
DelDOT
Delaware Department of Transportation
SR 10 at SR 15
INTERSECTION IMPROVEMENTS
November 19, 2012

Introduction

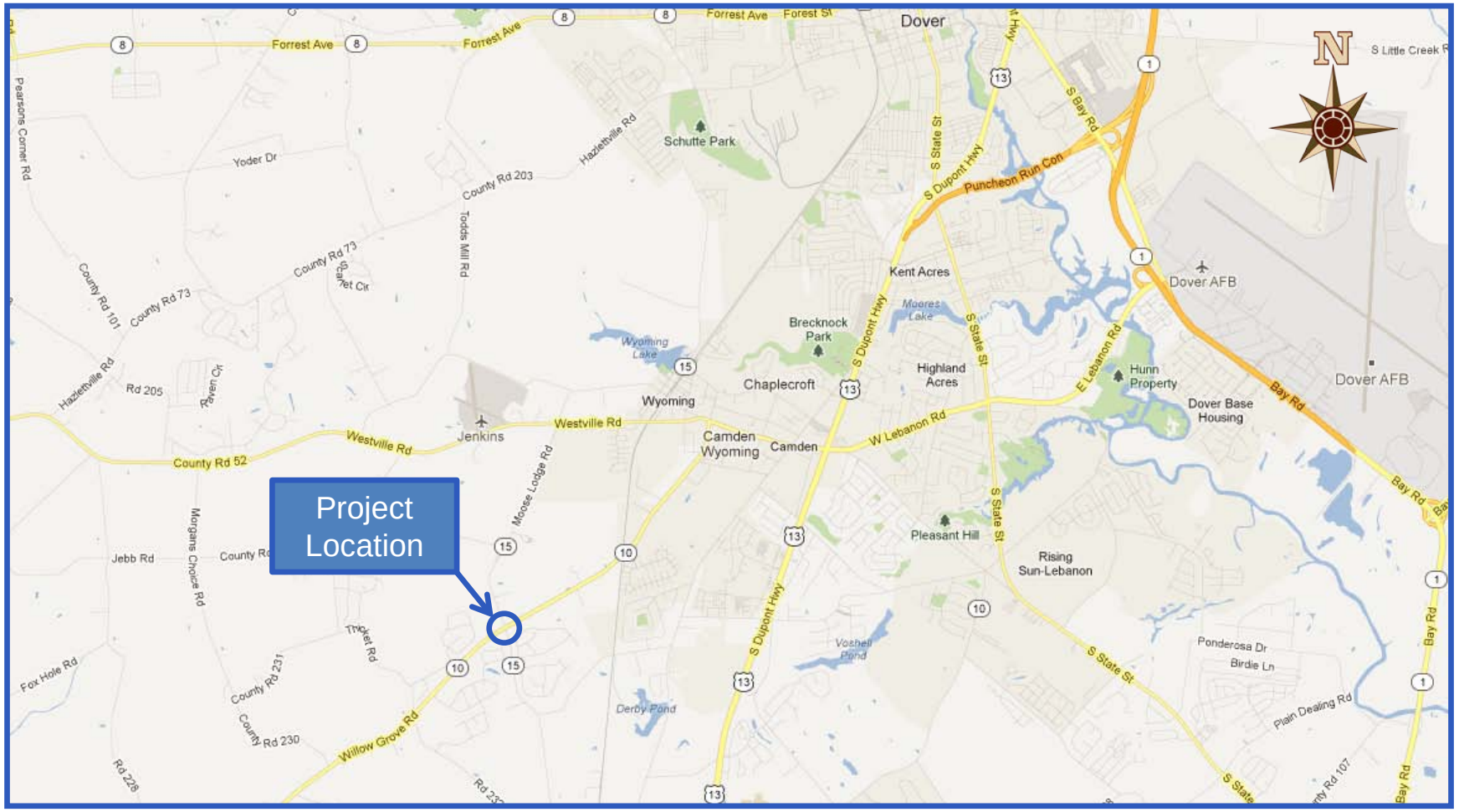
- Purpose of the Meeting
- Agenda
  - Previous Studies
  - Crash History
  - Alternatives Considered
  - Costs / Right-of-Way Impacts
  - Conclusion
  - Next Steps
- Questions

