 

Moving Together 25

 

Session 2A: Intersection Safety/Roundabouts

Presenters: Kevin Fitzgerald, Kirsten Johnson, Lisa Schletzbaum, Sasha Wood

MassDOT Highway Division

Moderator: Brenda Kaushal

Office of Transportation Planning

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Roundabouts, Pedestrian Crossings, & MUTCD

Lisa Schletzbaum

MassDOT Highway Division

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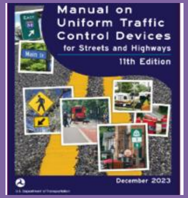
MassDOT Traffic and Safety Updates

ROUNDABOUTS

IMPROVING PEDESTRIAN SAFETY AT UNCONTROLLED CROSSING LOCATIONS



MA AMENDMENTS TO THE 11TH ED. MUTCD

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ROUNDABOUTS

- What is a roundabout?
- Why are they gaining in popularity?
- Where are they?
- How many will be constructed in MA?
- What is NEW?

Roundabout 101

What is a roundabout?

- Intersection with a circular configuration
- Channelized and curved approaches
- Vehicle entry yields to circulating traffic
- Counterclockwise flow
- Entry/Exit vehicle yield to pedestrians
- Minimized conflict points
- Lower speeds
- Substantially reduced injury/fatality crashes
- Efficient movement

Illustration of a multi-lane roundabout. Source: FHWA

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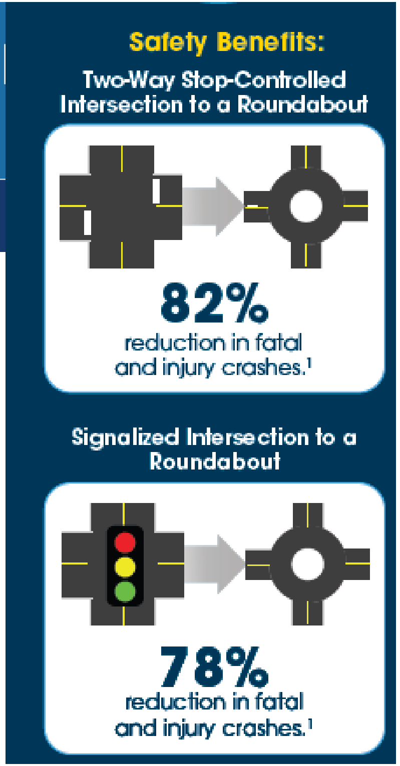
Roundabout Popularity

Why are we constructing more roundabouts?



