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THE NILES AREA TRAFFIC STUDY

BASIC FACTS AND TABLES

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STATE HIGHWAY DEPARTMENT
Charles M. Ziegler
State Highway Commissioner

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Cooperating Agencies:

The City of Niles

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Prepared by the
Planning and Traffic Division
June, 1950

FOREWORD

Since the Fall of 1945, comprehensive traffic studies have been undertaken in several important Michigan urban areas. The purpose of such studies is to secure sound highway transportation data for the solution of the critical problems that exist in and around the State's principal cities. They were initiated and are being conducted by the Michigan State Highway Department in cooperation with the U.S. Bureau of Public Roads and the cities participating in each of the successive area studies.

It has been determined that for the smaller cities data collected at interview stations surrounding the area will give a sufficient accumulation of factual data without taking internal or house-to-house sampling within the city. This External type of survey was used to collect the data on the traffic movements into, out of, and through the Niles area. These data are tabulated by the Planning and Traffic Division of the State Highway Department and are used in the analysis and investigation of the specific phases of the local traffic problems.

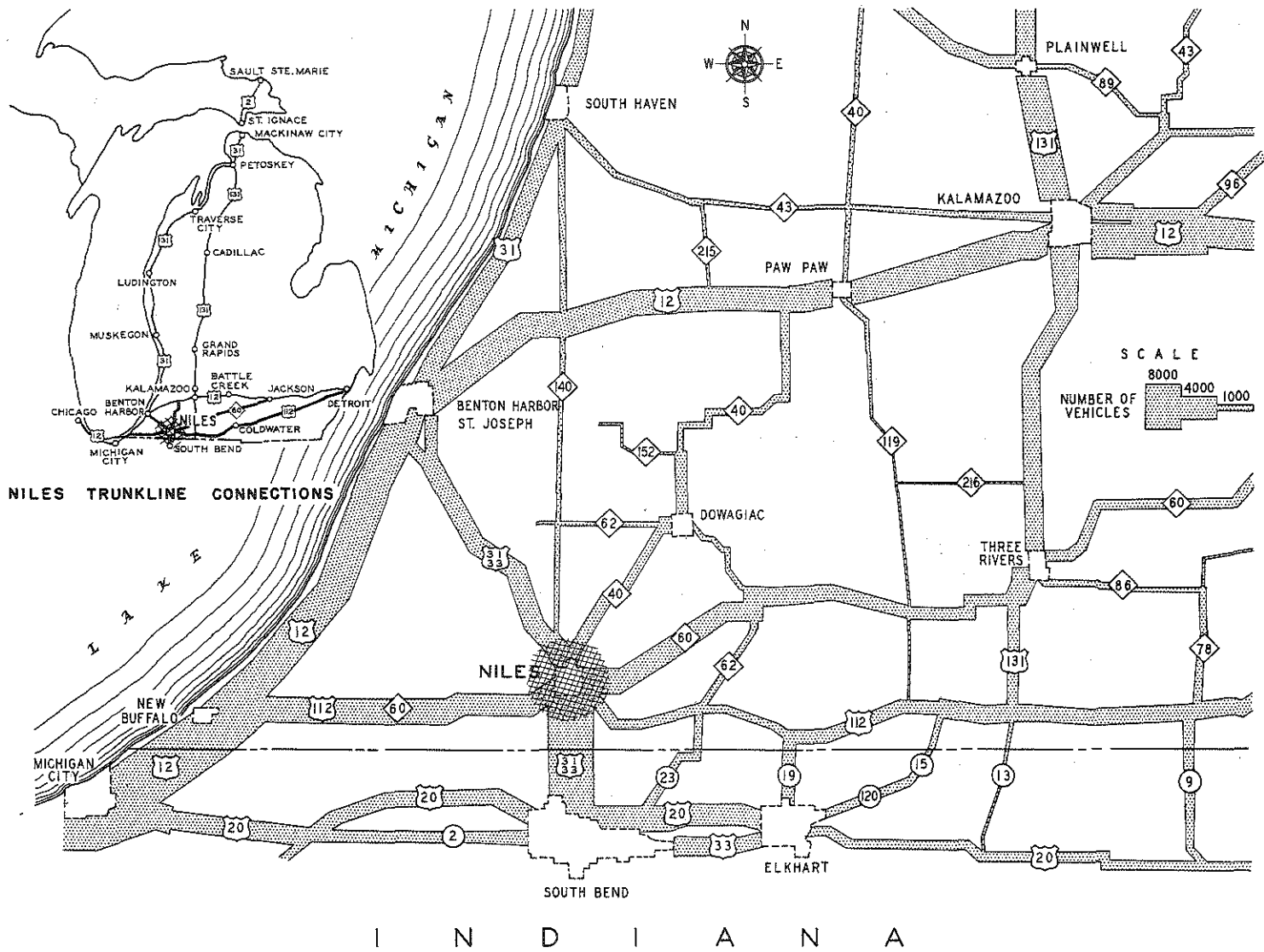
This report, "Basic Facts and Tables," is the initial presentation of the results of the present traffic study. The data contained herein is the basic material for future study by the Department's engineers and responsible local officials. A study of this material and of the methods for using it will enable the interested parties to arrive at the answers to the problems that are now posed by the local traffic situation. Subsequent reports will be published to cover the suggested solutions.

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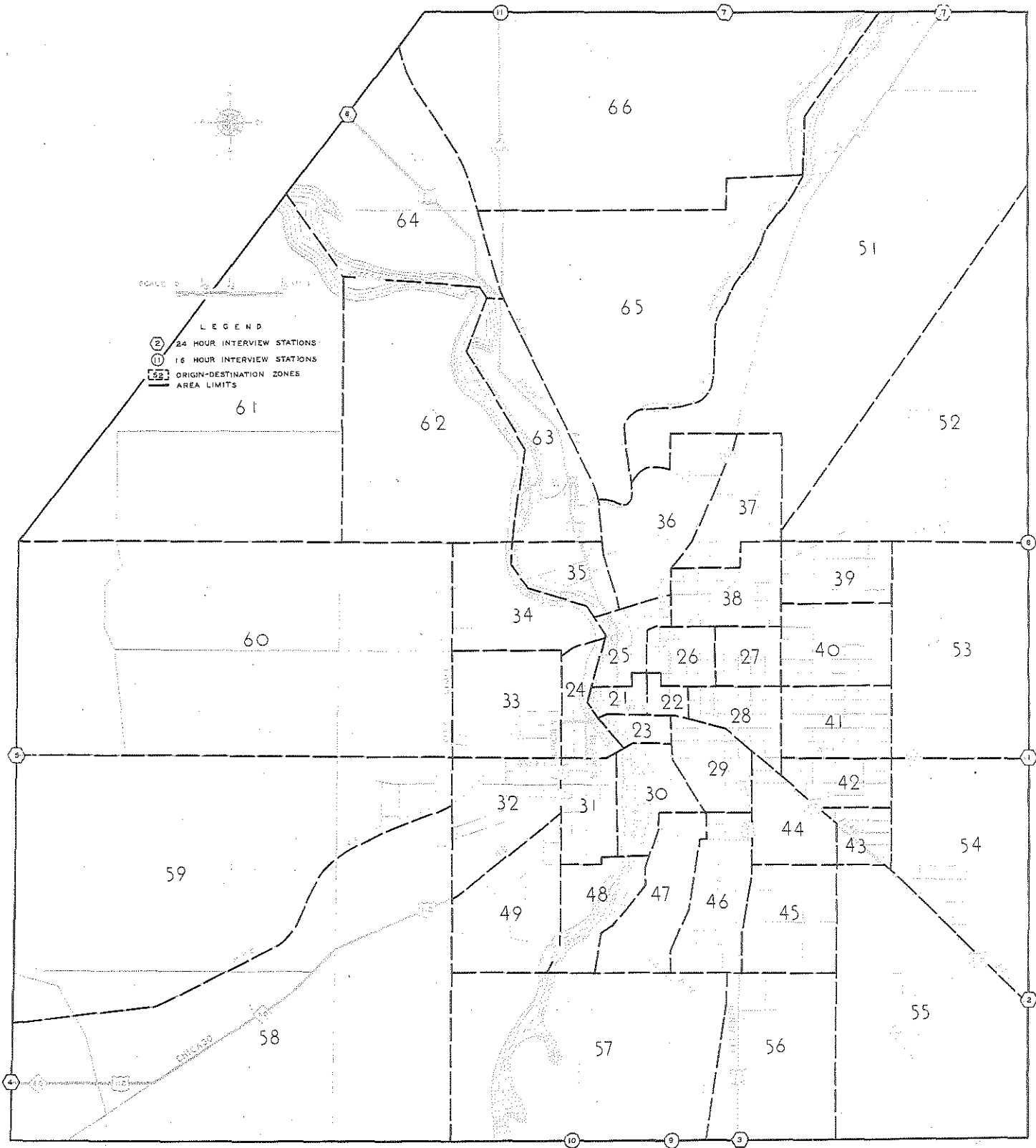
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STATE TRUNKLINE ROUTES AND TRAFFIC IN SOUTHWESTERN MICHIGAN



THE NILES STUDY AREA



TERMINOLOGY AND DEFINITIONS

Central Business District:	The zones comprising the concentrated commercial and retail business center of the city.
Cordon Trip:	A trip with one terminal outside the Study Area and one terminal inside the Study Area.
Destination:	The place where a trip ends.
Downtown Area:	The zones comprising the Central Business District and its commercial-residential fringe.
External:	Outside the Study Area.
External Cordon:	The line connecting the External Stations and outlining the Study Area.
External Station:	A point on a highway at the limits of the Study Area at which the drivers of vehicles were interviewed.
External Trip:	A trip with one or both of its terminals outside the Study Area.
Internal:	Within the Study Area.
Internal (Local) Trip:	A trip with both terminals inside the Study Area.
Non-Resident:	A person living outside of the Study Area.
Origin:	The place where a trip begins.
Origin-Destination Zone: O-D Zone; Zone:	A basic subdivision of the Study Area having a single or a dominant land use, designated for purposes of tabulation and analysis.
Resident:	A person living within the Study Area.
Screen Line:	A line through the Study Area on a natural or artificial division where all cross traffic is counted for later comparison with the expanded survey data.
Study Area:	The area enclosed by the external cordon.
Thru Trip:	A trip passing through the Study Area with both terminals outside the Study Area.
Trip:	One-way travel between an origin and a destination.
Trip Terminal:	The point where a trip begins or ends.

THE SURVEY

The City of Niles, on the St. Joseph River in the southeastern section of Berrien County, is about four miles north of the Indiana state line. It is served by three Federal highways - U.S. 31, 33 and 112, the first named two using the same route through the city. There are also two Michigan highways - M-40 whose point of beginning is in Niles and point of ending in Holland, and M-60 with point of beginning in Jackson and ending in New Buffalo. A third state trunkline, M-140 has its origin inside the study area at its intersection with US-31 and 33 north of the city limits. This highway goes straight north, terminating at South Haven. Niles is a junction point on the Detroit-Chicago line of the New York Central Railroad. Several large trucking companies have terminals in the city.

