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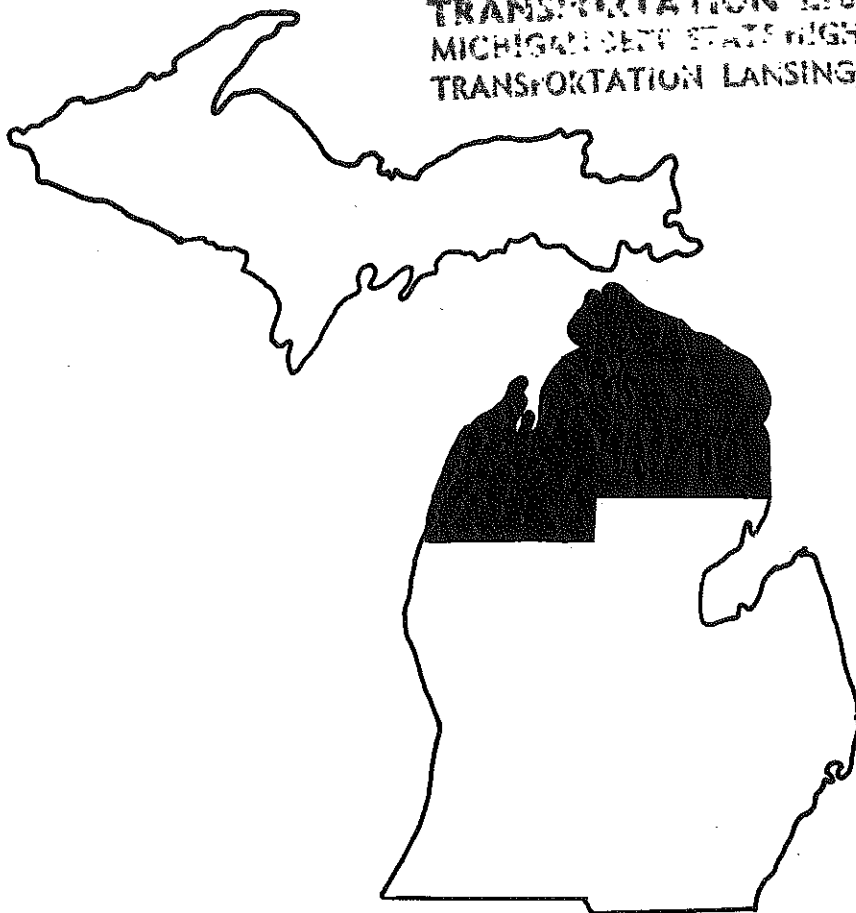
# MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

CHARLEVOIX EXTERNAL  
ORIGIN DESTINATION  
SURVEY

FACTUAL DATA REPORT

1974

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TRANSPORTATION LANSING, MICH.



MICHIGAN DEPARTMENT  
OF  
STATE HIGHWAYS AND TRANSPORTATION

CHARLEVOIX EXTERNAL  
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SURVEY

FACTUAL DATA REPORT

1974

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JOHN P. WOODFORD, DIRECTOR

May 27, 1976

Mr. Sam F. Cryderman, Deputy Director  
Bureau of Transportation Planning

Dear Mr. Cryderman:

The Multi-Regional Planning Division of the Bureau of Transportation Planning has documented the results of the "Charlevoix External Origin-Destination Survey". The purpose of the origin-destination survey, conducted in August, 1974, was to determine the traffic patterns in the area in order to provide a sound basis for planning an efficient future transportation system.

This report was jointly prepared by Sam Wallace and Steve Schafer under the direct guidance of Thomas Pickens, Traffic Analyst for the North Region Planning Section.

Sincerely,

A handwritten signature in cursive script that reads "Keith E. Bushnell".

Keith E. Bushnell, Administrator  
Multi-Regional Planning Division



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## STUDY AREA

The City of Charlevoix, the county seat of Charlevoix County, is located in the northwest portion of lower Michigan, approximately 270 miles from Detroit and about 180 miles from Grand Rapids.

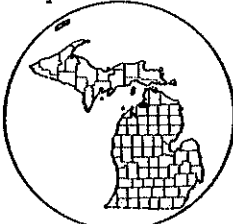
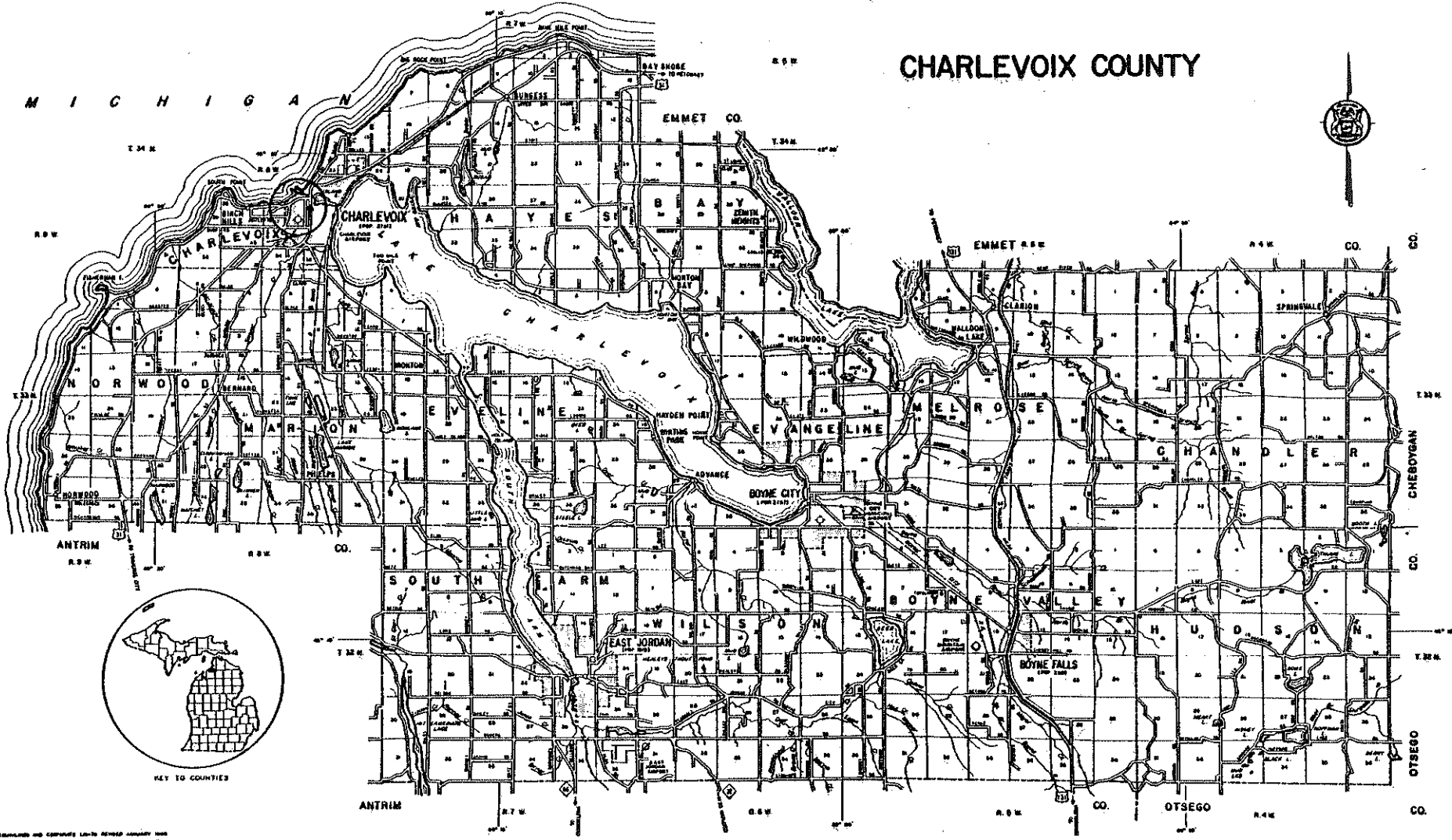
The economy of Charlevoix, which has a population of 3,500 (1970), is based primarily on the tourist trade. Situated on three lakes, the city is a haven for Great Lakes yachtsmen. Charlevoix is also a hub for much winter sports activity. Several small manufacturers in the area which provide employment for the residents include: American Mold Engineering Company and Freedman Aircraft Engineering Corporation.

Trunk line facilities which service the city include US-31 and M-32 and 66, providing north-south and east-west access. US-31 is a principal north-south connector in the Lower Peninsula of Michigan and provides Charlevoix with access to the more populous urban areas to the south.



L A K E

# CHARLEVOIX COUNTY



KEY TO COUNTIES

BOUNDARIES AND CORPORATE LIMITS REVERSED JANUARY 1908

## TERMINOLOGY AND DEFINITIONS

Central Business District (CBD) --- The Zone or zones comprising the concentrated commercial and retail business center of a city.

Classification Counts --- A survey of vehicles in which those passing through the study area are placed in categories (passenger cars, single unit trucks, etc.).

Cordon Line --- An imaginary line around the area under study.

Destination --- The place where a trip ends.

External Station --- A point on a route crossing the cordon line at which the drivers of vehicles are interviewed and classification counts are taken.

Interview Counts --- A survey of vehicles in which those passing through the study area are stopped and drivers interviewed regarding the origin, destination and purpose of the trip.

Origin --- The place where a trip begins.

Origin - Destination Zone --- (Analysis Zone) a basic subdivision of the study area having a single or dominant land use, designed as such for purposes of tabulation and analysis.

Study Area --- The geographical area selected for the origin and destination study.

Terminal Trip --- A trip with one end outside the study area and the other end inside the study area. (Beginning or ending at one of the internal analysis zones).

Through Trip --- A trip passing through the study area. (Both ends of the trip outside the cordon line).

Trip --- One-way travel between an origin and destination.

Trip Ends --- Each trip has two ends; an origin and a destination.

Trip Length-Average --- The value that is determined by summing all of the recorded trip lengths and dividing by the number of trips.

Trip Length-Median ---- The value that is determined by dividing the trip length distribution so that an equal number of trips are on either side of it.



## FIELD PROCEDURE

Field work for the Charlevoix External Origin-Destination Survey was conducted during August of 1974. The purpose of the study was to collect data on traffic movement into, out of, and through the Charlevoix area.

A cordon line was drawn around the Charlevoix area in order to define the study area. Where the cordon line crossed a road an external interview station was established. Six such stations were created for the Charlevoix area of which three were on truck lines.

Each of the six external stations was operated for fourteen hours. During the hours of operation, vehicles were stopped and drivers interviewed regarding the origin, destination and purpose of the trip. These interviews were made of vehicles traveling in each direction, i.e. inbound and outbound. Manual vehicle classification counts were taken in conjunction with interviews and during the remainder of that twenty-four hour day.

In addition, the study area was sub-divided into analyses zones based generally on homogeneous land uses. Each trip inbound or outbound from these zones was recorded.

Sample interview forms for both interviews and Manual Vehicle Classification Counts appear in the Appendix.

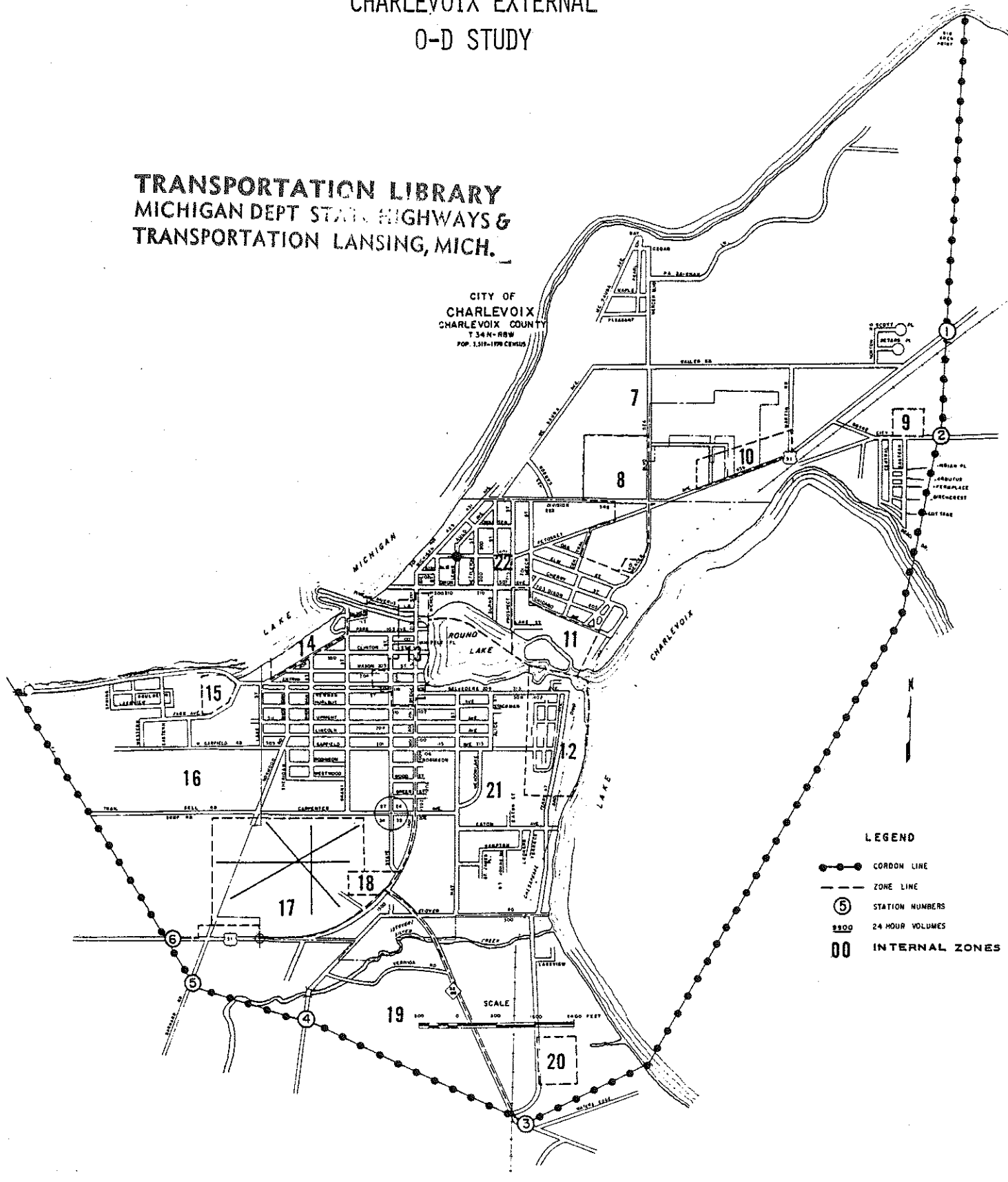
STATION LOCATIONS

<u>Station Number</u>	<u>Route</u>	<u>Location</u>
1	US-31, North	.6 Mi. Northwest of Boyne City Road
2	Boyne City Road	.6 Mi. East of US-31
3	M-32 & M-66, South	South of Waters Edge Road
4	Marion Center Road	.8 Mi. South of Stover Street, North of Clark Road
5	Barnard Road	.3 Mi. South of US-31
6	US-31, Southwest	Between Old US-31 and Barnard Road