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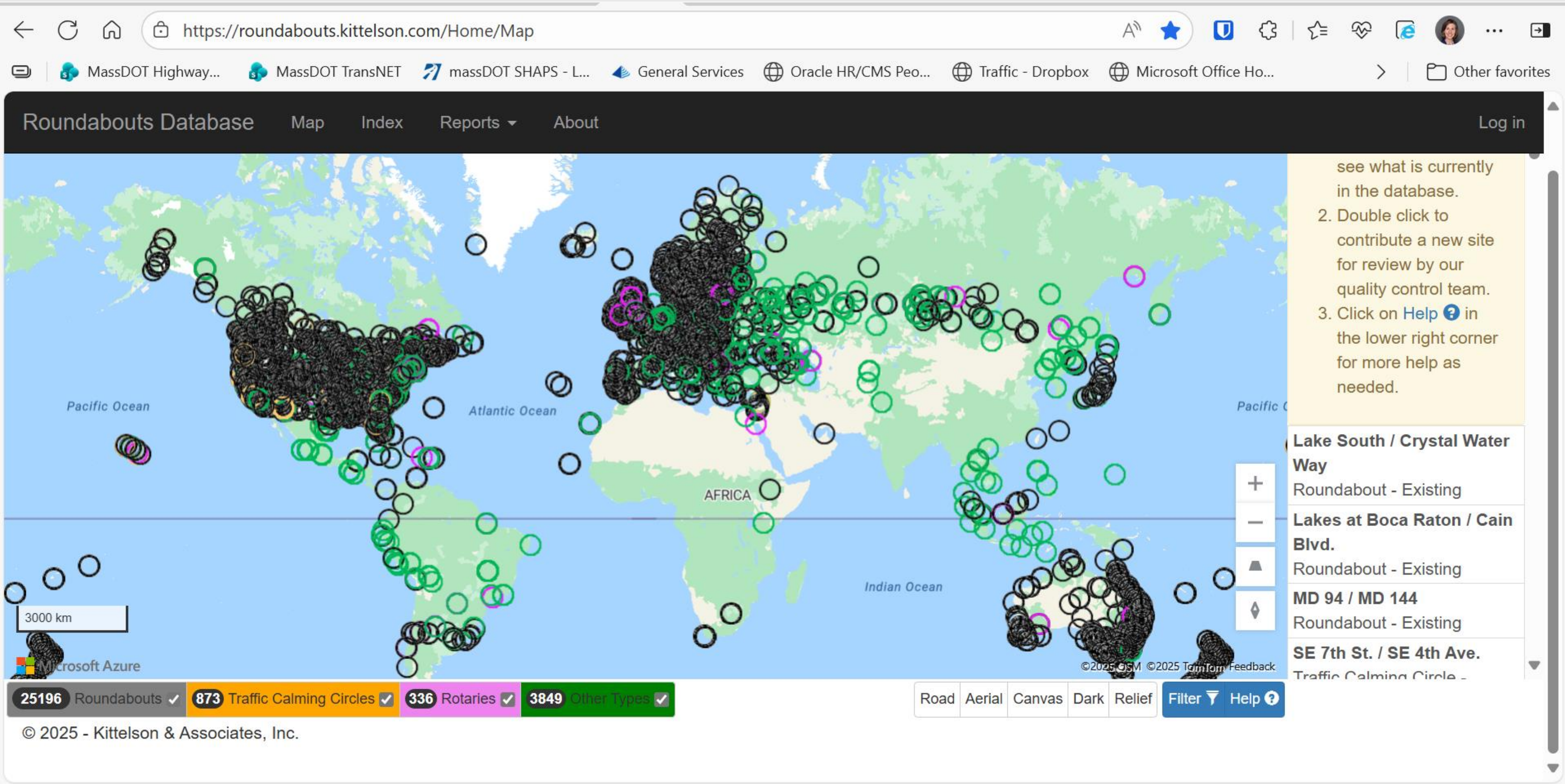
