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# **WAVERLY**

## **Origin and Destination Traffic Report**

**Revised Study of Iowa 3 East  
and U. S. 218 South**

IOWA DEPARTMENT OF TRANSPORTATION  
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**Iowa**

**June 1972**

## Introduction

This report is based on an external origin and destination traffic survey that was made in Waverly in June of 1972. The survey was made in cooperation with the Federal Highway Administration and was taken to provide up-to-date trip information for traffic on Iowa 3 east and U.S. 218 south of the study area.

A complete external origin-destination survey was taken in Waverly in July of 1968 but due to road construction in this area at the time of the survey, it was felt that additional data was needed to provide accurate trip information for making traffic projections.

The study area used for the 1972 survey in Waverly was identical to that used in 1968 with the exception that only two interview stations were used in the latter survey. Interviews were conducted at locations on Iowa 3 east and U.S. 218 south of the study area on June 14-16, 1972. Standard procedures were used in operating each of the interview stations over a 15 hour period from 6 a.m. to 9 p.m. Automatic traffic recorders were used at each interview station for a period of five weekdays, including the days the stations were in operation.

At the conclusion of the field work, the recorder counts were summarized and used in conjunction with interview data to expand the trip information to 24 hour average June weekday traffic for 1972.

# TABLE OF CONTENTS

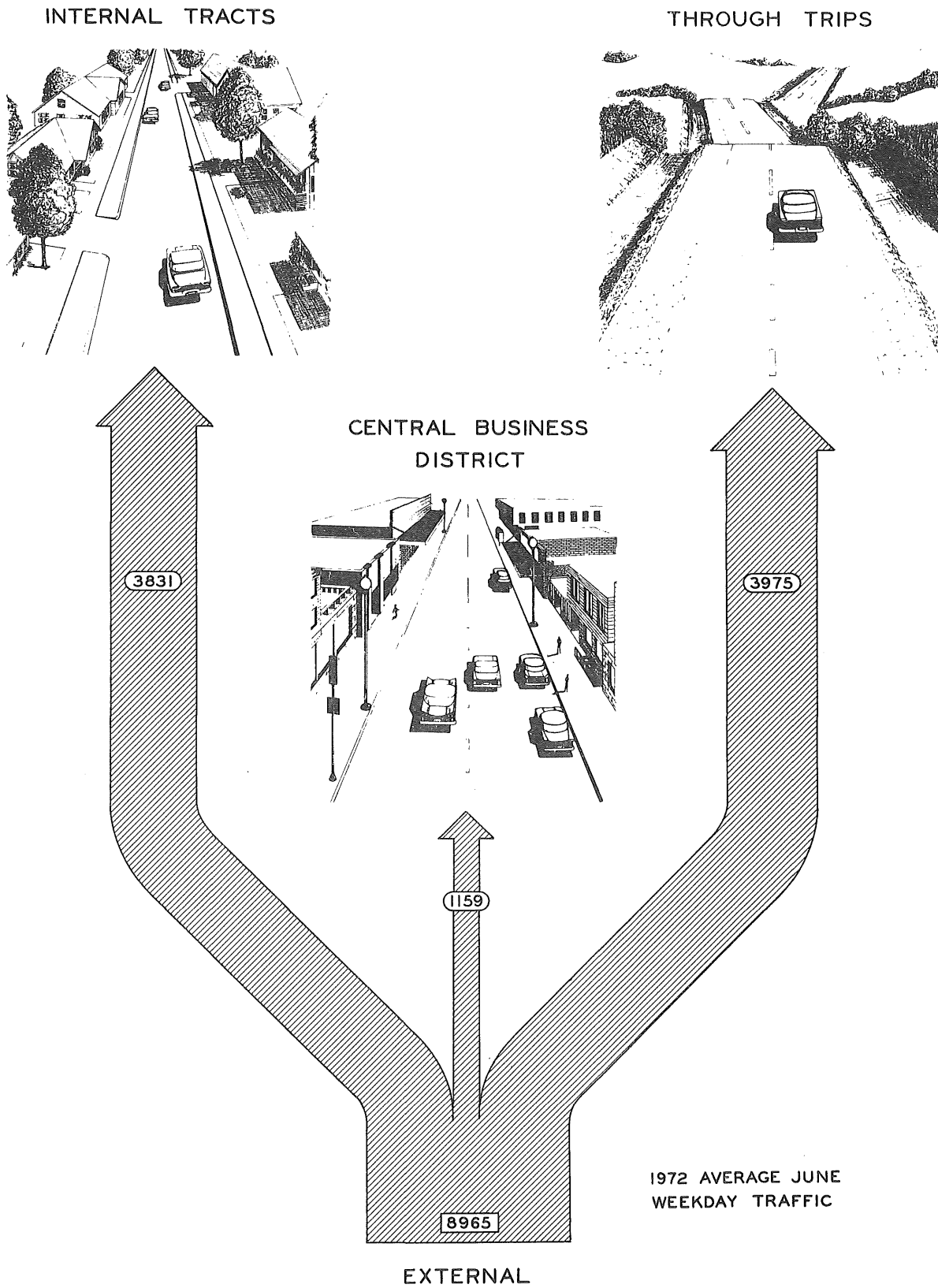
	Page
Definitions . . . . .	5
Distribution of Trips . . . . .	6
Trip Distribution Summary . . . . .	7
Trips Between the Study Area and Other Counties in Iowa . . . . .	8
Trips Between the Study Area and Points Within Adjacent Counties . . . . .	9
Vehicle Type Summary . . . . .	10
Tract Map of the Study Area . . . . .	11
Population Trends . . . . .	12
Motor Vehicle Registration . . . . .	14
Internal Dispersion of All Vehicular Trips Passing Through:	
Station 705, Iowa 3 East . . . . .	16
Station 709, U.S. 218 South . . . . .	17
Desire Lines of Travel of Trips to or from External Entrances of the Study Area and:	
The Central Business District . . . . .	19
Other External Entrances . . . . .	19
Internal Tracts . . . . .	19
External Trip Termini . . . . .	20
Summary of Trips Entering or Leaving the Waverly Study Area . . . . .	21
Dispersion of External Trips Between the Waverly Study Area and Points in Iowa Beyond Bremer County . . . . .	22
Dispersion of External Trips Between the Waverly Study Area and Points Within Bremer County . . . . .	23

APPENDIX	Page
Trip Purpose of External Trips . . . . .	26
Average Car Occupancy by Trip Purpose . . . . .	27
Directional Trips Between Stations and Tracts by Autos, Trucks, Taxis, and Buses . . . . .	28
Nondirectional Trips Between Stations and Tracts by Autos, Trucks, Taxis, and Buses . . . . .	29

## DEFINITIONS OF TECHNICAL TERMS

Study Area	The area enclosed by a cordon line of interview stations
Cordon Line	A hypothetical line determined by the location of traffic interview stations and used to delimit the area under study
Interview Station	A location at which vehicle drivers are stopped and interviewed
Code Station	A location on a street or highway at the point where it crosses the cordon line and at which traffic is counted but not interviewed
Central Business District	The major business district of a city
Origin	The location from which a driver started a trip
Destination	The location at which a trip was ended
Trip	The one-way travel between a point of origin and a point of destination
Internal Trip	A trip having both origin and destination within the study area
External Local Trip	A trip having either origin or destination within the study area and which passed through only one interview station in the cordon line en route to its destination
External Through Trip	A trip having neither origin nor destination within the study area but which passes through it en route to its destination
Traffic	The total number of vehicles passing a given point
Desire Line	A straight line between the point of origin and point of destination without regard to routes of travel

FIGURE 1  
DISTRIBUTION OF TRIPS  
WAVERLY STUDY AREA



### TRIP DISTRIBUTION SUMMARY

The chart at left graphically illustrates the distribution of trips which passed through Stations 705, Iowa 3 east and 709, U.S. 218 south of Waverly during the survey period. Origin-destination data was not obtained for other highways in the study area.

1,159 trips (12.93 percent of the total) were between external areas and the central business district.

