Big Rapids Area Transportation Study External Survey

Factual Data and Trip Tables

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

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Factual Data and Trip Tables

Cooperating Agencies:

City of Big Rapids
Mecosta County Road Commission
U.S. Department of Transportation
Federal Highway Administration

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1970

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, GOVERNOR

DEPARTMENT OF STATE HIGHWAYS

STATE HIGHWAYS BUILDING – POST OFFICE DRAWER K – LANSING, MICHIGAN 48904
HENRIK E. STAFSETH, Director

September 10, 1970

Mr. Sam F. Cryderman
Engineer of Transportation Planning
Transportation Planning Division
Michigan Department of State Highways
Lansing, Michigan 48904

Dear Mr. Cryderman:

This presents the "Factual Data and Trip Tables" report for the 1968 Big Rapids Area Transportation Study External Survey. This publication fulfills a requirement of the Bureau of Public Roads.

The purpose of this report is to summarize the base year data obtained from the Origin-Destination survey including trip tables.

This report was prepared by the following Transportation Analysts of the Northwest Michigan Analysis Unit of the Transportation Survey and Analysis Section: Phillip Lamb, David Jewison. Their Supervisor is Leo Farman.

Sincerely,

K E Bushnell

K. E. Bushnell, Engineer
Transportation Survey & Analysis

MICHIGAN
THE GREAT LAKE STATE

PREFACE

During the month of July, 1968, the Transportation Planning Division of the Department of State Highways, conducted an external origin and destination survey at Big Rapids, Michigan. Its purpose is to determine the traffic patterns in Big Rapids as a sound basis for planning the efficient traffic arteries needed in the future.

This report "Factual Data and Trip Tables", is the first of two or more reports which will present the results of the traffic study. The data in this report will serve as the basis for study and detailed recommendations by the Department's Planners and by local officials. Subsequent reports will consider the suggested solutions to local traffic problems, made possible by this data.

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HISTORY

Mecosta County is located in the west central part of Michigan's Lower Peninsula. Prior to 1850, Mecosta County had not been penetrated except for an occasional trapper or missonary bound for the northern part of the State.

The early history of Big Rapids was very prominently associated with the lumbering industry of Michigan. The Muskegon River upon which it is located was an important artery of commerce to lumbering operations. The early lumberman's reference to the swift current near the City as "The Big Rapids" was a natural name when the original settlement began.

The City of Big Rapids was never a legally incorporated village. Its affairs were conducted by Township Officials until 1869 when it incorporated as a City. Its first frame dwelling was a two-story boarding house built in 1857. A water power sawmill was built in the same year. The first school was a two-story frame building built in 1859, and a bridge over the Muskegon River was completed in 1860. The post Civil War years were years of great activity in Big Rapids. Stores were built and trade expanded. There was a great transient population in these logging days and many hotels, boarding houses and saloons existed. There were two breweries in Big Rapids in 1880.

Mr. and Mrs. Woodbridge Nathan Ferris arrived in Big Rapids in May 1884, and prepared to organize a school which opened in September of that year with an enrollment of 15. The student body steadily grew and in 1894 the school was incorporated. By 1901 a three story red brick building was erected and enrollment reached 2,000 in 1906. Ferris State College continues to be an important asset to the City of Big Rapids.

The Grand Rapids and Indiana Railroad first served Big Rapids in 1870, followed by the Chicago and West Michigan in 1873. The Detroit, Lansing and Northern Railroad began operating in 1880. Big Rapids is served by two State Trunk Lines. US-131 is the more important and carries the North-South traffic, while M-20 carries the East-West traffic. A Freeway is planned to replace US-131. Big Rapids also has an airport.

SURVEY AREA

Big Rapids is a city of 5,800 people, located on the Muskegon River in Mecosta County. Population within the entire survey area is estimated at 15,000. This area is composed of the city of Big Rapids and part of Big Rapids Township. The entire survey area covers approximately 8 square miles.

BIG RAPIDS AREA EXTERNAL O.D. STUDY

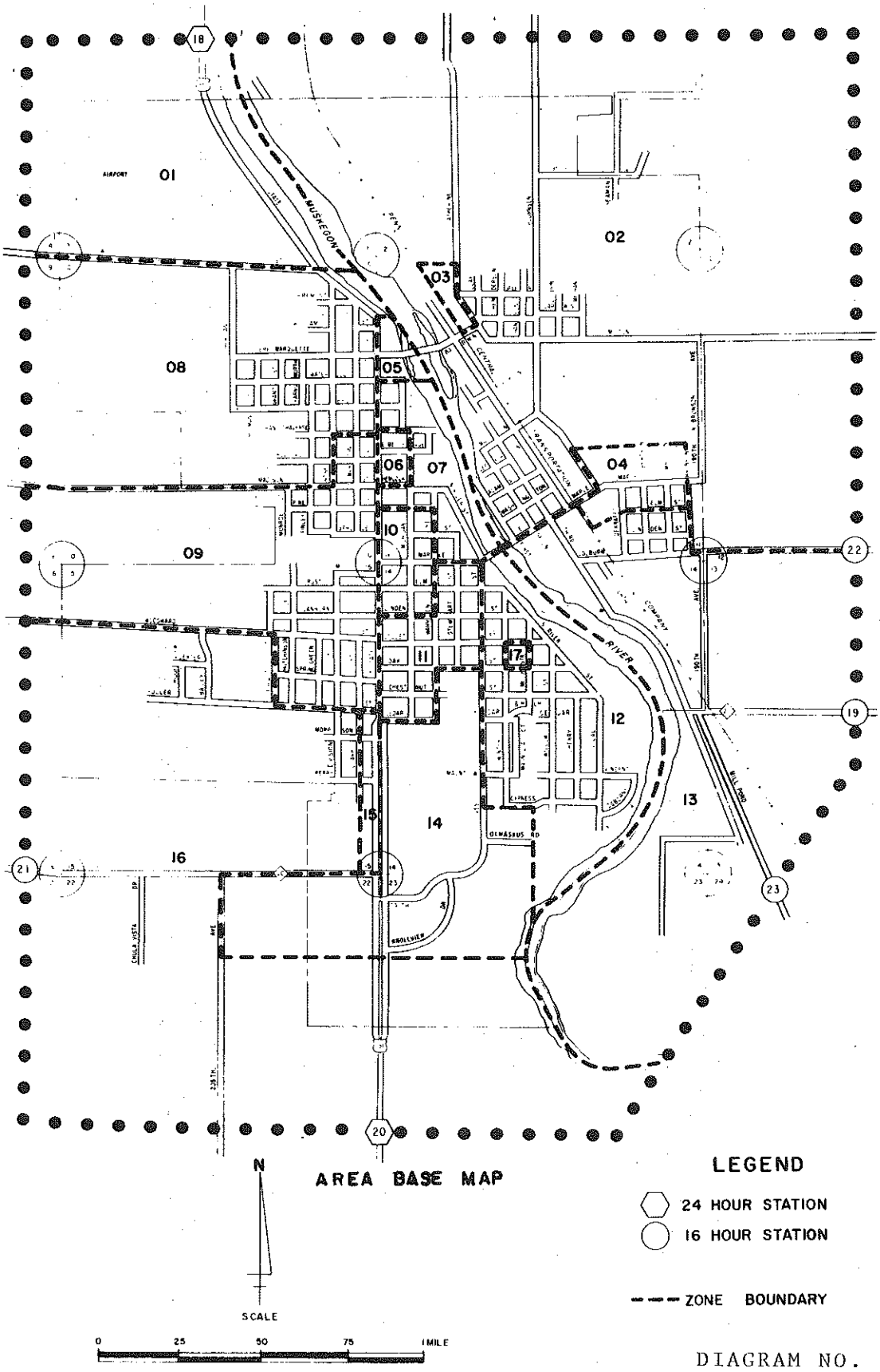


DIAGRAM NO. 1

FIELD PROCEDURE

Field work on the Big Rapids Traffic Study was conducted during the month of July, 1968. The purpose was to accumulate data concerning the movement of people and goods by motor vehicle through, into and out of the study area.

Data for the study of external trips was obtained at a cordon of six interview stations established on all of the important roads leading into the study area. At each of these stations, vehicles were stopped and the drivers interviewed concerning the origin, destination and purpose of their trips. Manual vehicle classification counts were taken at the six stations for twenty-four hours.

Answers to the interview questions were recorded on Form O-D 4. One line of this form was used for each vehicle interviewed. A sample copy of Form O-D 4 is shown in Appendix "A". Both inbound and outbound vehicles were interviewed. They were recorded each hour at each station by direction of travel.

TERMINOLOGY AND DEFINITIONS

Central Business District (CBD):	The zones comprising the concentrated commercial and retail business center of the city.
Cordon Line:	A hypothetical line encompassing the area under study.
Cordon Trip, Terminal 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 CBD and its commercial-residential fringe.
External:	Outside 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.
Non Resident:	A person living outside the study area.
Origin:	The place where the trip begins.
Origin-Destination Zone, O-D Zone, Zone:	A basic subdivision of the study area having a single or dominant land use, designated for purposes of tabulation and analysis.
Resident:	A person living within the study area.
Study Area:	The area enclosed by the cordon line.
Through Trip:	A trip passing through the study area with the terminals outside the study area.
Trip:	One-way travel between an origin and destination.
Trip Terminal:	The point where a trip begins or ends.

TRAFFIC VOLUMES

Many factors are responsible for the patterns of traffic volumes within a community. Such items as land use, street width, type and condition of street surface, parking restrictions, one or two way operation and signalization attract traffic to certain routes. The majority of motorists in the Big Rapids Area voluntarily confine their travel to a small number of streets. These are: State Street (US-131), Maple Street (M-20), Colburn Avenue, Mill Pond Road, Catherine Street, Bjornsen Street, Milton Avenue, 205th Avenue, Madison Street, West Avenue, Pere Marquette Street-Baldwin Street, Pine Street, Michigan Avenue, Ives Avenue, Third Avenue (M-20), Rust Avenue-Elm Street, Oak Street, and South Street.

Traffic volumes on these thoroughfares are in most cases small in the peripheral areas, gradually increasing as these routes converge upon the central area, and reaching their maximum in the Big Rapids central business district. The highest traffic volume in the city (19,380 vehicles, July weekday) occurred on State Street (US-131) North of Maple Street (M-20).

Traffic decreases, along US-131 (North), to 7,700 at the north city limit. Other streets and their approximate 24-hour July weekday volumes are Pine Street (1,840), Michigan Avenue (3,590), Maple Street (8,110), Third Avenue (6,340), Elm Street (2,290), Oak Street (2,150), Ives Avenue (1,120), and South Street (2,040).

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
VEHICLE VOLUME COUNTS
JULY 1968

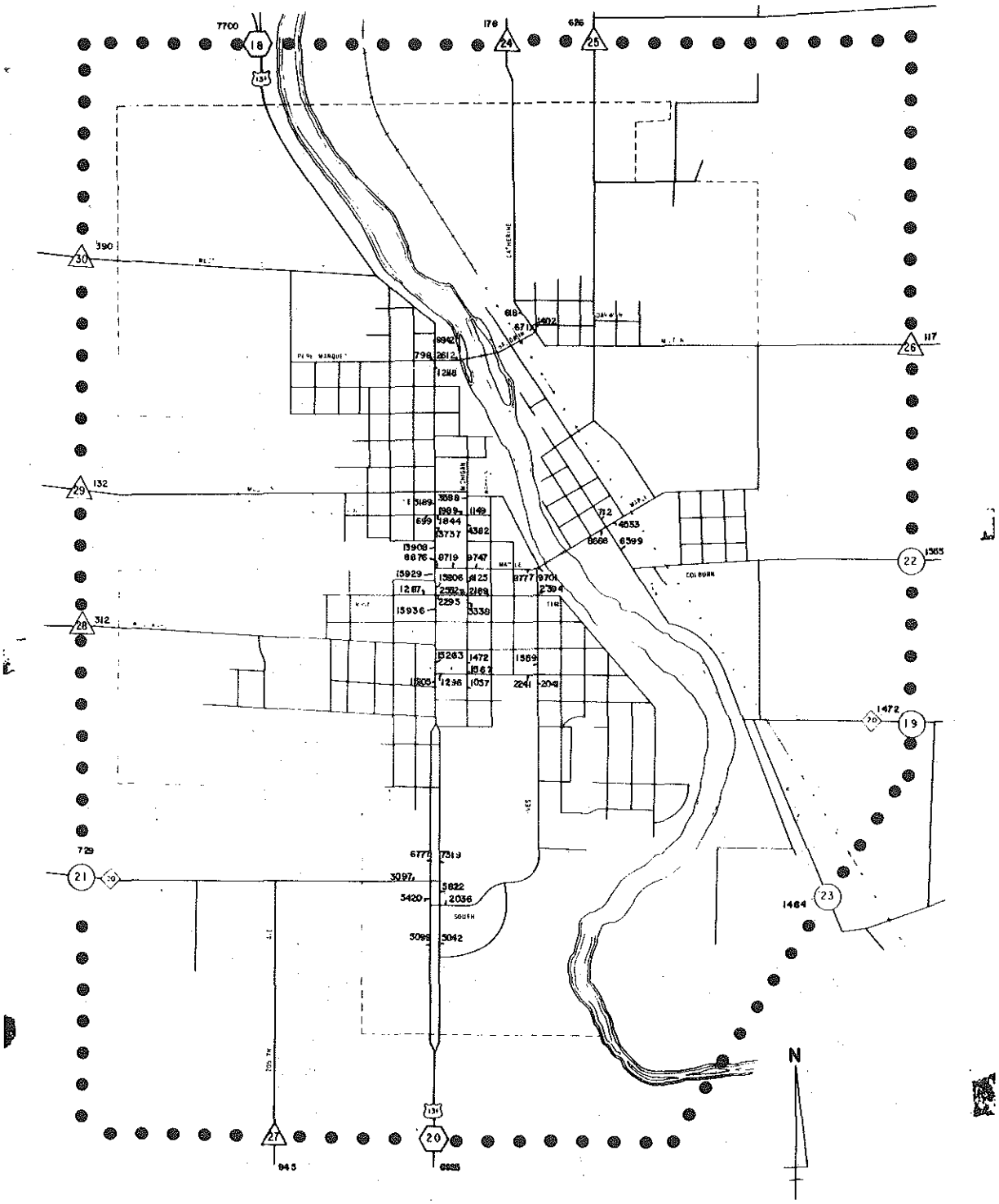
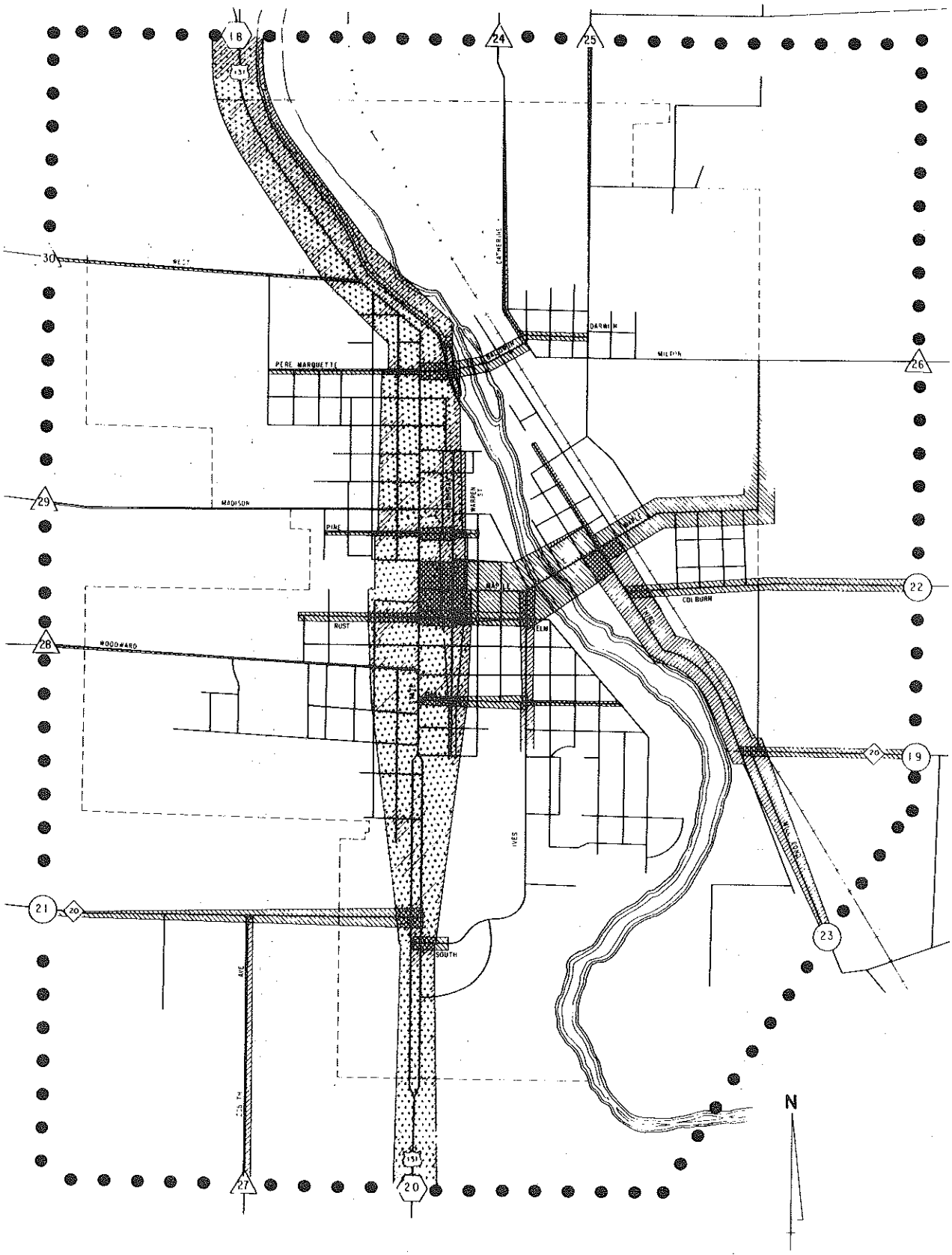


DIAGRAM NO. 2

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
TRAFFIC FLOW MAP
JULY 1968



LEGEND

- CORDON LINE
- (1) 24 HOUR INTERVIEW STATION
- (4) 16 HOUR INTERVIEW STATION
- △ STATION NOT OPERATED

VOLUME SCALE

DIAGRAM NO. 3

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

SUMMARY

Total Traffic

On an average July weekday in 1968, approximately 19,905 vehicles passed the six interview stations located on the federal aid primary and secondary highways serving Big Rapids. Of the 19,905 vehicles, 16,886 (84.8%) traveled on the state highways.

The traffic volume at each station is as follows:

Location	Station	Traffic	Percent of Total
US-131 - North - 0.8 Mi. North of West Ave.	18	7700	38.7
M-20 - East - 0.15 Mi. East of 190th Ave.	19	1472	7.4
US-131 - South - 1.0 Mi. South of S. Jct.M-20	20	6985	35.1
M-20 - West - 0.9 Mi. West of 205th Avenue	21	729	3.7
Colburn Avenue - 0.6 Mi. East of Big Rapids E.C.L.	22	1555	7.8
Mill Pond Road - 0.6 Mi. S.E. of M-20	23	1464	7.3
TOTAL ALL STATIONS		19,905	100.0%

COMPARISON OF BIG RAPIDS TRAFFIC WITH OTHER MICHIGAN COMMUNITIES

DATA COMPARED	CITIES		
	Big Rapids	Fremont	Petoskey
Month and Year of Survey	July, 1968	July & Aug., 1969	July, 1967
Population Year of Survey	15,800	4,880	7,430
Total Trips Per Day	16,176	12,833	18,775
Trips Per Person Population	1.02	2.63	2.53
Terminal Trips Per Day	12,447	11,160	13,599
Percent of Total Trips	76.9	87.0	72.4
Through Trips Per Day	3,729	1,673	5,176
Percent of Total Trips	23.1	13.0	27.6
Terminal Auto Trips Per Day	10,467	9,079	11,623
Percent of Total Trips	64.7	70.8	61.9
Terminal Truck Trips Per Day	1,980	2,081	1,976
Percent of Total Trips	12.3	16.2	10.5
Through Auto Trips Per Day	2,753	1,321	4,619
Percent of Total Trips	17.0	10.3	24.6
Through Truck Trips Per Day	976	352	557
Percent of Total Trips	6.0	2.7	3.0
Percent of Total Trips for Social-Recreation Purpose	28.4	30.7	35.9
Percent of Terminal Trips to Central Business District	13.8	20.8	36.4
Average Passenger Car Occupancy for Vehicles Owned Inside the Area	1.90	2.02	1.82
Average Passenger Car Occupancy for Vehicles Owned Outside the Area	2.02	1.97	2.33

Automobile and Truck Traffic

Automobiles account for 15,973 vehicles or 80.2 percent of the total traffic. The remaining 3,932 vehicles are trucks of which 3,134, or 15.7 percent of the total traffic, are single unit trucks.

The traffic volume by vehicle type at each station is listed below:

Location	Station	Auto & Taxi Vehicles	%	Single Unit Vehicles	%	Trailer Comb. Vehicles	%
US-131 North	18	6055	78.6	1284	16.7	361	4.7
M-20 East	19	1242	84.4	193	13.1	37	2.5
US-131 South	20	5556	79.5	1060	15.2	369	5.3
M-20 West	21	576	79.0	149	20.4	4	0.6
Colburn Avenue	22	1304	83.9	234	15.0	17	1.1
Mill Pond Road	23	1240	84.7	214	14.6	10	0.7
		15,973	80.2%	3,134	15.7%	798	4.1%

EXTERNAL STATION TRAFFIC
BY
HIGH ONE-HOUR, TWO-HOUR AND THREE-HOUR PERIODS

Sta. No.	One Hour Time	One Hour Volume	One Hour %	Two Hour Time	Two Hour Volume	Two Hour %	Three Hour Time	Three Hour Volume	Three Hour %
18	1-2P	612	7.8	12N-2P	1136	14.6	11A-2P	1745	22.4
19	5-6P	150	10.6	4-6P	264	18.6	3-6P	389	27.4
20	3-4P	526	7.7	2-4P	1010	14.8	3-6P	1499	22.0
21	10-11A	98	12.1	10-12N	187	23.1	10A-1P	245	30.3
22	3-4P	176	9.8	3-5P	307	17.0	3-6P	470	26.1
23	5-6P	147	9.5	4-6P	269	17.4	4-7P	362	23.4

The above table summarizes the traffic movement at each external station during the high one-hour, two-hour and three-hour periods. For each period, the table shows the traffic volume, its percentage of the station total and time of occurrence. The largest external traffic movement for all stations combined (4,527 vehicles or 22.4%) occurred during the afternoon between 3:00 PM and 6:00 PM. The highest one-hour period for all stations (1,545 vehicles or 7.7%) was from 5:00 PM - 6:00 PM. The highest two-hour period for all stations (3,029 vehicles or 15.0%) occurred during the afternoon between 4:00 PM and 6:00 PM.