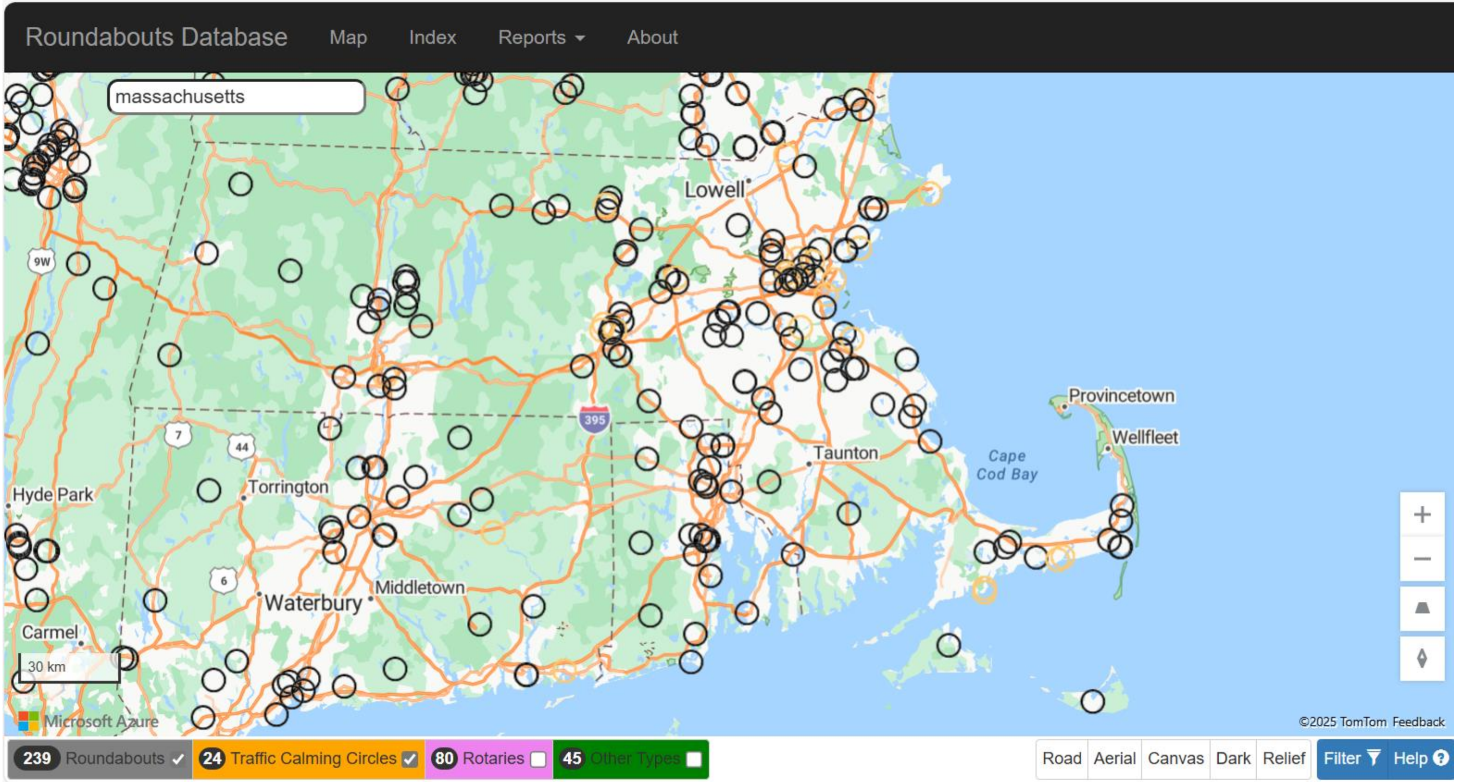
Roundabouts Worldwide



