

CHAMPAIGN COUNTY **Regional Planning Commission**

Selected Intersection Crash Analysis for 1993-1998

Prepared by: Rita Morocoima-Black Susan Chavarría Lucas Cruse



Champaign-Urbana Urbanized Area Transportation Study (CUUATS)

July 16, 2001

Table of Contents

ABS	TRACT	IV
I. I	NTRODUCTION	6
II.	DATA SOURCES AND COMPILATION	2
III.	PROBLEMS IN CRASH DATA	3
IV.	REVIEW OF CRASH STATISTICS IN CHAMPAIGN-URBANA	4
V.	METHODOLOGY FOR CRASH INTERSECTION SELECTION	9
A.	Crash Analyses Methods	9
1.	AVERAGE NUMBER OF CRASHES METHOD	9
2.	CRASH RATE METHOD	10
В.	CUTEC CRITERIA	11
1.	VOLUME-BASED CLASSIFICATION	11
2.	IDOT CRITERION BASED ON AVERAGE NUMBER OF CRASHES AND APPLY THIS CRITERIA TO T	THE
VOI	LUME-BASED CLASSIFICATION	12
3.	IDOT CRITERION BASED ON THE AVERAGE CRASH RATE AND APPLY THIS CRITERIA TO THE	E 10
	A DRIVE A THON OF THE CLITEC CRITERIA	12
U.	APPLICATION OF THE CUTEC CRITERIA	13
VI.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS	14
VI. A.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS	14 14
VI. A. B.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS Champaign Urbana	14 14 15
VI. A. B. C.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS Champaign Urbana University of Illinois Area	14 14 15 15
VI. A. B. C. D.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS Champaign Urbana University of Illinois Area Champaign-Urbana	14 15 15 16
VI. A. B. C. D. VII.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND	14 15 15 16
VI. A. B. C. D. VII. REC	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS.	14 15 15 16 19
VI. A. B. C. D. VII. REC 199	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS	14 15 15 16 19
VI. A. B. C. D. VII. REC 199	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS	14 15 15 16 19
VI. A. B. C. D. VII. REC 199 1. 2.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS 97-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND ARMORY, C:	14 15 15 16 19 22 24
VI. A. B. C. D. VII. REC 199 1. 2. 3.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS P7-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND ARMORY, C:	14 15 15 16 19 22 24 26
VI. A. B. C. D. VII. REC 199 1. 2. 3. 4.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND OMMENDATIONS 97-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 3 RD AND GREEN, C:	14 15 15 16 19 22 24 26 28
VI. A. B. C. D. VII. REC 199 1. 2. 3. 4. 5.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN. URBANA URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS OMMENDATIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 3 RD AND GREEN, C: 4 TH AND GREEN, C:	14 15 15 16 19 22 24 26 28 30
VI. A. B. C. D. VII. REC 199 1. 2. 3. 4. 5. 6.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS Champaign URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND OMMENDATIONS 97-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 3 RD AND GREEN, C: 4 TH AND GREEN, C: 4 TH AND GREEN, C:	14 15 15 16 19 22 24 26 28 30 32
VI. A. B. C. D. VII. REC 199 1. 2. 3. 4. 5. 6. 7.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND OMMENDATIONS 97-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 3 RD AND GREEN, C: 4 TH AND GREEN, C: 4 TH AND GREEN, C: ANTHONY AND MARKETVIEW, C:	14 15 15 16 19 22 24 26 28 30 32 34
VI. A. B. C. D. VII. REC 199 1. 2. 3. 4. 5. 6. 7. 8.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS 97-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 2 ND AND GREEN, C: 3 RD AND GREEN, C: 4 TH AND JOHN, C: 4 TH AND JOHN, C: 4 TH AND AND MARKETVIEW, C: 5 TH C	14 15 15 16 19 22 24 26 28 30 32 34 36
VI. A. B. C. D. VII. REC 199 1. 2. 3. 4. 5. 6. 7. 8. 9.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS Champaign URBANA UNIVERSITY OF ILLINOIS AREA. CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS 97-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 2 ND AND GREEN, C: 3 RD AND GREEN, C: 4 TH AND GREEN, C: 4 TH AND GREEN, C: 4 TH AND GREEN, C: BLOOMINGTON AND PROSPECT, C: BLOOMINGTON AND PROSPECT, C: BRADLEY AND COUNTRY FAIR, C:	14 15 15 16 19 22 24 28 30 32 34 36 38
VI. A. B. C. D. VII. REC 1999 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS CHAMPAIGN URBANA UNIVERSITY OF ILLINOIS AREA CHAMPAIGN-URBANA SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND COMMENDATIONS OMMENDATIONS 07-1998 CHAMPAIGN INTERSECTIONS 1 ST AND GREEN, C: 2 ND AND GREEN, C: 2 ND AND GREEN, C: 2 ND AND GREEN, C: 4 TH AND GREEN, C: 4 TH AND GREEN, C: ANTHONY AND MARKETVIEW, C: BLOOMINGTON AND PROSPECT, C.: BRADLEY AND COUNTRY FAIR, C: COLUMBIA AND WALNUT, C	14 15 15 16 19 22 24 26 28 30 32 34 36 38 38 40

12.	JOHN AND PROSPECT, C.:	44
13.	MARKETVIEW AND NEIL, C:	46
14.	NEIL AND UNIVERSITY, C:	
15.	STATE AND UNIVERSITY, C:	50

1997-1998 URBANA INTERSECTIONS

1.	CUNNINGHAM AND UNIVERSITY, U:	.54
2.	FAIRVIEW AND LINCOLN, U:	.56
3.	Illinois and Lincoln, U:	.58
4.	LINCOLN AND SPRINGFIELD, U:	.60

APPENDIX A: CHAMPAIGN-URBANA INTERSECTION CRASH STATISTICS

APPENDIX B: GENERAL CRASH COUNTERMEASURES IDEAS

APPENDIX C: TRAFFIC GROWTH RATES

APPENDIX D: KEY TO COLLISION DIAGRAM SYMBOLS

APPENDIX E: SUMMARY OF SCIL'S BETWEEN 1972 AND 1998

Table of Figures

0	
Figure 1: Roadway traffic crashes	5
Figure 2: Roadway traffic crash injuries	7
Figure 3: Roadway traffic crash fatalities	7
Figure 4.a: Champaign: Changes in traffic volumes and crashes over time	8
Figure 4.b: Urbana: Changes in traffic volumes and crashes over time	9
Figure 5: Selected Crash Intersection Locations (SCIL) in 1997 and 1998	17

Abstract

The present report was undertaken with the aim of determining safety improvements in the Champaign-Urbana area. This report identifies crash intersection locations and provides safety alternative improvements in the Champaign-Urbana area during two time periods: 1993 through 1997, and 1994 through 1998, in areas where crashes were occurring more frequently than normal. The report presents a detailed analysis of the intersections that meet the new criteria for selected crash intersection location (SCILs) based on volume classification, number of crashes, and crash rate. Specifically, in 1997, Forty-five (45) such intersections were identified, 20 of which are on the Campus of the University of Illinois. In 1998, Forty-nine (49) such intersections were identified, 18 of which are on the Campus of the University of Illinois. In depth five-year summaries and diagrams were prepared for the 1997 and 1998 ranked crash intersections in Champaign-Urbana. Field visits were conducted at all of these locations, and where possible, corrective measures were recommended.

During the period 1993 – 1996, travel had been steadily, but modestly, increasing in both Urbana and Champaign. This trend continued in 1997 and 1998. At the same time, crash numbers were on a general upward trend until 1997, when they decreased significantly. In 1998, there was a slight increase again in the number of crashes in the Champaign-Urbana area.

The 1997 intersection safety conditions were comparable to previous years. There were 3046 crashes, 1067 injuries, and 0 fatalities in Champaign-Urbana including the University of Illinois area, but excluding the Savoy area. The 1997 crash number (i.e., 3043) is considerably below the average of the past 18 years, as are the number of injuries and the number of fatalities. In 1998, there were 3082 crashes, 1051 injuries, and 5 fatalities. The 1998 crash number (3082) and the number of injuries are still considerably below the 18-year average. The number of fatalities, an increase from 0 to 5 from 1997 to 1998, is above the 18-year average.

In 1997, the intersections in the City of Champaign with the highest number of crashes and entering volumes were Neil Street and University Avenue (First Street and Green Street tied with Neil Street and University Avenue at 32 crashes each), and Kirby Avenue and Neil Street, respectively. The intersection of Kirby Avenue and Neil Street had a traffic volume over 47,000 vehicles per day.

In Urbana, two intersections tied for the highest number of crashes (21): Lincoln Avenue at Springfield Avenue and Cunningham Avenue at University Avenue. The intersection with the highest daily entering volume was Lincoln Avenue and University Avenue, which had a traffic volume over 43,000 vehicles per day.

In 1998, the intersection in the City of Champaign with the highest number of crashes was once again Neil Street and University Avenue, with 32 crashes. The intersection with the highest daily entering traffic volume was again Kirby Avenue and Neil Street, with almost 48,000 vehicles per day.

In Urbana, Cunningham Avenue and University Avenue again had the highest number of crashes. Lincoln Avenue and University Avenue again had the highest daily entering traffic volume, with a volume of over 44,000 vehicles per day.

It is important to note that during the 1997-1998 time period Green Street intersections account for many of the crashes occurred. Green Street corridor, particularly through the Campus area in Champaign is particularly noted for the high levels of interaction between pedestrians, delivery trucks, bikes and auto travel which can explain the high number of crashes at these intersections.

INTERSECTION CRASH ANALYSIS for 1993-1997 and 1994-1998

I. INTRODUCTION

Despite the many advances in highway design, traffic engineering, automobile manufacturing, and police enforcement technologies, many countries around the world still suffer from an ever-increasing problem of traffic crashes. Worldwide, about half a million people are killed in road crashes every year. In the US, more than 41,000 Americans die and 3.5 million are injured in vehicle crashes each year. Besides these facts, the annual direct costs of road crashes are estimated at about 80 billion dollars, themselves far exceeded by their related social costs¹. Therefore, there has been a keen interest in identifying crash locations, diagnosing their problems, and suggesting proper countermeasures.

This Intersection Crash Analysis report is prepared in compliance with the requirement of the annual Unified Technical Work Program (UTWP) of the Champaign-Urbana Urbanized Area Transportation Study (CUUATS). CUUATS prepares an crash analysis report every one or two years. This report is the Intersection Crash Analysis for the years 1993-1997 and 1994-1998.

The purpose of the report is to identify **intersections** in the Champaign-Urbana urbanized area where crash experience and crash rate according to their daily entering volume appears to be higher than normal. This in turn assists in identifying low-cost improvements, traffic control devices and/or physical conditions that will improve safety at these intersections. These intersections are referred to in this report as the Selected Crash Intersection Locations (SCIL). The report is a step towards fulfilling this area's Transportation System Management (TSM) objective of improving safety and efficiency of the local roadway system. Traditionally, crash locations have been identified based on

the total number of crashes. This criterion provides no consideration of whether the crashes were caused or could be corrected by road improvements. This traditional method results in the identification of locations that are not truly hazardous from a road safety authority perspective, and consequently may lead to a misapplication of safety improvement funding.

Effective treatment of the safety problems depends on accurate and timely identification of the deficiencies in the design and control of highways and intersections. Because traffic safety is affected by a number of factors including roadway design, traffic flow and control, vehicular and human characteristics, and weather and other environmental conditions, investigation into the cause of an crash is usually complex. However, this report takes a macroscopic approach and focuses only on roadway factors. In this sense, it provides only a starting point for more elaborate safety studies at specific intersections. Therefore, the findings reported should not be taken as the ultimate verdict on the safety of the respective locations.

II. DATA SOURCES AND COMPILATION

The crash database, known as the Local Crash Reference System (LARS), is the main source of data for transportation practitioners to conduct safety analyses and crash studies. This database is produced by the Illinois Department of Transportation (IDOT), which uses local and State police departments' crash reports submitted to the IDOT's Division of Traffic Safety. This division compiles the information and produces the LARS computerized database that contains every crash by location, date, time, type of collision as well as other information. The LARS reports are prepared and disseminated to local jurisdictions on a yearly basis. Although crash records have already been stored electronically for easy compilation and access by IDOT, CUUATS staff needs to work with crash data files prepared on a county basis in which all reported crashes and relevant information are coded in numbers based on established coding rules. A record for each crash may include as many as twenty data fields. Obviously, it is very cumbersome to

¹ 1999 Report to the Nation, FHWA, 2000

manually interpret the codes. Because of the substantial length of time consumed in processing the crash data, the LARS reports are usually distributed with an eight to nine month lag. For example, the LARS report for crashes that occurred in January is not available until the following August or September.

Furthermore, as a way to improve the quality of the report in analyzing the data, CUUATS staff constructs the collision diagram, which graphically shows the detailed collision characteristics for all the selected crash intersection locations for a given year. Such details may include the number of vehicles, pedestrians, bikes, or roadside objects involved, the direction of travel of each vehicle, and the type of collision. This task is extremely time-consuming without using some kind of automated graphical tools.