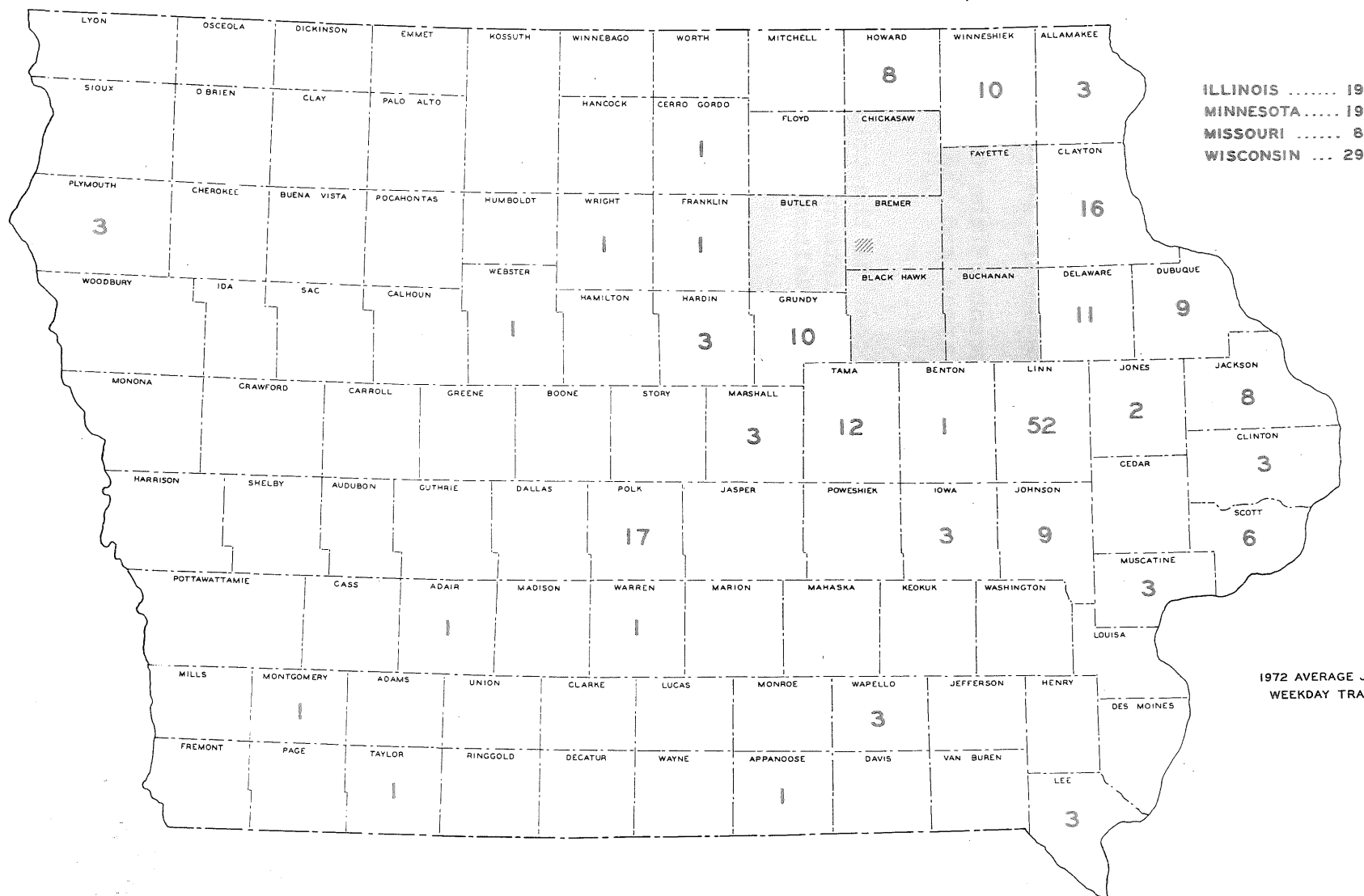
3,831 trips (42.73 percent of the total) were between external and internal areas exclusive of the central business district.

3,975 trips (44.34 percent of the total) were through trips which passed through Waverly en route to another destination.

Of the total number of trips which passed through interview stations, 21.83 percent began or ended at work, 23.29 percent were for social or recreational purposes, 21.33 percent were during work, 14.63 percent were for personal business, 10.96 percent were for shopping, and the remaining 7.96 percent were for other purposes.

FIGURE 2  
TRIPS BETWEEN THE STUDY AREA  
AND OTHER COUNTIES IN IOWA

(INCLUDES ONLY THOSE TRIPS WITH ORIGIN OR DESTINATION IN WAVERLY)





(INCLUDES ONLY THOSE TRIPS WITH ORIGIN OR DESTINATION IN THE WAVERLY STUDY AREA)

1972 AVERAGE JUNE WEEKDAY TRAFFIC



Table 1  
Vehicle Type Summary  
Waverly Study Area

1972 Average, June Weekday Traffic

Station	Location	Passenger Cars	Pickups and Panels	Single Unit Trucks	Truck Combi- nations	Total
705	Iowa 3 East	2,756	409	167	296	3,628
709	U.S. 218 South	4,458	641	282	184	5,565
Grand Total		7,214	1,050	449	480	9,193

The totals shown above include the duplication of those trips which passed entirely through the study area and were, therefore, interviewed twice.



# POPULATION TRENDS

## Waverly Population

Table 2

Census Year	Waverly Population	Volume Increase or Decrease	Percent Change 10-Year Period
1900	3,177		
1910	3,205	28	.88
1920	3,352	147	4.59
1930	3,652	300	8.95
1940	4,156	504	13.80
1950	5,124	968	23.29
1960	6,357	1,233	24.06
1970	7,205	848	13.34

## Bremer County Population

Table 3

Census Year	Bremer Co. Population	Volume Increase or Decrease	Percent Change 10-Year Period
1860	4,915		
1870	12,528	7,613	154.89
1880	14,081	1,553	12.40
1890	14,630	549	3.90
1900	16,305	1,675	11.45
1910	15,843	- 462	- 2.83
1920	16,728	885	5.59
1930	17,046	318	1.90
1940	17,932	886	5.20
1950	18,884	952	5.31
1960	21,108	2,224	11.78
1970	22,737	1,629	7.72

Figure 5  
POPULATION TRENDS

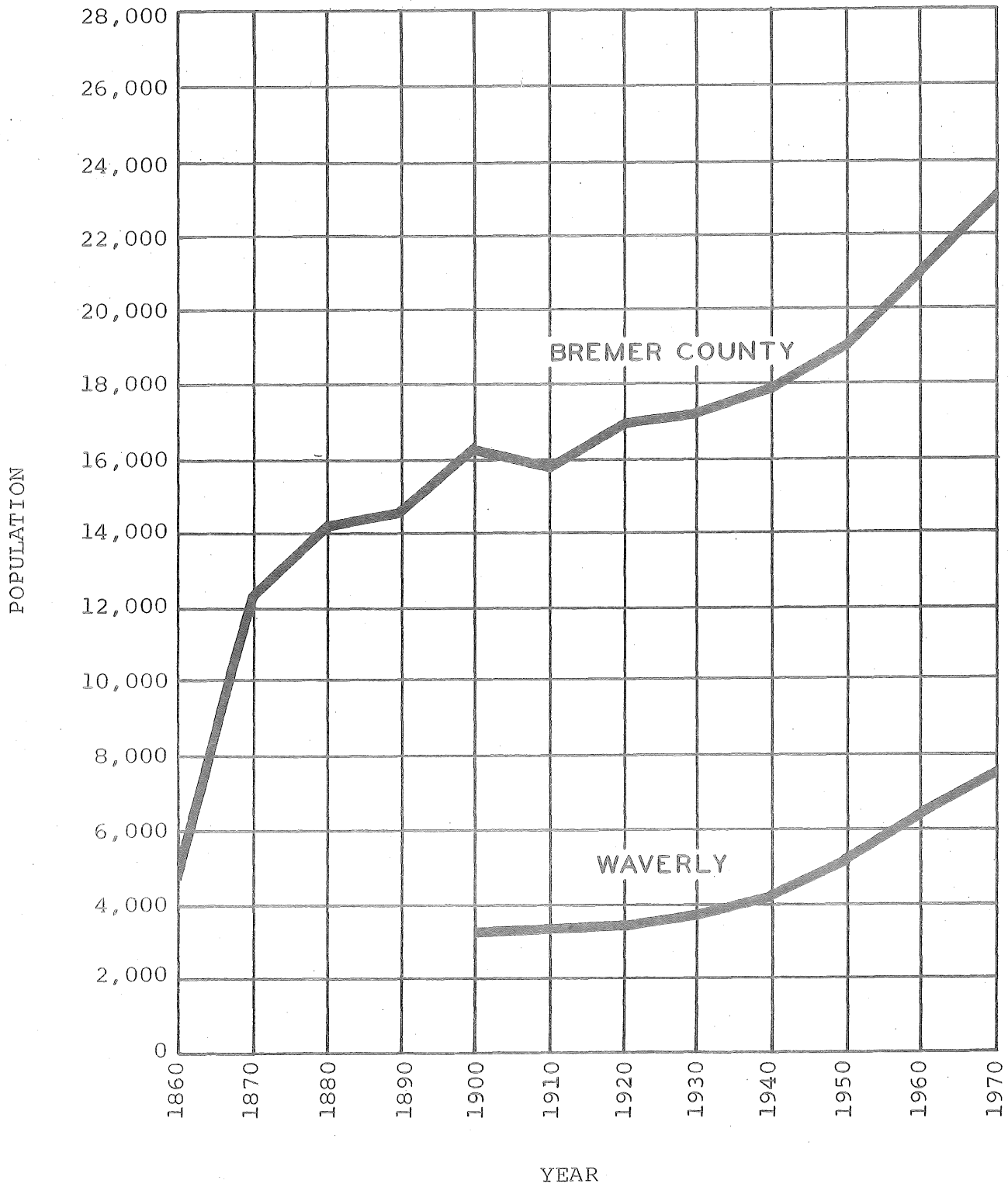
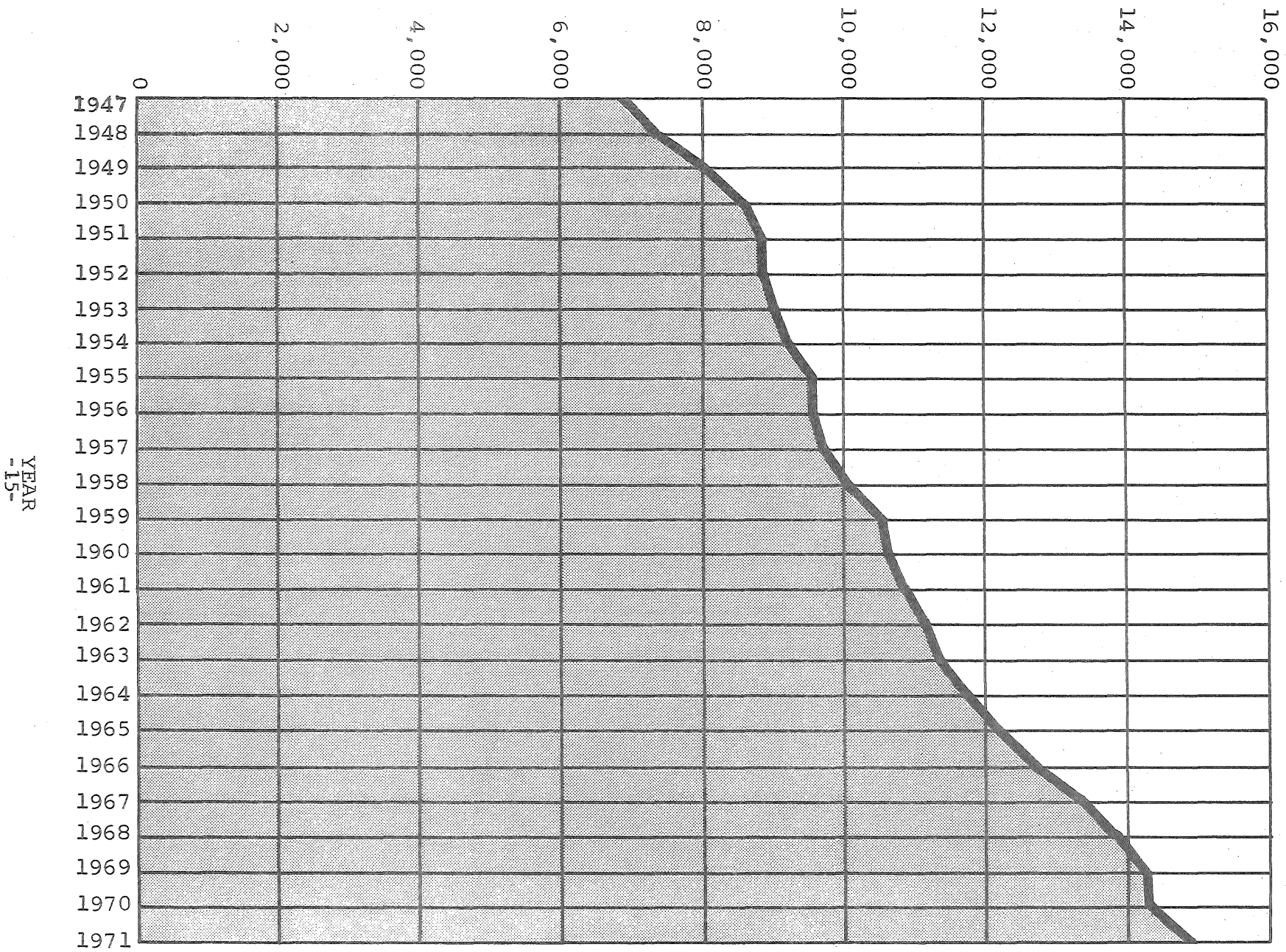