Previous Studies

- 2002 – Identified as part of DelDOT's Hazard Elimination Program (HEP)
  - Signing and striping improvements installed
- 2005 – Studied in response to safety concerns
  - Lighting installed in 2008
  - Roundabout recommended
- 2011 – Identified as part of DelDOT's Hazard Elimination Program (HEP) and High Risk Rural Roads Program (HRRRP)
  - Roundabout recommended

Project Location

SR 10 at SR 15
INTERSECTION IMPROVEMENTS



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Source: Google Maps

Existing Conditions

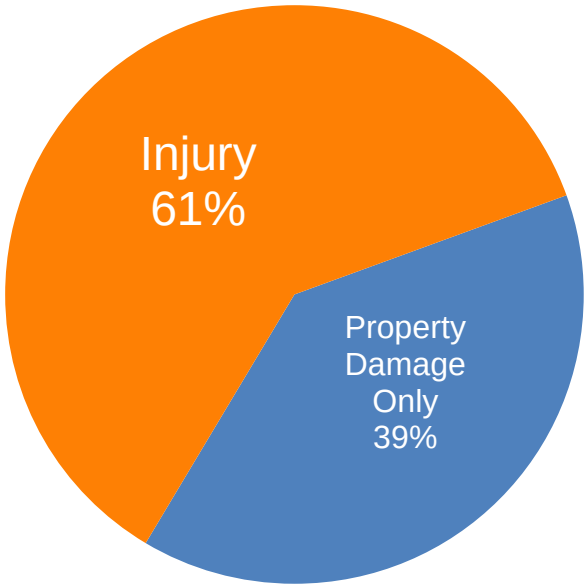
SR 10 at SR 15
INTERSECTION IMPROVEMENTS

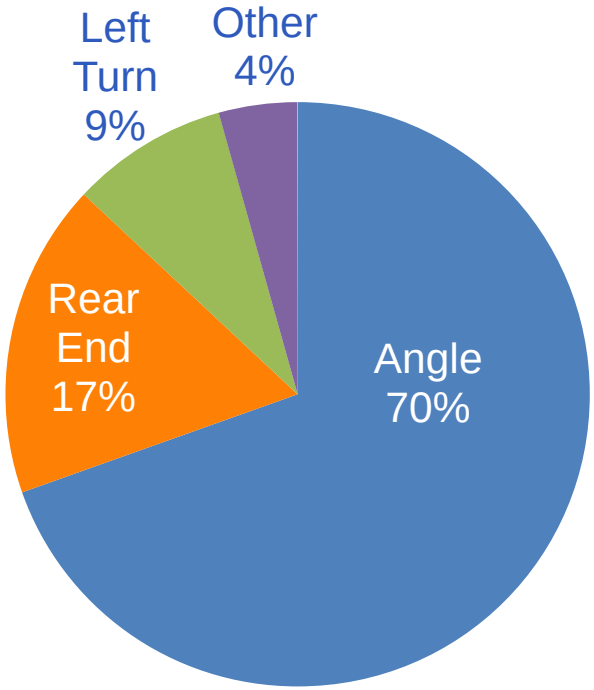
- Two-way stop control
- 50 mph Speed Limit