Known as the "Four Flags City," Niles is the only locality in the state that has been under the flags of France, England, Spain and the United States. One of the oldest settlements in Michigan, it was first known as St. Joseph's Mission, Father Claude Aveneau having built a mission there in 1690. Seven years later the French built a fort at the mission calling it Fort St. Joseph. In 1781 in a surprise attack, a party of Spaniards under Don Eugene Poure captured the fort, taking all of the residents prisoner, and raised the flag of Spain. The following day the raiders withdrew and the fort reverted to the British.

The settlement served as a post stop on the Great Sauk Trail from Detroit to Fort Dearborn in Chicago. In 1824 Congress appropriated \$10,000 for a survey of this trail which is the approximate route of present US-112.

The village was laid out in 1829 and given the name of Niles in honor of Hezekiah Niles then editor of the "Niles Register" in Baltimore, Maryland. It was incorporated in 1839 and on October 2, 1848 the first train to reach Niles arrived from Detroit on the Michigan Central Railroad.

Originally a farming community, the city now has many diversified industries. A paper mill, several metal fabricating shops, two pattern companies, a large mushroom industry, two wire products plants, a fixture company, a meat packing plant and a number of small manufacturing establishments.

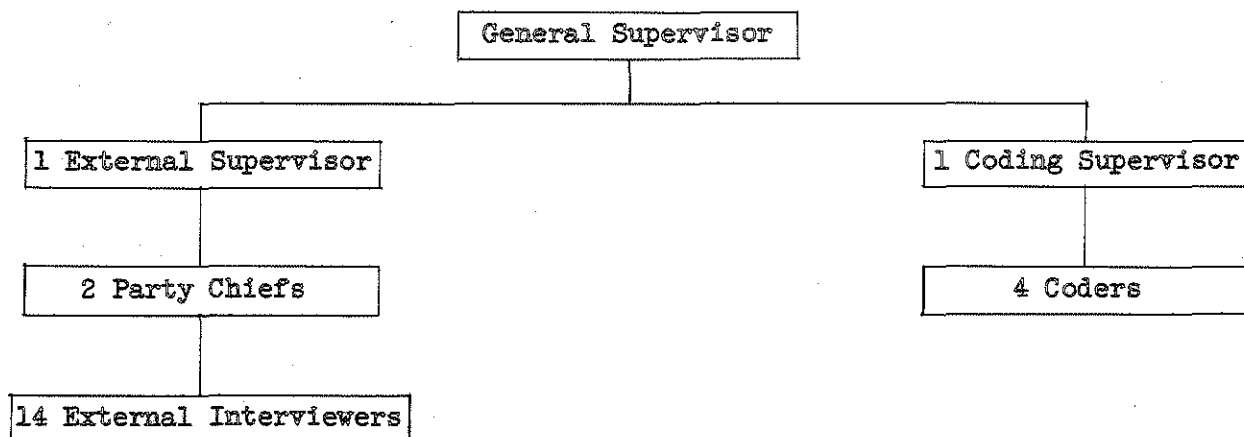
Due to the location of the city on two important Federal highways that pass through and have their intersection in the business district, the through traffic has created a serious situation. It was felt that an Origin-Destination Study was needed to aid in the solution of the city's traffic problem and after Federal approval was received, the survey was made in 1949.

FIELD PROCEDURE

The field work of the Niles Area Traffic Study was conducted during June and July of 1949. The purpose was to accumulate data concerning the movement of people and goods into, out of, and through the Niles Area. As this was an external survey the data for the study of the external trips was obtained at a cordon of interview stations located on all of the important roads leading into the study area. At each of these stations vehicles were stopped and the drivers interviewed as to the origin, destination and purpose of the trip. Seven stations, six of which were trunklines, were operated for twenty-four hours and four on non-trunklines were operated for sixteen hours. At the twenty-four hour stations, interviewing and manual vehicle classification counts were taken for the entire twenty-four hours, while at the sixteen hour stations interviewing and manual vehicle classification counts were taken from 6:00 AM until 10:00 PM with machine counts covering the eight hours from 10:00 PM until 6:00 AM. The answers to the interview questions were recorded on Form O-D 5, one line of the form for each vehicle interviewed. A sample of this form is shown in Appendix B. As it is impossible to interview one-hundred percent of the vehicles passing the external station the classification counts were recorded to establish the control for expansion of the interviewed sample. Both inbound and outbound traffic were interviewed and classified at all stations.

Preliminary machine counts were taken on May 31 and June 1, 1949 to start the field work and establish the location of the external stations. The actual field interviewing and classifying started on June 21 and was completed on July 21, 1949.

All of the operational field work was conducted by the Traffic Surveys Section of the Planning and Traffic Division with the following organization:



The coding was done in the field by the coding section which started this work on August 1 and completed it on September 16, 1949.

Coding consists of reducing all of the answers to interview questions to a predetermined numerical code. All of the information as to the origin, destination, purpose of trip, direction of travel, type of vehicle, place of ownership of vehicle, number of passengers, state of registration, etc., is recorded on the interview form at the time of the interview and it is the responsibility of the coding section to enter the code numbers on the interview form so that when the forms reach the tabulating section the information can be recorded on the tabulation cards.

Before coding the origins and destinations within the study area, the entire area was divided into forty-five wards, twenty-nine within the city and sixteen outside of the city. These wards are not political subdivisions but are fairly regular areas based on the Niles Zoning Plan. Every block in the area was assigned a number that was included in a four digit code so that all locations could be identified by a six digit code, the first two digits being the ward and the last four digits the block.

Final field work was completed and the following survey data transmitted to the Traffic Analysis and Planning Section on September 20, 1949:

- I. INTERVIEW FORMS
 1. External Interviews Form O-D 5
- II. TRAFFIC DATA
 1. Hourly traffic volumes by vehicle type for:
 - (a) Seven 24-hour External Stations
 - (b) Four 16-hour External Stations
- III. GENERAL DATA
 1. Land Use Map
 2. Zoning Plan Map
 3. Berrien County Map
 4. Cass County Map
- IV. MANUALS
 1. Prospectus of Operation
 2. Master Code and Coding Supplement

OFFICE PROCEDURE

When the field survey data is submitted to the Traffic Analysis and Planning Section it is grouped and coded by ward and block on the original interview forms. In this study it was decided to use the original ward designation as origin-destination zones. The complete breakdown is shown in Appendix A. To tabulate and analyze this information the data for each trip is recorded on International Business Machine tabulating cards. The recording is done by key punching into the cards the coded information that is listed on the interview forms. On an external survey such as this, only one tabulating card, the "Urban Area Traffic Studies - II - External" is used for the original recording. A reproduction of this card is shown in Appendix B.

After all of the original data is punched into the cards by the key-punchers each card is verified for accuracy by being run through a machine similar to the key punch except that it punches no holes but throws out the card if the verifying punch does not agree with the original. This process eliminates the possibility of any wrong code numbers being punched into the cards.

With all of the cards key-punched and verified for accuracy, the coding is machine-checked. This is not a process for checking the key-punching or verifying, it is instead, a process for checking the original coding and it will detect only certain classes of errors. These two general types of errors are:

- (1) Impossible codes for a single item.
- (2) Impossible combinations of codes between two or more items.

Specific examples to illustrate the types of error are:

1. Impossible codes.

These are the result of the erroneous use of code numbers to which no meaning was, or could be, attached when the codes were set up.

Example:

A combination of Ward and Block numbers that does not exist. This occurs in coding Origin, Destination, or other geographical locations.

2. Impossible combinations of codes for two or more items in the same card.

Example:

In the external cards, trips with both terminals outside of the area must have specific station numbers for routes of both exit and entrance. Conversely, trips with one terminal inside of the area can have a specific station number only for route of exit or entrance. The codes for direction of travel (inbound or outbound), origin, destination, and route of entrance or exit are interlocked. The coding of these four items has proved highly susceptible to error. Machine checking detects these errors and they are corrected to permit logical tabulation.

The machine checking is a continuous process from the start of the key-punching and verifying. Final machine checking for this study was completed on November 14, 1949.

In addition to the original information recorded on the tabulating card, certain additional data such as O-D zones and expansion factors are entered on the cards by gang-punching so that each card is a complete record of a single trip.

A total of 27,701 cards were punched for this study over the period September 21 to November 14, 1949:

<u>IBM Tabulating Cards</u>	<u>Number Punched</u>
External Trip Report	26,695
Summary Cards for Trip Tables	1,006

EXPANSION OF TRIP DATA

Interviews and classification counts were taken at seven twenty-four-hour stations and four sixteen-hour stations as stated under "FIELD PROCEDURE." To use the interview data it is necessary to expand it to full twenty-four-hour representation. This expansion must be made separately for each vehicle type, (passenger car or truck) by hour, by direction of travel, because of the difference in volume of vehicles that pass each station during the twenty-four one-hour periods. In the peak hours the ratio of vehicles interviewed to vehicles counted goes down and in some of the hours of low volume every vehicle can be interviewed.

It is necessary to use two expansion factors to bring the interview data to full representation. For the twenty-four hour stations the first factor is the ratio of the number of vehicles counted, to the number of vehicles interviewed, by hour, by type, by direction. The second factor is always 1.000 as both the interviewing and classification were conducted for twenty-four hours. For the sixteen-hour stations the first factor is the same as for the twenty-four hour stations but the second factor is the ratio of the total manual or machine count for the twenty-four hours to the total interviews for the sixteen-hour period. These factors are gang-punched into the cards after the original survey data punching is completed. When the interview data is multiplied by the expansion factors the resulting data is used for all future tabulations as it then represents one-hundred percent of the traffic at each station.

TABULATION OF DATA

The data accumulated during the course of this study can be summarized in many different ways for the study of specific problems inherent in the improvement of the urban state trunklines and the arterial street system. The tabulating cards are available at all times and tabulations will be prepared as the progress of the studies reveals the need and the results will be summarized and presented in appropriate form. The purpose of this report is to develop and present the basic tabulations that are considered essential to an understanding of the scope of the compiled data, and additional tabulations to demonstrate the use of the basic data in the preliminary stages of analysis and interpretation.

As this survey is made at external stations on a cordon line around the periphery of the study area, it results in certain data being duplicated on the tabulating cards. Trips through the area, i.e., both origin and destination outside of the area, were duplicated because such trips were recorded inbound by interviewers at one external station and the same, or similar, trips were recorded as outbound by interviewers at some other external station. This duplication was eliminated by punching into the through trip cards a factor equal to one-half of the computed expansion factor: therefore, it is not necessary to divide by two the tabulated figures for thru trips.

In the analysis of traffic movements and in the study of route locations for urban state trunklines and arterial street plans, the most important tabulations are the trip tables. From the trip tables, data can be tabulated to establish the major desired lines of travel to and from the areas of trip terminal concentration, also estimates of the amount and distribution of potential traffic to proposed routes, and other studies and analyses of similar nature as the need develops.