TABLE 4  
MOTOR VEHICLE REGISTRATION IN BREMER COUNTY  
FROM 1947 THROUGH 1971

Year	Autos	Trucks	Motorcycles	Total	Percent Change
1947	5,537	1,262	60	6,859	
1948	5,864	1,420	71	7,355	7.23
1949	6,359	1,561	82	8,002	8.80
1950	6,784	1,771	73	8,627	7.81
1951	6,885	1,920	59	8,864	2.75
1952	6,775	1,958	67	8,800	-.72
1953	6,991	1,971	60	9,022	2.52
1954	7,178	1,976	63	9,217	2.16
1955	7,414	2,023	53	9,490	2.96
1956	7,419	2,063	55	9,537	.50
1957	7,561	2,086	65	9,712	1.83
1958	7,854	2,143	76	10,073	3.72
1959	8,206	2,287	81	10,574	4.97
1960	8,268	2,250	81	10,599	.24
1961	8,472	2,293	82	10,847	2.34
1962	8,741	2,324	89	11,154	2.83
1963	8,892	2,340	112	11,344	1.70
1964	9,156	2,371	143	11,660	2.79
1965	9,484	2,423	187	12,094	3.72
1966	9,881	2,596	230	12,707	5.07
1967	10,281	2,700	312	13,293	4.61
1968	10,559	2,846	376	13,781	3.67
1969	10,722	3,070	405	14,197	3.02
1970	10,767	3,080	482	14,329	.93
1971	11,047	3,261	603	14,911	4.06

# Number of Motor Vehicle Registrations

Figure 6  
Motor Vehicle Registration in Bremer County  
From 1947 Through 1971



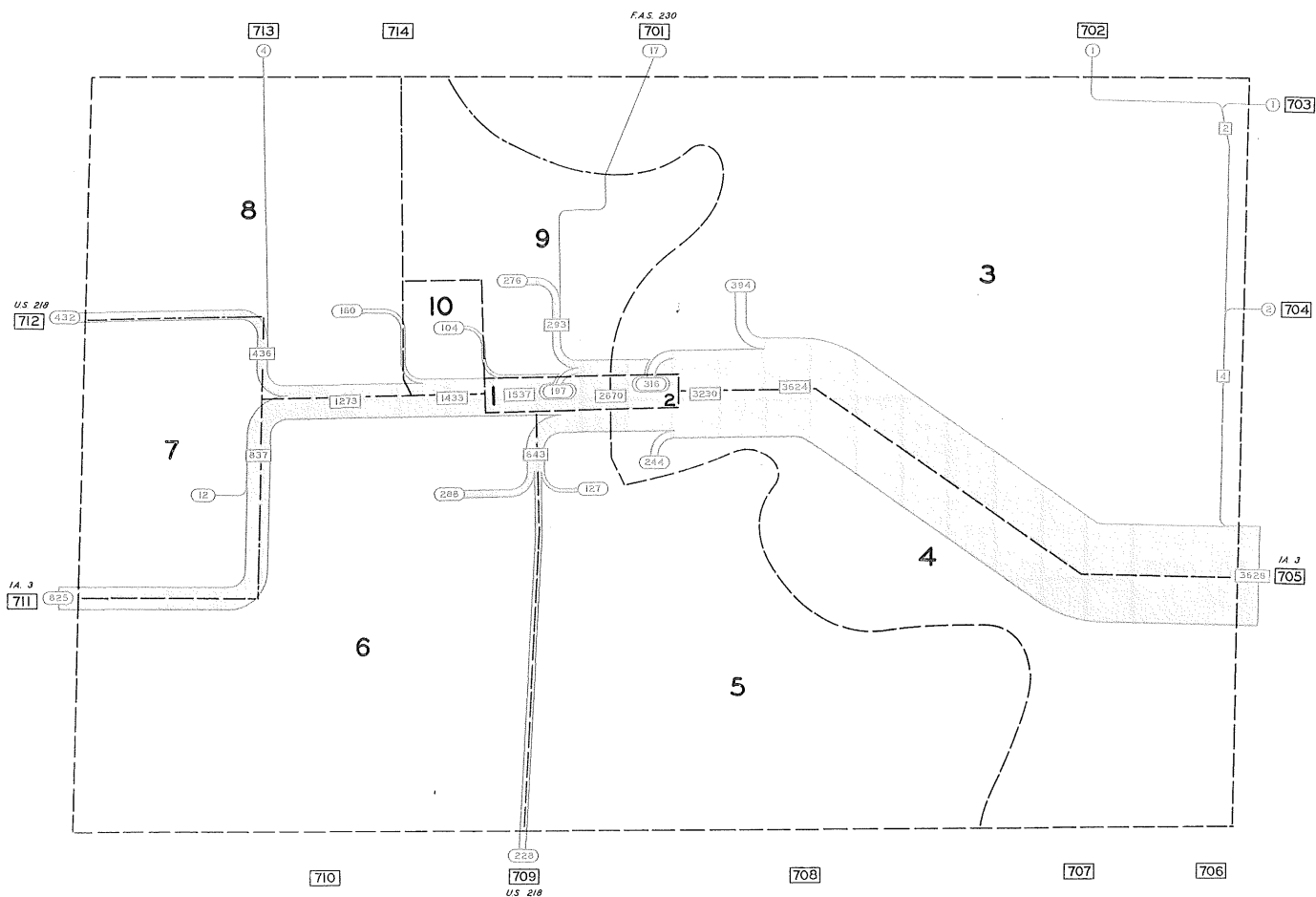
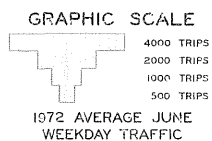


FIGURE 7  
INTERNAL DISPERSION OF  
ALL VEHICULAR TRIPS PASSING THROUGH  
STATION 705 - IOWA 3 EAST  
OF THE  
WAVERLY STUDY AREA  
(ALL TRIPS BY DRIVERS OF AUTOS TRUCKS TAXIS BUSES)