Source: Google Earth

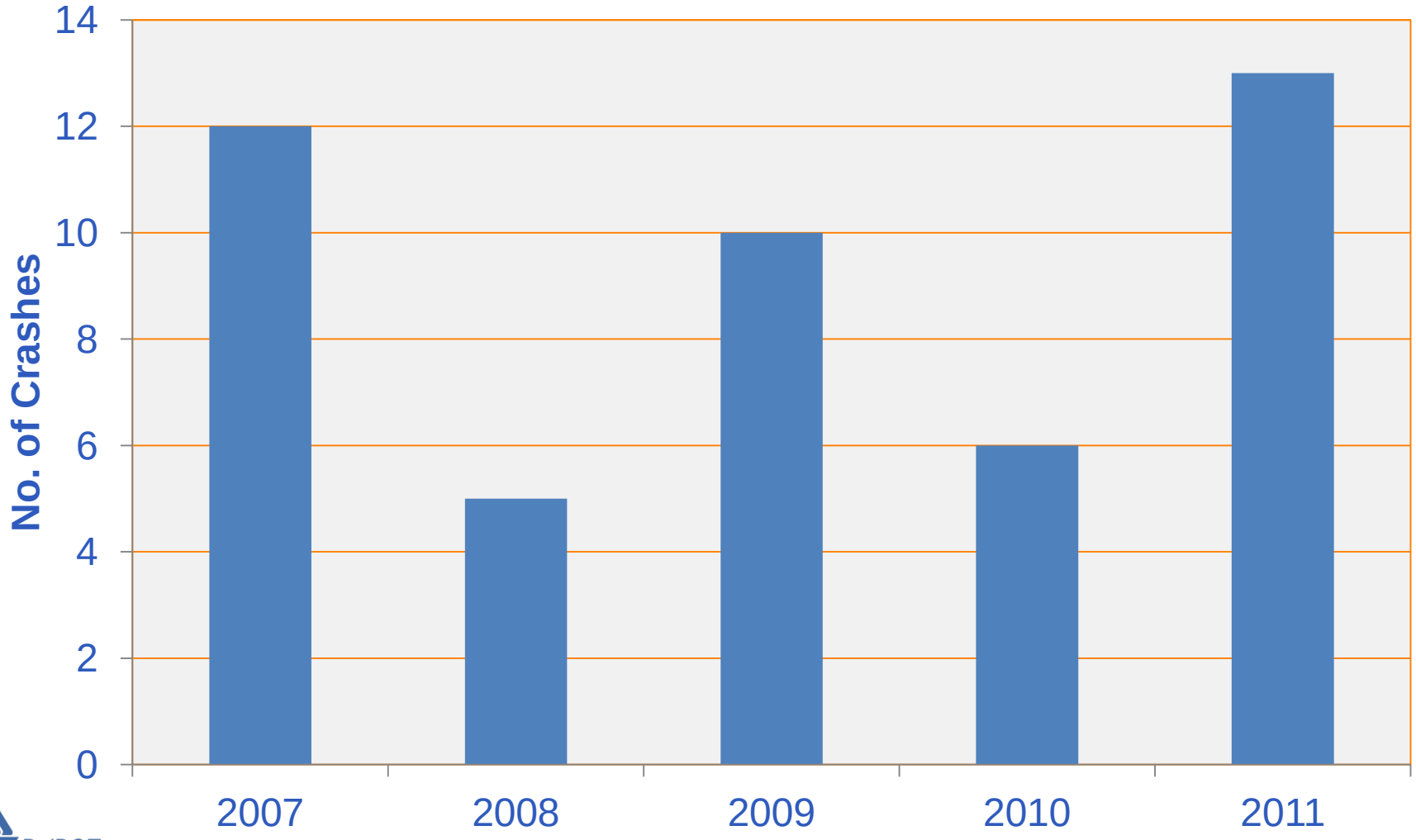
Crash History

- Crash rates along SR 10 and SR 15 are significantly greater than other similar roadways
- 46 reported crashes (2007 – 2011)





Crash History



Alternatives Considered

Several alternatives considered to address crashes:

- Signing and pavement markings (implemented)
- Lighting (implemented)
- 4-way stop control
- Flashing beacons
- Traffic signal
- Roundabout