TRIP MOVEMENTS

The diagram on page 21 graphically shows the through traffic movement. The following tables are a consolidation of the through and terminal traffic by vehicle type and by trip purpose. Of the total numbers of trips made, 3,729 (23.1%) were through trips, and 12,447 (76.9%) were terminal trips. A through vehicle is counted twice. It is counted at both its entering and departing stations.

The table shows that more than 8 out of 10 vehicles were autos. Nearly 5 out of 10 through trips were made for the purpose of social-recreation. More than 4 out of 10 terminal trips (5,337 trips) were made for the purpose of work. Work and social-recreation accounted for 69.8 percent of the total traffic movement. All trips not listed under work, business, or shopping that were made for other purposes are included under social-recreation.

THROUGH AND TERMINAL TRAFFIC BY VEHICLE TYPE

Vehicle Type	Through Traffic Number of Trips	Through Traffic Percent	Terminal Traffic Number of Trips	Terminal Traffic Percent	Total Traffic Number of Trips	Total Traffic Percent
Auto	2,753	73.8	10,467	84.1	13,220	81.7
Single Unit Truck	659	17.7	1,816	14.6	2,475	15.3
Trailer Comb. Truck	317	8.5	164	1.3	481	3.0
Totals	3,729	100.0	12,447	100.0	16,176	100.0
Percent of Totals	23.1		76.9		100.0	

THROUGH AND TERMINAL TRAFFIC BY TRIP PURPOSE

Trip Purpose	Through Traffic Number of Trips	Through Traffic Percent	Terminal Traffic Number of Trips	Terminal Traffic Percent	Total Traffic Number of Trips	Total Traffic Percent
Work	1,367	36.6	5,337	42.9	6,704	41.4
Business	461	12.4	2,432	19.5	2,893	17.9
Shopping	86	2.3	1,904	15.3	1,990	12.3
Social-Recreation	1,815	48.7	2,774	22.3	4,589	28.4
Totals	3,729	100.0	12,447	100.0	16,176	100.0
Percent of Totals	23.1		76.9		100.0	

PASSENGER CAR OCCUPANCY

Separate tabulations were made for vehicles owned inside the study area and those owned outside the area. The first table shows the average occupancy of passenger cars owned by area residents making trips that crossed the cordon line. The second table shows the average occupancy of passenger cars owned by non-residents and garaged outside the study area making trips that crossed the cordon line. The tabulations use the driver's trip purpose and includes him in the occupancy count.

About half of all person travel is accounted for by the driver of the car. Of the principal purpose categories, social-recreation had the greatest number of passengers. This is expected since social-recreation is most often a family oriented activity. The average auto occupancy rate for vehicles owned outside the area are higher. The longer trip lengths that can be expected may influence the auto occupancy rate.

PASSENGER CAR OCCUPANCY TABLE

VEHICLES OWNED INSIDE THE AREA

TO-Purpose Of Trip	Number of Vehicles	% of Vehicles	Number of Occupants	Average Occupants
WORK	904	29.1	1220	1.35
BUSINESS	755	24.3	1314	1.74
SHOPPING	242	7.8	557	2.30
SOCIAL-REC.	1204	38.8	2817	2.34
SUB-TOTAL	3105	100.0	5908	1.90

VEHICLES OWNED OUTSIDE THE AREA

WORK	3601	35.6	5293	1.47
BUSINESS	1841	18.2	3516	1.91
SHOPPING	1588	15.7	3509	2.21
SOCIAL-REC.	3085	30.5	8083	2.62
SUB-TOTAL	10115	100.0	20401	2.02

3105	23.5	5908	1.90
10115	76.5	20401	2.02
TOTAL 13220	100.0	26309	1.99

TOTAL TRAFFIC AND THROUGH TRAFFIC INTERCHANGE

Desire line diagram No. 4 shows the total traffic passing each station and the station interchange of through traffic. The 7,458 through vehicles consist of only 3,729 through trips as each vehicle is counted at both its entering and departing stations. The 7,458 through vehicles represent 37.5 percent of the 19,905 total vehicles passing the six interview stations.

The largest through traffic movement is the 3,036 north-south movement on US-131 interchanging between Stations 18 and 20.

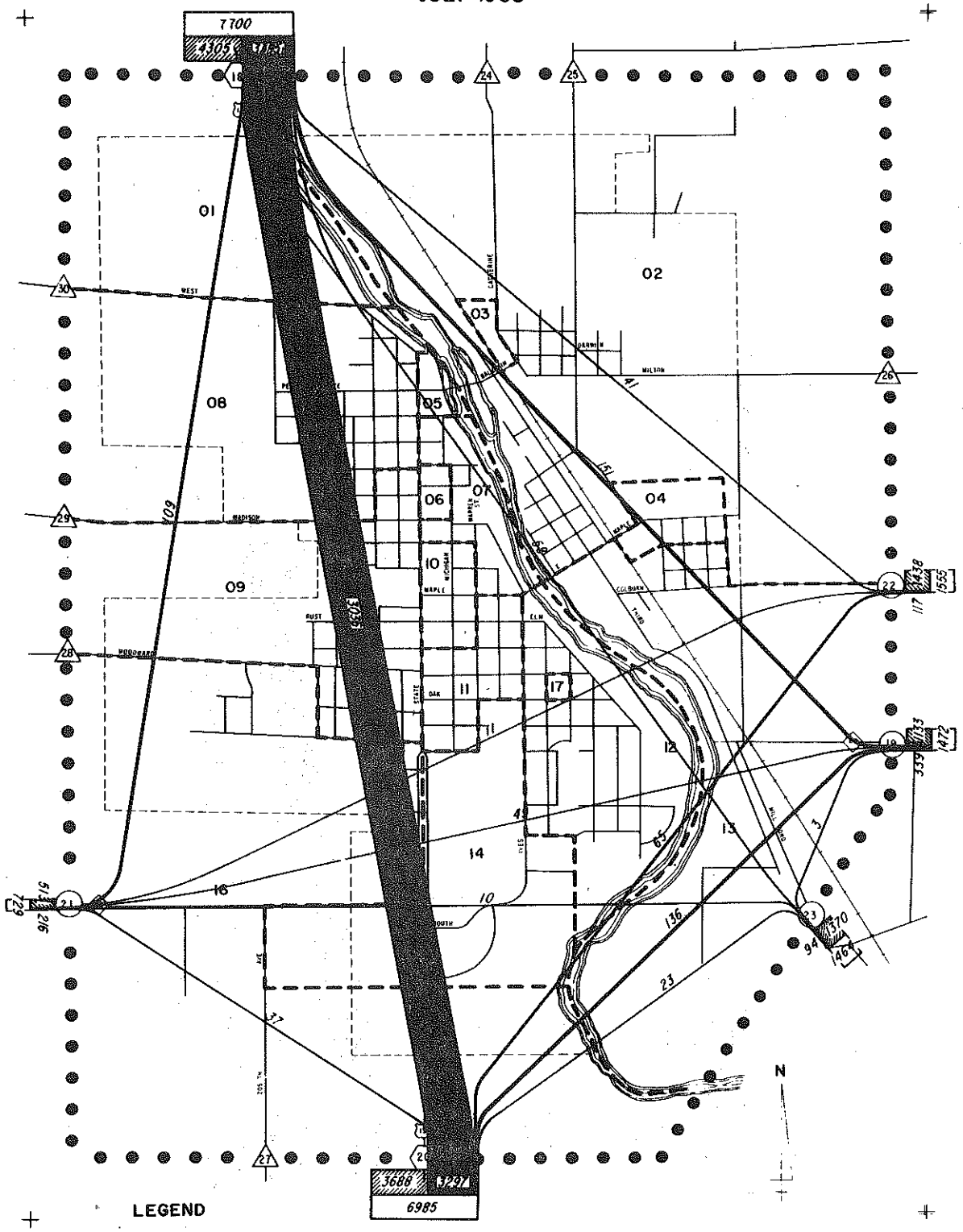
Station 18 (US-131 North) has the largest traffic flow with 7,700 vehicles per day or 38.7 percent of the total traffic.

The following table shows the station interchange of through traffic, the terminal and total traffic passing each station:

TOTAL TRAFFIC AND THROUGH TRAFFIC INTERCHANGE

US-131-NORTH STATION 18	M-20-EAST STATION 19	US-131-SOUTH STATION 20	M-20-WEST STATION 21	COLBURN AVE. STATION 22	MILL POND ROAD STATION 23	TOTAL TRAFFIC ALL STATIONS	TOTAL THROUGH TRIPS 3729
151							
3036	156						
109	48	37					
41	0	65	11				
83	3	23	10	0			
3395	839	3297	216	117	94	7458	THROUGH
4305	1133	3688	513	1438	1370	12447	TERMINAL
7700	1472	6985	729	1555	1464	19905	TOTAL
38.7	7.4	35.1	3.7	7.8	7.3	100.0	PERCENT

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- 24 HOUR STATION
- 16 HOUR STATION
- STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

THROUGH TRAFFIC INTERCHANGE OF TOTAL DRIVER TRIPS

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

DIAGRAM NO. 4

TOTAL AUTO TRAFFIC AND AUTO THROUGH TRAFFIC INTERCHANGE

Desire line diagram No. 5 shows the total auto traffic passing each station and the station interchange of through auto traffic. The 5,506 through autos consist of only 2,753 through auto trips as each vehicle is counted at both its entering and departing stations. The 5,506 through autos represents 34.5 percent of the total auto traffic of 15,973 autos passing the six interview stations.

The heaviest through auto traffic movement is the 2,217 north-south trips on US-131 interchanging between Stations 18 and 20.

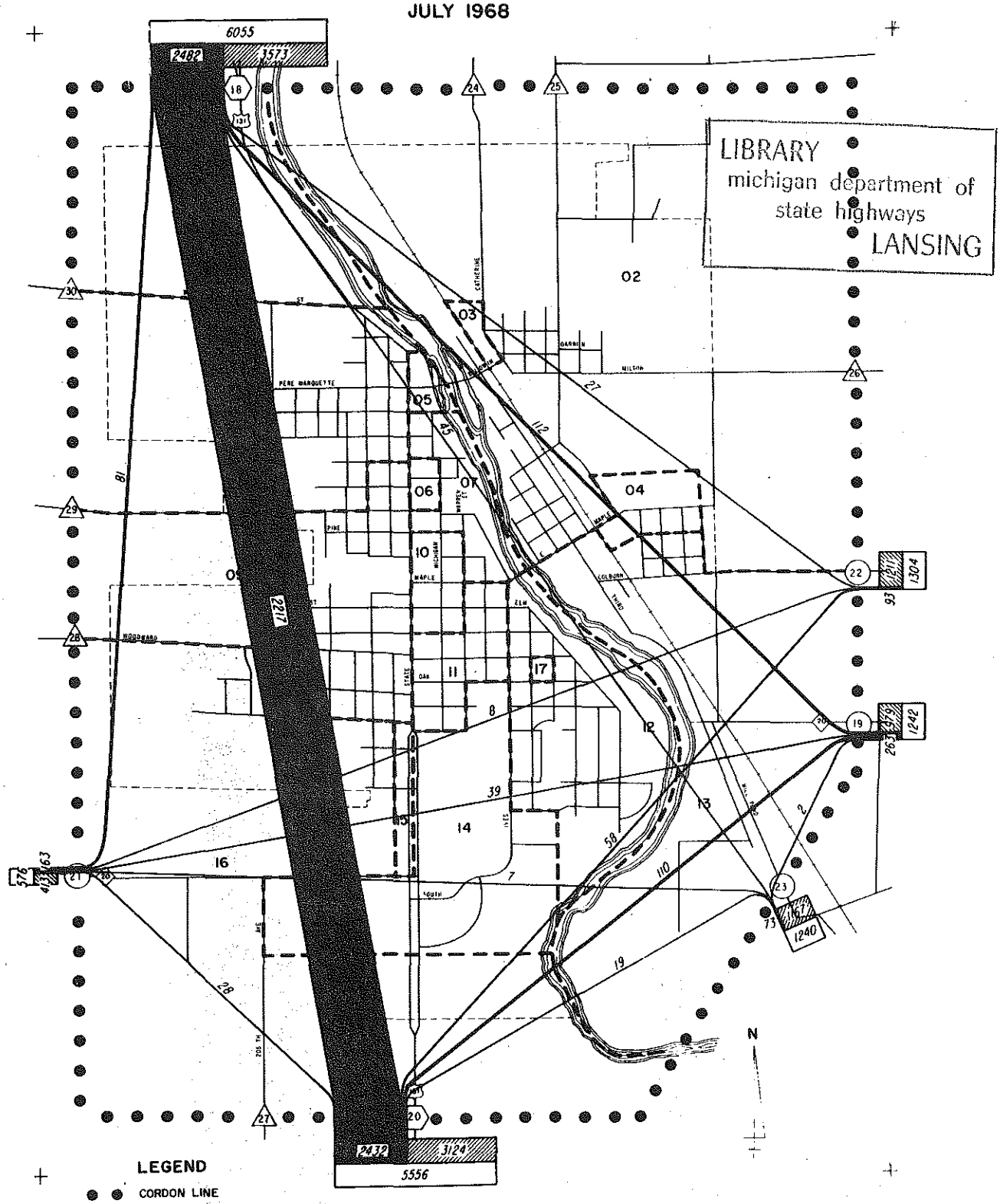
Station 18 has the largest total auto traffic flow of 6,055 autos or 37.9 percent of the total auto traffic.

The following table shows the station interchange of through auto traffic, the terminal and total auto traffic passing each station:

TOTAL AUTO TRAFFIC AND AUTO THROUGH TRAFFIC INTERCHANGE

US-131-NORTH STATION 18	M-20-EAST STATION 19	US-131-SOUTH STATION 20	M-20-WEST STATION 21	COLBURN AVE STATION 22	MILL POND ROAD STATION 23	TOTAL ALL TRAFFIC STATIONS	TOTAL THROUGH TRIPS 2753
112							
227	110						
81	39	28					
27	0	58	8				
45	2	19	7	0			
2432	263	2432	163	93	73	5506	THROUGH
3573	979	3124	413	1211	1167	10467	TERMINAL
8055	1242	5556	576	1304	1240	15973	TOTAL
37.9	7.8	34.8	3.6	8.1	7.8	100.0	PERCENT

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



MICHIGAN DEPARTMENT OF STATE HIGHWAYS

DIAGRAM NO. 5

TOTAL SINGLE UNIT TRUCK TRAFFIC AND SINGLE UNIT TRUCK THROUGH TRAFFIC INTERCHANGE

Desire line diagram No. 6 shows the total single unit truck traffic passing each station and the station interchange of through single unit truck traffic. The 1318 through single unit trucks consist of only 659 through single unit truck trips as each vehicle is counted at both its entering and departing stations. The 1318 through single unit truck trips represents 42.1 percent of the total single unit truck traffic of 3134 single unit trucks passing the six interview stations.

The heaviest through single unit truck traffic movement is the 516 north-south trips on US-131 interchanging between stations 18 and 20.

Station 18 has the largest total single unit truck traffic flow of 1284 single unit trucks or 41.0 percent of the total single unit truck traffic.

The following table shows the station interchange of through single unit truck traffic, the terminal and total single unit truck traffic passing each station:

AND SINGLE UNIT TRUCK
THROUGH TRAFFIC INTERCHANGE

US-131-NORTH STATION 18	M-20-EAST STATION 19	US-131-SOUTH STATION 20	M-20-WEST STATION 21	COLBURN AVE STATION 22	MILL POND ROAD STATION 23	TOTAL TRAFFIC ALL STATIONS	TOTAL THROUGH TRIPS 659
33							
3.3	23						
26	10	9					
14.0	0	6	2				
12	1	4	3	0			
601	67	558	50	22	20	1318	THROUGH
683	126	502	99	212	194	1816	TERMINAL
1284	193	1060	149	234	214	3134	TOTAL
41.0	6.2	33.8	4.7	7.5	6.8	100.0	PERCENT

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968

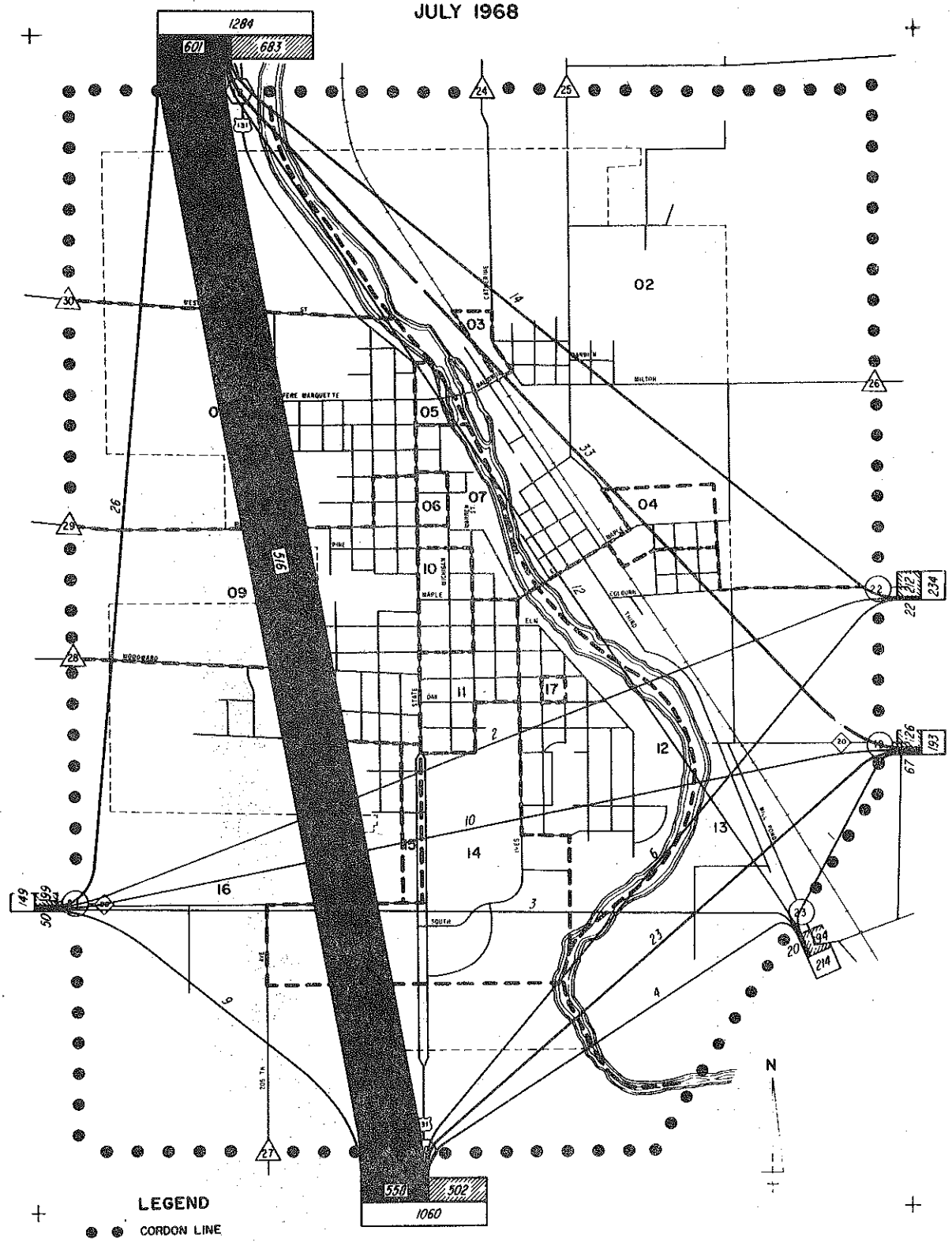


DIAGRAM NO. 6

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

TOTAL TRAILER COMBINATION TRUCK TRAFFIC AND TRAILER COMBINATION TRUCK THROUGH TRAFFIC INTERCHANGE

Desire line diagram No. 7 shows the total trailer combination truck traffic passing each station and the station interchange of through trailer combination truck traffic. The 634 through trailer combination trucks consist of only 317 through trailer combination truck trips as each vehicle is counted at both its entering and departing stations. The 634 through trailer combination trucks represents 79.4 percent of the total trailer combination traffic of 798 trailer combination trucks passing the six interview stations.

The heaviest through trailer combination truck movement is the 303 north-south trips on US-131 interchanging between Stations 18 and 20.