This report compiles intersection crash frequencies for the years 1993, 1994, 1995, 1996, 1997, and 1998 and calculates their corresponding crash rates. These crash statistics are estimated for the two cities, Champaign and Urbana, as well as for the University of Illinois Campus area. Data for the Village of Savoy will start appearing in the 2001 or 2002 report.

III. PROBLEMS IN CRASH DATA

It is important to note that the number or rate of crashes at a location is not an absolute indicator of the "safety" of the location. Crashes are random events; at best they provide only an indication of the safety of the location if conditions are the same in the future as they were in the past. Given the many limitations on the use of crash data, even this estimate is difficult to establish. Following is a summary of the limitations that affect crash studies.²

Unreported Crashes: Not all traffic crashes are reported to the police. Most states have thresholds of property damage below which crashes are not investigated. In other cases, motorists do not report crashes for fear of high insurance rates. Crashes on private properties may go unreported.

²See Chapter 11, Manual of Transportation Engineering Studies, ITE. 1994.

Erroneous Data: Crash reports may contain errors, and the number of errors grows as the data is further processed. Range and logic checks can reveal some of these errors, however, often times analysts need to consult a hard copy of the crash report. Unresolved problems may require that part or all of the crash record be deleted.

Crash Cause: Crashes are usually the result of a chain of events that involve the interaction of three factors: the road, the vehicle, and the driver. Most crash reports contain - in the best scenario - only the last and most obvious link of the crash cause chain. Other important events in this chain may get easily overlooked, and hence the engineer would seek treatments for the obvious cause, which may or may not be the sole cause of the crash. In particular, it is known that driver inattention is a factor in majority of crashes; however, the significance of this fact is often overlooked when analyzing crashes.

Limitation of the Report Form: The level of details in crash reports is often a balance between competing interests. In most cases traffic engineers find information about vehicle and roadway conditions to be insufficient. Hence, accurate assessment of the crash cause is not always possible.

IV. REVIEW OF CRASH³ STATISTICS IN CHAMPAIGN-URBANA

Traffic safety success is measured over time. Therefore, an 18-year (1979-1996) crash history table, in the Champaign-Urbana area is depicted in Table 1 and Figure 1. In the last five years, crash occurrences in the Champaign-Urbana area, including intersections and non-intersection locations, do not have a stabilized trend of increasing or decreasing rates.

From 1993 to 1996, overall crashes in the area were increasing. Since that time, however, the crash average decreased in 1997, and increased again in 1998. Champaign has been following this overall trend, while crashes in Urbana have been decreasing since 1996. The 18-year average is 3,281 crashes per year with a standard deviation of 221 crashes.

³These are *reported* accidents only. They may not be inclusive of all accidents that actually occurred in the area.

1979-1998											
	TO	TAL ACCIDEN	тs	PE	rsons injur	ED	AVG INJURIES	FA	TALITIES		
TEAK	CHAMPAIGN	URBANA	TOTAL	CHAMPAIGN	URBANA	TOTAL	PER ACCIDENT	CHAMPAIGN	URBANA	TOTAL	
1980	2394	1088	3482	1017	447	1464	0.42	3	1	4	
1981	2597	1129	3726	992	460	1452	0.39	4	1	5	
1982	2184	1009	3193	939	368	1307	0.41	3	1	4	
1983	2086	892	2978	917	333	1250	0.42	1	0	1	
1984	2055	969	3024	950	389	1339	0.44	2	1	3	
1985	2429	1058	3487	957	415	1372	0.39	3	3	6	
1986	2543	1027	3570	1023	427	1450	0.41	4	2	6	
1987	2589	1011	3600	1186	434	1620	0.45	8	3	11	
1988	2375	924	3299	973	342	1315	0.40	1	2	3	
1989	2232	943	3175	869	321	1190	0.37	3	0	3	
1990	2410	926	3336	915	344	1259	0.38	3	4	7	
1991	2218	866	3084	788	299	1087	0.35	2	4	6	
1992	2264	802	3066	973	276	1249	0.41	1	1	2	
1993	2295	881	3176	938	368	1306	0.41	0	0	0	
1994	2363	893	3256	1045	347	1392	0.43	0	0	0	
1995	2482	780	3262	995	285	1280	0.39	2	0	2	
1996	2579	910	3489	907	323	1230	0.35	3	2	5	
1997	2154	892	3046	802	265	1067	0.35	0	0	0	
1998	2292	790	3082	760	291	1051	0.34	5	0	5	
TOTAL	44541	17790	62331	17946	6734	24680		48	25	73	
AVG/YR	2344	936	3281	945	354	1299	0.40	2.53	1.32	3.84	

Table 1: Crash History for Champaign-Urbana Area



Figure 1: Roadway traffic crashes

The number of people injured, as seen in Figure 2, shows an upward trend between 1991 and 1994 followed by a continuous decline. The 18-year average injury rate is 0.40 injuries per crash. The highest average injury rate was 0.45 injuries per crash, which occurred in 1987. The lowest average was 0.34 injuries per crash, which occurred in 1998. Crash fatalities had been on the decline from 1990 until 1994 when there were no fatalities, as is shown in Figure 3. But, in 1995 there was an increase in the number of fatalities when two occurred. In 1996, five fatalities occurred, continuing this upward trend. In 1997, however, there were no fatalities in the Champaign-Urbana area. In 1998, the number climbed back up to five. The 18-year average number of persons killed is 3.84 per year, with the highest number of fatalities (11) occurring in 1987. No fatalities occurred in 1993, 1994 or 1997.

When it comes to safety, however, success is a relative concept. Although many lives have been saved by intersection improvements in the last few years in Champaign-Urbana, the fact that there are still fatalities and injuries compels CUUATS to continue efforts to improve safety. Therefore, additional improvements in intersection safety are required to decrease the number of fatalities and injuries in the urbanized area. In general, to measure safety success, the numbers of crashes, traffic fatalities and injuries are associated to vehicle-miles traveled (VMT). This means that number of crashes, fatalities and injuries cannot be used as the only explanatory variables to explain improvements or decline in the level of safety in Champaign-Urbana. For example, an increase in number of crashes can be the result of increase in travel, not that roads are becoming less safe. Consequently, traffic flows (ADT volumes) are used as a measure of exposure or as an explanatory variable in assessing intersection safety trends.

In order to better assess traffic safety in Champaign-Urbana, ADT volume data for intersections with 3 or more crashes in the last five years, or critical according to the new criterion in Champaign and Urbana, along with number of crashes per year and crash rates, were used.



Figure 2: Roadway traffic crash injuries



Figure 3: Roadway traffic crash fatalities

Figure 4A shows these three variables graphed together for the City of Champaign. As can be seen in Figure 4A, traffic volumes in Champaign during 1993 - 1995 show an upward trend, but since 1996 there has been a significant decrease in traffic volumes. At the same time, crash numbers as well as crash rates declined from 1994 to 1996, but increased in 1997 and decreased slightly in 1998. In Figure 4B, it can be seen that traffic volumes have been significantly decreasing in Urbana. The number of crashes and crash rates show the same behavior in Urbana as in Champaign, an increase in the first two years; a peak in 1994; a decrease from 1994 o 1996; an increase in 1997, and a decrease in 1998. However, the data for 1996 cannot be compared with the rest of the data (1993-1995) due to differences in the methodology used to select the critical intersections in Champaign-Urbana. The new methodology used to analyze crashes since 1996 shows that a greater number of intersections within the lower volume range are obtained. Consequently, the traffic volumes values graphed from 1996 and after are not comparable with the volumes obtained in previous years. In fact, traffic volumes in 1996-1998 are smaller.



Figure 4.a: Champaign: Changes in traffic volumes and crashes over time



Figure 4.b: Urbana: Changes in traffic volumes and crashes over time

Notes: 1- Not all volumes are actual counts.

2- Graphs based on intersections with <u>3 or more</u> crashes or <u>1.5 or more</u> crash rate in any one of the five years between 1992-1996 or critical according to the new criterion.

V. METHODOLOGY FOR CRASH INTERSECTION SELECTION

A. Crash Analyses Methods

There are various methods used to analyze crash data. The two most commonly used methods are the Number of Crashes Method and the Crash Rate Method. The following is a brief description of both methods.

1. Average Number of Crashes Method

The simplest method to analyze crash data is to use crash frequency and calculate the average number of crashes for each year. The numbers of crashes are summarized for each location under consideration. According to IDOT, in the past, locations having more than a defined number of crashes have been identified as potential SCILs. Now, IDOT uses the *average crash number plus two standard deviations* (Av-Number+2 SD) as the cut-off point between critical and non-critical intersections. The same criterion is used in this report. The main shortcoming of this method is that exposure, or the number of vehicles using intersections, is not taken into account.

2. Crash Rate Method

The crash rate method is more appropriate because it takes exposure measured in terms of traffic volume into account. An intersection may have numerous crashes because it is heavily used and not necessarily because it is especially hazardous. Therefore, an crash rate method that takes into account traffic volume is more useful for ranking locations according to crash experience. The crash rate of an intersection is calculated using the following formula:

$$AR = \underline{A}$$
DEV x (365/1,000,000)

where:

AR = crash rate in crashes per million entering vehicles (APMEV)
 A = number of crashes per year
 DEV = daily entering vehicles

For example, at the intersection of Neil Street and University Avenue, there were 22 crashes in 1996, and the number of daily entering vehicles was 22,322. The corresponding crash rate is:

This method has its flaws too. It results in identifying too many low-volume rural and local street sites, because a chance occurrence of an crash or two divided by a low volume results in a high rate.

To determine if an intersection is a SCIL, some criteria or cut-off point had to be used. IDOT has in the past used a rate of 1.5 APMEV as the cut-off point between SCIL and non-SCIL locations. Now, IDOT uses the *average crash rate plus one standard deviation* (Av-Rate+1SD) as the cut-off point between critical and non-critical intersections. The same criterion rate is adopted in this report.

Although the Crash Rate Method is widely used for SCIL identification, caution should be exercised with low volume intersections. These intersections show a wide variation in crash rates with any change in the actual number of crashes. For example, the intersection of Fifth Street and Beardsley had 1 crash in 1993 and a rate of 7.71 crashes per million entering vehicles. However, no crashes occurred in 1994. It is possible that one crash in 1993 was a random occurrence rather than a result of inadequate geometry or poor visibility. Therefore, improvements would probably not be justified based solely on such a limited observation. This suggests that a combination of average crash rates, average crash numbers, and intersection daily entering volumes analysis for both cities may need to be considered as a means to identify SCILs, and in turn, appropriate corrective measures.

The main purpose of this report is to help identify intersections in the Champaign-Urbana area that appear to have above average crash occurrence and crash rate according to their daily entering volume. These intersections are referred to in this report as the Selected Crash Intersection Locations (SCIL). These intersections (or, the SCILs) can then be studied in further detail to identify possible improvements (or countermeasures). There are several criteria used to identify such locations:

B. CUTEC Criteria

In order to choose the SCILs to be studied in this report, the data was first analyzed following the two methods mentioned above. Then, to finally determine the SCILs, the three criteria decided by the CUTEC Committee were applied to the data: volume based (intersection daily traffic volume), the average number of crashes and the average crash rates for intersections in Champaign and Urbana.

1. Volume-based classification

Intersections from Champaign and Urbana were classified according to the volume of entering traffic, combining signalized and unsignalized intersections. IDOT's Traffic Map was used to estimate entering volumes. Every street with a daily traffic flow of 1000 vehicles or more was identified, and then the total traffic volume calculated. The following volume classes were defined, and each intersection was placed into one of the categories depending on its total traffic volume.

- Class A: 20,000 daily vehicles or greater
- Class B: 10,000 to 19,999 daily vehicles

- Class C: 5,000 to 9,999 daily vehicles
- Class D: 2,000 to 4,999 daily vehicles
- Class E: 1,999 or less daily vehicles

For the purpose of this report, intersections included within Class E (1,999 or less daily vehicles) are not considered for selection as critical intersections (SCILs) to be studied.

2. IDOT criterion based on <u>average number of crashes</u> and apply this criteria to the volume-based classification

IDOT uses the *average crash number plus two standard deviations* (Av-Number+2 SD) as the cut-off point between critical and non-critical intersections. In this report, this criterion was applied to each volume class intersection. Then, the mean number of crashes and standard deviation was calculated for each volume-class of intersection. It is important to point out that the average-plus-2 standard deviations (Av-Num+2SD) criterion, when based on volume, captures most of the SCILs that were identified under the 1.5 APMEV criterion before.

The number of crashes for each intersection was then compared to the mean-plus-two standard deviations (Av-Number+2 SD) to determine if the intersection should be classified as critical or not.

