

# 2007-2009 Green Bay Metropolitan Area Intersection Crash Study



Brown County Planning Commission/Green Bay MPO  
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## 2007-2009 Green Bay Metropolitan Area Intersection Crash Study

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## **I. Introduction**

The Green Bay metropolitan area experiences hundreds of vehicle crashes every year that are caused by a variety of factors, and many of these crashes occur at intersections because these are the main conflict points in the street system. This study begins by comparing the crash statistics for the 30 intersections that were profiled in the planning commission's 2002-2004 intersection crash study to the statistics for the three-year period between 2007 and 2009. Following this comparison, the study examines the 30 metropolitan area intersections that experienced at least 15 reportable crashes and had the highest average annual crash rates between 2007 and 2009 to determine the primary causes for the incidents and methods of correcting many of the major problems that appear to exist at the intersections. The study does not include the metropolitan area freeway interchanges because reliable crash rates could not be calculated using the available information.

The information for this study was obtained from the University of Wisconsin's Traffic Operations and Safety (TOPS) Laboratory database and through reviews of each intersection in the report. The TOPS Laboratory records are very extensive and provide a detailed summary of the information provided on the forms completed by law enforcement officers at the scene of every reportable crash. The summary information, field visits, and the experience of observing and using many of the intersections on a daily basis enabled staff to develop observations and comments for the study.



## **II. Explanation of Terms Used in the Study**

### **Crash Rate**

The crash rates were estimated for the intersections using Wisconsin Department of Transportation (WisDOT) traffic count data from 2009 and, when necessary, counts from 2010. These rates represent the number of crashes that occurred for every million vehicles that entered each intersection in a year. The intersections were ranked by crash rate because this was assumed to be the most appropriate indication of safety problems, but many intersections with relatively low rates experienced many property damage and injury crashes throughout the three-year study period and should not be disregarded merely because of their lower rates. Each intersection's estimated crash rate during the study period is shown in Map 1, and the number of crashes experienced at each intersection during the study period is shown in Map 2.

### **Reportable Crashes During the Study Period**

This study only includes crashes that are considered to be reportable by the law enforcement officer who was at the scene because these are believed to be the most severe and are the incidents that are submitted to the TOPS Laboratory in Madison. For a crash to be reportable, an officer has to believe that government property has sustained a minimum of \$200 damage, that non-government property has sustained a minimum of \$1,000 damage, or that an injury or death has occurred. Crashes where these criteria are not met are typically noted by officers but are not submitted to the TOPS Laboratory for inclusion in the database.

### **Estimated Property Damage Cost During the Study Period**

To estimate the property damage costs at each intersection for the period between 2007 and 2009, staff used the National Safety Council's (NSC's) 2008 average per-crash property damage estimate of \$8,300.

### **Fatalities During the Study Period**

This statistic identifies the number of people who were killed at each intersection during the three-year study period.

### **Estimated Fatality Cost During the Study Period**

To estimate the fatality costs at each intersection for the period between 2007 and 2009, staff used the NSC's 2008 average estimate of \$1,300,000 per fatality.



## **Injuries During the Study Period**

This statistic identifies the number of people who were injured at each intersection during the three-year study period. But unlike the injury figures in the MPO's 1997-1999 and 2002-2004 intersection crash studies, the 2007-2009 study classifies injuries based on three levels of severity as determined by the law enforcement officers completing the reports. These are:

- Incapacitating injuries (Class A)
- Non-incapacitating injuries (Class B)
- Possible injuries (Class C)

This method of estimating injuries was not included in the state's crash database until after the 2002-2004 intersection crash study was completed, so this is Brown County Planning Commission staff's first opportunity to use it in a comprehensive crash study.

## **Estimated Injury Cost During the Study Period**

To estimate the average annual injury costs at each intersection for the period between 2007 and 2009, staff used the NSC's 2008 average per-injury estimates for Incapacitating, Non-incapacitating, and Possible injuries. These are:

- Incapacitating injuries (Class A): \$67,200
- Non-incapacitating injuries (Class B): \$21,800
- Possible injuries (Class C): \$12,300

## **Crash Type**

The crash reports provided by the TOPS Laboratory identify several types of crashes, but this study concentrates on angle, rear end, head on, and side swipe crashes because these were usually the most common and severe types of crashes at each intersection. The study also notes the percentage of crashes that involved pedestrians and bicyclists to determine if the intersections are relatively unsafe for these transportation modes.

## **Driver Factor**

The TOPS Laboratory reports also identify several factors that caused the intersection-related crashes, but this study concentrates on crashes that involved drivers disregarding traffic controls, failing to yield, driving inattentively, and traveling too fast for conditions. The study also notes the percentage of crashes that were caused by the condition of the drivers, which typically meant that one or more of the drivers was under the influence of alcohol or another substance.

## **Comments**

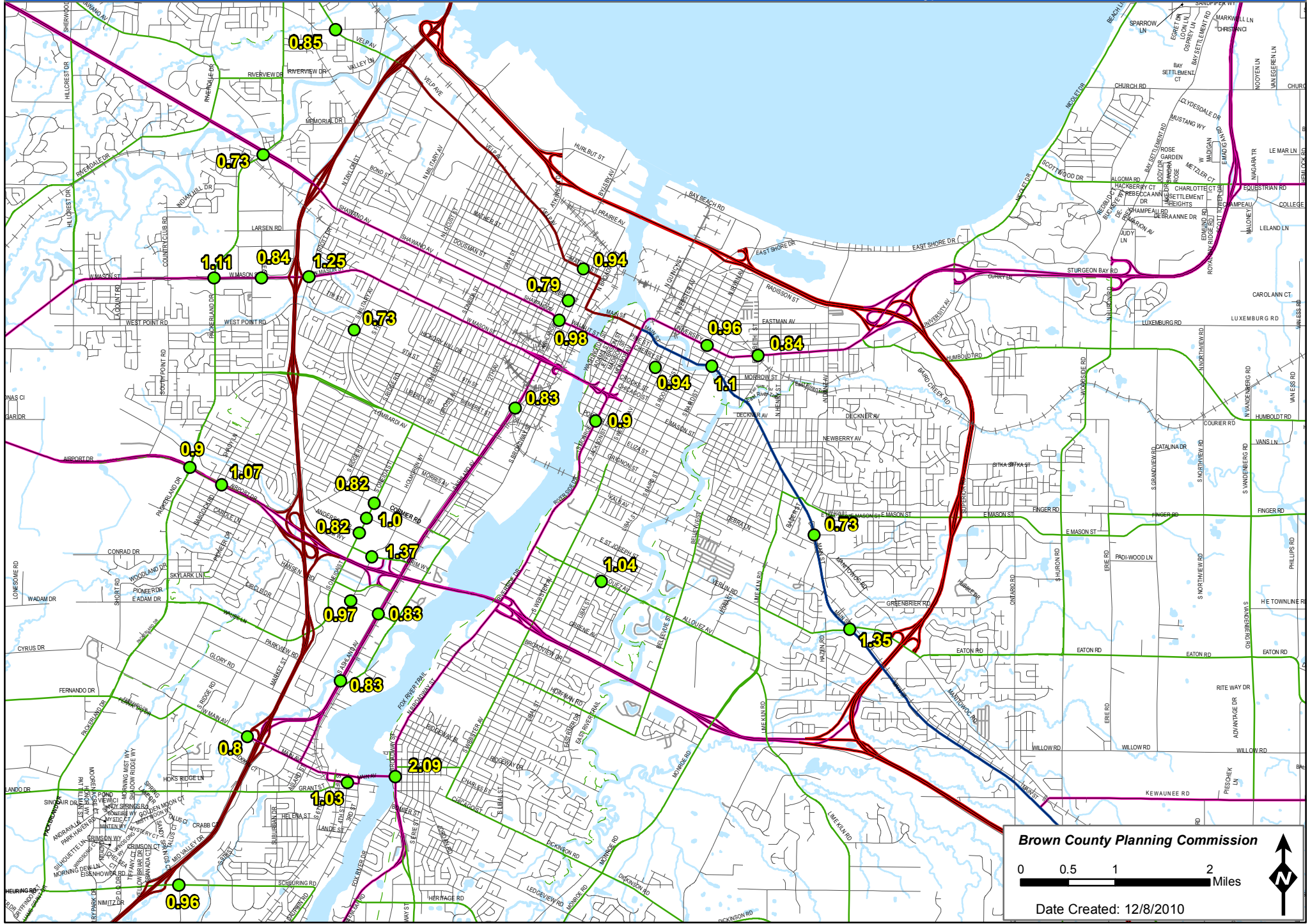
The comments for the intersections are based on an extensive review of the crash data and visits to the intersections to identify problems and confirm the existence of hazards.



# Map 1

# Top 30 Metropolitan Intersection Crash Rates, 2007-2009

(At Least Fifteen Crashes Over a Three-Year Period Needed to be Included in Study)



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0 0.5 1 2 Miles

Date Created: 12/8/2010

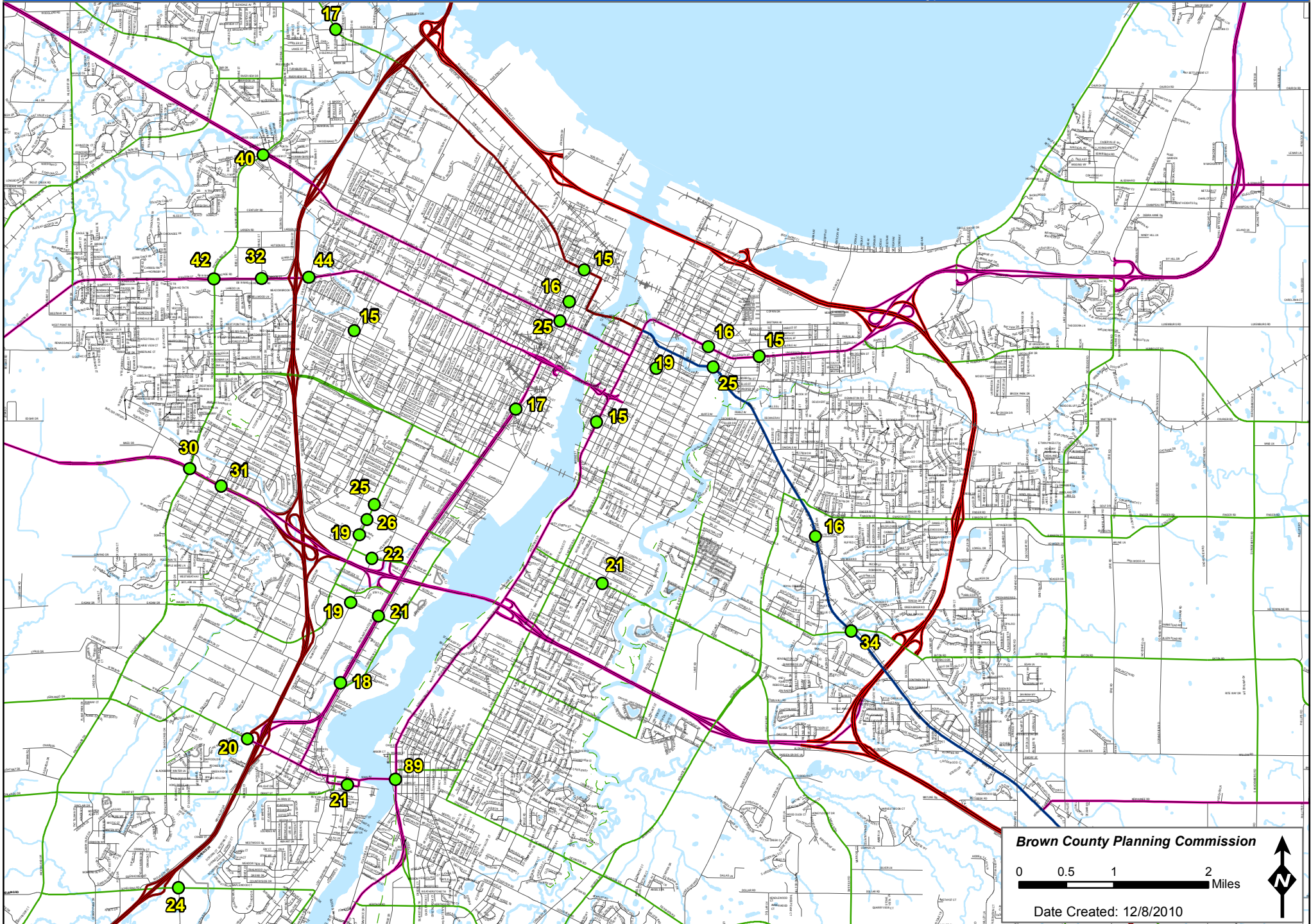




# Map 2

## Number of Reportable Crashes, 2007-2009

(At Least Fifteen Crashes Over a Three-Year Period Needed to be Included in Study)



