



MEMO:

Brighton-Deering-Falmouth Crash History and Roundabout Safety

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A. Crash History

The Brighton-Deering-Falmouth intersection was a High Crash Location (HCL) in the most recent three-year study period (2014-2016), with 25 crashes reported and a Critical Rate Factor of 1.18. This means that this intersection experienced 18% more crashes than expected based on estimates from statewide crash data at comparable intersections.

A review of the collisions that occurred in this period reveals that 16 of 25 were rear-end collisions, with “following too close” and “driver inattention” cited as the most common causes. Other crashes included angle crashes resulting from running a red light or failure to yield, and sideswipe crashes resulting from improper lane changes, passing and inattention.

Between 2007 and 2016 approximately 30% of crashes were injury crashes.

B. Safety Effects of Roundabouts

i. Vehicle Collisions

The Federal Highway Administration (FHWA) has included roundabouts in the Proven Safety Countermeasures initiative, which promotes “infrastructure-oriented safety treatments and strategies, chosen based on proven effectiveness and benefits, to encourage widespread implementation... to reduce serious injuries and fatalities...”¹

The American Association of State Highway Transportation Officials (AASHTO) indicates that, compared to signalized intersections, roundabouts exhibit an average of 78% fewer sever crashes.¹ This is largely because roundabouts eliminate the traffic dynamics that produce right-angle and head-on crashes, which are most dangerous. However, the Insurance Institute for Highway Safety notes that roundabouts can also reduce the likelihood of rear-end crashes because drivers are no longer speeding to catch a green or yellow light, nor are they abruptly stopping for red lights.² Furthermore, modern roundabouts are designed to encourage lower speeds, which greatly reduces crash severity.

¹ <https://safety.fhwa.dot.gov/provencountermeasures/roundabouts/>

² <http://www.iihs.org/iihs/sr/statusreport/article/45/11/2>

ii. Pedestrian and Bicyclist Safety

There are several ways in which roundabouts improve safety for people walking and biking.³ There are 50% fewer conflict points in a single lane roundabout than a comparable signalized intersection; for instance, a pedestrian crossing a conventional signalized roundabout is exposed to conflicts from through-moving vehicles, left-turning vehicles, and right-turning vehicles, whereas a pedestrian crossing a leg of a roundabout is exposed to conflicts from only entering and exiting vehicles.

Crossing distances are significantly shorter at single lane roundabouts, which reduces pedestrian exposure to vehicles. The maximum crossing distance at the Brighton-Deering-Falmouth intersection will be reduced from over 50' to approximately 20'. Furthermore, because the splitter islands serve as pedestrian refuges, people crossing a leg of the roundabout will have to focus on only one direction of traffic at a time.

Finally, modern roundabouts are designed to encourage low speeds – the design speed for the circular travel way of the proposed Brighton-Deering-Falmouth intersection is 15 mph. Lower speeds facilitate higher yielding rates, reduced vehicle stopping distance, lower risk of collision, and significantly lower risk of injury or fatality in the event of a collision.

iii. Roundabouts and Schools

The design team for the proposed Brighton-Deering-Falmouth is aware of 64 modern roundabouts in the USA that are located immediately adjacent to K-12 schools. The reported experiences of students and school staff at these roundabouts is very positive.

For instance, the FHWA has documented the experience of Green Bay, Wisconsin, where the local county sheriff had prohibited children from walking to school due to concerns about vehicle traffic and speeds. In the two years following the installation of a roundabout near the elementary and middle schools, the annual average number of injuries went from five to zero. Due to the improved safety, the sheriff's department reversed their policy and again allowed children to walk to school.⁴

Similarly, a roundabout was constructed adjacent to a middle school in Montpelier, VT. School officials report that the intersection is much safer for their students after construction of the roundabout, and the number of people walking across the intersection has increased markedly.⁵

iv. Additional Resources

https://safety.fhwa.dot.gov/ped_bike/

https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/case_studies/rounds4peds.pdf

https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/case_studies/santacruzroundabout.pdf

https://safety.fhwa.dot.gov/provencountermeasures/pc_memo.cfm

<https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/>

https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/roundabouttoolbox/docs/or_case_study/or_rdbt.pdf

³ https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/ped_bike_brochure/pedbikeroundabout.pdf

⁴ https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/roundabouttoolbox/docs/wi_case_study_school/wi_sz_rdbt.pdf

⁵ https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/case_studies/vt_rdbt.pdf

What is a Roundabout?

A roundabout is a type of circular intersection, but is quite unlike a neighborhood traffic circle or large rotary. Roundabouts have been proven safer and more efficient than other types of circular intersections.