3. IDOT criterion based on <u>the average crash rate</u> and apply this criteria to the volume-based classification

IDOT uses the *average crash rate plus one standard deviation* (Av-R +1 SD) as the cut-off point between critical and non-critical intersections. In this report, this criterion was applied to each volume class intersection. Then, the mean number of crash rate and standard deviation was calculated for each volume-class of intersections. Crash rate for each intersection was then compared to the mean-plus-one standard deviation (Av-Rate+1 SD) to determine if the intersection should be classified as critical or not.

These three criteria were used as a threshold to identify intersections that need special attention. These intersections are referred to in this report as the Selected Crash

Intersection Locations (SCIL). Using this threshold, there were 45 intersections in 1997 and 49 intersections in 1998 with more than 1,999 daily entering vehicles identified to have a number of crashes greater than the Average Number of Crashes plus two standard deviations or a crash rate greater than the Average Rate of Crashes plus one standard deviation for each volume based classification. Dominant crash patterns and probable causes of crashes at these SCILs were investigated. On-site observations were conducted and where appropriate, suitable countermeasures were recommended for each SCIL.

C. Application of the CUTEC Criteria

Below is a detailed explanation of how the selection of the SCILs were determined. 1997 SCILS were figured separately from 1998 SCILs.

- 1. Based on both the 1996 IDOT traffic map and the estimated traffic growth rate, the average daily volume was found for every two roads defining an intersection.
- 2. The average daily volume for both streets was added to obtain the total average daily volume for each intersection.
- 3. A database with all the intersections that have a daily entering volume of 1,000 or above was created.
- Each intersection was classified according to its average daily volume as Class A, B, C, D, and E.
- 5. Used IDOT Crash Database to find the number of crashes that occurred at each intersection where at least the daily entering volume is greater than 1,000 vehicles. Entered the number of crashes at each respective intersection in 1997 and 1998 into the intersection/crash database.
- 6. The total number of crashes for each intersection (sum of all crashes at a particular intersection) was calculated.
- 7. The average number of crashes for each particular volume classification as defined in step 4 was calculated.
- 8. The standard deviation for the average number of crashes for each volume class as defined in step 4 was calculated.
- 9. The average number of crashes plus two times the standard deviation calculated in

steps 7 and 8 for each volume class was obtained.

- 10. The average rate of crashes for each particular volume class as defined in step 4 was estimated.
- 11. The standard deviation for the average rate of crashes for each volume class as defined in step 4 was obtained.
- 12. The average rate of crashes plus the standard deviation calculated in steps 10 and 11 for each volume class were added.
- 13. The results obtained in steps 9 and 12 for each volume class were compared with the number of crashes and crash rate calculated for each intersection in particular within each volume class. If either number was greater than either value obtained in steps 9 and 12 for the correspondent volume class to which the intersection belongs, the intersection was considered critical or a SCIL.

VI. CHAMPAIGN-URBANA: INTERSECTION CRASH STATISTICS

A. Champaign

Table 2 lists all intersections in the City of Champaign that had <u>3 or more</u> crashes or <u>1.5</u> <u>or more</u> crash rate in any one of the five years (1993 through 1997 and 1994 through 1998) or are <u>critical</u> according to the new criterion. The total number of these intersections in the City of Champaign from 1993 to 1997 is 272 intersections. From 1994 to 1998, the total number of such intersections is 281. Table 2 is sorted alphabetically by street. Many other intersections have had less than 3 crashes in any of these 5 years. However, these intersections were not included so that the listing in Table 2 can be maintained at a manageable size while still presenting an overall picture of the citywide crash locations.

Table 3 lists the same number of intersections sorted by the highest crash rate to the lowest crash rate in 1997 and 1998. As can be seen in Table 3 there are 48 intersections with a 1997 crash rate that is equal to or higher than 1.50 crashes per year per million entering vehicles (APMEV). There are 52 such intersections in 1998.

Table 4 lists the same intersections sorted by the highest number of crashes to the lowest

number of crashes in 1996. It should be noted that of the listed intersections, 27 experienced 10 or more crashes in 1997; 27 had greater than 10 crashes in 1998.

Table 5 lists the critical intersections in the City of Champaign according to the newly adopted criterion in 1996. There are 35 alphabetically sorted critical intersections listed in Table 5.

B. Urbana

For the City of Urbana, Table 6 lists 118 intersections that had <u>3 or more</u> crashes or <u>1.5 or</u> <u>more</u> crash rate in any of the five years 1993-1997/1994-1998 or are <u>critical</u> according to the new criterion. Table 6 is sorted alphabetically by street.

Table 7 lists the same intersections sorted by the highest crash rate to the lowest crash rate in 1997 and 1998. It is important to note that there are 28 intersections with a 1997 crash rate that is equal to or higher than 1.50 crashes per year per million entering vehicles (APMEV). There are 16 such intersections in 1998.

Table 8 lists the same intersections sorted by the highest number of crashes to the lowest number of crashes in 1997 and 1998. Out of the 118 intersections, 7 experienced 10 or more crashes in 1997, and 6 had 10 or more crashes in 1998.

Table 9 lists 16 intersections considered critical according to the newly adopted criterion in 1997. There are 14 such intersections in 1998.

C. University of Illinois Area

Similar tables were compiled for the University of Illinois (UI) Campus area for information purposes only. It is important to note that these University intersections are already included in either Champaign or Urbana. Campus area is defined by University Avenue to the north, Windsor Road to the south, Illinois Central Railroad tracks to the west, and Lincoln Avenue to the east.

Table 6-University lists 91 intersections in the campus area that had 3 or more crashes in

the years 1993 through 1997 and/or 1994 through 1998. 19 of those intersections are critical in 1997, and 19 of the 100 intersections in 1998 are critical.

Table 10 lists 103 intersections in 1997 and 102 intersections in 1998 in the campus area that had <u>3 or more</u> crashes or <u>1.5 or more</u> crash rate in any of the five years from 1993 through 1997 and/or from 1994 through 1998, <u>or critical</u> according to the new criterion.

Table 11 lists the 19 intersections that are critical in campus according to the newly adopted criterion in both 1997 and 1998.

D. Champaign-Urbana

For the Champaign-Urbana area in 1997, 45 intersections were selected as SCIL according to the new CUTEC criterion. In 1998, 49 intersections were selected. Figure 5 shows the locations of these SCILs within the urban area and they are listed in Table 12. In addition, Table 13 shows the collision patterns at these different locations, which would help to identify possible crash causes. The collision types were investigated and on-site observations were conducted for each intersection to determine possible causes of crashes and to recommend feasible counter-measures. It is very important to keep in mind that under the best of circumstances, these field visits are of limited help as they only assist in identifying deficiencies related to the roadway, which is only one of three factors contributing to crashes. The other two are the driver and the vehicle. The results are documented later in this report. The reference used to analyze crashes and recommend counter-measures can be found in Appendix A.

Figure 5: Selected Crash Intersection Locations (SCIL) in 1997 and 1998

In addition to the number of crashes and crash rates for the different intersections, the tables, with the exception of Table 13, show the volumes of daily entering vehicles (DEV) that were used to calculate crash rates. These volumes are either based on actual counts taken at the given intersections, or they were extrapolated from counts in previous years using observed growth rates. Only those of 1991 and 1996 are actual counts. The volumes of 1993, 1994, and 1995 were extrapolated from the 1991 volumes based on observed growth rates. The 1995 volumes were estimated from the 1996 actual volumes based on observed traffic growth rates. The 1997 and 1998 volumes were also extrapolated from the 1991 and 1996 volumes based on observed growth rates.

Actual counts used for this report are based on traffic maps, which are generated every five years by IDOT. These IDOT traffic maps are based on actual field traffic counts (both tube counts and turning movement counts) that are taken at key intersections and roadway segments. After adjusting these counts for seasonal variations, they are used to estimate traffic volumes at nearby intersections and roadways. The end product of this effort is a traffic map. Streets on this traffic map are shown with different codes. Each code represents a traffic volume <u>range</u>. These volumes are referred to as "actual" counts in this report.

The traffic volumes needed to calculate the 1996 crash rates were developed using both the 1996 IDOT Traffic map and the observed traffic growth rates. The growth rates were established using the 1996 and the 1991 Traffic maps for the Champaign-Urbana urbanized area. Appendix B explains the methodology used in establishing the growth rates for the different intersections in the Champaign-Urbana-Savoy area.

VII. SELECTED CRASH INTERSECTION LOCATIONS: ANALYSES AND RECOMMENDATIONS

As mentioned previously, 45 intersections were identified as SCILs for the year 1997 (See Table 12). The locations of these SCILs are shown in Figure 5. 16 intersections were found in Urbana while 29 were located in Champaign. Among those 45 intersections, the University of Illinois had 20 SCILs, 7 in Urbana and 13 in Champaign. In 1998, 49

intersections were identified as SCILs for the year 1998 (See Table 12). The locations of these SCILs are shown in Figure 5. 14 intersections were found in Urbana while 35 were located in Champaign. Among those 49 intersections, the University of Illinois had 18 SCILs, 4 in Urbana and 14 in Champaign.

The only drawback about the new methodology is the impossibility to compare the data for the first time SCILs intersections in the years since the methodology was adopted in 1996 with data from previous years in order to analyze trends. As a consequence, for many of the new SCILs intersections, no immediate actions are recommended. However, these intersections should be monitored. As in previous years, the study was conducted through a macroscopic approach. The respective local jurisdictions should proceed with more detailed studies in order to verify or modify the recommended improvement actions before their implementation. The jurisdictions that assume the maintenance responsibility of each SCIL are noted:

C for ChampaignU for UrbanaUI for University of IllinoisIDOT for Illinois Department of Transportation

The results of the analysis are summarized below.

1997-1998 CHAMPAIGN INTERSECTIONS

1. 1st and Green, C:

This is a signalized intersection located in the Campus area. First Street and Green Street are both minor arterials. First Street has exclusive left turn lanes and the northbound approach of First Street at this intersection has an exclusive left turn phase. This intersection has been included as a SCIL the last two years.

	1993	1994	1995	1996	1997	1998	Total
# crashes	21	27	20	15	32	25	140
Crash Rate	2.19	2.68	1.99	1.50	3.20	2.51	
ADT	26,968	27,642	27,518	27,392	27,365	27,337	

In 1997, there were thirty-two (32) crashes at this intersection and twenty-five (25) in 1998. The number of crashes in 1997 is the highest number of crashes in the last five years; it doubled the number from 1996. The 1997 and 1998 crash rate is 3.20 and 2.51 APMEV, respectively.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	19	60.00	Angle	10	40.00
Turning	6	19.00	Turning	8	32.00
Rear-end both moving	3	9.00	Rear-end both moving	4	16.00
Head-on	2	6.00	Pedalcyclist	1	4.00
Sideswipe-opposite direction	1	3.00	Sideswipe-same direction	1	4.00
Undefined	1	3.00	Fixed object	1	4.00
Total	32	100.00	Total	25	100.00

Twenty-nine angle crashes occurred at this intersection during the 1997-1998 time period. In 1997 and 1998, the angle crashes represented 60% and 40 % of the total number of crashes respectively. This type of crash has been the predominant crash pattern at this intersection in the last five years.

Recommendation: The collision pattern reveals the need for implementing left turning phases for all the approaches at this intersection. However, any intersection improvement needs to take into consideration recommended actions for the Green Street corridor proposed by CATS.



2. 2nd and Armory, C:

This is a 4-leg intersection controlled by stop signs on Second Street. The northbound and southbound approaches are offset at this intersection. The northern leg of Second Street is a one-way southbound local street, while the southern leg is a two-way local street. Armory Avenue is an east-west, two-way local street. The intersection is located in a residential area of the UI Campus. This intersection is included in the ongoing CATS project.

	1993	1994	1995	1996	1997	1998	Total
# crashes	1	0	2	0	4	3	10
Crash Rate	1.14	0.00	2.15	0.00	4.29	3.22	
ADT	2,472	2,534	2,544	2,554	2,554	2,554	

Between 1997 and 1998 seven (7) crashes occurred at this intersection. This is the first time that this intersection is considered a SCIL. Field observations revealed that sight distance is somewhat restricted to the southbound traffic from the east and west legs of the intersection. This situation along with the geometry (offset) of the intersection explain the high proportion of left turn collisions.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	3	75.00	Angle	1	33.33
Pedestrian	1	25.00	Sideswipe same- direction	1	33.33
			Other	1	33.33
Total	4	100.00	Total	3	100.00

Recommendation: Remove four parking spaces off the east and west legs (north side of Armory) to improve sight distance. Monitor this intersection closely.



3. 2nd and Green, C:

This is a 4-leg intersection controlled by stop signs on Second Street. Green Street is a four-lane minor arterial. Second Street is a one-way southbound local street, south of Green Street and one-way northbound local street, north of Green Street. Therefore, the only conflict at this intersection is between through traffic and left turning traffic off Green Street.