Brown County Planning Commission

0 0.5 1 2 Miles

Date Created: 12/8/2010





### III. Comparison of 2002-2004 and 2007-2009 Crash Statistics

#### 1. Main Street/Allouez Avenue (Bellevue)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	2.33	1.09	-1.24	-53%
<b>Reportable Crashes During Period</b>	27	13	-14	-52%
<b>Injuries During Period</b>	24	6	-18	-75%
<b>Crash Type</b>				
Right Angle	19	0	-19	-100%
Rear End	5	2	-3	-60%
Side Swipe	0	0	0	NA
Head On	1	0	-1	-100%
Bicycle/Pedestrian	1	0	-1	-100%
Other (Single Vehicle Crash, Etc.)	1	11	10	1000%
<b>Driver Factor</b>				
Disregard Traffic Control	1	0	-1	-100%
Failure To Yield	18	0	-18	-100%
Inattentive Driving	5	2	-3	-60%
Too Fast For Conditions	1	4	3	300%
Driver Condition (Alcohol)	0	3	3	NA
Other/No Factor Indicated	2	4	2	100%

#### Comments for 2007-2009 Period:

- 3 of the 13 crashes between 2007 and 2009 occurred before the existing roundabout was completed.
- 3 of the 6 injuries between 2007 and 2009 occurred before the roundabout was completed.
- 1 of the 2 Rear End crashes between 2007 and 2009 occurred when the intersection was controlled by stop signs.
- All 11 "Other" crashes between 2007 and 2009 involved individual vehicles hitting curbs, signs, or trees.
- Only 1 crash happened on Allouez Avenue between 2007 and 2009.

## 2. Ontario Road - Voyager Drive (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.69	1.03	-0.66	-39%
<b>Reportable Crashes During Period</b>	16	7	-9	-56%
<b>Injuries During Period</b>	12	10	-2	-17%
<b>Crash Type</b>				
Right Angle	14	6	-8	-57%
Rear End	1	1	0	0%
Side Swipe	0	0	0	NA
Head On	0	0	0	NA
Bicycle/Pedestrian	1	0	-1	-100%
Other (Single Vehicle Crash, Etc.)	0	0	0	NA
<b>Driver Factor</b>				
Disregard Traffic Control	7	3	-4	-57%
Failure To Yield	7	3	-4	-57%
Inattentive Driving	0	0	0	NA
Too Fast For Conditions	2	0	-2	-100%
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	0	1	1	NA

### Comments for 2007-2009 Period:

- 6 of the 7 crashes occurred in 2007. Only 1 crash happened between 2008 and 2009.
- All 10 injuries occurred in 2007.
- All 6 2007 crashes were angle crashes. The 2009 crash was a rear end crash.
- Only 1 crash happened on Voyager.
- The elimination of injuries and near elimination of crashes after 2007 is likely due to the installation of a second larger stop sign at the intersection's westbound approach. The angle of the stop signs was also adjusted to enable headlights to better reflect off of them at night.

### 3. Main Avenue - Ninth Street (De Pere)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.65	0.26	-1.39	-84%
<b>Reportable Crashes During Period</b>	42	10	-32	-76%
<b>Injuries During Period</b>	16	3	-13	-81%
<b>Crash Type</b>				
Right Angle	20	4	-16	-80%
Rear End	11	6	-5	-45%
Side Swipe	3	0	-3	-100%
Head On	1	0	-1	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	7	0	-7	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	4	1	-3	-75%
Failure To Yield	14	1	-13	-93%
Inattentive Driving	12	4	-8	-67%
Too Fast For Conditions	2	2	0	0%
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	10	1	-9	-90%

#### Comments for 2007-2009 Period:

- Left turn lanes were added to Main Avenue between the '02-'04 and '07-'09 study periods, which likely contributed to the significant crash and injury reductions.

- All of the crashes happened on Main Avenue.



#### 4. Holmgren Way - Pilgrim Way (Ashwaubenon)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.63	1.37	-0.26	-16%
<b>Reportable Crashes During Period</b>	36	22	-14	-39%
<b>Injuries During Period</b>	31	8	-23	-74%
<b>Crash Type</b>				
Right Angle	10	8	-2	-20%
Rear End	19	11	-8	-42%
Side Swipe	3	1	-2	-67%
Head On	1	0	-1	-100%
Bicycle/Pedestrian	1	0	-1	-100%
Other (Single Vehicle Crash, Etc.)	2	2	0	0%
<b>Driver Factor</b>				
Disregard Traffic Control	2	1	-1	-50%
Failure To Yield	7	3	-4	-57%
Inattentive Driving	11	7	-4	-36%
Too Fast For Conditions	0	4	4	NA
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	16	6	-10	-63%

#### Comments for 2007-2009 Period:

- Only 3 of the 22 crashes occurred between Thanksgiving and Christmas.
- All 3 of these crashes occurred during snowy conditions, and 2 of the 3 were single vehicle crashes.
- 1 of the 2 single vehicle crashes happened at 3 a.m.
- These data suggest that holiday traffic congestion near the Bay Park Square Mall did not create hazardous driving conditions at this heavily-used intersection.
- The data also suggest that Packer game day traffic congestion did not create hazardous driving conditions.

## 5. Lombardi Avenue - Marlee Lane (Green Bay & Ashwaubenon)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.44	0.30	-1.14	-79%
<b>Reportable Crashes During Period</b>	42	11	-31	-74%
<b>Injuries During Period</b>	19	13	-6	-32%
<b>Fatalities During Period</b>	1	0	-1	-100%
<b>Crash Type</b>				
Right Angle	23	3	-20	-87%
Rear End	12	5	-7	-58%
Side Swipe	1	0	-1	-100%
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	6	3	-3	-50%
<b>Driver Factor</b>				
Disregard Traffic Control	2	1	-1	-50%
Failure To Yield	21	1	-20	-95%
Inattentive Driving	8	2	-6	-75%
Too Fast For Conditions	1	3	2	200%
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	10	3	-7	-70%

### Comments for 2007-2009 Period:

- The median that was added along Marlee Lane to prevent certain movements to and from the frontage road south of Lombardi appears to have addressed many of the safety problems that appeared in the 2002-2004 crash study.

- All of the crashes that occurred between 2007 and 2009 happened on Lombardi Avenue.

- 8 of the 13 injuries occurred during 1 crash, and this appears to have happened on the morning of the 2009 Packer Family Night game.

- 8 of the 11 crashes appear to have been caused by EB drivers, and many of these crashes were rear end and single vehicle incidents that involved speed. This suggests that drivers are not successfully making the transition from highway speeds to urban street speeds, and this could be because Lombardi is relatively wide between US 41 and Marlee.

## 6 (Tie). West Mason Street - Taylor Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.35	1.25	-0.10	-7%
<b>Reportable Crashes During Period</b>	67	44	-23	-34%
<b>Injuries During Period</b>	60	34	-26	-43%
<b>Crash Type</b>				
Right Angle	45	29	-16	-36%
Rear End	16	13	-3	-19%
Side Swipe	3	2	-1	-33%
Head On	2	0	-2	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	0	-1	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	23	12	-11	-48%
Failure To Yield	24	18	-6	-25%
Inattentive Driving	8	3	-5	-63%
Too Fast For Conditions	1	2	1	100%
Driver Condition (Alcohol)	1	1	0	0%
Other/No Factor Indicated	10	8	-2	-20%

### Comments for 2007-2009 Period:

- This intersection will be converted to a roundabout when US 41 is reconstructed. This should significantly reduce the number and severity of right angle crashes at the intersection.

## 6 (Tie). University Avenue - Elizabeth Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.35	0.84	-0.51	-38%
<b>Reportable Crashes During Period</b>	28	15	-13	-46%
<b>Injuries During Period</b>	13	5	-8	-62%
<b>Crash Type</b>				
Right Angle	18	8	-10	-56%
Rear End	7	4	-3	-43%
Side Swipe	1	2	1	100%
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	2	1	-1	-50%
<b>Driver Factor</b>				
Disregard Traffic Control	6	3	-3	-50%
Failure To Yield	10	4	-6	-60%
Inattentive Driving	5	4	-1	-20%
Too Fast For Conditions	2	1	-1	-50%
Driver Condition (Alcohol)	2	0	-2	-100%
Other/No Factor Indicated	3	3	0	0%

## 8. STH 172-Babcock Road (Ashwaubenon)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.33	1.07	-0.26	-20%
<b>Reportable Crashes During Period</b>	41	31	-10	-24%
<b>Injuries During Period</b>	33	27	-6	-18%
<b>Crash Type</b>				
Right Angle	22	11	-11	-50%
Rear End	15	14	-1	-7%
Side Swipe	3	1	-2	-67%
Head On	0	1	1	NA
<b><u>Bicycle/Pedestrian</u></b>	1	2	1	100%
Other (Single Vehicle Crash, Etc.)	0	2	2	NA
<b>Driver Factor</b>				
Disregard Traffic Control	2	3	1	50%
Failure To Yield	16	8	-8	-50%
Inattentive Driving	13	9	-4	-31%
Too Fast For Conditions	5	2	-3	-60%
Driver Condition (Alcohol)	0	3	3	NA
Other/No Factor Indicated	5	6	1	20%

## 9. West Mason Street - Hinkle Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.3	0.84	-0.46	-35%
<b>Reportable Crashes During Period</b>	51	32	-19	-37%
<b>Injuries During Period</b>	33	15	-18	-55%
<b>Crash Type</b>				
Right Angle	19	13	-6	-32%
Rear End	26	11	-15	-58%
Side Swipe	4	8	4	100%
Head On	1	0	-1	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	0	-1	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	5	5	0	0%
Failure To Yield	10	11	1	10%
Inattentive Driving	14	7	-7	-50%
Too Fast For Conditions	9	4	-5	-56%
Driver Condition (Alcohol)	1	0	-1	-100%
Other/No Factor Indicated	11	5	-6	-55%

### Comments for 2007-2009 Period:

- Only 3 of the 32 crashes happened in 2008.

## 10. Oneida Street - Lombardi Avenue (Green Bay & Ashwaubenon)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.29	0.33	-0.96	-74%
<b>Reportable Crashes During Period</b>	35	11	-24	-69%
<b>Injuries During Period</b>	24	3	-21	-88%
<b>Crash Type</b>				
Right Angle	26	6	-20	-77%
Rear End	7	4	-3	-43%
Side Swipe	0	1	1	NA
Head On	2	0	-2	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	0	0	0	NA
<b>Driver Factor</b>				
Disregard Traffic Control	5	1	-4	-80%
Failure To Yield	21	4	-17	-81%
Inattentive Driving	2	3	1	50%
Too Fast For Conditions	0	1	1	NA
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	7	2	-5	-71%

### Comments for 2007-2009 Period:

- The intersection was reconfigured between the 2002-2004 and 2007-2009 study periods. Changes that occurred included adding double left turn lanes and a protected left turn signal phase on Oneida at the intersection's northbound approach and installing traffic signals that extend over the street.

