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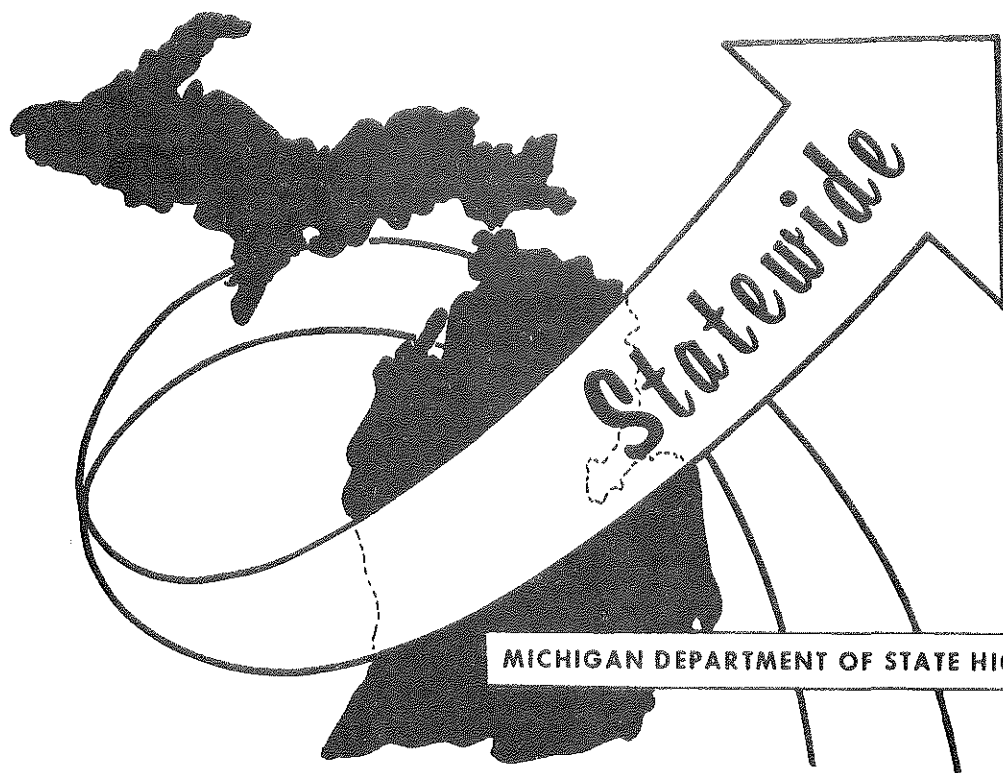


Transportation Analysis & Research

STATEWIDE PROJECT
REPORT

"RIFLE-RANGE
PROXIMITY ANALYSIS"

Report no. 7
August, 1972



MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

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STATEWIDE PROJECT
REPORT

"RIFLE-RANGE
PROXIMITY ANALYSIS"

Report no. 7
August, 1972

TRANSPORTATION SURVEY AND ANALYSIS SECTION
Keith E. Bushnell, Engineer

Prepared by: STATEWIDE STUDIES UNIT

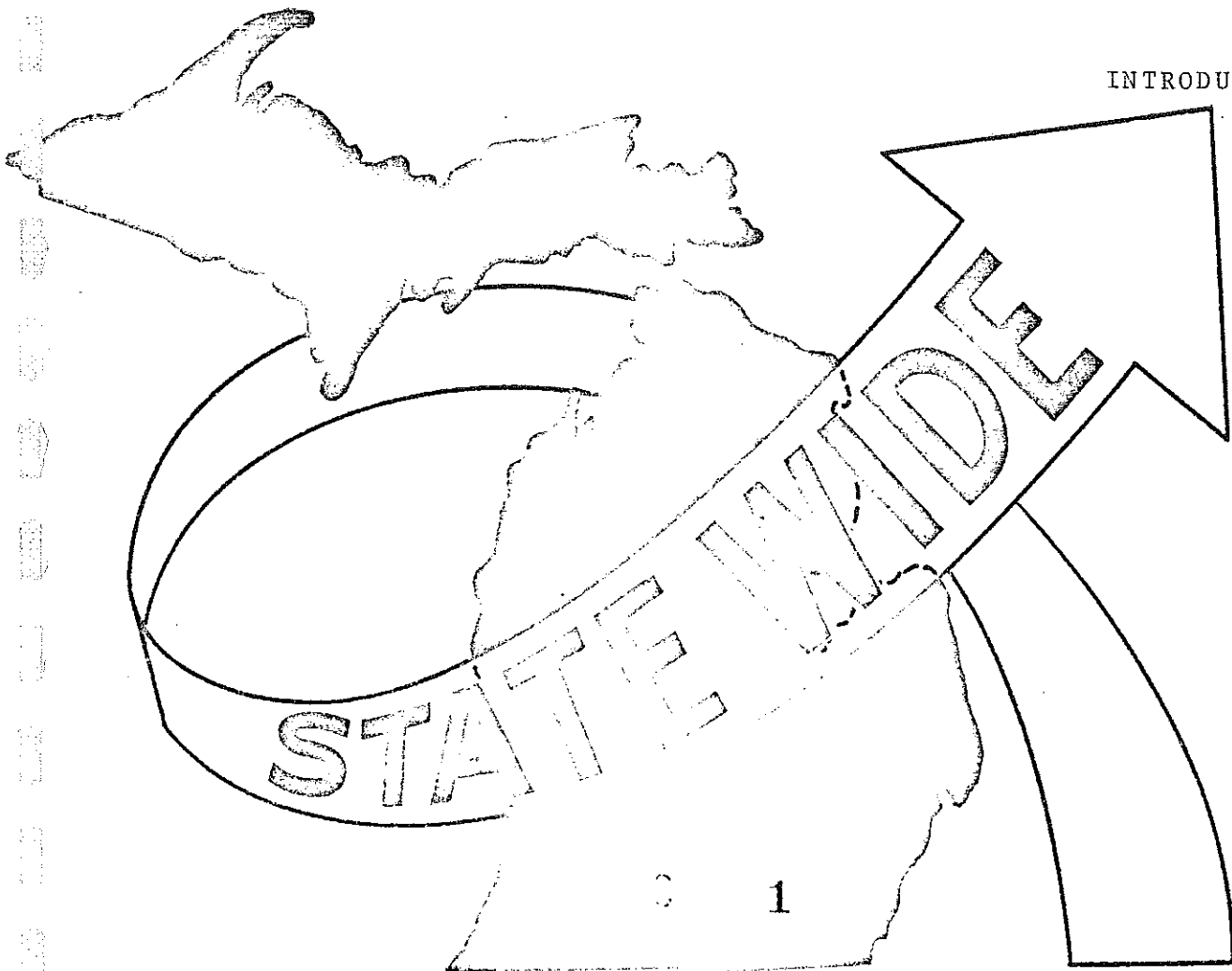
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Analyst Richard Nelson
Richard Nelson

With the Participation of:

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

INTRODUCTION

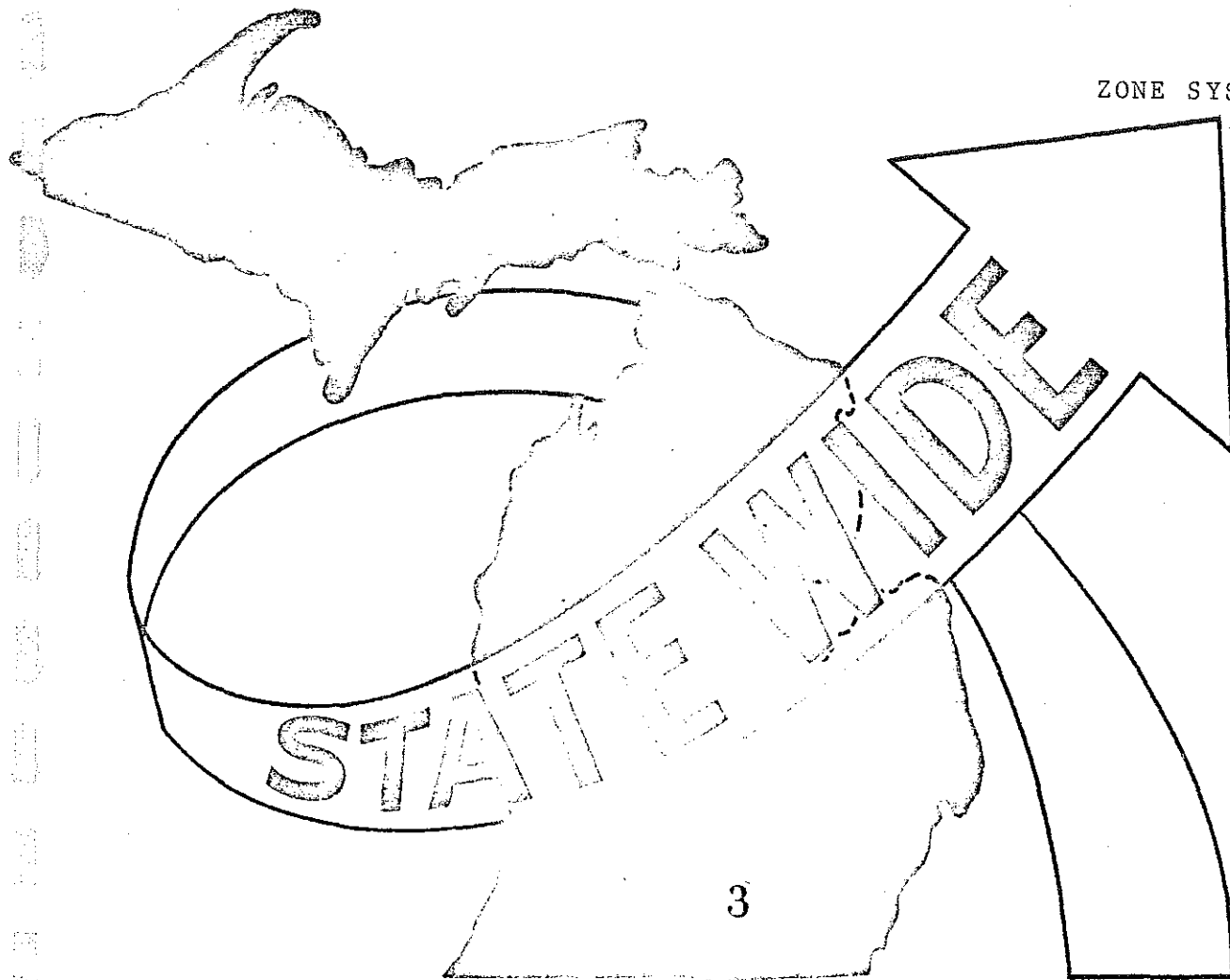


INTRODUCTION

The Department of Natural Resources requested information from the Statewide Model to aid in planning for rifle range sites. The Statewide Studies Unit of the Michigan Department of State Highways was able to supply average driving times from the eleven proposed rifle range sites to all zones within one hour's drive. It was felt that for the purpose of this study, few trips attracted to the rifle range would originate from zones more than one hour away. The output, in the form of computer plots, depicts the minimum time path away from each of the (11) proposed sites. Average driving times were accumulated on each link and expressed in hundredths of minutes.

The DNR also requested populations of the zones which would be most influenced by each rifle range, i.e. within 1 hour's drive. Using a program developed within the Statewide Studies Unit, populations were accumulated and summarized within four 15-minute isochronic bands around each rifle range zone.