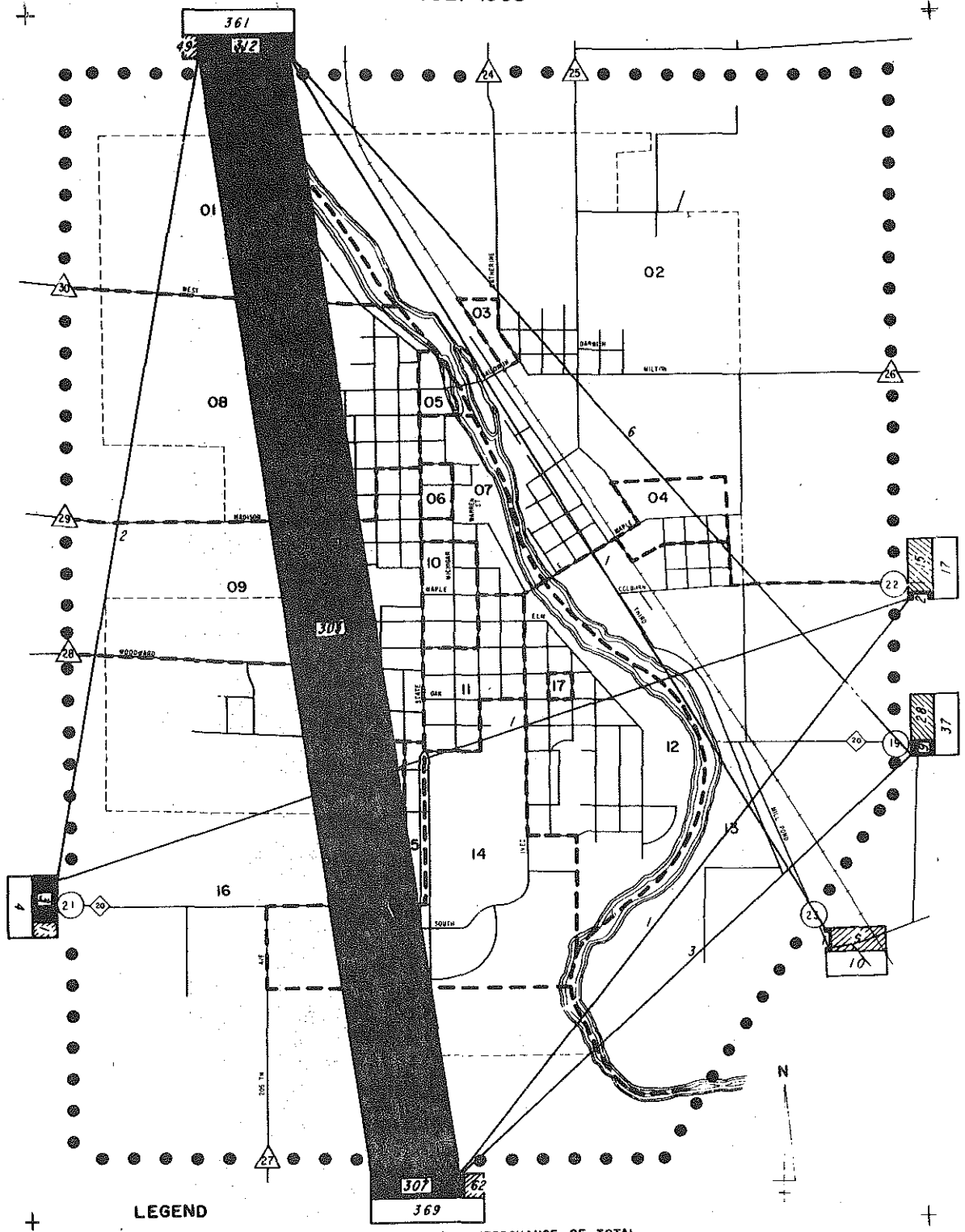
Station 20 has the largest total trailer combination truck traffic flow of 369 trailer combination trucks or 46.2 percent of the total trailer combination truck traffic.

The following table shows the station interchange of through trailer combination truck traffic, the terminal and total trailer combination truck traffic passing each station:

TOTAL TRAILER COMB. TRAFFIC AND TRAILER COMB. THROUGH TRAFFIC INTERCHANGE

US-131-NORTH STATION 18	M-20- EAST STATION 19	US-131-SOUTH STATION 20	M-20- WEST STATION 21	COLBURN AVE. STATION 22	MILL POND ROAD STATION 23	TOTAL TRAFFIC ALL STATIONS	TOTAL THRCUGH TRIPS 317
6							
303	3						
2	0	0					
0	0	1	1				
1	0	0	0	0			
312	9	307	3	2	1	634	THROUGH
49	28	62	1	15	9	164	TERMINAL
361	37	369	4	17	10	798	TOTAL
45.2	4.7	46.2	0.5	2.1	1.3	100.0	PERCENT

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- 24 HOUR STATION
- 16 HOUR STATION
- STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

THROUGH TRAFFIC INTERCHANGE OF TOTAL COMBINATION TRUCK DRIVER TRIPS

SCALE 0 25 50 75 1 MILE

DIAGRAM NO. 7

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

TERMINAL TRAFFIC DISTRIBUTION BY INTERNAL ZONE AND STATION TOTAL DRIVER TRIPS

The 12,447 total driver trips have terminals in zones as designated on the following page and desire line diagram Nos. 8, 9, 10, 11, 12, & 13.

Approximately 77.4 percent of the vehicles making a trip into or out of the study area passed through the four trunkline stations.

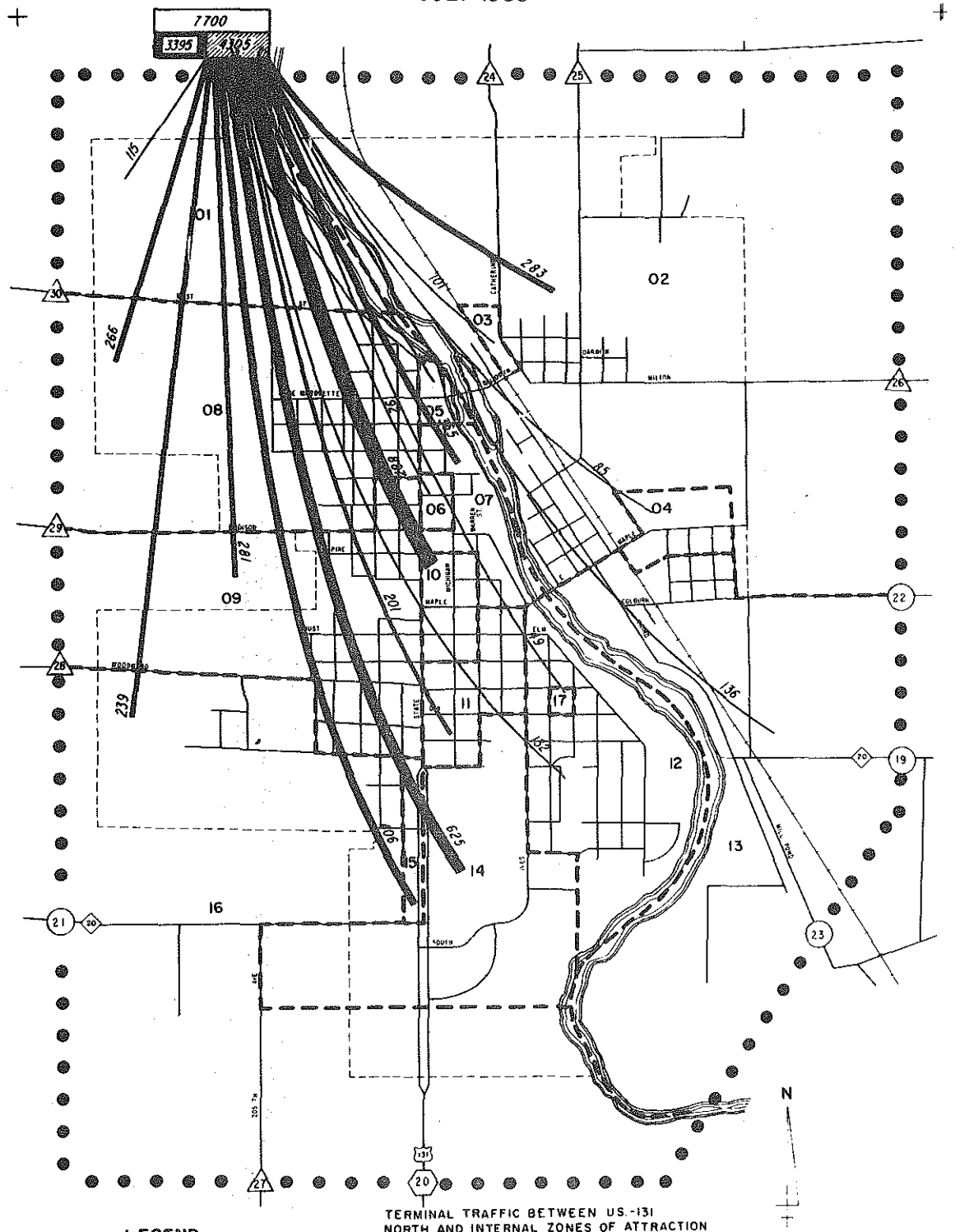
The central business district, zone 10, is origin or destination of 2,231 (17.9%) of the 12,447 terminal trips. Zone 14, containing Ferris State College, is second highest with 2,055 (16.5%) trips.

TERMINAL TRAFFIC DISTRIBUTION
BY INTERNAL ZONE AND STATION
TOTAL DRIVER TRIPS

Entering or Departing Stations

Internal Zone	Zone Totals	US-131 North Sta.18	M-20 East Sta.19	US-131 South Sta.20	M-20 West Sta.21	Colburn Avenue Sta.22	Mill Pond Road Sta.23	Percent of Total
1	228	115	14	51	4	20	24	1.8
2	715	283	75	156	38	79	84	5.7
3	388	101	19	53	7	132	76	3.1
4	379	85	39	88	15	80	72	3.1
5	168	52	17	40	7	28	24	1.4
6	222	92	15	43	13	8	51	1.8
7	851	355	70	236	27	71	92	6.8
8	951	266	100	172	34	238	141	7.6
9	672	281	67	200	23	33	68	5.4
10	2231	887	219	611	88	209	217	17.9
11	621	201	55	224	17	65	59	5.0
12	333	132	39	87	10	21	44	2.7
13	554	136	72	132	18	94	102	4.5
14	2055	625	166	869	95	153	147	16.5
15	1128	406	81	343	67	130	101	9.1
16	711	239	59	295	36	44	38	5.7
17	240	49	26	88	14	33	30	1.9
TOTAL	12,447	4,305	1,133	3,688	513	1,438	1,370	
PERCENT		34.6	9.1	29.6	4.1	11.6	11.0	100.0

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



TERMINAL TRAFFIC BETWEEN US.-131 NORTH AND INTERNAL ZONES OF ATTRACTION TOTAL DRIVER TRIPS.

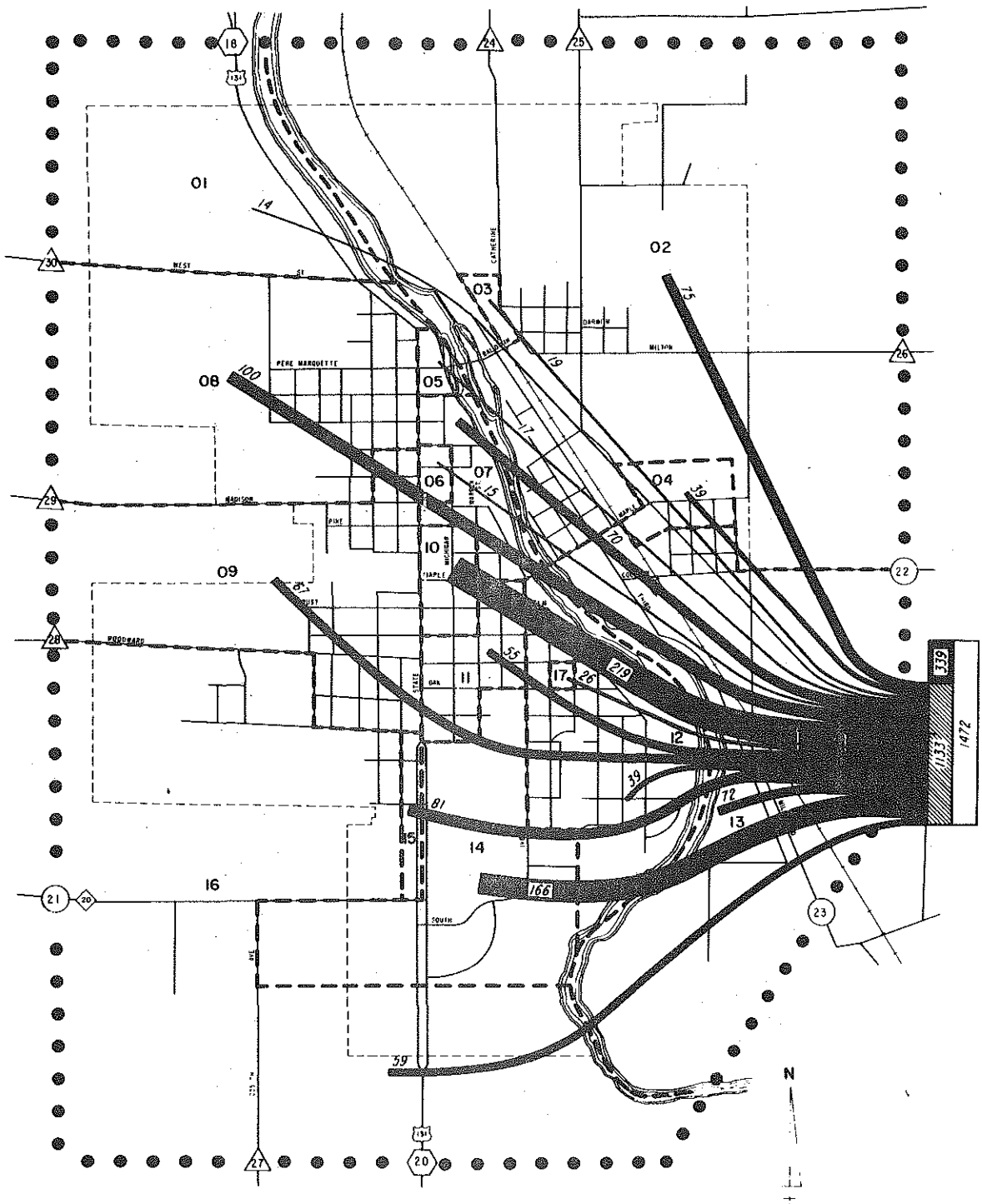
LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- (1) 24 HOUR STATION
- (6) 16 HOUR STATION
- STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

DIAGRAM NO. 8

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- (1) 24 HOUR STATION
- (6) 16 HOUR STATION
- (7) STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

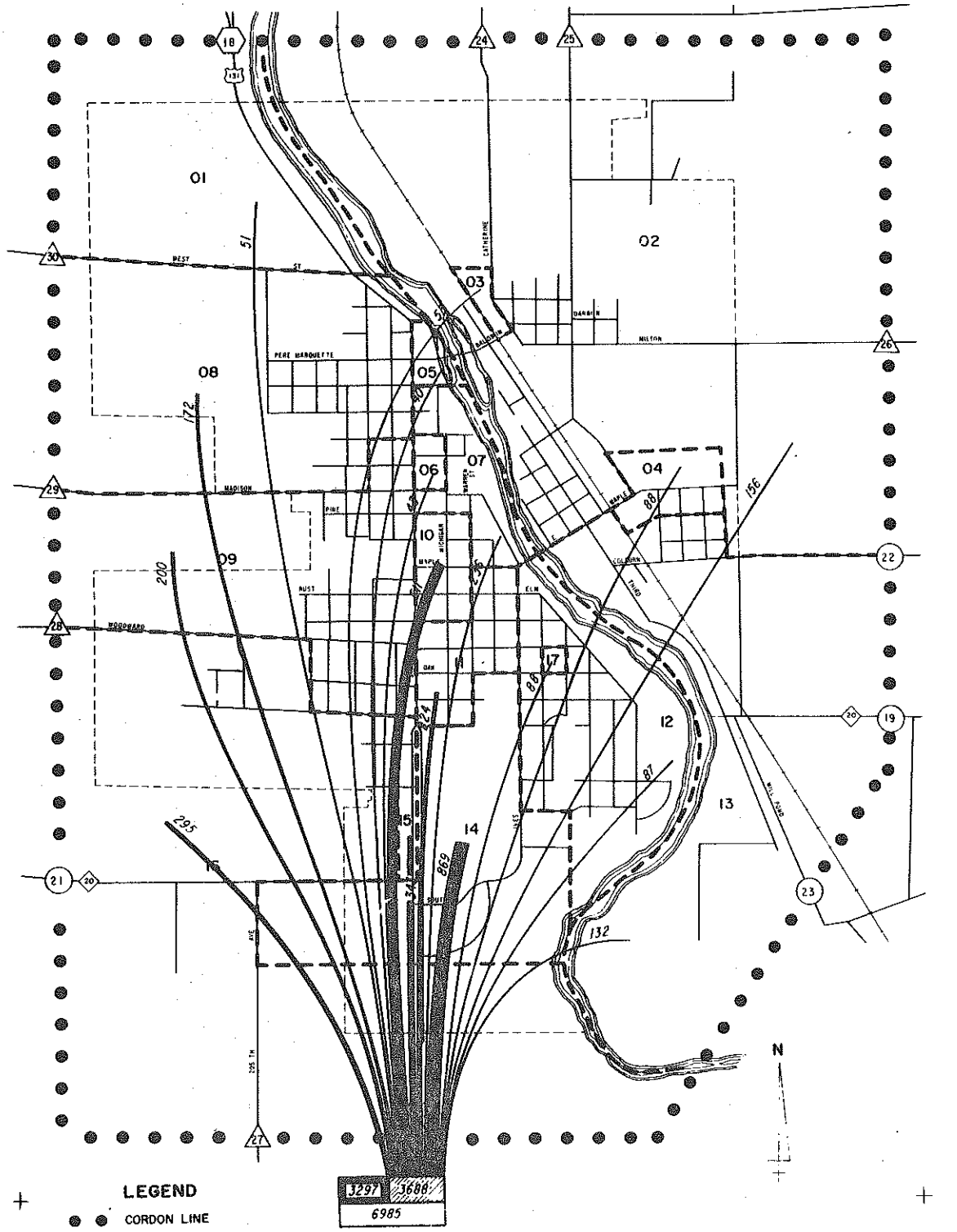
TERMINAL TRAFFIC BETWEEN M-20 EAST AND
INTERNAL ZONES OF ATTRACTION
TOTAL DRIVER TRIPS

SCALE
0 25 50 75 1 MILE

DIAGRAM NO. 9

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- (1) 24 HOUR STATION
- (6) 16 HOUR STATION
- (7) STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

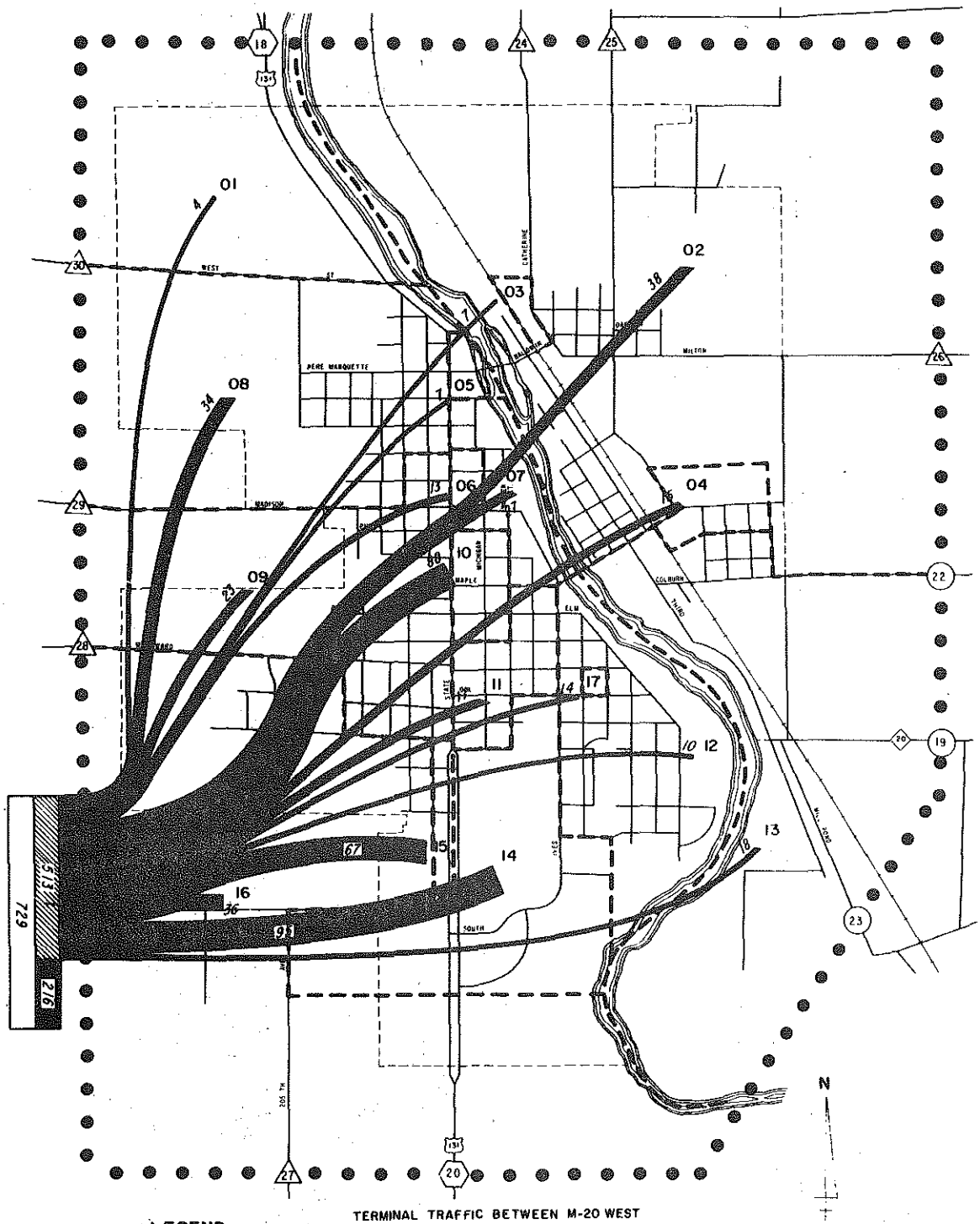
TERMINAL TRAFFIC BETWEEN US-131 SOUTH AND INTERNAL ZONES OF ATTRACTION
TOTAL DRIVER TRIPS