	1993	1994	1995	1996	1997	1998	Total
# crashes	15	7	5	1	11	14	53
Acc. Rate	2.30	1.02	0.73	0.15	1.62	2.07	
ADT	18,324	18,782	18,688	18,612	18,556	18,500	

There were eleven (11) and fourteen (14) crashes in 1997 and 1998 respectively at this intersection, which might be a growing trend in the occurrence of crashes at this intersection. This intersection is included in the ongoing CATS project.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	6	55.00	Angle	6	43.00
Turning	2	18.00	Turning	5	36.00
Rear-end both moving	2	18.00	Rear-end both moving	2	14.00
Pedestrian	1	9.00	Sideswipe-same direction	1	7.00
Total	11	100.00	Total	14	100.00

Twelve (12) angle and seven (7) turning collisions occurred at this intersection in the 1997-1998 time period.

Recommendation: A field visit did not reveal any problems at this intersection; however, the lack of exclusive turning lanes on Green Street might explain the collision patterns (angle and turning) at this intersection.



4. 3rd and Green, C:

This is a 4-leg intersection controlled by a stop sign on 3rd Street. Third Street is a two-way local street and Green Street is a four-lane minor arterial. This intersection is located in a heavy commercial area of Campus. This intersection is included in the ongoing CATS project.

	1993	1994	1995	1996	1997	1998	Total
# crashes	7	8	12	10	8	13	58
Acc. Rate	1.01	1.10	1.66	1.38	1.11	1.80	
ADT	19,411	19,896	19,817	19,873	18,814	19,754	

Eight (8) and thirteen (13) crashes occurred at this intersection in 1997 and 1998, respectively.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	5	64.00	Angle	6	46.00
Sideswipe same direction	1	12.00	Rear-end both moving	4	31.00
Pedestrian	1	12.00	Turning	2	15.00
Other	1	12.00	Animal	1	8.00
Total	8	100.00	Total	13	100.00

Eleven (11) of the crashes occurred during the 1997-1998 time period were angle collisions. Many of the crashes involved cars turning and/or going through the northbound and southbound approaches.

Recommendation: Stripe the northbound and southbound approaches to indicate lane usage. Evaluate and then implement the CATS recommendations when they become available.



5. 4th and Green, C:

This is a four-leg signalized intersection located in a very busy area of Campus. Green Street is a four-lane arterial. Fourth Street is a two-way collector, north of Green Street and one-way, two-lane collector, south of Green Street. Due to this intersection location in Campus, many bicyclists, pedestrians and delivery trucks travel through this intersection. This intersection has been a SCIL since 1981.

	1993	1994	1995	1996	1997	1998	Total
# crashes	17	22	18	13	19	16	105
Acc. Rate	1.83	2.26	1.86	1.36	1.99	1.67	
ADT	26,037	26,687	26,581	26,235	26,209	26,183	

There were nineteen (19) and sixteen (16) crashes, respectively, at this intersection in 1997 and 1998.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	8	42.00	Angle	9	56.00
Turning	3	16.00	Turning	2	13.00
Rear-end both moving	3	16.00	Rear-end both moving	4	25.00
Sideswipe same direction	2	11.00	Sideswipe same direction	1	6.00
Sideswipe opposite direction	1	5.00			
Pedal cyclist	1	5.00			
Vehicle overturned	1	5.00			
Total	19	100.00	Total	16	100.00

Seventeen (17) of the crashes were angle collisions at this location. Between 1992 and 1995 there were eight (8) crashes involving bikes and pedestrians at this intersection. In 1996 and 1998, no bikes or pedestrians crashes were reported at this intersection and just one occurred in 1997, which shows a declining trend for this type of crash at this location, compared to the 1992-1995 time period. An IDS completed for this intersection years ago recommended a five-lane cross-section on all approaches at this intersection; however, any changes at this intersection need to consider CATS recommendations.

Recommendation: Stripe the northbound and southbound approaches to indicate lane usage. Evaluate and then implement the CATS recommendations.


6. 4th and John, C:

This is a four-leg intersection controlled by a stop sign on John Street. Fourth Street is a two-way collector street and John Street is a one-way eastbound local roadway. Relatively high volumes of cyclists, pedestrians and pedestrians with disabilities travel through this intersection.

	1993	1994	1995	1996	1997	1998	Total
# crashes	5	7	5	1	5	11	34
Acc. Rate	1.25	1.67	1.19	0.23	1.15	2.54	
ADT	11,228	11,509	11,555	11,878	11,878	11,878	

In the 1993-1998 time period, thirty four (34) crashes occurred at this intersection, sixteen (16) of them occurred between 1997 and 1998. Forty seven percent (47%) of the total number of crashes occurred in the last two years.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	2	40.00	Angle	9	82.00
Sideswipe same direction	1	20.00	Sideswipe same direction	1	9.00
Pedal cyclist	1	20.00	Pedestrian	1	9.00
Fixed object	1	20.00			
Total	5	100.00	Total	11	100.00

Eleven (11) of the total sixteen (16) crashes reported for 1997-1998 were angle collisions. Field observation indicated that sight distance from John Street is restricted to the south due to vehicles parked on the west side of Fourth Street, which is made evident in the crash pattern existent at this intersection. This intersection is highly used by people with disabilities going/coming to/from Beckwith Hall, which is located on the southeast corner of 2nd and John Streets.

Recommendation: Install "cross road" warning signs (MUTCD W2-1) on the Fourth Street approaches and a larger size stop sign (MUTCD R1-1) or a "Stop Ahead" warning sign (MUTCD W3-1a) on the John Street approach to alert drivers about the proximity of the intersection. Remove 3 parking spaces off the west side of Fourth St. (south of John Street) to improve visibility. Monitor the intersection thereafter.



7. Anthony and Marketview, C:

This is a 4-leg intersection controlled by stop signs on Anthony Drive. Marketview Drive is a two-way, east-west, collector roadway. Anthony Drive is a two-way local street. The intersection is located in a dense commercial area of Champaign.

	1993	1994	1995	1996	1997	1998	Total
# crashes	2	3	3	9	7	9	33
Acc. Rate	0.35	0.49	0.46	1.42	1.09	1.40	
ADT	16,213	16,861	17,856	17,414	17,536	17,659	

There were thirty three (33) crashes at this intersection between 1993-1998, sixteen (16) of which where crashes that occurred in 1997-1998 time period. This is the second consecutive year that this intersection is considered a SCIL.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	4	58.00	Angle	4	45.00
Turning	1	14.00	Rear-end both moving	4	45.00
Fixed object	1	14.00	Turning	1	10.00
Other	1	14.00			
Total	7	100.00	Total	9	100.00

Fifty percent (50%) of the total number of crashes during 1997-1998 period were angle collisions. It is important to note that all and three of the crashes, respectively, during 1997 and 1998 involved southbound vehicles.

Recommendation: The southbound (Lowe's driveway) should be made right-in right-out only, using a sign indicating this limitation. Monitor the intersection thereafter.



8. Bloomington and Prospect, C.:

This is a signalized intersection located in a commercial area of north-west Champaign. Bloomington Avenue is a four-lane minor arterial and Prospect Avenue is a four-lane minor arterial (south of Bloomington Avenue) and a sixlane minor arterial (north of Bloomington Avenue). Each approach at this intersection has an exclusive left turn lane and an exclusive right turn lane. The number of crashes in the last three years shows a steady trend in the occurrence of crashes at this intersection.

	1993	1994	1995	1996	1997	1998	Total
# crashes	0	14	7	21	21	23	63
Acc. Rate	0.00	1.22	0.60	1.80	1.80	1.97	
ADT	30,360	31,423	31,988	31,938	31,938	31,938	

This is the intersection to be considered a SCIL in three consecutive years.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Rear-end both moving	12	57.00	Rear-end both moving	11	48.00
Angle	5	24.00	Angle	3	13.00
Turning	3	14.00	Turning	3	13.00
Pedestrian	1	5.00	Sideswipe same direction	3	13.00
			Sideswipe opp. direction	1	4.00
			Fixed object	2	9.00
Total	21	100.00	Total	23	100.00

The predominant collision pattern at this location is the rear end crash. This crash pattern might be caused by insufficient allocation of time for certain movements.

Recommendation: Due to the large increase in the number of crashes since 1996, signal timing allocation for the different phases needs to be evaluated.



9. Bradley and Country Fair, C:

This was an unsignalized intersection until the year 2001, when the City of Champaign installed a traffic signal at this location. It is still too soon to have "after signalization" crash data, that allows to measure the difference in crash numbers or trends compared to "before signalization" conditions.

	1993	1994	1995	1996	1997	1998	Total
# crashes	1	10	7	2	8	8	36
Acc. Rate	0.17	1.68	1.17	0.33	1.33	1.33	
ADT	15,995	16,315	16,348	16,443	16,443	16,443	

Bradley Avenue is a minor arterial and Country Fair Drive is collector roadway.

This is the first time that this intersection is included as a SCIL. The number of crashes during the 1997-1998 time period was sixteen (16); eight (8) in each year.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Rear-end both moving	4	50.00	Rear-end both moving	1	13.00
Angle	3	37.00	Angle	4	50.00
Turning	1	13.00	Turning	3	37.00
Total	8	100.00	Total	8	100.00

Rear end and angle crashes are the dominant type at this intersection. The crash pattern could be attributed to the lack of traffic signals. This intersection needs to be closely monitored after the installation of the traffic signal to measure improvements in "after signalization" conditions.

Recommendation: Monitor this intersection closely.



10. Columbia and Walnut, C:

This is a four-leg intersection with stop controls on Walnut Street approaches. Both streets are two-way, two-lane local streets. This intersection has been a SCIL during the last three years.

	1993	1994	1995	1996	1997	1998	Total
# crashes	2	6	3	3	8	6	28
Acc. Rate	1.00	2.90	1.47	1.49	4.04	3.08	
ADT	5,486	5,677	5,609	5,516	5,423	5,332	

Twenty-eight crashes occurred at this intersection between 1993 and 1998. The numbers of crashes at this intersection in 1997 increased significantly, and in 1998 showed a decrease with respect to 1997. However, based on these two numbers it cannot be determined if this is part of a decreasing trend in the occurrence of crashes.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	8	100.00	Angle	5	83.00
			Rear-end both moving	1	17.00
Total	8	100.00	Total	6	100.00

All the crashes in 1997 involved vehicles moving northbound. A field visit revealed sight distance obstruction from the south leg to the west leg of the intersection due to vehicles parked on the south side of Columbia Street and in the parking garage located on the southeast corner of the intersection. Another factor that might explain the angle collision pattern is the lack of compliance with the stop signs.

Recommendation: Remove three parking spaces from the south side of Columbia Street, west of Walnut Street. Install "cross road" warning signs (MUTCD W2-1) on the Columbia Street approaches and a larger size stop sign (MUTCD R1-1) or a "Stop Ahead" warning sign (MUTCD W3-1a) on the Walnut Street approach to alert drives about the proximity of the intersection. Monitor the intersection thereafter.



11. Green and Prospect, C:

This is a four-leg signalized intersection located in a heavily traveled corridor of Champaign. Land use around this intersection is mainly low density residential. The traffic signal consists of two phases, with no left turn phases. No left turn lanes are provided at any of the approaches at this intersection. Green Street is an east-west, two-way, two-lane, minor arterial. Prospect Avenue is a north-south, two-way, four- lane, minor arterial.

	1993	1994	1995	1996	1997	1998	Total
# crashes	17	19	23	12	22	27	120
Acc. Rate	2.01	2.14	2.58	1.29	2.36	2.90	
ADT	23,759	24,353	24,450	25,549	25,549	25,549	

Since 1996 the number of crashes at this intersection has been increasing. Over the last five years, the highest crash occurrence happened in 1998 with twentyseven (27) crashes reported. An IDS completed in 2001 recommended adding left turn lanes on all the approaches at this intersection, but Champaign City Council's decided to install mast arms and split phasing.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	12	54.00	Angle	12	45.00
Rear-end both moving	5	23.00	Rear-end both moving	7	26.00
Turning	4	18.00	Turning	6	22.00
Sideswipe same direction	1	5.00	Sideswipe-same direction	2	7.00
Total	22	100.00	Total	27	100.00

Angle crashes accounted for almost half of all the crashes during the 1997-1998 time period. Fifteen (15) and eight (8) injuries were reported for 1997 and 1998, respectively, which corresponds to an average rate of 0.47 for these two years. Another IDS is currently being conducted by the City of Champaign to propose feasible improvements at this intersection in order to reduce the occurrence of crashes.

Recommendation: Monitor the intersection closely.



12. John and Prospect, C.:

This is a four-leg, unsignalized intersection located in a busy corridor of Champaign. The surrounding area is low density residential. Prospect Avenue is a four-lane minor arterial and John Street is a two-lane, two-way local street.