ZONE SYSTEM

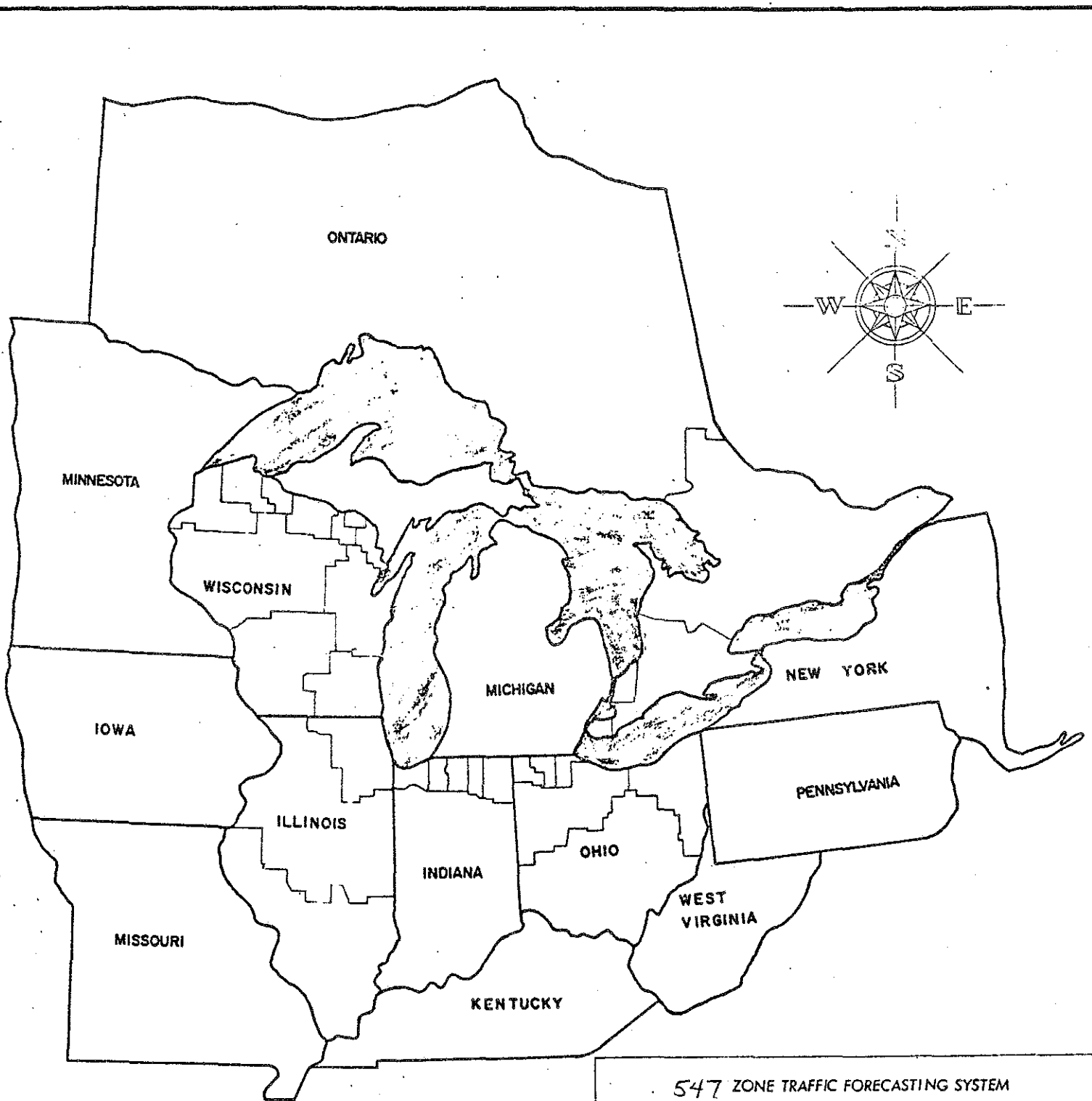


ZONE SYSTEM

Figure 1 shows the instate zones of the 547-zone system. Only these zones were used in the analysis, because the out-state zones are very large (see figure 2) and the shortest time path to Indiana, for instance, means little in this context. Figure 3 is a list of the rifle ranges for which analysis was to be done and the zones taken to represent them; these sites are superimposed on a zone map in figure 4.

The zone-to-zone travel times were calculated on the network shown in figure 5. This is a plot of all links in the system, as contrasted with the plots in the next section of selected paths from one rifle-range zone to all other zones.

FIGURE 2
547-Zone Outstate Zones

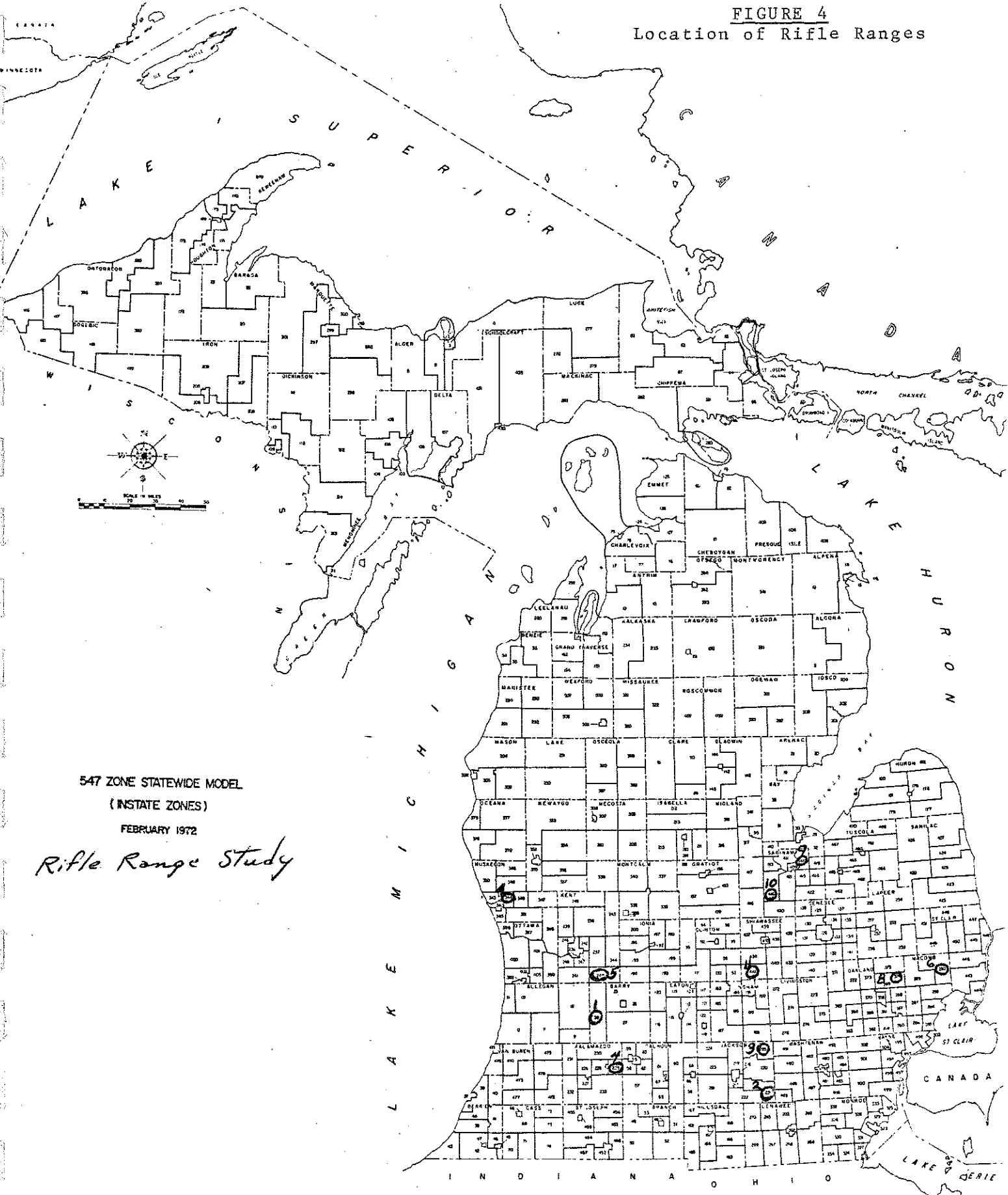


547 ZONE TRAFFIC FORECASTING SYSTEM
OUTSTATE ANALYSIS ZONES
MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRANSPORTATION PLANNING DIVISION
STATEWIDE STUDIES UNIT

FIGURE 3
Rifle Range Zones

1. Zone 28 Barry State Game Area
2. Zone 221 Sharonville State Game Area
3. Zone 225 Waterloo Recreation Area
4. Zone 229 Fort Custer
5. Zone 240 Middleville State Game Area
6. Zone 290 Richmond
7. Zone 344 Muskegon State Game Area
8. Zone 374 Bald Mt.
9. Zone 412 Crow Island
10. Zone 416 Shiawassee River State Game Area
11. Zone 441 Rose Lake Wildlife Research Area