Previously implemented improvements have not addressed crash problems

4-Way Stop Control

- Pros
  - Alternates the right-of-way between SR 10 and SR 15 traffic, reducing the potential for angle crashes
  - Relatively easy to implement

- Cons
  - Motorists along SR 10 may not anticipate the stop condition, creating the potential for rear end and angle crashes
  - In the future, high delays are anticipated along eastbound SR 10 during the morning peak period
  - All vehicles must stop, resulting in increased noise and pollution

Flashing Beacons

- Pros
  - May increase motorists' awareness of the stop condition along SR 15 and the potential for crossing traffic along SR 10

- Cons
  - Lose effectiveness over time
  - Minimal crash reduction benefits
  - Long term maintenance costs

Traffic Signal

- Pros
  - Alternates the right-of-way between SR 10 and SR 15 traffic, reducing the potential for angle crashes
- Cons
  - Increases the potential for rear end crashes along SR 10
  - Does not eliminate the potential for angle crashes due to the potential for red light running
  - Higher delay for motorists compared to roundabout option, especially during off-peak periods
  - Requires the installation of turns lanes to efficiently operate the signal, resulting in greater right-of-way impacts
  - Long term maintenance costs
  - Increased noise and pollution due to increased number of stops

Roundabout

- Pros
  - Reduces the potential for both angle and rear end crashes
  - Reduces the severity of crashes due to lower speeds
  - Less delay for motorists compared to other options, especially during off-peak periods (motorists will rarely stop during off-peak periods)
  - Less overall right-of-way impacts compared to a traffic signal
  - Lower long term maintenance costs

- Cons
  - May be unfamiliar to some motorists
  - Greater right-of-way impacts in the immediate vicinity of the intersection

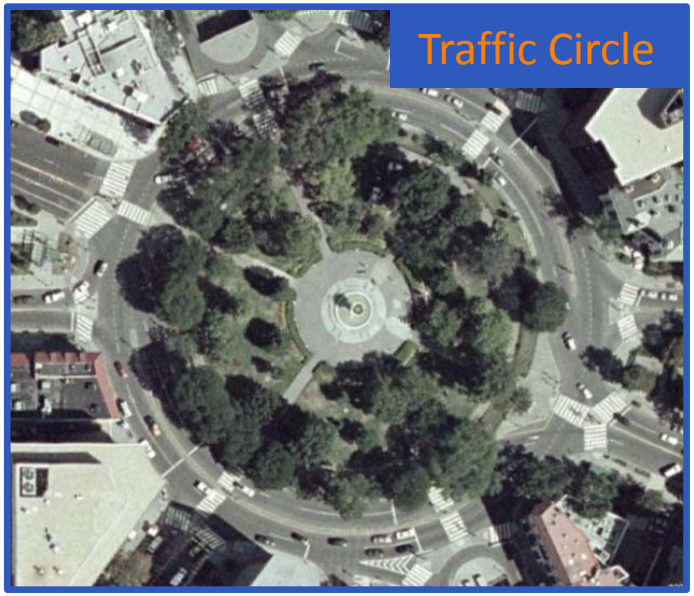
What is a Roundabout?

- Compact circular intersection
- Traffic flows in a counterclockwise pattern
- Entering traffic yields to traffic within roundabout
- Approaches channelized to deflect vehicles into a proper entry path

St. Annes Church Road at Levels Road, Middletown, DE

What is NOT a Roundabout?

- **Rotaries** – high speed approaches and within circle
- **Traffic Circles** – often signalized with numerous "T" intersections
- **Neighborhood Circles** – traffic calming countermeasure