# CHARLEVOIX EXTERNAL O-D STUDY

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CITY OF  
CHARLEVOIX  
CHARLEVOIX COUNTY  
T 34 N - R 5 W  
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### LEGEND

- CORDON LINE
- ZONE LINE
- STATION NUMBERS
- 24 HOUR VOLUMES
- INTERNAL ZONES

## All Stations

On an average August weekday in 1974, there were 19,896 vehicles which passed through the six interview stations located on the cordon line around the Charlevoix Study Area. Of the 19,896 vehicles, 15,650 (78.7 percent) traveled on trunk lines.

There were 11,321 interviews taken for 14-hours at the six stations. This is 56.9 percent of the 19,896 vehicles counted during the 24-hour period. Station 6 (US-31, Southwest) had 2,701 interviews taken in the 14-hour period or 47.2 percent of the 24-hour volume of 5,724 vehicles. This is the lowest percentage for any of the six stations. The highest percentage of 14-hour interviews of 24-hour volume was 80.6 percent at Station 5 (Barnard Road).

Station 1 (US-31, North) had the highest volume of 6,126 vehicles for a 24-hour period or 30.8 percent of the 19,896 counted vehicles at all stations. Station 5 (Barnard Road) had the lowest volume of traffic for a 24-hour period-837 vehicles or 4.2 percent of the total 19,896 vehicles.

Station 2 (Boyne City Road) had the highest percentage of terminal traffic-83.7 percent or 1,550 vehicles out of the 1,852 total. Station 6 (US-31, Southwest) had the lowest percent of terminal traffic-41.9 percent or 2,300 vehicles out of the 5,483 total.

There were 10,946 terminal trips. These are trips that have one end of the trip inside the study area and the other end outside the area. Zone 13 (Central Business District) generated the largest number of terminal trips-4,210 trips or 38.5 percent

of the 10,946 total terminal trips. Four zones (7, 13, 16, and 21) accounted for 8,879 terminal trips or 81.1 percent of the total 10,946 terminal trips.

The traffic volume at each station is as follows:

Station	Traffic	% of Grand Total
1 - US-31, North	6126	30.8
2 - Boyne City Road	1900	9.5
3 - M-32 & M-66, South	3800	19.1
4 - Marion Center Road	1509	7.6
5 - Barnard Road	837	4.2
6 - US-31, Southwest	<u>5724</u>	<u>28.8</u>
GRAND TOTAL	19896	100.0

	Traffic	% of Grand Total
Trunk line (Stations 1,3, and 6)	15650	78.7
Non-Trunk line (Stations 2,4, and 5)	<u>4246</u>	<u>21.3</u>
GRAND TOTAL	19896	100.0

\* The above totals are based on 24-Hour Classification Counts.

CHARLEVOIX  
TOTAL STATION TRIPS

Station	24-Hour <sup>1</sup> Traffic Counts	14-Hour Interviews	Percent Interviewed	Vehicle <sup>2</sup> Trips	Percent of Total Traffic
1	6126	3133	51.1	5956	31.0
2	1900	1390	73.2	1852	9.6
3	3800	2228	58.6	3648	19.0
4	1509	1194	79.1	1472	7.7
5	837	675	80.6	806	4.2
6	5724	2701	47.2	5483	28.5
TOTAL	19896	11321	56.9	19217	100.0

Station	Vehicle Trips	Terminal Trips	Percent of Total	Through Trips	Percent of Total
1	5956	2624	44.1	3332	55.9
2	1852	1550	83.7	302	16.3
3	3648	2767	75.8	881	24.2
4	1472	1095	74.4	377	25.6
5	806	610	75.7	196	24.3
6	5483	2300	41.9	3183	58.1
Vehicle Trips	19217	10946	57.0	8271	43.0
Adjusted Vehicle Total <sup>3</sup>	15082	10946	72.6	4136	27.4

1 Based on 24-Hour Classification Counts.

2 Based on 24-Hour Expanded Interview Counts. Expanded Interview Counts do not correspond exactly with Classification Counts due to two factors: (1) Motorcycles and buses, although counted in the Classification Counts, were not interviewed and do not appear in the Expanded Interview Counts. Listed below are the total of these vehicle types counted at each station.

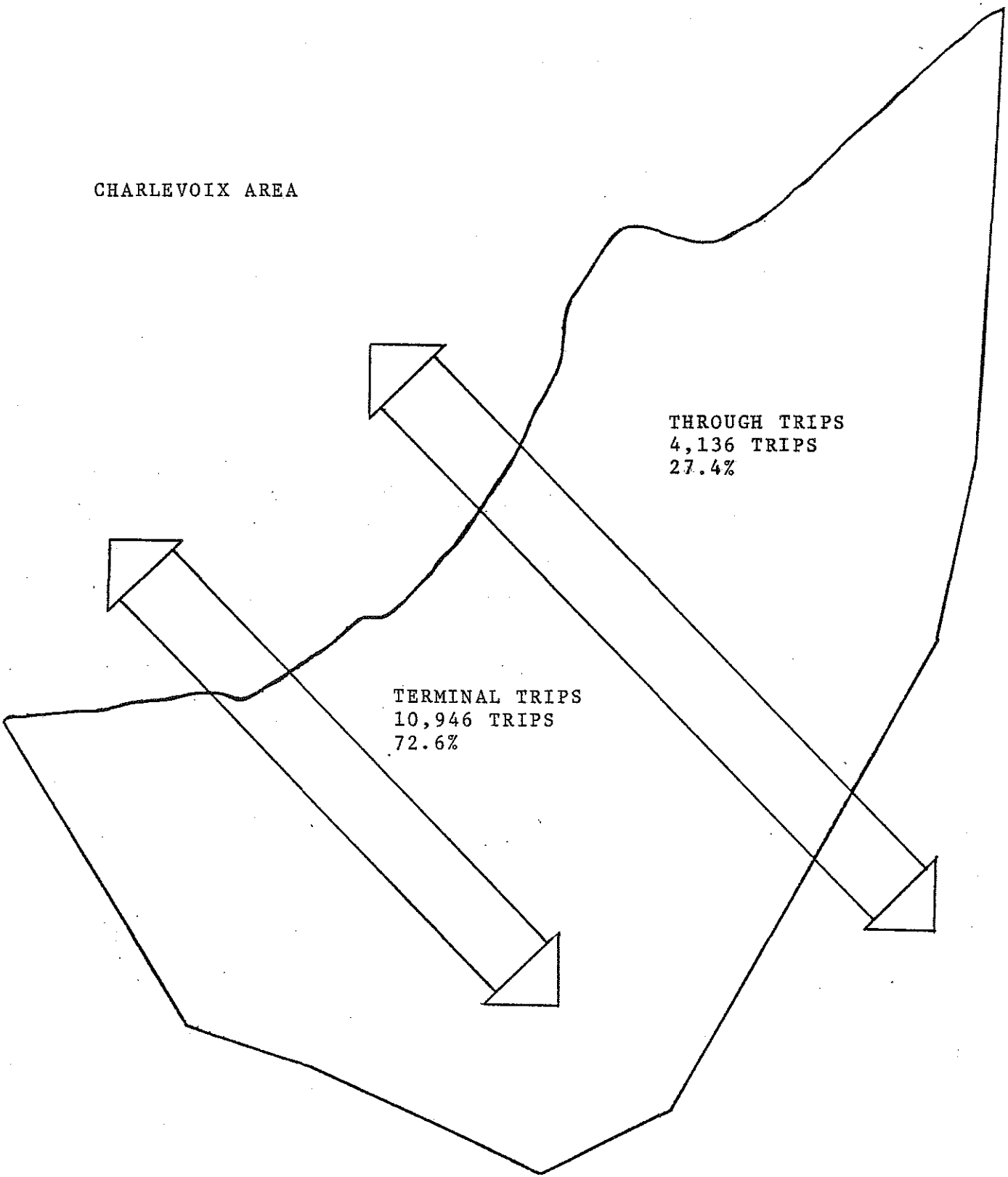
Station	1	2	3	4	5	6	Total
	<u>76</u>	<u>35</u>	<u>67</u>	<u>15</u>	<u>31</u>	<u>98</u>	<u>322</u>

(2) Due to the convention of certain computer programs, Expanded Interview Counts may not correspond exactly with 24-Hour Classification Counts.

3 A through trip is counted both at the station of entrance and exit. To adjust for this double counting it was necessary to half-factor through trip records. The above statistic has been rounded-off.

TRIP MOVEMENTS  
1974 AUGUST WEEKDAY  
TOTAL 15,082 TRIPS

CHARLEVOIX AREA



THROUGH TRIPS  
4,136 TRIPS  
27.4%

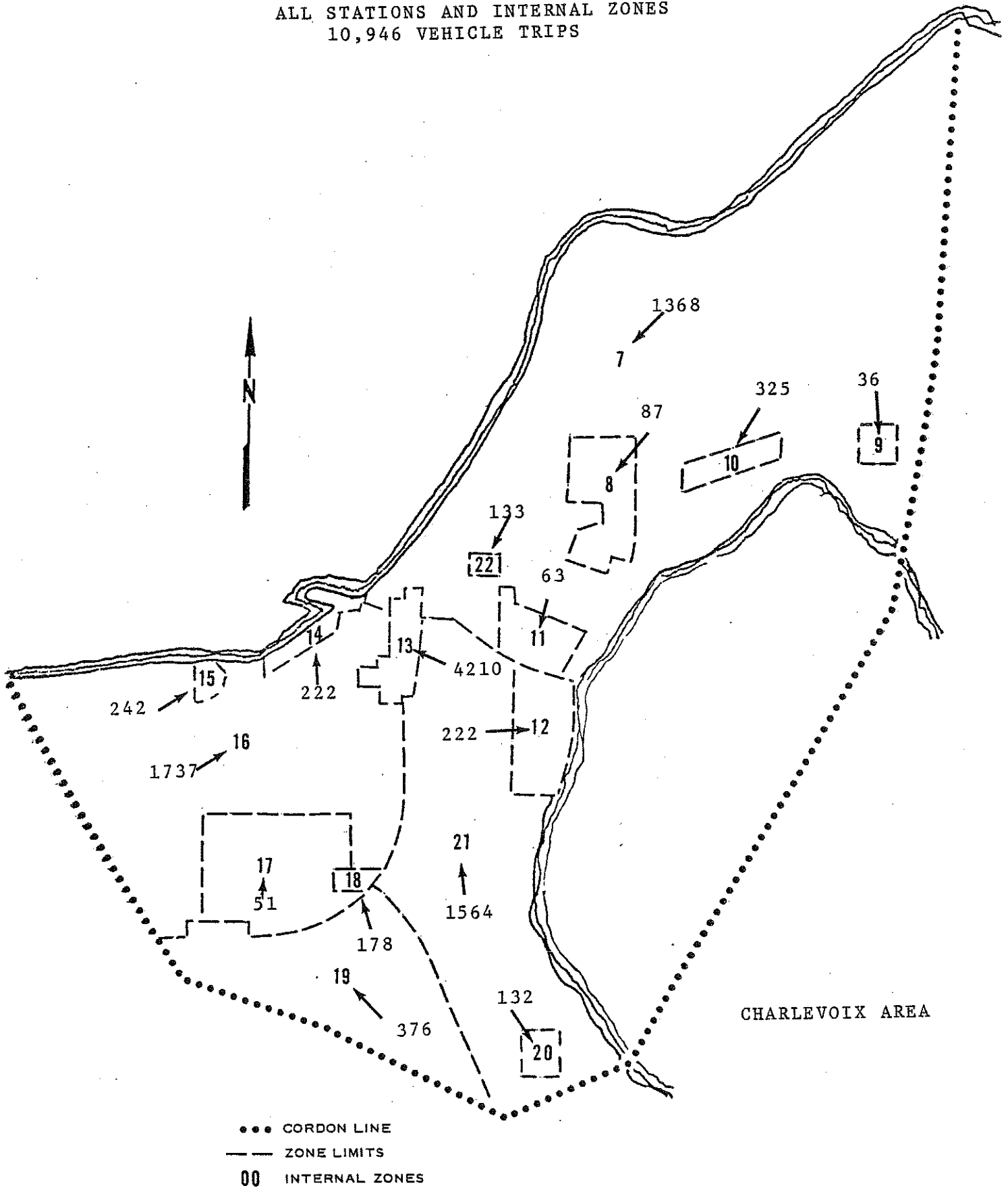
TERMINAL TRIPS  
10,946 TRIPS  
72.6%



ALL STATIONS COMBINED  
 TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zones</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	1368	12.5
8	87	0.8
9	36	0.3
10	325	3.0
11	63	0.6
12	222	2.0
13	4210	38.5
14	222	2.0
15	242	2.2
16	1737	15.9
17	51	0.5
18	178	1.6
19	376	3.4
20	132	1.2
21	1564	14.3
22	<u>133</u>	<u>1.2</u>
TOTAL	10946	100.0

TERMINAL TRAFFIC BETWEEN  
ALL STATIONS AND INTERNAL ZONES  
10,946 VEHICLE TRIPS



CHARLEVOIX AREA

## Station 1 (US-31, North)

Station 1 is located 0.6 miles northwest of Boyne City Road.