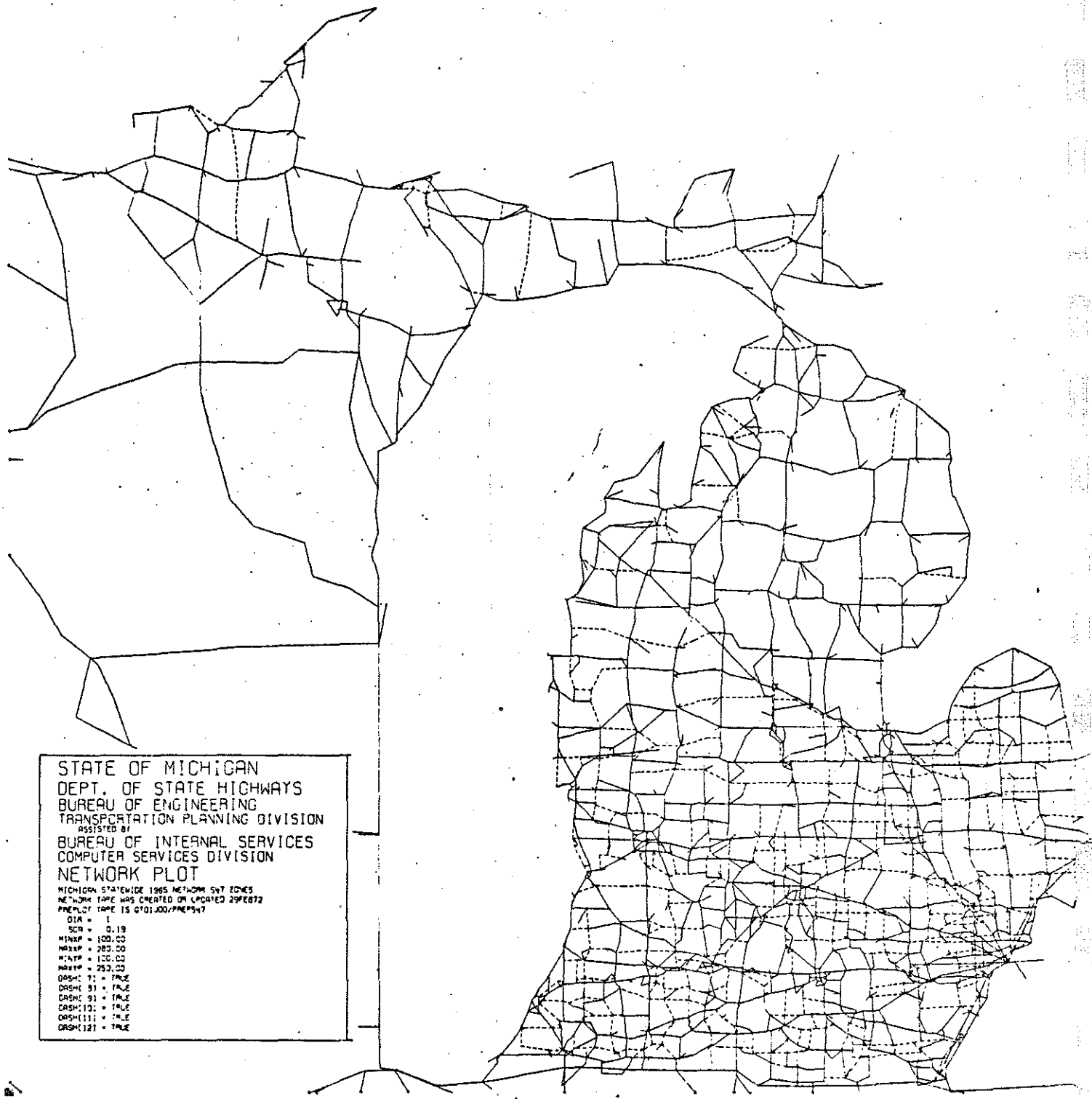
FIGURE 4
Location of Rifle Ranges



547 ZONE STATEWIDE MODEL
(INSTATE ZONES)
FEBRUARY 1972

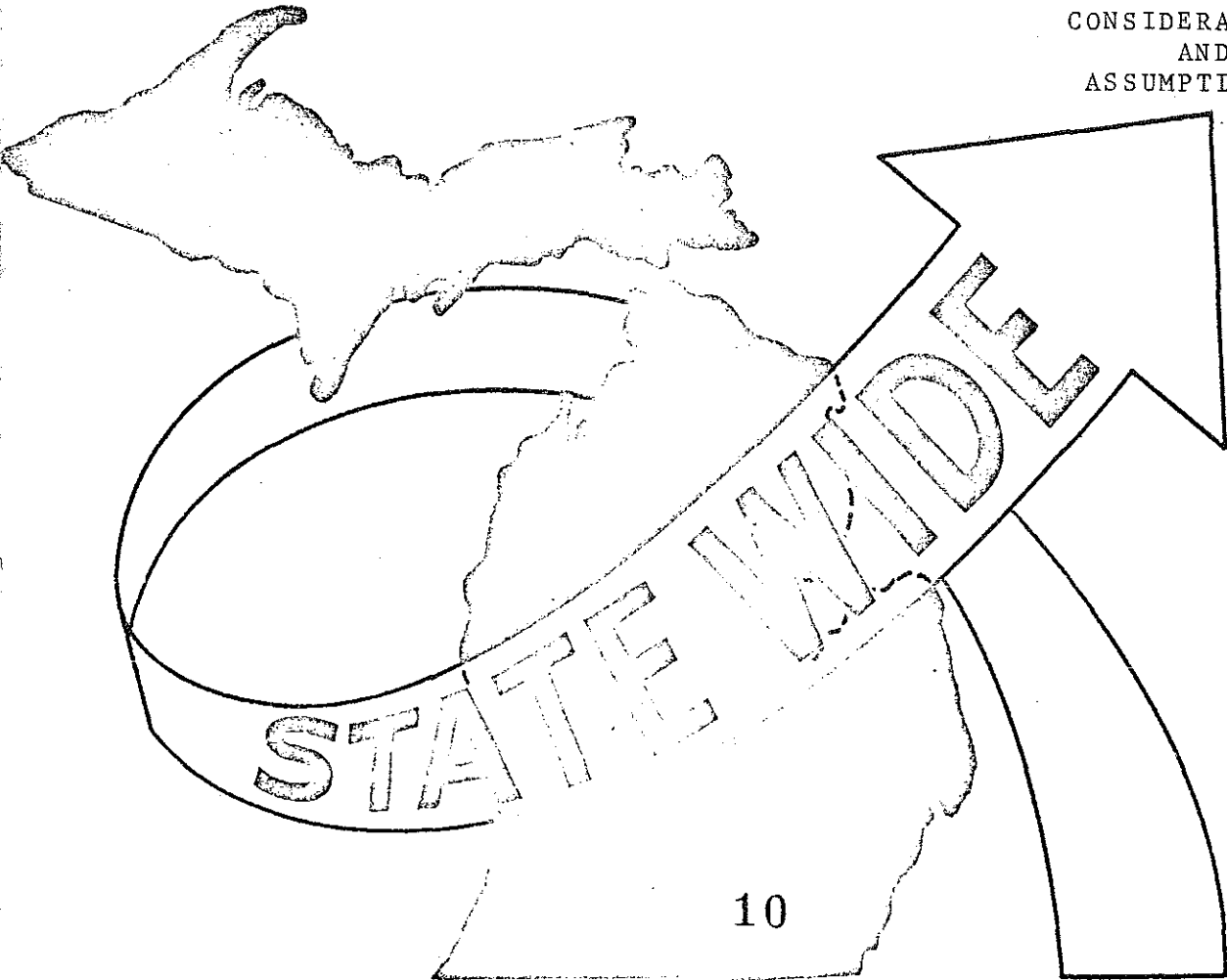
Rifle Range Study

FIGURE 5
'547-Zone Highway Network



STATE OF MICHIGAN
DEPT. OF STATE HIGHWAYS
BUREAU OF ENGINEERING
TRANSPORTATION PLANNING DIVISION
ASSISTED BY
BUREAU OF INTERNAL SERVICES
COMPUTER SERVICES DIVISION
NETWORK PLOT
MICHIGAN STATEWIDE 1965 NETWORK SHY ZONES
NETWORK TAPE WAS CREATED OR UPDATED 29P2872
PLOT TAPE IS 0101.00/PNE547
OIA = 1
SCR = 0.19
MINRP = 100.00
MAXRP = 200.00
MINTP = 100.00
MAXTP = 200.00
DASH: 1: = TRUE
DASH: 51: = TRUE
DASH: 91: = TRUE
DASH: 101: = TRUE
DASH: 111: = TRUE
DASH: 121: = TRUE

CONSIDERATIONS
AND
ASSUMPTIONS



CONSIDERATIONS AND ASSUMPTIONS

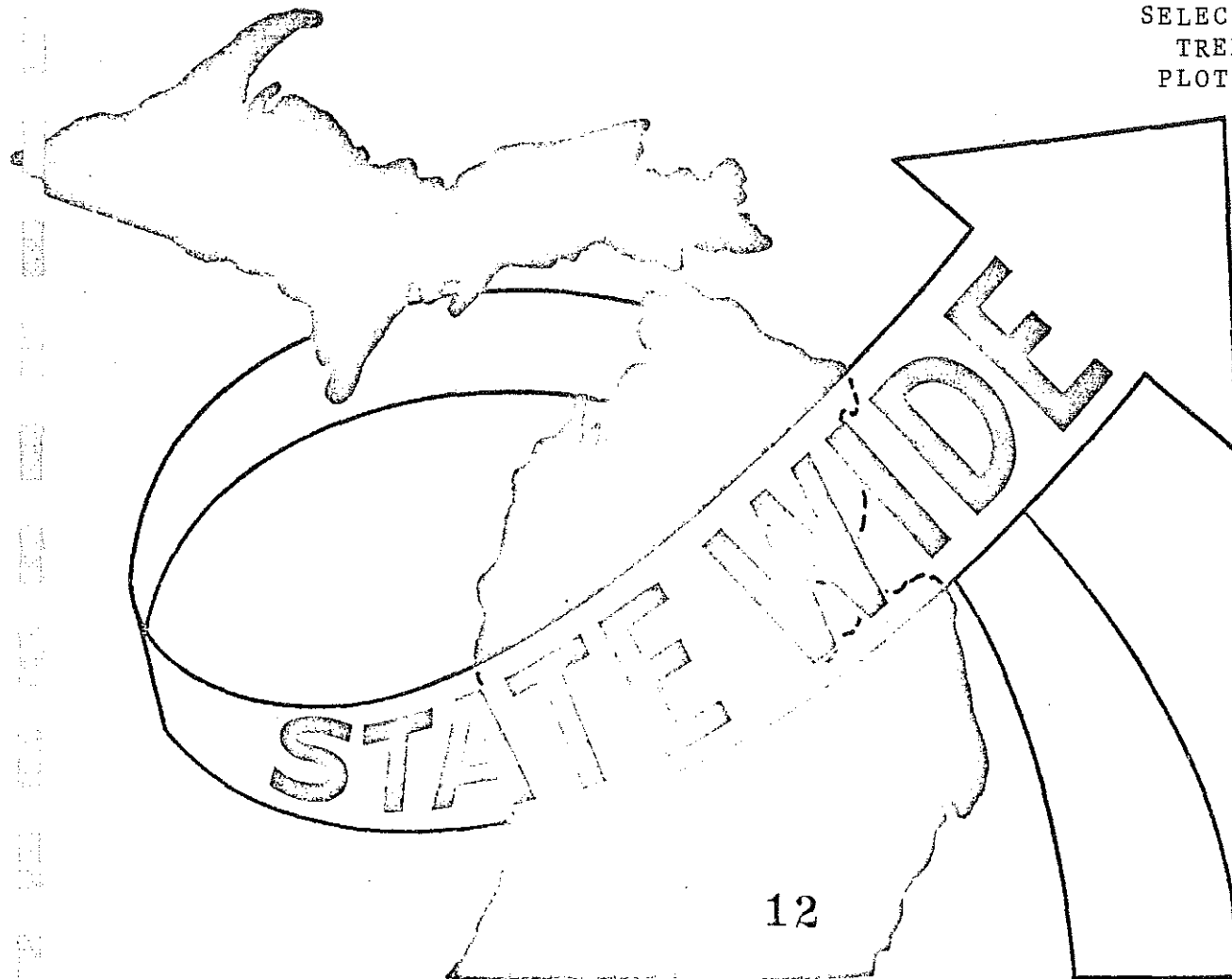
Using the 547-zone Statewide Traffic Forecasting Model network "trees" (minimum-time paths) were created from each rifle range site to every other zone in the system. These paths were then plotted using a CAL COMP plotter. Before reading the plots, however, a user unfamiliar with the model should familiarize himself with certain assumptions of the process.

First, the network used includes only the state trunkline system and certain selected secondary roads, because the level of detail of the 547-zone system is not sufficient to support a richer system. Therefore, the shortest-time path between zones is assumed to lie in this system.

Second, the time needed to traverse a given link is derived from the length of the link and the average driving time on the link as determined by MDSH speed studies. We cannot emphasize too strongly that the speed on a link is not the speed limit on that link; it is rather the effective speed on that link.

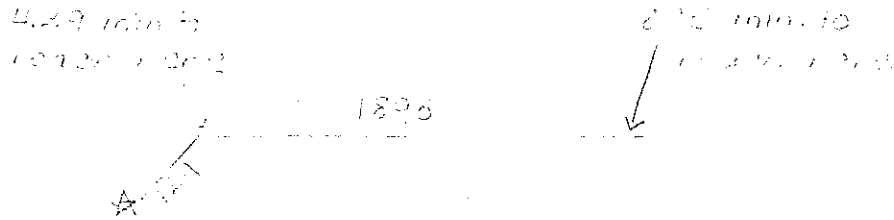
Third, the rifle range sites are not themselves zones in the 547-zone system. Thus it was necessary to select the zone centroid (or center of population) which was most representative of travel patterns to and from each rifle range. In all but one case, this was the centroid of the zone in which the rifle range lay. The exception was the Middleville State Game Area, which lies at the northern end of zone 28 in Barry County; it was determined that the travel pattern for this rifle range was more closely approximated by the centroid of neighboring zone 240, so that selection was made in the interest of accuracy.