SCALE
0 25 50 75 1 MILE

DIAGRAM NO.10

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



TERMINAL TRAFFIC BETWEEN M-20 WEST
AND INTERNAL ZONES OF ATTRACTION
TOTAL DRIVER TRIPS

LEGEND

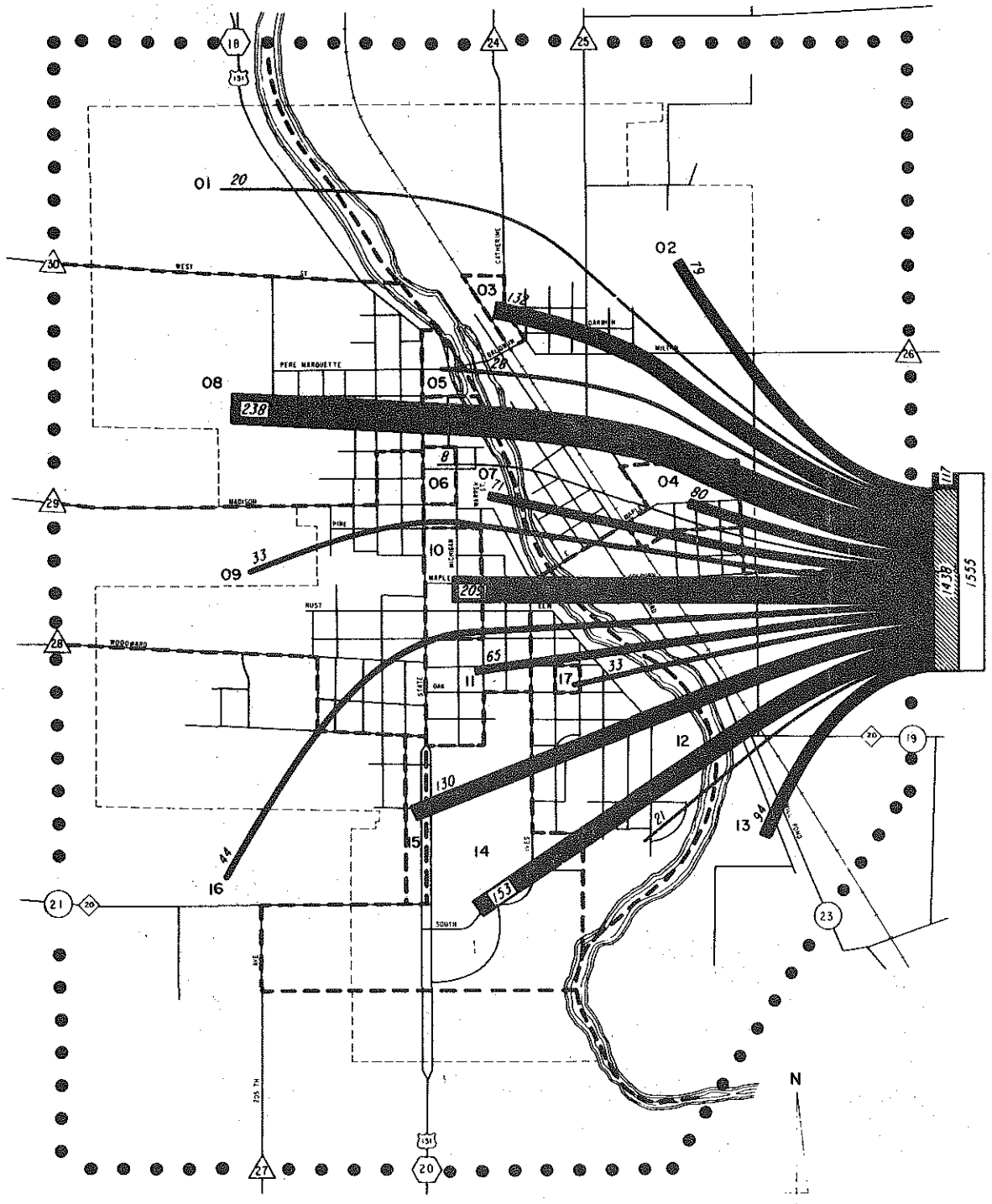
- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- (1) 24 HOUR STATION
- (6) 16 HOUR STATION
- STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

SCALE
0 25 50 75 1 MILE

DIAGRAM NO. 11

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- (1) 24 HOUR STATION
- (6) 16 HOUR STATION
- (7) STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

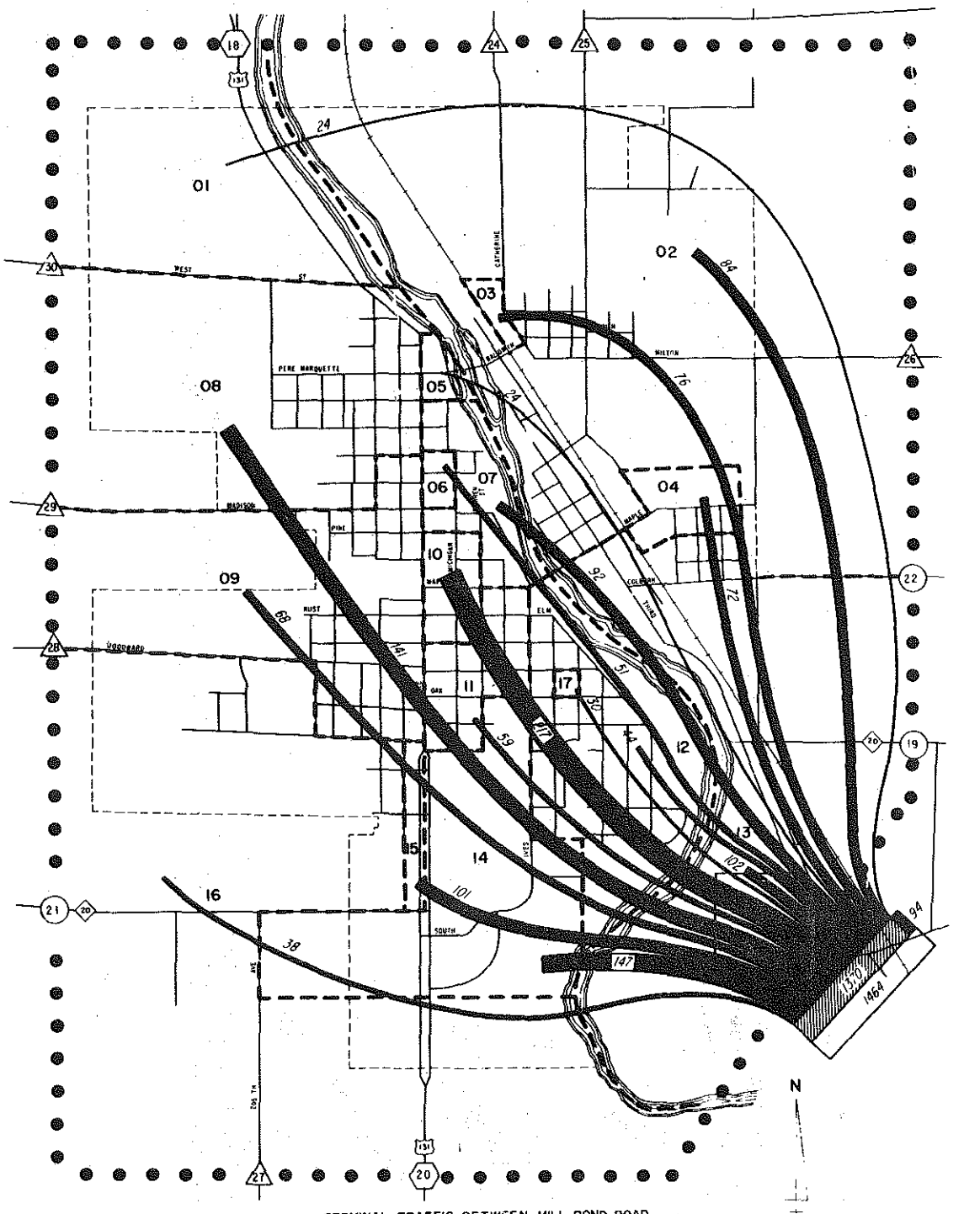
TERMINAL TRAFFIC BETWEEN COLBURN AVENUE AND INTERNAL ZONES OF ATTRACTION
TOTAL DRIVER TRIPS

SCALE
0 25 50 75 1 MILE

DIAGRAM NO. 12

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

BIG RAPIDS
EXTERNAL ORIGIN-DESTINATION SURVEY
JULY 1968



TERMINAL TRAFFIC BETWEEN MILL POND ROAD
AND INTERNAL ZONES OF ATTRACTION
TOTAL DRIVER TRIPS

LEGEND

- CORDON LINE
- O-D ZONE BOUNDARY
- 06 ZONE NUMBER
- (1) 24 HOUR STATION
- (6) 16 HOUR STATION
- (A) STATION NOT OPERATED
- TOTAL TRIPS
- THROUGH TRIPS
- TERMINAL TRIPS

DIAGRAM NO. 13

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

TERMINAL TRAFFIC DISTRIBUTION BY INTERNAL ZONE AND STATION AUTO DRIVER TRIPS

The 10,467 total auto driver trips have terminals in zones as designated in the table. Approximately 64 percent of the terminal auto trips passed through Stations 18 and 20.

Ferris State College, zone 14, is origin or destination of 1,866 (17.8%) of the 10,467 terminal auto trips. Zone 10, the central business district, is second with 1,855 (17.7%) trips.

TERMINAL TRAFFIC DISTRIBUTION
BY INTERNAL ZONE AND STATION
AUTO DRIVER TRIPS

Entering or Departing Stations

Internal Zone	Zone Totals	US-131 North Sta.18	M-20 East Sta.19	US-131 South Sta.20	M-20 West Sta.21	Colburn Avenue Sta.22	Mill Pond Road Sta.23	Percent of Total
1	141	62	10	30	4	17	18	1.3
2	586	234	63	136	24	59	70	5.6
3	327	73	16	41	7	128	62	3.1
4	247	67	17	63	9	47	44	2.4
5	125	39	10	33	5	20	18	1.2
6	190	83	7	39	9	7	45	1.8
7	729	297	61	205	22	63	81	7.0
8	807	222	82	139	30	202	132	7.7
9	571	228	62	170	18	28	65	5.5
10	1855	737	193	495	73	180	177	17.7
11	575	185	52	203	16	62	57	5.5
12	298	107	38	82	9	20	42	2.8
13	312	62	51	74	7	60	58	3.0
14	1866	565	161	795	79	124	142	17.8
15	991	354	74	299	55	117	92	9.5
16	626	213	56	247	32	44	34	6.0
17	221	45	26	73	14	33	30	2.1
Total	10,467	3,573	979	3,124	413	1,211	1,167	
Percent		34.1	9.4	29.9	3.9	11.6	11.1	100.00

TERMINAL TRAFFIC DISTRIBUTION BY INTERNAL ZONE AND STATION
SINGLE UNIT TRUCK TRIPS

The 1,816 total single unit truck driver trips have terminals in zones as designated in the table. Approximately 37.6 percent of the single unit trucks making terminal trips pass Station 18 on US-131 North.

Approximately 19 percent of the 1,816 single unit trucks have a terminal in zone 10 (CBD). Zone 13 has 11.4 percent of the total terminal single unit truck trips as compared to only 3.0 percent of the terminal auto driver trips and 4.5 percent of all terminal traffic. This is due to the land use activity in this zone which is largely commercial with some manufacturing.

TERMINAL TRAFFIC DISTRIBUTION
BY INTERNAL ZONE AND STATION
SINGLE UNIT TRUCK TRIPS

Entering or Departing Stations

Internal Zone	Zone Totals	US-131 North Sta.18	M-20 East Sta.19	US-131 South Sta.20	M-20 West Sta.21	Colburn Avenue Sta.22	Mill Pond Road Sta.23	Percent of Total
1	87	53	4	21	0	3	6	4.8
2	122	47	11	16	14	20	14	6.7
3	59	28	2	12	0	3	14	3.3
4	103	18	5	24	6	23	27	5.7
5	40	12	7	5	2	8	6	2.2
6	29	9	7	2	4	1	6	1.6
7	106	53	9	21	5	8	10	5.8
8	141	44	18	31	4	36	8	7.8
9	95	51	5	26	5	5	3	5.2
10	343	134	25	101	15	29	39	18.9
11	44	15	3	20	1	3	2	2.4
12	35	25	1	5	1	1	2	1.9
13	207	61	15	50	11	30	40	11.4
14	189	60	5	74	16	29	5	10.4
15	115	44	6	33	11	13	8	6.3
16	82	25	3	46	4	0	4	4.5
17	19	4	0	15	0	0	0	1.1
TOTAL	1,816	683	126	502	99	212	194	
PERCENT		37.6	6.9	27.6	5.5	11.7	10.7	100.0

TERMINAL TRAFFIC DISTRIBUTION BY INTERNAL ZONE AND STATION
TRAILER COMBINATION TRUCK TRIPS

The 164 total trailer combination truck driver trips have terminals in zones as designated in the table. Approximately 38 percent of the trailer combination trucks making terminal trips pass Station 20 on US-131 South.

Zones 4, 10, 13, and 15 account for 119 (72.6%) terminal trailer combination truck trips. Zone 4 is primarily manufacturing while the others are mainly commercial in nature.

TERMINAL TRAFFIC DISTRIBUTION
BY INTERNAL ZONE AND STATION
TRAILER COMBINATION TRIPS

Entering or Departing Stations

Internal Zone	Zone Totals	M-131 North Sta.18	M-20 East Sta.19	US-131 South Sta.20	M-20 West Sta.21	Colburn Avenue Sta.22	Mill Pond Road Sta.23	Percent of Total
1	0	0	0	0	0	0	0	0.0
2	7	2	1	4	0	0	0	4.3
3	2	0	1	0	0	1	0	1.2
4	29	0	17	1	0	10	1	17.7
5	3	1	0	2	0	0	0	1.8
6	3	0	1	2	0	0	0	1.8
7	16	5	0	10	0	0	1	9.8
8	3	0	0	2	0	0	1	1.8
9	6	2	0	4	0	0	0	3.7
10	33	16	1	15	0	0	1	20.1
11	2	1	0	1	0	0	0	1.2
12	0	0	0	0	0	0	0	0.0
13	35	13	6	8	0	4	4	21.4
14	0	0	0	0	0	0	0	0.0
15	22	8	1	11	1	0	1	13.4
16	3	1	0	2	0	0	0	1.8
17	0	0	0	0	0	0	0	0.0
TOTAL	164	49	28	62	1	15	9	
PERCENT		29.9	17.1	37.8	0.6	9.1	5.5	100.0

STATION 18
(US-131 NORTH)
THROUGH AND TERMINAL TRAFFIC
BY VEHICLE TYPE
BY TRIP PURPOSE

A total of 7,700 vehicles passed through Station 18 on US-131 North of Big Rapids. Tabulations on the following pages give a detailed analysis of this traffic.

Approximately 56 percent of the vehicles had a terminal inside the study area. Eight of every 10 vehicles were autos, whether they traveled into or through the area.

More than 16 out of every 100 vehicles were single unit trucks. Less than 5 out of every 100 vehicles were trailer combination trucks.

The largest through traffic movement at this station is the 3,036 (89.4%) vehicles interchanging with Station 20 on US-131 South. Of these 3,036 vehicles, 819 are trucks of which 5 out of 8 are single unit trucks.

The heaviest terminal traffic movements are to and from Zone 10 (The Central Business District) and Zone 14 (Ferris State College).

Approximately 7 out of 10 trips passing through the station were made for the purpose of work or social-recreation. Five out of 10 through trips were made for the purpose of social-recreation. Four out of 10 terminal trips were for the purpose of work.

Approximately half of the trips interchanging with Station 20 on US-131 South were for the purpose of social-recreation.

The largest terminal trip movements by purpose were the 368 work trips to Zone 14 (Ferris State College) and 286 work trips to Zone 10 (The Central Business District).

1. Total Traffic Through Station 18 By Vehicle Type

Through	Terminal	Total	
3395	4305	7700	Vehicles
44.1	55.9	100.0	Percent of Total

Auto	Truck		
	Single Unit	Trailer Combination	
6055	1284	361	Vehicles
78.6	16.7	4.7	Percent of Total

A. Through Traffic: 3395 Vehicles

Auto	Truck		
	Single Unit	Trailer Combination	
2482	601	312	Vehicles
73.1	17.7	9.2	Percent of Total

B. Terminal Traffic: 4305 Vehicles

Auto	Truck		
	Single Unit	Trailer Combination	
3573	683	49	Vehicles
83.0	15.9	1.1	Percent of Total

C. Through Traffic Interchange of 3395 Vehicles

Station	Autos	Truck		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
19	112	33	6	151	4.5
20	2217	516	303	3036	89.4
21	81	26	2	109	3.2
22	27	14	0	41	1.2
23	45	12	1	58	1.7
Total	2482	601	312	3395	100.0

D. Terminal Traffic Distribution of 4305 Vehicles

Zone	Autos	Truck		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
1	62	53	0	115	2.7
2	234	47	2	283	6.6
3	73	28	0	101	2.3
4	67	18	0	85	2.0
5	39	12	1	52	1.2
6	83	9	0	92	2.1
7	297	53	5	355	8.2
8	222	44	0	266	6.2
9	228	51	2	281	6.5
10	737	134	16	887	20.6
11	185	15	1	201	4.7
12	107	25	0	132	3.1
13	62	61	13	136	3.2
14	565	60	0	625	14.5
15	354	44	8	406	9.4
16	213	25	1	239	5.6
17	45	4	0	49	1.1
Total	3573	683	49	4305	100.0

2. Total Traffic Through Station 18 By Trip Purpose

Work	Business	Shopping	Social-Recreation	Total	
3034	1366	813	2487	7700	Vehicles
39.4	17.7	10.6	32.3	100.0	Percent of Total

A. Through Traffic Interchange By Trip Purpose

Station	Work	Business	Shopping	Social-Recreation	Total
19	57	23	9	62	151
20	1102	358	60	1516	3036
21	37	12	2	58	109
22	22	8	1	10	41
23	39	5	0	14	58
Total	1257	406	72	1660	3395
Percent of Total	37.0	12.0	2.1	48.9	100.0

B. Terminal Traffic Distribution By Trip Purpose

Zone	Work	Business	Shopping	Social-Recreation	Total
1	50	29	16	20	115
2	137	64	16	66	283
3	87	6	8	0	101
4	60	6	5	14	85
5	34	9	3	6	52
6	64	16	3	9	92
7	106	77	119	53	355
8	99	76	17	74	266
9	104	66	23	88	281
10	286	224	251	126	887
11	65	42	27	67	201
12	42	21	18	51	132
13	82	31	8	15	136
14	368	129	19	109	625
15	82	111	160	53	406
16	87	33	48	71	239
17	24	20	0	5	49
Total	1777	960	741	827	4305
Percent of Total	41.3	22.3	17.2	19.2	100.0

STATION 19
(M-20 EAST)
THROUGH AND TERMINAL TRAFFIC
BY VEHICLE TYPE
BY TRIP PURPOSE

A total of 1,472 vehicles passed through Station 19 on M-20 East of Big Rapids. Tabulations on the following pages give a detailed analysis of this traffic.

Approximately 3 out of every 4 vehicles had a terminal inside the study area. Eight of every 10 vehicles were autos, whether they traveled into or through the area.

Approximately 13 out of 100 vheicles were single unit trucks. Two (or more) out of 100 vehicles were trailer combination trucks.

The largest through traffic movement at this station is the 151 (44.5%) vehicles interchanging with Station 18 on US-131 North. Of these 151 vehicles, approximately 1 of 4 is a truck of which more than 8 out of 10 are single unit trucks.

The heaviest terminal traffic movements are to or from the same zones as for Station 18.

One third of the trips passing through the station were made for the purpose of work. Four out of 10 through trips were made for the purpose of social-recreation.

The largest terminal trip movements by purpose were the 91 shopping trips to Zone 10 (CBD) and the 77 work trips to Zone 14 (Ferris State College).

1. Total Traffic Through Station 19 By Vehicle Type

Through	Terminal	Total	
339	1133	1472	Vehicles
23.0	77.0	100.0	Percent of Total

Auto	Truck Single Unit	Truck Trailer Combination	
1242	193	37	Vehicles
84.4	13.1	2.5	Percent of Total

A. Through Traffic: 339 Vehicles

Auto	Truck Single Unit	Truck Trailer Combination	
263	67	9	Vehicles
77.6	19.8	2.6	Percent of Total

B. Terminal Traffic: 1133 Vehicles

Auto	Truck Single Unit	Truck Trailer Combination	
979	126	28	Vehicles
86.4	11.1	2.5	Percent of Total

C. Through Traffic Interchange of 339 Vehicles

Station	Autos	Truck Single Unit	Truck Trailer Combination	Total Vehicles	Percent of Total
18	112	33	6	151	44.5
20	110	23	3	136	40.1
21	39	10	0	49	14.5
22	0	0	0	0	0.0
23	2	1	0	3	0.9
Total	263	67	9	339	100.0

D. Terminal Traffic Distribution of 1133 Vehicles

Zone	Autos	Trucks		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
1	10	4	0	14	1.2
2	63	11	1	75	6.6
3	16	2	1	19	1.7
4	17	5	17	39	3.4
5	10	7	0	17	1.5
6	7	7	1	15	1.3
7	61	9	0	70	6.2
8	82	18	0	100	8.8
9	62	5	0	67	5.9
10	193	25	1	219	19.3
11	52	3	0	55	4.9
12	38	1	0	39	3.4
13	51	15	6	72	6.4
14	161	5	0	166	14.7
15	74	6	1	81	7.2
16	56	3	0	59	5.2
17	45	0	0	26	2.3
TOTAL	979	126	28	1133	100.0

2. Total Traffic Through Station 19 By Trip Purpose

Work	Business	Shopping	Social Recreation	Total
490	290	213	479	1472 Vehicles
33.3	19.7	14.5	32.5	100.0 Percent of Total

A. Through Traffic Interchange By Trip Purpose

Station	Work	Business	Shopping	Social Recreation	Total
18	57	23	9	62	151
20	41	28	10	57	136
21	18	6	2	23	49
22	0	0	0	0	0
23	2	1	0	0	3
Total	118	58	21	142	339
Percent of Total	34.8	17.1	6.2	41.9	100.0

B. Terminal Traffic Distribution By Trip Purpose

Zone	Work	Business	Shopping	Social-Recreation	Total
1	6	2	1	5	14
2	28	14	8	25	75
3	18	1	0	0	19
4	30	5	2	2	39
5	13	2	2	0	17
6	13	1	1	0	15
7	18	12	14	26	70
8	20	15	10	55	100
9	9	14	4	40	67
10	60	52	91	16	219
11	11	19	3	22	55
12	4	2	0	33	39
13	33	9	16	14	72
14	77	44	2	43	166
15	19	19	28	15	81
16	7	6	10	36	59
17	6	15	0	5	26
Total	372	232	192	337	1133
Percent of Total	32.8	20.5	16.9	29.8	100.0

STATION 20
(US-131 SOUTH)
THROUGH AND TERMINAL TRAFFIC
BY VEHICLE TYPE
BY TRIP PURPOSE

A total of 6,985 vehicles passed through Station 20 on US-131 South of Big Rapids. Tabulations on the following pages give a detailed analysis of this traffic.