LEGEND  
TRACT BOUNDARY LINE - - - - -  
CORPORATION LINE - - - - -



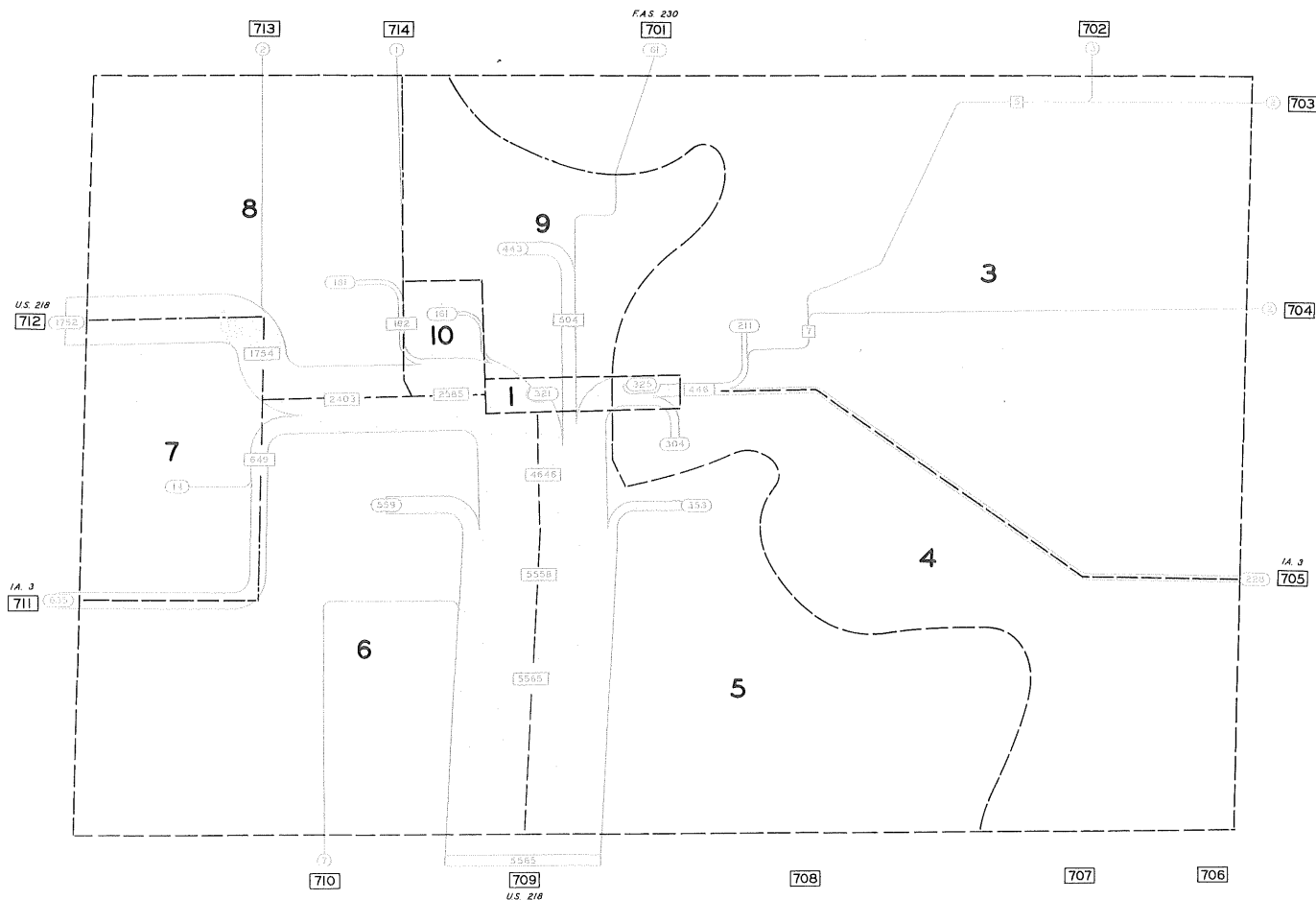


FIGURE 8  
INTERNAL DISPERSION OF  
ALL VEHICULAR TRIPS PASSING THROUGH  
STATION 709 - U.S. 218 SOUTH  
OF THE  
WAVERLY STUDY AREA  
(ALL TRIPS BY DRIVERS OF AUTOS TRUCKS TAXIS BUSES)

GRAPHIC SCALE  
4000 TRIPS  
2000 TRIPS  
1000 TRIPS  
500 TRIPS  
1972 AVERAGE JUNE  
WEEKDAY TRAFFIC

LEGEND  
TRACT BOUNDARY LINE - - - - -  
CORPORATION LINE - - - - -

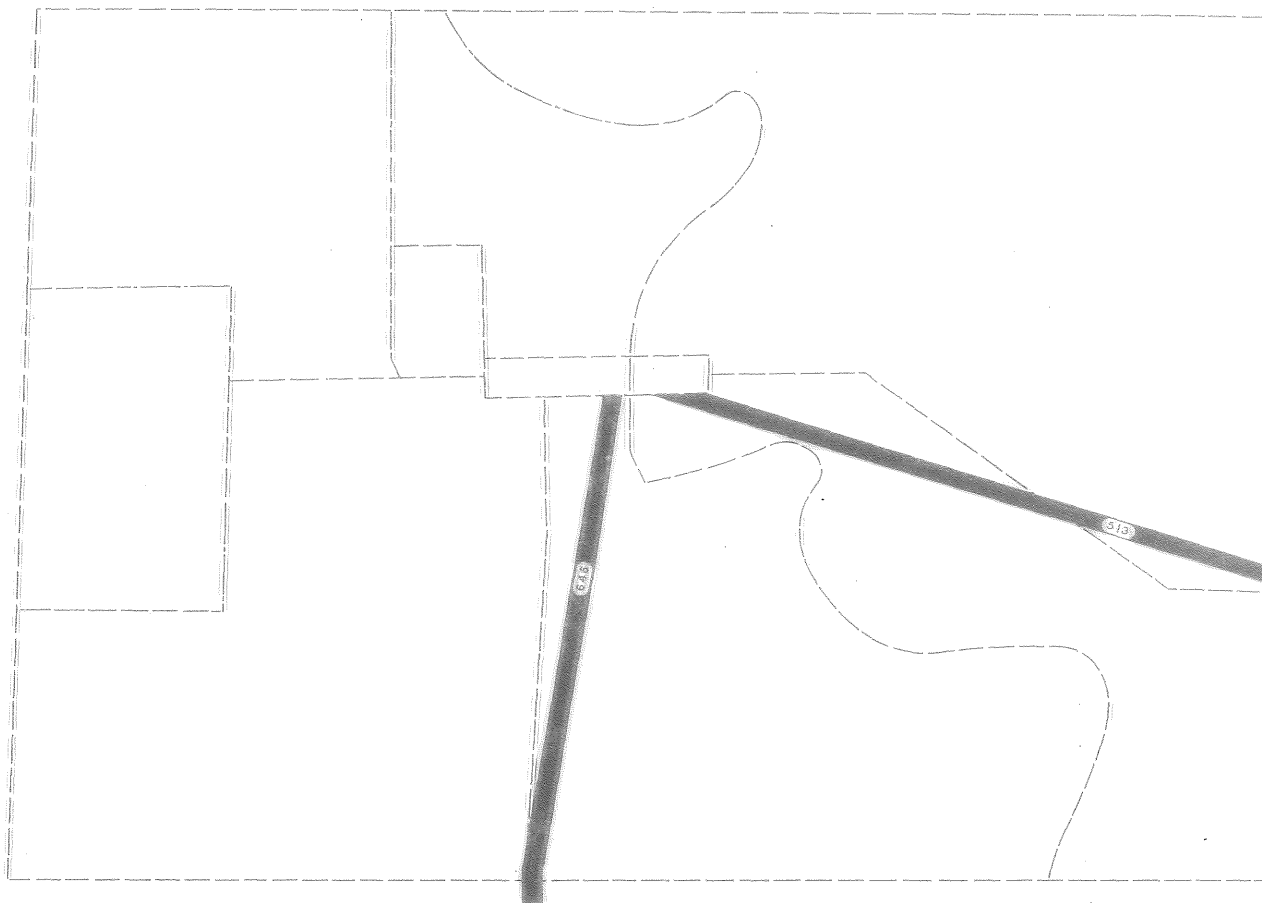
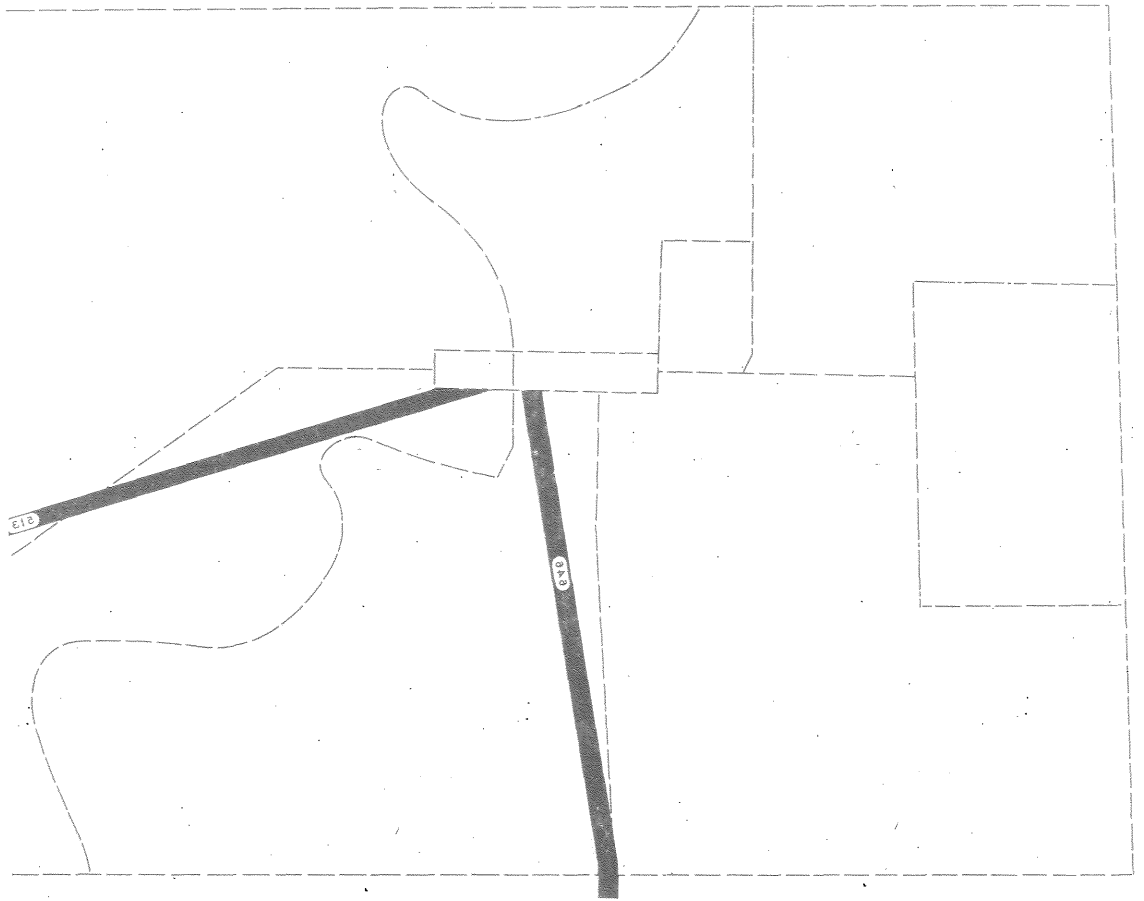