SELECTED
TREE
PLOTS



SELECTED TREE PLOTS

The following figures are plots of the shortest time paths from the selected zone of origin, indicated by a star, to every other zone in the system. The number along a link is the cumulative time in hundredths of a minute needed to travel from the zone of origin (the rifle range) to the end of that link farthest from the rifle range. For example, consider the following blow-up of a portion of the tree for zone 28:



Zones other than the origin zone are indicated by a box with the zone number near it, thus:

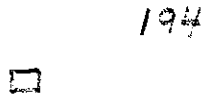


FIGURE 6

Zone 28-Barry State Game

Area Selected

Tree Plot

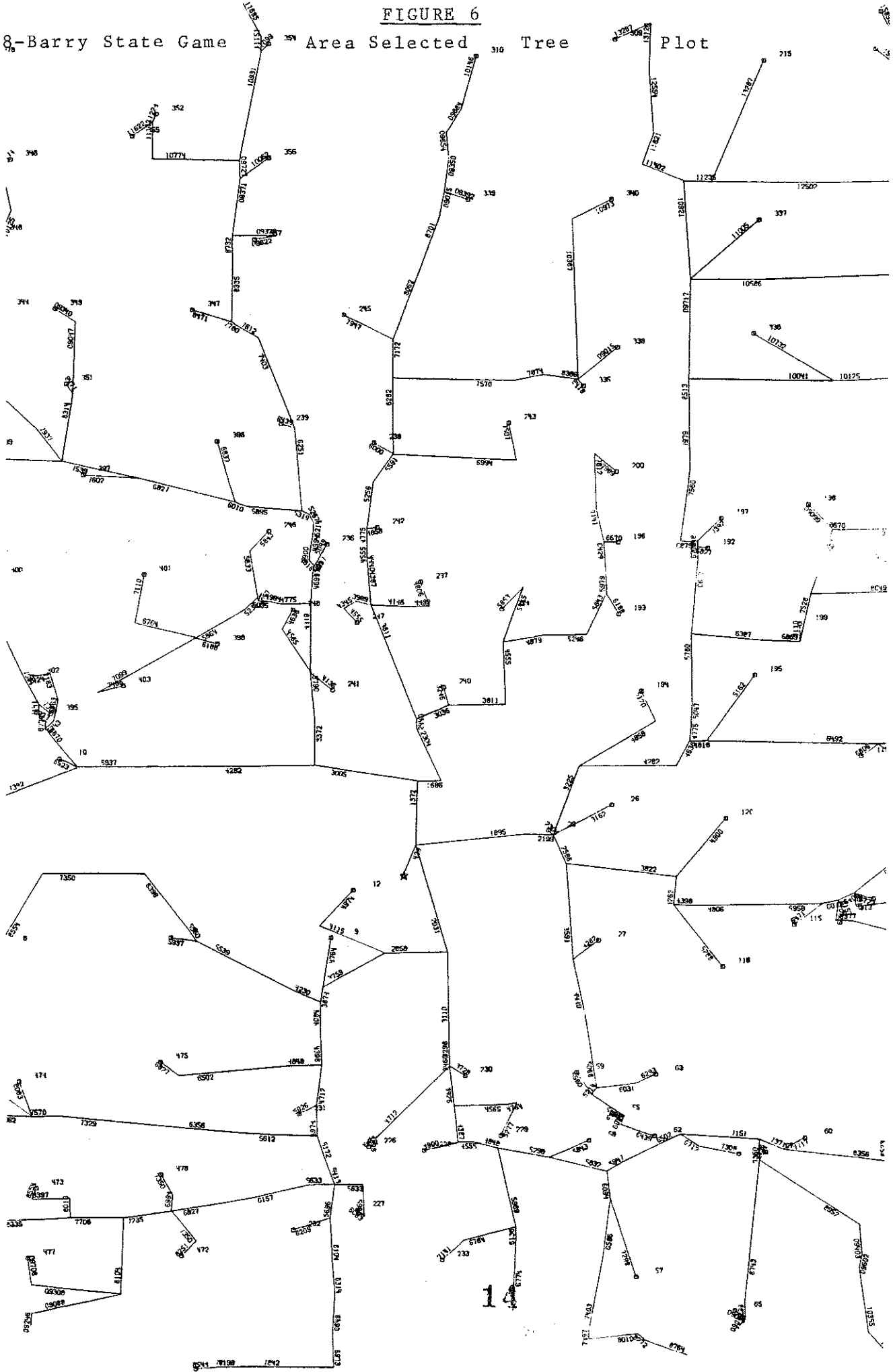


FIGURE 7

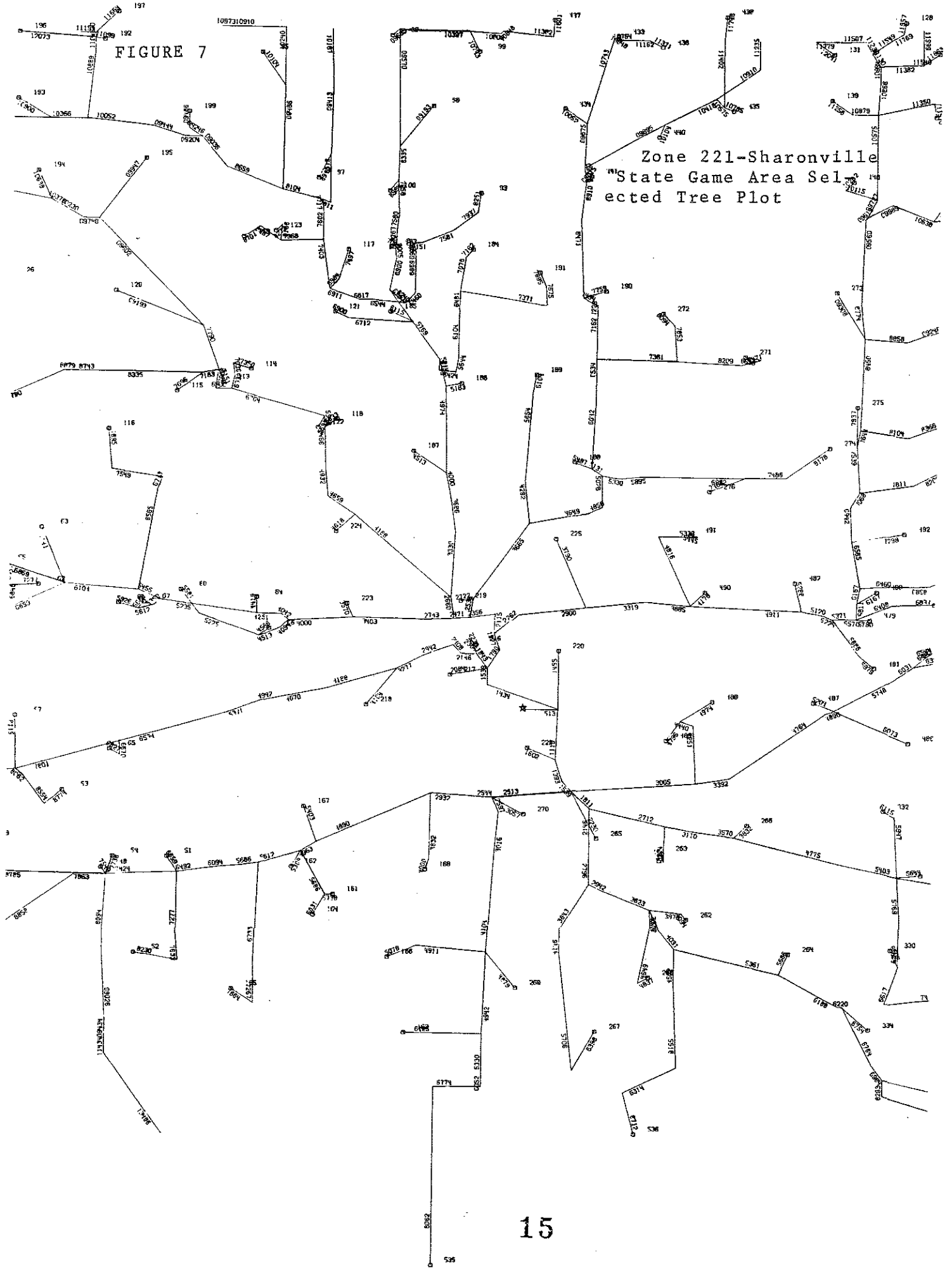


FIGURE 8

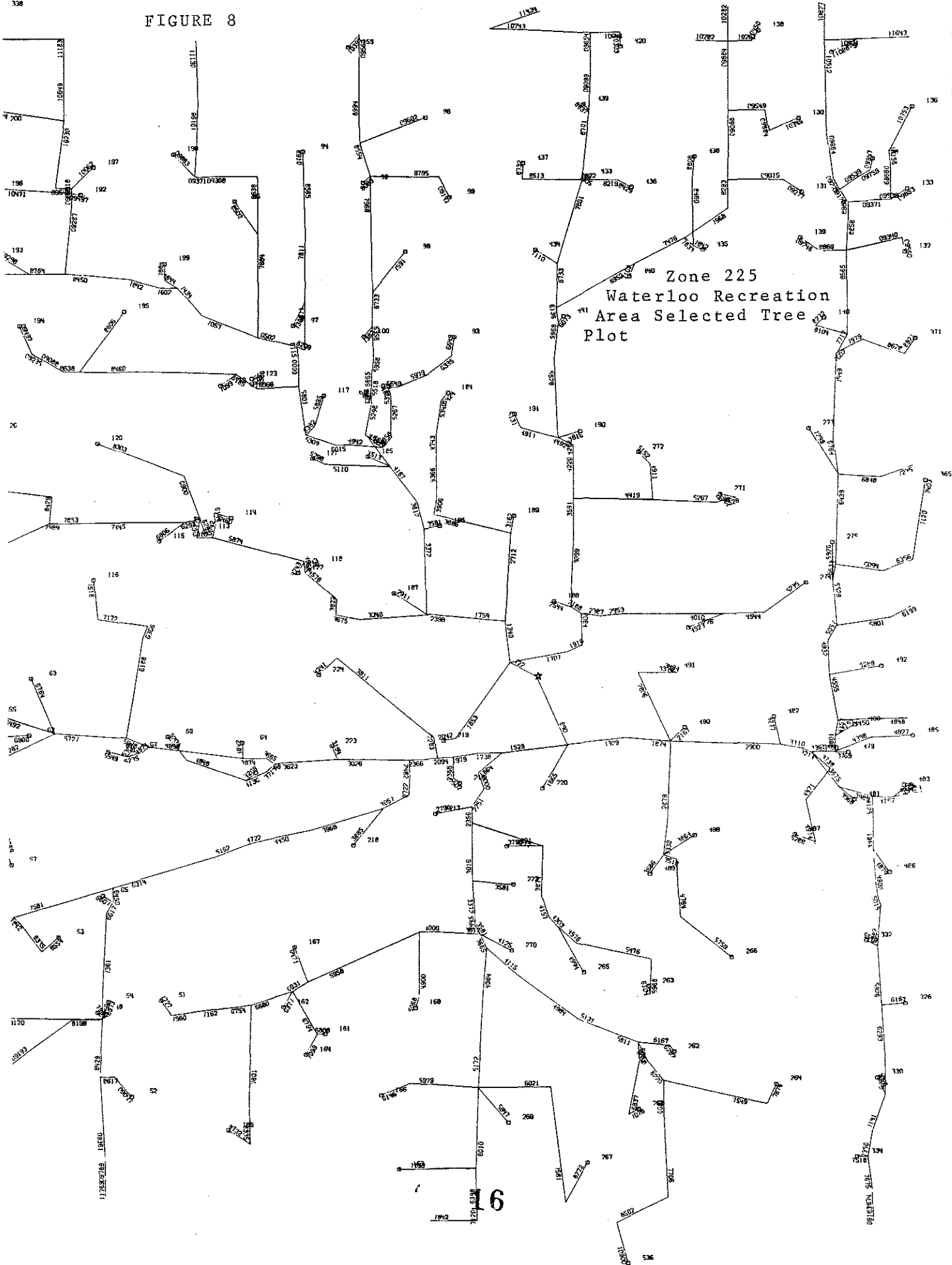


FIGURE 9

Zone 229-Fort Custer Selected Tree Plot



FIGURE 10

Zone 240-Middleville State Game Area Selected Tree Plot

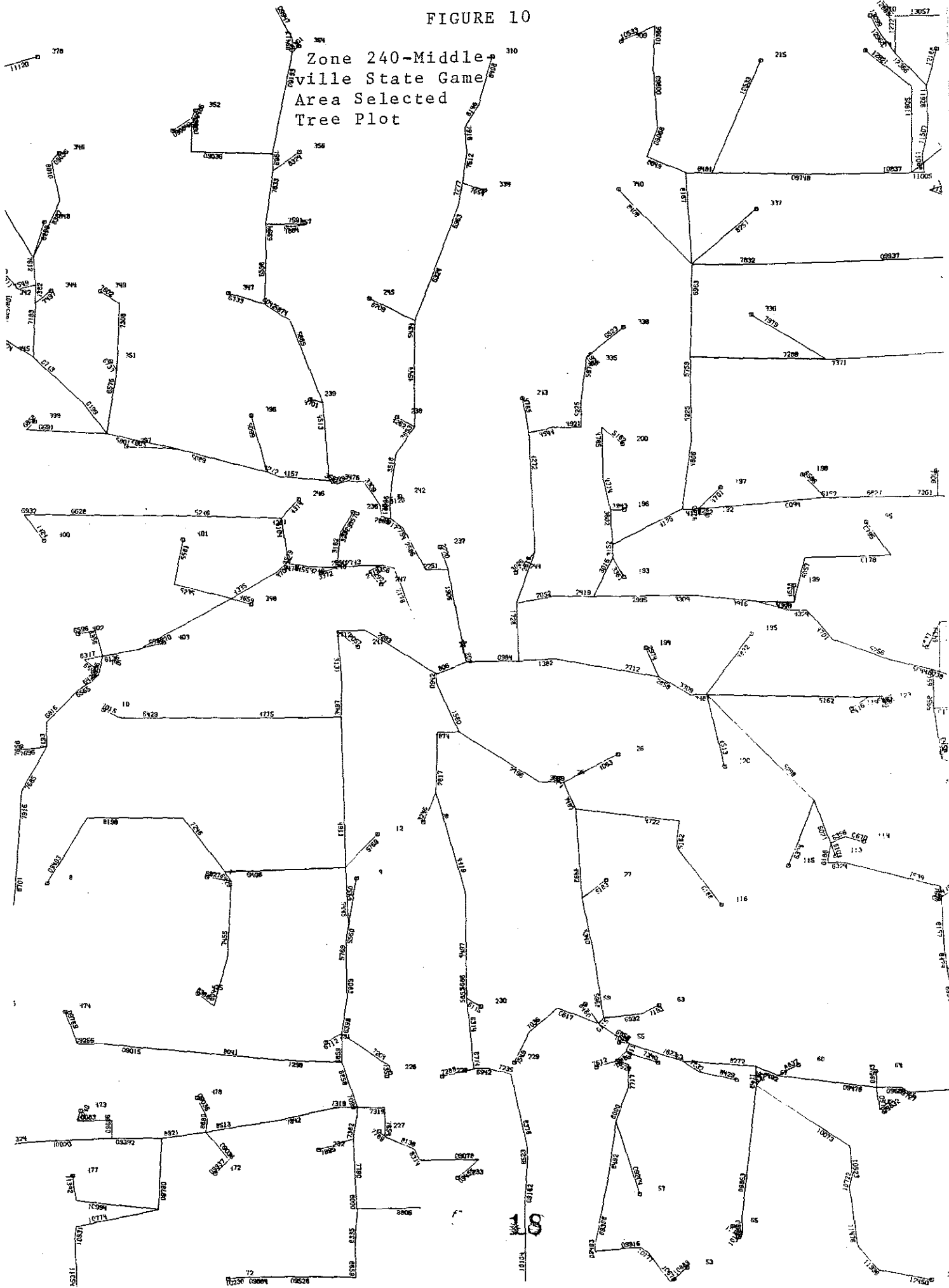


FIGURE 11

Zone 290-Richmond Selected Tree Plot