It should be borne in mind that the data set forth in these tables were determined by the expansion of a sample and that they are representative of weekday travel during the summer of 1949. These data must be regarded as

relative rather than absolute and they serve to establish general traffic flow patterns which are reliable within the limits of error of the sampling. Seasonal variations and anticipated future increases in traffic volumes may be estimated by applying appropriate multipliers to the basic data contained in the tables. As no internal samples were taken the traffic flow diagrams and estimates will show only the traffic into, out of, or through the area, unless the internal traffic is estimated from statistics available from other studies in the state and added to the external traffic. If an internal estimate is used in any table or chart it will be so stated in the explanation.

To arrive at a total figure for traffic in the Niles Area the internal or zone to zone trips must be estimated, if using only the external trips will not give a satisfactory solution to the problem at hand. The following table is a summary of internal trips in seven Michigan cities where internal surveys were conducted at the same time as the externals. The ratios shown can be used as a guide in estimating the internal trips.

Study Area	Year of Survey	1/ City Population	Total Internal Trips	Ratio of Int. Trips To Pop.	Internal Trips To and From C.B.D. 2/	
					Number Of Trips	Percent of Int. Trips
Kalamazoo	1946	55,767	81,249	1.5	19,228	24
Muskegon- Musk.Hts.	1946	69,880	86,052	1.2	23,011	25
Lansing- E. Lansing	1946	95,003	167,873	1.8	42,098	25
Pontiac	1947	71,417	79,866	1.1	22,876	29
Grand Rapids	1947	173,088	333,421	1.9	83,263	25
Bay City	1948	52,909	112,357	2.1	30,272	27
Saginaw	1948	89,384	176,005	2.0	46,676	27
Total		607,448	1,036,823	1.7	267,424	26

1/ Population From Dwelling Unit Sample

2/ Central Business District

Four trip tables are presented in Appendix C as follows:

- C-2 Trips by Passenger Cars
- D-1 Trips by Trucks
- S-1 Trips by All Vehicles
- S-2 Trips by Trailer Combinations

Table numbers C-2 and D-1 are the original numbers assigned to this type of table by the Bureau of Public Roads. Tables S-1 and S-2 are Special tables that the Michigan State Highway Department has found very useful.

To facilitate the use of these tables each is made in three sections, the first section showing thru trips with origins at external stations and destinations at external stations, the second section showing the inbound cordon trips with origins at external stations and destinations in internal O-D zones, and the third section showing outbound cordon trips with origins in internal O-D Zones and destinations at external stations. The use of the three sections is identical in that to arrive at the number of trips between

an origin and a destination, the trips are the figure shown at the intersection of the origin line and the destination column for sections one and three, and at the intersection of the origin column and the destination line for section two. This gives one way traffic only from the origin to the destination, and to arrive at the number of trips in the reverse direction between the same origin and destination it is necessary to reverse the origin and destination when looking them up on the tables. For example: to determine the number of thru passenger car trips between stations 3 and 6, consult sheet 1 of Table C-2; the trips with origin at station 3 and destination at station 6 are 769 and the trips with origins at station 6 and destinations at station 3 are 699 for a total of 1468 trips between the two stations.

Other data is presented in either tabular or graphic form, each with an accompanying explanation.

TRAFFIC VOLUME SUMMARIES

Tables of hourly traffic volumes were compiled from the classification counts taken at the eleven external stations. At stations 1 to 7 inclusive, the figures shown are actual counts for the twenty-four hours. Stations 8, 9, 10, and 11, are composed of the sixteen-hour classification count plus the eight-hour machine count, with the vehicle type prorated over the eight-hour period. A summary of these counts is shown on the opposite page but the individual tables are not reproduced in this report.

In addition to the twenty-four hour count a summary of the peak one-hour, peak two-hour, and peak three-hour traffic volumes for each station is compiled to aid in the analysis of travel habits for this area.

Classified 24-Hour Traffic Volumes at External Stations

Stations	Passenger Cars		Trucks		Trailer-Comb.		Buses		All Vehicles
	Volume	Percent	Volume	Percent	Volume	Percent	Volume	Percent	
1	4520	78.1	593	10.2	656	11.3	25	0.4	5794
2	1870	79.7	273	11.6	199	8.5	5	0.2	2347
3	8865	87.0	969	9.5	328	3.2	34	0.3	10196
4	2340	72.2	231	7.1	663	20.5	7	0.2	3241
5	2276	86.6	310	11.8	33	1.3	7	0.3	2626
6	3122	80.4	550	14.2	199	5.1	10	0.3	3881
7	1263	87.2	168	11.6	8	0.5	10	0.7	1449
8	1004	89.3	114	10.2	6	0.5	--	---	1124
9	719	85.5	107	12.7	2	0.2	13	1.6	841
10	76	86.4	12	13.6	--	---	--	---	88
11	263	81.1	58	17.9	3	1.0	--	---	324
Totals	26318	82.5	3385	10.6	2097	6.6	111	0.3	31911

Traffic Volumes and Percentages of Twenty-Four Hour Traffic
For High One-Hour, Two-Hour, and Three-Hour Periods at External Stations

Station	High One Hour			High Two Hours			High Three Hours		
	Time	Volume	Percent	Time	Volume	Percent	Time	Volume	Percent
1	5-6 P	415	7.2	4-6 P	817	14.1	3-6 P	1194	20.6
2	5-6 P	194	8.3	4-6 P	351	15.0	3-6 P	497	21.2
3	7-8 P	763	7.5	4-6 P	1497	14.7	3-6 P	2161	21.2
4	4-5 P	248	7.7	3-5 P	478	14.7	2-5 P	712	22.0
5	3-4 P	238	9.1	3-5 P	457	17.4	3-6 P	663	25.2
6	4-5 P	340	8.8	3-5 P	594	15.3	2-5 P	872	22.5
7	5-6 P	113	7.8	4-6 P	201	13.9	3-6 P	284	19.6
8	5-6 P	99	8.8	4-6 P	183	16.3	3-6 P	271	24.1
9	4-5 P	78	9.3	4-6 P	141	16.8	4-7 P	190	22.6
10	8-9 P	17	19.3	7-9 P	24	27.3	6-9 P	30	34.1
11	3-4 P	32	9.9	3-5 P	62	19.1	3-6 P	89	27.5

- Note: (1) Stations 8, 9, 10, 11 are 16-hour stations with 8-hour count prorated by vehicle type to complete the 24-hour counts.
- (2) Stations 1, 2, 3, 4, 6, 7, 11 are Trunkline Stations and account for 85.3% of the coron traffic.

AVERAGE PASSENGER CAR OCCUPANCY

These two tabulations are made from the expanded cordon trips for vehicles owned in the area going to destinations outside of the area for specific purposes, and for vehicles owned outside of the area going to destinations inside of the area for specific purposes. Both of the tables show the number of vehicles and the number of passengers for each trip purpose as well as the percentage of vehicles and the average occupancy for each purpose. The driver of each vehicle is included in the count of the occupants.

In these tables it must be noted that the purpose of the trip is recorded for the vehicle and driver and not for the other passengers.

Passenger Car Occupancy by Trip Purpose
Vehicles Owned in the Area

Purpose of Trip	Number Of Vehicles	Percent Of Vehicles	Number of Occupants	Average Occupancy
Work	1670	34.8	2696	1.61
Business	556	11.6	955	1.72
Medical-Dental	52	1.1	120	2.31
School	18	.4	25	1.39
Social-Recreation	2130	44.5	5498	2.58
Change Mode of Travel	4	.1	12	3.00
Eat Meal	25	.5	39	1.56
Shopping	257	5.4	576	2.24
Serve Passenger	79	1.6	208	2.63
All Purposes	4791	100.0	10129	2.11

Passenger Car Occupancy by Trip Purpose
Vehicles Owned Outside the Area

Purpose of Trip	Number Of Vehicles	Percent Of Vehicles	Number of Occupants	Average Occupancy
Work	3121	41.4	4990	1.60
Business	963	12.8	1634	1.70
Medical-Dental	213	2.8	461	2.16
School	11	.1	23	2.09
Social-Recreation	1860	24.6	4573	2.46
Change Mode of Travel	13	.2	37	2.85
Eat Meal	238	3.2	500	2.10
Shopping	869	11.5	1967	2.26
Serve Passenger	259	3.4	581	2.24
All Purposes	7547	100.0	14766	1.96

LAND USES AND TRUNKLINE ROUTES IN THE NILES AREA

In studying traffic routing and traffic behavior it is necessary to know the predominant land use of the various blocks and districts in the study area. A complete land use map is prepared in the field showing the commercial, industrial, residential, recreational and institutional areas with the public buildings, industrial buildings and other pertinent useful information.

Most of the interpretative results are based on the location of commercial and industrial areas and the specific locations of truck terminals. For the study of traffic data in the Niles area these three items are the only ones shown on the Land Use Map, Figure 1.

