



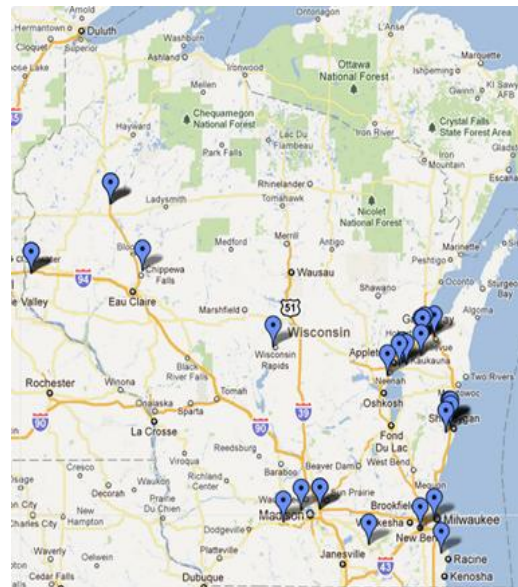
## Roundabout Safety Analysis

Roundabouts (RABs) are being installed throughout the U.S. at an aggressive pace. The primary reasons for the rapid installation of RABs are the simultaneous operations and safety benefits. Wisconsin is no exception to this national trend with approximately 150 currently installed on the state system and approximately 300 by the end of the 2015 construction season.

This document provides an Executive Summary of the key findings from a safety study of existing Wisconsin RABs. A safety study was performed using a before and after crash analysis methodology to determine the safety benefits gained with Wisconsin RABs.

### Study Design

- 30 RABs were built with WisDOT oversight in 2007 or before. 24 of the 30 RABs were selected for this analysis.
- 6 RABs were omitted due to either a lack of post-construction data or unique geometry, specifically:
  - 4 RABs were new intersections
  - 1 RAB combined several closely spaced intersections
  - 1 RAB had changes until 2009
- Crash data were collected for 3 years before and three years after the RAB installation
- Traffic volume data were collected before and after the RAB installation
- Crash data obtained during the construction year were omitted
- Statistical methods were applied to make inferences about the safety data, namely the Empirical Bayes and Simple Before/After Crash Analysis methods



### Empirical Bayes Crash Analysis

- Total crash frequency
  - 13 locations (54%) observed a decrease or no change in total crashes
  - 11 locations (46%) observed an increase in total crashes
    - 8 of the 11 RABs observed increases of 1 to 3 total crashes, or less than 1 per year



- 3 of 11 RABs contributed to 71% of the total increase in crashes
- Overall, Wisconsin experienced a 9% decrease in crashes across all 24 RABs
  - Nationally, a 35% reduction in total crashes was reported at RABs
- Crash severity
  - Significant decrease in crash severity
    - 17 of 24 locations had decrease in all injury crashes
    - 7 of the 17 locations had no fatal or injury crashes
    - 0 of 24 locations had fatal crashes after RAB installation
    - 7 of 24 locations had increase in injury crashes. For the 7 roundabouts, the average annual crash increase was 0.2 with the largest annual increase being 0.5.
  - Wisconsin RABs had a decrease of 52% for fatal and injury crashes. RABs nationwide are also experiencing a significant decrease in severe crashes

### Simple Before and After Analysis

- Fatal and injury crashes
  - Fatal (K) crashes: 2 of 24 locations had 1 fatal crash in before period
    - No fatal crashes observed in the after period
  - Incapacitating (A) crashes: 5 of 24 locations had 'A' crashes in the before period
    - 4 of 5 locations had no 'A' crashes in the after period
    - 1 of 5 locations remained unchanged
    - 1 location experienced one 'A' crash in the after period with no 'A' crashes in the before period
    - 1 location experienced two 'A' crashes in the after period with no 'A' crashes in the before period
  - Non-Incapacitating (B) crashes: 15 of 24 locations had crashes in the before period
    - 8 of 15 locations had no 'B' crashes in after period
    - 1 of 15 locations reduced from four to one 'B' crashes
    - 5 of 15 locations did not change in total 'B' crashes
    - 1 of 15 locations observed 'B' crashes increase from one to two
    - 3 other locations observed increases in 'B' crashes from 0 to 1
  - Possible Injury (C) crashes: 16 of 24 locations had crashes in the before period
    - 6 of 16 locations had no 'C' crashes in the after period
    - 1 of 16 location did not change in 'C' crashes
    - 6 of 16 locations observed 'C' crash reductions from 27 to 10 in total



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- The remaining locations observed an increase of less than 3 'C' crashes in the after period
  - Property Damage Only (PDO) crashes
    - 12 locations had an increase in 'PDO' crashes in the after period
    - 2 locations did not change
    - 10 locations observed a reduction in PDO crashes

Roundabout	WisDOT Region	Before						After					
		K	A	B	C	PDO	Total	K	A	B	C	PDO	Total
STH 54/Gaynor St/17th St	NC			2	6	9	17					20	20
CTH F/S. Ninth St.	NE			1			1			1	2	1	4
CTH F/Suburban Dr.	NE					2	2						
STH 32/57 and STH 96	NE			1		6	7			1	1	6	8
STH 141 / Allouez Ave	NE		1	1	1	9	12			1	2	8	11
STH 32/STH 57 Broadway	NE				1	8	9				3	40	43
STH 55/CTH KK	NE	1	1	4	5	9	20			1		4	5
Lake Park/Plank Rd (CTH LP/CTH P)	NE									1		2	3
CTH N / Emons Road	NE			1	1		2			2		3	5
STH 28/32 (high speed)	NE			1	1	6	8				1	10	11
STH 42/ I-43, Interchange Ramps (West)*	NE			1	1	7.5	9.5			1	3.5	8	12.5
STH 42/ I-43, Interchange Ramps (East)*	NE			1	1	13.5	15.5		2	1	0.5	12	15.5
STH 42/Vanguard, Wal-Mart entrance	NE				1	1	2					8	8
Breezewood In/Tullar Rd	NE				2	2	4					6	6
US 53 ramps and CTH O (West)*	NW				1	9.5	10.5			1	0.5	2	3.5
US 53 ramps and CTH O (East)*	NW					5.5	5.5			1	1.5	2	4.5
STH 124/CTH S	NW		1	2	8	5	16				1	5	6
Canal St/25th Ave	SE					1	1				2	11	13
STH 38/CTH K	SE			3	6	19	28		1		1	18	20
Elkhorn Rd (Bus 12)/Bluff Rd/Clay St	SE		1			2	3					3	3
STH 78/STH 92, 8th St, Springdale, CTH ID	SW			1		13	14					11	11
Thompson and Commercial (North)	SW	1	1	3	7	8	20		1		6	32	39
Thompson and STH 30 (South)	SW			1	4	8	13				1	7	8
Old STH 12/Parmenter	SW			3	1	5	9					2	2
Grand Total		2	5	26	47	149	229	0	4	11	26	221	262

\*Crashes at interchange ramp terminals that could not be ascribed to a particular roundabout were assigned as 0.5 to each roundabout.