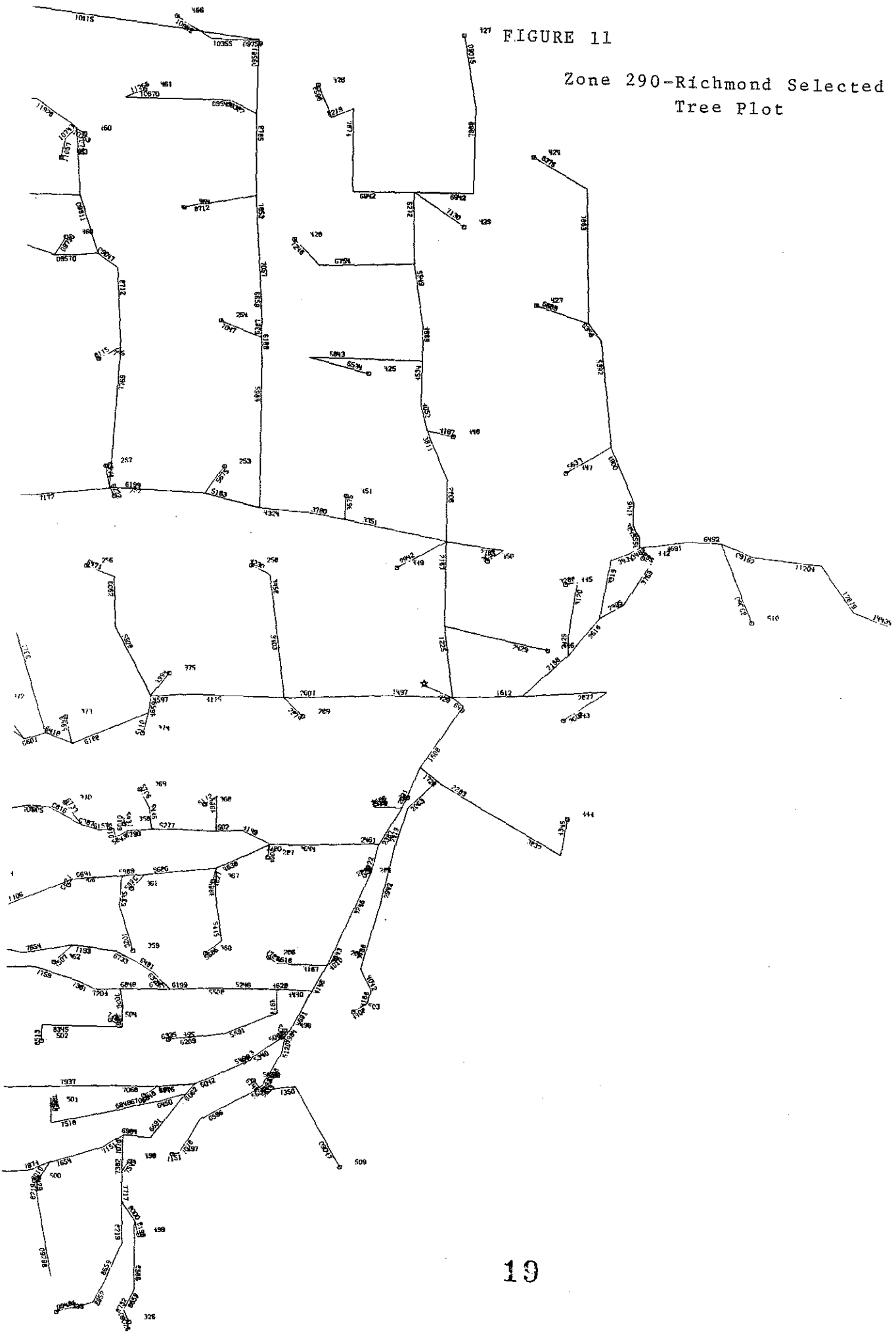


FIGURE 12

Zone 344-Muskegon State Game Area Selected Tree Plot

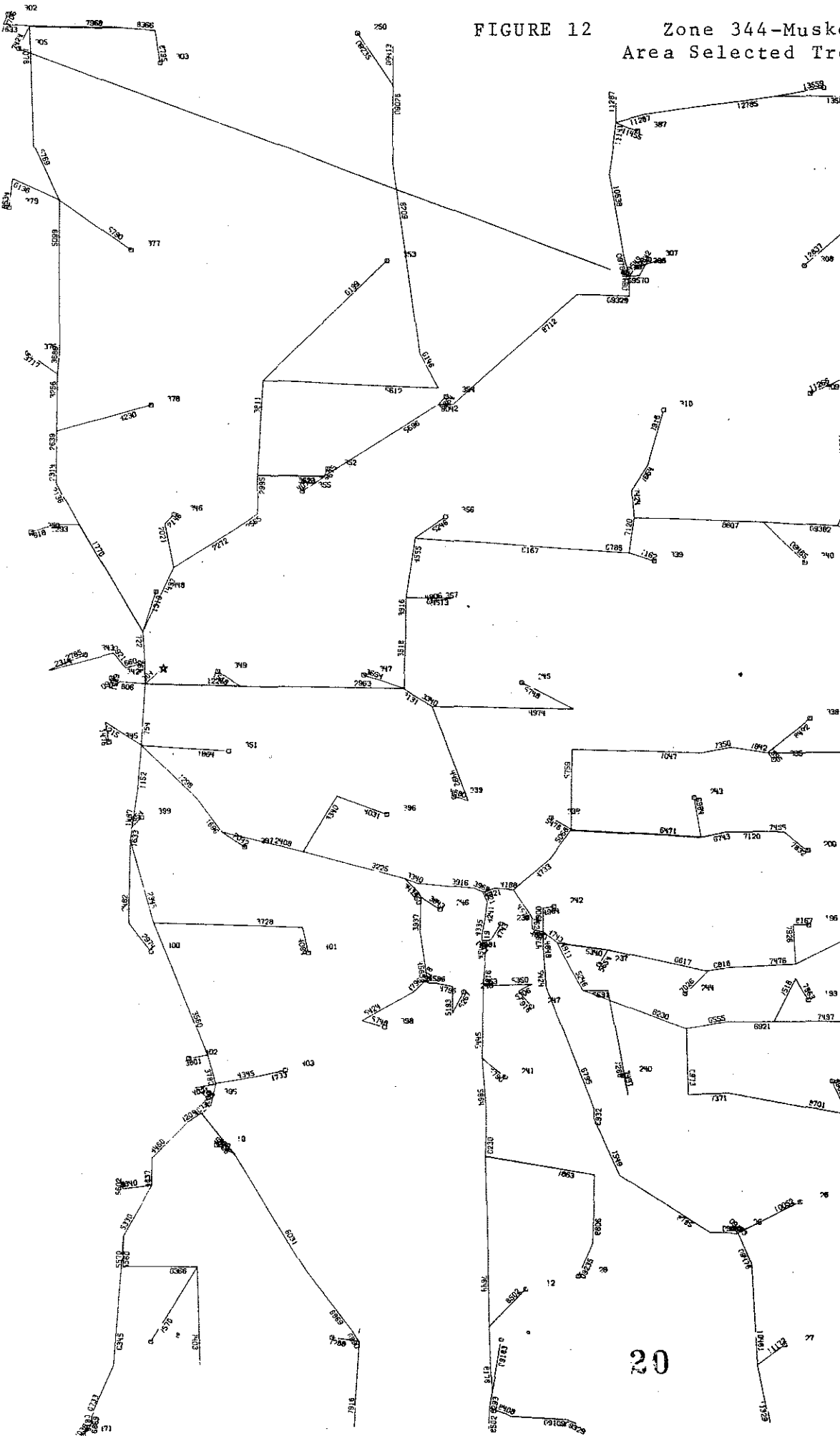


FIGURE 13

Zone 374-Bald Mt. Selected Tree Plot

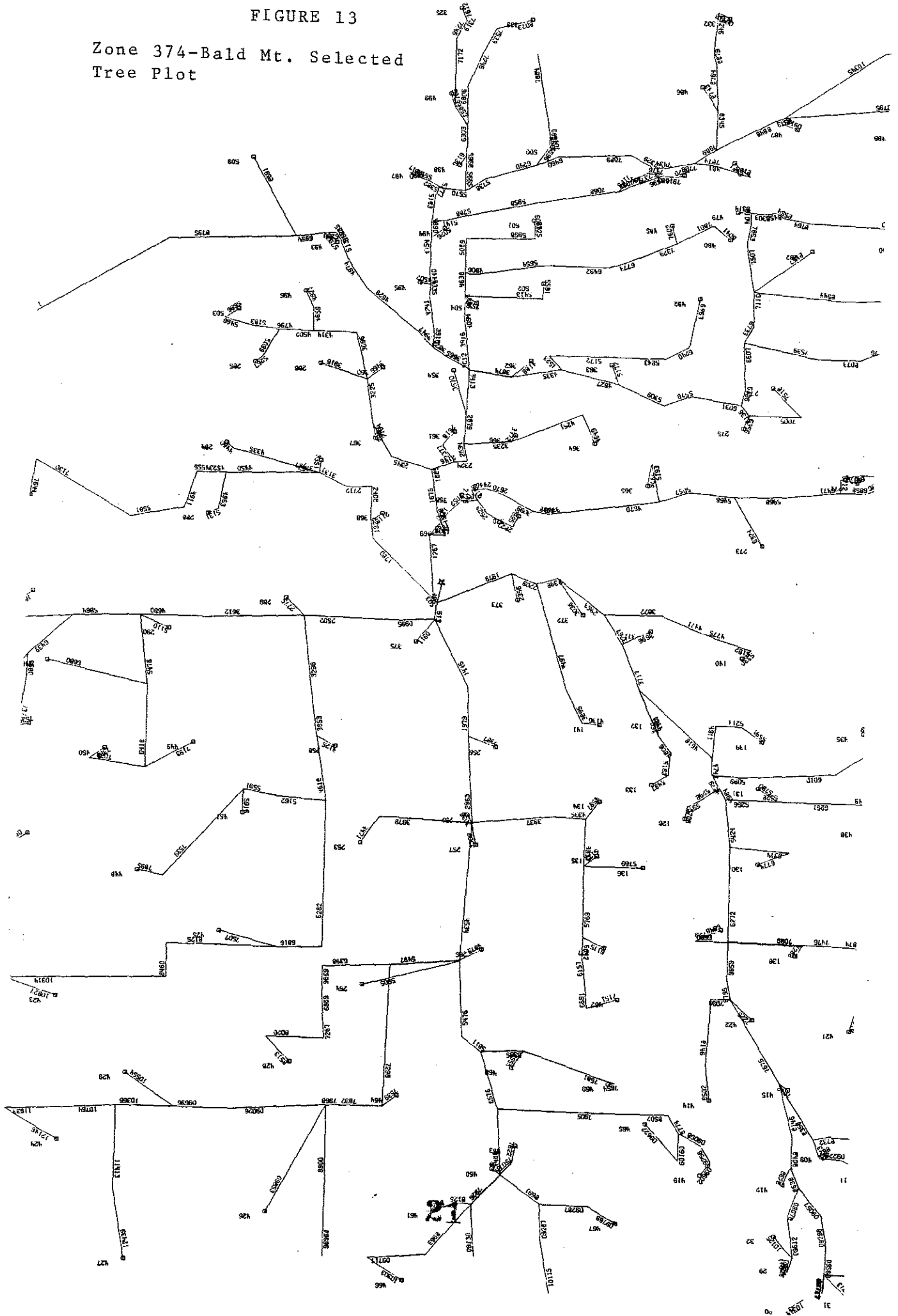


FIGURE 14

Zone 412-Crow Island Selected Tree Plot

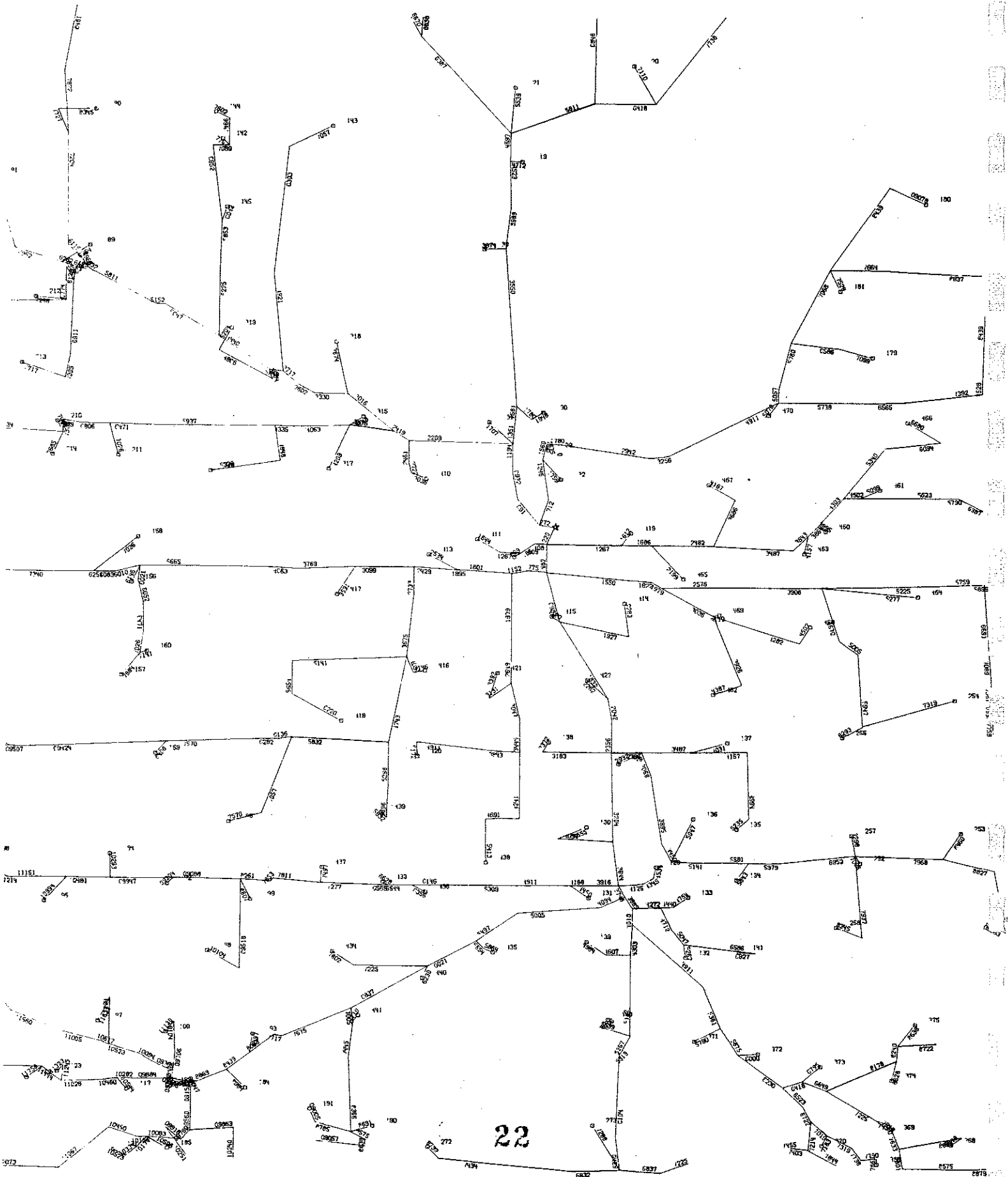


FIGURE 15

Zone 416-Shiawassee R.
State Game Area Selected
Tree Plot

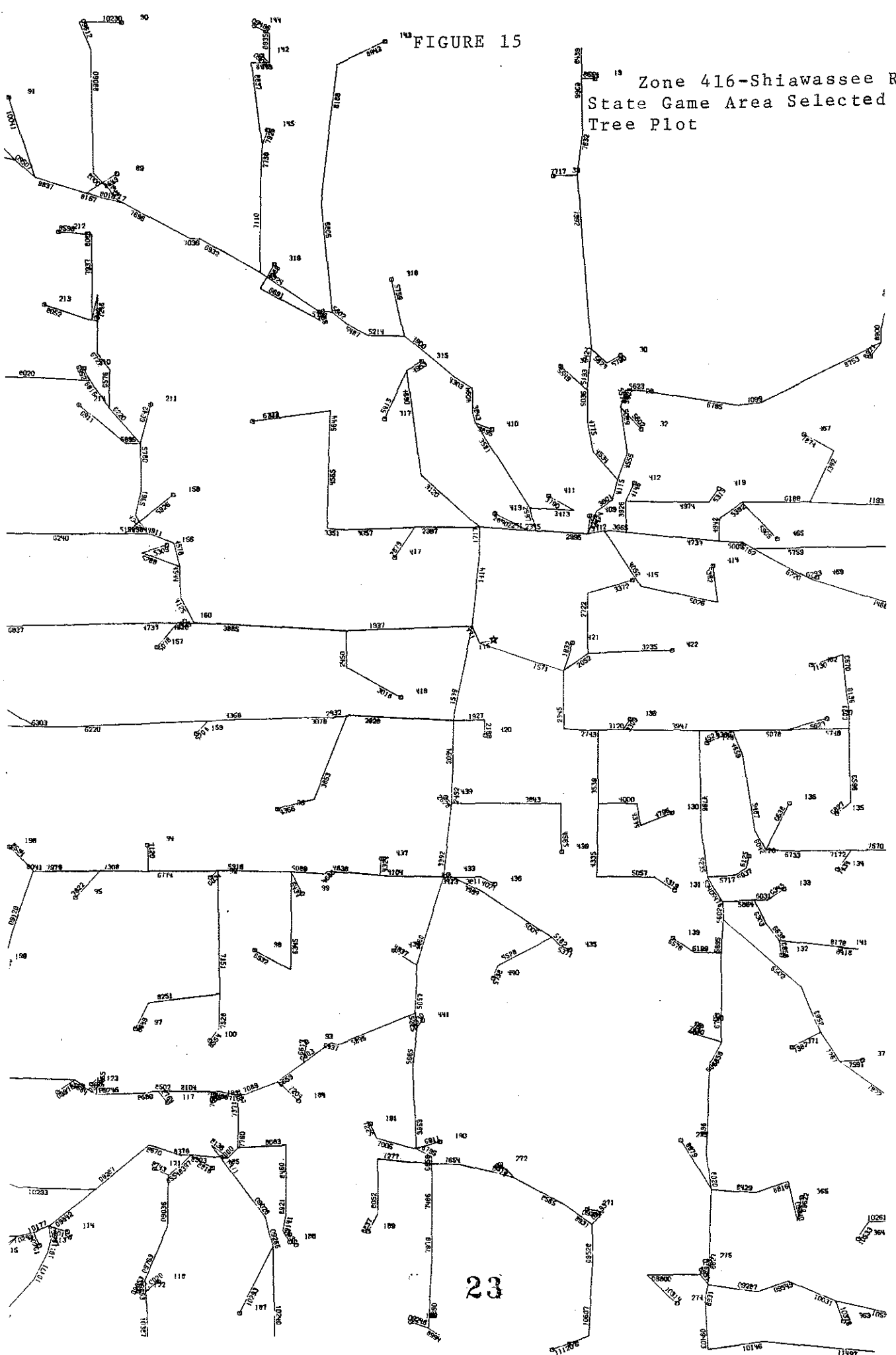
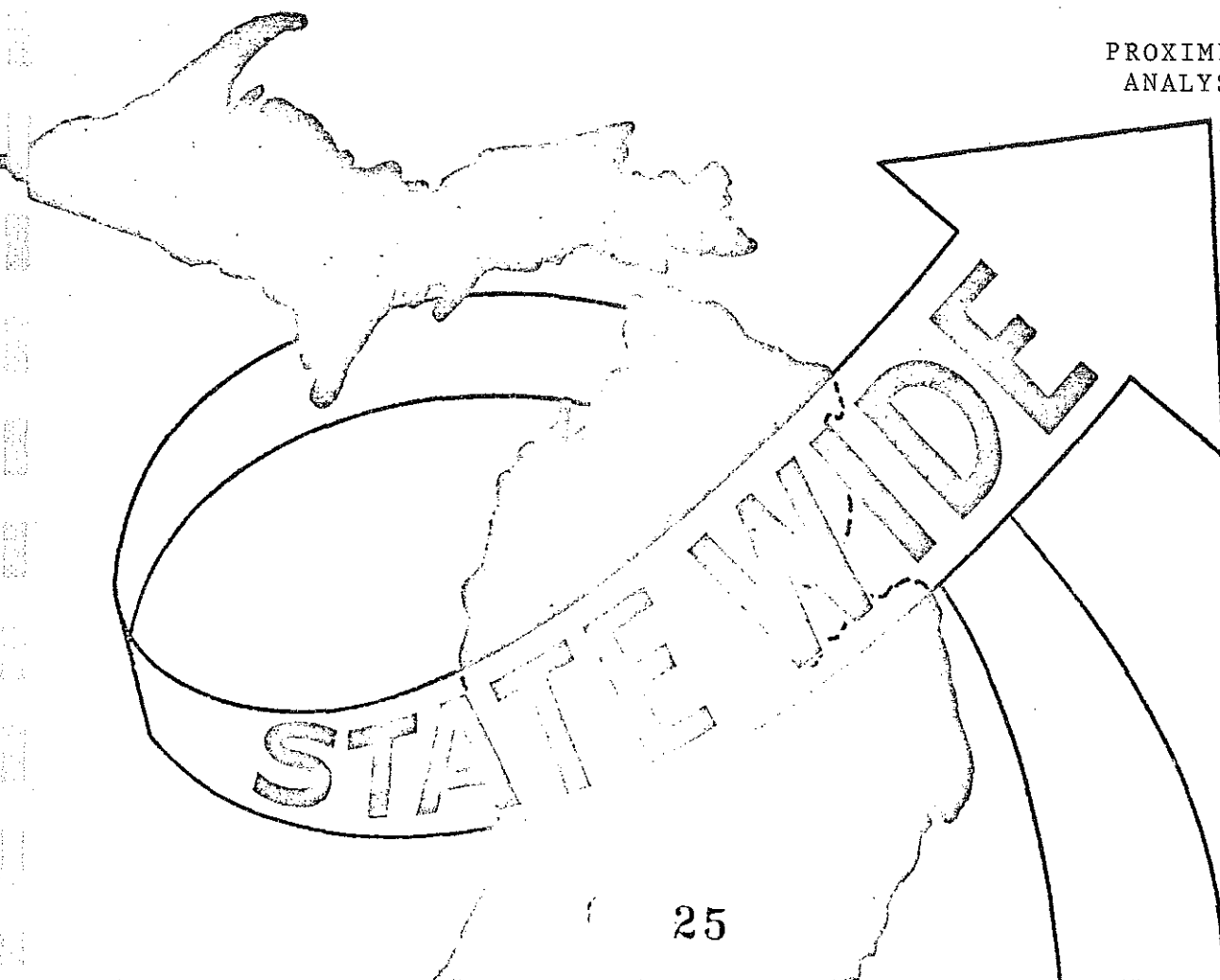