Traffic Circle


Rotary

Neighborhood Circle

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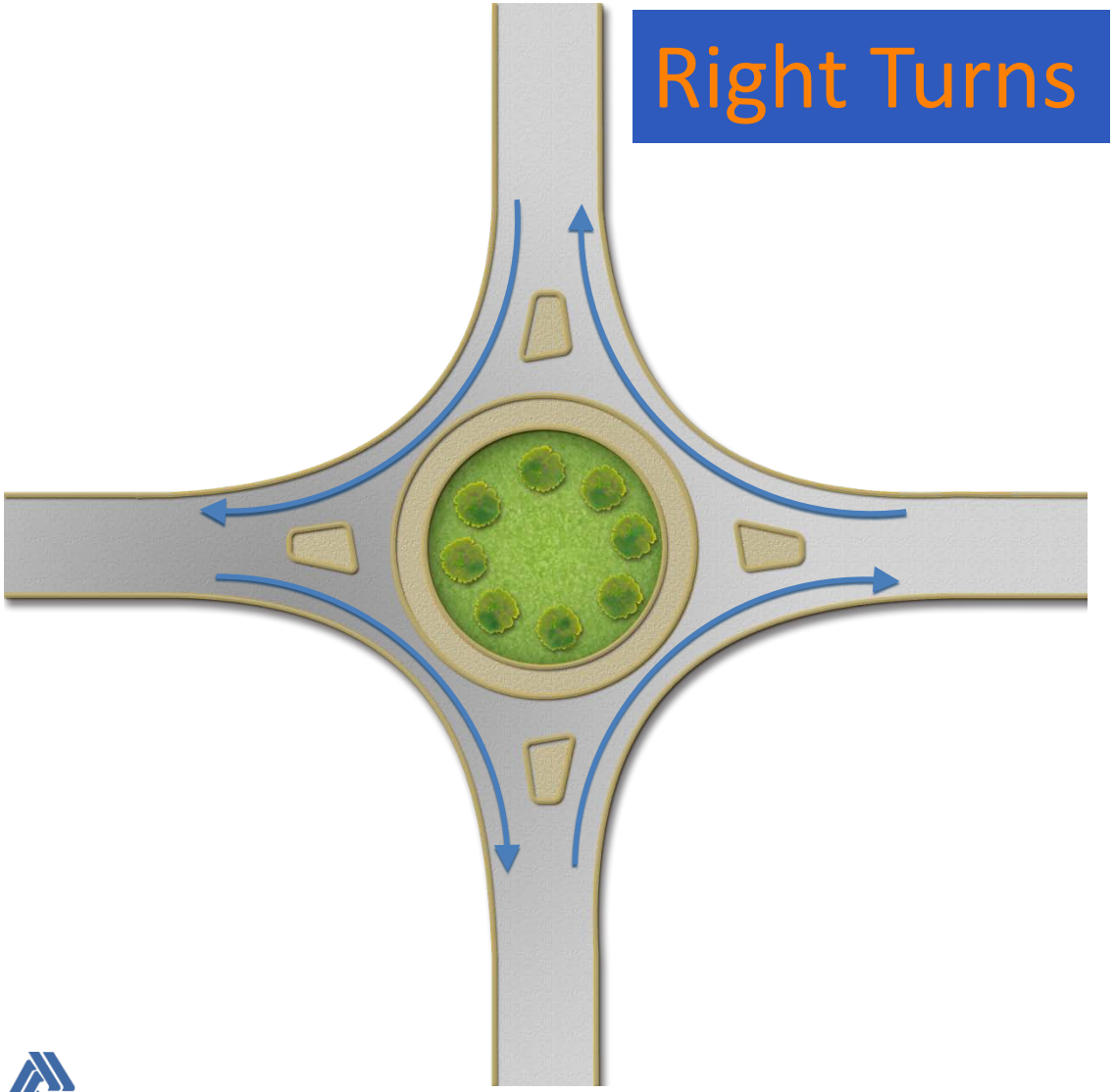
Source: FHWA

