

ROUNDAOBOUTS CAN IMPROVE SAFETY AT STOP SIGN-CONTROLLED INTERSECTIONS

INTRODUCTION

The National Highway Traffic Safety Administration (NHTSA) data show that approximately 733,000 people were injured and 7,196 were killed in intersection-related traffic crashes in 2008¹. Research has shown that a primary reason for the high number of crashes is driver inability or failure to see the traffic control device, such as the stop sign. The experience of Maryland State Highway Administration (MDSHA) demonstrates how transportation agencies can significantly reduce the number of crashes while maintaining capacity and reducing costs.

MDSHA was concerned about the high number of crashes at some of its intersections controlled by two-way stop signs. Recognizing that high approach speeds coupled with drivers violating stop-controls can result in crashes, MDSHA converted five rural, two-way stop-controlled intersections experiencing a high incidence of crashes, many with injuries, to single-lane roundabout intersections. The speed limits on the approach roadways ranged from 25 mph to 50 mph. The crash reduction averages in this report reflect the average percent reduction per year based on the difference between the total number of “before” and “after” crashes, observed over a minimum duration of 15 years at each intersection, between 1990 - 2007. The “before” and “after” observation periods ranged from five years to more than thirteen years at the treated intersections.

This article summarizes the conversion of five intersections to roundabouts and the crash reductions that were experienced at these two-way, stop sign-controlled intersections.

TREATMENT SUMMARY

Roundabouts are circular intersections with specific design and traffic control features. These features include yield control of all entering traffic, channelized approaches, and appropriate geometric curvature to ensure that travel speeds on the circulatory roadway are typically less than 30 miles per hour (mph). Also, traffic movement is possible only in a counter-clockwise direction within the roundabout. The five roundabout intersections are described in more detail below.

1) Cearfoss Roundabout, Washington County

This roundabout is located at the intersection of MD-58 and MD-63/MD-494. MDSHA constructed this single-lane roundabout in 1995 with a 116 feet inscribed circle diameter, including a circulatory roadway 16 feet wide. The landscaped central island has a radius of 42 feet with an apron width of 12 feet. The approach and departure lane widths on MD-63 are 10 feet and on MD-63 are 10 feet and 11 feet, respectively. The “before” observation period was 60 months and the “after” observation period was 121 months. Data showed that 19 crashes occurred before the roundabout was installed; 9 crashes occurred after the change. **The roundabout conversion reduced total crashes by 76.5 percent and injury crashes by 93.8 percent per year. Fatal crashes were eliminated.**

2) Lisbon Roundabout, Howard County

¹ 2008 Traffic Safety Facts Annual FARS, National Highway Traffic Safety Administration, Washington, DC

This roundabout is located at the intersection of MD-94 and MD-144. MDSHA constructed this single-lane roundabout in 1993 with a 100 feet inscribed circle diameter, including a circulatory roadway 18 feet wide. The landscaped central island has a radius of 32 feet with an apron width of 12 feet. The entry and exit widths on MD-94 and MD-144 are 18 feet. The “before” observation period was 60 months and the “after” observation period was 161 months. Data showed that 42 crashes occurred before the roundabout was installed; 18 crashes occurred after the change. **Installing this roundabout reduced total crashes by 84 percent, injury crashes by approximately 92.2 percent per year. There were no fatal crashes in either the “before” or “after” periods.**

3) Lothian Roundabout, Anne Arundel County

This roundabout is located at the intersection of MD-2 and MD-408/MD-422. MDSHA constructed this single-lane roundabout in 1995 with a 120 feet inscribed circle diameter, including a circulatory roadway 18 feet wide. The landscaped central island has a radius of 42 feet, with an apron width of 12 feet. Approach and departure lane widths on all the approaches are 10 feet. The “before” observation period was 60 months and the “after” observation period was 122 months. Data showed that 39 crashes occurred before the roundabout was installed; 40 crashes occurred after the changes (“before and after” timeframe varied). **The roundabout conversion reduced total crashes by 49.6 percent and injury crashes by 79.2 percent per year. Fatal crashes were eliminated.**

4) Taneytown Roundabout, Carroll County

This roundabout is located at the intersection of MD-140 and MD-832/Antrim Boulevard. MDSHA constructed this single-lane roundabout in 1996 with a 150 feet inscribed circle diameter, including a circulatory roadway 30 feet wide. The landscaped central island has a radius of 42 feet, with an apron width of 10 feet. The approach and departure lane widths along Antrim Boulevard and along MD-140 are 24 feet. The “before” observation period was 60 months and the “after” observation period was 112 months. Data showed that 30 crashes occurred before the improvements were made; 10 crashes occurred after the changes. **The roundabout reduced total crashes by 82.1 percent and reduced injury crashes by 89.3 percent per year. There were no fatal crashes in either the “before” or “after” periods.**

5) Leeds Roundabout, Cecil County

This roundabout is located at the intersection of MD-213 and Leeds Road/Elk Mills Road. MDSHA constructed this single-lane roundabout in 1995 with a 110 feet inscribed circle diameter. The “before” observation period was 60 months and the “after” observation period was 124 months. Data showed that 20 crashes occurred before the improvements were made; 22 crashes occurred after the changes (“before and after” timeframe varied). **The roundabout reduced total crashes by 46.8 percent and reduced injury crashes by 93.1 percent per year. Fatal crashes were eliminated.**

The Cost of Improved Safety

MDSHA had no implementation issues with these countermeasures and the costs for implementing the roundabouts ranged from \$194,000 to just under \$500,000. The costs varied depending on the size (or “footprint”) and right-of-way acquisitions that were needed. The roundabout construction time ranged from six to nine months.

The roundabouts installed at these Maryland stop-controlled intersections cumulatively reduced total crashes by approximately 69.1 percent, injury crashes by 88 percent, and fatal crashes by an average of 100 percent per year.

As the Maryland experience demonstrates, roundabouts can effectively improve safety and reduce traffic crashes and their resulting injuries and/or fatalities. For more detailed data and results on this success story and other proven intersection safety treatments from across the country, please see the following website: <http://safety.fhwa.dot.gov/intersection>. For more information, contact Ed Rice, Intersection Safety Team Leader, FHWA Office of Safety (ed.rice@dot.gov), or Mike Niederhauser, Maryland State Highway Administration (mniederhauser@sha.state.md.us).

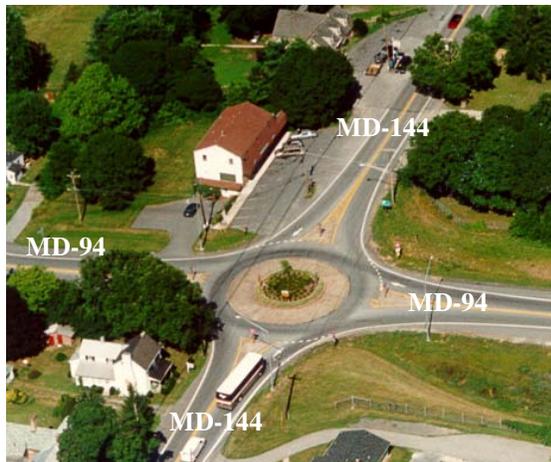
OPTIONAL FIGURES:
(Photos courtesy MDSHA)



Cearfoss Roundabout, MD



Lothian Roundabout, MD



Lisbon Roundabout, MD



Taneytown Roundabout, MD



Leeds Roundabout, MD