- The most significant safety problems at this intersection between 2002 and 2004 were right angle crashes that occurred when northbound drivers made left turns in front of southbound vehicles, so the significant reductions in angle crashes (77%) and failure to yield violations (81%) are likely due to the modifications to the intersection's northbound approach.

## 11 (Tie). West Mason Street - Military Avenue (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.24	0.59	-0.65	-52%
<b>Reportable Crashes During Period</b>	60	26	-34	-57%
<b>Injuries During Period</b>	38	28	-10	-26%
<b>Crash Type</b>				
Right Angle	34	12	-22	-65%
Rear End	21	7	-14	-67%
Side Swipe	1	1	0	0%
Head On	2	1	-1	-50%
Bicycle/ <u>Pedestrian</u>	0	4	4	NA
Other (Single Vehicle Crash, Etc.)	2	1	-1	-50%
<b>Driver Factor</b>				
Disregard Traffic Control	9	3	-6	-67%
Failure To Yield	23	9	-14	-61%
Inattentive Driving	10	5	-5	-50%
Too Fast For Conditions	5	1	-4	-80%
Driver Condition (Alcohol)	2	1	-1	-50%
Other/No Factor Indicated	11	7	-4	-36%

### Comments for 2007-2009 Period:

- Far fewer crashes occurred during the 07-09 study period than during the 02-04 period.
- There were more injuries than crashes during 07-09 period.
- 4 of the 26 crashes during the 07-09 period involved pedestrians.
- The intersection was reconstructed in 2010, and it should be monitored to determine if the new intersection is safer than the previous one.



## 11 (Tie). Scheuring Road - Lawrence Drive (De Pere)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.24	0.96	-0.28	-22.6%
<b>Reportable Crashes During Period</b>	19	24	5	26.3%
<b>Injuries During Period</b>	5	12	7	140.0%
<b>Crash Type</b>				
Right Angle	10	9	-1	-10.0%
Rear End	5	11	6	120.0%
Side Swipe	2	2	0	0.0%
Head On	1	0	-1	-100.0%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	2	1	100.0%
<b>Driver Factor</b>				
Disregard Traffic Control	2	1	-1	-50.0%
Failure To Yield	9	6	-3	-33.3%
Inattentive Driving	3	8	5	166.7%
Too Fast For Conditions	1	1	0	0.0%
Driver Condition (Alcohol)	1	0	-1	-100.0%
Other/No Factor Indicated	3	8	5	166.7%

### Comments for 2007-2009 Period:

- There were more crashes and injuries during 07-09 study period than during 02-04 period.

- This intersection was reconstructed as a roundabout in 2010. This will likely reduce the number and severity of right angle crashes at the intersection.

### 13. Main Street - Baird Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.22	1.10	-0.12	-10%
<b>Reportable Crashes During Period</b>	35	25	-10	-29%
<b>Injuries During Period</b>	30	20	-10	-33%
<b>Crash Type</b>				
Right Angle	25	19	-6	-24%
Rear End	6	2	-4	-67%
Side Swipe	2	0	-2	-100%
Head On	1	1	0	0%
Bicycle/ <u>Pedestrian</u>	0	1	1	NA
Other (Single Vehicle Crash, Etc.)	1	2	1	100%
<b>Driver Factor</b>				
Disregard Traffic Control	6	6	0	0%
Failure To Yield	22	11	-11	-50%
Inattentive Driving	2	0	-2	-100%
Too Fast For Conditions	2	1	-1	-50%
Driver Condition (Alcohol)	1	2	1	100%
Other/No Factor Indicated	2	5	3	150%

#### Comments for 2007-2009 Period:

- Many of the same problems that existed at the intersection between 2002 & 2004 continued to exist between 2007 & 2009.

#### 14. Main Avenue - Eighth Street (De Pere)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.16	0.64	-0.52	-45%
<b>Reportable Crashes During Period</b>	28	16	-12	-43%
<b>Injuries During Period</b>	19	4	-15	-79%
<b>Crash Type</b>				
Right Angle	15	5	-10	-67%
Rear End	7	7	0	0%
Side Swipe	1	3	2	200%
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	5	1	-4	-80%
<b>Driver Factor</b>				
Disregard Traffic Control	2	1	-1	-50%
Failure To Yield	13	4	-9	-69%
Inattentive Driving	6	8	2	33%
Too Fast For Conditions	1	0	-1	-100%
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	6	2	-4	-66.7%

**Comments for 2007-2009 Period:**

- Right angle crashes and failure to yield violations dropped significantly between the two crash study periods.

## 15. West Mason Street - Packerland Drive (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.12	1.11	-0.01	-1%
<b>Reportable Crashes During Period</b>	44	42	-2	-5%
<b>Injuries During Period</b>	23	28	5	22%
<b>Crash Type</b>				
Right Angle	25	26	1	4%
Rear End	14	8	-6	-43%
Side Swipe	3	6	3	100%
Head On	1	0	-1	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	2	1	100%
<b>Driver Factor</b>				
Disregard Traffic Control	2	5	3	150%
Failure To Yield	22	21	-1	-5%
Inattentive Driving	2	7	5	250%
Too Fast For Conditions	2	2	0	0%
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	16	6	-10	-63%

### Comments for 2007-2009 Period:

- The West Mason Street frontage roads continued to be hazardous during the 2007-2009 study period.

## 16. George Street - Erie Street (De Pere)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.11	0.14	-0.97	-87%
<b>Reportable Crashes During Period</b>	15	2	-13	-87%
<b>Injuries During Period</b>	9	0	-9	-100%
<b>Crash Type</b>				
Right Angle	9	1	-8	-89%
Rear End	3	0	-3	-100%
Side Swipe	1	0	-1	-100%
Head On	1	0	-1	-100%
<b>Bicycle</b> /Pedestrian	0	1	1	NA
Other (Single Vehicle Crash, Etc.)	1	0	-1	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	5	2	-3	-60%
Failure To Yield	4	0	-4	-100%
Inattentive Driving	4	0	-4	-100%
Too Fast For Conditions	1	0	-1	-100%
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	1	0	-1	-100%

### Comments for 2007-2009 Period:

- Bump-outs were installed along George Street at the intersections west of Erie Street between the two study periods.

- These bump-outs could have contributed to the significant reduction in crashes and elimination of injuries at Erie Street by slowing George Street traffic and making vehicle movements more predictable by preventing people from driving in the parking areas.

## 17. East Mason Street - Baird Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.10	0.39	-0.71	-65%
<b>Reportable Crashes During Period</b>	25	15	-10	-40%
<b>Injuries During Period</b>	14	11	-3	-21%
<b>Crash Type</b>				
Right Angle	7	5	-2	-29%
Rear End	15	6	-9	-60%
Side Swipe	0	3	3	NA
Head On	0	0	0	NA
Bicycle/Pedestrian	1	0	-1	-100%
Other (Single Vehicle Crash, Etc.)	2	1	-1	-50%
<b>Driver Factor</b>				
Disregard Traffic Control	4	2	-2	-50%
Failure To Yield	3	4	1	33%
Inattentive Driving	7	4	-3	-43%
Too Fast For Conditions	1	1	0	0%
Driver Condition (Alcohol)	1	0	-1	-100%
Other/No Factor Indicated	9	4	-5	-56%

## 18. Ashland Avenue - Hansen Road (Ashwaubenon)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.09	0.83	-0.26	-24%
<b>Reportable Crashes During Period</b>	28	21	-7	-25%
<b>Injuries During Period</b>	8	12	4	50%
<b>Crash Type</b>				
Right Angle	17	12	-5	-29%
Rear End	6	4	-2	-33%
Side Swipe	3	0	-3	-100%
Head On	2	0	-2	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	0	5	5	NA
<b>Driver Factor</b>				
Disregard Traffic Control	4	4	0	0%
Failure To Yield	11	4	-7	-64%
Inattentive Driving	2	6	4	200%
Too Fast For Conditions	0	3	3	NA
Driver Condition (Alcohol)	1	0	-1	-100%
Other/No Factor Indicated	10	4	-6	-60%

### Comments for 2007-2009 Period:

- Although the crash rate and number decreased by about 25%, the number of injuries increased by 50%.

## 19. Main Street - Auto Plaza Way (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.08	0.73	-0.35	-32%
<b>Reportable Crashes During Period</b>	35	16	-19	-54%
<b>Injuries During Period</b>	20	6	-14	-70%
<b>Crash Type</b>				
Right Angle	30	16	-14	-47%
Rear End	3	0	-3	-100%
Side Swipe	1	0	-1	-100%
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	0	-1	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	4	2	-2	-50%
Failure To Yield	25	12	-13	-52%
Inattentive Driving	3	1	-2	-67%
Too Fast For Conditions	2	1	-1	-50%
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	1	0	-1	-100%

### Comments for 2007-2009 Period:

- It appears that many of the crashes were caused by people running the stop signs on the frontage road or not getting across the intersection in time to avoid being hit. These types of crashes were also common during the 2002-2004 study period.



## 20 (Tie). East Mason Street - Lime Kiln Road (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.06	0.42	-0.64	-60%
<b>Reportable Crashes During Period</b>	31	14	-17	-55%
<b>Injuries During Period</b>	26	18	-8	-31%
<b>Crash Type</b>				
Right Angle	15	7	-8	-53%
Rear End	10	6	-4	-40%
Side Swipe	0	1	1	NA
Head On	1	0	-1	-100%
Bicycle/Pedestrian	3	0	-3	-100%
Other (Single Vehicle Crash, Etc.)	2	0	-2	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	8	2	-6	-75%
Failure To Yield	6	2	-4	-67%
Inattentive Driving	6	4	-2	-33%
Too Fast For Conditions	0	1	1	NA
Driver Condition (Alcohol)	3	1	-2	-67%
Other/No Factor Indicated	8	4	-4	-50%

### Comments for 2007-2009 Period:

- The city modified the timing of the traffic signals at the beginning of 2008, and the incandescent traffic lights were replaced by LED signals at the end of 2008. These modifications appear to have reduced the number of right angle crashes caused by drivers disregarding the signals on East Mason Street.

- 9 of the 14 crashes resulted in confirmed or possible injuries, and 7 of the 9 injury crashes each involved at least 2 injuries.

## 20 (Tie). Military Avenue - Leo Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.06	*	-1.06	-100%
<b>Reportable Crashes During Period</b>	32	20	-12	-38%
<b>Injuries During Period</b>	23	12	-11	-48%
<b>Crash Type</b>				
Right Angle	25	12	-13	-52%
Rear End	6	1	-5	-83%
Side Swipe	1	0	-1	-100%
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	0	7	7	NA
<b>Driver Factor</b>				
Disregard Traffic Control	13	12	-1	-8%
Failure To Yield	8	3	-5	-63%
Inattentive Driving	3	3	0	0%
Too Fast For Conditions	3	0	-3	-100%
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	5	2	-3	-60%

### Comments for 2007-2009 Period:

\*A crash rate was not calculated for this intersection because it was closed when WisDOT performed its 2009 traffic counts.

- The Military-Leo intersection was converted to right in-right out only when Military was reconstructed in 2009-2010.

## 22 (Tie). Main Street - Verlin Road (Bellevue)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.04	1.35	0.31	30%
<b>Reportable Crashes During Period</b>	23	34	11	48%
<b>Injuries During Period</b>	14	21	7	50%
<b>Crash Type</b>				
Right Angle	11	12	1	9%
Rear End	8	11	3	38%
Side Swipe	2	7	5	250%
Head On	1	2	1	100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	2	1	100%
<b>Driver Factor</b>				
Disregard Traffic Control	2	1	-1	-50%
Failure To Yield	10	14	4	40%
Inattentive Driving	4	4	0	0%
Too Fast For Conditions	2	1	-1	-50%
Driver Condition (Alcohol)	0	2	2	NA
Other/No Factor Indicated	5	12	7	140%

### Comments for 2007-2009 Period:

- This intersection was converted to a roundabout in 2010. This will likely reduce the number and severity of right angle crashes at the intersection. The roundabout will also eliminate head on crashes at the intersection.