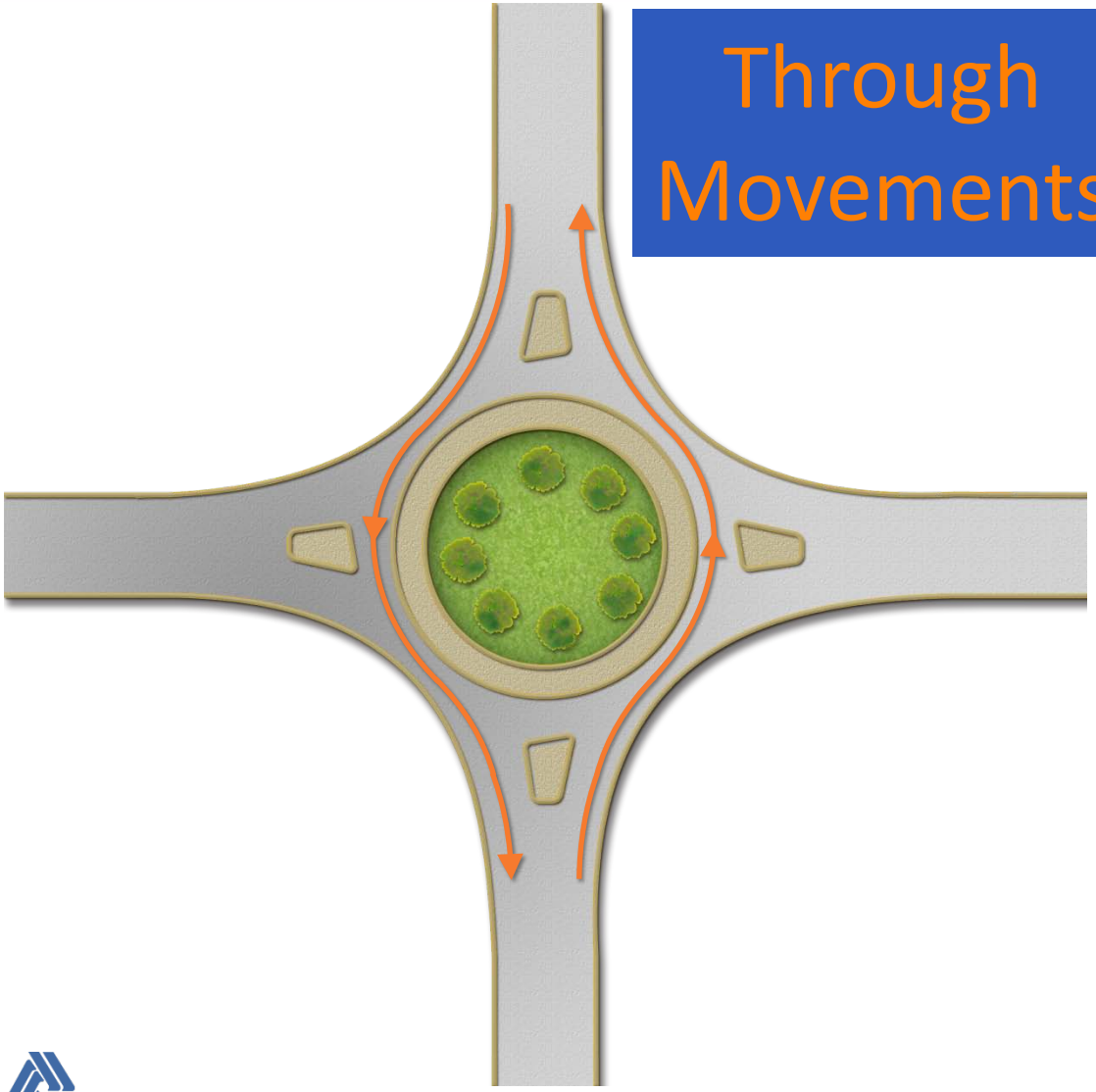
How Do you Drive a Roundabout?