Roundabout locations in MA



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Roundabout locations in MA

Click on a roundabout location for more information:

US 202 (E State St.) / School St.

Type	Roundabout
Status	Existing
Functional Class	Other (At-Grade)
Lane Type	Single-Lane
Control Type	All-Way Yield
Previous Control Type	One/Two-Way Stop
Other Control Type	Unknown
Approaches	4
Driveways	0
Diameter (ICD)	119.98 ft

City	Granby
County	Hampshire Co.
State	MA
Country	United States
Latitude	42.26516
Longitude	-72.47326
	[Center on map] [Zoom on map]
Year Completed	2024
Notes	none

View Google Export to KML

Report Correction

Print Close

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Recent Roundabout Construction

District 1 - North/First/Stoddard/Berkshire Medical Center in Pittsfield

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Recent Roundabout Construction

District 1 - Route 7 at Route 43 in Williamstown

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Recent Roundabout Construction

District 2 – Route 2A at Route 101 in Templeton

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Recent Roundabout Construction

District 2 – St. James Ave. at Tapley Street in Springfield

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Recent Roundabout Construction

District 2 – St. James Ave. at Tapley Street in Springfield

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Recent Roundabout Construction

District 3 – Route 20 at Oxbow Road in Oxford

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Recent Roundabout Construction

District 3 – Route 20 at Oxbow Road in Oxford

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Recent Roundabout Construction