FIGURE 9

THE CENTRAL BUSINESS DISTRICT

FIGURE 9



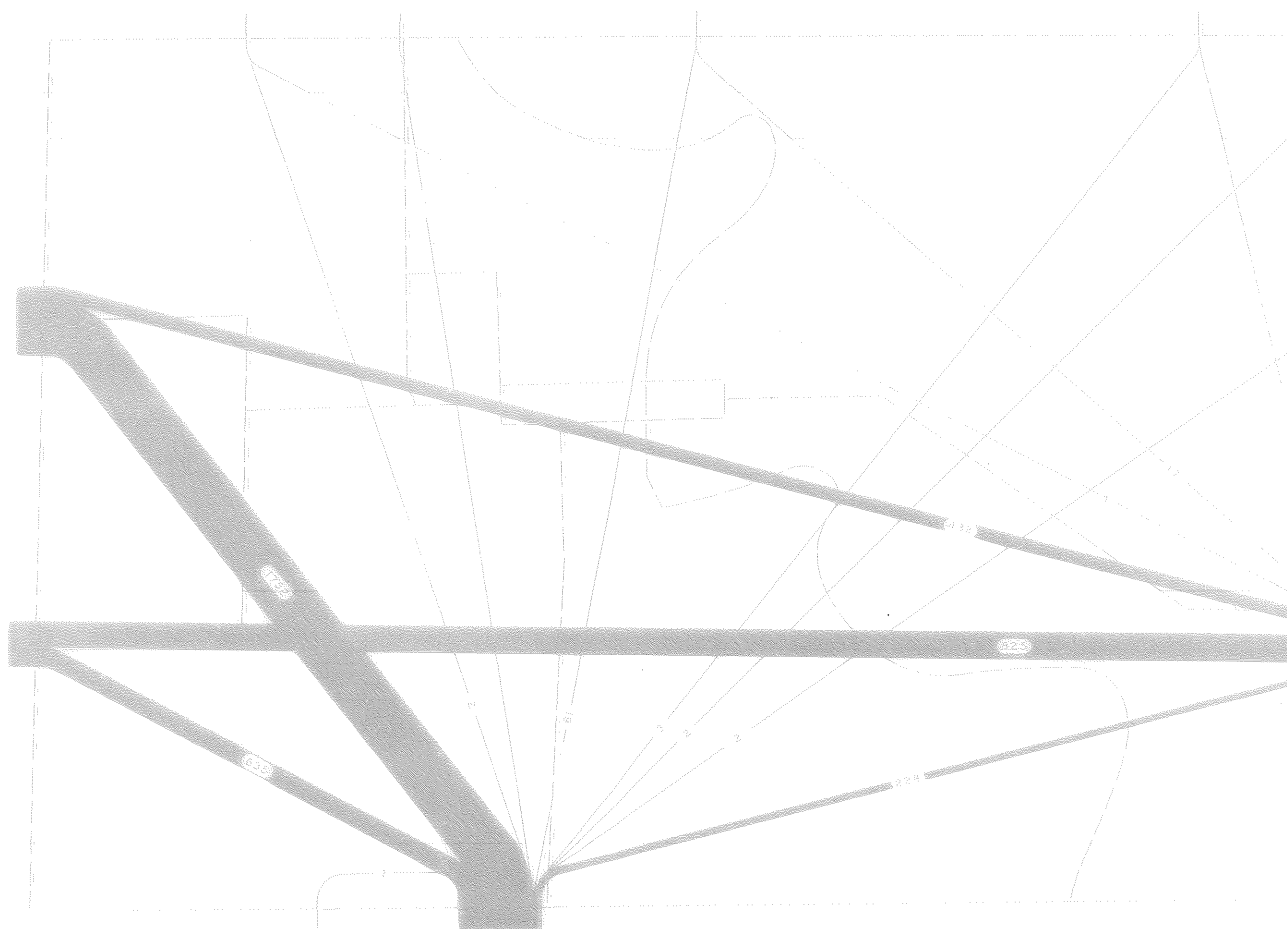


FIGURE 10

OTHER EXTERNAL ENTRANCES

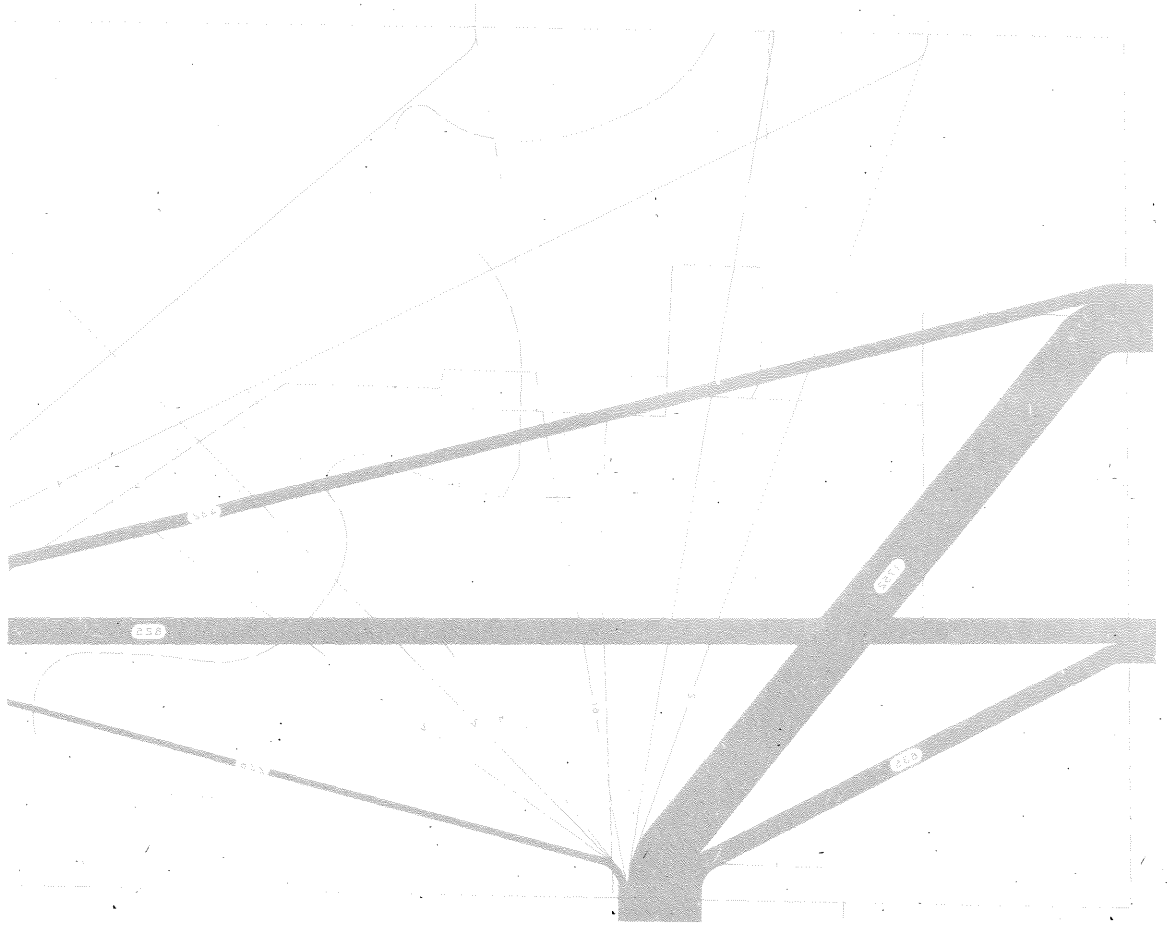
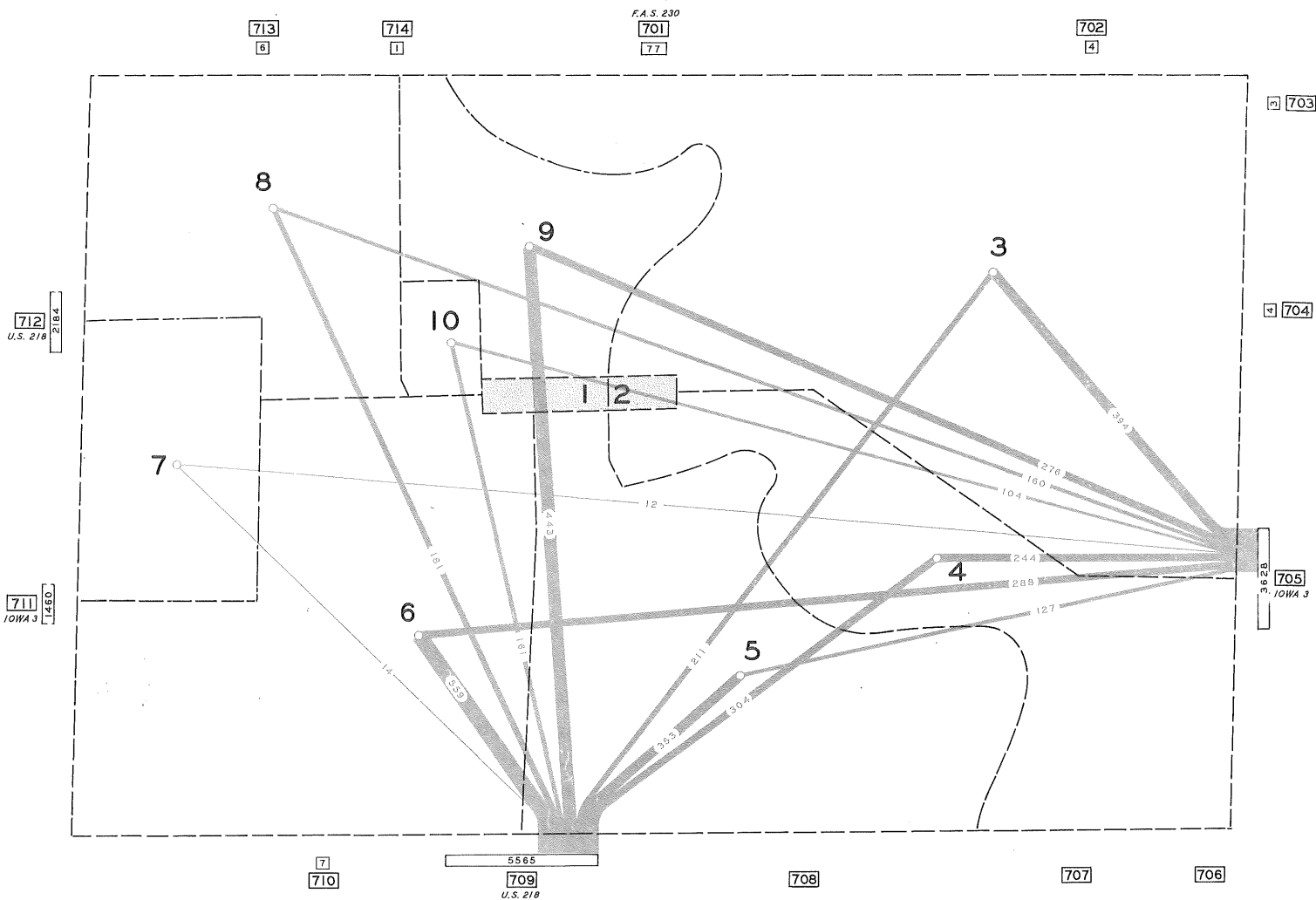