## 22 (Tie). Military Avenue - Velp Avenue (Green Bay & Howard)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.04	0.46	-0.58	-56%
<b>Reportable Crashes During Period</b>	27	9	-18	-67%
<b>Injuries During Period</b>	13	6	-7	-54%
<b>Crash Type</b>				
Right Angle	11	4	-7	-64%
Rear End	11	3	-8	-73%
Side Swipe	2	1	-1	-50%
Head On	2	1	-1	-50%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	1	0	-1	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	3	1	-2	-67%
Failure To Yield	11	1	-10	-91%
Inattentive Driving	6	3	-3	-50%
Too Fast For Conditions	1	0	-1	-100%
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	6	4	-2	-33%

### Comments for 2007-2009 Period:

- WisDOT intends to build a roundabout at this intersection in 2012.

## 24 (Tie). Monroe Avenue - Walnut Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.02	0.41	-0.61	-60%
<b>Reportable Crashes During Period</b>	24	8	-16	-67%
<b>Injuries During Period</b>	17	10	-7	-41%
<b>Crash Type</b>				
Right Angle	13	7	-6	-46%
Rear End	4	0	-4	-100%
Side Swipe	2	1	-1	-50%
Head On	0	0	0	NA
Bicycle/Pedestrian	2	0	-2	-100%
Other (Single Vehicle Crash, Etc.)	3	0	-3	-100%
<b>Driver Factor</b>				
Disregard Traffic Control	7	4	-3	-43%
Failure To Yield	5	2	-3	-60%
Inattentive Driving	2	0	-2	-100%
Too Fast For Conditions	2	0	-2	-100%
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	8	1	-7	-88%

### Comments for 2007-2009 Period:

- 3 of the 8 crashes happened when the stop lights were on flash setting.
- 7 of the 8 at-fault drivers appeared to be traveling eastbound on Walnut.

## 24 (Tie). Velp Avenue - Memorial Drive (Howard)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	1.02	0.68	-0.34	-33%
<b>Reportable Crashes During Period</b>	21	13	-8	-38%
<b>Injuries During Period</b>	16	8	-8	-50%
<b>Crash Type</b>				
Right Angle	17	10	-7	-41%
Rear End	0	0	0	NA
Side Swipe	1	0	-1	-100%
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	3	3	0	0%
<b>Driver Factor</b>				
Disregard Traffic Control	0	0	0	NA
Failure To Yield	16	8	-8	-50%
Inattentive Driving	4	0	-4	-100%
Too Fast For Conditions	0	0	0	NA
Driver Condition (Alcohol)	0	2	2	NA
Other/No Factor Indicated	1	3	2	200%

### Comments for 2007-2009 Period:

- WisDOT intends to build a roundabout at this intersection when it reconstructs US 41.

**26 (Tie). STH 172 - Packerland Drive (Ashwaubenon)**

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	0.98	0.90	-0.08	-8%
<b>Reportable Crashes During Period</b>	37	30	-7	-19%
<b>Injuries During Period</b>	22	20	-2	-9%
<b>Crash Type</b>				
Right Angle	15	9	-6	-40%
Rear End	11	10	-1	-9%
Side Swipe	3	6	3	100%
Head On	2	0	-2	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	6	5	-1	-17%
<b>Driver Factor</b>				
Disregard Traffic Control	5	3	-2	-40%
Failure To Yield	14	7	-7	-50%
Inattentive Driving	8	4	-4	-50%
Too Fast For Conditions	3	4	1	33%
Driver Condition (Alcohol)	0	2	2	NA
Other/No Factor Indicated	7	10	3	43%

## 26 (Tie). Webster Avenue - Walnut Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	0.98	0.94	-0.04	-4%
<b>Reportable Crashes During Period</b>	23	19	-4	-17%
<b>Injuries During Period</b>	20	19	-1	-5%
<b>Crash Type</b>				
Right Angle	15	12	-3	-20%
Rear End	1	1	0	0%
Side Swipe	2	2	0	0%
Head On	1	1	0	0%
Bicycle/Pedestrian	2	2	0	0%
Other (Single Vehicle Crash, Etc.)	2	1	-1	-50%
<b>Driver Factor</b>				
Disregard Traffic Control	11	4	-7	-64%
Failure To Yield	8	5	-3	-38%
Inattentive Driving	2	2	0	0%
Too Fast For Conditions	1	1	0	0%
Driver Condition (Alcohol)	1	4	3	300%
Other/No Factor Indicated	0	3	3	NA

### Comments for 2007-2009 Period:

- 8 of the 19 crashes occurred when the signals were on flash setting.



## 28. Shawano Avenue - Packerland Drive (Howard)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	0.97	0.73	-0.24	-25%
<b>Reportable Crashes During Period</b>	53	40	-13	-25%
<b>Injuries During Period</b>	37	20	-17	-46%
<b>Crash Type</b>				
Right Angle	18	6	-12	-67%
Rear End	29	27	-2	-7%
Side Swipe	3	3	0	0%
Head On	1	0	-1	-100%
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	2	4	2	100%
<b>Driver Factor</b>				
Disregard Traffic Control	3	1	-2	-67%
Failure To Yield	9	3	-6	-67%
Inattentive Driving	18	17	-1	-6%
Too Fast For Conditions	8	5	-3	-38%
Driver Condition (Alcohol)	3	2	-1	-33%
Other/No Factor Indicated	12	12	0	0%

### Comments for 2007-2009 Period:

- This intersection will be reconstructed by WisDOT to eliminate direct access to the highway section of STH 29. The new local street intersection will be controlled by roundabouts.

## 29. Cormier Road - Holmgren Way (Ashwaubenon)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	0.96	0.45	-0.51	-53%
<b>Reportable Crashes During Period</b>	16	8	-8	-50%
<b>Injuries During Period</b>	15	7	-8	-53%
<b>Crash Type</b>				
Right Angle	14	3	-11	-79%
Rear End	1	2	1	100%
Side Swipe	1	1	0	0%
Head On	0	1	1	NA
<b>Bicycle</b> /Pedestrian	0	1	1	NA
Other (Single Vehicle Crash, Etc.)	0	0	0	NA
<b>Driver Factor</b>				
Disregard Traffic Control	5	4	-1	-20%
Failure To Yield	6	1	-5	-83%
Inattentive Driving	2	0	-2	-100%
Too Fast For Conditions	0	1	1	NA
Driver Condition (Alcohol)	0	0	0	NA
Other/No Factor Indicated	3	2	-1	-33%

### 30 (Tie). Monroe Avenue - Porlier Street (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	0.91	0.90	-0.01	-1%
<b>Reportable Crashes During Period</b>	21	15	-6	-29%
<b>Injuries During Period</b>	17	10	-7	-41%
<b>Crash Type</b>				
Right Angle	19	10	-9	-47%
Rear End	2	4	2	100%
Side Swipe	0	0	0	NA
Head On	0	0	0	NA
Bicycle/Pedestrian	0	0	0	NA
Other (Single Vehicle Crash, Etc.)	0	1	1	NA
<b>Driver Factor</b>				
Disregard Traffic Control	3	0	-3	-100%
Failure To Yield	16	8	-8	-50%
Inattentive Driving	2	1	-1	-50%
Too Fast For Conditions	0	3	3	NA
Driver Condition (Alcohol)	0	1	1	NA
Other/No Factor Indicated	0	2	2	NA

#### Comments for 2007-2009 Period:

- As with the 2002-2004 study period, many of the crashes between 2007 and 2009 involved southbound left turning motorists who failed to yield to oncoming vehicles. These crashes likely happened because the left turning motorists' views of oncoming vehicles were blocked by northbound motorists who were also waiting to turn left.

### 30 (Tie). East Mason Street - Alpine Drive (Green Bay)

	<u>2002-2004</u>	<u>2007-2009</u>	<u>Difference</u>	<u>% Difference</u>
<b>Estimated Crash Rate</b>	0.91	**	-0.91	-100%
<b>Reportable Crashes During Period</b>	26	20	-6	-23%
<b>Injuries During Period</b>	11	21	10	91%
<b>Crash Type</b>				
Right Angle	17	12	-5	-29%
Rear End	5	5	0	0%
Side Swipe	1	2	1	100%
Head On	0	0	0	NA
Bicycle/Pedestrian	1	0	-1	-100%
Other (Single Vehicle Crash, Etc.)	2	1	-1	-50%
<b>Driver Factor</b>				
Disregard Traffic Control	6	2	-4	-67%
Failure To Yield	7	9	2	29%
Inattentive Driving	2	2	0	0%
Too Fast For Conditions	8	3	-5	-63%
Driver Condition (Alcohol)	1	1	0	0%
Other/No Factor Indicated	2	3	1	50%

**Comments for 2007-2009 Period:**

\*\* No count was available for Alpine Drive, so a crash rate could not be calculated.

- The number of crashes at this intersection decreased, but the number of injuries sharply increased.



## IV. Metropolitan Area Intersections with the Highest Crash Rates Between 2007 and 2009

### 1. Claude Allouez Bridge - Broadway (De Pere)

**Crash Rate** 2.09

**Reportable Crashes During Period** 89  
**Estimated Property Damage Cost** \$738,700

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 3  
**Possible Injuries During Period** 10  
**Estimated Injury Cost** \$188,400

#### Crash Type

Right Angle	18	20%
Rear End	18	20%
Side Swipe	51	57%
Head On	0	0%
<b>Bicycle</b> /Pedestrian	1	1%
Other (Single Vehicle Crash, Etc.)	1	1%

#### Driver Factor

Disregard Traffic Control	5	6%
Failure To Yield	30	34%
Inattentive Driving	17	19%
Too Fast For Conditions	0	0%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	37	42%

#### Comments:

- 14 of the 89 crashes occurred before the roundabout was completed.
- 4 of the 13 non-incapacitating and possible injuries occurred before the roundabout was completed.
- 2 of the 3 non-incapacitating injuries involved a bicyclist and a moped rider, and the bicyclist was cited for failing to yield at the roundabout.
- The intersection's crash statistics for 2008 and 2009 suggest that the roundabout's high peak period traffic volumes (especially during the 2009 STH 172 redecking project) and unfamiliar lane configuration resulted in many side swipe and other minor property damage crashes.
- As people become more familiar with this roundabout and have a chance to use the multi-lane roundabouts that WisDOT intends to build along US 41, the number of reportable crashes will likely decrease. However, this and other multi-lane roundabouts in the area should be monitored to determine if this occurs.

## 2. Holmgren Way - Pilgrim Way (Ashwaubenon)

**Crash Rate** 1.37

**Reportable Crashes During Period** 22  
**Estimated Property Damage Cost** \$182,600

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 2  
**Possible Injuries During Period** 6  
**Estimated Injury Cost** \$117,400

### Crash Type

Right Angle	8	36%
Rear End	11	50%
Side Swipe	1	5%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	2	9%

### Driver Factor

Disregard Traffic Control	1	5%
Failure To Yield	3	14%
Inattentive Driving	7	32%
Too Fast For Conditions	4	18%
Driver Condition (Alcohol)	1	5%
Other/No Factor Indicated	6	27%

### Comments:

- The most common property damage and injury incidents at this intersection were rear end crashes on Pilgrim Way where westbound motorists hit other motorists who were stopped at the signal or in a vehicle queue. In most of these situations, the offending drivers were cited for inattentive driving or for following other vehicles too closely.
- If vehicle queues at the Pilgrim/Holmgren intersection are the cause of many of the crashes, the best crash reduction strategy would be to minimize the queue. To do this, the Brown County Highway Department and Village of Ashwaubenon should consider constructing a roundabout at the intersection. In addition to improving safety at the intersection by making the intersection more efficient and minimizing vehicle conflicts, a roundabout would improve the intersection's appearance and create an attractive entry point to the village's retail area from the freeway.