District 5 – Route 44 at Route 118 in Rehoboth

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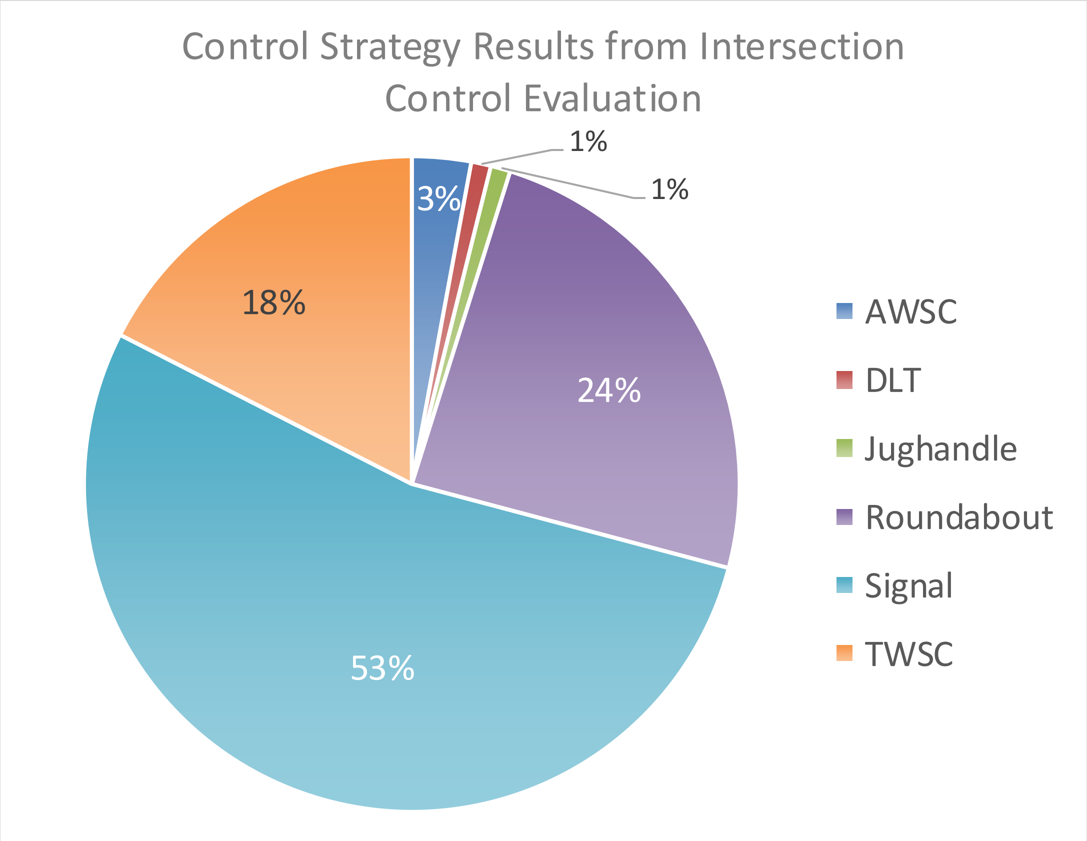
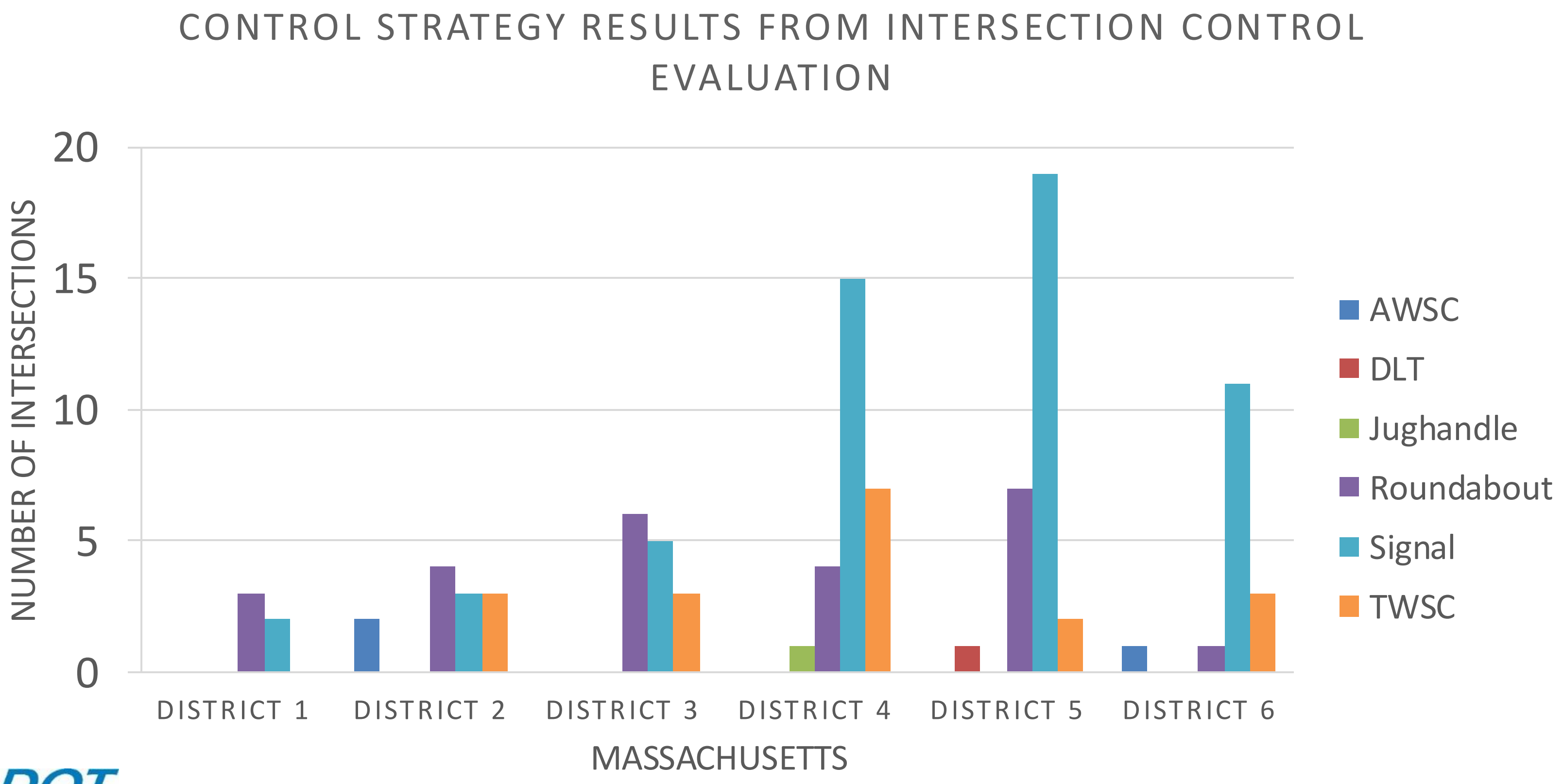
Future Intersection Projects