The through and terminal traffic passing this station is nearly equally divided. Eight of every 10 vehicles were autos. Trailer combination trucks accounted for one fourth of the total truck traffic.

The largest through traffic movement at this station is the 3,036 (92.1%) vehicles interchanging with Station 18 on US-131 North. Of these 3,036 vehicles, more than 1 of 4 is a truck of which 5 out of 8 are single unit trucks.

The heaviest terminal traffic movements are to and from Zone 14 (Ferris State College) and Zone 10 (The Central Business District).

Approximately 4 out of 10 trips passing through the station were made for the purpose of work. Five out of 10 through trips were made for the purpose for social-recreation. Four out of 10 terminal trips were made for the purpose of work.

The largest terminal trip movements by purpose were the 441 work trips to Zone 14 and 245 work trips to Zone 10.

1. Total Traffic Through Station 20 By Vehicle Type

Through	Terminal	Total	
3297	3688	6985	Vehicles
47.2	52.8	100.0	Percent of Total

	Truck		
Auto	Single Unit	Trailer Combination	
5556	1060	369	Vehicles
79.5	15.2	5.3	Percent of Total

A. Through Traffic: 3297 Vehicles

	Truck		
Auto	Single Unit	Trailer Combination	
2432	558	307	Vehicles
73.8	16.9	9.3	Percent of Total

B. Terminal Traffic: 3688 Vehicles

	Truck		
Auto	Single Unit	Trailer Combination	
3124	502	62	Vehicles
84.7	13.6	1.7	Percent of Total

C. Through Traffic Interchange of 3297 Vehicles

		Trucks			
Station	Autos	Single Unit	Trailer Combination	Total Vehicles	Percent of Total
18	2217	516	303	3036	92.1
19	110	23	3	136	4.1
21	28	9	0	37	1.1
22	58	6	1	65	2.0
23	19	4	0	23	0.7
Total	2432	558	307	3297	100.0

D. Terminal Traffic Distribution of 3688 Vehicles

Zone	Autos	Trucks		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
1	30	21	0	51	1.4
2	136	16	4	156	4.2
3	41	12	0	53	1.4
4	63	24	1	88	2.4
5	33	5	2	40	1.1
6	39	2	2	43	1.2
7	205	21	10	236	6.4
8	139	31	2	172	4.7
9	170	26	4	200	5.4
10	495	101	15	611	16.6
11	203	20	1	224	6.1
12	82	5	0	84	2.3
13	74	50	8	132	3.6
14	795	74	0	869	23.5
15	299	33	11	343	9.3
16	247	46	2	295	8.0
17	73	15	0	88	2.4
Total	3124	502	62	3688	100.0

2. Total Traffic Through Station 20 By Trip Purpose

Work	Business	Shopping	Social-Recreation	Total	
2755	1155	544	2531	6985	Vehicles
39.5	16.5	7.8	36.2	100.0	Percent of Total

A. Through Traffic Interchange By Trip Purpose

Station	Work	Business	Shopping	Social - Recreation	Total
18	1102	358	60	1516	3036
19	41	28	10	57	136
21	10	7	2	18	37
22	17	10	0	38	65
23	14	1	0	8	23
Total	1184	404	72	1637	3297
Percent of Total	35.9	12.3	2.2	49.6	100.0

B. Terminal Traffic Distribution By Trip Purpose

Zone	Work	Business	Shopping	Social-Recreation	Total
1	24	11	5	11	51
2	69	36	13	38	156
3	47	3	0	3	53
4	64	12	3	9	88
5	33	3	1	3	40
6	28	7	2	6	43
7	65	41	29	101	236
8	77	35	13	47	172
9	65	35	15	85	200
10	245	113	179	74	611
11	80	60	9	75	224
12	34	10	4	39	87
13	74	18	11	29	132
14	441	229	13	186	869
15	97	68	115	63	343
16	89	33	59	114	295
17	39	37	1	11	88
Total	1571	751	472	894	3688
Percent of Total	42.6	20.4	12.8	24.2	100.0

STATION 21
(M-20 WEST)
THROUGH AND TERMINAL TRAFFIC
BY VEHICLE TYPE
BY TRIP PURPOSE

A total of 729 vehicles passed through Station 21 on M-20 West of Big Rapids. Tabulations on the following pages give a detailed analysis of this traffic.

Approximately 5 out of every 7 vehicles had a terminal inside the study area. Eight out of every 10 trucks were single unit trucks. Less than 1 vehicle out of 100 was a trailer combination truck.

The largest through traffic movement at this station is the 109 (50.5%) vehicles interchanging with Station 18 on US-131 North. Of these 109 vehicles, 28 of them were trucks of which 26 are single unit trucks.

The heaviest terminal traffic movements are to or from Zone 14 (Ferris State College), Zones 10 and 15.

Approximately 4 out of 10 trips passing through the station were made for the purpose of work. Five out of 10 through trips were for the purpose of social-recreation. More than 4 out of 10 terminal trips were made for the purpose of work.

The largest terminal trip movements by purpose were the 52 work trips to Zone 14 and 34 work trips to Zone 10.

1. Total Traffic Through Station 21 By Vehicle Type

Through	Terminal	Total	
216	513	729	Vehicles
29.6	70.4	100.0	Percent of Total

Auto	Truck		
	Single Unit	Trailer Combination	
576	149	4	Vehicles
79.0	20.4	0.6	Percent of Total

A. Through Traffic: 216 Vehicles

Auto	Truck		
	Single Unit	Trailer Combination	
163	50	3	Vehicles
75.5	23.1	1.4	Percent of Total

B. Terminal Traffic: 513 Vehicles

Auto	Truck		
	Single Unit	Trailer Combination	
413	99	1	Vehicles
80.5	19.3	0.2	Percent of Total

C. Through Traffic Interchange of 216 Vehicles

Station	Autos	Trucks		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
18	81	26	2	109	50.5
19	39	10	0	49	22.7
20	28	9	0	37	17.1
22	8	2	1	11	5.1
23	7	3	0	10	4.6
Total	163	50	3	216	100.0

D. Terminal Traffic Distribution of 513 Vehicles

Zone	Autos	Trucks		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
1	4	0		4	0.8
2	24	14		38	7.4
3	7	0		7	1.4
4	9	6		15	2.9
5	5	2		7	1.4
6	9	4		13	2.5
7	22	5		27	5.3
8	30	4		34	6.6
9	18	5		23	4.5
10	73	15		88	17.2
11	16	1		17	3.3
12	9	1		10	1.9
13	7	11		18	3.5
14	79	16		95	18.5
15	55	11	1	67	13.1
16	32	4		36	7.0
17	14	0		14	2.7
Total	413	99	1	513	100.0

2. Total Traffic Through Station 21 By Trip Purpose

Work	Business	Shopping	Social-Recreation	Total	
297	128	94	210	729	Vehicles
40.7	17.6	12.9	28.8	100.0	Percent of Total

A. Through Traffic Interchange By Trip Purpose

Station	Work	Business	Shopping	Social-Recreation	Total
18	37	12	2	58	109
19	18	6	2	23	49
20	10	7	2	18	37
22	3	1	0	7	11
23	5	1	0	4	10
Total	73	27	6	110	216
Percent of Total	33.8	12.5	2.8	50.9	100.0

B. Terminal Traffic Distribution By Trip Purpose

Zone	Work	Business	Shopping	Social-Recreation	Total
1	3	1	0	0	4
2	13	6	2	17	38
3	7	0	0	0	7
4	12	1	2	0	15
5	7	0	0	0	7
6	12	1	0	0	13
7	8	5	6	8	27
8	20	8	1	5	34
9	10	8	0	5	23
10	34	28	21	5	88
11	2	6	1	8	17
12	3	2	0	5	10
13	14	0	2	2	18
14	52	14	2	27	95
15	17	12	30	8	67
16	6	1	21	8	36
17	4	8	0	2	14
Total	224	101	88	100	513
Percent of Total	43.7	19.7	17.1	19.5	100.0

STATION 22
(COLBURN AVE.)
THROUGH AND TERMINAL TRAFFIC
BY VEHICLE TYPE
BY TRIP PURPOSE

A total of 1,555 vehicles passed through Station 22 on Colburn Ave. East of Big Rapids. Tabulations on the following pages give a detailed analysis of this traffic.

The terminal traffic passing this station accounted for more than 9 out of every 10 vehicles. Approximately 8 out of 10 vehicles were autos, whether they traveled into or through the area.

Approximately 15 out of every 100 vehicles were single unit trucks and 1 out of 100 was a trailer combination truck.

The largest through traffic movement at this station is the 65 (55.6%) vehicles interchanging with Station 20 on US-131 South. This same movement accounted for only 2.0% of the through movement at Station 20. Of these 65 vehicles 7 were trucks of which 6 were single unit trucks.

The heaviest terminal traffic movements (447 vehicles or 31.1%) were to or from Zone 8 and Zone 10.

More than 4 out of 10 trips passing through the station were made for the purpose of work and more than 2 out of 10 trips were made for the purpose of social-recreation.

More than 4 out of 10 through trips were for the purpose of social-recreation.

The largest terminal trip movements by purpose were the 168 social-recreation trips to or from zone 8 and the 127 work trips to zone 3.

1. Total Traffic Through Station 22 By Vehicle Type

Through	Terminal	Total
117	1438	1555 Vehicles
7.5	92.5	100.0 Percent of Total

Auto	Truck	
	Single Unit	Trailer Combination
1304	234	17 Vehicles
83.9	15.0	1.1 Percent of Total

A. Through Traffic: 117 Vehicles

Auto	Truck	
	Single Unit	Trailer Combination
93	22	2 Vehicles
79.5	18.8	1.7 Percent of Total

B. Terminal Traffic: 1438 Vehicles

Auto	Truck	
	Single Unit	Trailer Combination
1211	212	15 Vehicles
84.2	14.7	1.1 Percent of Total

C. Through Traffic Interchange of 117 Vehicles

Station	Autos	Truck		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
18	27	14	0	41	35
19	0	0	0	0	0.0
20	58	6	1	65	55.6
21	8	2	1	11	9.4
23	0	0	0	0	0.0
Total	93	22	2	117	100.0

D. Terminal Traffic Distribution of 1438 Vehicles

Zone	Autos	Trucks		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
1	17	3	0	20	1.4
2	59	20	0	79	5.5
3	128	3	1	132	9.2
4	47	23	10	80	5.6
5	20	8	0	28	1.9
6	7	1	0	8	0.6
7	63	8	0	71	4.9
8	202	36	0	238	16.6
9	28	5	0	33	2.3
10	180	29	0	209	14.5
11	62	3	0	65	4.5
12	20	1	0	21	1.5
13	60	30	4	94	6.5
14	124	29	0	153	10.6
15	117	13	0	130	9.0
16	44	0	0	44	3.1
17	33	0	0	33	2.3
Total	1211	212	15	1438	100.0

2. Total Traffic Through Station 22 By Trip Purpose

Work	Business	Shopping	Social Recreation	Total	
716	209	251	379	1555	Vehicles
46.1	13.4	16.1	24.4	100.0	Percent of Total

A. Through Traffic Interchange By Trip Purpose

Station	Work	Business	Shopping	Social-Recreation	Total
18	22	8	1	10	41
19	0	0	0	0	0
20	17	10	0	38	65
21	3	1	0	7	11
23	0	0	0	0	0
Total	42	19	1	55	117
Percent of Total	35.9	16.2	0.9	47.0	100.0

B. Terminal Traffic Distribution By Trip Purpose

Zone	Work	Business	Shopping	Social-Recreation	Total
1	13	2	3	2	20
2	39	15	5	20	79
3	127	3	0	2	132
4	50	9	18	3	80
5	23	3	1	1	28
6	5	2	1	0	8
7	16	14	23	18	71
8	55	10	5	168	238
9	8	8	2	15	33
10	77	30	89	13	209
11	23	28	2	12	65
12	9	5	2	5	21
13	43	9	14	28	94
14	119	20	1	13	153
15	40	14	69	7	130
16	22	2	15	5	44
17	5	16	0	12	33
Total	674	190	250	324	1438
Percent of Total	46.9	13.2	17.4	22.5	100.0

STATION 23
(MILL POND ROAD)
THROUGH AND TERMINAL TRAFFIC
BY VEHICLE TYPE
BY TRIP PURPOSE

A total of 1,464 vehicles passed through Station 23 on Mill Pond Road Southeast of Big Rapids. Tabulations on the following pages give a detailed analysis of this traffic.

Similar to Station 22, the terminal traffic passing this station accounts for more than 9 out of 10 vehicles. Approximately 8 out of 10 vehicles were autos.

Less than 2 out of 10 vehicles were single unit trucks. Less than 1 out of 100 vehicles were trailer combination trucks.

The largest through traffic movement at this station is the 58 (61.7%) vehicles interchanging with Station 18 on US-131 North. Of these 58 vehicles 12 were single unit trucks.

The heaviest terminal traffic movements (505 vehicles or 36.8%) were to zones 10, 14, and 8.

Approximately 5 out of 10 trips were made for the purpose of work and 2 out of 10 trips were made for the purpose of social-recreation. More than 6 out of 10 through trips were for the purpose of work.

The largest terminal trip movements by purpose were 120 work trips to zone 14 and 111 work trips to zone 10.

1. Total Traffic Through Station 23 By Vehicle Type

Through	Terminal	Total	
94	1370	1464	Vehicles
6.4	93.6	100.0	Percent of Total

Auto	Truck		
	Single Unit	Trailer Combination	
1240	214	10	Vehicles
84.7	14.6	0.7	Percent of Total

A. Through Traffic: 94 Vehicles

Auto	Truck		
	Single Unit	Trailer Combination	
73	20	1	Vehicles
77.6	21.3	1.1	Percent of Total

B. Terminal Traffic: 1370 Vehicles

Auto	Truck		
	Single Unit	Trailer Combination	
1167	194	9	Vehicles
85.2	14.2	0.6	Percent of Total

C. Through Traffic Interchange of 94 Vehicles

Station	Autos	Trucks		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
18	45	12	1	58	61.7
19	2	1	0	3	3.2
20	19	4	0	23	24.5
21	7	3	0	10	10.6
22	0	0	0	0	0.0
Total	73	20	1	94	100.0

D. Terminal Traffic Distribution of 1370 Vehicles

Zone	Autos	Truck		Total Vehicles	Percent of Total
		Single Unit	Trailer Combination		
1	18	6	0	23	1.7
2	70	14	0	84	6.1
3	62	14	0	76	5.6
4	44	27	1	72	5.3
5	18	6	0	24	1.8
6	45	6	0	51	3.7
7	81	10	1	92	6.7
8	132	8	1	141	10.3
9	65	3	0	68	5.0
10	177	39	1	217	15.8
11	57	2	0	59	4.3
12	42	2	0	44	3.2
13	58	40	4	102	7.4
14	142	5	0	147	10.7
15	92	8	1	101	7.4
16	34	4	0	38	2.8
17	30	0	0	30	2.2
Total	1167	194	9	1370	100.0

2. Total Traffic Through Station 23 By Trip Purpose

Work	Business	Shopping	Social-Recreation	Total	
779	206	161	318	1464	Vehicles
53.2	14.1	11.0	21.7	100.0	Percent of Total

A. Through Traffic Interchange By Trip Purpose

Station	Work	Business	Shopping	Social-Recreation	Total
18	39	5	0	14	58
19	2	1	0	0	3
20	14	1	0	8	23
21	5	1	0	4	10
22	0	0	0	0	0
Total	60	8	0	26	94
Percent of Total	63.8	8.5	0.0	27.7	100.0

B. Terminal Traffic Distribution By Trip Purpose

Zone	Work	Business	Shopping	Social-Recreation	Total
1	15	1	5	3	23
2	40	7	4	33	84
3	76	0	0	0	76
4	64	7	0	1	72
5	21	1	0	2	24
6	47	2	1	1	51
7	27	21	17	27	92
8	33	18	5	85	141
9	31	17	0	20	68
10	111	37	41	28	217
11	26	21	3	9	59
12	7	8	2	27	44
13	45	17	23	17	102
14	120	11	3	13	147
15	27	18	48	8	101
16	10	3	9	16	38
17	19	9	0	2	30
Total	719	198	161	292	1370
Percent of Total	52.5	14.5	11.7	21.3	100.0

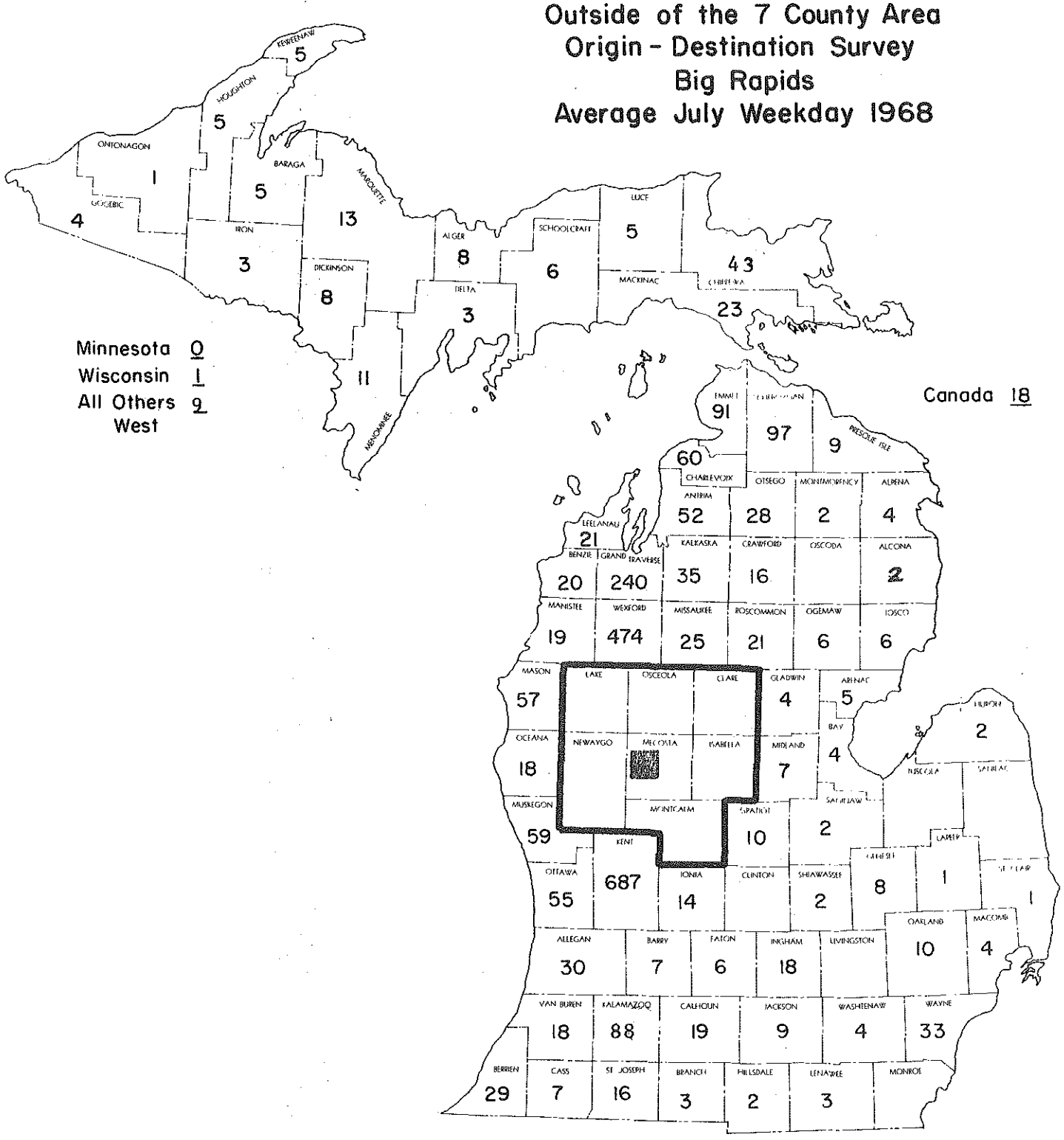
EXTERNAL TERMINALS

The preceding part of this report dealt with the traffic inside the Big Rapids O-D Survey Area. This part of the report will deal with the origin and/or destination trip ends outside of the Study Area. A through trip is counted twice. It is counted at both its entering and departing stations but this will not change the number of external terminals.