A total of 5,956 vehicles passed through this station. Tabulations on the following pages give a detailed documentation of this traffic.

Approximately 6 out of every 10 vehicles had a through trip in the study area. There were 8 out of every 10 vehicles which were autos and 9 out of every 100 vehicles which were panels or pickups irregardless of whether they traveled into or through the area.

The largest trip purpose was vacation with 2,077 trips or 34.9 percent of the 5,956 total trips. Over three-fourths of the vacation trips were through trips.

Station 6 (US-31, Southwest) accounted for 2,685 trips or 80.6 percent of the 3,332 through trips.

Zone 13 (Central Business District) accounted for 999 trips or 38.0 percent of the 2,624 terminal trips. Zones 7, 13, and 16 accounted for 2,009 trips or 76.6 percent of the 2,624 terminal trips.

There were 1,845 trips or 31.0 percent of the 5,956 trips that had a trip length of 20-40 minutes. There were 2,913 trips (48.9 percent) that had a trip length of one hour or less.

The origin and destination of all the trips which passed through the station were tabulated by county, Ontario and 7 states. There are two ends for each trip; an origin and a destination. There were 5,956 trips which passed through Station 1, accounting for 11, 912 total trip ends.

There were 3,986 trip ends (33.5 percent) in Charlevoix County. There were 827 trip ends (7.0 percent) in the Upper Peninsula. The Lower Peninsula accounted for 10,843 trip ends (91.0 percent). There were 242 origins and/or destinations (2.0 percent) outstate.

STATION 1, US-31, NORTH

<u>Vehicle Type</u>	<u>Vehicles</u>	Percent of <u>Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Passenger Car	4854	81.5	2198	45.3	2656	54.7
Passenger Car with Trailer	199	3.3	25	12.6	174	87.4
Panel or Pickup	528	8.9	281	53.2	247	46.8
Panel or Pickup with Trailer	44	0.8	3	6.8	41	93.2
Other Single Unit Trucks	199	3.3	84	42.2	115	57.8
Combinations and Trucks with Trailers	<u>132</u>	<u>2.2</u>	<u>33</u>	<u>25.0</u>	<u>99</u>	<u>75.0</u>
TOTAL	5956	100.0	2624	44.1	3332	55.9

<u>Trip Purpose</u>	<u>Vehicles</u>	Percent of <u>Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Work	1617	27.2	986	61.0	631	39.0
Personal Business	398	6.7	210	52.8	188	47.2
Shopping	527	8.8	3361	63.8	191	36.2
Vacation	2077	34.9	423	20.4	1654	79.6
Other Soc. or Rec.	1050	17.6	499	47.5	551	52.5
All Other	<u>287</u>	<u>4.8</u>	<u>170</u>	<u>59.2</u>	<u>117</u>	<u>40.8</u>
TOTAL	5956	100.0	2624	44.1	3332	55.9

STATION 1, US-31, NORTH

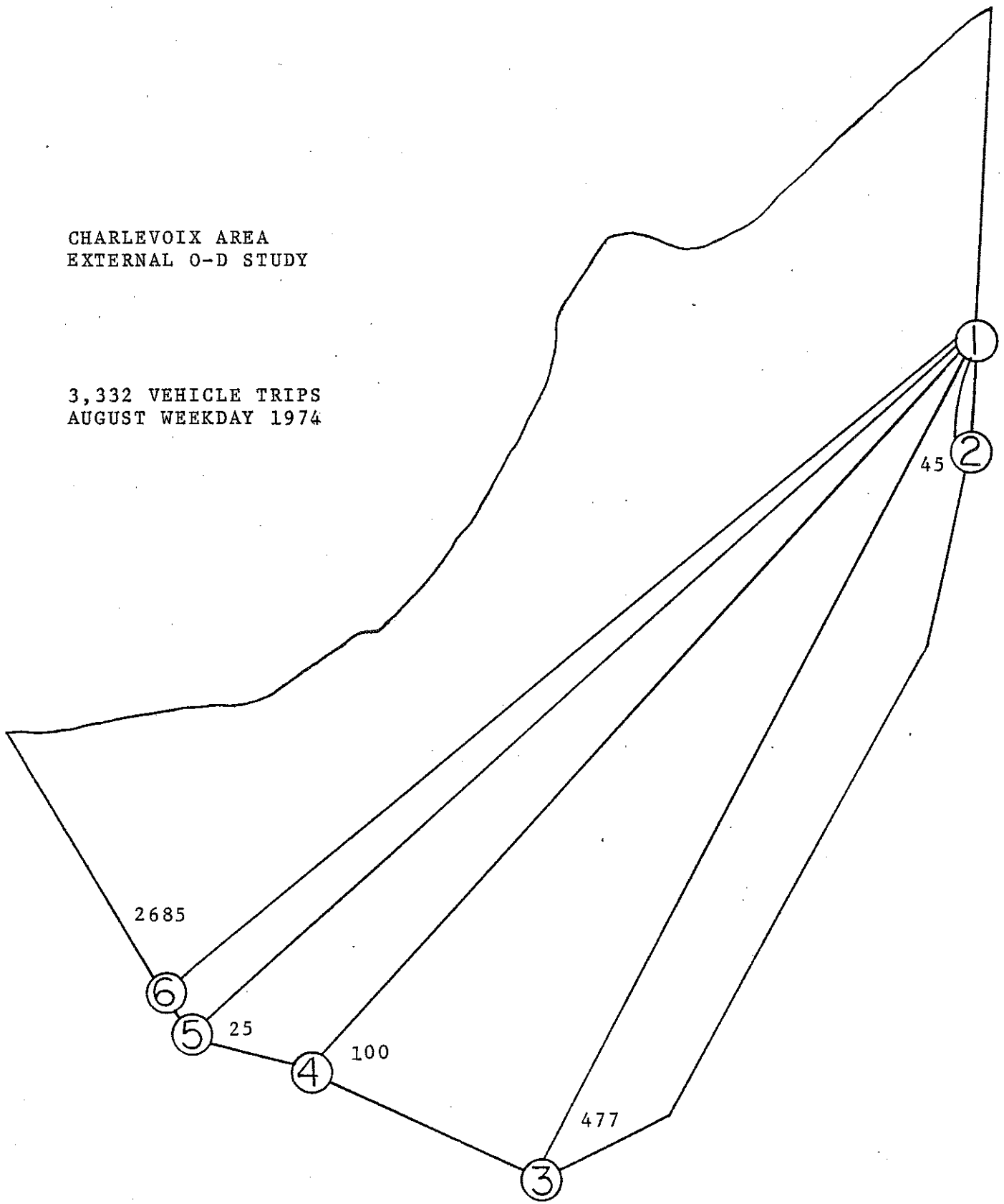
THROUGH TRIPS TO EXTERNAL STATIONS

<u>External Station</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
2-Boyne City Road	45	1.4
3-M-32 & M-66, South	477	14.3
4-Marion Center Road	100	3.0
5-Barnard Road	25	0.7
6-US-31, Southwest	<u>2685</u>	<u>80.6</u>
TOTAL	3332	100.0

THROUGH TRAFFIC INTERCHANGE  
STATION 1, US-31, NORTH

CHARLEVOIX AREA  
EXTERNAL O-D STUDY

3,332 VEHICLE TRIPS  
AUGUST WEEKDAY 1974

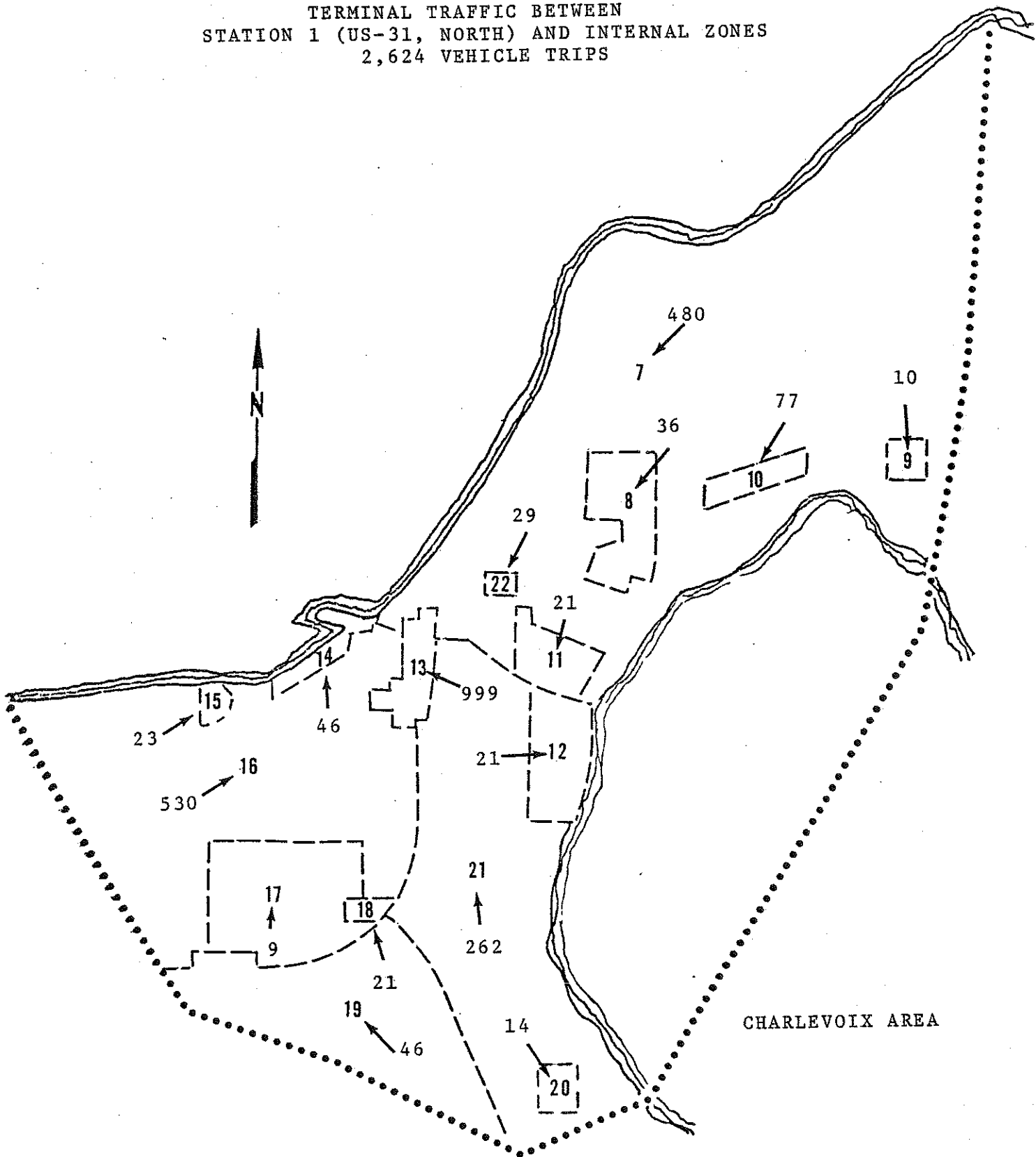


STATION 1, US-31, NORTH  
 TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zone</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	480	18.3
8	36	1.4
9	10	0.4
10	77	2.9
11	21	0.8
12	21	0.8
13	999	38.0
14	46	1.8
15	23	0.9
16	530	20.2
17	9	0.3
18	21	0.8
19	46	1.8
20	14	0.5
21	262	10.0
22	<u>29</u>	<u>1.1</u>
TOTAL	2624	100.0



TERMINAL TRAFFIC BETWEEN  
 STATION 1 (US-31, NORTH) AND INTERNAL ZONES  
 2,624 VEHICLE TRIPS



CHARLEVOIX AREA

- CORDON LINE
- ZONE LIMITS
- 00 INTERNAL ZONES

STATION 1, US-31, NORTH

<u>TRIP LENGTHS</u>		
<u>Minutes</u>	<u>No. of Trips</u>	<u>Percent of Totals</u>
1-20	616	10.3
20-40	1845	31.0
40-60	452	7.6
60-90	888	14.9
90-120	257	4.3
120-180	715	12.0
180-240	403	6.8
240-300	342	5.7
300-360	170	2.8
360-420	83	1.4
420-480	62	1.0
480-540	59	1.0
540-600	31	0.5
600-680	21	0.4
680-760	9	0.2
760-840	<u>3</u>	<u>0.1</u>
TOTAL	5956	100.0

Longest Trip = 14 Hr. Average Trip Length = 114 Min.  
 Median Trip Length = 60 Min.\*

\*Due to the convention of the computer program, this value can be approximated only in 10 minute intervals.