PRINCIPAL LAND USES

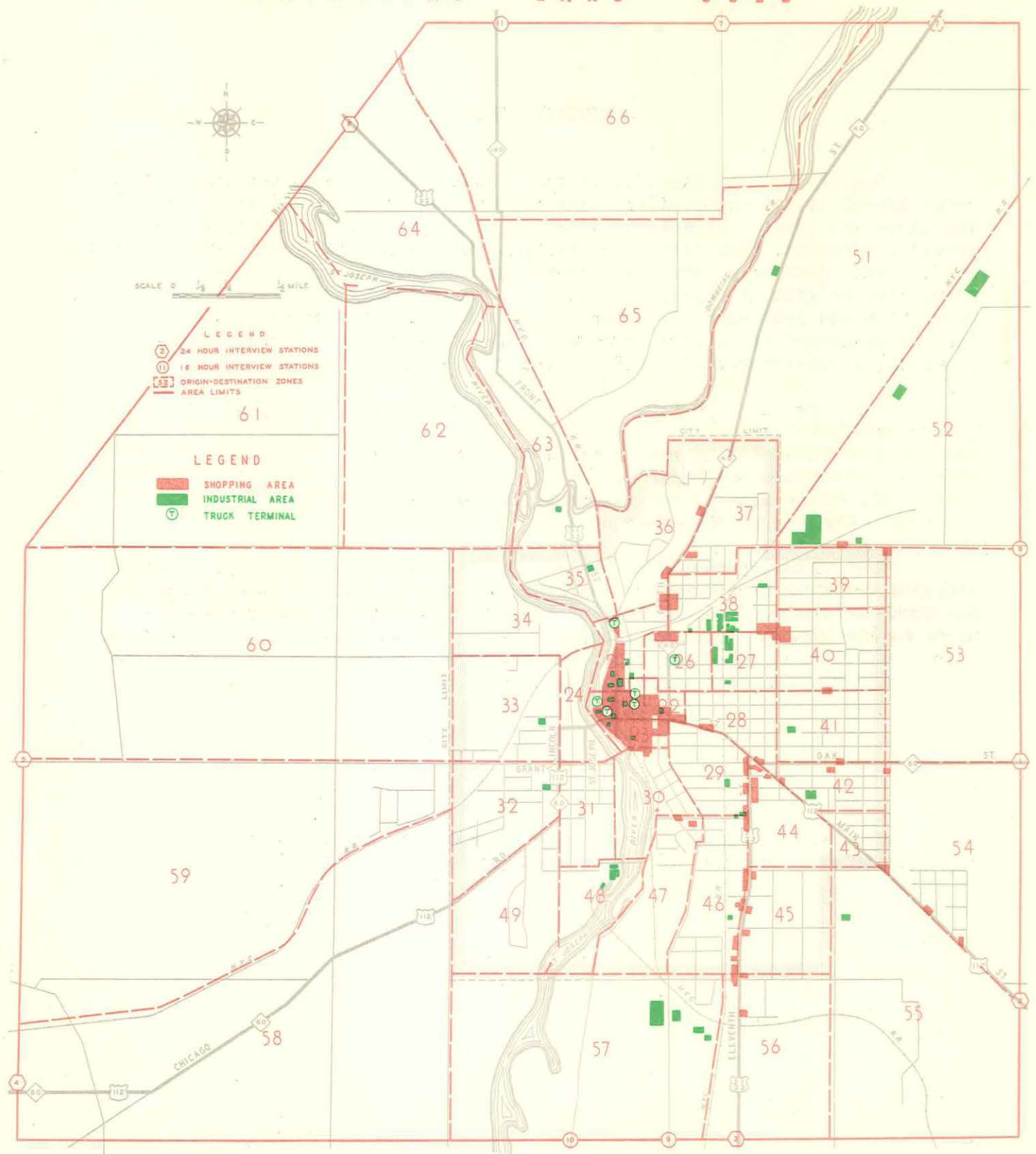


FIGURE 1

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OBJECTIVE TRIPS

One of the most significant and revealing factors in the analysis of urban travel is the study of the origins, destinations, and distribution of the objective trips. Objective trips are trips to specific destinations for specific purposes. This definition excludes the return to "home" from specific objectives. Home trips are the converse of objective trips and their destinations (the origins of objective trips) are indicated by the distribution of population and passenger car ownership. In tabulating objective trips the "serve passenger" trips were prorated to the five purposes, work, business, shopping, social-recreation, and all others.

Two types of objective trips are important to the study of movements for purpose:

1. Trips made by residents of the study area to destinations outside of the area.
2. Trips made by non-residents of the area to destinations inside of the study area.

The following four diagrams each show total objective trips. Tabulations of the five trip purposes are available in the Traffic Planning and Analysis section but the tabulations are not presented in this report. By plotting the inbound individual purpose groups on the same basis as the total trips, the various zones important as industrial, commercial, or recreational are pointed out in their relative importance.

Origins of objective trips made by residents of the area to destinations outside of the area are shown in Figure 2.

ORIGINS OF OUTBOUND OBJECTIVE TRIPS BY RESIDENT AUTO DRIVERS

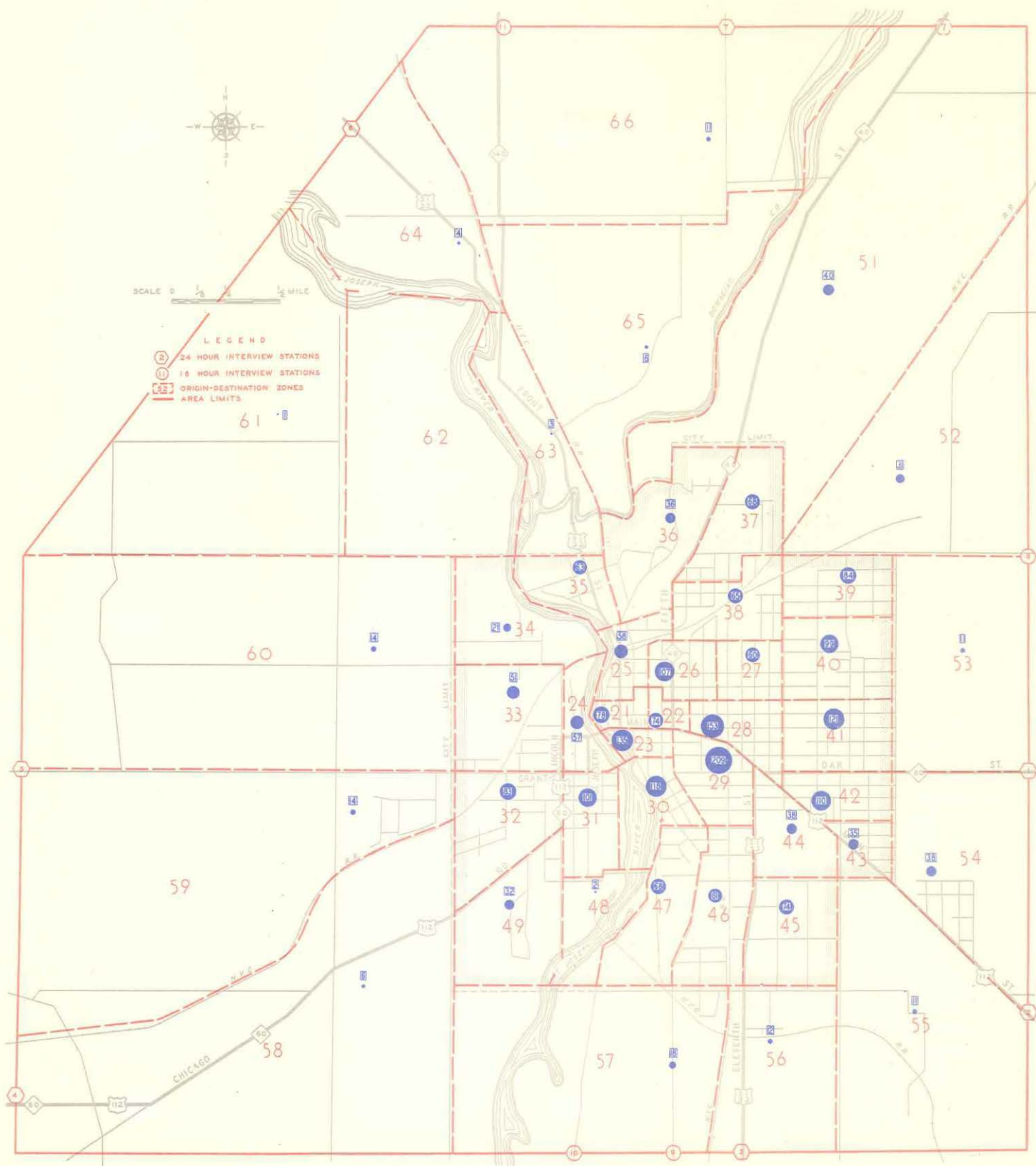


FIGURE 2

Figure 3 shows the destinations and distribution of trips by residents to their destinations outside of the area. These are the destinations of the trips whose origins are shown in Figure 2.

Figure 4 shows the distribution and origins of trips by non-residents from outside of the area to destinations in the study area. This figure shows the trips only from their origin to the study area limits.

ORIGINS OF INBOUND OBJECTIVE TRIPS BY NON-RESIDENT AUTO DRIVERS

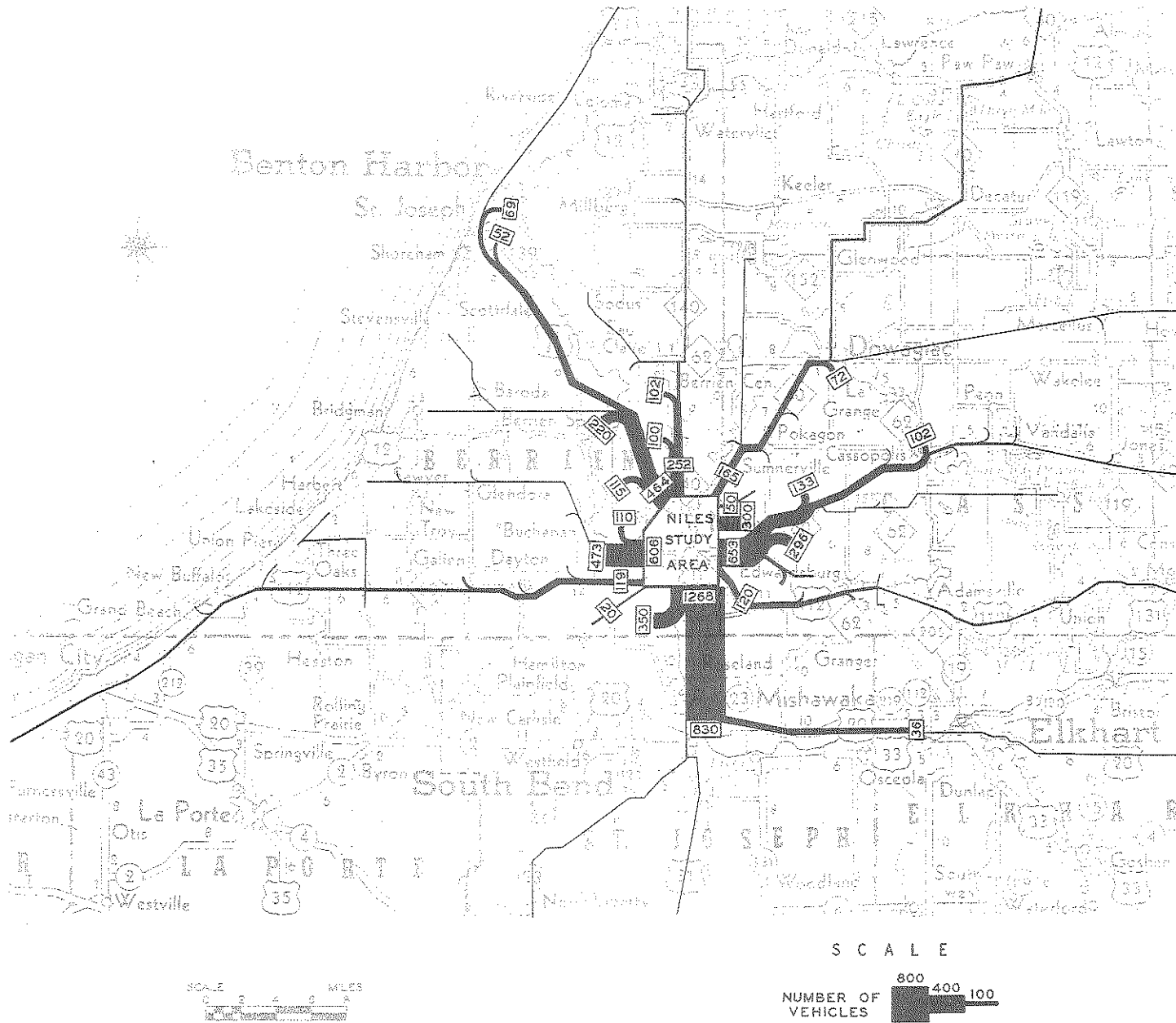


FIGURE 4

Figure 5 shows the volumes, by zones, of the destinations within the study area, of objective trips made by non-residents to destinations in the area. These destinations are from the trips with origins shown in Figure 4.