### 3. Main Street - Verlin Road (Bellevue)

<b>Crash Rate</b>	1.35
<b>Reportable Crashes During Period</b>	34
<b>Estimated Property Damage Cost</b>	\$282,200
<b>Incapacitating Injuries During Period</b>	2
<b>Non-Incapacitating Injuries During Period</b>	12
<b>Possible Injuries During Period</b>	7
<b>Estimated Injury Cost</b>	\$482,100

#### Crash Type

Right Angle	12	35%
Rear End	11	32%
Side Swipe	7	21%
Head On	2	6%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	2	6%

#### Driver Factor

Disregard Traffic Control	1	3%
Failure To Yield	14	41%
Inattentive Driving	4	12%
Too Fast For Conditions	1	3%
Driver Condition (Alcohol)	2	6%
Other/No Factor Indicated	12	35%

#### Comments:

- Between the 2002-2004 and 2007-2009 study periods, this intersection experienced increases in crash rate (30 percent), crash number (48 percent), and injury number (50 percent).
- 14 of the 21 injuries recorded at the intersection were confirmed at the scene by the responding officers, and 2 of the injuries were classified as serious (incapacitating).
- The 2 incapacitating injuries occurred in separate head on crashes.
- To address the increasing number of head on and right angle injury crashes, the intersection's traffic signals were replaced by a roundabout in 2010.



#### 4. West Mason Street - Taylor Street (Green Bay)

<b>Crash Rate</b>	1.25
<b>Reportable Crashes During Period</b>	44
<b>Estimated Property Damage Cost</b>	\$365,200
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	9
<b>Possible Injuries During Period</b>	25
<b>Estimated Injury Cost</b>	\$503,700

#### Crash Type

Right Angle	29	66%
Rear End	13	30%
Side Swipe	2	5%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	0	0%

#### Driver Factor

Disregard Traffic Control	12	27%
Failure To Yield	18	41%
Inattentive Driving	3	7%
Too Fast For Conditions	2	5%
Driver Condition (Alcohol)	1	2%
Other/No Factor Indicated	8	18%

#### Comments:

- This intersection's crash rate dropped slightly (7 percent) between the 2002-2004 and 2007-2009 study periods, and the number of crashes and injuries dropped between the two study periods by 34 percent and 43 percent, respectively.
- Despite these crash and injury reductions, the intersection continues to experience a relatively high number of right angle injury crashes when compared to other metropolitan area intersections.
- The intersection's traffic signals are scheduled to be replaced by a roundabout when US 41 is reconstructed by WisDOT. This should significantly reduce the number and severity of right angle crashes at the intersection.

## 5. West Mason Street - Packerland Drive (Green Bay)

**Crash Rate** 1.11

**Reportable Crashes During Period** 42  
**Estimated Property Damage Cost** \$348,600

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 5  
**Possible Injuries During Period** 23  
**Estimated Injury Cost** \$391,900

### Crash Type

Right Angle	26	62%
Rear End	8	19%
Side Swipe	6	14%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	2	5%

### Driver Factor

Disregard Traffic Control	5	12%
Failure To Yield	21	50%
Inattentive Driving	7	17%
Too Fast For Conditions	2	5%
Driver Condition (Alcohol)	1	2%
Other/No Factor Indicated	6	14%

### Comments:

- Once again, this intersection experienced many right angle crashes that involved drivers on the West Mason frontage roads pulling in front of drivers traveling north or south on Packerland Drive. The 2007-2009 data suggest that 14 of the 42 crashes involved frontage road drivers.
- The data also suggest that many other right angle crashes were caused by left-turning drivers pulling in front of oncoming vehicles on Packerland and West Mason. These crashes could have happened because the turning drivers could not see approaching traffic around opposing vehicles.
- The data suggest that many of the crashes at the intersection could be eliminated if drivers entering Packerland Drive from the frontage roads were only allowed to make right turns (at least during peak traffic periods). Another approach to eliminating many of the right angle crashes would be to construct a roundabout at the intersection, but it might be difficult to safely integrate the frontage roads into the roundabout.

## 6. Main Street - Baird Street (Green Bay)

<b>Crash Rate</b>	1.10
<b>Reportable Crashes During Period</b>	25
<b>Estimated Property Damage Cost</b>	\$207,500
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	4
<b>Possible Injuries During Period</b>	16
<b>Estimated Injury Cost</b>	\$284,000

### Crash Type

Right Angle	19	76%
Rear End	2	8%
Side Swipe	0	0%
Head On	1	4%
Bicycle/ <u>Pedestrian</u>	1	4%
Other (Single Vehicle Crash, Etc.)	2	8%

### Driver Factor

Disregard Traffic Control	6	24%
Failure To Yield	11	44%
Inattentive Driving	0	0%
Too Fast For Conditions	1	4%
Driver Condition (Alcohol)	2	8%
Other/No Factor Indicated	5	20%

### Comments:

- The most common incidents at this intersection during the three-year period were angle crashes that happened when vehicles traveling straight hit vehicles making left turns, and most of the left turners were traveling westbound or southbound when they were hit.
- Many of the crashes that occurred between 2007 and 2009 were similar to the crashes that occurred during the 2002-2004 study period.

## 7. STH 172 - Babcock Road (Ashwaubenon)

Crash Rate 1.07

Reportable Crashes During Period 31  
 Estimated Property Damage Cost \$257,300

Incapacitating Injuries During Period 0  
 Non-Incapacitating Injuries During Period 5  
 Possible Injuries During Period 22  
 Estimated Injury Cost \$379,600

### Crash Type

Right Angle	11	35%
Rear End	14	45%
Side Swipe	1	3%
Head On	1	3%
<b><u>Bicycle (1)/Pedestrian (1)</u></b>	2	6%
Other (Single Vehicle Crash, Etc.)	2	6%

### Driver Factor

Disregard Traffic Control	3	10%
Failure To Yield	8	26%
Inattentive Driving	9	29%
Too Fast For Conditions	2	6%
Driver Condition (Alcohol)	3	10%
Other/No Factor Indicated	6	19%

### Comments:

- The positive offset left turn lanes that were installed at the STH 172 intersection approaches in 2003 appear to have reduced the total numbers of right angle crashes and failure to yield violations. However, the intersection still experienced 7 right angle crashes that were caused by drivers who failed to yield while turning, and all of these crashes were caused by westbound drivers on STH 172 who turned in front of eastbound drivers.
- The bicyclist and pedestrian were hit at the intersection's northwest corner by drivers who were making right turns.

## 8. Allouez Avenue - Libal Street (Allouez)

**Crash Rate** 1.04

**Reportable Crashes During Period** 21  
**Estimated Property Damage Cost** \$174,300

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 1  
**Possible Injuries During Period** 0  
**Estimated Injury Cost** \$21,800

### Crash Type

Right Angle	6	29%
Rear End	4	19%
Side Swipe	7	33%
Head On	0	0%
<b>Bicycle</b> /Pedestrian	1	5%
Other (Single Vehicle Crash, Etc.)	3	14%

### Driver Factor

Disregard Traffic Control	0	0%
Failure To Yield	9	43%
Inattentive Driving	7	33%
Too Fast For Conditions	1	5%
Driver Condition (Alcohol)	1	5%
Other/No Factor Indicated	3	14%

### Comments:

- Although this roundabout intersection experienced a much higher number of reportable crashes than the county's other single-lane roundabout intersections during the three-year study period, only one minor injury occurred at the intersection during this period. This injury was sustained by a bicyclist who was hit by a car while passing through the roundabout.
- The intersection experienced a variety of reportable crashes during the three-year study period, but at least half of the crashes appear to have been directly or indirectly caused by eastbound drivers entering and passing through the roundabout at relatively high speeds. Assuming that high eastbound entry and circulation speeds are problems, it is possible that the likelihood of crashes could be reduced by increasing the eastbound lane's horizontal deflection prior to and within the roundabout. Increasing the horizontal deflection at the other approaches might also reduce the likelihood of crashes at the intersection.

## 9. Reid Street - Fourth Street (De Pere)

<b>Crash Rate</b>	1.03	
<b>Reportable Crashes During Period</b>	21	
<b>Estimated Property Damage Cost</b>	\$174,300	
<b>Fatalities During Period</b>	1	
<b>Estimated Fatality Cost</b>	\$1,300,000	
<b>Incapacitating Injuries During Period</b>	0	
<b>Non-Incapacitating Injuries During Period</b>	1	
<b>Possible Injuries During Period</b>	3	
<b>Estimated Injury Cost</b>	\$58,700	
<b>Crash Type</b>		
Right Angle	11	52%
Rear End	7	33%
Side Swipe	3	14%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	0	0%
<b>Driver Factor</b>		
Disregard Traffic Control	9	43%
Failure To Yield	3	14%
Inattentive Driving	5	24%
Too Fast For Conditions	0	0%
Driver Condition (Alcohol)	1	5%
Other/No Factor Indicated	3	14%

### Comments:

- Most of the right angle crashes occurred when southbound drivers ran flashing and solid red lights (5 crashes) and eastbound drivers ran solid red lights (3 crashes).
- The fatality was a result of a high-speed rear end crash on eastbound Reid Street. The driver of the speeding vehicle was killed, and the crash factor was listed as driver condition. Although this usually means that alcohol was involved, the crash record does not indicate that alcohol was a factor. The apparent absence of alcohol and the fact that the crash happened at 9:00 a.m. on a Monday morning suggest that the driver could have been impaired because of health or other issues, but the full crash report would have to be reviewed to be certain.

## 10. Oneida Street - Willard Drive (Ashwaubenon)

<b>Crash Rate</b>	1.00
<b>Reportable Crashes During Period</b>	26
<b>Estimated Property Damage Cost</b>	\$215,800
<b>Fatalities During Period</b>	2
<b>Estimated Fatality Cost</b>	\$2,600,000
<b>Incapacitating Injuries During Period</b>	1
<b>Non-Incapacitating Injuries During Period</b>	0
<b>Possible Injuries During Period</b>	8
<b>Estimated Injury Cost</b>	\$165,600

### Crash Type

Right Angle	10	38%
Rear End	10	38%
Side Swipe	1	4%
Head On	0	0%
<b><u>Bicycle (1)/Pedestrian (2)</u></b>	3	12%
Other	2	8%

### Driver Factor

Disregard Traffic Control	3	12%
Failure To Yield	6	23%
Inattentive Driving	7	27%
Too Fast For Conditions	0	0%
Driver Condition	1	4%
Other/No Factor Indicated	9	35%

### Comments:

- The most common incidents appear to have been right angle crashes that happened when left turning motorists pulled in front of oncoming vehicles and rear end crashes that were attributed to driver inattentiveness or following other vehicles too closely.
- The crash types and factors at this intersection are similar to the crash types and factors at many other intersections along the commercial section of Oneida Street, which is not surprising considering of the corridor's relatively high traffic volumes, significant number of driveways, lack of positive offset left turn lanes at intersections, and heavy concentration of signs and storefronts that are designed to attract the attention of passing drivers.
- The Brown County Highway Department intends to reconstruct Oneida Street between Hansen Road and Cormier Road in 2011, and this project will include the removal of some driveways near the Willard Drive intersection.
- The two fatalities occurred when an intoxicated driver disregarded the traffic light and hit a car carrying two people. The two people in the car were killed, and the intoxicated driver sustained an incapacitating injury.

## 11. Ashland Avenue - Walnut Street (Green Bay)

**Crash Rate** 0.98

**Reportable Crashes During Period** 25  
**Estimated Property Damage Cost** \$207,500

**Incapacitating Injuries During Period** 2  
**Non-Incapacitating Injuries During Period** 5  
**Possible Injuries During Period** 9  
**Estimated Injury Cost** \$354,100

### Crash Type

Right Angle	18	72%
Rear End	4	16%
Side Swipe	1	4%
Head On	0	0%
<b>Bicycle</b> /Pedestrian	1	4%
Other (Single Vehicle Crash, Etc.)	1	4%

### Driver Factor

Disregard Traffic Control	8	32%
Failure To Yield	8	32%
Inattentive Driving	4	16%
Too Fast For Conditions	1	4%
Driver Condition (Alcohol)	2	8%
Other/No Factor Indicated	2	8%

### Comments:

- 10 of the 25 reportable crashes during the three-year study period occurred when the traffic signals were on flash setting, and only 2 of the 10 flash-setting crashes were caused by alcohol-impaired drivers.
- 17 of the 23 crashes where the drivers' ages were known were caused by people who were 25 years old or less.
- 7 of the 10 flash-setting crashes were caused by drivers who were 25 years old or less (2 were alcohol-impaired, 5 were not alcohol-impaired).