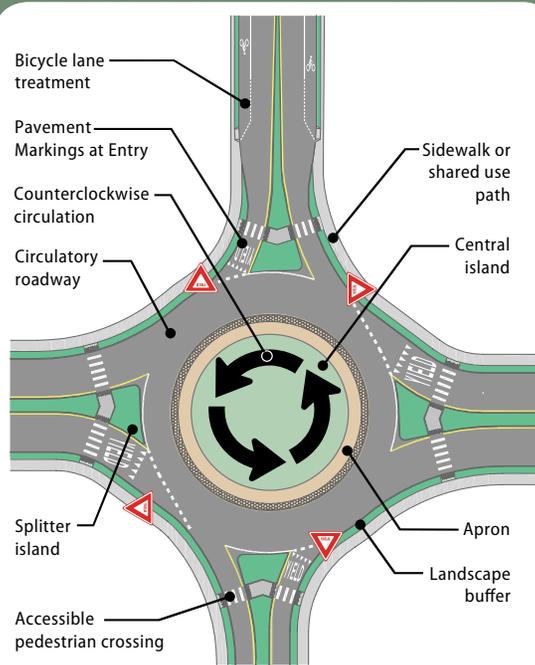


Figure 1. Modern Roundabout Schematic

Roundabouts have certain essential distinguishing features:

- **Counterclockwise Flow.** Traffic travels counterclockwise around a center island.
- **Entry Yield Control.** Vehicles entering the roundabout yield to traffic already circulating.
- **Low Speed.** Curvature that results in lower vehicle speeds (15-25 mph) throughout the roundabout.

FHWA identified roundabouts as a **Proven Safety**

Countermeasure because of their ability to substantially reduce the types of crashes that result in injury or loss of life. Roundabouts are designed to improve safety for all users, including pedestrians and bicycles. They also provide significant operational benefits compared to conventional intersections.

On average, roundabouts reduce severe crashes – those resulting in injury or loss of life – by 78-82%¹

¹ *Highway Safety Manual*, American Association of State Highway and Transportation Officials, Washington, DC, 2010.

Educational Resources

Michigan “How to Use a Roundabout – Sharing the Road” Informational Brochure

www.michigan.gov/documents/mdot/MDOT_RoundaboutPedBikeBrochure_465164_7.pdf

New York Guidance for Roundabout Users

www.dot.ny.gov/main/roundabouts/guide-users/pedestrians

Washington State videos for Roundabouts and Pedestrians and Bicycles

www.wsdot.wa.gov/Safety/roundabouts/PedestriansCyclists.htm

Leveraging Partnerships

PEDSAFE Pedestrian Safety Guide & Countermeasure Selection System - Roundabouts

www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=25

BIKESAFE Bicycle Safety Guide & Countermeasure Selection System – Roundabouts

www.pedbikesafe.org/BIKESAFE/countermeasures_detail.cfm?CM_NUM=17

Choosing Roundabouts for Safe Routes to School

www.saferoutesinfo.org/program-tools/case-study-bellingham-wa

AARP Livable Communities Fact Sheet Series

www.aarp.org/livable-communities/info-2014/livability-factsheet-modern-roundabouts.html

For More Information

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To learn more about roundabouts, please visit:

safety.fhwa.dot.gov

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Cover photo source: Google Earth Pro

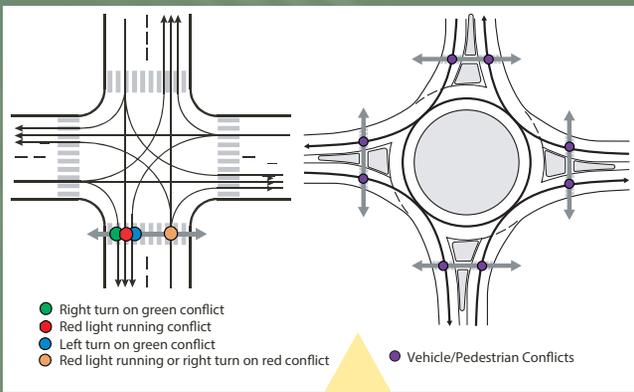


U.S. Department of Transportation
Federal Highway Administration

ROUNDABOUTS with Pedestrians & Bicycles

A Safe Choice for Everyone





Less conflict. Roundabouts have fewer conflict points. A single lane roundabout has 50% fewer pedestrian-vehicle conflict points than a comparable stop or signal controlled intersection. Conflicts between bicycles and vehicles are reduced as well.