	1993	1994	1995	1996	1997	1998	Total
# crashes	10	12	12	5	12	11	62
Acc. Rate	1.46	1.65	1.63	0.67	1.60	1.47	
ADT	19,247	19,965	20,225	20,586	20,565	20,544	

This intersection has been part of the SCIL list for the last six years, except in 1996 when the numbers of crashes dropped dramatically. The number of crashes during the last six years has fluctuated between ten and twelve, except in 1996, when there were five.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	8	67.00	Angle	6	55.00
Rear-end both moving	3	25.00	Rear-end both moving	2	18.00
Turning	1	8.00	Turning	2	18.00
			Fixed object	1	9.00
Total	12	100.00	Total	11	100.00

About sixty (60%) of the crashes during the 1997-1998 time period were angle collisions. Twelve (12) and seven (7) injuries were reported at this intersection for 1997 and 1998, respectively. A field visit revealed that high speed on Prospect Avenue along with insufficient gaps in the Prospect Avenue traffic forces motorists on John Street to execute unsafe turns or crossings, which may explain the high incidence of crashes and injuries at this intersection. This intersection is part of the IDS currently being conducted by the City of Champaign for a segment of Prospect Avenue to propose feasible improvements at two intersections (Green St./Prospect Ave. and John St./Prospect Ave.) in order to reduce the occurrence of crashes.

Recommendation: Monitor the intersection closely.



13. Marketview and Neil, C:

This is a four-leg signalized intersection. All the approaches at this intersection are three lanes each (including a left turn lane) except the northbound approach that has four lanes. The intersection is located in a dense commercial area of Champaign. This intersection gives access to the Market Place Mall area and the commercial area north of Prospect Avenue.

	1993	1994	1995	1996	1997	1998	Total
# crashes	6	23	13	6	7	9	64
Acc. Rate	0.71	3.27	1.79	0.92	1.13	1.52	
ADT	20,699	19,712	18,771	17,876	17,023	16,211	

This intersection has been considered a SCIL the last five years. A downward trend was seen in the number of crashes between 1994 and 1996, but in the last two years the numbers of crashes has been slightly increasing.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	5	72.00	Angle	7	78.00
Turning	1	14.00	Turning	2	22.00
Rear-end both moving	1	14.00			
Total	7	100.00	Total	9	100.00

The predominant crash pattern at this intersection has always been angle collisions. During the 1997-1998 time period, seventy five percent (75%) of the crashes that occurred at this intersection were angle crashes. Field visit did not reveal any problem at this intersection. However, the increase of traffic due to the rapid growth of this area might be the cause of the slight increase in crashes since 1996.

Recommendation: Monitor the intersection closely.



14. Neil and University, C:

This intersection has been a SCIL the last five years. This is a four-leg signalized intersection. At this location, Neil Street is a two-lane southbound arterial and University Avenue is a four-lane, two-way, arterial with an exclusive westbound left turn pocket. This intersection is one of the most heavily traveled points in Champaign.

	1993	1994	1995	1996	1997	1998	Total
# crashes	10	17	21	22	22	32	124
Acc. Rate	1.28	1.82	2.26	2.38	2.39	3.49	
ADT	25,683	25,575	25,467	25,360	25,525	25,147	

In 1998, the number of crashes at this intersection grew noticeably after a steady growth trend during the 1995-1997 time period. Thirty two (32) crashes occurred in 1998, the highest number recorded at this intersection. However, only a few injuries were reported.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	18	82.00	Angle	27	85.00
Sideswipe same direction	2	9.00	Sideswipe-same direction	2	6.00
Turning	2	9.00	Turning	1	3.00
			Sideswipe-opp direction	1	3.00
			Fixed object	1	3.00
Total	22	100.00	Total	32	100.00

Angle crashes were the predominant type at this intersection. This may be caused by different factors including, but not limited to: insufficient all red and yellow phases or inadequate green time for the different phases. In 1999; however, the City of Champaign made changes to the phases and timings of all the traffic signals on University Avenue between State Street and First Street, including this signal, as part of the traffic signal coordination for University Avenue. This intersection needs to be closely monitored after the changes made to the traffic signal to measure improvements in "after improvement" conditions.

Recommendation: Monitor this intersection closely to evaluate improvements.



15. State and University, C:

This is a four-leg intersection controlled by a traffic signal. State Street is a threelane, south bound, minor arterial, while the east leg of University Avenue is a two-way, two-lane minor arterial and the west leg is a one-way eastbound minor arterial.

	1993	1994	1995	1996	1997	1998	Total
# crashes	8	12	8	3	12	9	
Acc. Rate	1.23	1.78	1.17	0.42	1.70	1.28	
ADT	17,868	18,493	18,734	19,351	19,312	19,274	

This intersection has not been a SCIL since 1994. There were twenty-one (21) crashes in the 1997-1998 time period. Two (2) and seven (7) injuries were reported in 1997 and 1998, respectively, which accounts for 0.16 and 0.58 injuries per crash.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	5	42.00	Angle	4	45.00
Sideswipe-same direction	3	25.00	Sideswipe-same direction	4	45.00
Fixed object	2	17.00	Rear-end both moving	1	10.00
Rear-end both moving	1	8.00			
Turning	1	8.00			
Total	12	100.00	Total	9	100.00

Angle crashes and sideswipe same-direction were almost equally frequent at this intersection. A field visit did not reveal any major problem at this intersection. Phasing and timing at this intersection were changed in 1999 as part of the traffic signal coordination of University Avenue made by the City of Champaign. However, traffic speed on State Street might be a contributing factor to the number of crashes and particularly high injury rate in 1998.

Recommendation: Conduct a speed study on State Street. Monitor this intersection to evaluate improvements after the changes made to the traffic signal.



1997-1998 URBANA INTERSECTIONS

1. Cunningham and University, U:

This is a four-leg signalized intersection. Both Cunningham and University are 4lane principal arterials with exclusive left turn pockets and exclusive right turn lanes. This is the intersection of two commercial corridors in Urbana, and is the most heavily traveled location in Urbana.

	1993	1994	1995	1996	1997	1998	Total
# crashes	14	11	7	18	21	19	90
Acc. Rate	0.93	0.72	0.46	1.16	1.36	1.23	
ADT	41,158	41,776	42,068	42,405	42,405	42,405	

This intersection became a SCIL since 1996 when a new methodology to select SCIL's was implemented. Prior to that, crash frequency at this location ranged between 9 and 14 crashes, but it never qualified as a SCIL due to its low crash rate.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Rear-end both moving	10	48.00	Rear-end both moving	10	53.00
Angle	6	29.00	Angle	5	26.00
Sideswipe-same direction	3	13.00	Sideswipe-same direction	3	16.00
Turning	2	10.00	Turning	1	5.00
Total	21	100.00	Total	19	100.00

Rear end crashes have been the predominant type at this intersection since 1996. Most of these crashes involved right turning vehicles. This may be caused by different factors including, but not limited to: insufficient all-red and yellow phases or inadequate green time for the different phases.

Recommendation: Clearance intervals and signal timings may need to be examined. Monitor this intersection thereafter.



2. Fairview and Lincoln, U:

In 1997, there were improvements made at this intersection. Traffic signals and exclusive left turn pockets were provided at each of the four-approaches at this intersection. Fairview is a two-way collector street and Lincoln Avenue is a minor arterial. Land use surrounding the intersection is a residential/commercial mix.

	1993	1994	1995	1996	1997	1998	Total
# crashes	10	11	14	7	13	10	65
Acc. Rate	1.55	1.67	2.12	1.05	1.94	1.49	
ADT	17,620	18,061	18,079	18,350	18,350	18,350	

Crash frequency ranged from a low of seven (7) crashes in 1996 to a high of fourteen (14) in 1995. After the improvements the number of crashes increased, which can be attributed to the unfamiliarity of the drivers with the traffic signals at this intersection.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Rear-end both moving	6	46.00	Rear-end both moving	1	10.00
Angle	5	38.00	Angle	6	60.00
Head-on	1	8.00	Turning	2	20.00
Pedestrian	1	8.00	Pedalcyclist	1	10.00
Total	13	100.00	Total	10	100.00

The pattern of crashes at this intersection changed after the installation of the traffic signals. In 1997, rear-end collisions were the predominant type at this intersection. However, in 1998 the crash pattern is angle crashes. An inadequate green time for the left turn phases might be causing the angle crashes.

Recommendation: Because this is the first time that this intersection is evaluated as a signalized intersection, no immediate action is recommended. However, this intersection should be monitored.



3. Illinois and Lincoln, U:

This is a four-leg signalized intersection located in the UI Campus area. This intersection is controlled by stop signs on Illinois Avenue, which runs two-way east-west. The west leg of Illinois Street is a collector roadway, while the east leg is a local roadway. Lincoln Avenue is a four-lane minor arterial.

	1993	1994	1995	1996	1997	1998	Total
# crashes	4	4	6	10	11	18	53
Acc. Rate	0.56	0.55	0.82	1.39	1.53	2.51	
ADT	19,656	20,050	19,969	19,709	19,690	19,670	

The number of crashes at this intersection have been increasing rapidly in the last six years, reaching a maximum value of eighteen (18) crashes in 1998.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	6	55.00	Angle	10	56.00
Turning	3	27.00	Turning	4	22.00
Rear-end both moving	1	9.00	Rear-end both moving	1	5.00
Vehicle overturned	1	9.00	Sideswipe-same direction	1	5.00
			Fixed object	1	5.00
			Other	1	5.00
Total	11	100.00	Total	18	100.00

The crash pattern at this intersection is the angle crash. A combination of high speed along with insufficient gaps on Lincoln Avenue forces the drivers on Illinois Street to execute unsafe turns or crossings. This may explain the high number of angle and turning crashes. An IDS has been completed for this intersection with recommended signalization of this intersection and left turn lanes in all the approaches. These improvements are planned to be implemented in the summer of 2001.

Recommendation: Implement the recommendations proposed in the IDS for this intersection.



4. Lincoln and Springfield, U:

This is a signalized intersection. Both Lincoln Avenue and Springfield Avenue are 4-lane roadways with exclusive left turn pockets. Signal modernization and left turn lanes were added to this intersection in 1997. Lincoln Avenue and Springfield Avenue are both minor arterials.

	1993	1994	1995	1996	1997	1998	Total
# crashes	13	24	18	14	21	10	100
Acc. Rate	1.38	2.49	1.89	1.47	2.21	1.05	
ADT	25,749	26,393	26,155	26,024	26,050	26,076	

The number of crashes decreased to fifty percent (50%) in 1998 after intersection improvements in 1997.

Type of Collision 1997	Total	%	Type of Collision 1998	Total	%
Angle	12	57.00	Angle	2	20.00
Turning	4	19.00	Turning	6	60.00
Rear-end both moving	3	14.00	Rear-end both moving	2	20.00
Pedestrian	1	5.00			
Pedalcyclist	1	5.00			
Total	21	100.00	Total	10	100.00

Angle crashes were the predominant type until 1997. After 1997, the collision pattern is turning crashes. Phase timing and clearance intervals may need to be examined. However, since this intersection was redesigned in 1997, no immediate action is recommended at this point.

Recommendation: Monitor the intersection.



APPENDICES

Appendix A: Champaign-Urbana Intersection Crash Statistics

Appendix B: General Crash Countermeasures Ideas

Appendix C: Traffic Growth Rates
Appendix D: Key to Collision Diagram Symbols

Appendix E: Summary of SCIL's between 1972 and 1998

SELECTED CRASH INTERSECTION LOCATIONS

	Road 1	Road 2	1972	1974	1975	1976	1977	1978	1980	1981	1982	1983	1984	1985	1989	1991	1992	1994	1995	1996	1997	1998
Cha	mpaign		-	-			-															
1st	St.	Armory Ave.													Х			Х		Х	Х	1
1st	St	Chalmers St																X	х		X	1
1st	St.	Clark St.																X	~		~	-
1st	St.	Daniel St.				х								х	х			X	х		Х	-
1st :	St.	Gerty St.																				
1st :	St.	Green St.				Х	Х	Х	Х	Х	Х	Х		Х	Х	Х	Х		Х	Х	Х	x
1st	st.	Gregory Ave.																				
1st	St.	Healey St.																				x
1st :	St.	John St.												Х								
1st :	St.	Kirby Ave.						Х					Х	Х								
1st :	\$t.	Park St.																				
1st	\$t.	Peabody Dr.																		Х		
1st	\$t.	Springfield Ave.																				
1st a	\$t.	Stadium Dr.															Х					
1st	\$t.	University Ave.				Х																
1st s	\$t.	Washington St.																				
2nd	St.	Armory Ave.								Х	Х			Х	Х	Х			Х		Х	x
2nd	St.	Chalmers St.													Х	Х	Х	Х	Х			
2nd	St.	Church St.																				
2nd	St.	Daniel St.					Х								Х	Х	Х	Х		Х		x
2nd	St.	Green St.										Х						Х			Х	x
2nd	St.	Gregory St.																				
2nd	St.	John St.									Х		Х	Х		Х		Х	Х			
2nd	St.	University Ave.																				
3rd	\$t.	Armory Ave.											Х	Х		Х	Х			Х		
3rd	\$t.	Chalmers St.				Х	Х		Х			Х	Х	Х	Х	Х	Х					
3rd	\$t.	Clark St.							Х								Х		Х	Х		
3rd	\$t.	Daniel St.		Х		Х	Х				Х	Х	Х	Х	Х	Х	Х	Х	Х	Х		
3rd	\$t.	Green St.			Х	Х		Х		Х	Х		Х	Х		Х	Х	Х	Х	Х	Х	X
3rd	St.	Healey St.		Х													Х					
3rd	\$t.	John St.														Х				Х		
3rd	\$t.	Springfield Ave.																				
3rd	\$t.	Stoughton St.																				
3rd	\$t.	University Ave.																				
3rd	St.	Washington St.																		Х		
3rd	\$t.	White St.						Х							Х							
4th	\$t	Armory Ave.												Х				Х		Х		
4th	\$t	Beardsley Ave.					1															
4th	\$t	Bradley Ave.				Х	Т															
4th	St.	Chalmers St.																				