Station 2, (Boyne City Road)

Station 2 is located 0.6 miles east of US-31.

A total of 1,852 vehicles passed through this station.

Tabulations on the following pages give a detailed documentation of this traffic.

Approximately 8 out of every 10 vehicles had a terminal inside the study area. There were 8 of every 10 vehicles which were autos and 14 out of every 100 vehicles which were panels or pickups irregardless of whether they traveled into or through the area. More than 85 percent of the passenger cars and panels or pickups had a terminal inside the study area.

The largest trip purpose was work with 702 trips or 37.9 percent of the 1,852 total trips. All trip purposes except vacation had 80 percent or more terminal traffic.

Station 6 (US-31, Southwest) accounted for 133 trips or 44.1 percent of the 302 through trips.

Zone 13 (Central Business District) accounted for 507 trips or 32.7 percent of the 1,550 terminal trips. Zones 7, 13, and 16 accounted for 1,005 trips or 64.9 percent of the 1,550 terminal trips.

There were 1,540 trips or 83.1 percent of the 1,852 trips that had a trip length of 1-20 minutes. There were 1,732 trips (93.5 percent) that had a trip length of one hour or less.

The origin and destination of all the trips which passed through the station were tabulated by county, and 1 state. There are two ends for each trip; an origin and a destination. There were 1,852 trips which passed through Station 2, accounting for 3,704 total trip ends.

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There were 3,466 trip ends (93.6 percent) in Charlevoix County.  
There were 5 trip ends (0.1 percent) in the Upper Peninsula. The  
Lower Peninsula accounted for 3,698 trip ends (99.9 percent).  
There was 1 origin or destination outstate.

STATION 2, BOYNE CITY ROAD

<u>Vehicle Type</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Passenger Car	1476	79.7	1276	86.4	200	13.6
Passenger Car with Trailer	24	1.3	6	25.0	18	75.0
Panel or Pickup	255	13.8	205	80.4	50	19.6
Panel or Pickup with Trailer	8	0.4	5	62.5	3	37.5
Other Single Unit Trucks	68	3.7	44	64.7	24	35.3
Combinations and Trucks with Trailers	<u>21</u>	<u>1.1</u>	<u>14</u>	66.7	<u>7</u>	33.3
TOTAL	1852	100.0	1550	83.7	302	16.3

<u>Trip Purpose</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Work	702	37.9	559	79.6	143	20.4
Personal Business	158	8.5	149	94.3	9	5.7
Shopping	271	14.7	261	96.3	10	3.7
Vacation	145	7.8	91	62.8	54	37.2
Other Soc. or Rec.	368	19.9	301	81.8	67	18.2
All Other	<u>208</u>	<u>11.2</u>	<u>189</u>	90.9	<u>19</u>	9.1
TOTAL	1852	100.0	1550	83.7	302	16.3

STATION 2, BOYNE CITY ROAD

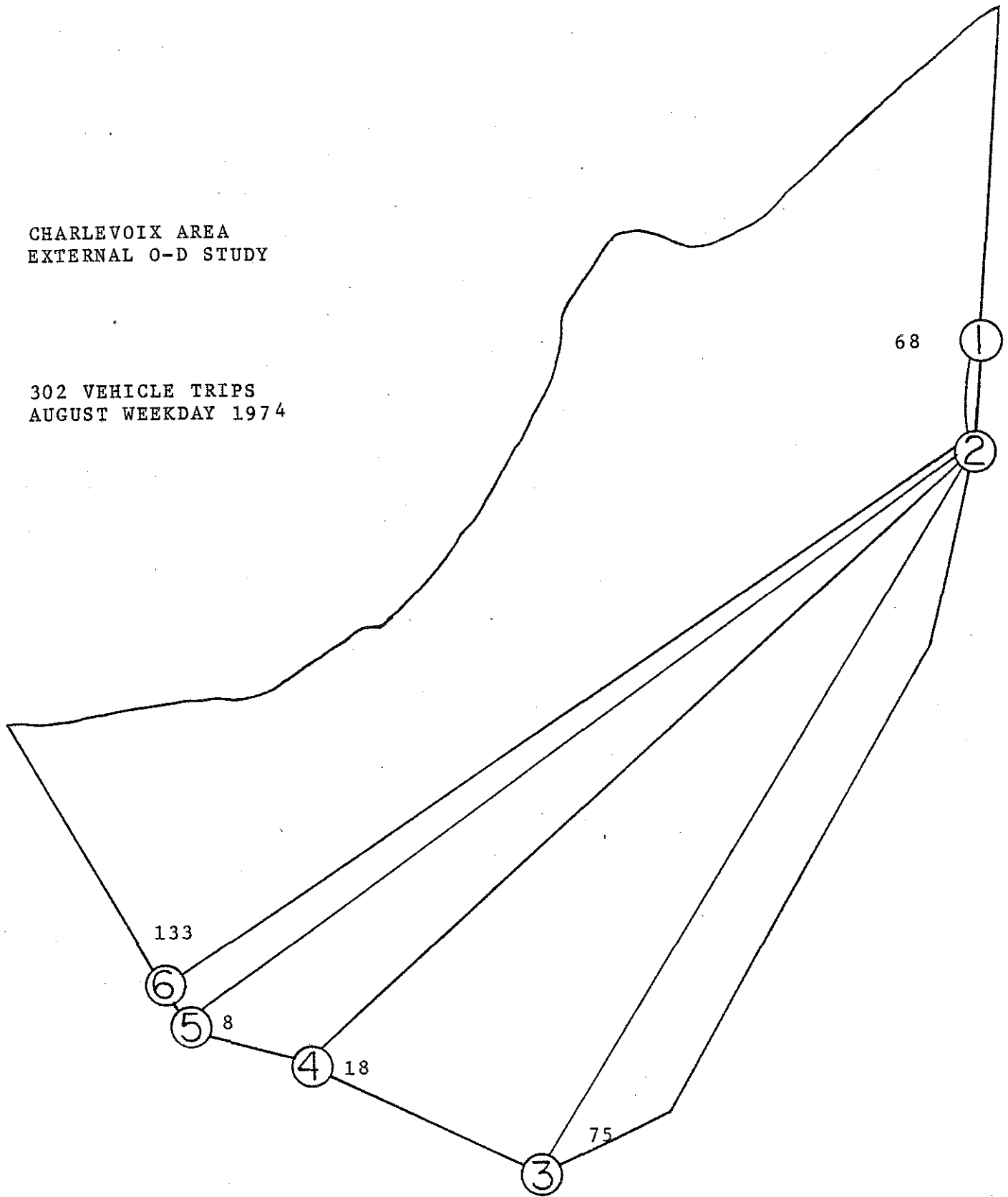
THROUGH TRIPS TO EXTERNAL STATIONS

<u>External Station</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
1-US-31, North	68	22.5
3-M-32 & M-66, South	75	24.8
4-Marion Center Road	18	6.0
5-Barnard Road	8	2.6
6-US-31, Southwest	<u>133</u>	<u>44.1</u>
TOTAL	302	100.0

THROUGH TRAFFIC INTERCHANGE  
STATION 2, BOYNE CITY ROAD

CHARLEVOIX AREA  
EXTERNAL O-D STUDY

302 VEHICLE TRIPS  
AUGUST WEEKDAY 1974



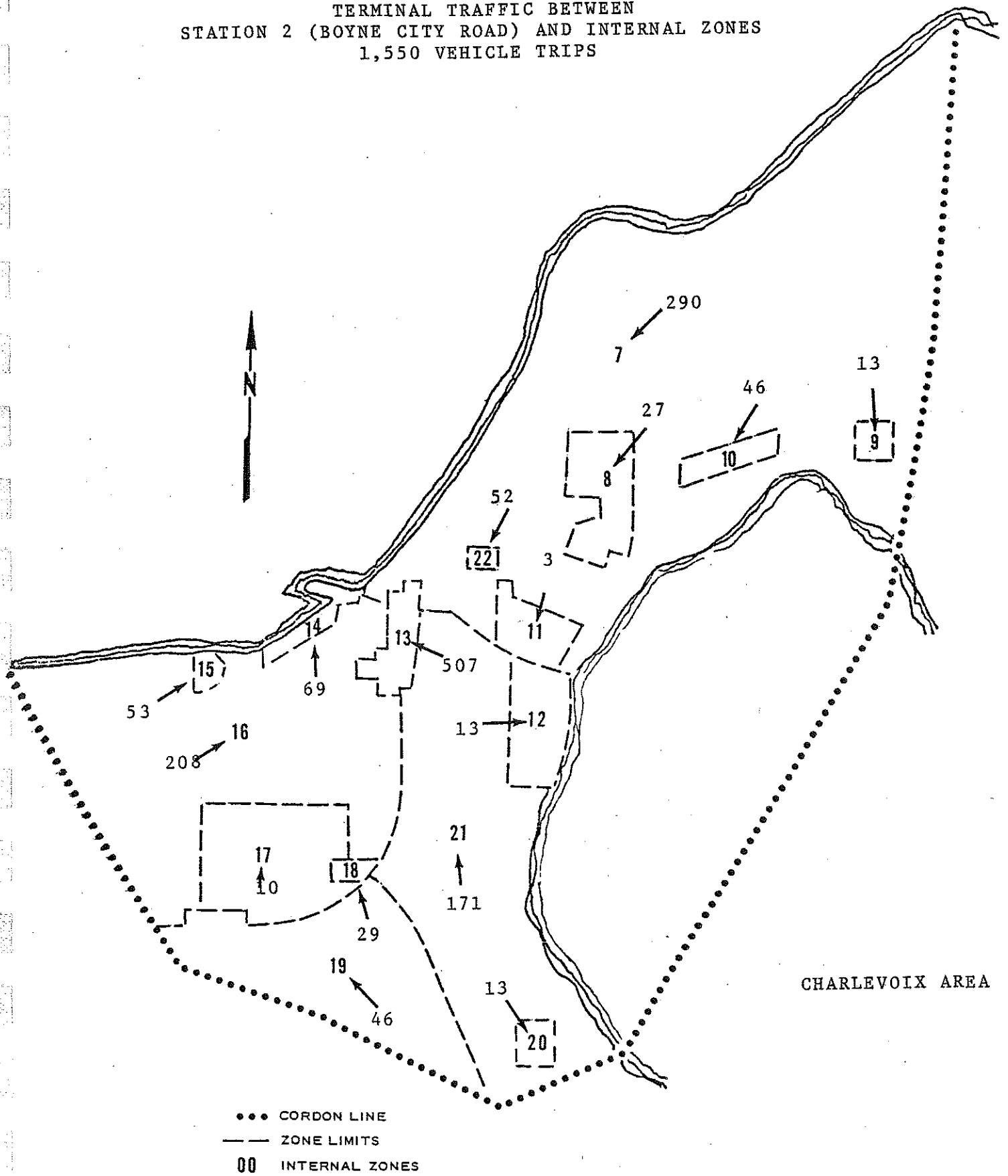


STATION 2, BOYNE CITY ROAD

TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zone</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	290	18.7
8	27	1.7
9	13	0.8
10	46	3.0
11	3	0.2
12	13	0.8
13	507	32.7
14	69	4.5
15	53	3.4
16	208	13.4
17	10	0.7
18	29	1.9
19	46	3.0
20	13	0.8
21	171	11.0
22	<u>52</u>	<u>3.4</u>
TOTAL	1550	100.0

TERMINAL TRAFFIC BETWEEN  
 STATION 2 (BOYNE CITY ROAD) AND INTERNAL ZONES  
 1,550 VEHICLE TRIPS



CHARLEVOIX AREA

STATION 2, BOYNE CITY ROAD

TRIP LENGTHS

<u>Minutes</u>	<u>No. of Trips</u>	<u>Percent of Totals</u>
1-20	1540	83.1
20-40	174	9.4
40-60	18	1.0
60-90	83	4.5
90-120	8	0.4
120-180	9	0.4
180-240	13	0.7
240-300	5	0.3
300-360	1	0.1
360-420	0	0.0
420-480	0	0.0
480-540	0	0.0
540-600	0	0.0
600-680	<u>1</u>	<u>0.1</u>
TOTAL	1852	100.0

Longest Trip = 10 Hr. 50 Min. Average Trip Length = 20 Min.  
 Median Trip Length = 10 Min.\*

\* Due to the convention of the computer program, this value can be approximated only in 10 minute intervals.



Station 3, (M-32 & M-66, South)

Station 3 is located south of Waters Edge Road.

A total of 3,648 vehicles passed through this station.

Tabulations on the following pages give a detailed documentation of this traffic.

Approximately 8 out of every 10 vehicles had a terminal inside the study area. There were 8 of every 10 vehicles which were autos and 16 out of 100 vehicles which were panels or pickups irregardless of whether they traveled into or through the area. More than 75 percent of the passenger cars and panels or pickups had a terminal inside the study area.

The largest trip purpose was work with 1,135 trips or 31.1 percent of the 3,648 total trips. All trip purposes except vacation had more than 70 percent terminal traffic.

Station 1 (US-31, North) accounted for 478 trips or 54.2 percent of the 881 through trips. Stations 1 and 6 accounted for 721 trips or 81.8 percent of the 881 through trips.

Zone 13 (Central Business District) accounted for 1,140 trips or 41.2 percent of the 2,767 terminal trips. Zones 13, 16, and 21 accounted for 2,012 trips or 72.7 percent of the 2,767 terminal trips.