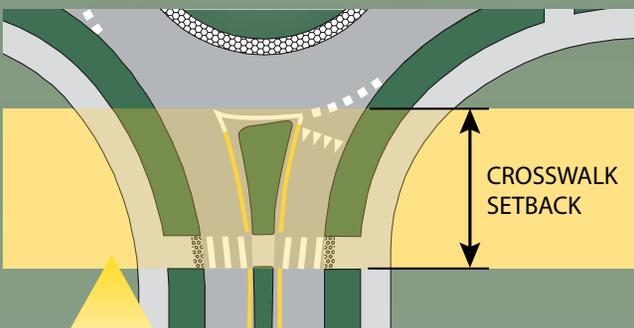
Lower speed.

Traffic speed at any road or intersection is vitally important to the safety of everyone, and especially non-motorized users. Lower speed is associated with better yielding rates, reduced vehicle stopping distance, and lower risk of collision injury or fatality. Also, the speed of traffic through a roundabout is more consistent with comfortable bicycle riding speed.



Features for All Users. Adding certain treatments at roundabouts can enhance the experience for both pedestrians and bicycles.

- At more complex roundabouts, such as those with multiple lanes, certain design elements and enhanced crossing treatments can improve accessibility for visually impaired pedestrians.
- Where bicycle facilities lead to a roundabout, providing an option to bicyclists to either ride in the travel lane or use a ramp to and from a separated shared use path.



Shorter, setback crossings.

Pedestrians cross a shorter distance of only one direction of traffic at a time since the entering and exiting flows are separated. Drivers focus on pedestrians apart from entering, circulating and exiting maneuvers.



Wisconsin Roundabouts Calm Traffic, Improve School Zone Safety

Location

Green Bay, Wisconsin
(Central United States)

Implementation Stage

- ✓ Planning
- ✓ Design
- ✓ Construction

Roundabout Type/Setting

Single and multi-lane roundabouts

Target Audience

- ✓ General Public
- ✓ Elected Officials
- ✓ School Officials

Strategies Employed

- ✓ Meetings with the public
- ✓ Field trips to the roundabout site
- ✓ An easily adaptable PowerPoint presentation
- ✓ A follow-on study comparing before and after statistics and conditions

"People were expecting *European Vacation* [the movie]. They had never seen what we were talking about."

– Cole Runge,
Brown County Planning
Commission



Background

In 1999, the intersection outside of a Green Bay, Wisconsin, metro area elementary and middle school complex located near a major highway had become a problem. As traffic volume on the adjacent highway grew, local officials became concerned about vehicle speed. The county sheriff got involved, and eventually the community decided to prohibit children from walking and biking to school out of concern for their safety. Plans to build a new high school on the same road were also underway, which exacerbated local residents' safety concerns.

Local Brown County officials had the option to expand the highway to four lanes to accommodate projected growth, adding turn lanes and traffic signals, but transportation planners and local residents feared this option would make the school zone less safe. The Brown County Planning Commission recommended constructing two simple roundabouts to calm traffic in and around the school zones and improve safety and access for pedestrians and bicyclists. But local residents, unclear about how a roundabout intersection would work, were vocal in their opposition. A concerted effort to obtain public support for these school zone roundabouts was needed.

Approach

Once transportation planners settled on roundabouts as the best option for enhancing the safety and traffic flow of the school zone, they approached the schools' administrators and the local school board to explain what they wanted to do, how a roundabout intersection would work, and why they believed it was the safest and best option. Planners addressed their concerns, answered their questions, and obtained their valuable support, which helped pave the way for a public announcement about the plan.

However, even with this support, local residents resisted this unfamiliar intersection alternative. It quickly became apparent that most of those who objected believed that roundabouts would increase congestion and possibly cause even more crashes, endangering students. There were also several objections based on weather concerns: Green Bay averages nearly 50 inches of snowfall per year, and many residents were concerned whether the roundabout could be maintained during severe winter weather.

To address the multitude of concerns and misunderstanding regarding roundabouts, transportation planning officials visited the elected bodies of the affected communities and held public meetings, inviting residents to come and voice their concerns. For these meetings, the County provided knowledgeable transportation planning and engineering representatives, who educated local residents about the dramatic safety benefits of roundabouts. They shared roundabout experiences from other locales, such as Vermont and Colorado, that have similar winter climates, which the residents accepted as relevant, "apples to apples," comparisons.

Planners also brought visual aids to explain the differences between roundabouts and traffic circles, which turned out to be extremely useful. By walking through the



Figure 1: Overhead view of the second Lineville Road roundabout, neighboring a local school complex (in lower left corner).