SELECTED CRASH INTERSE	CTION LOCATIONS								-	-			-								
Road 1	Road 2	1972	1974	1975	1976	1977	1978	1980	1981	1982	2 1983	1984	1985	1989	1991	1992	1994	1995	1996	199	7 199
Champaign	·																				
1st St.	Armory Ave.													Х			Х		Х	Х	I
1st St.	Chalmers St.																Х	Х		Х	
1st St.	Clark St.																Х				
1st St.	Daniel St.				Х								Х	Х			Х	Х		Х	
1st St.	Gerty St.																				
1st St.	Green St.				Х	Х	Х	Х	Х	Х	Х		Х	Х	Х	Х		Х	Х	Х	Х
1st St.	Gregory Ave.																				
1st St.	Healey St.																				Х
1st St.	John St.												Х								
1st St.	Kirby Ave.						Х					Х	Х								
1st St.	Park St.																				
1st St.	Peabody Dr.																		Х		
1st St.	Springfield Ave.																				
1st St.	Stadium Dr.															Х					
1st St.	University Ave.				Х																
1st St.	Washington St.																				
2nd St.	Armory Ave.								Х	Х			Х	Х	Х			Х		Х	Х
2nd St.	Chalmers St.													Х	Х	Х	Х	Х			
2nd St.	Church St.																				
2nd St.	Daniel St.					Х								Х	Х	Х	Х		Х		Х
2nd St.	Green St.										Х						Х			Х	Х
2nd St.	Gregory St.																				
2nd St.	John St.									Х		Х	Х		Х		Х	Х			
2nd St.	University Ave.																				
3rd St.	Armory Ave.											Х	Х		Х	Х			Х		
3rd St.	Chalmers St.				Х	Х		Х			Х	Х	Х	Х	Х	Х					
3rd St.	Clark St.							Х								Х		Х	Х		
3rd St.	Daniel St.		Х		Х	Х				Х	Х	Х	Х	Х	Х	Х	Х	Х	Х		
3rd St.	Green St.			Х	Х		Х		Х	Х		Х	Х		Х	Х	Х	Х	Х	Х	Х
3rd St.	Healey St.		Х													Х					
3rd St.	John St.														Х				Х		
3rd St.	Springfield Ave.																				
3rd St.	Stoughton St.																				
3rd St.	University Ave.																				
3rd St.	Washington St.																		Х		

	Armory Ave. Beardsley Ave. Bradley Ave.						1	1	1	1	1	1	1	1	1	1	1	1	1 1	+ +
	Beardsley Ave. Bradley Ave.		1									Х				Х		Х		11
	Bradley Ave.																			
				Х																
	Chalmers St.																			
	Church St.																			
	Daniel St.																			
	Green St.		Х	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
	Gregory Ave.																		Х	
	Healey St.												Х							Х
	John St.					Х										Х			Х	Х
	Kirby Ave.					Х						Х								
	Park St.																			
	Peabody Dr.		Х											Х		Х				
	Pennsylvania Ave.																			
	Springfield Ave.																			
	Stoughton St.																			Х
	University Ave.															Х			Х	
	Washington St.						Х					Х								
	White St.																Х			
	Armory Ave.				Х												Х			
	Beardsley Ave.														Х		Х			
	Bradley Ave.																			
	Chalmers St.												Х		Х			Х		
	Church St.													Х						
	Daniel St.				Х	Х	Х							Х	Х	Х	Х			Х
	Green St.				Х	Х	Х			Х		Х		Х	Х	Х		Х		Х
	Healey St.					Х														
	John St.				Х				Х			Х	Х	Х	Х	Х				
	Springfield Ave.																		Х	
	Stoughton Ave.									Х			Х	Х						
	University Ave.																			
	Vine St.															Х				
	Washington St.												Х			Х			Х	
	White St.					Х											Х	Х		Х
ch Village C.	Bradley Ave.				Х															
	Chalmers St.								1		Х	Х					1	Х		П
	Daniel St.			Х	Х		Х		Х			Х		Х			Х	Х	Х	П
	Green St.	X		Х	Х	Х				Х		Х	Х		Х					
		Green St. Gregory Ave. Healey St. John St. Kirby Ave. Park St. Peabody Dr. Pennsylvania Ave. Springfield Ave. Stoughton St. University Ave. Washington St. White St. Armory Ave. Beardsley Ave. Bradley Ave. Chalmers St. Church St. Daniel St. Green St. Healey St. John St. Springfield Ave. Stoughton Ave. University Ave. Vine St. Stoughton Ave. University Ave. Stoughton Ave. University Ave. Stoughton Ave. University Ave. Stoughton St. Stoughton St. Stoughton St. Stoughton St. Stoughton Ave. University Ave. Stoughton St. Stoughton St. S	Green St.Gregory Ave.Healey St.John St.Kirby Ave.Park St.Peabody Dr.Pennsylvania Ave.Springfield Ave.Stoughton St.University Ave.Washington St.White St.Beardsley Ave.Bradley Ave.Chalmers St.Church St.Daniel St.John St.University Ave.White St.White St.Beardsley Ave.Bradley Ave.Chalmers St.Daniel St.University Ave.University Ave.University Ave.Church St.Daniel St.University Ave.Vine St.Stoughton Ave.University Ave.Stoughton Ave.University Ave.Chalmers St.Daniel St.Stoughton Ave.University Ave.Unit	Green St. A Gregory Ave. Image: Constraint of the st. Healey St. Image: Constraint of the st. John St. Image: Constraint of the st. Park St. Image: Constraint of the st. Park St. Image: Constraint of the st. Peabody Dr. X Peabody Dr. X Peabody Dr. X Pennsylvania Ave. Image: Constraint of the st. Stoughton St. Image: Constraint of the st. University Ave. Image: Constraint of the st. White St. Image: Constraint of the st. Bradley Ave. Image: Constraint of the st. Chalmers St. Image: Constraint of the st. Green St. Image: Constraint of the st. John St. Image: Constraint of the st. University Ave. Image: Constraint of the st. Washington St. Image: Constraint of the st. White St. Image: Constraint of the st. White St. Image: Constraint of the st. White St. Image: Constraint of the st. Daniel St. Image: Constraint of the st. Daniel St. Image: Const.	Green St.XGregory Ave.Healey St.John St.Kirby Ave.Park St.Peabody Dr.Yark St.Pennsylvania Ave.Springfield Ave.Stoughton St.University Ave.Washington St.Washington St.Beardsley Ave.Chalmers St.Church St.Green St.Healey St.John St.University Ave.Stoughton St.Washington St.University Ave.Stoughton St.Stoughton St.Stoughton St.Chalmers St.Chalmers St.Stoughton Ave.University Ave.University Ave.University Ave.Stoughton Ave.University Ave.Stoughton Ave.University Ave.Stoughton St.Stoughton St. <td>Green St.XXXGregory Ave.Image: Standard S</td> <td>Green St.XXXXGregory Ave.Image: St.Image: St.Image: St.Image: St.John St.Image: St.Image: St.Image: St.Image: St.Park St.Image: St.Image: St.Image: St.Image: St.Pennsylvania Ave.Image: St.Image: St.Image: St.Pennsylvania Ave.Image: St.Image: St.Image</td> <td>Green St. X X X X Healey St. Image: St. Image: St. Image: St. Image: St. John St. Image: St. Image: St. Image: St. Image: St. Image: St. Park St. Image: St. Image: St. Image: St. Image: St. Image: St. Pennsylvania Ave. Image: St. Image: St. Image: St. Image: St. Image: St. University Ave. Image: St. Image: St. Image: St. Image: St. Image: St. University Ave. Image: St. Image: St. Image: St. Image: St. Image: St. Mite St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St.</td> <td>Green St. X</td> <td>Green St. X Image: State State</td> <td>Green St. X</td> <td>Green St. X</td> <td>Green St. X</td> <td>Gregory Ave. X <t< td=""><td>Gregory Ave. X <t< td=""><td>Green St. X</td><td>Green St. X</td><td>Green St. X</td><td>Gréen St. X</td><td>Green St. X</td></t<></td></t<></td>	Green St.XXXGregory Ave.Image: Standard S	Green St.XXXXGregory Ave.Image: St.Image: St.Image: St.Image: St.John St.Image: St.Image: St.Image: St.Image: St.Park St.Image: St.Image: St.Image: St.Image: St.Pennsylvania Ave.Image: St.Image: St.Image: St.Pennsylvania Ave.Image: St.Image: St.Image	Green St. X X X X Healey St. Image: St. Image: St. Image: St. Image: St. John St. Image: St. Image: St. Image: St. Image: St. Image: St. Park St. Image: St. Image: St. Image: St. Image: St. Image: St. Pennsylvania Ave. Image: St. Image: St. Image: St. Image: St. Image: St. University Ave. Image: St. Image: St. Image: St. Image: St. Image: St. University Ave. Image: St. Image: St. Image: St. Image: St. Image: St. Mite St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St. Image: St.	Green St. X	Green St. X Image: State	Green St. X	Green St. X	Green St. X	Gregory Ave. X <t< td=""><td>Gregory Ave. X <t< td=""><td>Green St. X</td><td>Green St. X</td><td>Green St. X</td><td>Gréen St. X</td><td>Green St. X</td></t<></td></t<>	Gregory Ave. X <t< td=""><td>Green St. X</td><td>Green St. X</td><td>Green St. X</td><td>Gréen St. X</td><td>Green St. X</td></t<>	Green St. X	Green St. X	Green St. X	Gréen St. X	Green St. X

2			1		1	1		1			1	1	1	1	1	1	1	1		1	1
6ti	n St.	Gregory Dr.			-	-	~	V	X		×	~	~	×			+	<u> </u>		╪══╕	-
6t	n St.	John St.					X	X			X	X	X	X			+		X	+	-
6t	n St.	Peabody Dr.			_		-			-	-							<u> </u>	──		
6t	n St.	Pennsylvania Ave.											Х				<u> </u>	<u> </u>	<u> </u>		
6t	h St.	Springfield Ave.			X		X					X					X		<u>X</u>	\parallel	
6t	h St.	Stoughton St.															<u> </u>	X	──		
6t	h St.	University Ave.															<u> </u>		<u> </u>		_
Ar	thony Dr.	Campbell Dr.			_												<u> </u>	<u> </u>	<u> </u>		
Ar	thony Dr.	Marketview Dr.															<u> </u>	<u> </u>	Х	Х	Х
Ar	thony Dr.	Moreland Blvd.																Х			
Ar	thony Dr.	Neil St.																	Х		
Ar	bor St.	Gregory Ave.																	Х		
Ar	cadia/Bellefontaine	Neil St.																			
Ar	mory Ave.	Euclid St.																			
Ar	mory Ave.	Locust St.																			
Be	ardsley Ave.	Elm Blvd./St.																			
Be	Ilefontaine St.	Market St.										Х									
Be	Imont Ave.	Springfield Ave.				Х															
Bi	rch St.	Neil St.																			
Bl	pominaton Rd.	Hagan St.					Х	Х													
Bl	pominaton Rd.	Mattis Ave.																	1		
Bl	pominaton Rd.	Prospect Ave.			Х							Х	х						х	x	X
Br	adlev Ave.	Chestnut St.																			
Br	adlev Ave.	Clavton Blvd.																х			
Br	adley Ave	Country Fair Dr															1		1	x	X
Br	adley Ave	Duncan Rd												х							
Br	adley Ave	Elm St																	1		
Br	adley Ave	Hagan St																	1		
Br	adley Ave	Harris Ave															+			x	
Br	adley Ave	Hedge Rd																			
Br	adley Ave.	Market St						v							Y	Y	Y			+	
		Mattic Avo	 v	v	v			^			v	v	v	v	^	^			v	+	
Di		Mallis Ave.	 ^	^	v	v		v			^	^	^	^ V	v		<u>^</u>	v	<u> </u>	V	
			 v			^					v	v	v		^ V	v	v	∧ ∨		<u>^</u>	
		Nell St.	 ^		^			^			^	^	^	^	^	^	<u>^</u>	<u>^</u>	<u>^</u>	+	
ם.		Dreeneet Ave			v	V	v							V			+		<u> </u>	+	-
BI		Prospect Ave.			~	<u> </u>	^							^				<u> </u>	<u> </u>	+	
ВL		Randolph St.		-		-											+		+	+	+
Br	adley Ave.	Redwood Dr.				+			-					+			┼──	──	┼───	+	
Br	adley Ave.	State St./Fairview Dr.																		\bot	
Br Br	adley Ave. adley Ave.	Redwood Dr. State St./Fairview Dr.				4														t	