Right Turns

When Entering Roundabout

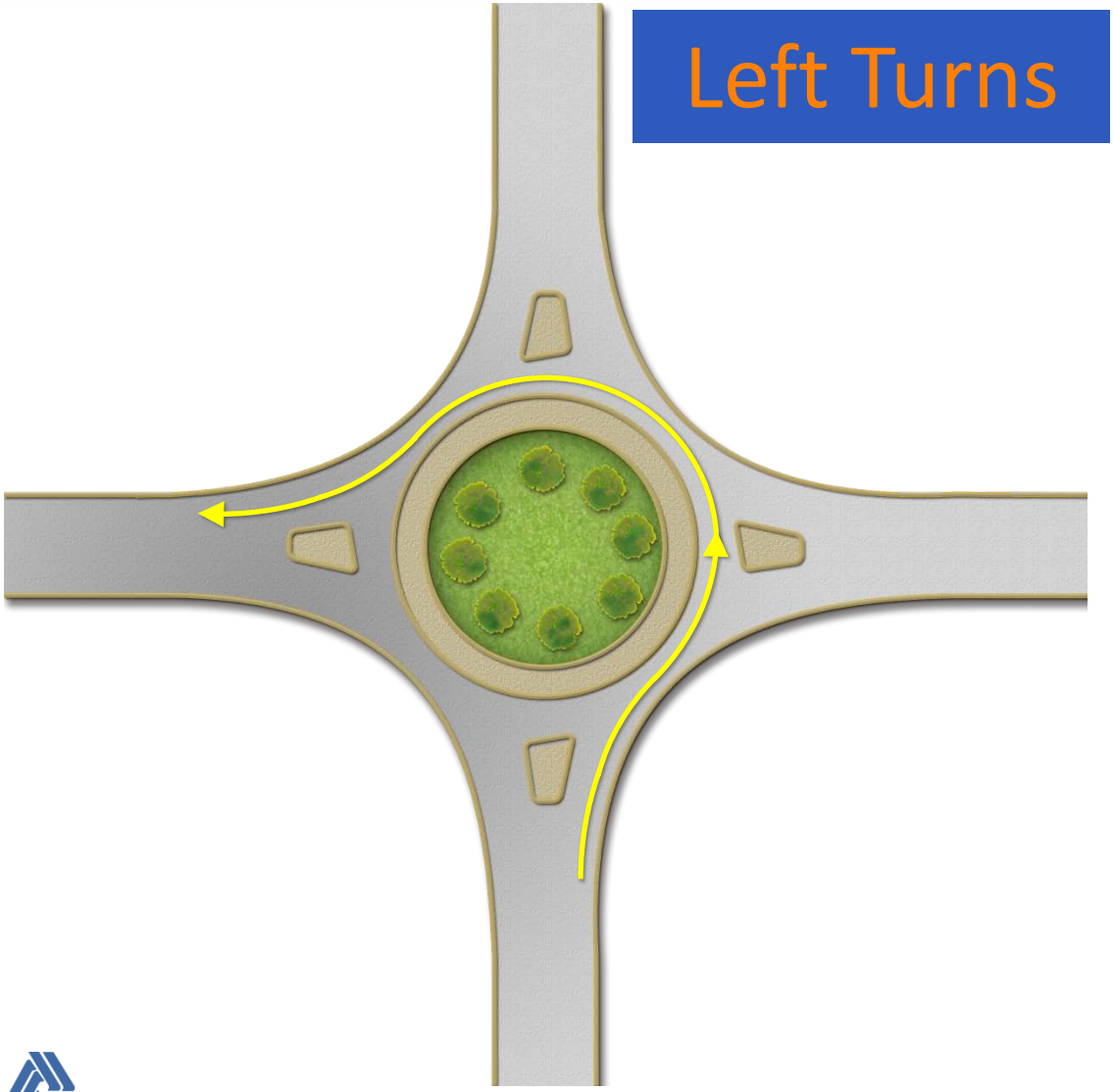
How Do you Drive a Roundabout?