The following desire diagrams show all external terminals by county for the State of Michigan and by States for terminals outside of the State of Michigan:

Desire	Diagram No.	14	Station 18
Desire	Diagram No.	15	Station 19
Desire	Diagram No.	16	Station 20
Desire	Diagram No.	17	Station 21
Desire	Diagram No.	18	Station 22
Desire	Diagram No.	19	Station 23

External Terminals of Traffic Through Station 18
US-131 - 0.8 Mi. North of West Avenue
Outside of the 7 County Area
Origin - Destination Survey
Big Rapids
Average July Weekday 1968



Minnesota 0
Wisconsin 1
All Others 9
West

Canada 18

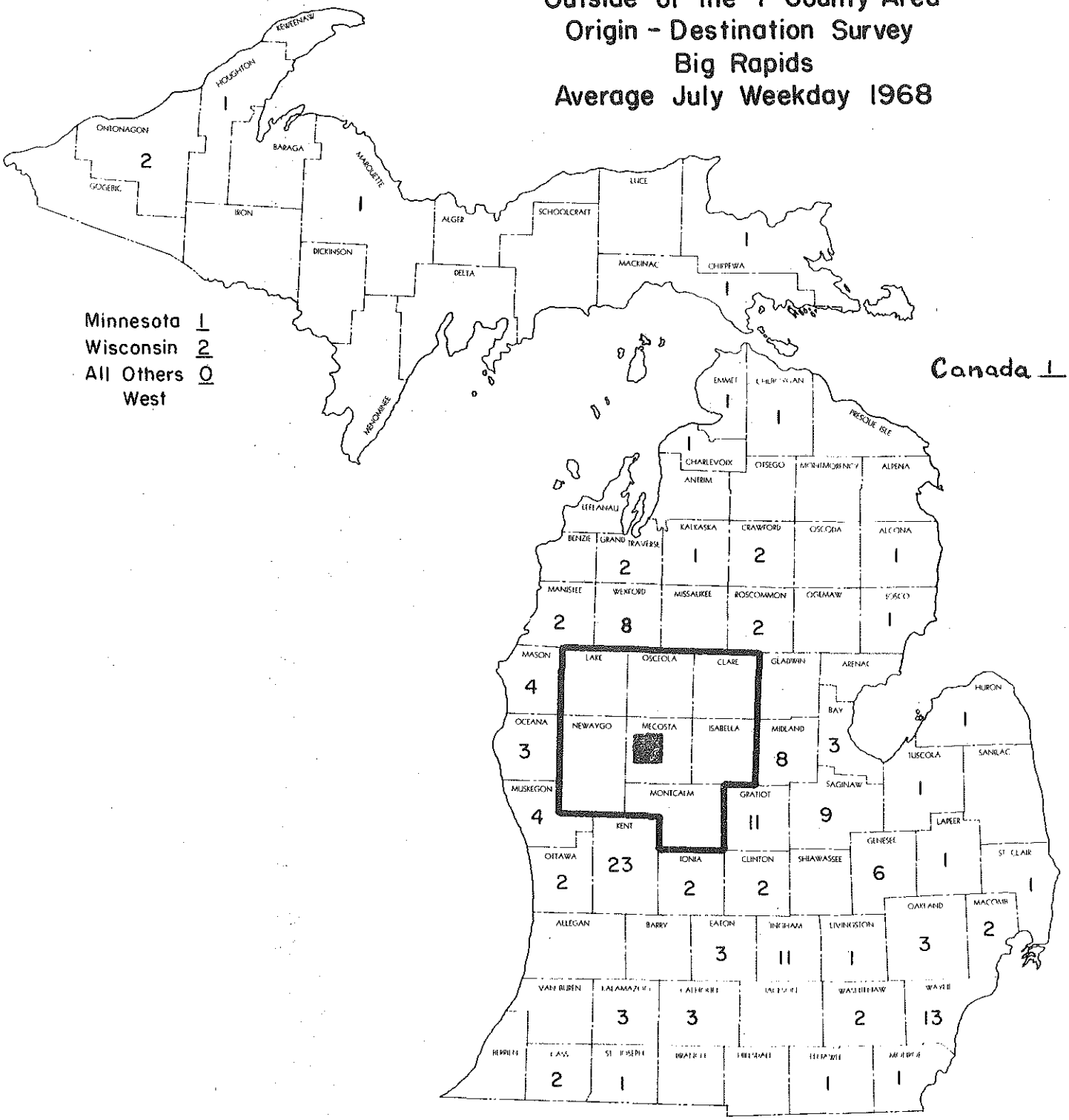
Illinois 55

Indiana 72

Ohio 6
All Other 4
East & South

Diagram No. 14

External Terminals of Traffic Through Station 19
M-20 - 0.15 Mi East of 190th Avenue
Outside of the 7 County Area
Origin - Destination Survey
Big Rapids
Average July Weekday 1968



Minnesota 1
Wisconsin 2
All Others 0
West

Canada 1

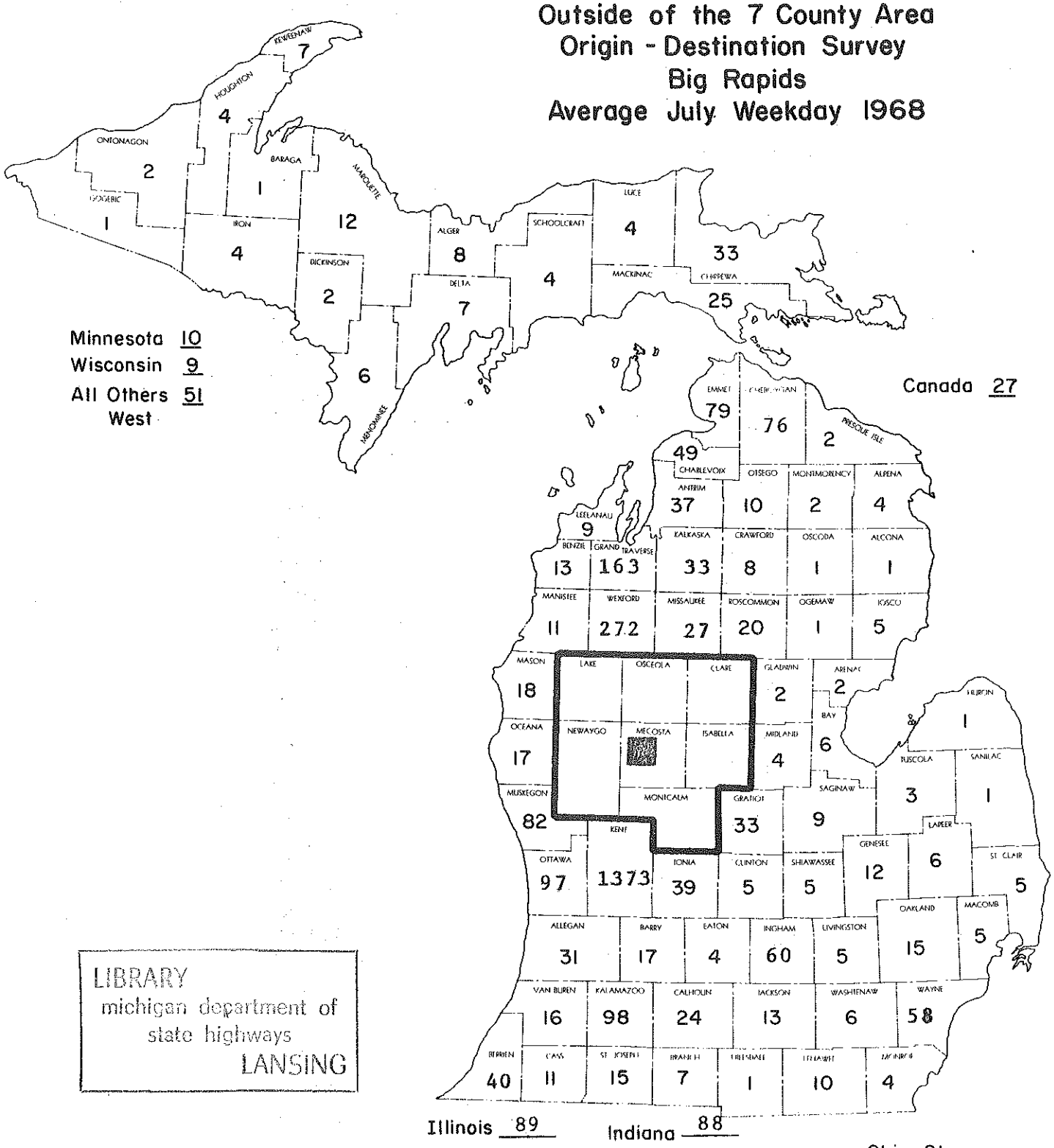
Illinois 2

Indiana 3

Ohio 3
All Others 3
East & South

Diagram No. 15

External Terminals of Traffic Through Station 20
US-131 - 1.0 Mi. South of South Jct. M-20
Outside of the 7 County Area
Origin - Destination Survey
Big Rapids
Average July Weekday 1968



Minnesota 10
Wisconsin 9
All Others 51
West

Canada 27

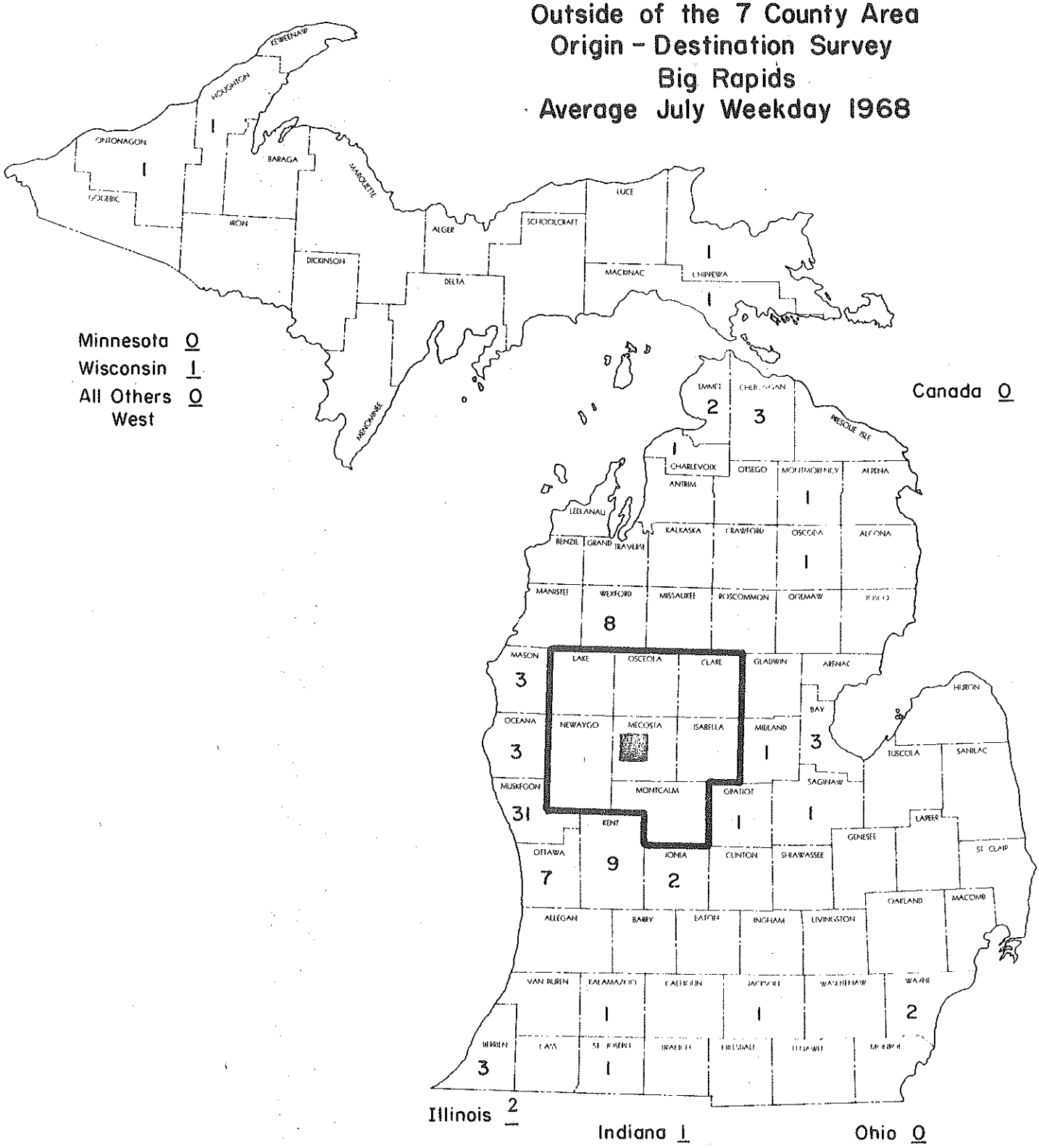
Illinois 89

Indiana 88

Ohio 21
All Others 23
East & South

Diagram No. 16

External Terminals of Traffic Through Station 21
M-20 - 0.9 Mi. West of 205th Avenue
Outside of the 7 County Area
Origin - Destination Survey
Big Rapids
Average July Weekday 1968



Minnesota 0
Wisconsin 1
All Others 0
West

Canada 0

Illinois 2

Indiana 1

Ohio 0
All Others 1
East & South

Diagram No. 17

External Terminals of Traffic Through Station 22

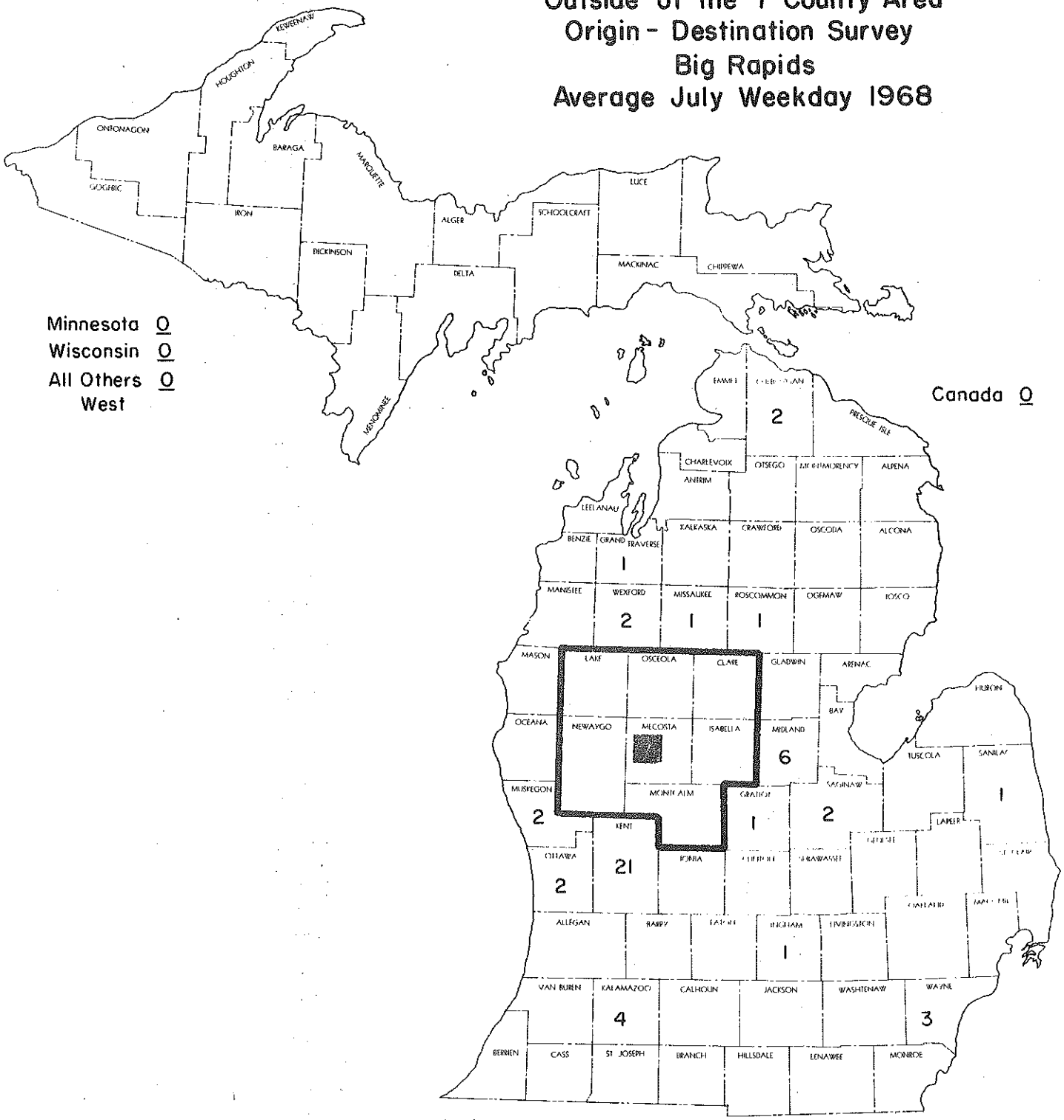
Colburn Avenue - 0.6 Mi. East of Big Rapids E.C.L.

Outside of the 7 County Area

Origin - Destination Survey

Big Rapids

Average July Weekday 1968



Minnesota 0
Wisconsin 0
All Others 0
West

Canada 0

Illinois 1

Indiana 0

Ohio 0
All Others 0
East & South

Diagram No. 18

External Terminals of Traffic Through Station 23

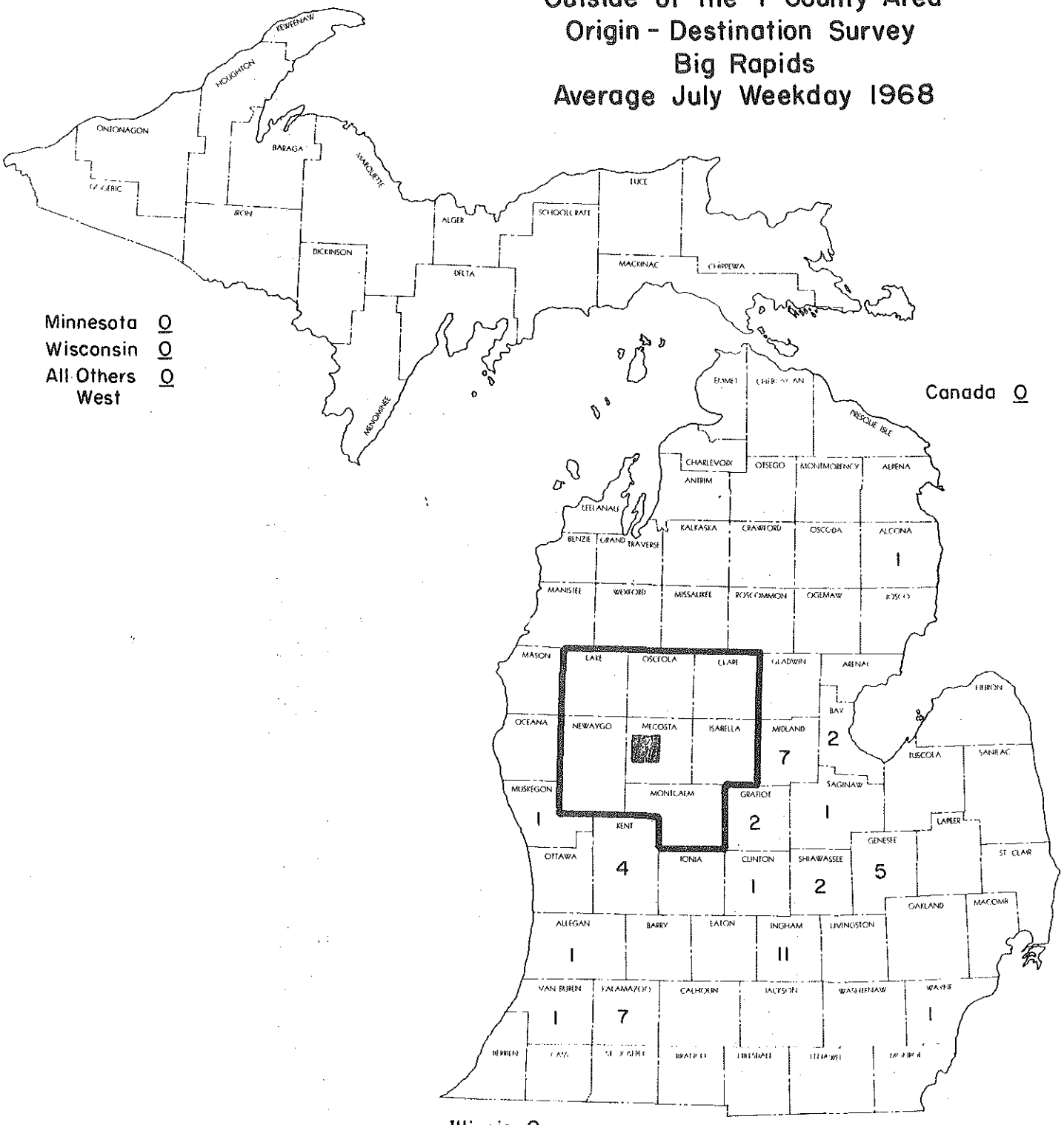
Mill Pond Road - 0.6 Mi. SE of M-20

Outside of the 7 County Area

Origin - Destination Survey

Big Rapids

Average July Weekday 1968



Minnesota 0
Wisconsin 0
All Others 0
West

Canada 0

Illinois 0

Indiana 0

Ohio 0
All Others 0
East & South

Diagram No. 19

The following desireline diagrams show only the external terminals in Mecosta and the surrounding six counties.

* Desireline	Diagram No.	20	Station 18
* Desireline	Diagram No.	21	Station 19
* Desireline	Diagram No.	22	Station 20
* Desireline	Diagram No.	23	Station 21
* Desireline	Diagram No.	24	Station 22
* Desireline	Diagram No.	25	Station 23

*Note: These Desireline Diagrams show a breakdown of the trip terminals at the points of interest in these seven counties.

Of the 7,700 vehicles which passed through Station 18, 4,922 (63.9%) trips had origins and/or destinations within the seven county area.

Of the 1,472 vehicles which passed through Station 19, 1,302 (88.5%) trips had origins and/or destinations within the seven county area.

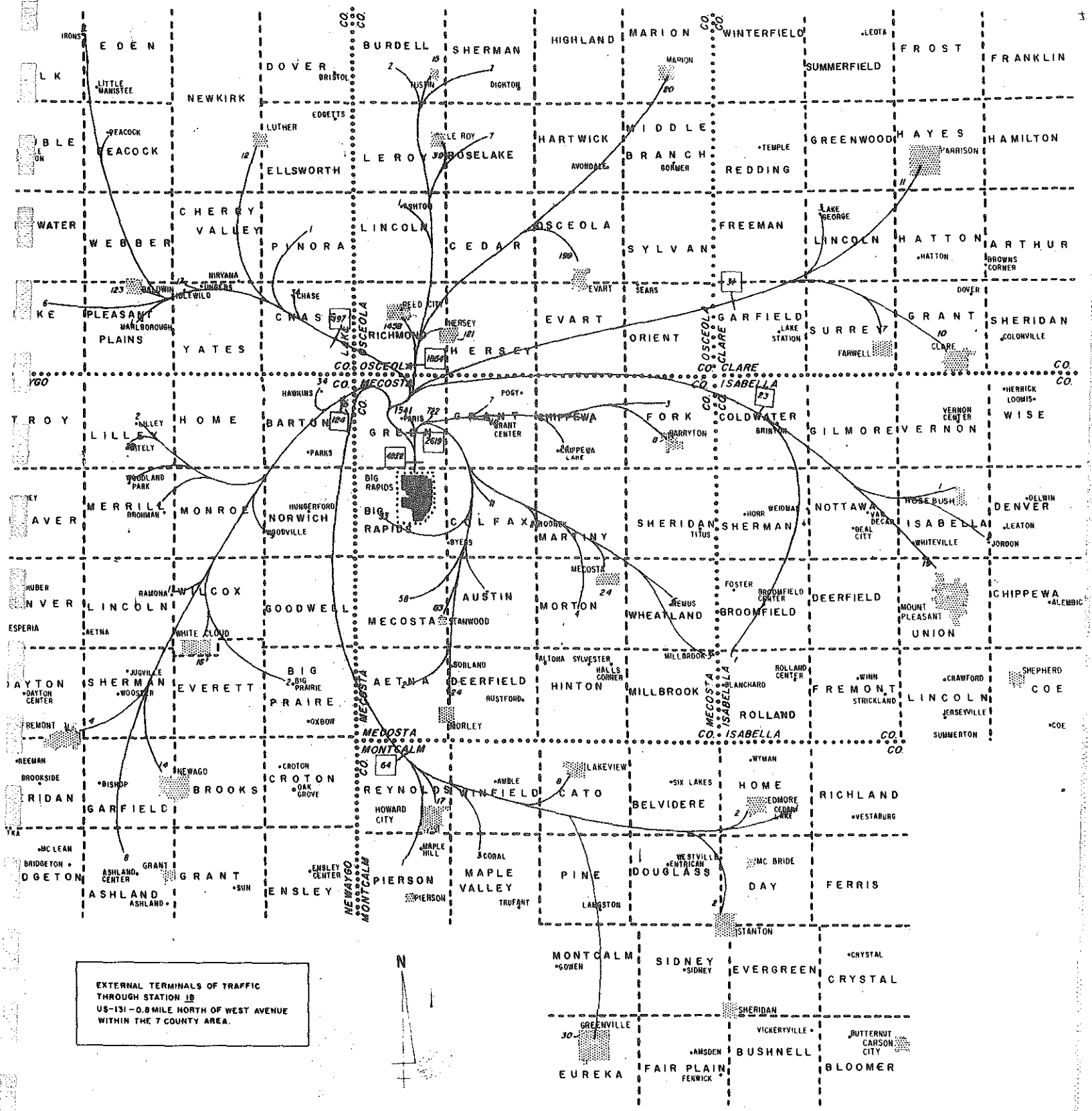
Of the 6,985 vehicles which passed through Station 20, 3,563 (51.0%) trips had origins and/or destinations within the seven county area.