## 12. Hansen Road - Holmgren Way (Ashwaubenon)

**Crash Rate** 0.97

**Reportable Crashes During Period** 19  
**Estimated Property Damage Cost** \$157,700

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 2  
**Possible Injuries During Period** 13  
**Estimated Injury Cost** \$203,500

### Crash Type

Right Angle	11	58%
Rear End	4	21%
Side Swipe	2	11%
Head On	1	5%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	1	5%

### Driver Factor

Disregard Traffic Control	8	42%
Failure To Yield	4	21%
Inattentive Driving	5	26%
Too Fast For Conditions	1	5%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	1	5%

### Comments:

- The most common incidents at this intersection were right angle crashes that happened on Hansen Road when drivers disregarded the stoplights or made left turns in front of oncoming vehicles. All 4 of the rear end crashes also occurred on Hansen Road, and 3 of these 4 crashes were caused by eastbound drivers.
- 10 of the 19 crashes and 9 of the 15 confirmed/possible injuries were caused by eastbound drivers on Hansen Road.

### T13. Scheuring Road - Lawrence Drive (De Pere)

<b>Crash Rate</b>	0.96
<b>Reportable Crashes During Period</b>	24
<b>Estimated Property Damage Cost</b>	\$199,200
<b>Incapacitating Injuries During Period</b>	1
<b>Non-Incapacitating Injuries During Period</b>	3
<b>Possible Injuries During Period</b>	8
<b>Estimated Injury Cost</b>	\$231,000

#### Crash Type

Right Angle	9	38%
Rear End	11	46%
Side Swipe	2	8%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	2	8%

#### Driver Factor

Disregard Traffic Control	1	4%
Failure To Yield	6	25%
Inattentive Driving	8	33%
Too Fast For Conditions	1	4%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	8	33%

#### Comments:

- Although the crash rate dropped at this intersection between the 2002-2004 and 2007-2009 study periods, the numbers of crashes and injuries increased. Nearly all of the additional crashes between the two study periods were rear end crashes, but right angle crashes continued to be the most severe.
- The intersection's traffic signals were replaced by a roundabout in 2010.

### T13. University Avenue - Irwin Avenue (Green Bay)

<b>Crash Rate</b>	0.96
<b>Reportable Crashes During Period</b>	16
<b>Estimated Property Damage Cost</b>	\$132,800
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	4
<b>Possible Injuries During Period</b>	5
<b>Estimated Injury Cost</b>	\$148,700

#### Crash Type

Right Angle	12	75%
Rear End	2	13%
Side Swipe	1	6%
Head On	0	0%
<b>Bicycle</b> /Pedestrian	1	6%
Other (Single Vehicle Crash, Etc.)	0	0%

#### Driver Factor

Disregard Traffic Control	5	31%
Failure To Yield	5	31%
Inattentive Driving	2	13%
Too Fast For Conditions	0	0%
Driver Condition (Alcohol)	1	6%
Other/No Factor Indicated	3	19%

#### Comments:

- 6 of the 16 reportable crashes during the three-year study period occurred when the traffic signals were on flash setting, and only 1 of the 6 flash-setting crashes were caused by alcohol-impaired drivers.
- 11 of the 14 crashes where driver factors were listed appear to have been caused by drivers who were traveling westbound or southbound.
- Only 1 of the 14 crashes where driver factors were listed involved a driver who was making a turn. The other 13 crashes involved drivers disregarding traffic controls and failing to yield while passing straight through the intersection.

## T15. Webster Avenue - Walnut Street (Green Bay)

<b>Crash Rate</b>	0.94
<b>Reportable Crashes During Period</b>	19
<b>Estimated Property Damage Cost</b>	\$157,700
<b>Incapacitating Injuries During Period</b>	2
<b>Non-Incapacitating Injuries During Period</b>	8
<b>Possible Injuries During Period</b>	9
<b>Estimated Injury Cost</b>	\$419,500

### Crash Type

Right Angle	12	63%
Rear End	1	5%
Side Swipe	2	11%
Head On	1	5%
<b>Bicycle</b> /Pedestrian	2	11%
Other (Single Vehicle Crash, Etc.)	1	5%

### Driver Factor

Disregard Traffic Control	4	21%
Failure To Yield	5	26%
Inattentive Driving	2	11%
Too Fast For Conditions	1	5%
Driver Condition (Alcohol)	4	21%
Other/No Factor Indicated	3	16%

### Comments:

- 8 of the 19 reportable crashes during the three-year study period occurred when the traffic signals were on flash setting, and only 3 of the 8 flash-setting crashes were caused by alcohol-impaired drivers.
- 6 of the 8 flash-setting crashes occurred when eastbound drivers entered the intersection and were hit by southbound drivers. This is likely a problem because it is difficult for eastbound drivers to see approaching southbound vehicles from around the building at the intersection's northwest corner.
- Both of the bicyclists were eastbound when they were hit by southbound right-turning vehicles, and one of the two drivers was cited for inattentive driving (no citation was listed for the driver or bicyclist for the other crash). This suggests that both bicyclists entered the north crosswalk from behind the building at the intersection's northwest corner and were hit as the drivers were making right turns (possibly on red). These crashes illustrate the danger of riding contra-flow on sidewalks in downtowns and other areas where buildings have zero or short setbacks.
- Both of the incapacitating injuries and 3 of the non-incapacitating injuries occurred as a result of alcohol-related crashes.

## T15. Ashland Avenue - Mather Street (Green Bay)

**Crash Rate** 0.94

**Reportable Crashes During Period** 15  
**Estimated Property Damage Cost** \$124,500

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 1  
**Possible Injuries During Period** 5  
**Estimated Injury Cost** \$83,300

### Crash Type

Right Angle	11	73%
Rear End	1	7%
Side Swipe	2	13%
Head On	0	0%
Bicycle/ <u>Pedestrian</u>	1	7%
Other (Single Vehicle Crash, Etc.)	0	0%

### Driver Factor

Disregard Traffic Control	5	33%
Failure To Yield	5	33%
Inattentive Driving	2	13%
Too Fast For Conditions	1	7%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	2	13%

### Comments:

- 4 of the 15 reportable crashes during the three-year study period occurred when the traffic signals were on flash setting, and none of the flash-setting crashes were caused by alcohol-impaired drivers.

## T17. Monroe Avenue - Porlier Street (Green Bay)

<b>Crash Rate</b>	0.9
<b>Reportable Crashes During Period</b>	15
<b>Estimated Property Damage Cost</b>	\$124,500
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	0
<b>Possible Injuries During Period</b>	10
<b>Estimated Injury Cost</b>	\$123,000

### Crash Type

Right Angle	10	67%
Rear End	4	27%
Side Swipe	0	0%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	1	7%

### Driver Factor

Disregard Traffic Control	0	0%
Failure To Yield	8	53%
Inattentive Driving	1	7%
Too Fast For Conditions	3	20%
Driver Condition (Alcohol)	1	7%
Other/No Factor Indicated	2	13%

### Comments:

- As with the 2002-2004 study period, many of the crashes between 2007 and 2009 involved southbound left turning motorists who failed to yield to oncoming vehicles. These crashes likely happened because the left turning motorists' views of oncoming vehicles were blocked by northbound motorists who were also waiting to turn left.

## T17. STH 172 - Packerland Drive (Ashwaubenon)

<b>Crash Rate</b>	0.90
<b>Reportable Crashes During Period</b>	30
<b>Estimated Property Damage Cost</b>	\$249,000
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	4
<b>Possible Injuries During Period</b>	16
<b>Estimated Injury Cost</b>	\$284,000

### Crash Type

Right Angle	9	30%
Rear End	10	33%
Side Swipe	6	20%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	5	17%

### Driver Factor

Disregard Traffic Control	3	10%
Failure To Yield	7	23%
Inattentive Driving	4	13%
Too Fast For Conditions	4	13%
Driver Condition (Alcohol)	2	7%
Other/No Factor Indicated	10	33%

### Comments:

- The positive offset left turn lanes that were installed at the STH 172 intersection approaches in 2003 appear to have reduced the total numbers of right angle crashes and failure to yield violations on STH 172.
- The intersection experienced 2 right angle and 4 side swipe - opposite direction crashes that were caused by drivers on Packerland Drive who failed to yield while making left turns.
- 9 crashes occurred when snow or ice was present, and 4 of the 5 single vehicle crashes happened when the road was snow and/or ice covered.

## 19. Velp Avenue - Glendale Avenue (Howard)

**Crash Rate** 0.85

**Reportable Crashes During Period** 17  
**Estimated Property Damage Cost** \$141,100

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 1  
**Possible Injuries During Period** 1  
**Estimated Injury Cost** \$34,100

### Crash Type

Right Angle	6	35%
Rear End	2	12%
Side Swipe	4	24%
Head On	1	6%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	4	24%

### Driver Factor

Disregard Traffic Control	2	12%
Failure To Yield	6	35%
Inattentive Driving	2	12%
Too Fast For Conditions	2	12%
Driver Condition (Alcohol)	3	18%
Other/No Factor Indicated	2	12%

### Comments:

- 4 of the 17 reportable crashes involved eastbound right turning vehicles side swiping other eastbound vehicles as they approached the intersection.
- The head on crash and 3 of the right angle crashes involved eastbound and westbound drivers getting hit as they made left turns.
- Both of the rear end crashes happened in the northbound left turn lane when slippery conditions existed (ice in one case, snow in the other). Also, both crashes happened in the mid-morning hours (8:00 a.m. and 9:00 a.m.).
- 3 of the 17 crashes involved alcohol.



## T20. University Avenue - Elizabeth Street (Green Bay)

Crash Rate 0.84

Reportable Crashes During Period 15  
Estimated Property Damage Cost \$124,500

Incapacitating Injuries During Period 0  
Non-Incapacitating Injuries During Period 2  
Possible Injuries During Period 3  
Estimated Injury Cost \$80,500

### Crash Type

Right Angle	8	53%
Rear End	4	27%
Side Swipe	2	13%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	1	7%

### Driver Factor

Disregard Traffic Control	3	20%
Failure To Yield	4	27%
Inattentive Driving	4	27%
Too Fast For Conditions	1	7%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	3	20%

### Comments:

- The intersection experienced a variety of crashes that were caused by a variety of factors during the study period.

## T20. West Mason Street - Hinkle Street (Green Bay)

<b>Crash Rate</b>	0.84
<b>Reportable Crashes During Period</b>	32
<b>Estimated Property Damage Cost</b>	\$265,600
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	1
<b>Possible Injuries During Period</b>	14
<b>Estimated Injury Cost</b>	\$194,000

### Crash Type

Right Angle	13	41%
Rear End	11	34%
Side Swipe	8	25%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	0	0%

### Driver Factor

Disregard Traffic Control	5	16%
Failure To Yield	11	34%
Inattentive Driving	7	22%
Too Fast For Conditions	4	13%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	5	16%

### Comments:

- The most common incidents at this intersection were rear end crashes on Mason Street that occurred when motorists were driving inattentively or were following other motorists too closely. The intersection also experienced several left turning angle and side swipe crashes.
- The left turning angle crashes on Mason Street would likely be eliminated by installing offset left turn lanes in the Mason medians, but the rear end crashes will likely continue unless traffic levels decrease or vehicle speeds are reduced. However, reducing speeds on this segment of Mason Street will be very difficult because it is very wide and invites motorists to drive fast. The roundabouts that are scheduled to be built at the Mason/Taylor intersection and at the Mason/US 41 interchange ramps could reduce speeds east of the Mason/Hinkle intersection, but many of the rear end crashes on Mason Street were caused by eastbound drivers as they approached the intersection from the west.