There were 2,025 trips or 55.5 percent of the 3,648 trips that had a trip length of 1-20 minutes. There were 3,135 trips (85.9 percent) that had a trip length of one hour or less.

The origin and destination of all the trips which passed through the station were tabulated by county, Ontario and 7 states. There are two ends for each trip; an origin and a destination. There were 3,648 trips which passed through Station 3, accounting for 7,296 total trip ends.

There were 6,313 trip ends (86.5 percent) in Charlevoix County. There were 41 trip ends (0.6 percent) in the Upper Peninsula. The Lower Peninsula accounted for 7,229 trip ends (99.0 percent). There were 26 origins and/or destinations (0.4 percent) outstate.

STATION 3, M-32 & M-66, SOUTH

<u>Vehicle Type</u>	<u>Vehicles</u>	Percent of <u>Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Passenger Car	2812	77.1	2175	77.3	637	22.7
Passenger Car with Trailer	64	1.8	36	56.3	38	43.7
Panel or Pickup	592	16.2	448	75.7	144	24.3
Panel or Pickup with Trailer	39	0.8	13	44.8	16	55.2
Other Single Unit Trucks	110	3.0	70	63.6	40	36.4
Combinations and Trucks with Trailers	<u>41</u>	<u>1.1</u>	<u>25</u>	61.0	<u>16</u>	39.0
TOTAL	3648	100.0	2767	75.8	881	24.2

<u>Trip Purpose</u>	<u>Vehicles</u>	Percent of <u>Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Work	1135	31.1	808	71.2	327	28.8
Personal Business	366	10.0	297	81.1	69	18.9
Shopping	560	15.4	512	91.4	48	8.6
Vacation	390	10.7	242	62.1	148	37.9
Other Soc. or Rec.	719	19.7	534	74.3	185	25.7
All Other	<u>478</u>	<u>13.1</u>	<u>374</u>	78.2	<u>104</u>	21.8
TOTAL	3648	100.0	2767	75.8	881	24.2

STATION 3, M-32 & M-66, SOUTH

THROUGH TRIPS TO EXTERNAL STATIONS

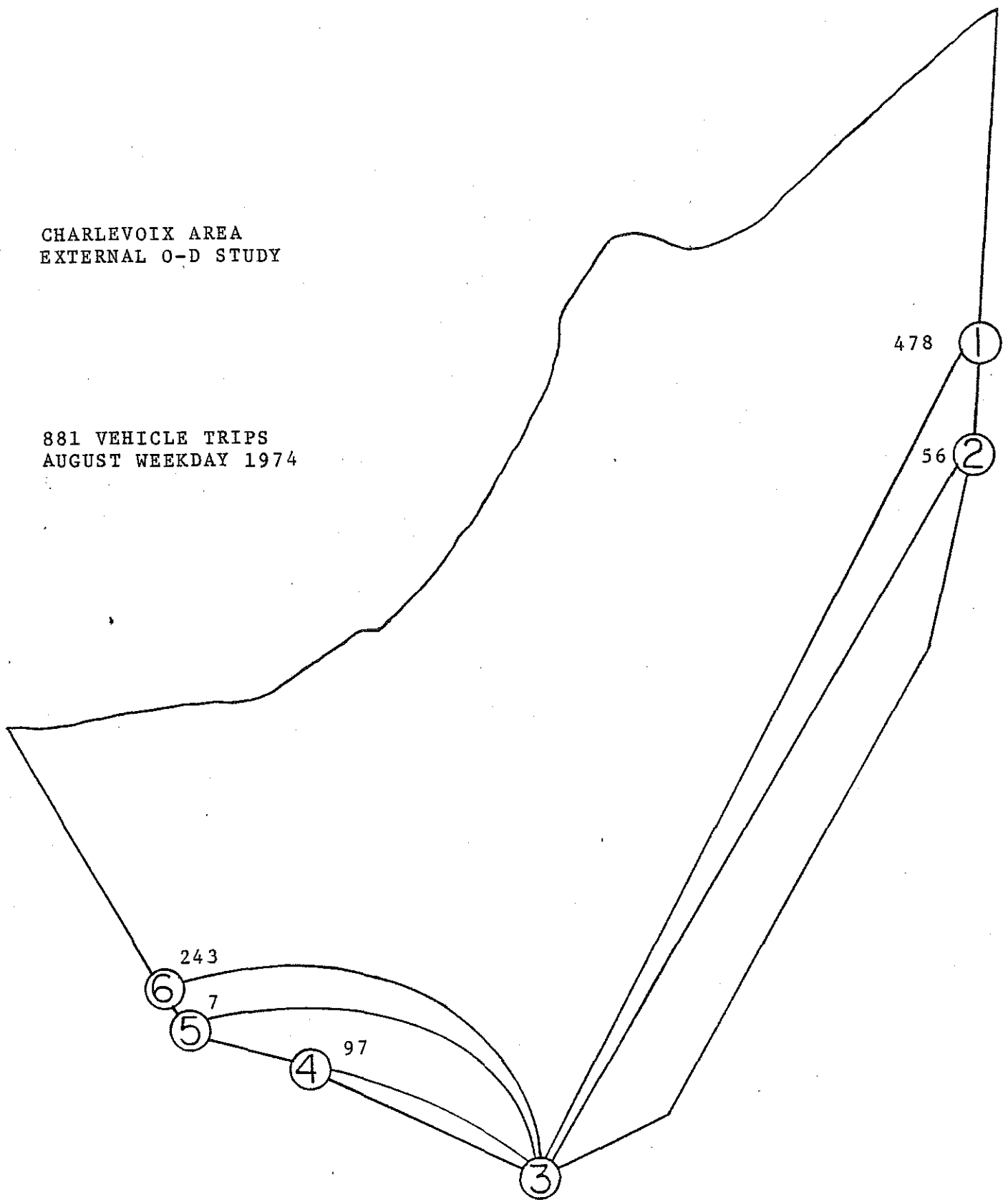
<u>External Station</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
1-US-31, North	478	54.2
3-Boyne City Road	56	6.4
4-Marion Center Road	97	11.0
5-Barnard Road	7	0.8
6-US-31, Southwest	<u>243</u>	<u>27.6</u>
TOTAL	881	100.0



THROUGH TRAFFIC INTERCHANGE  
STATION 3, M-32 & M-66, SOUTH

CHARLEVOIX AREA  
EXTERNAL O-D STUDY

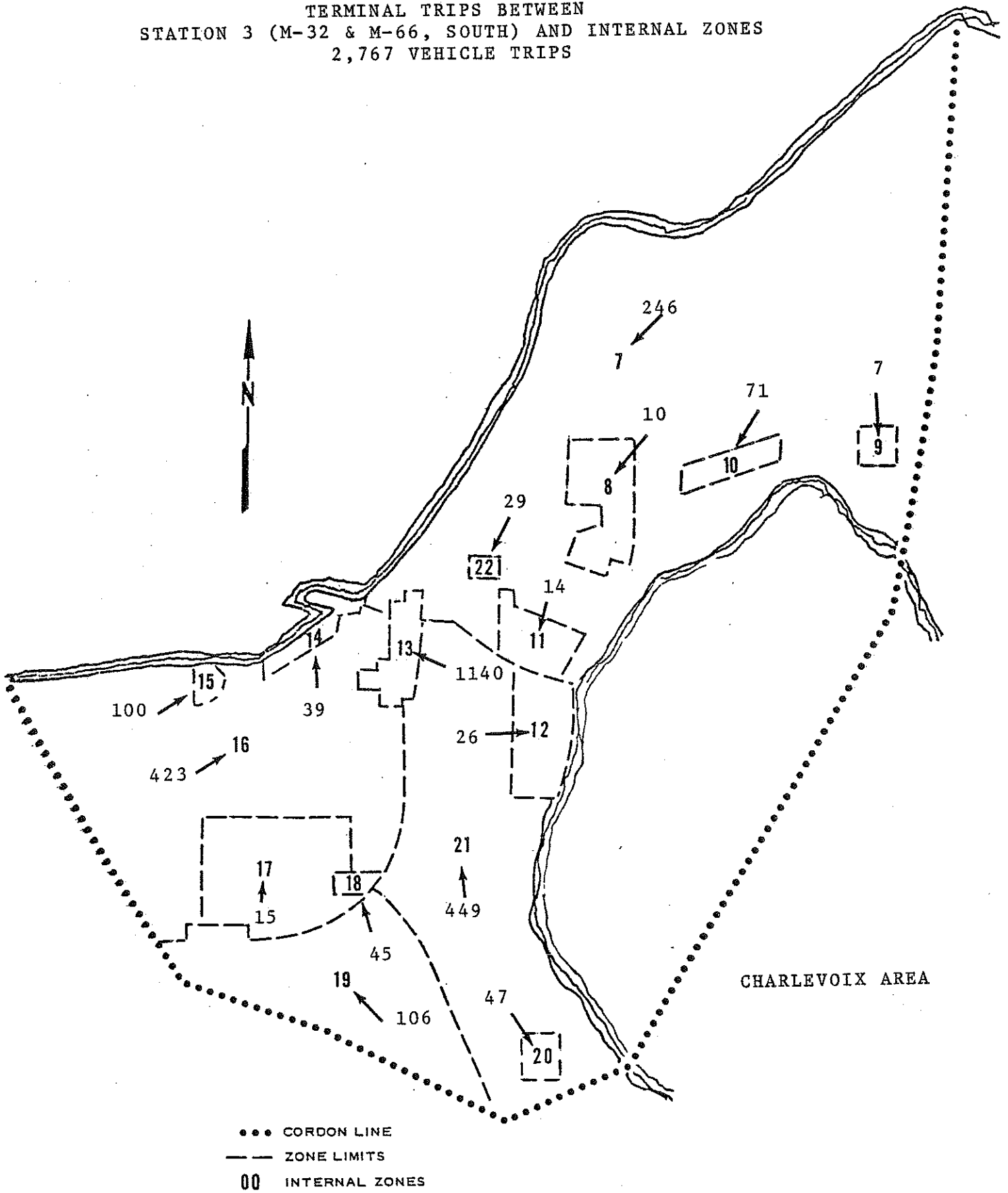
881 VEHICLE TRIPS  
AUGUST WEEKDAY 1974



STATION 3, M-32 & M-66, SOUTH  
 TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zone</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	246	8.9
8	10	0.4
9	7	0.3
10	71	2.6
11	14	0.5
12	26	0.9
13	1140	41.2
14	39	1.4
15	100	3.6
16	423	15.3
17	15	0.5
18	45	1.6
19	106	3.8
20	47	1.7
21	449	16.2
22	<u>29</u>	<u>1.1</u>
TOTAL	2767	100.0

TERMINAL TRIPS BETWEEN  
 STATION 3 (M-32 & M-66, SOUTH) AND INTERNAL ZONES  
 2,767 VEHICLE TRIPS



STATION 3, M-32 & 66, SOUTH

<u>TRIP LENGTHS</u>		
<u>Minutes</u>	<u>No. of Trips</u>	<u>Percent of Totals</u>
1-20	2025	55.5
20-40	1027	28.1
40-60	83	2.3
60-90	223	6.1
90-120	43	1.2
120-180	38	1.0
180-240	85	2.3
240-300	56	1.5
300-360	42	1.2
360-420	13	0.4
420-480	7	0.2
480-540	2	0.1
540-600	2	0.1
600-680	1	0.0
680-760	0	0.0
760-840	<u>1</u>	<u>0.0</u>
TOTAL	3648	100.0

Longest Trip = 13 Hr. 10 Min.      Average Trip Length = 40 Min.  
 Median Trip Length = 10 Min.\*

\*Due to the convention of the computer program, this value can be approximated only in 10 minute intervals.



Station 4, (Marion Center Road)

Station 4 is located 0.8 miles south of Stover Street and north of Clark Road.

A total of 1,472 vehicles passed through this station. Tabulations on the following pages give a detailed documentation of this traffic.

Approximately 7 out of every 10 vehicles had a terminal inside the study area. There were 8 of every 10 vehicles which were autos and 14 out of every 100 vehicles which were panels or pickups irregardless of whether they traveled into or through the area. More than 75 percent of the passenger cars and panels or pickups had a terminal inside the study area.

The largest trip purpose was work with 497 trips or 33.8 percent of the 1,472 total trips. Work and other social or recreational trips accounted for 950 trips or 64.5 percent of the 1,472 total trips.

Station 1 (US-31, North) accounted for 190 trips or 50.4 percent of the 377 through trips.

Zone 13 (Central Business District) accounted for 302 trips or 27.6 percent of the 1,095 terminal trips. Zones 12, 13, 16, and 21 accounted for 754 trips or 68.9 percent of the 1,095 terminal trips.

There were 850 trips or 57.7 percent of the 1,472 trips that had trip length of 1-20 minutes. There were 1,411 trips (95.9 percent) that had a trip length of one hour or less.

The origin and destination of all the trips which passed through the station were tabulated by county, and 3 states. There are two ends for each trip; an origin and a destination. There were 1,472 trips which passed through Station 4, accounting for 2,944 total trip ends.

There were 2,234 trip ends (75.9 percent) in Charlevoix County. There were 12 trip ends (0.4 percent) in the Upper Peninsula. The Lower Peninsula accounted for 2,929 trip ends (99.5 percent). There were 3 origins and/or destinations (0.1 percent) outstate.