DESTINATIONS OF INBOUND OBJECTIVE TRIPS BY NON-RESIDENT AUTO DRIVERS

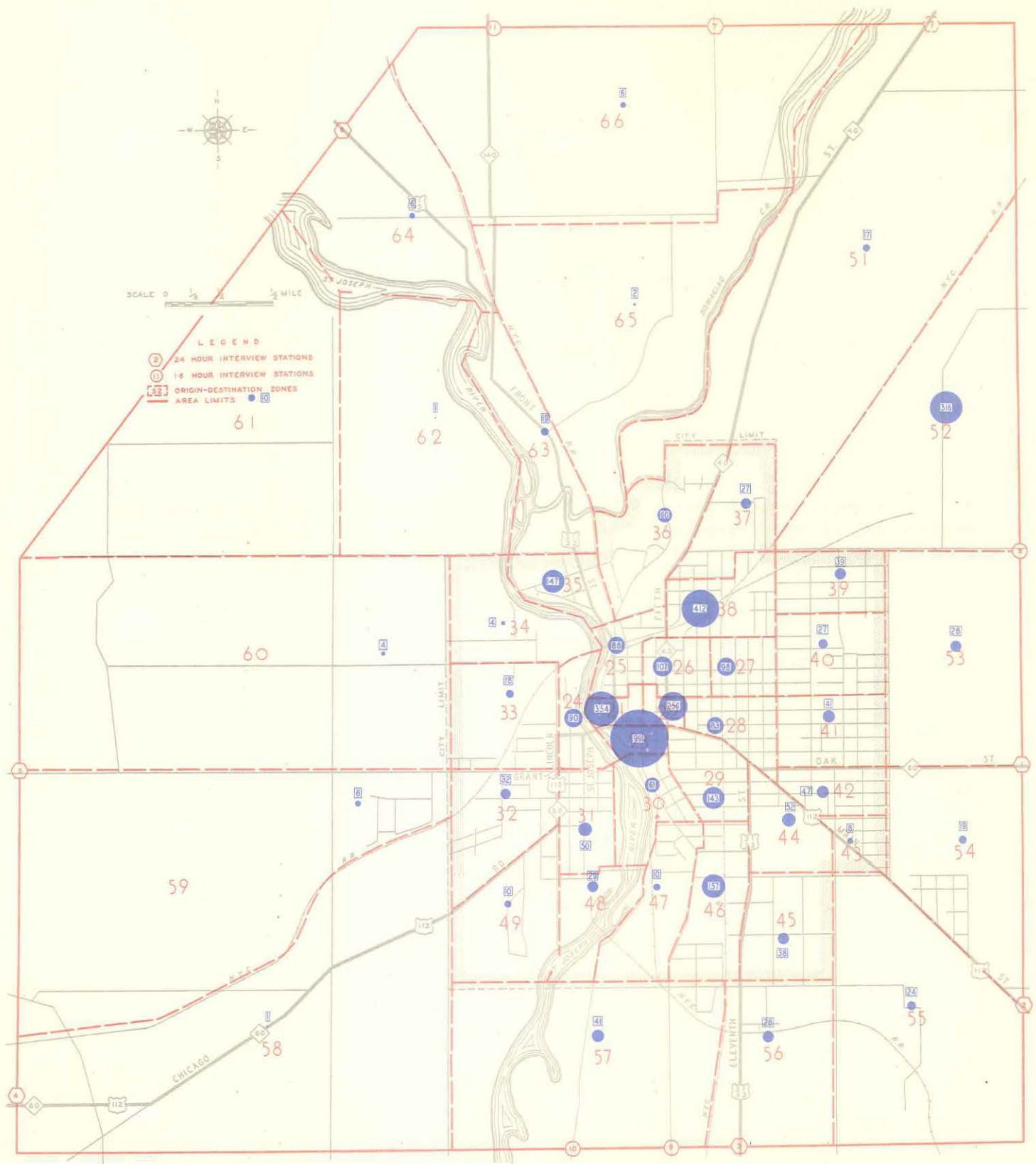


FIGURE 5

24-HOUR TRAFFIC ON STATE TRUNKLINE STREETS

During the course of the survey, manual traffic and turning movement counts were taken at all of the signalized intersections, and machine counts were taken at other non-signalized intersections. This data when summarized and plotted on a map of the study area gives a picture of the traffic volumes on the important streets.

The widths of the traffic bands show that the most important thoroughfares in Niles are the ones designated as State Trunkline Streets. These streets carry the trunkline traffic through the area with the trunklines being merged into one route on Main Street for ten blocks through the central business district from 11th Street to Front Street

All of the traffic shown on the streets in Figure 6 is not thru trunkline traffic, it is the total traffic on these streets and is made up of thru trips, inbound and outbound cordon trips, and internal trips. The volumes shown are for an average weekday in July, 1949.

INTERCHANGE OF THROUGH TRIPS ON MAJOR HIGHWAYS

Thru traffic is of major importance in the Niles area as the North-South and the East-West movements are on two very important trunkline routes. In addition to these straight through movements there is a considerable volume of vehicles that change their direction of travel at the intersections of these main routes. Figure 7 illustrates these various movements on a straight line desire pattern without regard to the city streets. This method of depicting thru trips on the desired lines of travel shows more clearly the actual number of trips between the external stations than if they were assigned to the city streets.

On an over-all basis the thru trips account for 59 percent of the traffic crossing the cordon line at the trunkline stations.

INTERCHANGE OF THROUGH TRIPS ON MAJOR HIGHWAYS

WEEKDAY IN JULY 1949

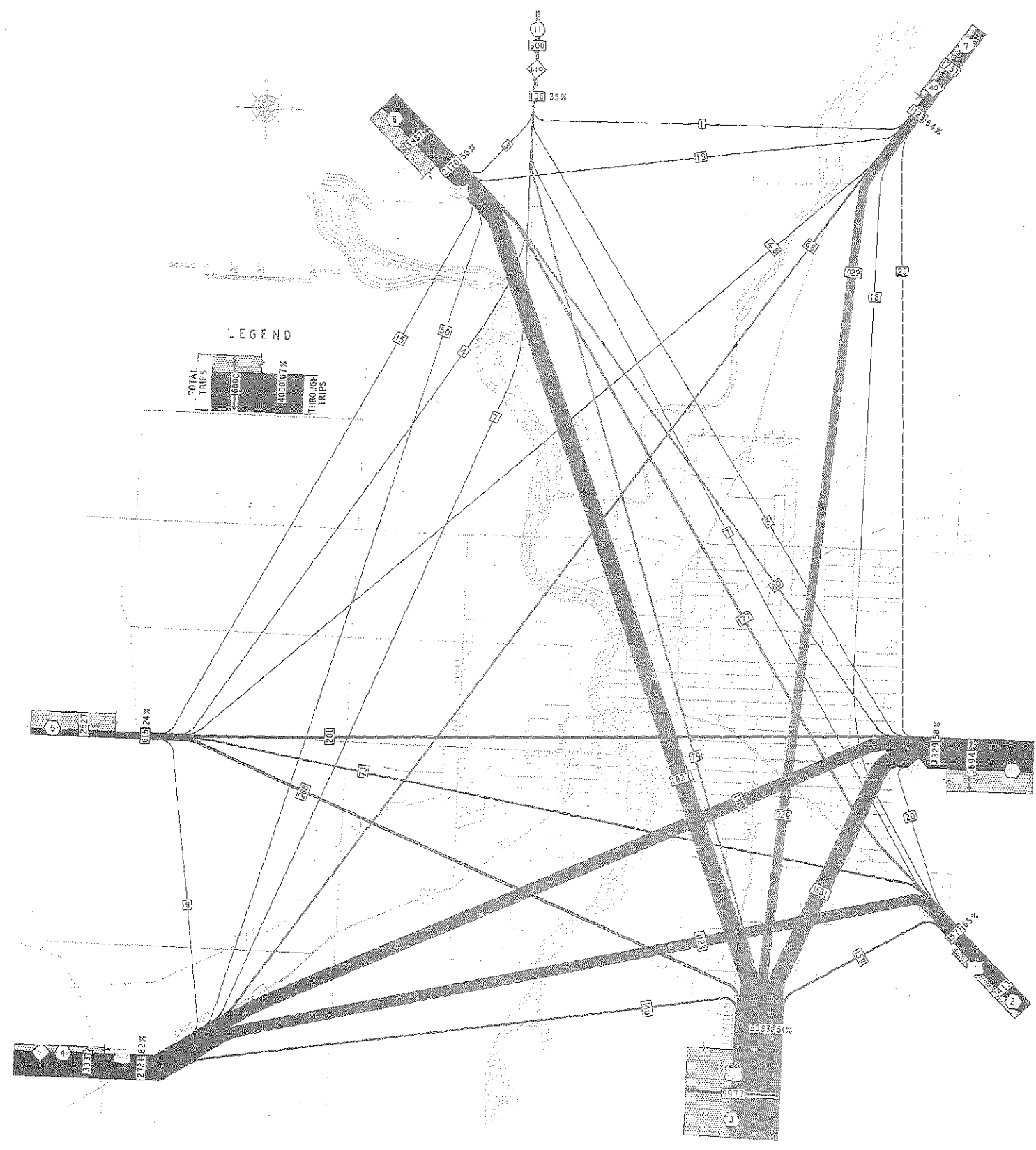


FIGURE 7

INTERCHANGE OF THROUGH TRAILER-COMBINATION TRIPS ON MAJOR HIGHWAYS

Through trailer-combination traffic has become one of the major problems in the Niles area. As can be seen in Figure 8 the trailer-combination trips that have one terminal in the area is small in comparison to the thru trips. On the over-all picture of the trunkline stations only 228, or eleven percent, of the trips terminate in the area and 1942, or 89 percent go through.

Figure 8 shows the desired routes of this interchange without regard to the city street system.

