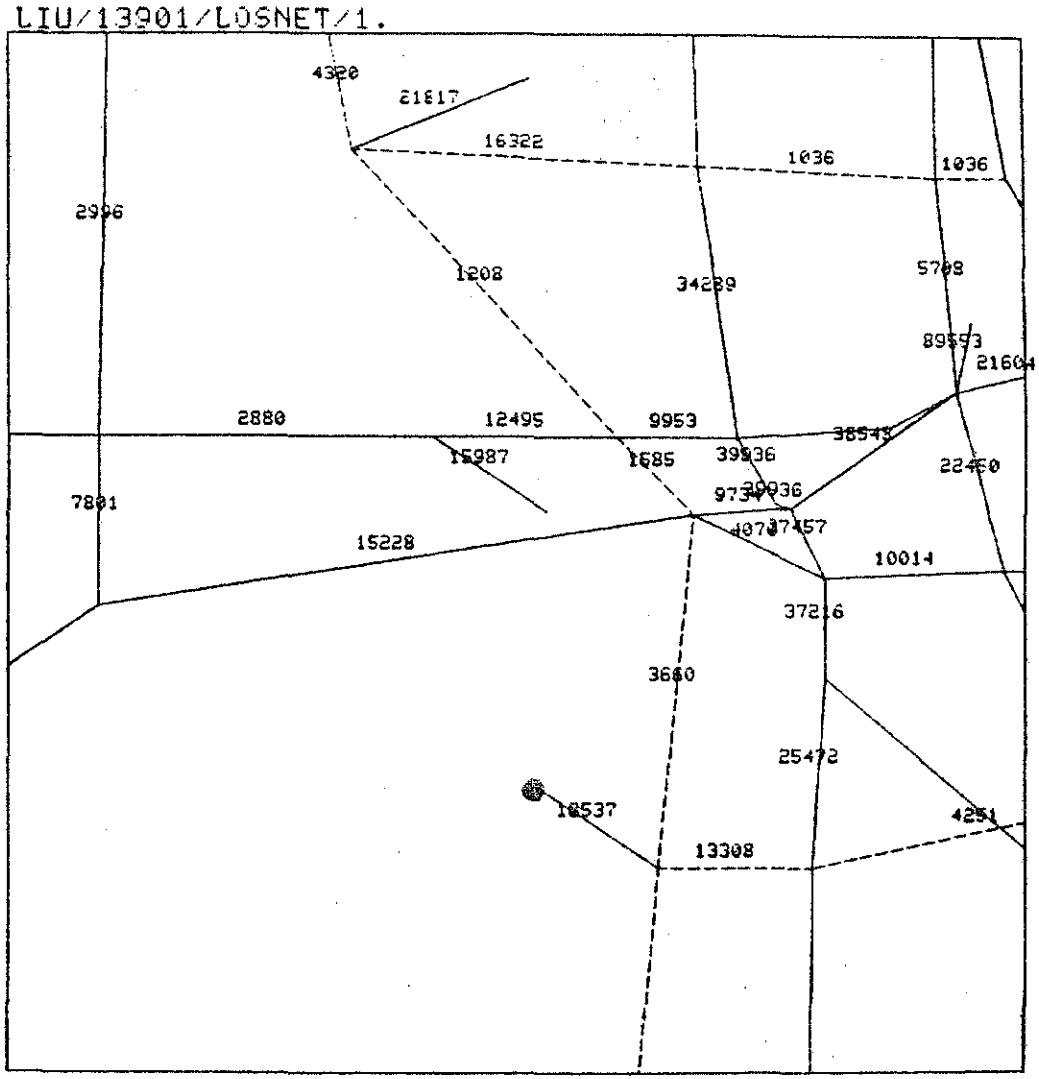


Figure 14(c) Total Traffic