STATION 4, MARION CENTER ROAD

<u>Vehicle Type</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Passenger Car	1193	81.0	924	77.5	269	22.5
Passenger Car with Trailer	13	0.9	4	30.8	9	69.2
Panel or Pickup	199	13.5	140	70.4	59	29.6
Panel or Pickup with Trailer	6	0.4	1	16.7	5	83.3
Other Single Unit Trucks	26	1.8	21	80.8	5	19.2
Combinations and Trucks with Trailers	<u>35</u>	<u>2.4</u>	<u>5</u>	14.3	<u>30</u>	85.7
TOTAL	1472	100.0	1095	74.4	377	25.6

<u>Trip Purpose</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Work	497	33.8	338	68.0	159	32.0
Personal Business	75	5.1	53	70.7	22	29.3
Shopping	209	14.2	174	83.3	35	16.7
Vacation	43	2.9	19	44.2	24	55.8
Other Soc or Rec.	453	30.8	357	78.8	96	21.2
All Other	<u>195</u>	<u>13.2</u>	<u>154</u>	79.0	<u>41</u>	21.0
TOTAL	1472	100.0	1095	74.4	377	25.6



STATION 4, MARION CENTER ROAD

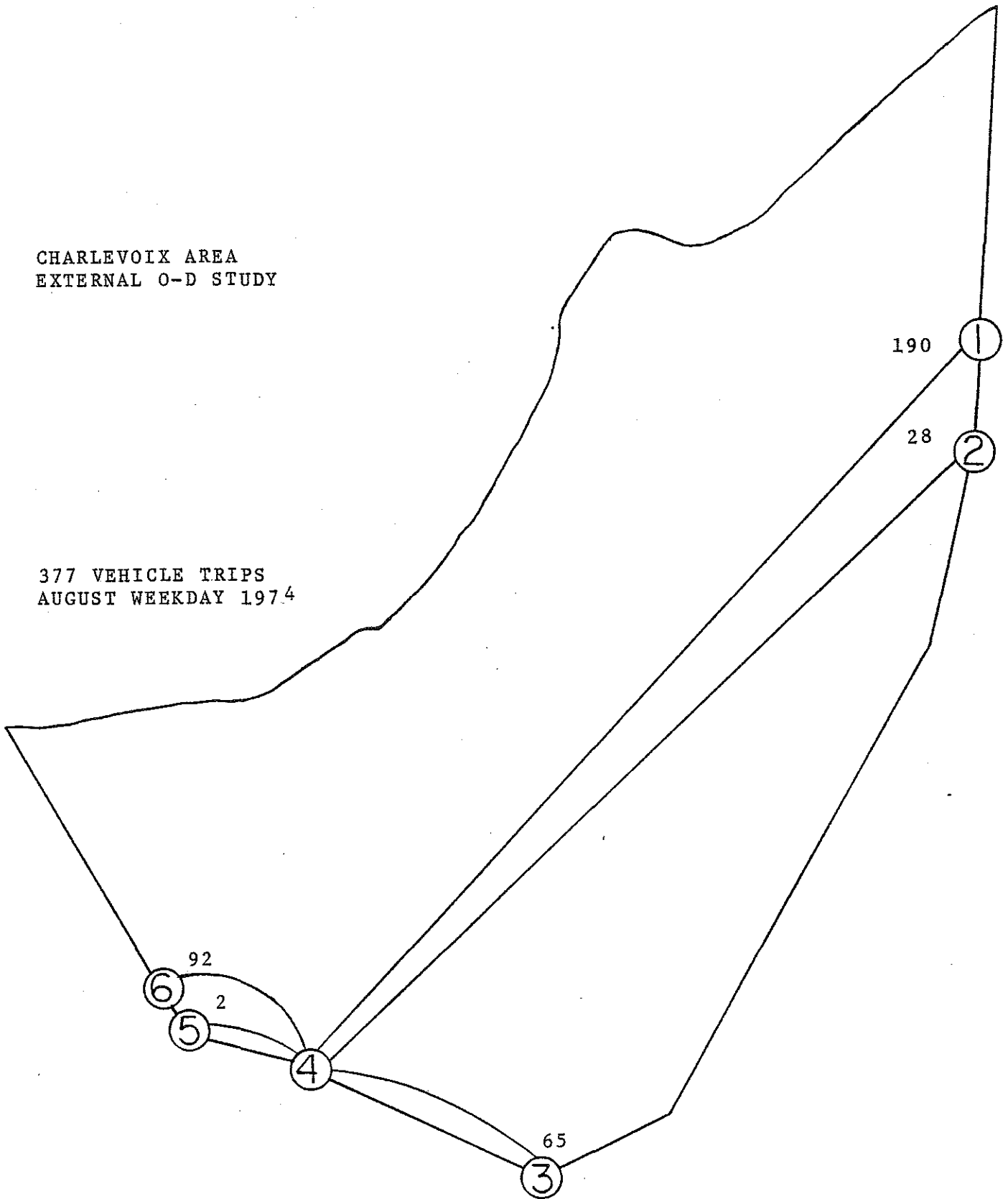
THROUGH TRIPS TO EXTERNAL STATIONS

<u>External Station</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
1-US-31, North	190	50.4
2-Boyne City Road	28	7.4
3-M-32 & M-66, South	65	17.3
5-Barnard Road	2	0.5
6-US-31, Southwest	<u>92</u>	<u>24.4</u>
TOTAL	377	100.0

THROUGH TRAFFIC INTERCHANGE  
STATION 4, MARION CENTER ROAD

CHARLEVOIX AREA  
EXTERNAL O-D STUDY

377 VEHICLE TRIPS  
AUGUST WEEKDAY 1974

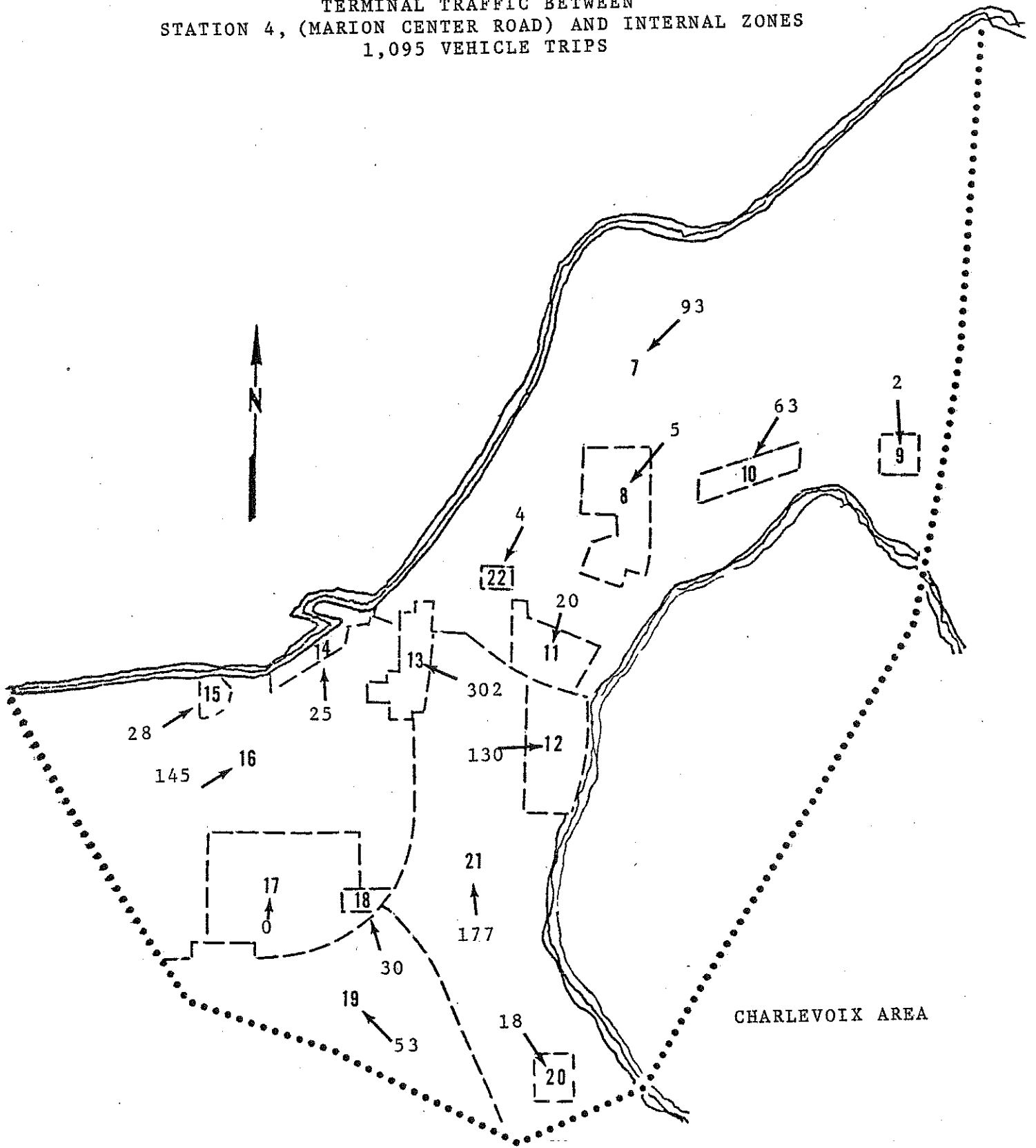


STATION 4, MARION CENTER ROAD

TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zone</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	93	8.5
8	5	0.5
9	2	0.2
10	63	5.7
11	20	1.8
12	130	11.9
13	302	27.6
14	25	2.3
15	28	2.6
16	145	13.2
17	0	0.0
18	30	2.7
19	53	4.8
20	18	1.6
21	177	16.2
22	<u>4</u>	<u>0.4</u>
TOTAL	1095	100.0

TERMINAL TRAFFIC BETWEEN  
 STATION 4, (MARION CENTER ROAD) AND INTERNAL ZONES  
 1,095 VEHICLE TRIPS



CHARLEVOIX AREA

- CORDON LINE
- - - ZONE LIMITS
- 00 INTERNAL ZONES

TRANSPORTATION LIBRARY  
 MICHIGAN DEPT. STATE HIGHWAYS &  
 TRANSPORTATION LANSING, MICH.

STATION 4, MARION CENTER ROAD

TRIP LENGTHS

<u>Minutes</u>	<u>No. of Trips</u>	<u>Percent of Totals</u>
1-20	850	57.7
20-40	435	29.5
40-60	126	8.6
60-90	30	2.0
90-120	10	0.7
120-180	4	0.3
180-240	11	0.7
240-300	1	0.1
300-360	3	0.2
360-420	0	0.0
420-480	0	0.0
480-540	0	0.0
540-600	1	0.1
600-680	<u>1</u>	<u>0.1</u>
TOTAL	1472	100.0

Longest Trip = 11 Hr. Average Trip Length = 28 Min.  
 Median Trip Length = 10 Min.\*

\* Due to the convention of the computer program, this value can be approximated only in 10 minute intervals.

CHARLEVOIX EXTERNAL O-D STUDY  
 STATION 4, MARION CENTER ROAD

Total: 1,472 trips, 2,944 trip ends. There were 873 trips that had both Origins and Destinations in Charlevoix County.



MICHIGAN

Minnesota 1

Indiana 1 New York 1

Station 5, (Barnard Road)

Station 5 is located 0.3 mile south of US-31.

A total of 806 vehicles passed through this station.

Tabulations on the following pages give a detailed documentation of this traffic.

Approximately 8 out of every 10 vehicles had a terminal inside the study area. There were 8 of every 10 vehicles which were autos and 20 out of 100 vehicles which were panels or pickups irregardless of whether they traveled into or through the area. More than 75 percent of the passenger cars and panels or pickups had a terminal inside the study area.

The largest trip purpose was work with 274 trips or 34.0 percent of the 806 total trips.

Station 1 (US-31, North) accounted for 81 trips or 41.3 percent of the 196 through trips.

Zone 13 (Central Business District) accounted for 172 trips or 28.2 percent of the 610 terminal trips. Zones 13, 16, and 21 accounted for 410 trips or 67.2 percent of the 610 terminal trips.

There were 676 trips or 83.9 percent of the 806 trips that had a trip length of 1-20 minutes. There were 786 trips (97.5 percent) that had a trip length of one hour or less.

The origin and destination of all the trips which passed through the station were tabulated by county. There are two ends for each trip; an origin and a destination. There were 806 trips which passed through Station 5, accounting for 1,612 total trip ends.

There were 1,485 trip ends (92.1 percent) in Charlevoix County. There were 2 trip ends (0.1 percent) in the Upper Peninsula. The Lower Peninsula accounted for 1,610 trip ends (99.9 percent). There were no origins and/or destinations outstate.