Williamsburg Dr. Willis Ave. Mattis Ave. Joak St. Dak St. Garwood St.						X													
Willis Ave. Mattis Ave. Mattis Ave. Marketview Dr. Marketview Dr. Veil St. Locust St. Dak St. Wright St. Garwood St.						X													
Mattis Ave. Mattis Ave. Marketview Dr. Neil St. Locust St. Dak St. Vright St. Garwood St.						Х													
Mattis Ave. Marketview Dr. Veil St. Locust St. Dak St. Vright St. Garwood St.																			1
Marketview Dr. Neil St. Locust St. Dak St. Vright St. Garwood St.																			
Veil St. Locust St. Dak St. Vright St. Garwood St.																			
Locust St. Dak St. Vright St. Garwood St.																			
Dak St. Vright St. Garwood St.												Х	Х	Х					Х
Vright St. Garwood St.																			
Garwood St.												Х					Х		
Green St.																			Х
Jniversity Ave.												Х							Х
Country Fair Dr.																			Х
Elm St.											Х								
Mattis Ave.					Х	Х													
AcKinley Ave.																	Х		
Prospect Ave.																			
Randolph St.																			
State St.																			
Elm Blvd./St.																			
_ynn St.												Х							
Neil St.																			
Prairie St.																			
Prospect Ave.																			
Randolph St.									Х	Х	Х	Х		Х					
State St.																			
Bellefontain												Х	Х		Х				
Broadmoor Dr.																			
Garfield Ave.																			
Hickory St.												Х	Х						
AcKinley Ave.												Х			Х		Х		
Neil St.						Х											Х		
Prospect Ave.																			
Randolph St.	Х		Х	Х					Х	Х	Х							Х	
State St.														Х					
Valnut St.				Х	Х												Х	Х	Х
Kirby Ave.							1												1
John St.																			
	Sireen St. Jniversity Ave. Country Fair Dr. Im St. Aattis Ave. AcKinley Ave. Prospect Ave. Randolph St. State St. Im Blvd./St. .ynn St. Veil St. Prospect Ave. Randolph St. State St. Prospect Ave. AcKinley Ave. Hickory St. AcKinley Ave. Veil St. Prospect Ave. Randolph St. State St. Valnut St. Kirby Ave. John St.	Sireen St. Iniversity Ave. Jountry Fair Dr. Im St. Jattis Ave. Actis Ave. Actis Ave. Actis Ave. Andolph St. Actis Ave. Junn St. Actis Ave. Arairie St. Actis Ave. Prospect Ave. Actis Ave. Andolph St. Actis Ave. Actis Ave. Actis Ave. Actis Ave.	Sireen St. Iniversity Ave. Jountry Fair Dr. Imit St. Jattis Ave. Attis Ave. AcKinley Ave. AcKinley Ave. Prospect Ave. AcKinley Ave. State St. Imit St. Im Blvd./St. Imit St. Jyrn St. Imit St. Veil St. Imit St. Prospect Ave. Imit St. State St. Imit St. Prospect Ave. Imit St. State St. Imit St. AcKinley Ave. Imit St. Ackinley Ave. Imit St. Prospect Ave. Imit St. Prospect Ave. Imit St. Ackinley Ave. Imit St. Andolph St. X State St. Imit St. Valnut St. Imit St. Girby Ave. Imit St. John St. Imit St. <td>Sireen St. </td> <td>Arreen St. </td> <td>Arreen St. </td> <td>Arren St. Image: Streen St. Image: Streen St. Image: Streen St. Jountry Fair Dr. Image: Streen St. Image: Streen St. Image: Streen St. Jountry Fair Dr. Image: Streen St. Image: Streen St. Image: Streen St. Attis Ave. X X X Attis Ave. X X X Ackinley Ave. Image: Streen St. Image: Streen St. Image: Streen St. Prospect Ave. Image: Streen St. Image: Streen St. Image: Streen St. Junt St. Image: Streen St. Image: Streen St. Image: Streen St. Image: St. Image: Streen St. Image: Streen St. Image: Streen St. Image: St. Image: Streen St. Image: Streen St. Image: Streen St. Prospect Ave. Image: Streen St. Image: Streen St. Image: Streen St. State St. Image: Streen St. Image: Streen St. Image: Streen St. Ackinley Ave. Image: Streen St. Image: Streen St. Image: Streen St. Ackinley Ave. Image: Streen St. Image: Streen St. Image: Streen St. Valuet St. X X X</td> <td>Antoo on Antoo on Sireen St. Image: Streen St. Iniversity Ave. Image: Streen St. Sountry Fair Dr. Image: Streen St. Im St. Image: Streen St. Attis Ave. X Attis Ave. X Attis Ave. X AcKinley Ave. Image: Streen St. Prospect Ave. Image: Streen St. State St. Image: Streen St. Im Blvd./St. Image: Streen St. Image: St. Image: Streen St. Prospect Ave. Image: Streen St. State St. Image: Streen St. Prospect Ave. Image: Streen St. State St. Image: Streen St. Valuet St. Image: Streen St. Valuet St. I</td> <td>Antion of the second second</td> <td>Arriver St. Arriver St.</td> <td>Sine St. Image: St</td> <td>Iniversity Ave. Iniversity Ave. Initial Ave. I</td> <td>Bin Bits Image: State Stat</td> <td>Iniversity Ave. X Iniversity Ave. X Sountry Fair Dr. X Im St. X Attis Ave. X AcKinley Ave. X 'rospect Ave. X andolph St. X im Blvd./St. X ynn St. X ieil St. X 'rospect Ave. X iandolph St. X iante St. X iante St. X iante St. X iante St. X</td> <td>Treen St. Important St.</td> <td>Inversity Ave. Image: Constraint of the second second</td> <td>Bit Image: State Sta</td> <td>Steen St. Iniversity Ave. X</td> <td>Treen St. Iniversity Ave. X X Iniversity Ave. Junty Fair Dr. X X X Iniversity Ave. Im St. X X X Iniversity Ave. AcKinley Ave. X X Iniversity Ave. X Attis Ave. X X Iniversity Ave. X Ackinley Ave. X X Iniversity Ave. X Andolph St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Initeralies theretin theretine theretine theretine theretine</td>	Sireen St.	Arreen St.	Arreen St.	Arren St. Image: Streen St. Image: Streen St. Image: Streen St. Jountry Fair Dr. Image: Streen St. Image: Streen St. Image: Streen St. Jountry Fair Dr. Image: Streen St. Image: Streen St. Image: Streen St. Attis Ave. X X X Attis Ave. X X X Ackinley Ave. Image: Streen St. Image: Streen St. Image: Streen St. Prospect Ave. Image: Streen St. Image: Streen St. Image: Streen St. Junt St. Image: Streen St. Image: Streen St. Image: Streen St. Image: St. Image: Streen St. Image: Streen St. Image: Streen St. Image: St. Image: Streen St. Image: Streen St. Image: Streen St. Prospect Ave. Image: Streen St. Image: Streen St. Image: Streen St. State St. Image: Streen St. Image: Streen St. Image: Streen St. Ackinley Ave. Image: Streen St. Image: Streen St. Image: Streen St. Ackinley Ave. Image: Streen St. Image: Streen St. Image: Streen St. Valuet St. X X X	Antoo on Antoo on Sireen St. Image: Streen St. Iniversity Ave. Image: Streen St. Sountry Fair Dr. Image: Streen St. Im St. Image: Streen St. Attis Ave. X Attis Ave. X Attis Ave. X AcKinley Ave. Image: Streen St. Prospect Ave. Image: Streen St. State St. Image: Streen St. Im Blvd./St. Image: Streen St. Image: St. Image: Streen St. Prospect Ave. Image: Streen St. State St. Image: Streen St. Prospect Ave. Image: Streen St. State St. Image: Streen St. Valuet St. Image: Streen St. Valuet St. I	Antion of the second	Arriver St. Arriver St.	Sine St. Image: St	Iniversity Ave. Initial Ave. I	Bin Bits Image: State Stat	Iniversity Ave. X Iniversity Ave. X Sountry Fair Dr. X Im St. X Attis Ave. X AcKinley Ave. X 'rospect Ave. X andolph St. X im Blvd./St. X ynn St. X ieil St. X 'rospect Ave. X iandolph St. X iante St. X iante St. X iante St. X iante St. X	Treen St. Important St.	Inversity Ave. Image: Constraint of the second	Bit Image: State Sta	Steen St. Iniversity Ave. X	Treen St. Iniversity Ave. X X Iniversity Ave. Junty Fair Dr. X X X Iniversity Ave. Im St. X X X Iniversity Ave. AcKinley Ave. X X Iniversity Ave. X Attis Ave. X X Iniversity Ave. X Ackinley Ave. X X Iniversity Ave. X Andolph St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Iniversity Ave. Im Bivd./St. Initeralies theretin theretine theretine theretine theretine

Country Fair Dr.	Park Ct.																		
Country Fair Dr.	Bradley Ave.														Х				1
Country Fair Dr.	Springfield Ave.		Х									Х							í T
Country Fair Dr.	University Ave.					Х						Х							ſ
Country Fair Dr.	White St.																		í T
Crescent Dr.	John St.			Х						Х									í T
Crescent Dr.	Kirby Ave.			Х		Х	Х			Х	Х						Х		í T
Crescent Dr.	Sangamon Dr.										Х								X
Crescent Dr.	William St.																		ſ
Daniel St.	Locust St.												Х	Х					ſ
Daniel St.	Wright St.								Х			Х							í T
Devonshire Dr.	Neil St.																		í T
Devonshire Dr.	Prospect Ave.																		í T
Duncan Rd.	John St.																		ſ
Duncan Rd.	Kirby Ave.																		1
Duncan Rd.	Springfield Ave.																		ſ
Duncan Rd.	Windsor Rd.												Х						1
Edgebrook Dr.	Garden Ln.				Х														ſ
Edgebrook Dr.	Neil St.																		í T
Elm Blvd.	Hill St.																	Х	í T
Elm Blvd.	Springfield Ave.																		1
Elm Blvd.	University Ave.																Х		í T
Elm Blvd.	Washington St.																		1
Euclid St.	Gregory Ave.																		Í
Eureka St.	McKinley Ave.																Х		í T
Eureka St.	Prospect Ave.																		í T
Francis Ave.	Prospect Ave.													Х					1
Galen Dr.	Harrington Dr.																		
Garden Hills Dr.	Paula Dr.														Х				í T
Glenn Park Dr.	Mattis Ave.																		í T
Green St.	Locust St.																		i l
Green St.	Mattis Ave.																		
Green St.	Neil St.		Х		Х	Х	Х	Х	Х										í T
Green St.	Pine St.																		í T
Green St.	Prairie St.																		í T
Green St.	Prospect Ave.				Х	Х	Х	Х	Х		Х		Х	Х	Х	Х		Х	Х
Green St.	Randolph St.					Х													ſ
Green St.	Russell St.														1				X
Green St	State St											V							í T

Green St.	Wright St.		х	х			Х	х	х		х	х						
Greencroft	Kirby Ave.																	
Hagan St.	Kenyon Rd.																	
Haines Blvd.	Prospect Ave.																	
Harris Ave.	Vine St.						Х				Х							
Harris Ave.	Washington St.																	
Harvard St.	Prospect Ave.																	
Healey St.	Locust St.																	
Healey St.	Prospect Ave.																	
Healey St.	Randolph St.																	
Healey St.	State St.																	
Healey St.	Wright St.		Х					Х	Х	Х	Х			Х	Х			
Hedge Rd.	Mattis Ave.																	
Hessel Blvd.	Neil St.																	
Hessel Blvd.	Prospect Ave.																	
Hickory St.	Bradley Ave.																	
Hill St.	Neil St.									Х								
Hill St.	Prospect Ave.																	
Hill St.	Randolph St.													Х				
Høgan St.	Kenyon Rd.								Х									
James St.	University Ave.									Х								
Joanne St.	Paula Dr.								Х									
John St.	Holiday Park Dr.		Х															
John St.	Locust St.										Х						Х	
John St.	Mattis Ave.																	
John St.	Neil St.																	
John St.	Pine St.	Х																
John St.	Prospect Ave.												Х	Х	Х		Х	Х
John St.	Randolph St.									Х		Х						
John St.	State St.						Х				Х	Х	Х		Х			X
John St.	Wright St.					Х												
Kenwood Rd.	Kirby Ave.																	
Kenwood Rd.	Sangamon Dr.								Х	Х								
Kenwood Rd.	Sheridan Dr.																	
Kenwood Rd.	Springfield Ave.																	
Kenyon Rd.	Neil St.		Х							Х								
Kier Dr.	EdgebrookDr.																	
Kirby Ave.	Mattis Ave.					Х	Х			Х								
Ki by Ave.	Mayfair Rd.			1	1	1	1		1							1		1
	•			_														