Of the 729 vehicles which passed through Station 21, 635 (87.1%) trips had origins and/or destinations within the seven county area.

Of the 1,555 vehicles which passed through Station 22, 1,504 (96.7%) trips had origins and/or destinations within the seven county area.

Of the 1,464 vehicles which passed through Station 23, 1,417 (96.8%) trips had origins and/or destinations within the seven county area.

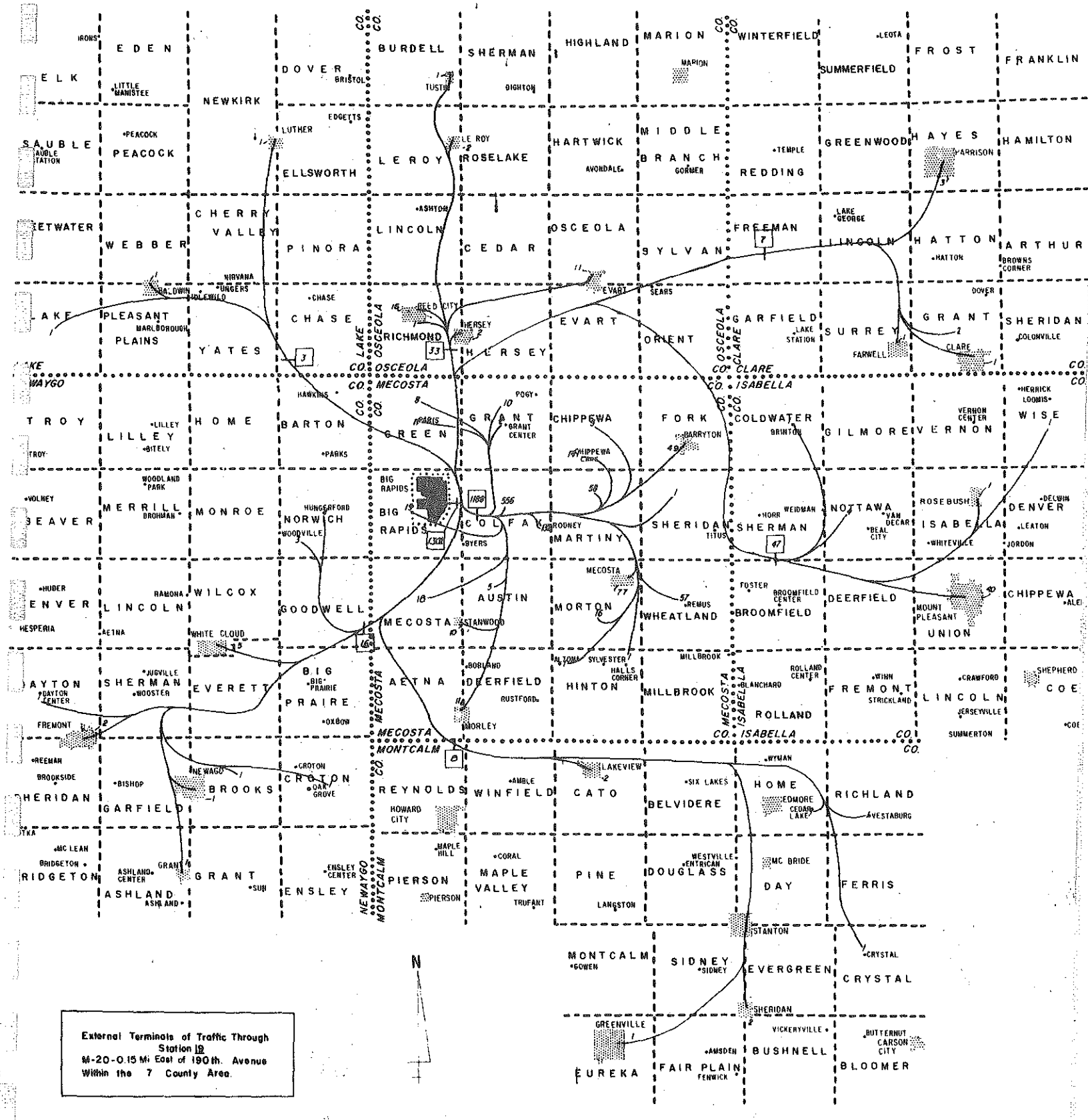
BIG RAPIDS
ORIGIN - DESTINATION SURVEY
AVERAGE JULY WEEKDAY 1968



EXTERNAL TERMINALS OF TRAFFIC THROUGH STATION 18
US-131 - 0.8 MILE NORTH OF WEST AVENUE WITHIN THE 7 COUNTY AREA.

Diagram No. 20

BIG RAPIDS
ORIGIN - DESTINATION SURVEY
AVERAGE JULY WEEKDAY 1968



External Terminals of Traffic Through Station 19
M-20-0.15 Mi East of 190th. Avenue
Within the 7 County Area.

Diagram No. 21

BIG RAPIDS
ORIGIN - DESTINATION SURVEY
AVERAGE JULY WEEKDAY 1968

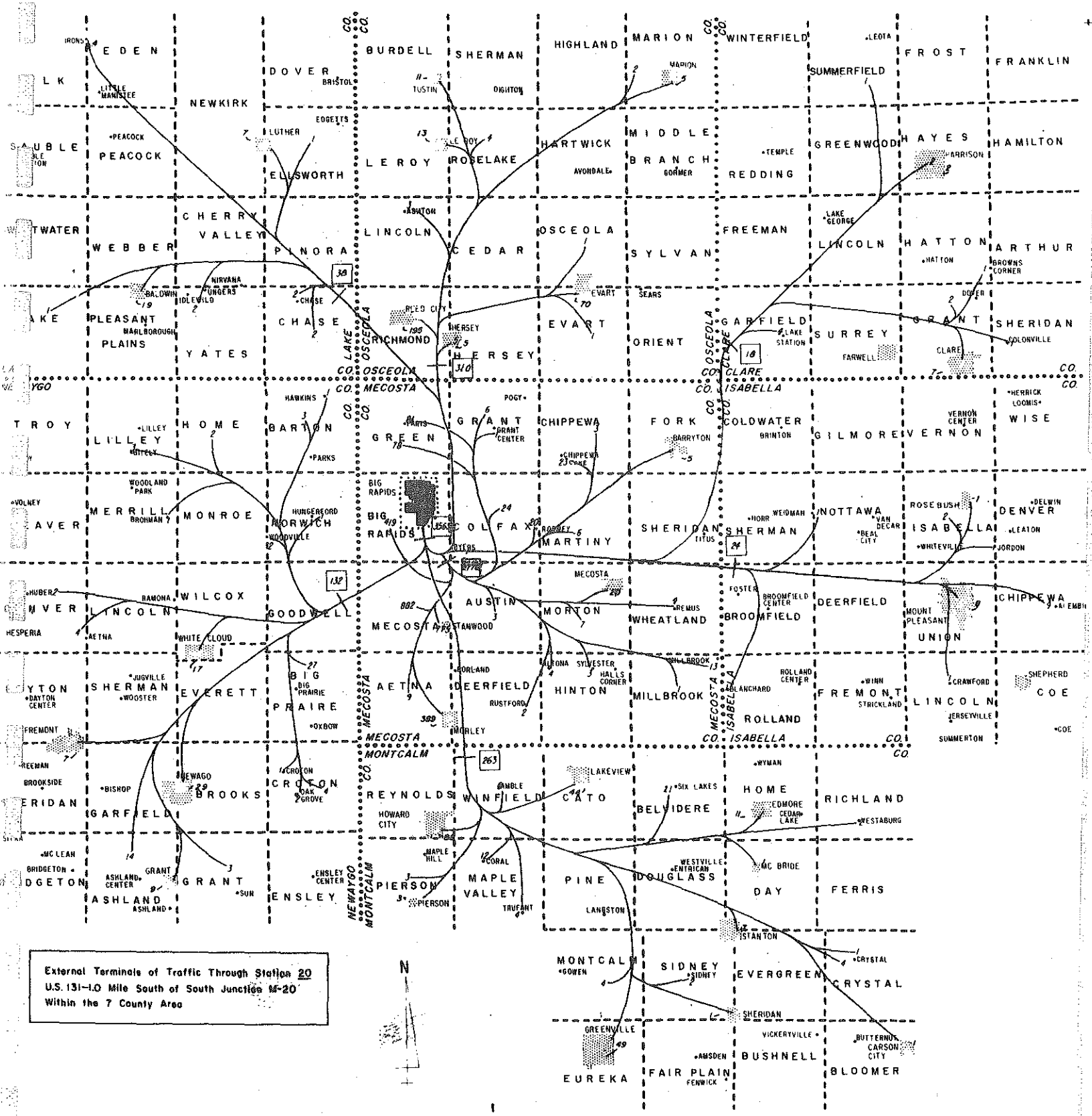
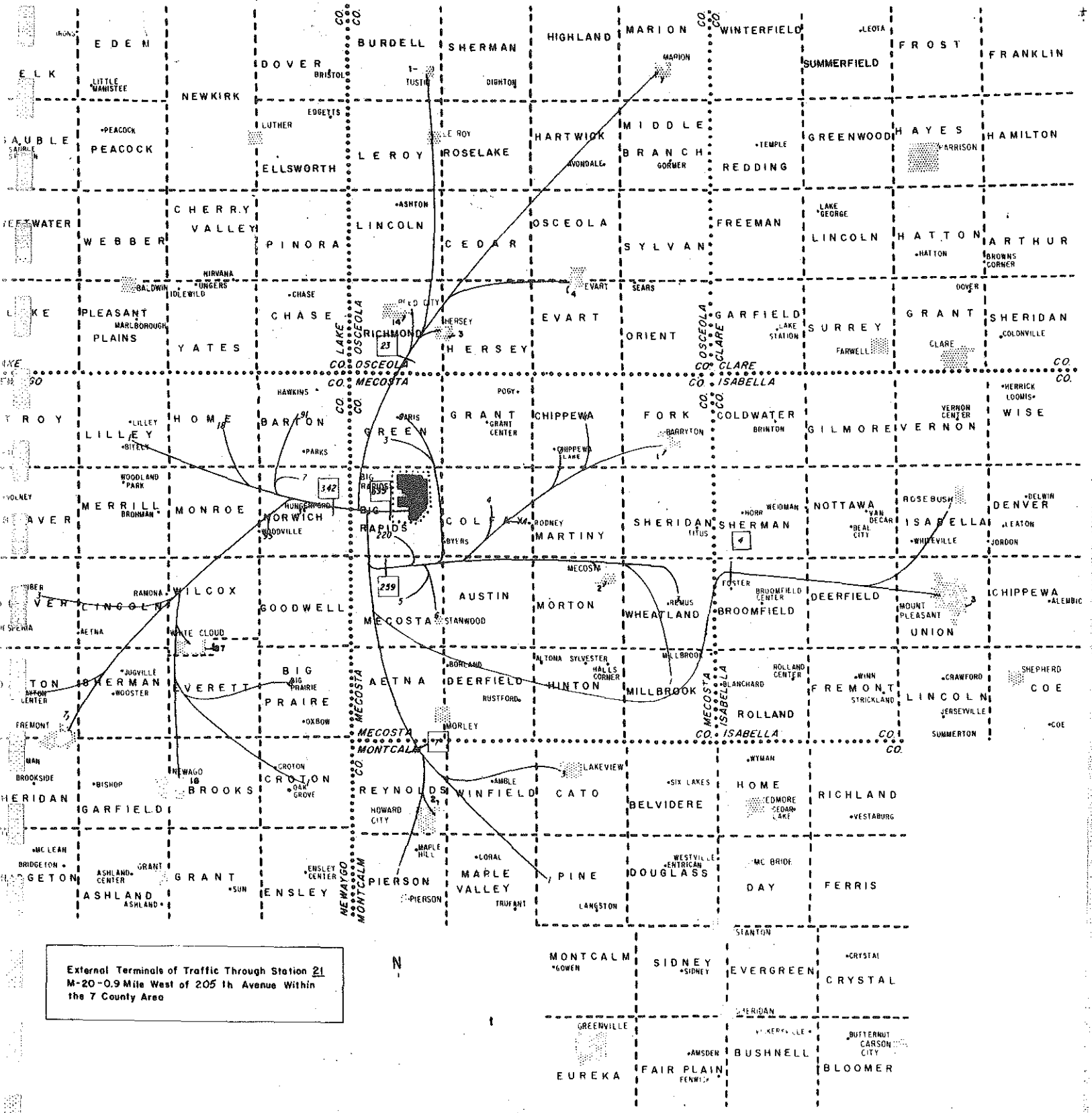


Diagram No. 22

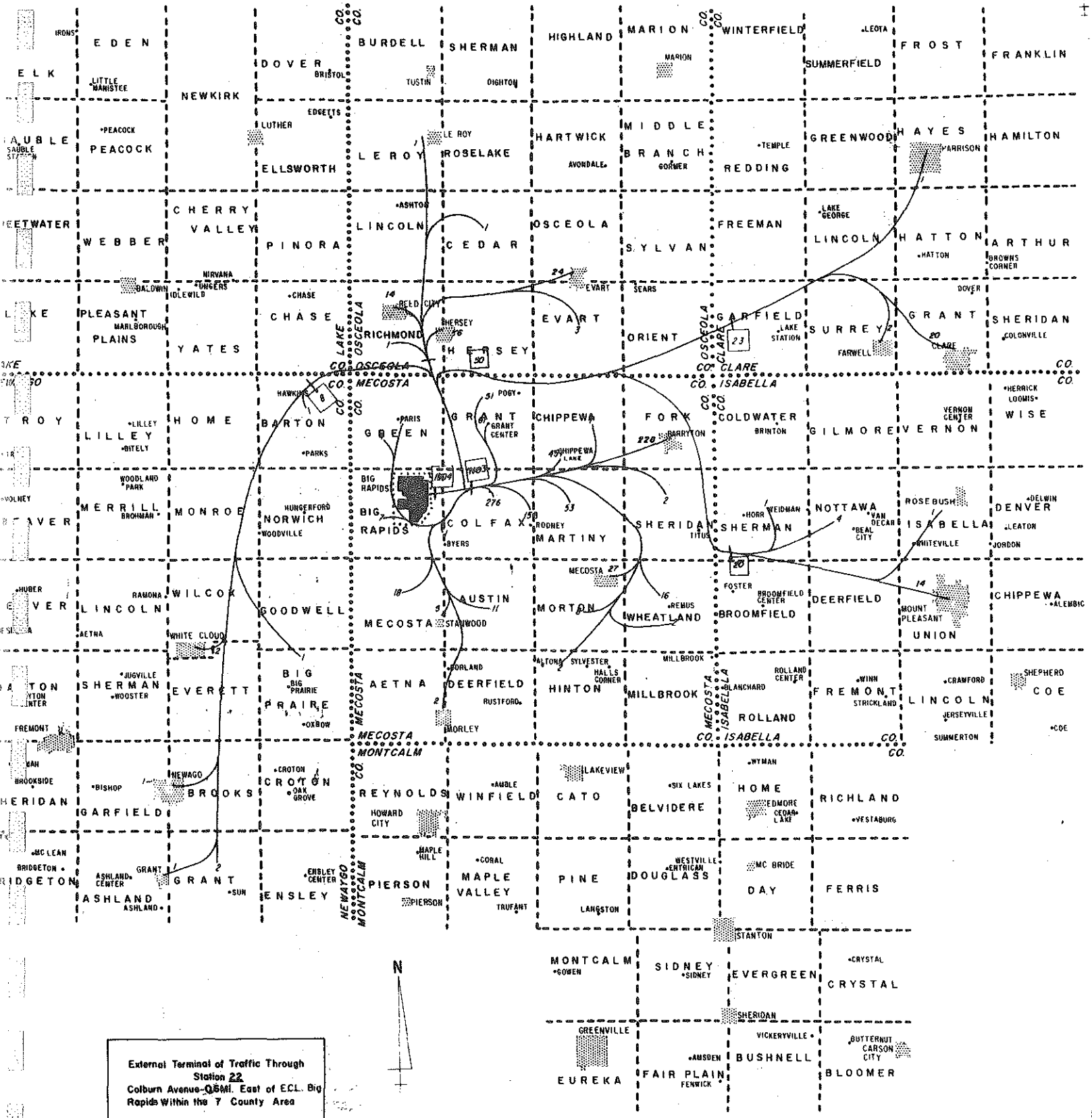
BIG RAPIDS
ORIGIN - DESTINATION SURVEY
AVERAGE JULY WEEKDAY 1968



External Terminals of Traffic Through Station 21
M-20 - 0.9 Mile West of 205 th Avenue Within the 7 County Area

Diagram No. 23

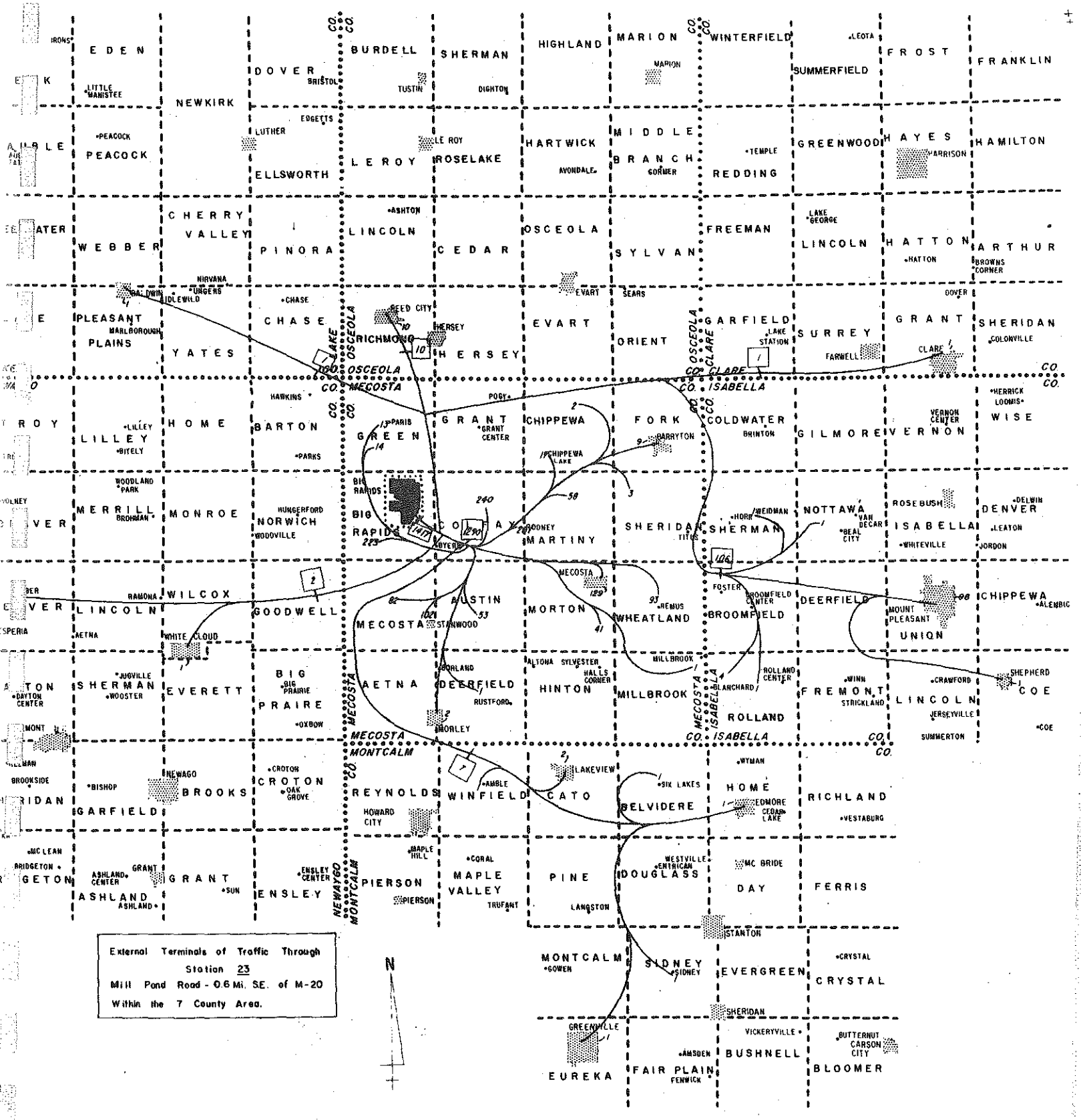
BIG RAPIDS
ORIGIN - DESTINATION SURVEY
AVERAGE JULY WEEKDAY 1968



External Terminal of Traffic Through Station 22
Colburn Avenue-0.6mi. East of ECL. Big Rapids Within the 7 County Area

Diagram No. 24

BIG RAPIDS
ORIGIN - DESTINATION SURVEY
AVERAGE JULY WEEKDAY 1968



External Terminals of Traffic Through Station 23
Mill Pond Road - 0.6 Mi. SE. of M-20
Within the 7 County Area.

