Benefits of Wisconsin's Ramp Metering System

Ramp metering is a critical component of Wisconsin's SmartWays program, which applies advanced technologies for traffic management and traveler information. Ramp metering has been relied upon in Wisconsin since 1969 and there are now 121 meters in operation.

- Ramp meters are traffic signals on freeway entrance ramps that break up clusters of vehicles entering the freeway. Doing this reduces disruptions that clusters cause to freeway flow and makes merging safer.
- The 2005 TTI Urban Mobility Report estimated that there was 938,000 hours of delay saved in 2003 through the use of ramp meters in Milwaukee.
- Furthermore, ramp metering evaluations have been completed in Wisconsin for the US 45 corridor in the Milwaukee area and also for the Beltline freeway in Madison.

US 45 Evaluation

Research teams studied a 15-mile stretch of the US 45 corridor in Milwaukee County, including the freeway and two parallel arterials. On seven of 14 southbound on-ramps, an evaluation was done before and after ramp meters were installed in March 2000. Results of the research included the following conclusions:

- Increased mainline speeds and reduced crashes. Overall, vehicle hours of travel decreased by 2% following meter installation.
- Drivers respond to delays at metered ramps. Where traffic volumes were heaviest or ramp queues longest, a significant number of drivers diverted their travel away from the freeway or from a specific ramp. If a metered ramp had waiting vehicles, 82% of surveyed drivers said they would take an alternate route. Following meter deployment, drivers were less likely to use the freeway for very short trips, which resulted in less entering and exiting and less disruption to traffic flow.
- Speeds in the most congested south portion of the corridor increased by as much as 13% during the afternoon peak period, shortening travel time considerably. Corridor average speed increased by 4% during the afternoon peak.
- New ramp meter operation, in conjunction with geometric improvements in ramp merging areas and mainline resurfacing, resulted in a 21% crash rate reduction.

Madison Beltline Evaluation

In July 2001, the Wisconsin Department of Transportation implemented ramp metering along the US 12/18 Beltline freeway in Dane County. The evaluation analyzed the impact of ramp metering on the Madison Beltline.

- **Reduced number of crashes**
  - While the entire Beltline from Stoughton Road to Old Sauk experienced a 57% reduction in crashes, the area identified as the eastbound ramp meter influence zone near Whitney Way experienced an even greater reduction in crashes during metered and non-metered periods - 86% for both periods.
  - The westbound ramp meter influence zone near Park Street and Fish Hatchery Road showed a 50% reduction in crashes during metered time periods, and an overall reduction of 27%.

Eastbound Beltline ramp meter at Whitney Way

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- **Improved ability to mitigate effects of traffic incidents**
    - About 96% of public safety agency representatives surveyed for the study found the time to clear accidents has improved because of the introduction of ramp meters along the Beltline, while approximately 64% of the agency respondents found that the time to respond to accidents has improved with ramp metering.
- **Reduced average travel delay and improved reliability and predictability of travel**
    - Despite significant growth in traffic volumes, travel times increased only slightly during three of the four metering periods, with a slight reduction in the westbound AM metering period.
    - Three out of the four travel periods experienced a lower variability in travel speeds.
    - The most significant finding is in the Westbound AM period where the variation of travel times was reduced from +/- 10.9 seconds down to +/- 3.8 seconds after ramp metering.
- **Maintain existing balance between freeway and arterial traffic loading**
    - Although the Madison Beltline has relatively few alternative routes, results from the ramp counts indicate that motorists at some locations are seeking alternative routes to avoid congested ramps.

Other States

According to FHWA, evaluations from across the country show that ramp metering reduces collisions on freeways and ramps from 15 to 50 percent. Ramp management strategies often increase travel speeds while reducing travel time and delay. Freeways that have metered entrance ramps usually carry more traffic than they did before metering began, while attaining the improvements mentioned previously. The table below provides a brief summary of common measures of effectiveness for ramp metering in other places.

	Study Roadway	Increase in Average Speed	Reduction in Travel Time		Reduction in Traffic Accidents	Change in Freeway Volume Peak Period	Initiation of Ramp Meter Program
			From	To	% Change		Year
Minneapolis	I-35	26%	-	-	- 27%	25%	1970
Portland	I-5	61%	23 min	9 min	- 43%	-	1981
Seattle	I-5		22 min	11.5 min	- 39%	86% (NB) 62% (SB)	1981
Long Island	Multiple	9%	-	-	- 15%	2%	1989
Detroit	I-94	8%	-	-	-50%	14%	1982
Austin	I-35	60%	-	-	-	7.9%	Late 1970's
San Francisco	I-80	-	2.5 min to 3.5 min		-	14%	1974
Denver	I-25	57% Increase	37% Decrease		-5%	-	1981
Milwaukee	US-45	6% to 13%	5% Decrease		-16%	-	1969

Source: Wisconsin Statewide Ramp Control Plan