FIGURE 10

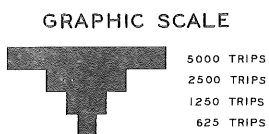
OTHER EXTERNAL ENTRAI



LEGEND

TRACT BOUNDARY LINE ———

CORPORATION LINE ———



1972 AVERAGE JUNE  
WEEKDAY TRAFFIC

FIGURE II

DESIRE LINES OF TRAVEL OF TRIPS  
TO OR FROM  
EXTERNAL ENTRANCES OF THE  
WAVERLY STUDY AREA  
AND INTERNAL TRACTS

#### EXTERNAL TRIP TERMINI

Table 5 on the adjoining page shows a tabulation of the number and percent of those trips which had termini in Bremer County, rural areas adjacent to the study area, other counties in Iowa, and other states.

The following traffic flow charts illustrate the data shown in Table 5 and point out the Iowa termini of all trips which passed through the two interview stations in Waverly at the time of the survey. Those trips which had termini in other states are shown entering or leaving Iowa on routes which appear to be most direct to the study area. All routes shown are approximate and should be interpreted as such.

Table 5  
SUMMARY OF TRIPS ENTERING OR LEAVING  
THE WAVERLY STUDY AREA

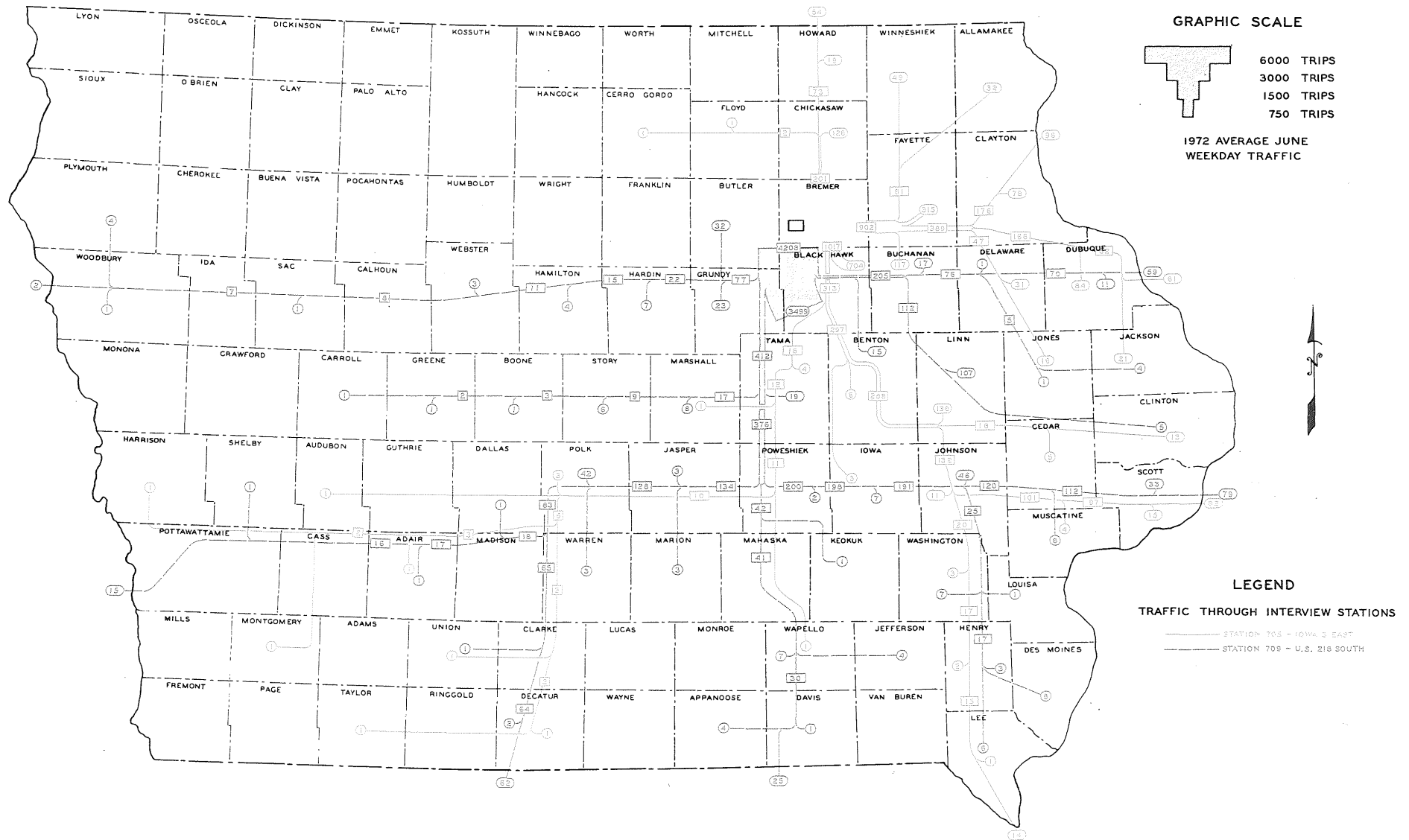
1972 Average June Weekday Traffic

Station Location  Origin or Destination	Iowa 3 East		U.S. 218 South	
	Station 705		Station 709	
	Vol.	%	Vol.	%
Bremer Station	4	.11		
Denver	491	13.53	25	.45
Frederika	19	.52		
Janesville	6	.17	803	14.43
Readlyn	266	7.33	3	.05
Sumner	175	4.82		
Tripoli	219	6.04		
Total to towns	1,180	32.52	831	14.93
Rural Bremer County	328	9.04	526	9.45
Other Counties	1,811	49.92	3,966	71.27
Out-of-State	309	8.52	242	4.35
Grand Total	3,628	100.00	5,565	100.00