Future Intersection Projects



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Roundabout Safety Analysis

Crash Modification Factor Development for Highway Ramp Terminals in Massachusetts

August 2025

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5.0 Conclusions

This study evaluates the effectiveness of converting one-way stop-controlled ramp terminals to signalized or roundabout control. A before-and-after analysis was conducted on ramp terminals that transitioned from one-way stop control, with Crash Modification Factors (CMFs) and Crash Reduction Factors (CRFs) calculated to assess safety improvements. A CMF value less than 1 indicates a reduction in crashes, signifying a positive safety impact.

The results show that for Fatal/Injury (FI) crashes, the CMF for roundabouts is 0.741, corresponding to a 25.9% crash reduction (CRF). Meanwhile, the CMF for signalized intersections is 0.914, indicating an 8.6% reduction. For Property Damage Only (PDO) crashes, the CMF for roundabouts is 0.795, representing a 20.5% reduction, while for signalized intersections, it is 0.846, corresponding to a 15.4% reduction. However, the 95% confidence intervals for all estimates include 1, suggesting that these reductions may not be statistically significant.

While these findings indicate that roundabouts generally provide greater safety benefits than signalized intersections, the wide confidence intervals suggest potential variability in the results. Increasing the dataset by incorporating more sites in future studies would improve the confidence level of the findings. A larger sample size would reduce statistical uncertainty and provide a more robust evaluation of the long-term effects of different traffic control measures.

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August 8, 2023

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R306.4.2 Crosswalk Treatments

Each multi-lane segment of the *roundabout* containing a *crosswalk* shall provide a *crosswalk* treatment consisting of one or more of the following: a traffic control signal with a *pedestrian signal head*; a *pedestrian hybrid beacon*; a *pedestrian* actuated rectangular rapid flashing beacon; or a raised crossing.

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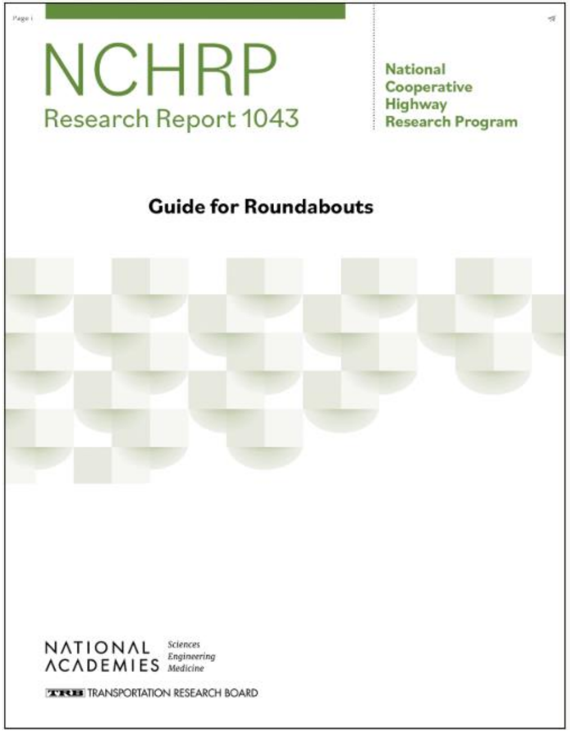
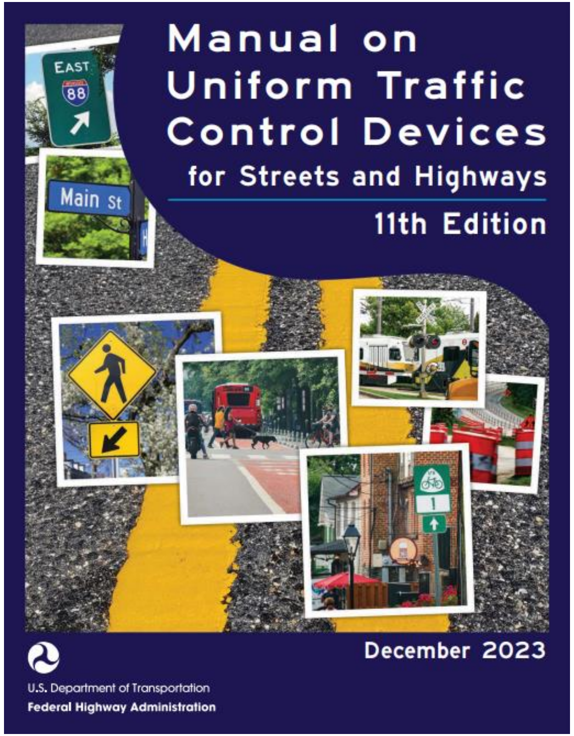
Roundabout Design Updates





MA Amendments to the MUTCD

Roundabout Educational Material

Rotaries and Clark Griswold may be hindering the public's favorable perception of roundabouts…

MassDOT Contract to create material to help promote the safety and efficiency benefits of roundabouts for the design public hearing

And

Social media content on various platforms

MassDOT Traffic and Safety Updates

IMPROVING PEDESTRIAN SAFETY AT UNCONTROLLED CROSSING LOCATIONS

- Design Guidance
- What is NEW?