Diagram No. 25

APPENDIX

APPENDIX A

INTERVIEW FORMS

Form 1559
O-D 4
(Rev. 5/67)

EXTERNAL TRIP REPORT

STATE OF MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

City Number 7 2 (1 2) | Form Number 4 (3) | Hour Period Ending ( ) AM or ( ) PM ____ to ____ (4 5) | In Bound 1 (6) | Station (7 8) | Day of Travel ____ (9)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Interview Number	State of Registration	Veh. Type	No. in Vehicle	Where did this trip begin? Origin	Land Use	Where will this trip end? Destination	Where is vehicle garaged?	Trip Purpose	Screen	Route of Exit or Ent.	Stops in area	Purpose	Stop Location
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
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

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

DESTINATION
Vehicle Garaged At

1. Within the cordon
2. Outside the cordon at origin
3. Outside the cordon at destination
4. Outside the cordon at neither origin or destination

1. Work
2. Pers. Business
3. Shopping
4. Vacation
5. Other Soc. or Rec.
6. All Other

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

DAY OF TRAVEL

1 Sun. 4 Wed.
2 Mon. 5 Thur.
3 Tue. 6 Fri.
7 Sat.

app. 2

Form 1599
O-D 4
(Rev. 5/67)

EXTERNAL TRIP REPORT

STATE OF MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

City Number	Form Number	Hour Period Ending ( ) AM or ( ) PM	Out Bound	Station	Day of Travel
7 2 (1 2)	4 (3)	____ to ____ (4 5)	2 (6)	(7 8)	(9)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Interview Number	State of Registration	Veh. Type	No. in Vehicle	Where did this trip begin? Origin	Land Use	Where will this trip end? Destination	Where is vehicle garaged?	Trip Purpose	Screen	Route of Exit or Ent.	Stops in area	Purpose	Stop Location
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
	1 Mich. 2 Other										1 Yes 2 No		
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

app. 3

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

ORIGIN

Vehicle Garaged At

1. Within the cordon
2. Outside the cordon at origin
3. Outside the cordon at destination
4. Outside the cordon at neither origin or destination

1. Work
2. Pers. Business
3. Shopping
4. Vacation
5. Other Soc. or Rec.
6. All Other

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

DAY OF TRAVEL

1 Sun. 4 Wed.
2 Mon. 5 Thur.
3 Tue. 6 Fri.
7 Sat.

APPENDIX B

TRIP TABLES

TABLE S-1

This trip table tabulates all trips by passenger car, truck and taxi drivers for a 24-hour period. The origin zone is listed down the left hand margin. The destination zone is listed horizontally.

In this table trip volumes are given directionally. Therefore, to find the total movements between two zones, it will be necessary to use each zone once as an origin and once as a destination and then total the two volumes.

BIG RAPIDS

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-1

TOTAL TRIPS BY PASSENGER CAR, TRUCK AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
SUB-TOT										
18	45	131	74	52	26	52	154	138	117	435
19	7	28	15	18	8	7	33	56	37	98
20	26	74	42	55	26	28	120	83	95	310
21	1	16	6	7	2	9	14	16	7	38
22	8	34	73	32	17	2	18	159	11	103
23	12	42	51	34	15	30	49	90	28	132
SUB-TOT	99	325	261	198	94	128	388	542	295	1116
FIN-TOT	99	325	261	198	94	128	388	542	295	1116

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-1

TOTAL TRIPS BY PASSENGER CAR, TRUCK AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	11	12	13	14	15	16	17	18	19	20
1								70	7	25
2								152	47	82
3								27	4	11
4								33	21	33
5								26	9	14
6								40	8	15
7								201	37	116
8								128	44	89
9								164	30	105
10								452	121	301
11								119	30	118
12								69	19	50
13								74	35	65
14								299	95	434
15								192	41	173
16								125	30	165
17								26	14	37
SUB-TOT								2197	592	1833
18	82	63	62	326	214	114	23		78	1386
19	25	20	37	71	40	29	12	73		62
20	106	37	67	435	170	130	51	1650	74	
21	9	4	8	41	28	18	8	66	28	17
22	31	12	32	74	75	14	16	20		36
23	34	25	48	85	54	15	13	33	1	10
SUB-TOT	287	161	254	1032	581	320	123	1842	181	1511
FIN-TOT	287	161	254	1032	581	320	123	4039	773	3344

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-1

TOTAL TRIPS BY PASSENGER CAR, TRUCK AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

	DESTINATIONS		
ORIGIN	21	22	23
1	3	12	12
2	22	45	42
3	1	59	25
4	8	48	38
5	5	11	9
6	4	6	21
7	13	53	43
8	18	79	51
9	16	22	40
10	50	106	85
11	8	34	25
12	6	9	19
13	10	62	54
14	54	79	62
15	39	55	47
16	18	30	23
17	6	17	17
SUB-TOT	281	727	613
18	43	21	25
19	21		2
20	20	29	13
21		6	2
22	5		
23	8		
SUB-TOT	97	56	42
FIN-TOT	378	783	655

METROPULITAN AREA TRAFFIC STUDY

TABLE S-1

TOTAL TRIPS BY PASSENGER CAR, TRUCK AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

	SUB-TOT	SUB-TOT	FIN-TOT
1		129	129
2		390	390
3		127	127
4		181	181
5		74	74
6		94	94
7		463	463
8		409	409
9		377	377
10		1115	1115
11		334	334
12		172	172
13		300	300
14		1023	1023
15		547	547
16		391	391
17		117	117
SUB-TOT		6243	6243
18	2108	1553	3661
19	541	158	699
20	1855	1786	3641
21	232	119	351
22	711	61	772
23	757	52	809
SUB-TOT	6204	3729	9933
FIN-TOT	6204	9972	16176

TABLE S-2

This trip table tabulates all trips by combination truck drivers for a 24-hour period. The origin zone is listed down the left hand margin. The destination zone is listed horizontally.

In this table trip volumes are given directionally. Therefore, to find the total movements between two zones, it will be necessary to use each zone once as an origin, and once as a destination and then total the two volumes.

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-2

TOTAL TRIPS BY COMBINATION TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

ORIGIN	DESTINATIONS 1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
SUB-TOT										
18		1					3		2	13
19			1	7						
20		1			1	2	6	1	1	5
21										
22			1	4						
23				1						1
SUB-TOT		2	2	12	1	2	9	1	3	19
FIN-TOT		2	2	12	1	2	9	1	3	19

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-2

TOTAL TRIPS BY COMBINATION TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	11	12	13	14	15	16	17	18	19	20
1										
2								1	1	3
3										
4									10	1
5								1		1
6									1	
7								2		4
8										1
9										3
10								3	1	10
11										
12										
13								10	1	2
14										
15								6		6
16										2
17										
SUB-TOT								23	14	33
18	1		3		2	1			2	130
19			5		1			4		1
20	1		6		5			173	2	
21					1			1		
22			2							1
23			3					1		
SUB-TOT	2		19		9	1		179	4	132
FIN-TOT	2		19		9	1		202	18	165

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-2

TOTAL TRIPS BY COMBINATION TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	21	22	23
1			
2			
3			
4		6	
5			
6			
7			1
8			1
9			
10			
11			
12			
13		2	1
14			
15			1
16			
17			
SUB-TOT		8	4
18	1		
19			
20			
21			
22	1		
23			
SUB-TOT	2		
FIN-TOT	2	8	4

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-2

TOTAL TRIPS BY COMBINATION TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

	SUB-TOT	SUB-TOT	FIN-TOT
1			
2		5	5
3			
4		17	17
5		2	2
6		1	1
7		7	7
8		2	2
9		3	3
10		14	14
11			
12			
13		16	16
14			
15		13	13
16		2	2
17			
SUB-TOT		82	82
18	26	133	159
19	14	5	19
20	29	175	204
21	1	1	2
22	7	2	9
23	5	1	6
SUB-TOT	82	317	399
FIN-TOT	82	399	481

TABLE S-3

This trip table tabulates all trips by single unit truck-drivers for a 24-hour period. The origin zone is listed down the left hand margin. The destination zone is listed horizontally.

In this table trip volumes are given directionally. Therefore, to find the total movements between two zones, it will be necessary to use each zone once as an origin and once as a destination and then total the two volumes.

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-3

TOTAL TRIPS BY SINGLE-UNIT TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
SUB-TOT										
18	17	26	13	11	9	7	18	24	19	48
19	4	5	1	4	3	5	7	10	5	13
20	11	10	9	18	3	1	11	18	14	48
21		6		2	1	3	2	3		5
22	3	11	3	8	4	1	2	20	1	18
23		5	9	11	4	3	5	7	1	29
SUB-TOT	35	63	35	54	24	20	45	82	40	161
FIN-TOT	35	63	35	54	24	20	45	82	40	161

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-3

TOTAL TRIPS BY SINGLE-UNIT TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	11	12	13	14	15	16	17	18	19	20
1								36		10
2								21	6	6
3								15	1	3
4								7	1	6
5								3	4	2
6								2	2	1
7								35	2	10
8								20	8	13
9								32		12
10								86	12	53
11								8		10
12								5		4
13								31	5	27
14								31	2	30
15								26	4	15
16								17	3	26
17								4		5
SUB-TOT								379	50	233
18	7	20	30	29	18	8			18	270
19	3	1	10	3	2			15		13
20	10	1	23	44	18	20	10	246	10	
21		1	5	7	6	3		14	5	3
22	3		6	9	9			7		2
23	1	1	22	2	5	4		8		2
SUB-TOT	24	24	96	94	58	35	10	290	33	290
FIN-TOT	24	24	96	94	58	35	10	669	83	523

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-3

TOTAL TRIPS BY SINGLE-UNIT TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	21	22	23
1			6
2	8	9	9
3			5
4	4	15	16
5	1	4	2
6	1		3
7	3	6	5
8	1	16	1
9	5	4	2
10	10	11	10
11	1		1
12		1	1
13	6	24	18
14	9	20	3
15	5	4	3
16	1		
17			
SUB-TOT	55	114	85
18	12	7	4
19	5		1
20	6	4	2
21		2	1
22			
23	2		
SUB-TOT	25	13	8
FIN-TOT	80	127	93

METROPOLITAN AREA TRAFFIC STUDY

TABLE S-3

TOTAL TRIPS BY SINGLE-UNIT TRUCK DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

	SUB-TOT	SUB-TOT	FIN-TOT
1		52	52
2		59	59
3		24	24
4		49	49
5		16	16
6		9	9
7		61	61
8		59	59
9		55	55
10		182	182
11		20	20
12		11	11
13		111	111
14		95	95
15		57	57
16		47	47
17		9	9
SUB-TOT		916	916
18	304	311	615
19	76	34	110
20	269	268	537
21	44	25	69
22	98	9	107
23	109	12	121
SUB-TOT	900	659	1559
FIN-TOT	900	1575	2475

TABLE S-4

This trip table tabulates all trips by passenger car and taxi-drivers for a 24-hour period. The origin zone is listed down the left hand margin. The destination zone is listed horizontally.

In this table trip volumes are given directionally. Therefore, to find the total movements between two zones, it will be necessary to use each zone once as an origin and once as a destination and then total the two volumes.

TABLE S-4

TOTAL TRIPS BY PASSENGER CAR AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

ORIGIN	DESTINATIONS 1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
SUB-TOT										
18	28	104	61	41	17	45	133	114	96	374
19	3	23	13	7	5	2	26	46	32	85
20	15	63	33	37	22	25	103	64	80	257
21	1	10	6	5	1	6	12	13	7	33
22	5	23	69	20	13	1	16	139	10	85
23	12	37	42	22	11	27	44	83	27	102
SUB-TOT	64	260	224	132	69	106	334	459	252	936
FIN-TOT	64	260	224	132	69	106	334	459	252	936

TABLE S-4

TOTAL TRIPS BY PASSENGER CAR AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

DESTINATIONS

ORIGIN	11	12	13	14	15	16	17	18	19	20
1								34	7	15
2								130	40	73
3								12	3	8
4								26	10	26
5								22	5	11
6								38	5	14
7								164	35	102
8								108	36	75
9								132	30	90
10								363	108	238
11								111	30	108
12								64	19	46
13								33	29	36
14								268	93	404
15								160	37	152
16								108	27	137
17								22	14	32
SUB-TOT								1795	528	1567
18	74	43	29	297	194	105	23		58	986
19	22	19	22	68	37	29	12	54		48
20	95	36	38	391	147	110	41	1231	62	
21	9	3	3	34	21	15	8	51	23	14
22	28	12	24	65	66	14	16	13		33
23	33	24	23	83	49	11	13	24	1	8
SUB-TOT	261	137	139	938	514	284	113	1373	144	1089
FIN-TOT	261	137	139	938	514	284	113	3168	672	2656

TABLE S-4

TOTAL TRIPS BY PASSENGER CAR AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

ORIGIN	DESTINATIONS 21	22	23
1	3	12	6
2	14	36	33
3	1	59	20
4	4	27	22
5	4	7	7
6	3	6	18
7	10	47	37
8	17	63	49
9	11	18	38
10	40	95	75
11	7	34	24
12	6	8	18
13	4	36	35
14	45	59	59
15	34	51	43
16	17	30	23
17	6	17	17
SUB-TOT	226	605	524
18	30	14	21
19	16		1
20	14	25	11
21		4	1
22	4		
23	6		
SUB-TOT	70	43	34
FIN-TOT	296	648	558

TABLE S-4

TOTAL TRIPS BY PASSENGER CAR AND TAXI DRIVERS FOR A 24-HOUR WEEKDAY IN 1968

		SUB-TOT	SUB-TOT	FIN-TOT
1			77	77
2			326	326
3			103	103
4			115	115
5			56	56
6			84	84
7			395	395
8			348	348
9			319	319
10			919	919
11			314	314
12			161	161
13			173	173
14			928	928
15			477	477
16			342	342
17			108	108
	SUB-TOT		5245	5245
18		1778	1109	2887
19		451	119	570
20		1557	1343	2900
21		187	93	280
22		606	50	656
23		643	39	682
	SUB-TOT	5222	2753	7975
	FIN-TOT	5222	7998	13220

SINGLE ZONE TRIP TABLE
BY DESTINATION PURPOSE

This trip table is tabulated by O-D zone of origin, listed in the upper left hand corner, and by O-D zones of destination, listed down the left hand margin. The external stations are numbered 18-23 and the internal zones are numbered 1-17.

In addition to total vehicle trips, this table includes a listing of all driver trips by destination purposes.

In this table trip volumes are given directionally. Therefore, to find the total movements between two zones, it will be necessary to use each zone once as an origin and once as a destination and then total the two volumes.

Big Rapids

Origin Zone 1 — Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	37	13	9	11	70
19	3	2	1	1	7
20	12	7	3	3	25
21	2	1			3
22	8	2	2		12
23	8		2	2	12
Total	70	25	17	17	129

Origin Zone 2

18	72	39	10	31	152
19	20	11	6	10	47
20	36	19	5	22	82
21	6	6	2	8	22
22	17	15	2	11	45
23	17	6	2	17	42
Total	168	96	27	99	390

Big Rapids

Origin Zone 3 — Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	17	2	8		27
19	3	1			4
20	9	1		1	11
21	1				1
22	55	2		2	59
23	25				25
Total	110	6	8	3	127

Origin Zone 4

18	24	3	1	5	33
19	15	4	2		21
20	18	10	2	3	33
21	6	1	1		8
22	21	8	17	2	48
23	32	5		1	38
Total	116	31	23	11	181

Big Rapids

Origin Zone 5 — Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	11	9	1	5	26
19	5	2	2		9
20	10	2		2	14
21	5				5
22	8	2	1		11
23	8	1			9
Total	47	16	4	7	74

Origin Zone 6

18	24	10	2	4	40
19	7	1			8
20	11	2		2	15
21	3	1			4
22	4	2			6
23	19	2			21
Total	68	18	2	6	94

Big Rapids

Origin Zone 7 — Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	56	47	73	25	201
19	7	10	6	14	37
20	26	27	18	45	116
21	2	5	2	4	13
22	5	14	18	16	53
23	6	10	12	15	43
Total	102	113	129	119	463

Origin Zone 8

18	34	46	10	38	128
19	6	12	7	19	44
20	37	24	7	21	89
21	9	5	1	3	18
22	28	8	4	39	79
23	11	13	1	26	51
Total	125	108	30	146	409

Big Rapids

Origin Zone 9 — Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	67	34	16	47	164
19	2	9	2	17	30
20	34	28	8	35	105
21	6	5		5	16
22	5	8	1	8	22
23	12	16		12	40
Total	126	100	27	124	377

Origin Zone 10

18	134	121	135	62	452
19	28	34	51	8	121
20	109	63	89	40	301
21	15	13	17	5	50
22	39	24	37	6	106
23	36	16	20	13	85
Total	361	271	349	134	1115

Big Rapids

Origin Zone 11 — Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	34	25	18	42	119
19	3	15	3	9	30
20	29	42	8	39	118
21	1	2	1	4	8
22	5	25	2	2	34
23	8	13	3	1	25
Total	80	122	35	97	334

Origin Zone 12

18	17	6	12	34	69
19	1	2		16	19
20	19	5	1	25	50
21	1	2		3	6
22	3	5	1		9
23	3	6		10	19
Total	44	26	14	88	172

Big Rapids

Origin Zone 13 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	42	20	6	6	74
19	11	8	12	4	35
20	41	15	1	8	65
21	8		1	1	10
22	29	8	8	17	62
23	15	13	16	10	54
Total	146	64	44	46	300

Origin Zone 14

18	140	99	8	52	299
19	34	41	2	18	95
20	139	171	12	112	434
21	22	14	2	16	54
22	45	20	1	13	79
23	45	9	3	5	62
Total	425	354	28	216	1023

Big Rapids

Origin Zone 15 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	41	63	68	20	192
19	7	16	11	7	41
20	50	46	52	25	173
21	7	10	21	1	39
22	26	9	15	5	55
23	15	10	20	2	47
Total	146	154	187	60	547

Origin Zone 16

18	58	18	15	34	125
19	5	5	7	13	30
20	52	20	27	66	165
21		1	12	5	18
22	11	2	14	3	30
23	5	3	7	8	23
Total	131	49	82	129	391

Big Rapids

Origin Zone 17 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
18	13	12		1	26
19	3	8		3	14
20	17	15	1	4	37
21	2	4			6
22	2	10		5	17
23	10	6		1	17
Total	47	55	1	14	117

Big Rapids

Origin Zone 18 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
1	13	16	7	9	45
2	65	25	6	35	131
3	70	4			74
4	36	3	4	9	52
5	23		2	1	26
6	40	6	1	5	52
7	50	30	46	28	154
8	65	30	7	36	138
9	37	32	7	41	117
10	152	103	116	64	435
11	31	17	9	25	82
12	25	15	6	17	63
13	40	11	2	9	62
14	228	30	11	57	326
15	41	48	92	33	214
16	29	15	33	37	114
17	11	8		4	23
19	29	14	4	31	78
20	518	205	35	628	1386
21	12	6	1	24	43
22	10	6	1	4	21
23	17	4		4	25
Total	1542	628	390	1101	3661

Big Rapids

Origin Zone 19 Single Zone Trip Table By Destination Purpose

Dest Zone	Work	Business	Shopping	Social Rec.	Total Trips
1	3			4	7
2	8	3	2	15	28
3	15				15
4	15	1		2	18
5	8				8
6	6		1		7
7	11	2	8	12	33
8	14	3	3	36	56
9	7	5	2	23	37
10	32	18	40	8	98
11	8	4		13	25
12	3			17	20
13	22	1	4	10	37
14	43	3		25	71
15	12	3	17	8	40
16	2	1	3	23	29
17	3	7		2	12
18	28	9	5	31	73
20	18	12	4	28	62
21	7	4		10	21
23	2				2
Total	267	76	89	267	699

Big Rapids

Origin Zone 20 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
1	12	4	2	8	26
2	33	17	8	16	74
3	38	2		2	42
4	46	2	1	6	55
5	23	1	1	1	26
6	17	5	2	4	28
7	39	14	11	56	120
8	40	11	6	26	83
9	31	7	7	50	95
10	136	50	90	34	310
11	51	18	1	36	106
12	15	5	3	14	37
13	33	3	10	21	67
14	302	58	1	74	435
15	47	22	63	38	170
16	37	13	32	48	130
17	22	22		7	51
18	584	153	25	888	1650
19	23	16	6	29	74
21	5	4	1	10	20
22	6	10		13	29
23	8	1		4	13
Total	1548	438	270	1385	3641

Big Rapids

Origin Zone 21 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
1	1				1
2	7			9	16
3	6				6
4	6		1		7
5	2				2
6	9				9
7	6		4	4	14
8	11	3		2	16
9	4	3			7
10	19	15	4		38
11	1	4		4	9
12	2			2	4
13	6		1	1	8
14	30			11	41
15	10	2	9	7	28
16	6		9	3	18
17	2	4		2	8
18	25	6	1	34	66
19	11	2	2	13	28
20	5	3	1	8	17
22	2	1		3	6
23	1			1	2
Total	172	43	32	104	351

Big Rapids

Origin Zone 22 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
1	5		1	2	8
2	22		3	9	34
3	72	1			73
4	29	1	1	1	32
5	15	1		1	17
6	1		1		2
7	11		5	2	18
8	27	2	1	129	159
9	3		1	7	11
10	38	6	52	7	103
11	18	3		10	31
12	6		1	5	12
13	14	1	6	11	32
14	74				74
15	14	5	54	2	75
16	11		1	2	14
17	3	6		7	16
18	12	2		6	20
20	11			25	36
21	1			4	5
Total	387	28	127	230	772

Big Rapids

Origin Zone 23 Single Zone Trip Table By Destination Purpose

Dest. Zone	Work	Business	Shopping	Social Rec.	Total Trips
1	7	1	3	1	12
2	23	1	2	16	42
3	51				51
4	32	2			34
5	13			2	15
6	28		1	1	30
7	21	11	5	12	49
8	22	5	4	59	90
9	19	1		8	28
10	75	21	21	15	132
11	18	8		8	34
12	4	2	2	17	25
13	30	4	7	7	48
14	75	2		8	85
15	12	8	28	6	54
16	5		2	8	15
17	9	3		1	13
18	22	1		10	33
19		1			1
20	6			4	10
21	4	1		3	8
Total	476	72	75	186	809
Total All Zones	6704	2893	1990	4589	16176