## T22. Ashland Avenue - Hansen Road (Ashwaubenon)

<b>Crash Rate</b>	0.83
<b>Reportable Crashes During Period</b>	21
<b>Estimated Property Damage Cost</b>	\$174,300
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	6
<b>Possible Injuries During Period</b>	6
<b>Estimated Injury Cost</b>	\$204,600

### Crash Type

Right Angle	12	57%
Rear End	4	19%
Side Swipe	0	0%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	5	24%

### Driver Factor

Disregard Traffic Control	4	19%
Failure To Yield	4	19%
Inattentive Driving	6	29%
Too Fast For Conditions	3	14%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	4	19%

### Comments:

- Although the crash rate and number decreased by about 25 percent between the 2002-2004 and 2007-2009 study periods, the number of injuries increased by 50 percent. However, 6 of the 12 injuries that occurred at the intersection between 2007 and 2009 happened as a result of 2 crashes (one crash had 4 injuries, another had 2). Both of these multiple-injury crashes happened when southbound drivers ran the red light and hit eastbound and westbound drivers.
- The positive offset left turn lanes that were installed at the Ashland Avenue intersection approaches in 2003 appear to have reduced the total numbers of right angle crashes and failure to yield violations on Ashland.
- 5 crashes occurred when vehicles hit a traffic signal, traffic sign, or another fixed object while making right turns off of northbound and southbound Ashland Avenue. Only 1 of the crashes happened when snow or ice was present.

## T22. Ashland Avenue - Parkview Road (De Pere)

Crash Rate 0.83

Reportable Crashes During Period 18  
Estimated Property Damage Cost \$149,400

Incapacitating Injuries During Period 1  
Non-Incapacitating Injuries During Period 2  
Possible Injuries During Period 1  
Estimated Injury Cost \$123,100

### Crash Type

Right Angle	12	67%
Rear End	4	22%
Side Swipe	1	6%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	1	6%

### Driver Factor

Disregard Traffic Control	0	0%
Failure To Yield	11	61%
Inattentive Driving	1	6%
Too Fast For Conditions	2	11%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	4	22%

### Comments:

- 8 of the 12 right angle crashes happened when drivers on Parkview Road pulled out in front of Ashland Avenue drivers, and 7 of these 8 crashes involved Parkview Road drivers being hit by drivers on the “near sides” of Ashland Avenue (westbound hit by northbound, eastbound hit by southbound).
- Most of these near side crashes (5 of 8) occurred when eastbound drivers pulled out in front of southbound drivers. This is likely because the intersection’s eastbound approach is an upslope, which makes it difficult to judge the distances and speeds of approaching southbound vehicles. The upslope also requires drivers to take more time than they typically need to accelerate through an intersection, and crashes could have occurred if drivers did not account for this when choosing gaps in traffic.
- 17 of the 18 crashes during the three-year study period involved collisions between two vehicles, but the single incapacitating injury was sustained by a southbound motorcyclist who lost control of his cycle while making a right turn at Parkview Road.

## T22. Ashland Avenue - Ninth Street (Green Bay)

**Crash Rate** 0.83

**Reportable Crashes During Period** 17  
**Estimated Property Damage Cost** \$141,100

**Incapacitating Injuries During Period** 2  
**Non-Incapacitating Injuries During Period** 2  
**Possible Injuries During Period** 12  
**Estimated Injury Cost** \$325,600

### Crash Type

Right Angle	8	47%
Rear End	6	35%
Side Swipe	1	6%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	2	12%

### Driver Factor

Disregard Traffic Control	3	18%
Failure To Yield	3	18%
Inattentive Driving	3	18%
Too Fast For Conditions	2	12%
Driver Condition (Alcohol)	1	6%
Other/No Factor Indicated	5	29%

### Comments:

- The intersection experienced a variety of crashes that were caused by a variety of factors during the study period.
- One of the incapacitating injuries was sustained by an eastbound moped rider who was hit by a southbound motorist who ran the red light, and the other incapacitating injury was sustained by a northbound motorcyclist who lost control of his cycle and crashed in the Ashland Avenue median.

## T25. Oneida Street - Anderson Drive (Ashwaubenon)

**Crash Rate** 0.82

**Reportable Crashes During Period** 19  
**Estimated Property Damage Cost** \$157,700

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 0  
**Possible Injuries During Period** 17  
**Estimated Injury Cost** \$209,100

### Crash Type

Right Angle	5	26%
Rear End	11	58%
Side Swipe	1	5%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other	2	11%

### Driver Factor

Disregard Traffic Control	4	21%
Failure To Yield	3	16%
Inattentive Driving	6	32%
Too Fast For Conditions	2	11%
Driver Condition	0	0%
Other/No Factor Indicated	4	21%

### Comments:

- 17 of the 19 crashes during the study period happened between 11:00 a.m. and 5:00 p.m.
- 9 of the 19 crashes happened on weekends, which is not surprising because Oneida is a busy commercial corridor and this intersection is the main entrance to Bay Park Square Mall.
- 11 of the 17 crashes for which ages are identified were caused by drivers between the ages of 16 and 19 years old, but only 3 of these 11 crashes happened on Saturdays or Sundays. The other 8 teen crashes primarily happened on weekdays around lunchtime or during mid-afternoon, which suggests that many crashes happened as Ashwaubenon High School students were traveling during their lunch periods or as students were leaving school at the end of the day.

## T25. Oneida Street - Cormier Road (Ashwaubenon)

Crash Rate 0.82

Reportable Crashes During Period 25  
Estimated Property Damage Cost \$207,500

Incapacitating Injuries During Period 0  
Non-Incapacitating Injuries During Period 4  
Possible Injuries During Period 6  
Estimated Injury Cost \$161,000

### Crash Type

Right Angle	7	28%
Rear End	11	44%
Side Swipe	2	8%
Head On	2	8%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	3	12%

### Driver Factor

Disregard Traffic Control	4	16%
Failure To Yield	6	24%
Inattentive Driving	5	20%
Too Fast For Conditions	2	8%
Driver Condition (Alcohol)	2	8%
Other/No Factor Indicated	6	24%

### Comments:

- The intersection experienced a variety of crashes that were caused by a variety of factors during the study period.
- 11 of the 25 crashes and 6 of the 10 injuries were caused by drivers who were 16, 17, or 18 years old.

## 27. Main Avenue - Mid Valley Drive (De Pere)

Crash Rate 0.80

Reportable Crashes During Period 20  
 Estimated Property Damage Cost \$166,000

Incapacitating Injuries During Period 0  
 Non-Incapacitating Injuries During Period 4  
 Possible Injuries During Period 1  
 Estimated Injury Cost \$99,500

### Crash Type

Right Angle	9	45%
Rear End	1	5%
Side Swipe	2	10%
Head On	1	5%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	7	35%

### Driver Factor

Disregard Traffic Control	2	10%
Failure To Yield	7	35%
Inattentive Driving	0	0%
Too Fast For Conditions	1	5%
Driver Condition (Alcohol)	1	5%
Other/No Factor Indicated	9	45%

### Comments:

- The most common crashes at this awkward intersection happened when drivers made left turns in front of oncoming vehicles and when drivers hit traffic signal posts while making left or right turns.
- This intersection will be reconfigured and a roundabout will be built when WisDOT reconstructs the US 41/Main Avenue interchange. This project is expected to occur before 2013.



## 28. Ashland Avenue - Dousman Street (Green Bay)

**Crash Rate** 0.79

**Reportable Crashes During Period** 16  
**Estimated Property Damage Cost** \$132,800

**Incapacitating Injuries During Period** 1  
**Non-Incapacitating Injuries During Period** 1  
**Possible Injuries During Period** 9  
**Estimated Injury Cost** \$199,700

### Crash Type

Right Angle	12	75%
Rear End	1	6%
Side Swipe	0	0%
Head On	0	0%
Bicycle/ <u>Pedestrian</u>	1	6%
Other (Single Vehicle Crash, Etc.)	2	13%

### Driver Factor

Disregard Traffic Control	7	44%
Failure To Yield	4	25%
Inattentive Driving	1	6%
Too Fast For Conditions	1	6%
Driver Condition (Alcohol)	2	13%
Other/No Factor Indicated	1	6%

### Comments:

- 9 of the 16 reportable crashes during the three-year study period occurred when the traffic signals were on flash setting, and only 2 of the 9 flash-setting crashes were caused by alcohol-impaired drivers.
- 6 of the 9 flash-setting crashes occurred when northbound drivers entered the intersection and were hit by westbound drivers. This could be a problem because it is difficult for northbound drivers to see approaching westbound vehicles from around the house at the intersection's southeast corner.

## T29. Military Avenue - Ninth Street (Green Bay)

**Crash Rate** 0.73

**Reportable Crashes During Period** 15  
**Estimated Property Damage Cost** \$124,500

**Incapacitating Injuries During Period** 0  
**Non-Incapacitating Injuries During Period** 2  
**Possible Injuries During Period** 4  
**Estimated Injury Cost** \$92,800

### Crash Type

Right Angle	8	53%
Rear End	2	13%
Side Swipe	2	13%
Head On	1	7%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	2	13%

### Driver Factor

Disregard Traffic Control	5	33%
Failure To Yield	3	20%
Inattentive Driving	0	0%
Too Fast For Conditions	1	7%
Driver Condition (Alcohol)	2	13%
Other/No Factor Indicated	4	27%

### Comments:

- 8 of the 15 reportable crashes and 5 of the 6 injuries at this intersection were caused by drivers between the ages of 60 and 91.
- 5 of the 8 crashes happened when the drivers disregarded the traffic control or failed to yield to oncoming vehicles, and 1 of the 8 crashes was due to the driver's condition (although alcohol was apparently not involved).
- This intersection was reconstructed in 2010 as a part of the Military Avenue corridor project, and the intersection should be monitored to determine if the project made it safer.

## T29. Main Street - Auto Plaza Way (Green Bay)

<b>Crash Rate</b>	0.73
<b>Reportable Crashes During Period</b>	16
<b>Estimated Property Damage Cost</b>	\$132,800
<b>Incapacitating Injuries During Period</b>	0
<b>Non-Incapacitating Injuries During Period</b>	0
<b>Possible Injuries During Period</b>	6
<b>Estimated Injury Cost</b>	\$73,800

### Crash Type

Right Angle	16	100%
Rear End	0	0%
Side Swipe	0	0%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	0	0%

### Driver Factor

Disregard Traffic Control	2	13%
Failure To Yield	12	75%
Inattentive Driving	1	6%
Too Fast For Conditions	1	6%
Driver Condition (Alcohol)	0	0%
Other/No Factor Indicated	0	0%

### Comments:

- The most common incidents at this intersection continued to be angle crashes that occurred when vehicles on the east Main Street frontage road pulled in front of vehicles traveling east or west on Auto Plaza Way. In many instances, the Main frontage road vehicles appear to have been trying to cross Auto Plaza Way to reach the opposing frontage road. These crashes were likely a result of the frontage road motorists trying to cross traffic on Auto Plaza Way by quickly accelerating into what were believed to be adequate gaps and getting hit before reaching the other side of the street.
- The data suggest that more than half of the crashes at the Main/Auto Plaza Way intersection could be eliminated if motorists approaching Auto Plaza Way on the frontage road were only allowed to make right turns. Left turns onto the frontage road from Auto Plaza Way could still be allowed since they do not appear to cause many crashes, but frontage road motorists that want to turn left or go straight would be forced to use the other streets to the north and south.