Design Guidance

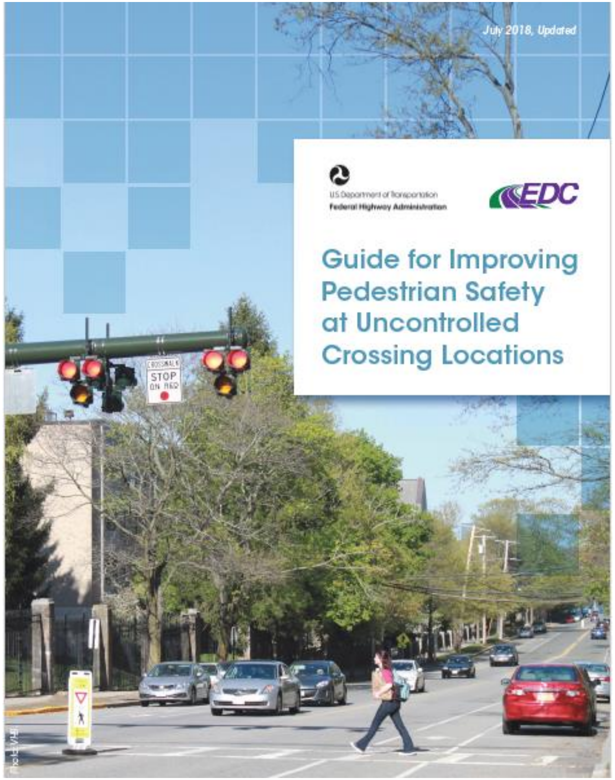


Table 1 provides initial countermeasure options for various roadway conditions. Each matrix cell indicates possibilities that may be appropriate for designated pedestrian crossings. Not all of the countermeasures listed in the matrix cell should necessarily be installed at a crossing.

For multi-lane roadway crossings with vehicle AADTs exceeding 10,000, a marked crosswalk alone is typically insufficient (Zegeer, 2005). Under such conditions, more substantial crossing improvements (such as the refuge island, PHB, and RRFB) are also needed to prevent an increase in pedestrian crash potential.

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

Safety Issues Addressed per Countermeasure

The results of the crash analysis, road safety audit, and/or stakeholder input provide the agency with a better understanding of the risk factors at uncontrolled crossing locations. The countermeasures listed in this guide can improve the visibility of crossing locations and reduce crashes, and they each address at least one additional safety concern associated with a higher risk of collision and/or severe injury. These additional safety issues include the following: excessive vehicle speed, inadequate conspicuity/visibility, drivers not yielding to pedestrians in crosswalks, and insufficient separation from traffic.

Table 2 shows the specific safety issues that each countermeasure may address. For example, the addition of PHBs has been consistently shown to improve motorist yielding by 90 percent or greater, when compared with no traffic control or warning type devices.

Table 2. Safety issues addressed per countermeasure.

Pedestrian Crash Countermeasure for Uncontrolled Crossings	Safety Issue Addressed				
	Conflicts at crossing locations	Excessive vehicle speed	Inadequate conspicuity/visibility	Drivers not yielding to pedestrians in crosswalks	Insufficient separation from traffic
Crosswalk visibility enhancement	🚶	🚶	🚶	🚶	🚶
High-visibility crosswalk markings*	🚶		🚶	🚶	
Parking restriction on crosswalk approach*	🚶		🚶	🚶	
Improved nighttime lighting*	🚶		🚶		
Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*	🚶		🚶	🚶	🚶
In-Street Pedestrian Crossing sign*	🚶	🚶	🚶	🚶	
Curb extension*	🚶	🚶	🚶		🚶
Raised crosswalk	🚶	🚶	🚶	🚶	
Pedestrian refuge island	🚶	🚶	🚶		🚶
Pedestrian Hybrid Beacon	🚶	🚶	🚶	🚶	
Road Diet	🚶	🚶	🚶		🚶
Rectangular Rapid-Flashing Beacon	🚶		🚶	🚶	🚶

*These countermeasures make up the STEP countermeasure "crosswalk visibility enhancements." Multiple countermeasures may be implemented at a location as part of crosswalk visibility enhancements.