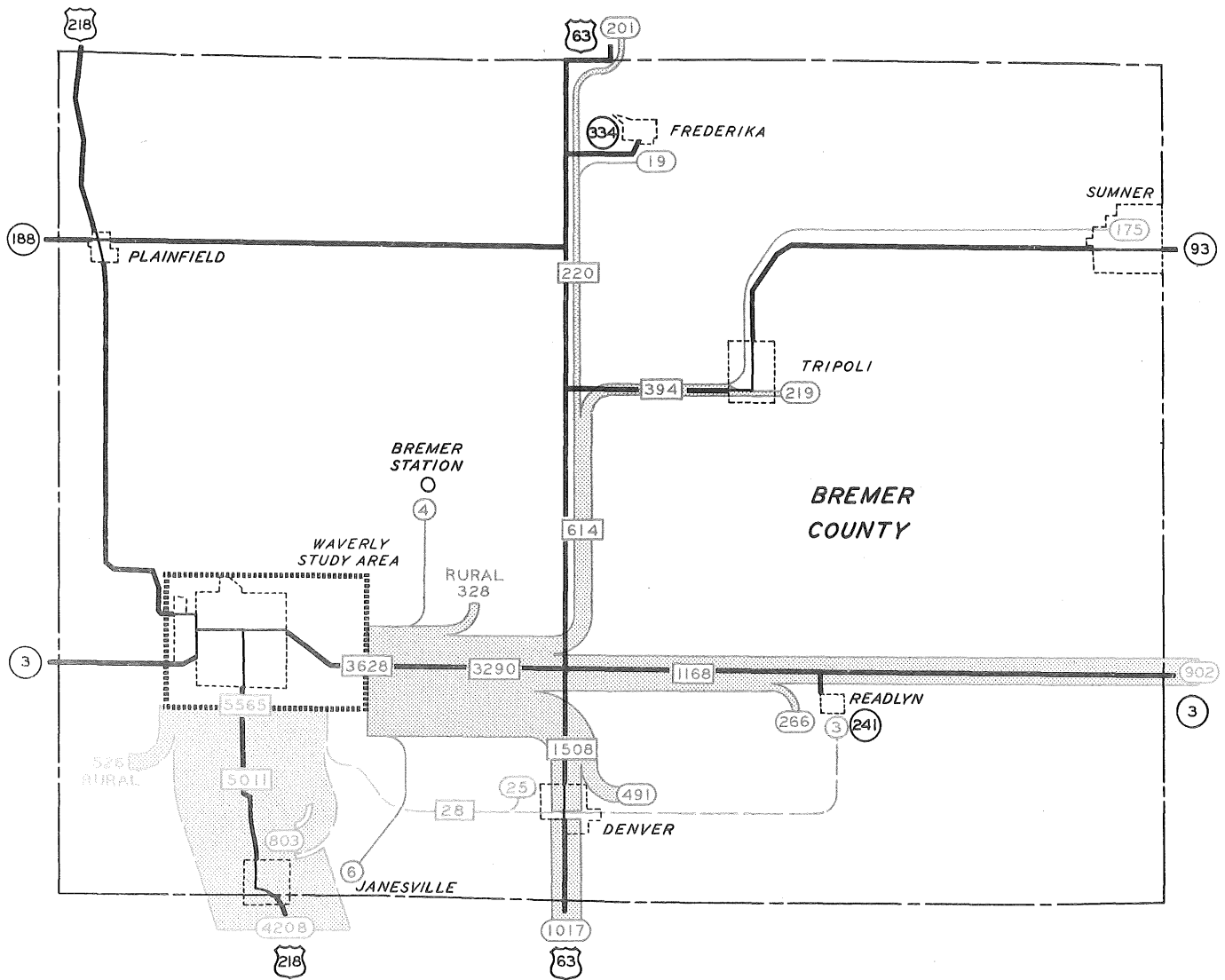
FIGURE 12  
DISPERSION OF EXTERNAL TRIPS  
BETWEEN THE WAVERLY STUDY AREA  
AND POINTS IN IOWA BEYOND BREMER COUNTY

ALL TRIPS BY DRIVERS OF AUTOS, TRUCKS, TAXIS, AND BUSES

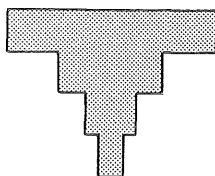


# **FIGURE 13** **DISPERSION OF EXTERNAL TRIPS** **BETWEEN THE WAVERLY STUDY AREA** **AND POINTS WITHIN BREMER COUNTY**

ALL TRIPS BY DRIVERS OF AUTOS, TRUCKS, TAXIS, AND BUSES



## **GRAPHIC SCALE**



1972 AVERAGE JUNE  
WEEKDAY TRAFFIC

6000 TRIPS  
3000 TRIPS  
1500 TRIPS  
750 TRIPS

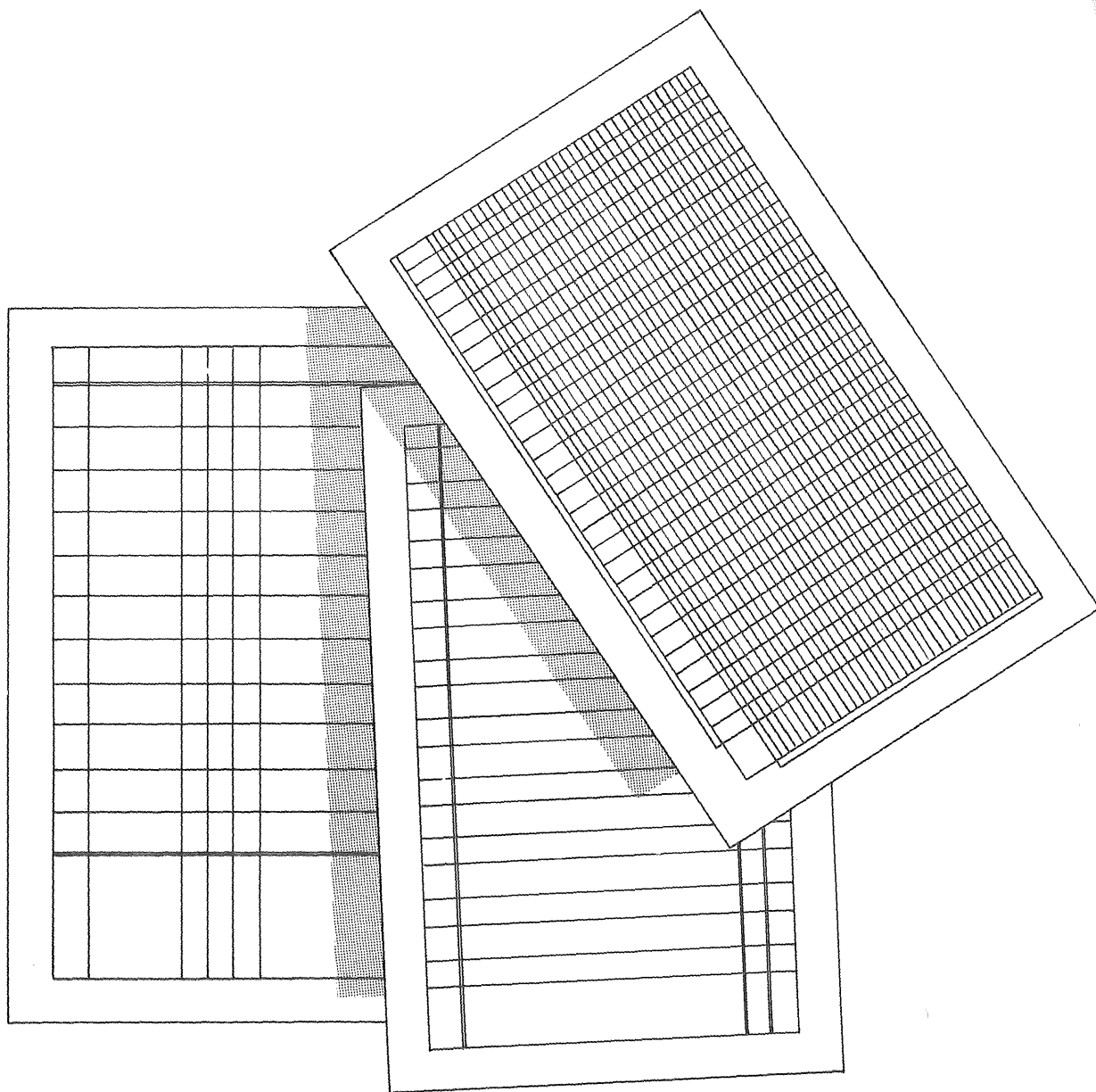


## **LEGEND**

### **TRAFFIC THROUGH INTERVIEW STATIONS**

STATION 705 - IOWA 3 EAST  
STATION 709 - U.S. 218 SOUTH

CORPORATION LINE -----  
CORDON LINE .....