Lessons Learned

- Be prepared. Before approaching any individuals or groups, anticipate questions and concerns and have the information needed to address them.
- Don't reinvent the wheel. Roundabouts have been used more frequently in the last decade, and many localities have studied various safety aspects of roundabouts. There are a lot of statistics available from areas similar to those where roundabouts are being considered.
- Perseverance through educational outreach is important.
- Create an image of what the reconstructed intersection will look like without a roundabout. When people see pictures of a roundabout versus the multilane signalized intersection alternative to accommodate the same level of traffic, they often start to reconsider the value of a roundabout.

Learn More

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differences between roundabouts and traffic circles, the County succeeded in shifting public perception, and residents became supportive.

As the roundabouts began to take shape during construction, Green Bay planners shuttled groups of students and school officials to the construction site, allowing them to walk through the new intersections and discussing how they were going to work. The Planning Commission videotaped the “before” intersection and the “after” intersection and developed a video to be used for subsequent roundabout outreach in the State.

Results

Brown County's outreach efforts paid off: Since 1999, Brown County, the Wisconsin Department of Transportation, and the county's communities have built 26 roundabouts in the county, and the county and its partners plan to build at least 33 more within the next 6 years. While many people initially confused roundabouts with traffic circles, the concerted effort to educate the public and clarify key misunderstandings helped the county successfully gain public support. Targeting the school board and administrators whose schools were affected by the change, as well as local residents and elected officials, was gutsy but effective. Once construction was completed, the increased safety results spoke for themselves.

A follow-up study conducted in 2001 showed that at one of the roundabout locations, the number of vehicles entering the intersection increased from 5,600 per day in 1998 before the roundabout construction to 10,800 per day in 2001, and yet crashes and injuries decreased significantly, from an average of three crashes and five injuries per year during the 1996-1998 period to no reported crashes between August 1999 and October 2001.

The sheriff's department was so pleased with the safety improvements and speed calming effects from the roundabouts that, in 2000, the previous prohibition policy was reversed, allowing students to walk and bike to school.

Outreach Investment

The cost of the outreach effort, relative to the cost of implementing the roundabouts, was very low. There was a small investment in slides and staff labor for presentations, but aside from labor, there were very few additional investments.

Related Products

General Information Website

“Roundabouts and Traffic Calming,”

http://www.co.brown.wi.us/departments/page_925e870c916d/?department=2317176c7f00&subdepartment=b4d10bb9388e

Presentation

“Pedestrian Safety at Roundabouts Presentation for Howard-Suamico School Board,”

<http://www.co.brown.wi.us/i/f/export/file/Ped%20safety%20at%20roundabouts%20for%20HS%20school%20board%20-%20November%202026,%202007.pdf>

Video

Lineville Road Roundabout Footage

http://www.public.applications.co.brown.wi.us/Plan/PlanningFolder/Video/Roundabout/Roundabout_All.WMv

Study

Lineville Road Roundabout Study

http://www.co.brown.wi.us/i/f/export/file/lineville_roundabout_study.pdf

Montpelier, Vermont, Constructs Roundabout Thanks to Local Roundabouts Steering Committee

Location

Montpelier, Vermont
(North-Eastern United States)

Implementation Stage

All phases of roundabout construction, including:

- ✓ Planning
- ✓ Design
- ✓ Construction
- ✓ Launch
- ✓ Post-Implementation

Roundabout Type/Setting

Single-lane roundabouts in a suburban location

Target Audience

- ✓ General public
- ✓ Elected Officials
- ✓ Engineers/Managers

Strategies Employed

- ✓ Presentations
- ✓ Public Meetings
- ✓ Flyers
- ✓ Brochures



Background

In the 1980s, a regional transportation plan for Montpelier, Vermont, identified the intersection of Main and Spring Streets as deficient. The three-way “T” intersection lacked pedestrian facilities and created a confusing traffic pattern for the public due to a triangular central island and a commercial driveway. To complicate matters further, a middle school was located nearby, which meant a number of children traversed this intersection to get to and from school.

Although the City planned to install a signal, a group of citizens approached the City Council about constructing a roundabout at the location instead. They successfully lobbied the Council to create a steering committee to investigate the feasibility of a roundabout at the intersection of Main and Spring Streets.

Because there were no roundabouts in the region at this time, and because this was several years before roundabouts were embraced by FHWA, the community as well as the Montpelier Department of Public Works were concerned about the validity of the design. With the assistance of a consultant experienced in constructing roundabouts in Florida, the City completed the design.