INTERCHANGE OF THROUGH TRAILER COMBINATION TRIPS ON MAJOR HIGHWAYS

WEEKDAY IN JULY 1949

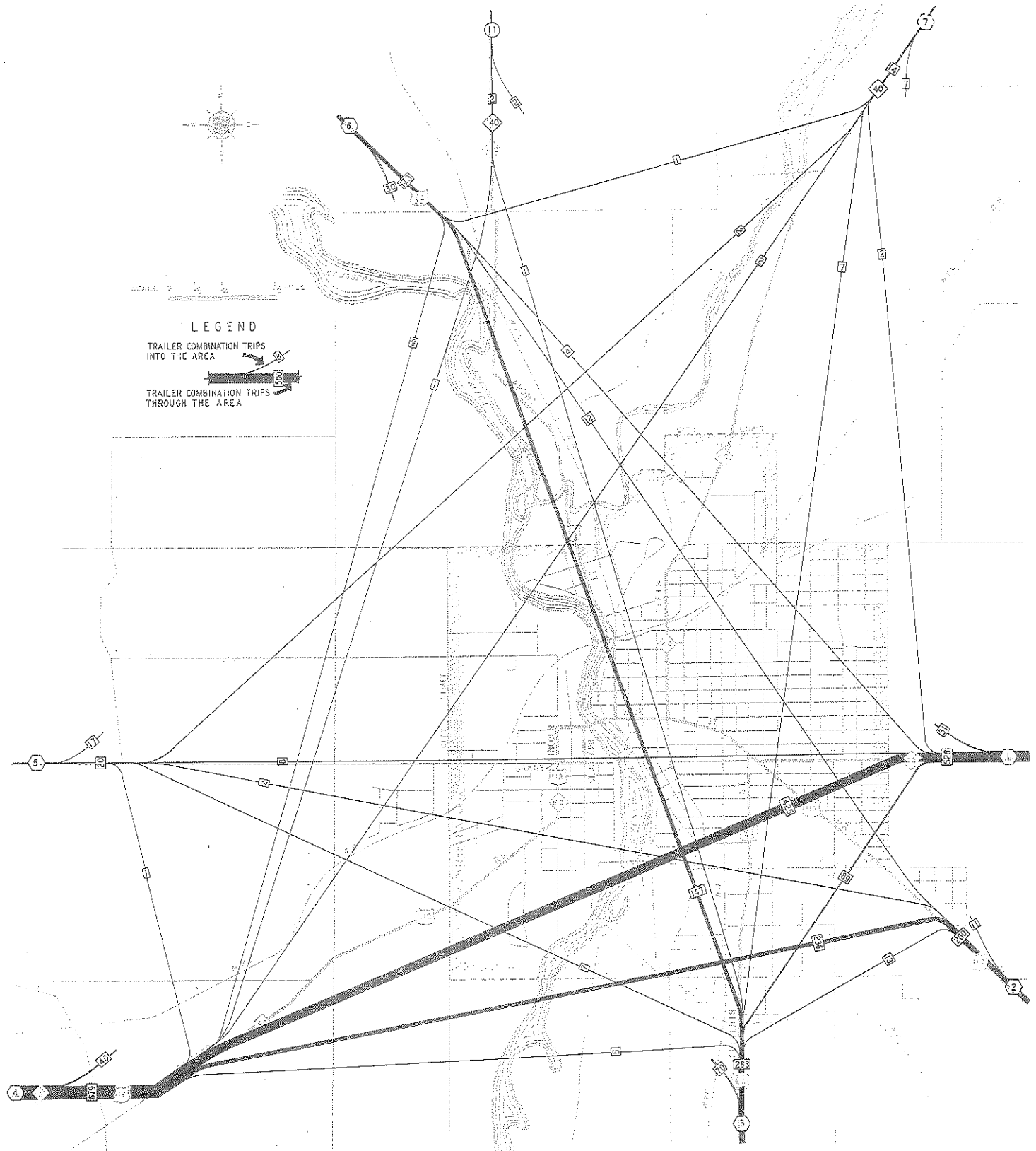


FIGURE 8

PASSENGER CAR TRIPS BETWEEN NILES AND SOUTH BEND

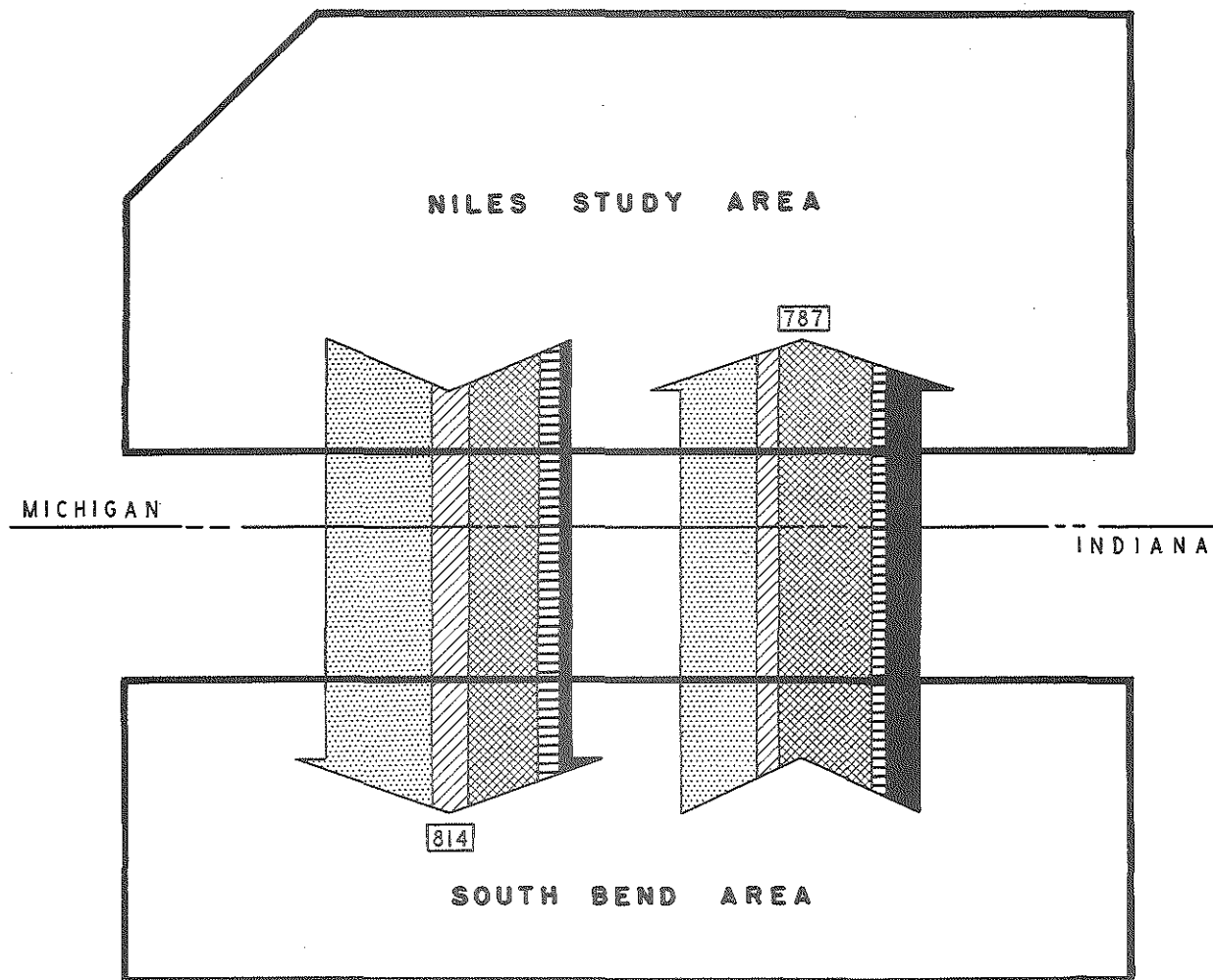
Objective trips with origins in the Niles area and destinations in the South Bend area, and vice versa, are shown as directional trips in Figure 9. Being directional objective trips the return trips are not shown as they would be the same total volumes but in the opposite directions. The south-bound band represents trips made for specific purposes by residents of the Niles Study Area to destinations in the St. Joseph County, Indiana, area; and the north-bound band represents trips made for specific purposes by residents of St. Joseph County, Indiana, to destinations in the Niles Study Area.

This chart should not be construed as showing total vehicular trips between these two areas because in addition to the objective trips shown there are the returns from these trips, the trips to and from the Niles Study Area and other states, through trips in both directions, and all commercial vehicle trips. The total volume through Stations 3, 9, and 10 is approximately 11,000 trips in the twenty-four hours of an average weekday in July of 1949.

Although the volumes of trips are nearly identical, it must be noted that in comparing these volumes with the population of the two areas, the trips from Niles represents a ratio of 58.1 trips per thousand people and the trips from South Bend represents a ratio of 4.9 trips per thousand people. The difference in these ratios means that the South Bend area has about twelve times the traffic attraction for Niles people as Niles has for persons in South Bend. This is in direct proportion to the population of the two areas as the population of the Niles Study Area is about 14000 and the population of St. Joseph County, Indiana, is about 162,000.

OBJECTIVE PASSENGER CAR TRIPS BETWEEN THE NILES AND SOUTH BEND AREAS BY RESIDENTS OF THE TWO AREAS

THROUGH STATIONS 3, 9 AND 10.



LEGEND

	NILES RESIDENTS TO SOUTH BEND	SOUTH BEND RESIDENTS TO NILES
WORK	355	255
BUSINESS	127	76
SOCIAL-REC.	225	308
SHOPPING	72	37
ALL OTHERS	35	111
TOTAL	814	787

FIGURE 9

HIGHWAY LIBRARY
 MICHIGAN DEPARTMENT OF STATE
 LANSING, MICH.
 P. O. DRAWER "K" 48904

THRU PASSENGER CAR TRIPS PASSING STATION 4

The East-West traffic through the city of Niles at the present time is funneled through the business district with the main eastern outlets at Stations 1 (M-60) and 2 (US-112) and the western outlet at Station 4 (M-60 and US-112). The volumes of this thru traffic are shown in the traffic flow diagram, Figure 10. As can be seen in the diagram, the heavy movements between Stations 4 and 1 and 4 and 2 contribute to the congestion in the downtown area. It should be noted, however, that in this diagram the traffic is not assigned to the streets of Niles nor the highways outside of Niles, but is demonstrated as desire lines, or where the traffic would naturally flow if it were possible.

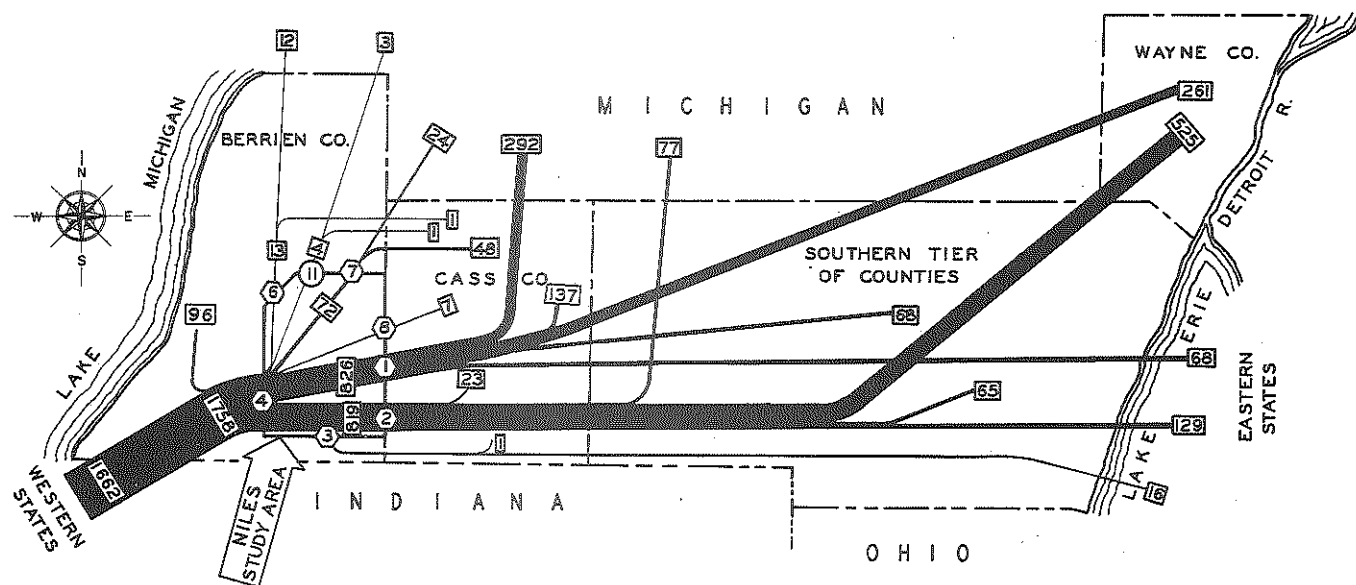
If and when the contemplated Chicago-Detroit link in the Interstate Highway System is built to the west and north of Niles, traffic would be either routed or attracted to the new route. By taking this by-pass traffic out of the city and by eliminating the minor trips through stations other than 1 and 2, the estimated traffic flow would be reduced to the volumes as shown in Figure 11.