FIGURE 16

Zone 441-Rose Lake Wild-
life Research Area Selected
Tree Plot



PROXIMITY
ANALYSIS



PROXIMITY ANALYSIS

Considering each rifle range zone in turn as a reference point, the program uses the skimmed tree for the zone to determine the accumulated population of all zones having their centroids lying within 0 - 15, 15 - 30, 30 - 45, and 45 - 60 minutes average driving time away. In addition to the accumulated population within each band, the program subdivides the total population in the band into an "urban" subtotal, a "suburban" subtotal, and a "rural" subtotal, and expresses the total population as a percent of the population of the state. Finally, the zones lying within each band are listed, together with their driving times away from the rifle range zone.

In considering the program output following, three things must be kept in mind. First, as has been stated above, driving times between zones are calculated using average speeds (derived from speed studies) on all links. Second, the process does not subdivide zones: a zone is included in a given band if, and only if, its centroid lies within that time band. Finally, the zone populations used in this run were 1965 populations, which the DNR had stated would be adequate for their purposes. Soon, a set of 1970 populations will be available for use in future analyses.

For further information on the proximity analysis routine, the reader is referred to Statewide Transportation Analysis and Research report volume I-D titled "Proximity Analysis". This report, soon to be released, also details other options available to the user in the program. Any other inquirers regarding the

proximity analysis procedure may be directed to the Statewide Studies Unit, Transportation Survey and Analysis Section, Transportation Planning Division, Michigan Department of State Highways.

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 28
 POPULATION = 7670
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 7670 , URBAN = 0
 = 0.085 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 7670.00
 WITHIN 0- 15 MIN., POPULATION = 7670
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 7670.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 7025 , URBAN = 0
 = 0.078 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 14695
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 14695.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 56531 , URBAN = 12641
 = 0.629 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 56531.00
 WITHIN 0- 45 MIN., POPULATION = 71226
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 35613.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 551571 , URBAN = 301870
 = 6.136 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 551571.00
 WITHIN 0- 60 MIN., POPULATION = 622797
 NUMBER OF SERVERS = 3
 POPULATION PER SERVER = 207599.00

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 221
 POPULATION = 6525
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 22005
 = 0.245 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 22005.00
 WITHIN 0- 15 MIN., POPULATION = 22005
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 22005.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 96780
 = 1.077 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 118785
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 118785.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 89777
 = 0.999 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 89777.00
 WITHIN 0- 45 MIN., POPULATION = 208562
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 104281.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 218780
 = 2.434 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 60 MIN., POPULATION = 427342
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 213671.00

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 225
 POPULATION = 5285
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 5285
 = 0.059 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 5285.00
 WITHIN 0- 15 MIN., POPULATION = 5285
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 5285.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 120175
 = 1.337 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 125460
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 125460.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 190993
 = 2.125 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 190993.00
 WITHIN 0- 45 MIN., POPULATION = 316453
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 158226.50

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 437100
 = 4.863 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 60 MIN., POPULATION = 753553
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 376776.50

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 229
 POPULATION = 3780
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 3780 ,
 = 0.042 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 3780.00
 WITHIN 0- 15 MIN., POPULATION = 3780
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 3780.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 242925 ,
 = 2.703 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 246705
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 246705.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 67475 ,
 = 0.751 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 45 MIN., POPULATION = 314180
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 314180.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 166641 ,
 = 1.854 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 166641.00
 WITHIN 0- 60 MIN., POPULATION = 480821
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 240410.50

POPULATION PROXIMITY

DATA FOR ZONE 240
 POPULATION = 4520
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 4520
 = 0.050 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 4520.00
 WITHIN 0- 15 MIN., POPULATION = 4520
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 4520.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 38021
 = 0.423 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 42541
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 42541.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 368677
 = 4.102 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 368677.00
 WITHIN 0- 45 MIN., POPULATION = 411218
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 205609.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 127631
 = 1.420 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 60 MIN., POPULATION = 538849
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 269424.50

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 290
 POPULATION = 13280
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 13280 ,
 = 0.148 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 13280.00
 WITHIN 0- 15 MIN., POPULATION = 13280
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 13280.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 202759 ,
 = 2.256 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 216039
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 216039.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 797644 ,
 = 8.874 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 45 MIN., POPULATION = 1013683
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 1013683.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 1169149 ,
 = 13.007 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 1169149.00
 WITHIN 0- 60 MIN., POPULATION = 2182832
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 1091416.00

POPULATION PROXIMITY

DATA FOR ZONE 344
 POPULATION = 16500
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 117280 ,
 = 1.305 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 117280.00
 WITHIN 0- 15 MIN., POPULATION = 117280
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 117280.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 73015 ,
 = 0.812 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 190295
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 190295.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 95135 ,
 = 1.058 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 45 MIN., POPULATION = 285430
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 285430.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 417575 ,
 = 4.646 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 60 MIN., POPULATION = 703005
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 703005.00

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 374
 POPULATION = 17630
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 26350 ,
 = 0.293 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 26350.00
 WITHIN 0- 15 MIN., POPULATION = 26350
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 26350.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 314399 ,
 = 3.498 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 340749
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 340749.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 1533223 ,
 = 17.057 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 45 MIN., POPULATION = 1873972
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 1873972.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 2626931 ,
 = 29.225 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 2626931.00
 WITHIN 0- 60 MIN., POPULATION = 4500903
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 2250451.50

POPULATION PROXIMITY

DATA FOR ZONE 412
 POPULATION = 14770
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 122430
 = 1.362 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 122430.00
 WITHIN 0- 15 MIN., POPULATION = 122430
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 122430.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 185151
 = 2.060 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 307581
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 307581.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 373491
 = 4.155 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 373491.00
 WITHIN 0- 45 MIN., POPULATION = 681072
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 340536.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 233910
 = 2.602 PERCENT OF TOTAL PO

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 60 MIN., POPULATION = 914982
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 457491.00

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 416
 POPULATION = 7162
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 7162 ,
 = 0.080 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 7162.00
 WITHIN 0- 15 MIN., POPULATION = 7162
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 7162.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 32739 ,
 = 0.364 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 39901
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 39901.00

TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 202225 ,
 = 2.250 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 202225.00
 WITHIN 0- 45 MIN., POPULATION = 242126
 NUMBER OF SERVERS = 2
 POPULATION PER SERVER = 121063.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 373484 ,
 = 4.155 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 373484.00
 WITHIN 0- 60 MIN., POPULATION = 615610
 NUMBER OF SERVERS = 3
 POPULATION PER SERVER = 205203.33

STATEWIDE PROXIMITY ANALYSIS

POPULATION PROXIMITY

DATA FOR ZONE 441
 POPULATION = 6550
 NUMBER OF SERVERS = 1
 TOTAL CAPACITY = 1

TIME BAND 0- 15 MINUTES
 POPULATION WITHIN BAND = 27290
 = 0.304 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 1
 POPULATION PER SERVER IN BAND = 27290.00
 WITHIN 0- 15 MIN., POPULATION = 27290
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 27290.00

TIME BAND 15- 30 MINUTES
 POPULATION WITHIN BAND = 232865
 = 2.591 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 30 MIN., POPULATION = 260155
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 260155.00