STATION 5, BARNARD ROAD

<u>Vehicle Type</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Passenger Car	611	75.8	481	78.7	130	21.3
Passenger Car with Trailer	4	0.5	1	25.0	3	75.0
Panel or Pickup	158	19.6	107	67.7	51	32.3
Panel or Pickup with Trailer	3	0.4	1	33.3	2	66.7
Other Single Unit Trucks	25	3.1	18	72.0	7	28.0
Combinations and Trucks with Trailers	<u>5</u>	<u>0.6</u>	<u>2</u>	40.0	<u>3</u>	60.0
TOTAL	806	100.0	610	75.7	196	24.3

<u>Trip Purpose</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Work	274	34.0	173	63.1	101	36.9
Personal Business	44	5.5	39	88.6	5	11.4
Shopping	187	23.1	161	86.1	26	13.9
Vacation	11	1.4	3	27.3	8	72.7
Other Soc. or Rec.	150	18.6	114	76.0	36	24.0
All Other	<u>140</u>	<u>17.4</u>	<u>120</u>	85.7	<u>20</u>	14.3
TOTAL	806	100.0	610	75.7	196	24.3



STATION 5, BARNARD ROAD

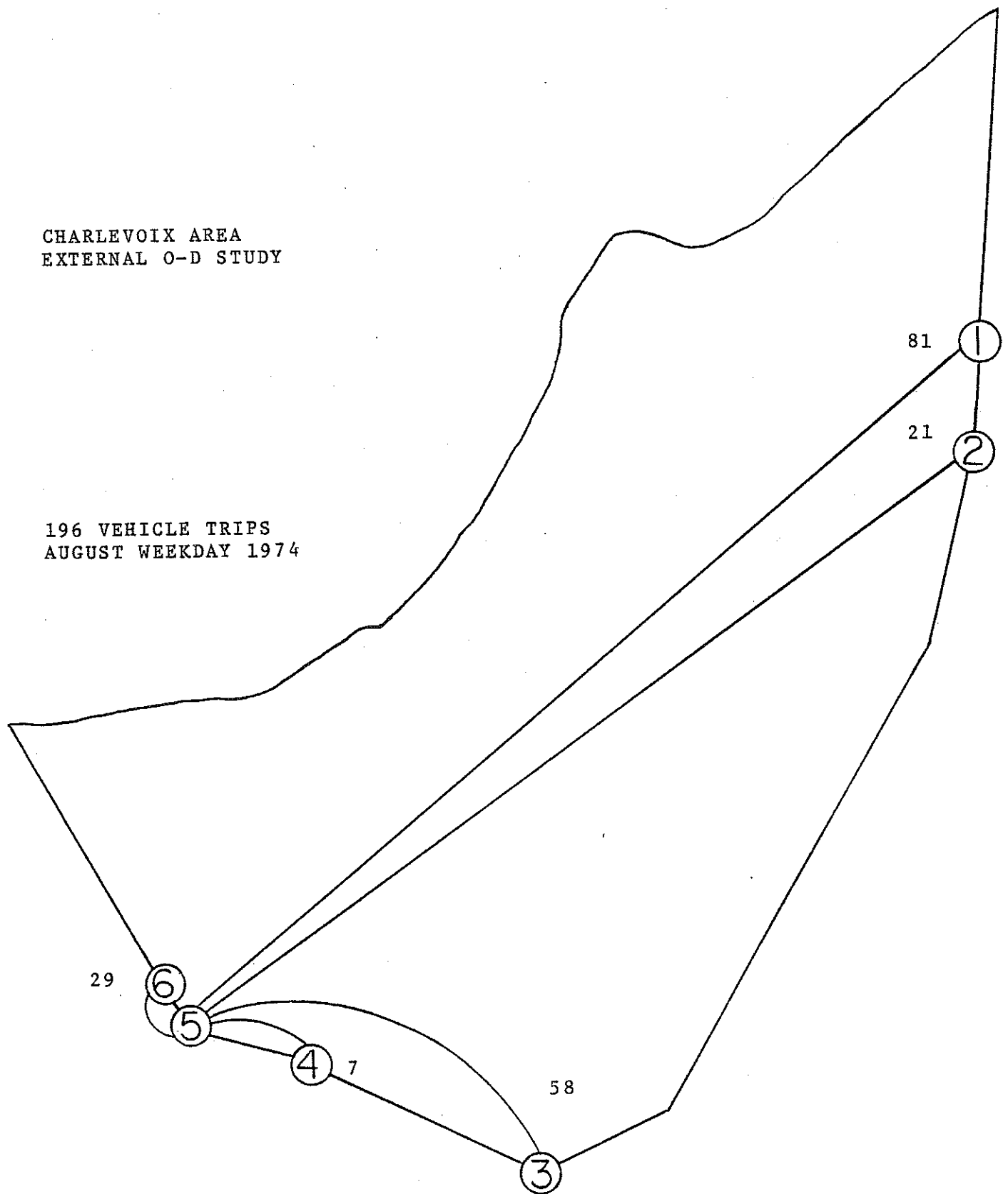
THROUGH TRIPS TO EXTERNAL STATIONS

<u>External Station</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
1-US-31, North	81	41.3
2-Boyne City Road	21	10.7
3-M-32 & M-66, South	58	29.6
4-Marion Center Road	7	3.6
6-US-31, Southwest	<u>29</u>	<u>14.8</u>
TOTAL	196	100.0

THROUGH TRAFFIC INTERCHANGE  
STATION 5, BARNARD ROAD

CHARLEVOIX AREA  
EXTERNAL O-D STUDY

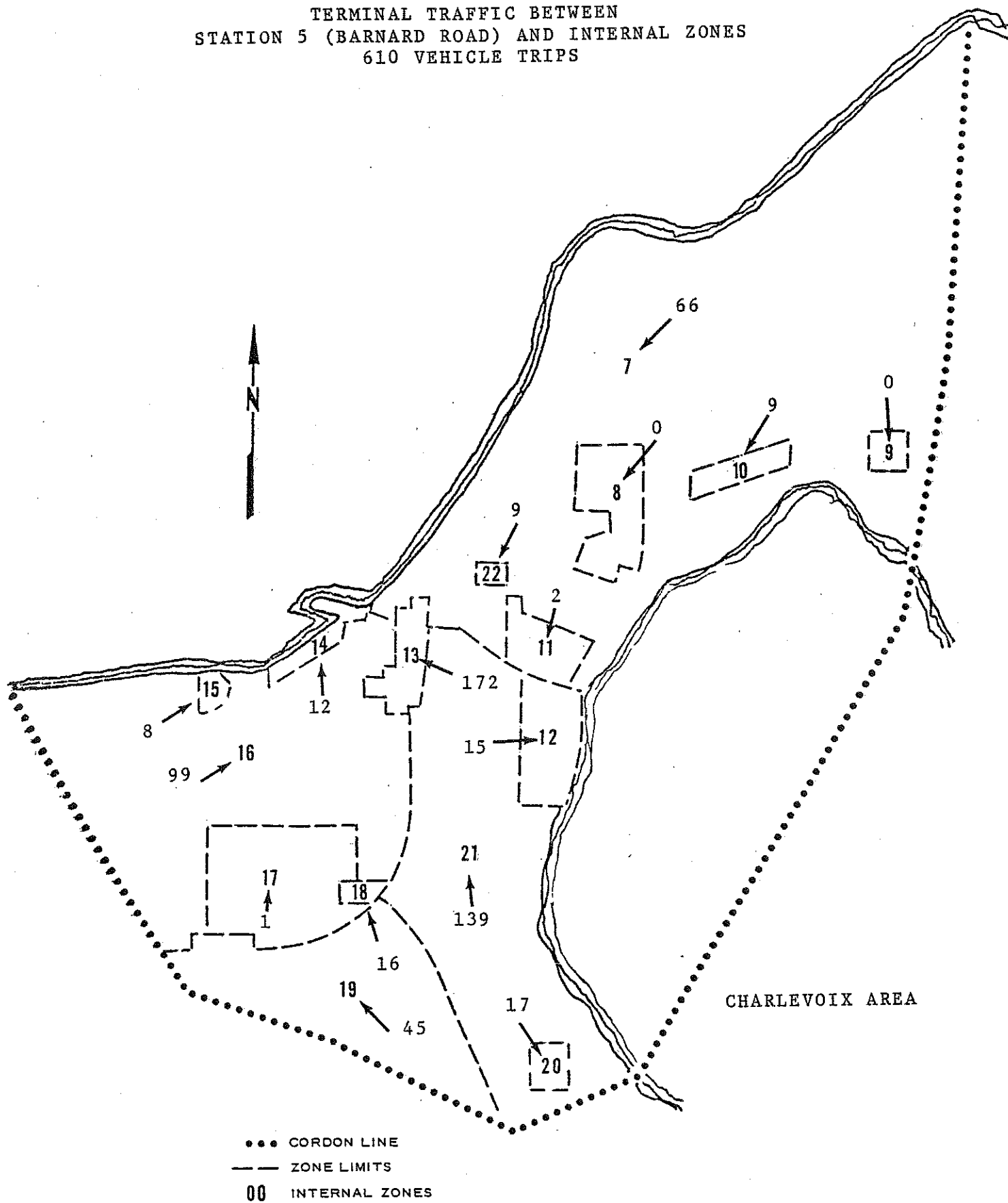
196 VEHICLE TRIPS  
AUGUST WEEKDAY 1974



STATION 5, BARNARD ROAD  
 TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zone</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	66	10.8
8	0	0.0
9	0	0.0
10	9	1.5
11	2	0.3
12	15	2.4
13	172	28.2
14	12	2.0
15	8	1.3
16	99	16.2
17	1	0.2
18	16	2.6
19	45	7.4
20	17	2.8
21	139	22.8
22	<u>9</u>	<u>1.5</u>
TOTAL	610	100.0

TERMINAL TRAFFIC BETWEEN  
 STATION 5 (BARNARD ROAD) AND INTERNAL ZONES  
 610 VEHICLE TRIPS



STATION 5, BARNARD Road

<u>TRIP LENGTHS</u>		
<u>Minutes</u>	<u>No. of Trips</u>	<u>Percent of Totals</u>
1-20	676	83.9
20-40	98	12.2
40-60	12	1.5
60-90	14	1.7
90-120	2	0.3
120-180	1	0.1
180-240	1	0.1
240-300	1	0.1
300-360	<u>1</u>	<u>0.1</u>
TOTAL	806	100.0

Longest Trip = 5 Hr. 10 Min. Average Trip Length = 17 Min.  
 Median Trip Length = 10 Min.\*

\* Due to the convention of the computer program, this value can be approximated only in 10 minute intervals.



Station 6, (US-31, Southwest)

Station 6 is located between old US-31 and Barnard Road.

A total of 5,483 vehicles passed through this station. Tabulations on the following pages give a detailed documentation of this traffic.

Approximately 6 out of every 10 vehicles had a through trip in the study area. There were 8 of every 10 vehicles which were autos and 12 out of every 100 vehicles which were panels or pickups irregardless of whether they traveled into or through the area.

The largest trip purpose was vacation with 2,101 trips or 38.3 percent of the 5,483 total trips.

Station 1 (US-31, North) accounted for 2,794 trips or 87.8 percent of the 3,183 through trips.

Zone 13 (Central Business District) accounted for 1,090 trips or 47.4 percent of the 2,300 terminal trips. Zones 13, 16, and 21 accounted for 1,788 trips or 77.7 percent of the 2,300 terminal trips.

There were 1,421 trips or 25.9 percent of the 5,483 trips that had a trip length of 1-20 minutes. There were 2,294 trips (41.8 percent) that had a trip length of one hour or less.

The origin and destination of all the trips which passed through the station were tabulated by county, Ontario and 7 states. There are two ends for each trip; an origin and a destination. There were 5,483 trips which passed through Station 6, accounting for 10,966 trip ends.

There were 4,479 trip ends (40.8 percent) in Charlevoix County. There were 698 trip ends (6.4 percent) in the Upper Peninsula. The Lower Peninsula accounted for 10,059 trip ends (91.7 percent). There were 209 origins and/or destinations (1.9 percent) outstate.



STATION 6, US-31, SOUTHWEST

<u>Vehicle Type</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Passenger Car	4255	77.6	1792	42.1	2463	57.9
Passenger Car with Trailer	174	3.2	20	11.5	154	88.5
Panel or Pickup	649	11.8	371	57.2	278	42.8
Panel or Pickup with Trailer	53	1.0	4	7.5	49	92.5
Other Single Unit Trucks	235	4.3	95	40.4	140	59.6
Combinations and Trucks with Trailers	117	2.1	18	15.4	99	84.6
<b>TOTAL</b>	<b>5483</b>	<b>100.0</b>	<b>2300</b>	<b>41.9</b>	<b>3183</b>	<b>58.1</b>

<u>Trip Purpose</u>	<u>Vehicles</u>	<u>Percent of Total</u>	<u>Terminal</u>	<u>%</u>	<u>Through</u>	<u>%</u>
Work	1389	25.3	761	54.8	628	45.2
Personal Business	311	5.7	185	59.5	126	40.5
Shopping	446	8.1	302	67.7	144	32.3
Vacation	2101	38.3	402	19.1	1699	80.9
Other Soc. or Rec.	965	17.6	462	47.9	503	52.1
All Other	271	5.0	188	69.4	83	30.6
<b>TOTAL</b>	<b>5483</b>	<b>100.0</b>	<b>2300</b>	<b>41.9</b>	<b>3183</b>	<b>58.1</b>