ĸ	irby Ave.	Neil St.			Х	х												
K	irby Ave.	Oak St.																
K	irby Ave.	Prospect Ave.				Х	Х	Х	Х	Х				Х	Х			
K	irby Ave.	Scottsdale Dr.																
K	irby Ave.	State St.																
Li	ierman Ave.	Washington St.								Х								
L	cust St.	Armory Ave.												Х				
L	cust St.	Daniel St.									Х			Х	Х			
L	cust St.	Healey St.											Х	Х				
L	ocust St.	John St.												Х				
L	cust St.	Logan St.							Х	Х		Х						
L	cust St.	Springfield Ave.																
L	dgan St.	Neil St.																
L	ogan St.	Water St.								Х								
Ŀ	vnn St.	Church St.																
Ŀ	vnn St.	John St.																
Ľ	vnn St.	Park St.					Х											
Ŀ	vnn St.	Springfield Ave.																
Ŀ	ynn St.	White St.																
Ŀ	ynn St.	William St.	Х															
N	lain St.	Market St.																
N	lain St.	Neil St.																
N	lain St.	Walnut St.								Х								
N	laple St.	Prospect Ave.																
N	laplepark Dr.	Sangamon Dr.																
N	larket St.	Columbia Ave.																
N	larket St.	Kenyon Rd.																
N	larket St.	Marketview Dr.														Х		
N	larket St.	Tulip Tree Dr.																
N	larket St.	University Ave.						Х										
N	larket St.	Washington St.																
N	larket St.	Wilbur Ave.																
N	larketview Dr.	Moreland Blvd.																
N	larketview Dr.	Neil St.												Х	Х	Х	Х	Х
N	larketview Dr.	Prospect Ave.																
N	lattis Ave.	Glenn Bumie Dr.																
N	lattis Ave.	Parkland Way																
N	lattis Ave.	Paula Dr.																
N	lattis Ave.	Round Barn Rd.																
			 	 			 	 										_

Mattis Ave.	Sangamon Dr.																		
Mattis Ave.	Springer Dr.																		
Mattis Ave.	Springfield Ave.									Х									
Mattis Ave.	University Ave.		Х			Х				Х					Х			Х	
Mattis Ave.	White St.																		
Mayfair Rd.	Waverly Dr.			Х															
McKinley Ave.	Daniel St.																		
McKinley Ave.	Healey St.																		
McKinley Ave.	Paula Dr.																Х		
McKinley Ave.	Springfield Ave.																		
McKinley Ave.	Washington St.													Х	Х		Х		Х
Neil St.	Church St.																		
Neil St.	Springfield Ave.															Х			
Neil St.	St. Mary's Road									Х									
Neil St.	Stadium Dr.																		
Neil St.	University Ave.												Х		Х	Х	Х	Х	Х
Neil St.	Washington St.																		
Neil St.	White St.												Х						
Neil St.	William St.																		
Neil St.	Windsor Rd.																		Х
New St.	Park St.													Х	Х	Х			
New St.	Springfield Ave.																		
New St.	University Ave.												Х				Х		
Oak St.	Stadium Dr.										Х	Х	Х						
Parkland Ct.	Bradley Ave.																		
Parkland Ct.	Camp Dr.																		
Phillips St.	Washington St.															Х	Х		
Philo Rd.	Windsor Rd.												Х						
Prairie St.	Columbia Ave.																		
Prairie St.	Springfield Ave.																		
Prairie St.	William St.																Х		
Prospect Ave.	Baytowne Dr.																		
Prospect Ave.	Dennison Dr.																		
Prospect Ave.	Park Ave.																		Х
Prospect Ave.	Springfield Ave.		Х		Х	Х	Х												
Prospect Ave.	Town Center Blvd.																		
Prospect Ave.	Tremont St.	1			1				1								1		1
Prospect Ave.	University Ave.	1									Х								1
Prospect Ave.	Vine St.	1			1				1								1		1
			-		<u>.</u>		•	<u>.</u>	<u>.</u>						-				

Pr <u>ospect Ave.</u>	Washington St.																			
Prospect Ave.	Windsor Rd.												Х							
Randolph St.	John St.																			Х
Randolph St.	Springfield Ave.		Х		Х															Х
Randolph St.	University Ave.																			
Randolph St.	Washington St.					Х						Х								
Randolph St.	White St.																			
Russell St	Healey St.																			
Russell St	Washington St.																			
Sheridan St.	Western St.								Х		Х	Х								
Southwood Dr.	Mattis Ave.																			
Springfield Ave.	New St.																			
Springfield Ave.	State St.		Х						Х				Х						Х	
Springfield Ave.	Wright St.					Х														
State St.	Hill St.																			
State St.	University Ave.											Х				Х			Х	Х
State St.	Vine St.															Х				
State St.	Washington St.																			
State St.	White St.																			
Summerlin St.	Williamsburg Dr.								Х											
University Ave.	Victor St.																			
University Ave.	Walnut St.												Х		Х		Х			
University Ave.	Water St.																			
University Ave.	Wright St.																			
Walnut St.	Beardsley Ave.																			
Walnut St.	Church St.						Х													
Walnut St.	Columbia														Х	Х				
Walnut St.	Logan St.																			
Walnut St.	Washington St.																			
Westlawn Ave.	Healey St.																			
Winchester Dr.	Branch Dr.																			
Wright St.	John St.																			
URBANA																				
Anderson St.	Oregon St.																		T	Τ
Anderson St.	Washington St.																	х		
Beech St.	Romine St.	1	1	1					1	1	1	1		1	1	1	1	1		1
Bradley Ave.	Goodwin Ave.		1	1					1							1		x		1
Bradley Ave.	Lincoln Ave.	Х	1	1		Х	1		1	х	Х	1		1	1	1	1	1		X
			1	1	1 1	 1	1	1	1	1	1	1	1	1	1		1	1	-	

Brighton Dr.	Vawter St.																	
Broadway Ave.	Country Club Rd.								Х									
Broadway Ave.	Florida Ave.																	
Broadway Ave.	Illinois St.																	
Broadway Ave.	Main St.									Х								
Broawday Ave.	Oregon St.																	
Broawday Ave.	Park St.																	
Broawday Ave.	Pennsylvania Ave.																	Х
Broawday Ave.	University Ave.																Х	
Busey Ave.	California Ave.											Х		Х	Х			
Busey Ave.	Church St.																	
Busey Ave.	Clark St.			Х														
Busey Ave.	Green St.															Х		
Busey Ave.	Illinois St.												Х					
Busey Ave.	lowa St.																	
Busey Ave.	Ohio St.																	
Busey Ave.	Oregon St.																	
Busey Ave.	Pennsylvania Ave.										Х							
Busey Ave.	Springfield Ave.																	
Cedar St.	Illinois St.																	
Cedar St.	Oregon St.																	
Church St.	Coler Ave.																	Х
Church St.	Lincoln Ave.																Х	
Clark St.	Harvey St.																	
Coler Ave.	Church St.								Х					Х				
Coler Ave.	Fairview Ave.										Х	Х	Х					
Coler Ave.	Green St.										х							
Coler Ave.	High St.																	
Coler Ave.	Illinois St.						Х											
Coler Ave.	Main St.													Х				
Coler Ave.	Springfield Ave.																	
Coler Ave.	University Ave.	Х		Х														
Colorado Ave.	Philo Rd.				Х	Х										Х		
Colorado Ave.	Vine St.															Х		
Cottage Grove Ave.	Briarcliff Dr.																	
Cottage Grove Ave.	Colorado Ave.																	
Cottage Grove Ave.	Green St.															Х		
Cottage Grove Ave.	Illinois St.															Х		X
Cottage Grove Ave.	Main St.															Х	Х	
																	ļ	i

Cottage Grove Ave.	Washington St.																	
Crystal Lake Dr.	Cunningham Ave.																\square	
Cunningham Ave.	Bradley Ave.																	
Cunningham Ave.	Illini Airport Rd.																Х	
Cunningham Ave.	Kenyon Rd.																	
Cunningham Ave.	Kerr Ave.																	
Cunningham Ave.	Perkins Rd.	Х																
Cunningham Ave.	University Ave.															Х		Х
Elm St.	McCullough St.																	
Elm St.	Vine St.																	
Fairlawn Dr.	Cottage Grove Ave.																	
Fairview Ave.	Busey Ave.																	
Fairview Ave.	Lincoln Ave.											Х	Х	Х	Х	Х	Х	Х
Fairview Ave.	Linview Ave.																	
Florida Ave.	Lincoln Ave.	Х									Х							Х
Florida Ave.	Maryland Dr.															Х		Х
Florida Ave.	Orchard St.																	
Florida Ave.	Philo Rd.	Х																
Florida Ave.	Vine St.																	
Glover Ave.	Oregon St.																	
Goodwin Ave.	Green St.																Х	
Goodwin Ave.	Illinois St.																	
Goodwin Ave.	Oregon St.				Х						Х							
Goodwin Ave.	Springfield Ave.	Х														Х		
Goodwin Ave.	University Ave.	Х																
Green St.	Busey Ave.															Х		
Green St.	Lincoln Ave.	Х		Х	Х	Х	Х	Х	Х	Х	Х							
Green St.	Lynn St.																	
Green St.	Mathews Ave.																	
Green St.	McCullough St.																	Х
Green St.	Race St.																	
Green St.	Vine St.																	
Gregory PI.	Nevada St.															Х		
Gregory St.	Clark St.																	
Gregory St.	Main St.																	
Gregory St.	Oregon St.											Х						
Gregory St.	Stoughton St.															<u> </u>		
Gregory St.	University Ave.															<u> </u>		
Grove St.	California Ave.																	

Gr <u>ove St</u> .	Green St.																		
Harvey St.	Hill St.																		
High St.	Coler Ave.																		
Illinois St.	Lincoln Ave.	Х																Х	Х
Illinois St.	Vine St.									Х									
Indiana Ave.	Orchard St.																		
Iowa St.	Orchard St.				Х														
Johnson Ave.	California Ave.																		
Kenyon Rd.	Killarney St.																		
Lierman Ave.	Washington St.																		
Lincoln Ave.	Main St.																		
Lincoln Ave.	Nevada St.																		
Lincoln Ave.	Ohio St.																		
Lincoln Ave.	Oregon St.																		
Lincoln Ave.	Park St.																		
Lincoln Ave.	Pennsylvania Ave.	Х																Х	
Lincoln Ave.	Springfield Ave.	Х							Х		Х	Х	Х	Х	Х	Х		Х	Х
Lincoln Ave.	St. Mary's Road		Х																
Lincoln Ave.	Stoughton St.																		
Lincoln Ave.	University Ave.	Х	Х	Х	Х												Х		1
Lynn	Green St.														Х				
Lynn St.	Park St.						Х												
Main St.	Harvey St.											Х							
Main St.	Race St.										Х	Х						Х	
Main St.	Smith Rd.																		
Main St.	Springfield Ave.																		
Main St.	Vine St.	Х			Х	Х	Х	Х	Х										Х
Maple St.	Michigan Ave.																		
Maple St.	University Ave.																		
Mathews Ave.	Springfield Ave.																		
Matthews Ave.	Stoughton St.																		
McCullough St.	Illinois St.																		
McCullough St.	Springfield Ave.																		
McCullough St.	University Ave.																		
Mumford Dr.	George Huff Dr.																		
Nevada St.	Gregory Pl.																		1
Orchard St.	Michigan Ave.																		
Orchard St.	Pennsylvania Ave.	1											Х	Х					
Orchard St.	University Ave.																		
					•														

Oregon St.	Anderson St.													
Oregon St.	Cedar St.													
Oregon St.	Vine St.													
Park St.	Broadway Ave.				Х									
Park St.	Central Ave.										Х		Х	
Park St.	Race St.													
Pennsylvania Ave.	Race St.												Х	
Pennsylvania Ave.	Vine St.													
Philo Rd.	Fairlawn Dr.													
Philo Rd.	Washington St.													
Race St.	Oregon St.													
Race St.	University Ave.													
Race St.	Windsor Rd.													
Romine St.	Beech St.													
Romine St.	Beslin St.									Х	Х			
Romine St.	Eads St.													
Rt. 130	University Ave.													
Rt. 130 (S. Windsor)	Washington St.													
Rt. 130 (S. Windsor)	Windsor Rd.													Х
Smith Rd.	University Ave.													Х
Springfield Ave.	Wright St.													
University Ave.	Vine St./Cunningham		Х	Х				Х	Х				Х	
Urbana St.	Main St.													
U\$150(exc University)High Cross Rd.	University Ave.													
U\$150(exc University)High Cross Rd.														
Vine St.	Shurts St.													
Vihe St.	Washington St.	х												