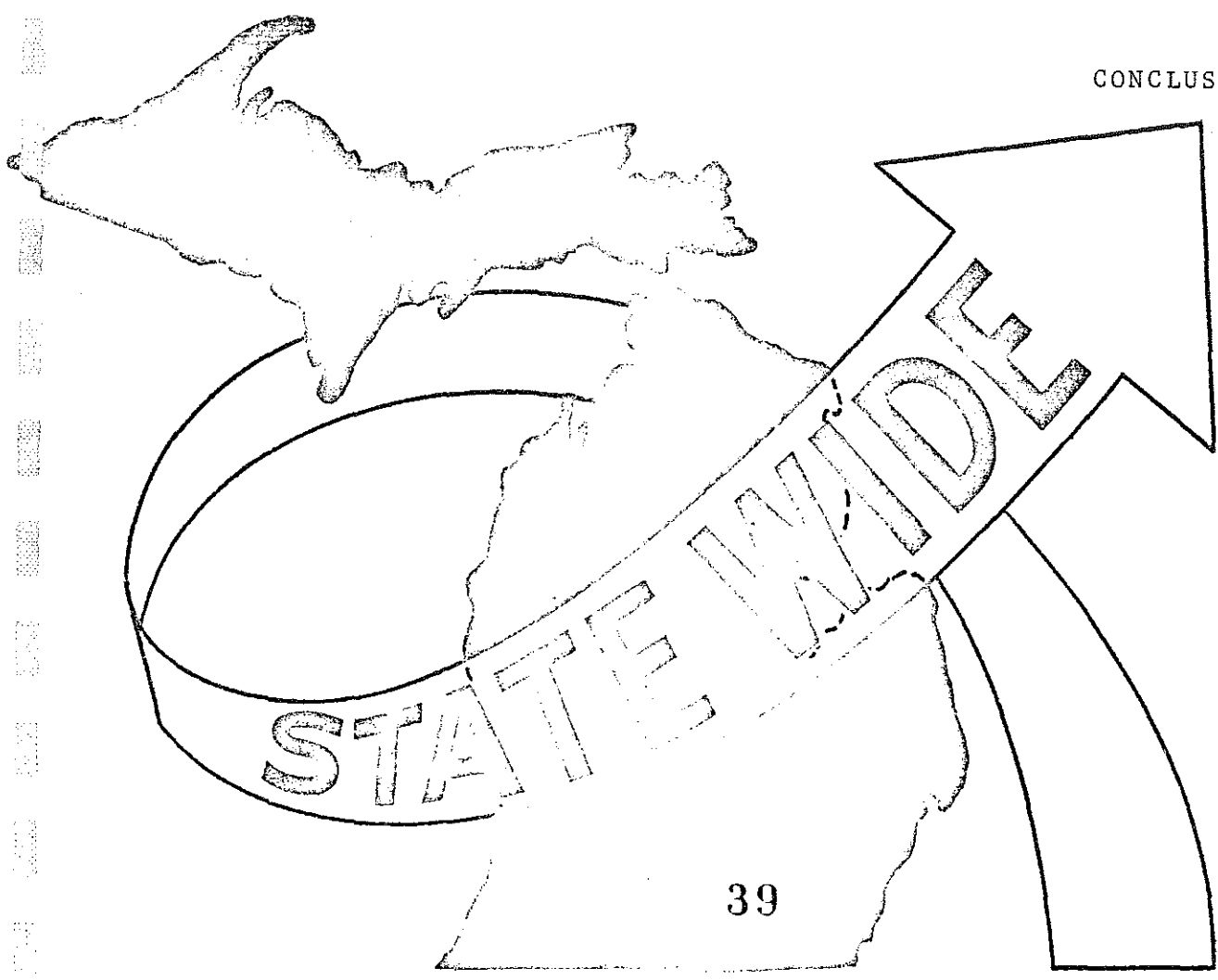
TIME BAND 30- 45 MINUTES
 POPULATION WITHIN BAND = 409621
 = 4.557 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 0
 POPULATION PER SERVER IN BAND = 0.00
 WITHIN 0- 45 MIN., POPULATION = 669776
 NUMBER OF SERVERS = 1
 POPULATION PER SERVER = 669776.00

TIME BAND 45- 60 MINUTES
 POPULATION WITHIN BAND = 240686
 = 2.678 PERCENT OF TOTAL POP

NUMBER OF SERVERS IN BAND = 2
 POPULATION PER SERVER IN BAND = 120343.00
 WITHIN 0- 60 MIN., POPULATION = 910462
 NUMBER OF SERVERS = 3
 POPULATION PER SERVER = 303487.33

CONCLUSION

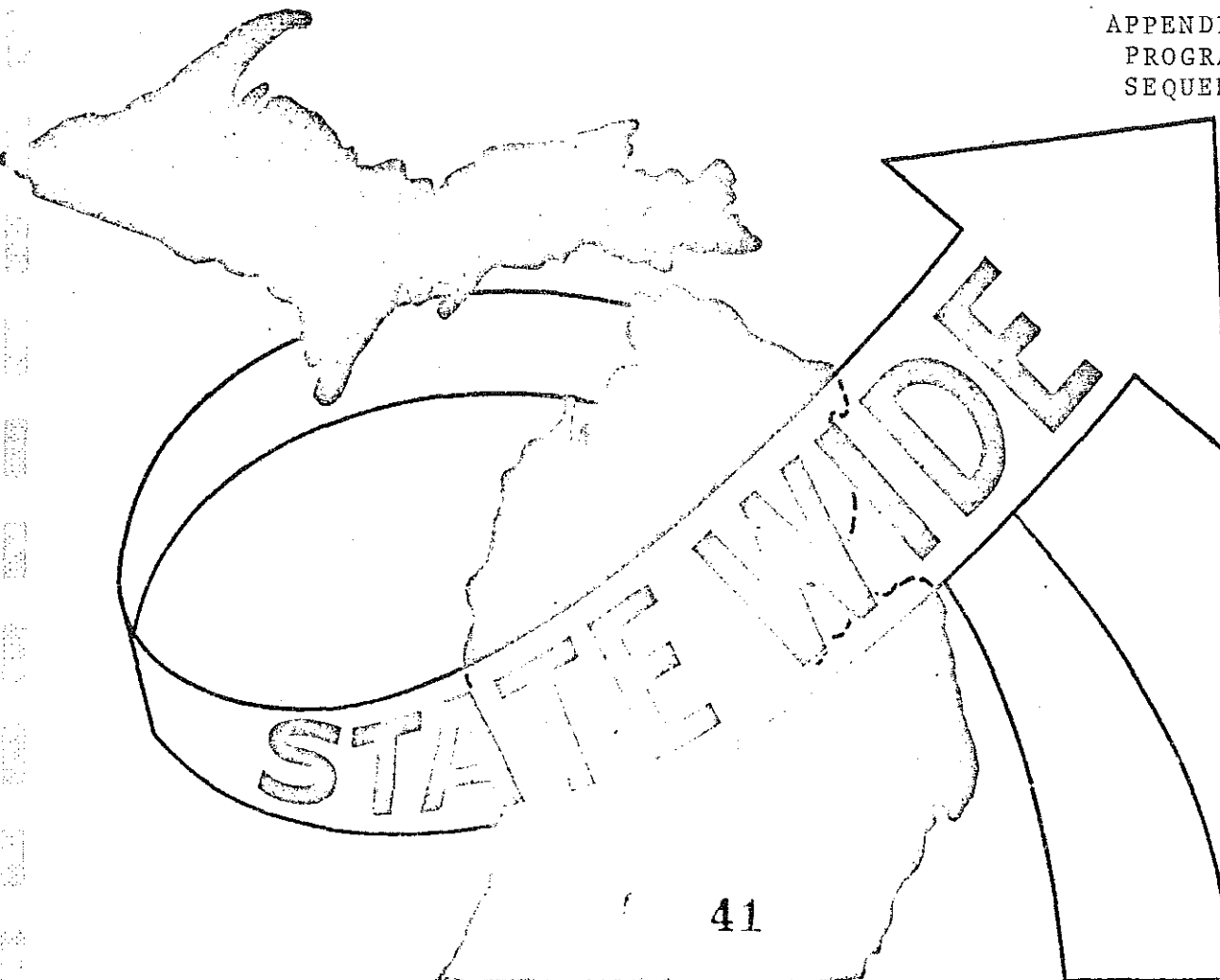


CONCLUSION

This brief effort illustrates how the Statewide Travel Model and its peripheral battery of analysis programs can be effectively used to plan locations of public facilities quickly, cheaply and accurately. If this project had been done manually, the effort required to complete the task would probably have taken at least two man-months; contrast this with the program run times listed on page 42.

The statewide studies unit would be happy to hear of suggestions for further model applications and program modifications which would make our battery more useful to management.

APPENDIX:
PROGRAM
SEQUENCE



PROGRAMS AS RUN

TP TREE Q01403 (to build selected trees)

INPUT : QT01A00/SWNET3A # (751)

OUTPUT : QT01B00/STREHAS # (3333)

CPU time approx, 5 min.

11 PLOTS OF : Q01154 (to plot selected trees)

INPUT : QT01A00/SWNET3A # (751)

INPUT : QT01B00/STREHAS # (3333)

OUTPUT : PLOTTER # ()

CPU time approx, 7 min ea.

Q SERV - (Proximity Analysis Program)

INPUT : QT01C00/SKIM3 # (4687)

INPUT : File of Rifle Range Zones

INPUT : 1965 Zone Populations

INPUT : Urban Suburban or Rural for each zone

OUTPUT : Line Printer QP

} Disk
Files

CPU time approx, 3 min.

TP TREE 001 (INFORMATION) DATE IS 12AUG72 TIME IS 20.32.15
INPUT NETWORK BUILT/UPDATED 6AUG72

PARAMETERS

COPY = 0
ZONES = 547
NODES = 3275
DMAX = 99.900
TMAX = 99.900
CMAX = 26.700
DCOST = 0.000
TCOST = 1.000
THRU = 1000
TURN0 = 0.200
TURN1 = 1.000
TURN2 = 1.000
WE 0] = 1.000
WE 1] = 1.000
WE 2] = 1.000
WE 3] = 1.000
WE 4] = 1.000
WE 5] = 1.000
WE 6] = 1.000
WE 7] = 1.000
WE 8] = 1.000
WE 9] = 1.000
WE10] = 1.000
WE11] = 1.000
WE12] = 1.000
WE13] = 1.000
WE14] = 1.000
WE15] = 1.000

OPTIONS

BUILD = T
PRINT = F
SHORT = F
PICK = T
AM = F
PM = F
OFF = T
TP = T
RETRY = F

TP TREE 104 (INFORMATION): SELECTED TREES = 28 221 225 229 240 290 344 374 412 416 441
TP TREE 999 (INFORMATION) DATE IS 12AUG72 TIME IS 20.51.32 ELAPSED PROCESSOR TIME IS 00.04.54

TP TREE PLOT 002 (INFORMATION) DATE IS 12AUG72 TIME IS 20.52.32

\$ PARAM

TREE = 28,
 ZON = 547,
 STA = 0,
 SCA = 0.72,
 MINXP = 170.03,
 MAXXP = 215.61,
 MINYP = 110.30,
 MAXYP = 150.09

MINXC = 0.00,
 MAXXC = 0.00,
 MINYC = 0.00,
 MAXYC = 0.00

NTABLE = 1,
 SKIP = 1\$END.

\$ OPTION

CUM = TRUE,
 NOD = FALSE,
 TRP = FALSE

DASH[0] = FALSE,
 DASH[1] = FALSE,
 DASH[2] = FALSE,
 DASH[3] = FALSE,
 DASH[4] = FALSE,
 DASH[5] = FALSE,
 DASH[6] = FALSE,
 DASH[7] = FALSE,
 DASH[8] = FALSE,
 DASH[9] = FALSE,
 DASH[10] = FALSE,
 DASH[11] = FALSE,
 DASH[12] = FALSE,
 DASH[13] = FALSE,
 DASH[14] = FALSE,
 DASH[15] = FALSE

JUMP = FALSE\$END.

INPUT TREE BUILT ON 12AUG72 .

INPUT NETWORK BUILT/UPDATED ON 6AUG72 .

TP TREE PLOT (WARNING) TREE FOR CENTROID 292 WAS NOT BUILT AND COULD NOT BE PLOTTED.

Manistee Co.

TP TREE PLOT (WARNING) TREE FOR CENTROID 56 WAS NOT BUILT AND COULD NOT BE PLOTTED.

Calhoun Co.

TP TREE PLOT (998) (FINISH) TOTAL ELAPSED CLOCK TIME 00.03.46
 TOTAL ELAPSED PROCESS TIME 00.06.39