## T29. Shawano Avenue - Packerland Drive (Howard)

**Crash Rate** 0.73

**Reportable Crashes During Period** 40  
**Estimated Property Damage Cost** \$332,000

**Incapacitating Injuries During Period** 2  
**Non-Incapacitating Injuries During Period** 6  
**Possible Injuries During Period** 12  
**Estimated Injury Cost** \$412,800

### Crash Type

Right Angle	6	15%
Rear End	27	68%
Side Swipe	3	8%
Head On	0	0%
Bicycle/Pedestrian	0	0%
Other (Single Vehicle Crash, Etc.)	4	10%

### Driver Factor

Disregard Traffic Control	1	3%
Failure To Yield	3	8%
Inattentive Driving	17	43%
Too Fast For Conditions	5	13%
Driver Condition (Alcohol)	2	5%
Other/No Factor Indicated	12	30%

### Comments:

- The slotted left turn lanes that were added to the intersection in 2003 appear to have reduced the number of right angle crashes and injuries. However, the rear end crash and injury statistics between the 2002-2004 and 2007-2009 study periods are very similar, which suggests that rear end crashes continue to be a problem.
- Within the next seven years, WisDOT plans to replace this intersection with a grade-separated interchange that will separate regional traffic from local traffic. When this project is completed, many of the right angle and rear end crashes at the intersection will likely be eliminated.



## V. Conclusions

The statistics for the 30 intersections in this study suggest that many of the crashes that occurred between 2007 and 2009 were the result of only a handful of problems. For example, every intersection experienced at least a few crashes that were likely caused by the inability of turning motorists to see oncoming motorists, and this was probably the primary cause of the majority of crashes at some of the intersections. All of the intersections in the study also experienced crashes attributable to drivers disregarding traffic signals or stop signs, and most of these incidents were probably the result of people failing to beat red lights or simply not seeing the signal or sign until it was too late. Rear end crashes were common, and in most cases these crashes appeared to have been caused by drivers not paying attention, following the vehicles in front of them too closely, and driving too fast in all types of weather. There were several crashes that did not fit into these categories, but these seemed to be the most common crashes at the 30 metropolitan area intersections during the three-year study period.

Since most of the crashes appear to fit into one of the categories listed above, it should be reasonably easy to correct the problems and significantly reduce the number of crashes in the area. Some of the intersection summaries presented in Section IV of the study recommended methods of improving safety, and these and other recommendations are discussed below.

### Roundabouts

Roundabouts are often recommended because they can significantly reduce the number and severity of the types of crashes that were common at many intersections featured in this study (e.g. right angle crashes and crashes caused by people disregarding traffic controls). Roundabouts also improve traffic capacity, pedestrian and bicyclist accessibility, and the attractiveness of an area. In many cases, roundabouts are less expensive to build than new or expanded signalized intersections and allow streets that would ordinarily be expanded for vehicle storage to remain narrow because traffic is able to flow virtually uninterrupted.

#### Single Lane Roundabouts

Nearly all of the single lane roundabouts in Brown County experience few or no reportable crashes and injuries each year, but this study found that the single lane roundabout at the Allouez Avenue/Libal Street intersection in Allouez experienced a relatively high number of reportable crashes between 2007 and 2009. Although almost all of these crashes resulted in minor property damage and only one person sustained a minor injury during the three-year study period, this intersection should be studied to determine if eastbound vehicle entry and circulation speeds are the primary problem or if other issues are contributing to the intersection's unusually high crash rate.

#### Multi-Lane Roundabouts

The first multi-lane roundabout in Brown County was completed in 2008 at the Claude Allouez Bridge/Broadway intersection in downtown De Pere, and the intersection's crash

statistics for 2008 and 2009 suggest that the roundabout's high peak period traffic volumes (especially during the 2009 STH 172 redecking project) and unfamiliar lane configuration resulted in many side swipe and other minor property damage crashes. But even though this intersection had a higher crash rate and experienced more crashes than the other intersections featured in this study, it experienced only three minor and six possible injuries in 2008 and 2009.

As people become more familiar with this roundabout and have a chance to use the multi-lane roundabouts that WisDOT intends to build along US 41, the number of reportable crashes will likely decrease. However, this and other multi-lane roundabouts in the area should be monitored to determine if this occurs.

### Flashing Signal Settings

The 2007-2009 crash study found that many intersections experienced crashes when traffic signals were flashing yellow (proceed with caution) along major streets and red (stop) along minor streets. Some examples of intersections featured in this study that experienced crashes while the signals were in flash mode are summarized below.

<b>Intersection</b>	<b>Flash Crashes vs. Total Crashes</b>	<b>Flash Crashes – Alcohol <u>Not</u> A Factor</b>	<b>Flash Crashes – Alcohol A Factor</b>
Ashland/Walnut (GB)	10 of 25 (40%)	8	2
Ashland/Mather (GB)	4 of 15 (27%)	4	0
Ashland/Dousman (GB)	9 of 16 (56%)	7	2
Webster/Walnut (GB)	8 of 19 (42%)	5	3
University/Irwin (GB)	6 of 16 (38%)	5	1

Although some of the flash-setting crashes at these intersections can be attributed to alcohol impairment, a significant majority of them (29 of 37) cannot. This suggests that other factors such as visibility problems and driver confusion were to blame. Assuming that these and possibly other factors were the problems, a potential method of improving safety at these and other intersections where flash settings are used is to flash red signals at all of the intersection approaches instead of flashing red at only the minor approaches. Doing this will allow the intersections to operate as four-way stops, which will make the intersections less confusing to drivers and significantly reduce the likelihood of crashes caused by people pulling in front of oncoming vehicles because buildings or other obstructions are blocking their view. Also, since flash settings are used when vehicle volumes are very low, a four-way flashing red setting will allow the major and minor streets to operate fairly efficiently while significantly improving safety.

## **Positive-Offset Left Turn Lanes**

Positive-offset left turn lanes are recommended in this and previous crash studies because they improve the ability of left turning motorists to see oncoming vehicles. The 2007-2009 crash data suggest that the positive-offset left turn lanes that were built in 2003 at intersections along STH 172 and Ashland Avenue have made the intersections safer, so it is recommended that they be installed at other intersections when space is available to reduce the likelihood of crashes. A diagram showing positive left turn lanes is included in Figure 1.

## **Frontage Roads**

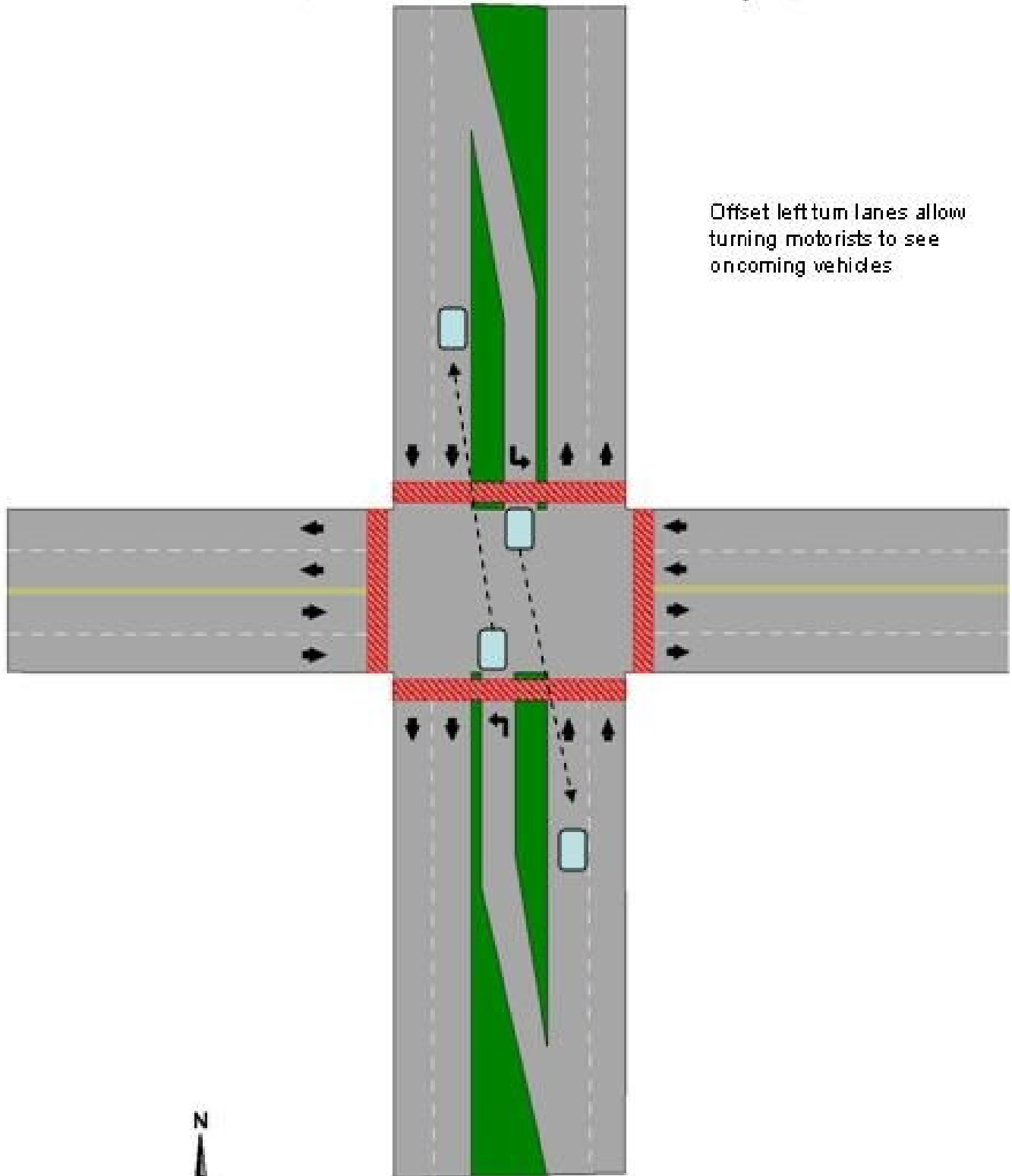
Some of the intersections in the study contain frontage roads on one or both sides of arterial streets that connect very close to the main intersections. The crash data and field reviews suggest that vehicle movements to and from the frontage roads make the intersections very hazardous at peak travel times and moderately hazardous during off-peak times. Unfortunately, the problems posed by the existing frontage roads are very difficult to fix because existing buildings make it nearly impossible to move the connection points farther away from the intersections. Since the connection points cannot be moved, the only way to reduce crashes at the frontage roads would be to restrict vehicle movements to and from the roads or make the existing movements safer.

This study recommends that frontage road movements at the West Mason Street/Packerland Drive and Main Street/Auto Plaza Way intersections be restricted to improve safety, which theoretically would reduce the number of crashes at the intersections. However, this would likely prompt drivers to cut through parking lots, make U-turns in traffic, and take other illegal and dangerous actions to minimize the “inconvenience” created by the frontage road restrictions. This probable reaction to the restrictions is one of the reasons the study recommends considering multi-leg roundabouts at the Mason/Packerland and Main/Auto Plaza Way intersections. But because multi-lane roundabouts with this many legs would likely be very confusing for local drivers, they should not be attempted until people become more familiar with multi-lane roundabouts that have fewer approaches.

As development occurs and streets are constructed or reconstructed, the addition of frontage roads should be avoided. Instead, access to buildings along major streets and highways should be from driveways that connect to side streets, roads that run behind the buildings, and, if no alternative exists, from shared driveways that directly connect to the major streets or highways.



Figure 1: Offset Left Turn Lanes  
(Four Lane Street Example)



Offset left turn lanes allow turning motorists to see oncoming vehicles



## **VI. Implementation**

This study identifies safety problems at several intersections, identifies the estimated property damage and injury costs associated with these problems, and, in some cases, recommends remedies to the problems that would likely be paid for by the cost savings associated with the resulting crash and injury reductions. Although the financial impact of improving safety at these and other intersections in the area would be very significant, the most important reason to make intersections as hazard-free as possible is to protect the drivers, pedestrians, bicyclists, and other users of the transportation system from injury. After all, a dented fender can be fixed, but many injuries never completely heal. To provide everyone safer access to a variety of destinations, the study should be used by the affected communities, Brown County Highway Department, and Wisconsin Department of Transportation as a means of identifying the existence of hazards, determining why the hazards exist, and financially justifying corrections that will reduce or eliminate the hazards.