Approach

The Roundabouts Steering Committee actively lobbied the City Council and worked with the media to tout the benefits of roundabouts and dispel common myths. While the Roundabout Steering Committee engaged the media to gain public support, they also prepared informational pamphlets for distribution to drivers’ education programs at the local schools. The group also worked closely with the Montpelier Department of Public Works and the Vermont Agency of Transportation (AOT), which performed a pre- and post-construction traffic study. Once the roundabout was opened, the committee placed a flyer in the local newspaper with instructions on how to drive the new roundabout to assist citizens in navigating this new type of intersection.

“There was... skepticism in house. We were inventing the wheel here, so to speak.”

— **Thomas J. McArdle**
Assistant Director of Public Works
Montpelier, Vermont

Results

Engaging the public and elected officials through the Roundabouts Steering Committee gave Montpelier, Vermont the distinction of constructing one of the first modern roundabouts in the northeast, and one of the earliest in the entire United States as well. A follow-up survey conducted one year after the project’s completion showed that 85 percent of the respondents had a favorable or neutral opinion of the roundabout.



Figure 1: Overhead photo of the second roundabout completed in Montpelier.

In addition, this roundabout has improved safety, reducing speeds at the intersection of Main and Spring Streets, and providing more favorable crossing conditions for pedestrians. Officials at the middle school affected by the roundabout have said that the intersection is much safer after the construction. Prior to construction, a limited number of pedestrians traversed the intersection, but after the roundabout construction, a large number of students use the route on their way to and from school (30-50 in the mornings and 150 in the afternoons).

Montpelier's pioneering effort with Vermont's first roundabout has been followed by successful installations of roundabout intersections in Brattleboro and Manchester, and a second roundabout recently has been completed in Montpelier.

Lessons Learned

- Public outreach is a critical step in the planning process. It's important to engage the local emergency service agencies, schools, stakeholders, and residents in an intersection design alternative review process.

Outreach Investment

There were costs associated with the printing of flyers but much of the public relations work was completed gratis for the Montpelier Department of Public Works by a volunteer and staunch roundabout advocate.

Related Products

Website

Vermont Roundabout Pedestrian Access Case Study

http://www.walkinginfo.org/pedsafe/casestudy.cfm?CM_NUM=16&CS_NUM=48

Learn More

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ROUNDABOUTS

What is a Modern Roundabout?

A modern roundabout is a new circular intersection design able to slow traffic while lowering delays and handling higher traffic volumes. Modern roundabouts have proved to more safely accommodate vehicles, pedestrians and bicyclists than alternatives, like stop signs or traffic signals. U-turns are permitted! Compared to other types of intersections, roundabouts save energy, reduce pollution, and require less land and maintenance. No intersections are perfect, but roundabouts generally provide the best conditions for movement of pedestrians, bicyclists, and all types of motor vehicles.

For Drivers...

Signs at Roundabouts

ROUNDABOUT AHEAD

A "Roundabout Ahead" and a "Reduced Speed Ahead" signs tell you that you are approaching a roundabout

REDUCED SPEED AHEAD

The "Advisory Speed Limit 15" sign tells the driver the maximum safe operating speed approaching the roundabout and operating through the roundabout

ADVISORY SPEED LIMIT 15

Yield

Roundabout Yield Signs mean yield, that is, slow or stop at the entry line to the circular roadway when there are vehicles there—vehicles in the circulating roadway have the right-of-way over vehicles entering the roadway.

Remember: Vehicles must give way to pedestrians.

Pedestrians, bicycle riders and motorcyclists are often very hard to see. They are particularly at risk, so always keep an eye out for them.

Approaching the Roundabout

Slow down to about 10-15 mph when approaching the roundabout [the advisory speed limit for motor vehicles at the Montpelier roundabout is 15 mph]. Also, be prepared to stop for pedestrians because pedestrian crossings are located one car length before the

entry line and one car length after the exit points.

Yield at the Roundabout

Always yield at the entry line to vehicles already in the roundabout.

Enter the roundabout only when there is an adequate and safe gap in the traffic.

Remember: bicyclists and motorcyclists are the most difficult to see when entering a roundabout.—be on the lookout for them when entering the circulating roadway.

Signaling at Roundabouts

It is important and courteous to let others know your intentions, and it is the Vermont law. When approaching, show a right signal for right hand turns, no signal for through travel, and left signal for left hand turns. When nearing your exit point, use a right turn signal just past the exit before your exit.

One Lane Roundabouts – It's Quite Simple

Figure 2: A flier developed to outline roundabout features.