By-pass facilities afforded by this proposed Interstate route would not be the final solution to the congestion problem in the central business district, but this diagram demonstrates that it would provide much needed relief to several major trunkline arteries within the area.

PASSENGER CAR TRAFFIC THROUGH NILES AREA

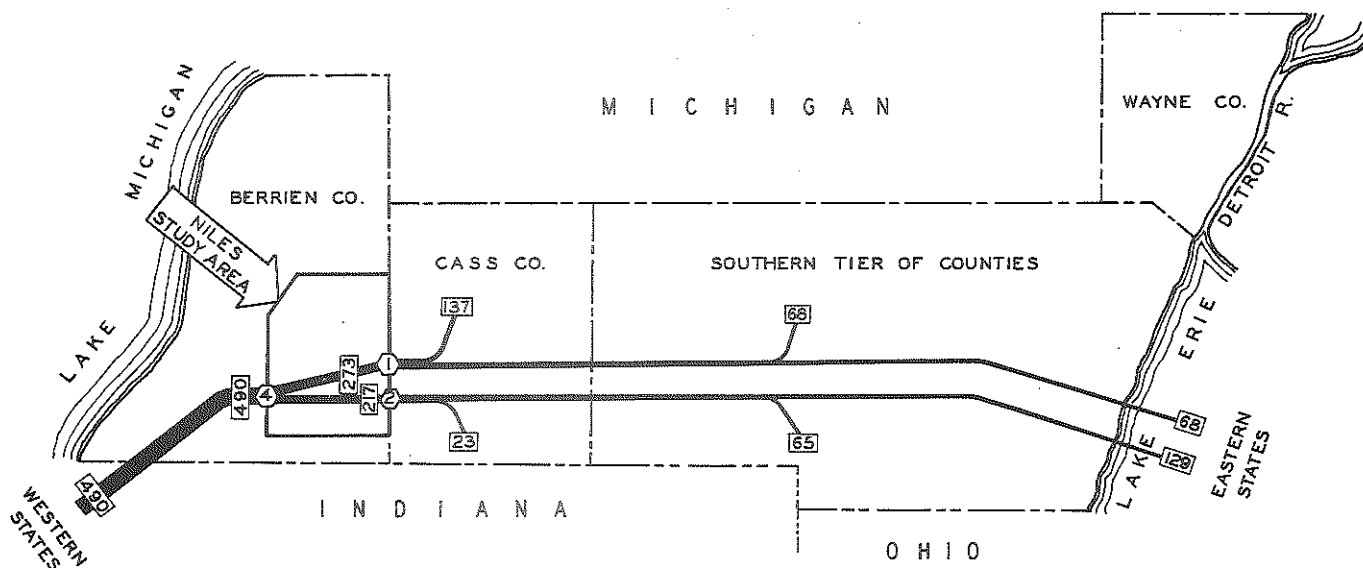
WEEKDAY IN JULY 1949

STATION 4



WITH EXISTING TRUNKLINE ROUTING

FIGURE 10



WITH PROPOSED CHICAGO-DETROIT INTERSTATE HIGHWAY
IN OPERATION

FIGURE 11

THRU TRAILER-COMBINATION TRIPS PASSING STATION 4

Trailer-combination trips through Station 4 are greater than for any other station, with the predominant movement east and west. As stated previously, the east-west traffic is routed through the business district because there is no other route available at the present time. Figure 12 shows the volumes of trailer-combination traffic through Station 4 and all other stations. From the diagram it can be seen that the large east-west movement from Stations 1 and 2 to Station 4 through the business district is adding to the congestion problem as well as creating a noise and nuisance problem to the offices and stores.

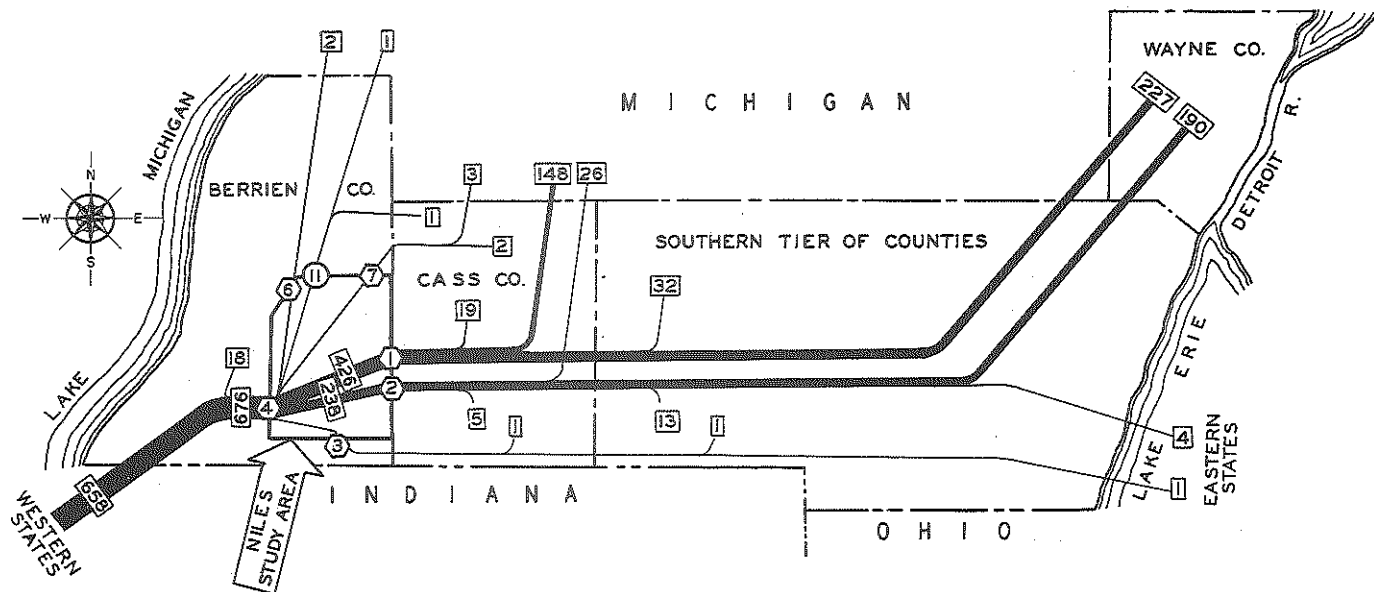
As in the case of the thru passenger cars, if it were possible to remove this large volume of trips, the estimated number of trailer-combinations left to go through the area would be as shown in Figure 13.

These two figures show desire lines only, as the flow bands are not assigned to city streets nor state highways.