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RESEARCH

CROSSWALK CONFUSION: UMASS AMHERST RESEARCHERS FIND MASSACHUSETTS DRIVERS FLUMMOXED BY PEDESTRIAN HYBRID BEACONS

Among other findings, nearly a quarter of drivers run through the red light

October 7, 2025

CONTACT

Julia Westbrook

SHARE THIS

Stopping early, failing to stop or rolling through—new research from University of Massachusetts Amherst reveals that more awareness of the rules of the road around this crosswalk design is necessary. Published in Transportation Research Record, the study looked at how Massachusetts drivers behave at pedestrian hybrid beacons, a type of crosswalk device increasingly found at mid-block crosswalks where there is not a full traffic signal.

Across the state, 40 pedestrian hybrid beacons (PHBs) are installed and, with more in planning stages, the confusion is a real safety issue, researchers say. PHBs have five phases of indications that communicate to motorists what to do, which allows for a greater flow of traffic than a traditional stop light while maintaining higher pedestrian visibility than similar beacon designs.

A New Jersey DOT Infographic of motorists' and pedestrians' expected actions at each Pedestrian Hybrid Beacon interval. Top: A pedestrian crosswalk beacon at the Norwottuck Rail Trail in Northampton, Mass.

The PHB remains "dark" when no pedestrian has activated it, and drivers proceed as usual. When a pedestrian pushes the

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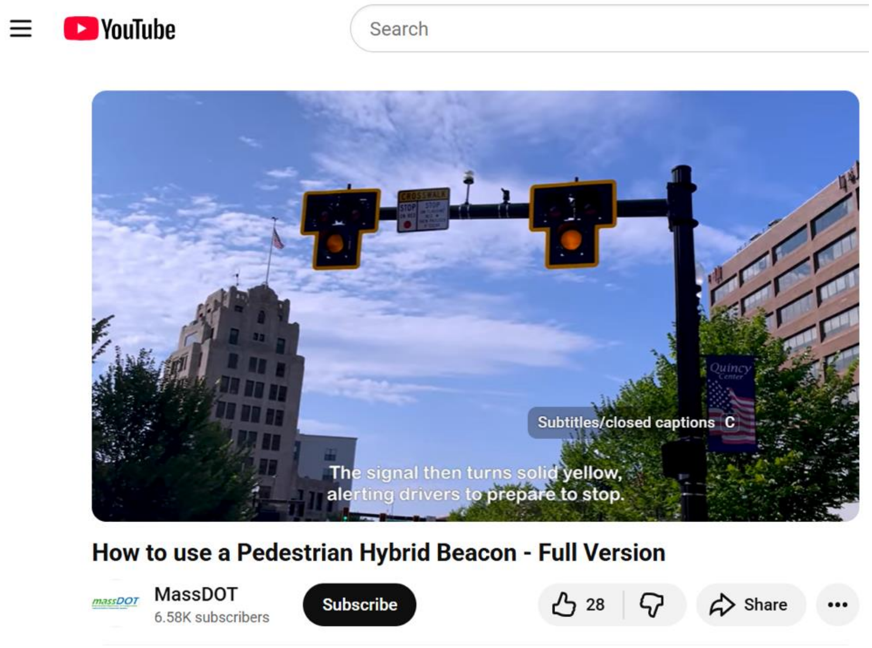
Pedestrian Hybrid Beacon Educational Material



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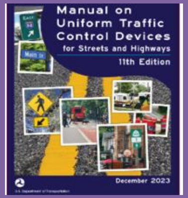

MA AMENDMENTS TO THE 11TH ED. MUTCD

- MassDOT is currently finalizing our review of the Draft Final Amendments
- Submission to FHWA in November

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Thank you

Lisa Schletzbaum

MassDOT Highway Division

Lisa.Schletzbaum@dot.state.ma.us

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