STATION 6, US-31, SOUTHWEST

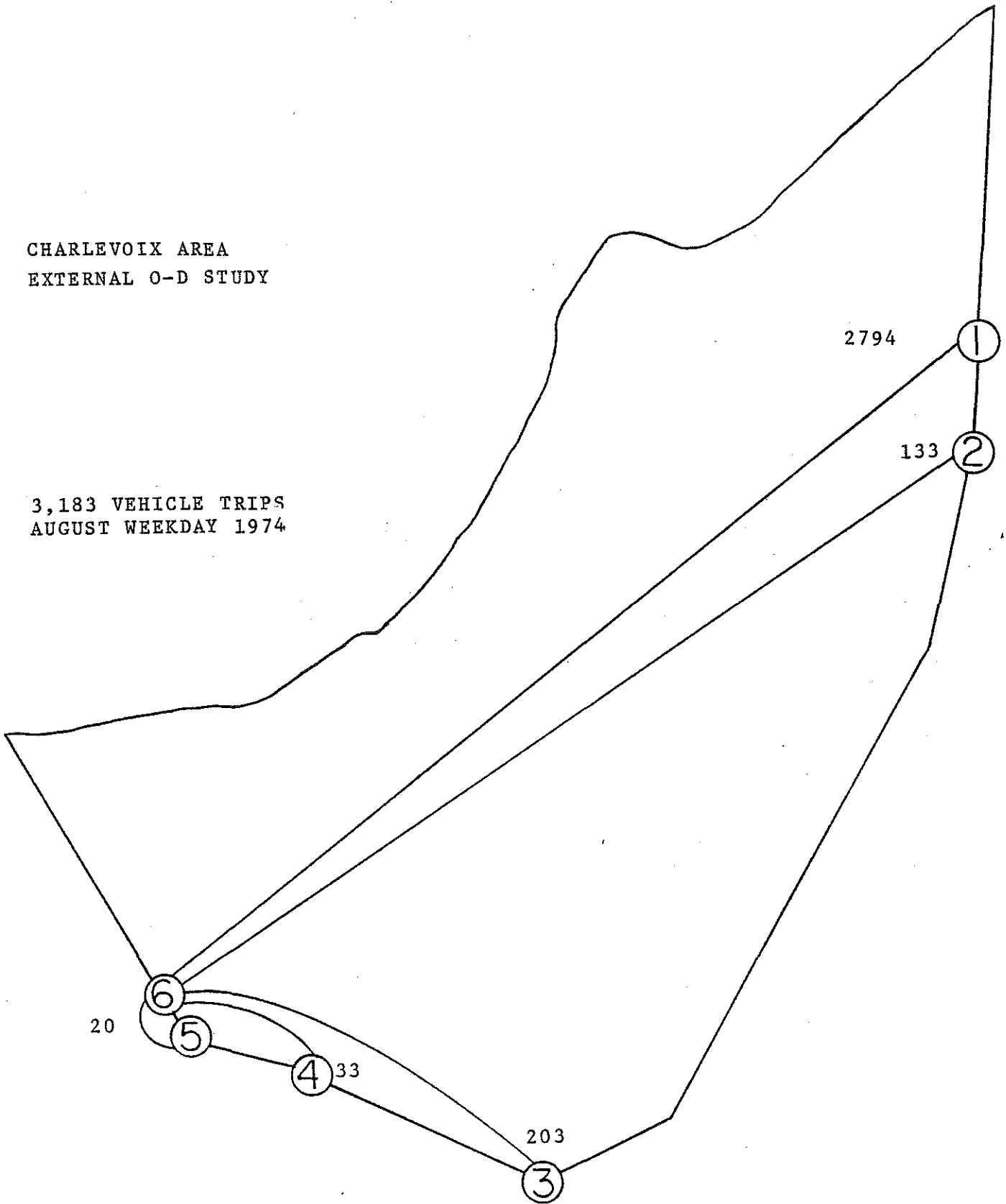
THROUGH TRIPS TO EXTERNAL STATIONS

<u>External Station</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
1-US-31, North	2794	87.8
2-Boyne City Road	133	4.2
3-M-32 & M-66, South	203	6.4
4-Marion Center Road	33	1.0
5-Barnard Road	<u>20</u>	<u>0.6</u>
TOTAL	3183	100.0

THROUGH TRAFFIC INTERCHANGE  
STATION 6, US-31, SOUTHWEST

CHARLEVOIX AREA  
EXTERNAL O-D STUDY

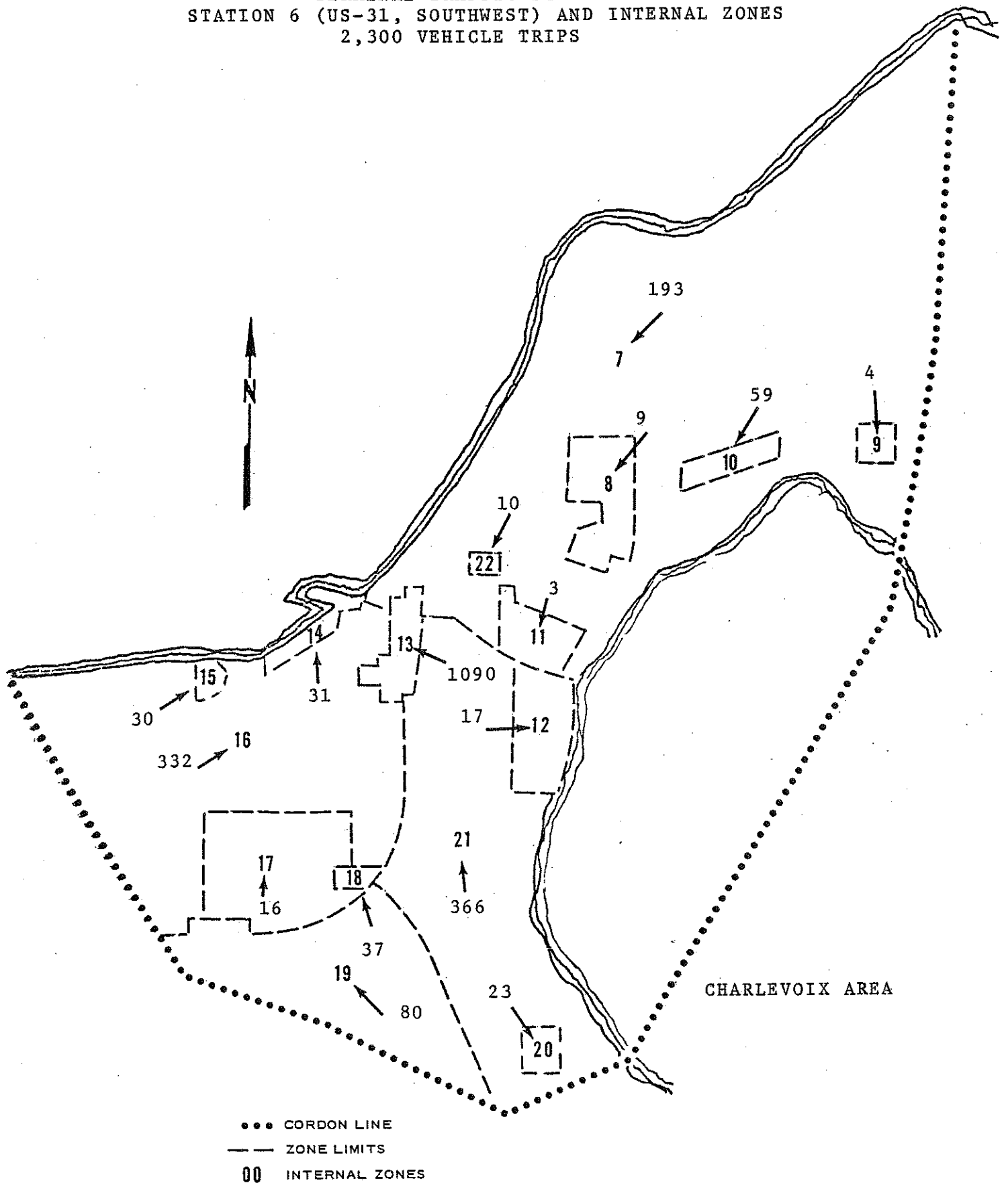
3,183 VEHICLE TRIPS  
AUGUST WEEKDAY 1974



STATION 6, US-31, SOUTHWEST  
 TERMINAL TRIPS TO STUDY ZONES

<u>Internal Zone</u>	<u>Total Vehicles</u>	<u>Percent of Total</u>
7	193	8.4
8	9	0.4
9	4	0.2
10	59	2.6
11	3	0.1
12	17	0.7
13	1090	47.4
14	31	1.4
15	30	1.3
16	332	14.4
17	16	0.7
18	37	1.6
19	80	3.5
20	23	1.0
21	366	15.9
22	<u>10</u>	<u>0.4</u>
TOTAL	2300	100.0

TERMINAL TRAFFIC BETWEEN  
 STATION 6 (US-31, SOUTHWEST) AND INTERNAL ZONES  
 2,300 VEHICLE TRIPS



STATION 6, US-31, SOUTHWEST

TRIP LENGTHS

<u>Minutes</u>	<u>No. of Trips</u>	<u>Percent of Totals</u>
1-20	1421	25.9
20-40	542	9.9
40-60	331	6.0
60-90	1098	20.0
90-120	198	3.6
120-180	721	13.1
180-240	447	8.2
240-300	319	5.8
300-360	163	3.0
360-420	77	1.4
420-480	60	1.1
480-540	69	1.3
540-600	15	0.3
600-670	6	0.1
670-740	15	0.3
760-840	<u>1</u>	<u>0.0</u>

TOTAL

Longest Trip = 13 Hr. Average Trip Length = 114 Min.  
 Median Trip Length = 80 Min.\*

\* Due to the convention of the computer program, this value can be approximated only in 10 minute intervals.



APPENDIX



SINGLE STATION RURAL O-D STUDY

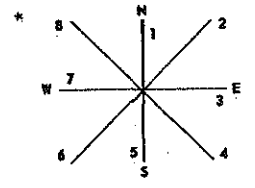
FORM NUMBER	6	COUNTY NUMBER		STATEWIDE NUMBER		HOUR PERIOD ENDING		* DIRECTION		DAY ** OF TRAVEL		MO.		DATE	
	1	2 3		4 5 6 7			8 9	10		11		12 13		14 15	

INTERVIEW NUMBER	VEH. TYPE	NO. IN VEH.	ORIGIN Where did this trip begin?  Co. or State	DESTINATION Where will this trip end?  Co. or State	WHERE IS VEHICLE GARAGED	P. BUS. OR P.B.	ROUTE OF EXIT OR ENT.
					0 0 0		
					0 0 0		
					0 0 0		
					0 0 0		
					0 0 0		
					0 0 0		
					0 0 0		
					0 0 0		

-69-

16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 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

- VEHICLE TYPE**
- 1 PASSENGER CAR WITHOUT A TRAILER
  - 2 PASSENGER CAR WITH A TRAILER
  - 3 PANEL OR PICK-UP WITHOUT A TRAILER
  - 4 PANEL OR PICK-UP WITH A TRAILER
  - 5 OTHER SINGLE UNIT TRUCKS
  - 6 COMBINATIONS & TRUCKS WITH TRAILERS



- DAY OF TRAVEL \*\***
- SUNDAY 1 THURSDAY 5
  - MONDAY 2 FRIDAY 6
  - TUESDAY 3 SATURDAY 7
  - WEDNESDAY 4

- GARAGED**
- 1 ORIGIN
  - 2 DESTINATION
  - 3 OTHER

- TRIP PURPOSE**
- 1 WORK
  - 2 PERS. BUSINESS
  - 3 SHOPPING
  - 4 VACATION
  - 5 OTHER SOC. OR REC.
  - 6 ALL OTHER

ROUTE \_\_\_\_\_ LOCATION DESCRIPTION \_\_\_\_\_ CITY \_\_\_\_\_

FORM	COUNTY				STATEWIDE STA. NO.				O-D STA. NO.		YEAR		MONTH		DATE		DAY	O-D CITY TYPE		SEQ	
9																					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	

RECORDER \_\_\_\_\_

**DO NOT ACCUMULATE**

IN OUT	DIRECT OF TRAVEL	TIME ENDING		PASSENGER CAR				PANEL & PICK-UP (2 AXLE, 4 TIRE)				ALL OTHER SINGLE UNIT TRUCKS			ALL TRUCK COMB. AND SINGLE UNIT			(7) ALL BUSES		(8) MOTOR CYCLE				TOTAL											
		HOUR	MIN.	WITHOUT (1) TRAILER		WITH (2) TRAILER		WITHOUT (3) TRAILER		WITH (4) TRAILER		WITHOUT TRAILER (5)			TRUCK WITH TRAILER (6)																				
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		
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DAY OF WEEK: Col. 17

STATION TYPE: Col. 20

Sunday	1	Thursday	5	Cordon Line Station	2
Monday	2	Friday	6	Screen Line Station	1
Tuesday	3	Saturday	7	Single Station	3
Wednesday	4			S. W. Winter Class.	4

**TRUCK IDENTIFICATION**

Panel and Pickup (2 axle, 4 tire)

Light 2-axle, 4-tire trucks of less than one ton rated capacity, including:

- a. Panel and pickups standard type, including mini-vans (Ford Econoline, Volkswagon, etc.)
- b. Pickup trucks carrying a cab high (sleeper style) camper.

All Other Single Unit Trucks

Heavy 2-axles or more (dual tires or super singles) equal to or greater than one ton rated capacity, including:

- a. All multistop or standup delivery trucks (primarily designed for moving rural and urban goods.)
- b. All large 4-tire trucks with flatbed, dump or other heavy cargo bodies.
- c. Pickups and panels, having heavy truck type hubs or axles, or are noticeably larger and longer than the standard type.
- d. Heavy 2-axle trucks with a higher than cab camper body.
- e. Truck tractor without trailer.

Truck Combinations

Truck and/or truck tractor (power unit) pulling semi-trailer or full trailer combinations.

DIRECTION OF TRAVEL: Cols. 23 - 24

Northbound	01	Westbound	07
Northeastbound	02	Northwestbound	08
Eastbound	03	North-South (2-Way)	09
Southeastbound	04	East-West (2-Way)	10
Southbound	05	Northeast-Southwest (2-Way)	11
Southwestbound	06	Northwest-Southeast (2-Way)	12

TIME ENDING: Cols. 25 - 28

TIME	HOUR	MIN.
	Cols. 25 - 26	Cols. 27 - 28
1:05 AM	01	05
2:13 AM	02	13
etc.		
12:00 Noon	12	00
etc.		
3:15 PM	15	15
etc.		
11:45 PM	23	45
etc.		