TRAILER COMBINATION TRAFFIC THROUGH NILES AREA

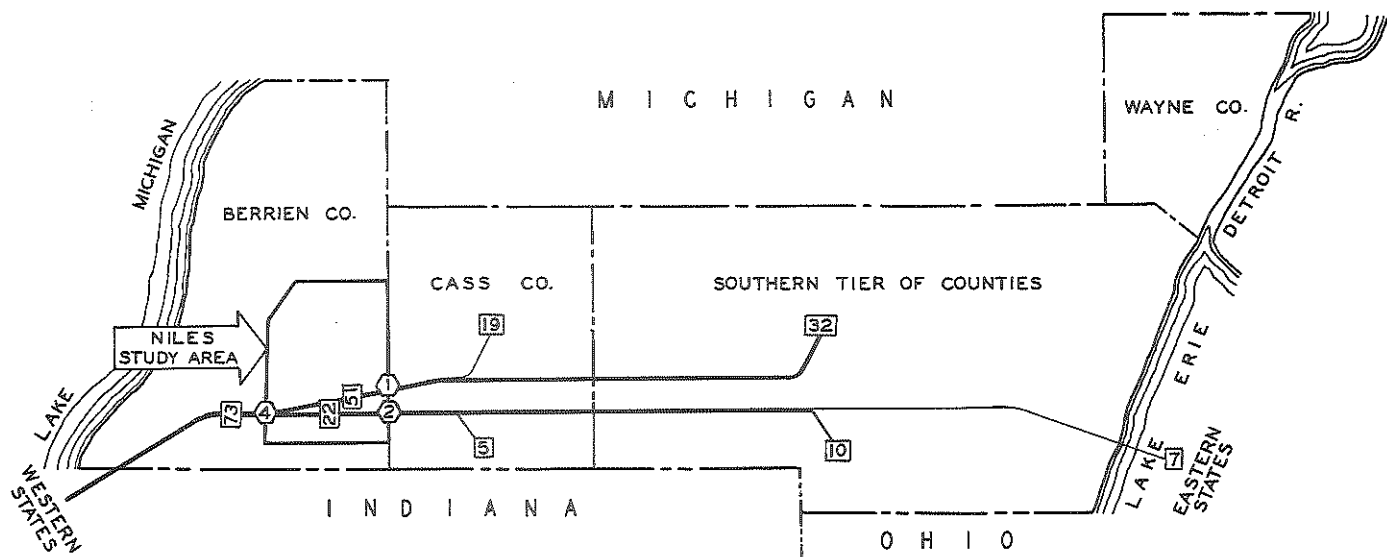
WEEKDAY IN JULY 1949

STATION 4



WITH EXISTING TRUNKLINE ROUTING

FIGURE 12



WITH PROPOSED CHICAGO-DETROIT INTERSTATE HIGHWAY
IN OPERATION

FIGURE 13

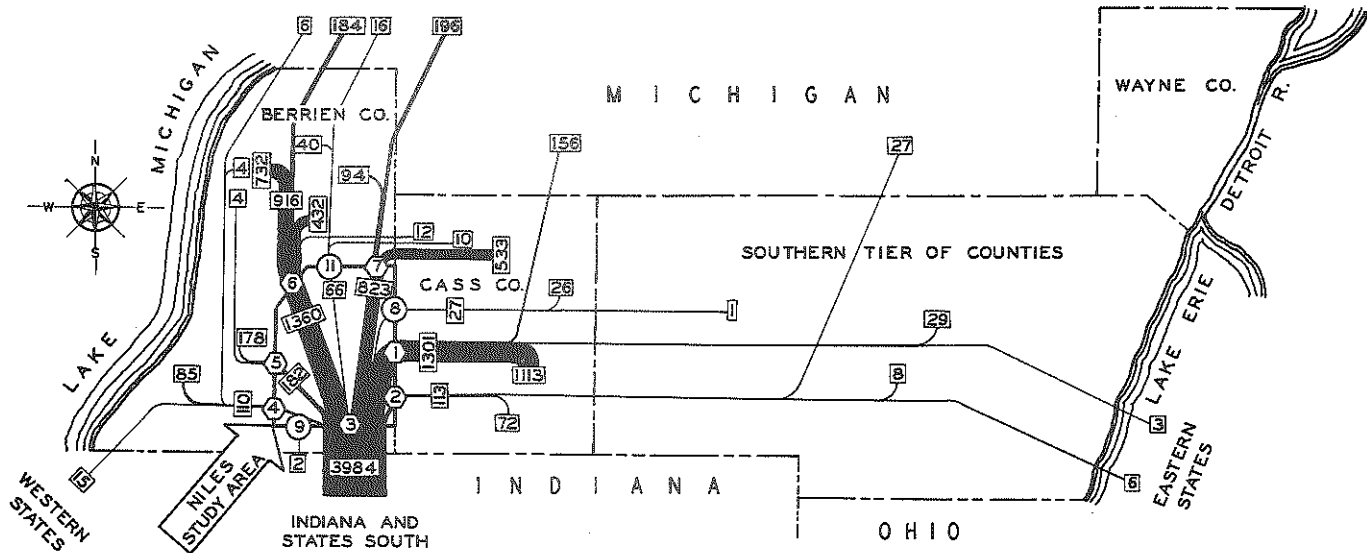
THRU TRIPS PASSING STATION 3

In addition to the east-west traffic problem shown in the preceding diagrams, Niles also has a north-south problem, because US-31 and US-33 combined, go through the area between Stations 3 and 6. By actual volume the passenger car trips are about the same in the north-south direction as in the east-west direction, but the trailer-combination trips are fewer in number on the north-south route. This trunkline route also passes through the business district joining M-60 and US-12 at the intersection of Eleventh and Main Streets with all routes combined from this point, through the business district on Main Street to the intersection of Front Street where US-31 and US-33 turn north. Ten city blocks are covered by these combined routes.

Figure 14 showing the passenger car trips and Figure 15 showing the trailer-combination trips, both presenting desire lines through the study area and on the highways outside of the study area, should not be construed as indicating the actual routes taken by the vehicles making the trips.

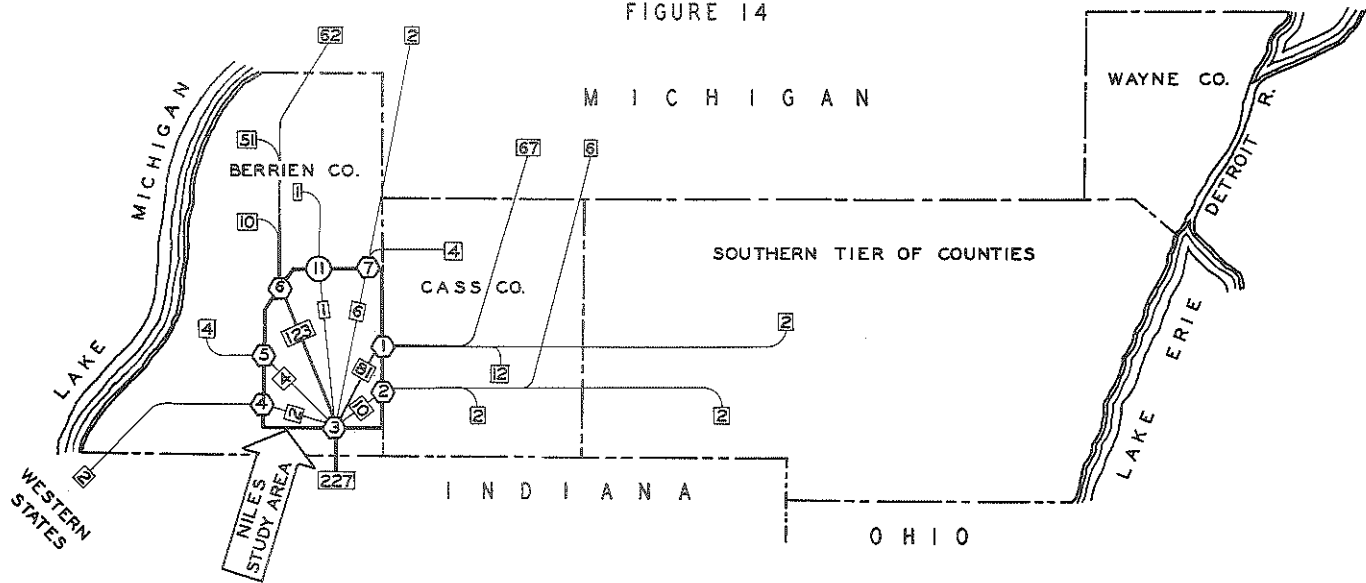
If the connection of the Inter-state Highway System, as previously mentioned, were to be built, it would in no way affect the north-south traffic on US-31 and US-33.

TRAFFIC THROUGH NILES AREA STATION 3



PASSENGER CARS FOR A WEEKDAY
IN JULY 1949

FIGURE 14



TRAILER - COMBINATIONS FOR A WEEKDAY
IN JULY 1949

FIGURE 15

APPENDIX A

STATISTICS OF OPERATION

For control of the survey operations and recording of data, the survey area was subdivided into 421 blocks. For tabulation and analysis, the blocks were combined into 45 Origin-Destination Zones based on the predominant land use as shown on the zone map on page 7. The division of the study area and the size of the zones is shown in the following tabulation:

O-D Zone Number	Type of Land Use	Number of Blocks	Area in Acres
21	Central Business District	9	25
22	Central Business District	6	19
23	Central Business District	10	25
24	Residential	4	61
25	Central Business District	19	60
26	Industrial	15	56
27	Industrial	15	56
28	Residential	28	71
29	Residential-Commercial	16	81
30	Residential	15	90
31	Residential	17	84
32	Residential	14	151
33	Residential	9	164
34	Residential	3	156
35	Recreational	8	79
36	Recreational	5	187
37	Residential	11	123
38	Industrial	19	106
39	Residential	15	98
40	Residential	15	128
41	Residential	20	114
42	Residential	15	70
43	Residential	11	47
44	Recreational-Cemetery	8	92
45	Residential-Commercial	7	138
46	Residential-Commercial	14	133
47	Residential	8	131
48	Industrial	3	97
49	Residential	5	175
51	Rural	4	1323
52	Industrial	2	645
53	Rural	1	409
54	Rural	10	351
55	Rural	3	614
56	Rural-Commercial	6	282
57	Industrial	7	643
58	Rural	9	1269
59	Rural	8	1150
60	Rural	5	1329
61	Rural	3	923
62	Rural	1	587
63	Industrial	7	204
64	Rural	4	410
65	Rural	3	725
66	Rural	4	1067
	Total	421	14748

Traffic was stopped and the drivers interviewed at the eleven external stations on the cordon line surrounding the study area. The following table shows the number of interviews, number of vehicles passing through each station, and the percentage of the traffic interviewed:

External Station	Hours of Operation	Total Interviews	Total Count	Percent of Traffic Interviewed
1	24	4820	5794	83.2
2	24	2212	2347	94.2
3	24	7540	10196	74.0
4	24	2868	3241	88.5
5	24	2471	2626	94.1
6	24	3344	3881	86.2
7	24	1423	1449	98.2
24-Hour Sub-Total		24678	29534	83.6
8	16	936	1124	83.3
9	16	702	841	83.5
10	16	88	88	100.0
11	16	290	324	89.5
16-Hour Sub-Total		2016	2377	84.8
Total		26694	31911	83.7

The eleven external stations that were operated on all of the main highways and important secondary roads crossing the cordon line accounted for ninety-six percent of all trips entering and leaving the area.

APPENDIX B
TABULATING CARD
INTERVIEW FORM

MICHIGAN STATE HIGHWAY DEPARTMENT-PLANNING AND TRAFFIC DIVISION URBAN AREA ORIGIN-DESTINATION STUDIES-II-EXTERNAL

CONTROL CITY NO.	STATION NO.	DAY OF WEEK	INTERVIEW PERIOD	IN OR OUT	INTERVIEW NUMBER	REGISTRATION VEHICLE TYPE	NO. OF PASSENGERS	ORIGIN		DESTINATION		VEHICLE GARAGED IN		SCREEN ROUTE OF EXIT OR ENTRANCE	STOPS IN AREA	INTERMEDIATE STOP		ZONE OF INTER-MEDIATE STOP	COMMON-VEHICLE TYPE	ZONE GARAGED IN	ZONE OF ORIGIN	ZONE OF DESTINATION	NO. OF VEHICLES REPRESENTED BY THIS CARD (INTERVIEW PERIOD)	NO. OF VEHICLES REPRESENTED BY THIS CARD (24 HOURS)																																																							
								WARD OR TRACT	BLOCK	WARD OR TRACT	BLOCK	TO FROM	PURPOSE OF TRIP			WARD OR TRACT	BLOCK								WARD OR TRACT	BLOCK																																																					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																							
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																																							
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2																																																							
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																																																							
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4																																																							
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5																																																							
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

MICHIGAN STATE HIGHWAY DEPARTMENT
 Charles M. Ziegler, State Highway Commissioner
 Planning & Traffic Division

METROPOLITAN AREA TRAFFIC STUDY

EXTERNAL INTERVIEW

Date Hour Period _____ to _____		A.M. P.M.	City	Station	Day of Travel	Hour Period Ending	Inbound	Outbound	Direction of Travel																													
			2	3 4	5	6 7	1	2	8																													
1	2	3	4	5		8		9	10	11		13																										
Interview Number	State of Registration	Vehicle Type	No. in Vehicle	Where did this trip begin? Origin	Where will this trip end? Destination	Trip Purpose	Where is this vehicle garaged?	Screen	Route of Exit or Ent.	Stops in area	Check	Purpose	Intermediate Stop Location																									
	1 Michigan 2 Other (write in)						5 Other 6			1 Yes 2 No X Not Stated																												
	1 Michigan 2 Other (write in)						5 Other 6			1 Yes 2 No X Not Stated																												
	1 Michigan 2 Other (write in)						5 Other 6			1 Yes 2 No X Not Stated																												
	1 Michigan 2 Other (write in)						5 Other 6			1 Yes 2 No X Not Stated																												
	1 Michigan 2 Other (write in)						5 Other 6			1 Yes 2 No X Not Stated																												
	1 Michigan 2 Other (write in)						5 Other 6			1 Yes 2 No X Not Stated																												
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47

- 1. Passenger Car
- 2. Pick-up or Panel
- 3. Single Unit - Single Rear Tire
- 4. Single Unit - Dual Rear Tire
- 5. TT-ST Combination
- 6. TT-ST-TR or TK-TR
- 7. Bus Not C.C.
- 8. Taxi
- 9. Single Unit - 3 Axle

- 1. Work
- 2. Transact Business
- 3. Medical - Dental
- 4. School
- 5. Social, Recreation
- 6. Change Mode of Travel
- 7. Eat Meal
- 8. Shopping
- 9. Serve Passenger

- 1. Course of Work
- 2. Transact Business
- 3. Social - Recreation
- 4. Eating
- 5. Gas-Oil Service
- 6. Serve Passenger
- 7. Secure Lodging
- 8. Shopping

APPENDIX C

TRIP TABLES