*Appendix*

**WAVERLY STUDY AREA**  
**TRIP PURPOSE OF EXTERNAL TRIPS**  
**(IOWA 3 EAST AND U.S. 218 SOUTH)**  
 1972 AVERAGE JUNE WEEKDAY TRAFFIC

EXTERNAL LOCAL TRIPS

Table B-2a(1)

Station Trip Purpose	705	709	Total Traffic
	Iowa 3 East	U.S. 218 South	
Work	542	779	1321
Personal Business	380	338	718
During Work	345	457	802
Medical or Dental	82	88	170
School	54	121	175
Social or Recreational	303	508	811
Eat	30	52	82
Shop	355	480	835
Serve Passengers	27	49	76
Total Traffic	2118	2872	4990

EXTERNAL THROUGH TRIPS

Table B-2a(2)

Station Trip Purpose	705	709	Total Traffic
	Iowa 3 East	U.S. 218 South	
Work	195	478	673
Personal Business	225	403	628
During Work	478	696	1174
Medical or Dental	25	29	54
School	15	116	131
Social or Recreational	529	821	1350
Eat	1	1	2
Shop	34	122	156
Serve Passengers	8	27	35
Total Traffic	1510	2693	4203

SUMMARY - ALL EXTERNAL TRIPS

Table B-2a(3)

Station Trip Purpose	705	709	Total Traffic
	Iowa 3 East	U.S. 218 South	
Work	737	1257	1994
Personal Business	605	741	1346
During Work	823	1153	1976
Medical or Dental	107	117	224
School	69	237	306
Social or Recreational	832	1329	2161
Eat	31	53	84
Shop	389	602	991
Serve Passengers	35	76	111
Total Traffic	3628	5565	9193

**WAVERLY STUDY AREA**  
**AVERAGE CAR OCCUPANCY BY TRIP PURPOSE**  
**(IOWA 3 EAST AND U.S. 218 SOUTH)**  
 1972 AVERAGE JUNE WEEKDAY TRAFFIC

EXTERNAL LOCAL TRIPS

Table B-3a(1)

Trip Purpose Origin	Trip Purpose - Destination										Average Occupancy
	Work	Personal Business	During Work	Medical or Dental	School	Social or Recreation	Eat	Shop	Serve Pass.	Home	
Work		1.259	1.190	1.993		1.324	1.000	1.561		1.309	1.300
Personal Business	1.678	1.786	1.537	1.000		2.088	2.000	2.133		1.846	1.851
During Work	1.660	1.000	1.255	2.000	1.000	1.000				1.344	1.286
Medical or Dental	1.510	1.332	2.000			1.000			4.000	2.174	2.080
School	1.000				2.974	1.959		1.468		1.379	1.456
Social or Recreation	1.484	1.948	1.663	3.001	2.336	2.330	4.336	2.251		2.424	2.420
Eat	1.000	1.000			1.000	2.324				2.873	2.560
Shop	2.063	1.814		1.325		1.786	3.377	1.697		2.013	1.991
Serve Passengers						2.000		2.000	2.000	2.034	2.031
Home	1.248	1.884	1.060	2.165	1.351	2.205	2.679	2.089	2.122		1.825
Average Occupancy	1.288	1.843	1.238	2.130	1.474	2.160	2.832	2.060	2.198	1.800	1.772

EXTERNAL THROUGH TRIPS

Table B-3a(2)

Trip Purpose Origin	Trip Purpose - Destination										Average Occupancy
	Work	Personal Business	During Work	Medical or Dental	School	Social or Recreation	Eat	Shop	Serve Pass.	Home	
Work	1.000	1.690	1.265	1.000	1.000	1.498				1.462	1.402
Personal Business	1.336	1.662	2.000			1.504		3.309		1.959	1.938
During Work	1.000	1.000	1.280							1.441	1.278
Medical or Dental										2.378	2.378
School		1.000	1.000			1.512				1.307	1.302
Social or Recreation	2.000	1.000		2.000	1.000	2.582		2.500		2.447	2.470
Eat		1.000	1.000							3.000	1.652
Shop	1.000							4.000		2.272	2.281
Serve Passengers										2.616	2.616
Home	1.347	2.046	1.181	2.149	1.480	2.524		2.698	2.418		2.170
Average Occupancy	1.322	1.992	1.273	2.059	1.460	3.521		2.747	2.418	2.018	1.986

SUMMARY - ALL EXTERNAL TRIPS

Table B-3a(3)

Trip Purpose Origin	Trip Purpose - Destination										Average Occupancy
	Work	Personal Business	During Work	Medical or Dental	School	Social or Recreation	Eat	Shop	Serve Pass.	Home	
Work	1.000	1.345	1.220	1.860	1.000	1.357	1.000	1.561		1.339	1.324
Personal Business	1.635	1.740	1.629	1.000		2.045	2.000	2.341		1.885	1.879
During Work	1.449	1.000	1.265	2.000	1.000	1.000				1.389	1.282
Medical or Dental	1.510	1.332	2.000			1.000			4.000	2.226	2.144
School	1.000	1.000	1.000		2.974	1.895		1.468		1.361	1.421
Social or Recreation	1.655	1.711	1.663	2.816	2.236	2.496	4.336	2.281		2.434	2.443
Eat	1.000	1.000	1.000		1.000	2.324				2.877	2.505
Shop	1.999	1.814		1.325		1.786	3.377	1.784		2.035	2.012
Serve Passengers						2.000		2.000	2.000	2.105	2.096
Home	1.265	1.933	1.101	2.164	1.390	2.349	2.679	2.143	2.186		1.918
Average Occupancy	1.294	1.887	1.252	2.125	1.470	2.321	2.832	2.119	2.243	1.855	1.832

## WAVERLY STUDY AREA

### DIRECTIONAL TRIPS BETWEEN STATION AND TRACTS

1972 AVERAGE JUNE WEEKDAY TRAFFIC

## STATION 705, IOWA 3 EAST

## STATION 709, U.S. 218 SOUTH

VEHICLE TRIPS						
From	To	Auto	Pickup and Panel	Single Unit & Bus	Semi Truck	Total
1	705	74	14	1	6	95
2	705	131	22	6	2	161
3	705	154	29	11	1	195
4	705	91	14	3	9	117
5	705	54	3	2	1	60
6	705	107	7	6	3	123
7	705	7				7
8	705	58	10	4		72
9	705	108	15	1	15	139
10	705	52	2			54
C1.2	Total	836	116	34	37	1023
705	1	83	16	1	2	102
705	2	139	15		1	155
705	3	148	43	4	4	199
705	4	93	16	9	9	127
705	5	57	8	2		67
705	6	145	9	10	1	165
705	7	4	1			5
705	8	68	10	9	1	88
705	9	94	27	4	12	137
705	10	44	4		2	50
C1.3	Total	875	149	39	32	1095
705	701	6	5			11
705	702		1			1
705	709	93	10	9	6	118
705	711	276	48	23	65	412
705	712	151	12	9	45	217
705	713	3				3
701	705	5	1			6
703	705	1				1
704	705	2				2
709	705	87	12	5	6	110
711	705	292	31	29	61	413
712	705	128	24	19	44	215
713	705	1				1
C1.4	Total	1045	144	94	227	1510

VEHICLE TRIPS						
From	To	Auto	Pickup and Panel	Single Unit & Bus	Semi Truck	Total
1	709	123	25	5	1	154
2	709	141	19	5	3	168
3	709	90	9	9	4	112
4	709	102	31	5	3	141
5	709	145	26	4		175
6	709	241	30	16	4	291
7	709	11	1			12
8	709	70	11	3	1	85
9	709	198	25	13	9	245
10	709	63	6	1		70
C1.2	Total	1184	183	61	25	1453
709	1	129	25	12	1	167
709	2	122	24	11		157
709	3	82	12	3	2	99
709	4	126	25	9	3	163
709	5	152	21	4	1	178
709	6	236	19	11	2	268
709	7	2				2
709	8	83	10	2	1	96
709	9	160	28	9	1	198
709	10	83	5	3		91
C1.3	Total	1175	169	64	11	1419
709	701	22	5		2	29
709	702	1				1
709	703	1				1
709	704	1				1
709	705	87	12	5	6	110
709	710	1	1			2
709	711	228	39	28	9	304
709	712	625	84	53	45	807
709	713	1				1
701	709	23	6	3		32
702	709	1	1			2
703	709	1				1
704	709	1				1
705	709	93	10	9	6	118
710	709	5				5
711	709	267	45	9	10	331

TABLE E-2

## WAVERLY STUDY AREA

## NONDIRECTIONAL TRIPS BETWEEN STATIONS AND TRACTS

1972 AVERAGE JUNE WEEKDAY TRAFFIC

## STATION 705, IOWA 3 EAST

VEHICLE TRIPS					
Between	Auto	Pickup and Panel	Single Unit & Bus	Semi Truck	Total
705 1	157	30	2	8	197
705 2	270	37	6	3	316
705 3	302	72	15	5	394
705 4	184	30	12	18	244
705 5	111	11	4	1	127
705 6	252	16	16	4	288
705 7	11	1			12
705 8	126	20	13	1	160
705 9	202	42	5	27	276
705 10	96	6		2	104
Cl.2&3 Total	1711	265	73	69	2118
705 701	11	6			17
705 702		1			1
705 703	1				1
705 704	2				2
705 709	180	22	14	12	228
705 711	568	79	52	126	825
705 712	279	36	28	89	432
705 713	4				4
Cl.1.4 Total	1045	144	94	227	1510
Cl.2&3 Total	1711	265	73	69	2118
705 Total	2756	409	167	296	3628

## STATION 709, U.S. 218 SOUTH

VEHICLE TRIPS					
Between	Auto	Pickup and Panel	Single Unit & Bus	Semi Truck	Total
709 1	252	50	17	2	321
709 2	263	43	16	3	325
709 3	172	21	12	6	211
709 4	228	56	14	6	304
709 5	297	47	8	1	353
709 6	477	49	27	6	559
709 7	13	1			14
709 8	153	21	5	2	181
709 9	358	53	22	10	443
709 10	146	11	4		161
Cl.2&3 Total	2359	352	125	36	2872
709 701	45	11	3	2	61
709 702	2	1			3
709 703	2				2
709 704	2				2
709 705	180	22	14	12	228
709 710	6	1			7
709 711	495	84	37	19	635
709 712	1365	169	103	115	1752
709 713	2				2
709 714		1			1
Cl.1.4 Total	2099	289	157	148	2693
Cl.2&3 Total	2359	352	125	36	2872
709 Total	4458	641	282	184	5565





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