Through Movements

When Entering Roundabout

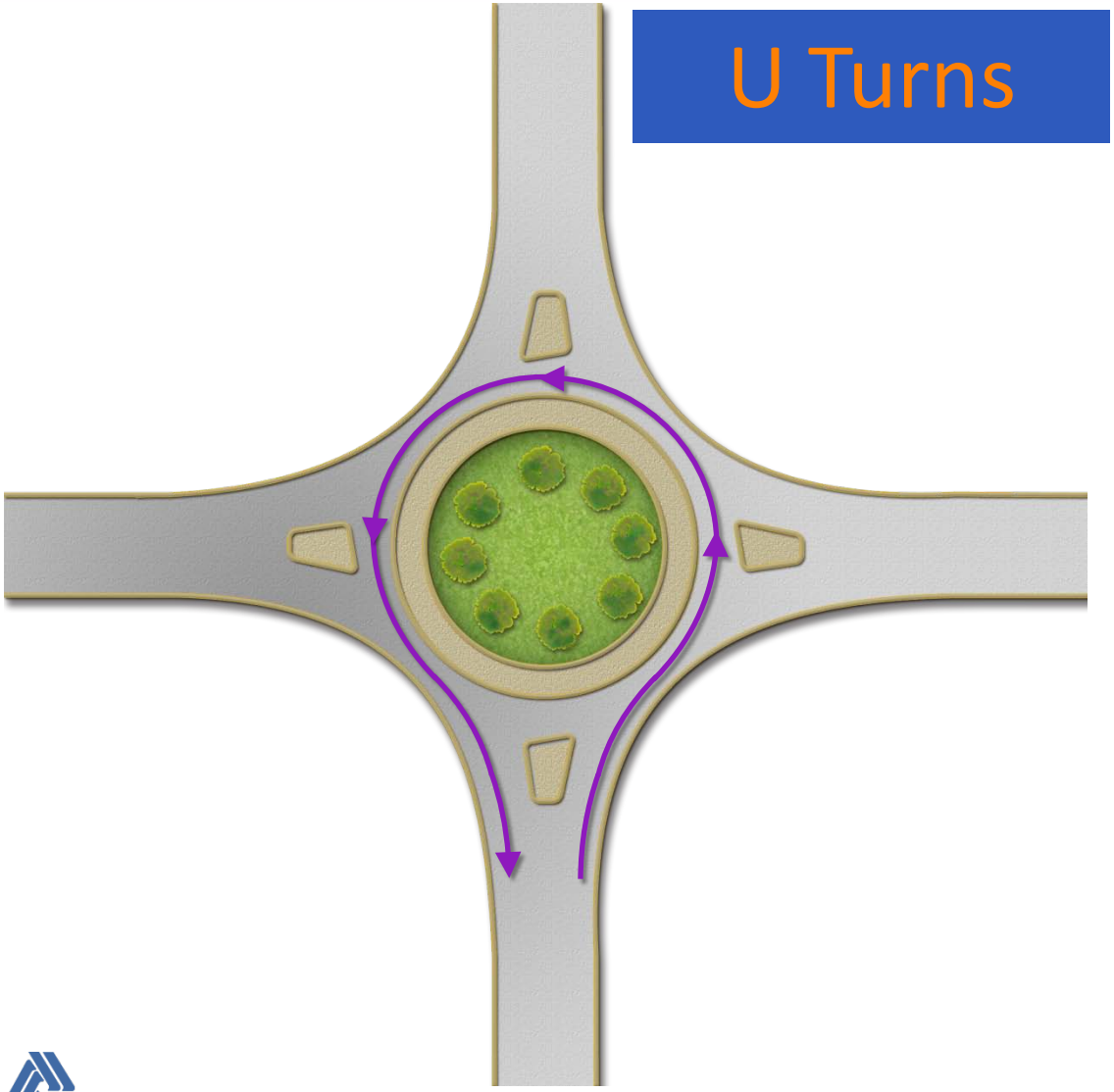
How Do you Drive a Roundabout?



Left Turns

When Entering Roundabout

How Do you Drive a Roundabout?

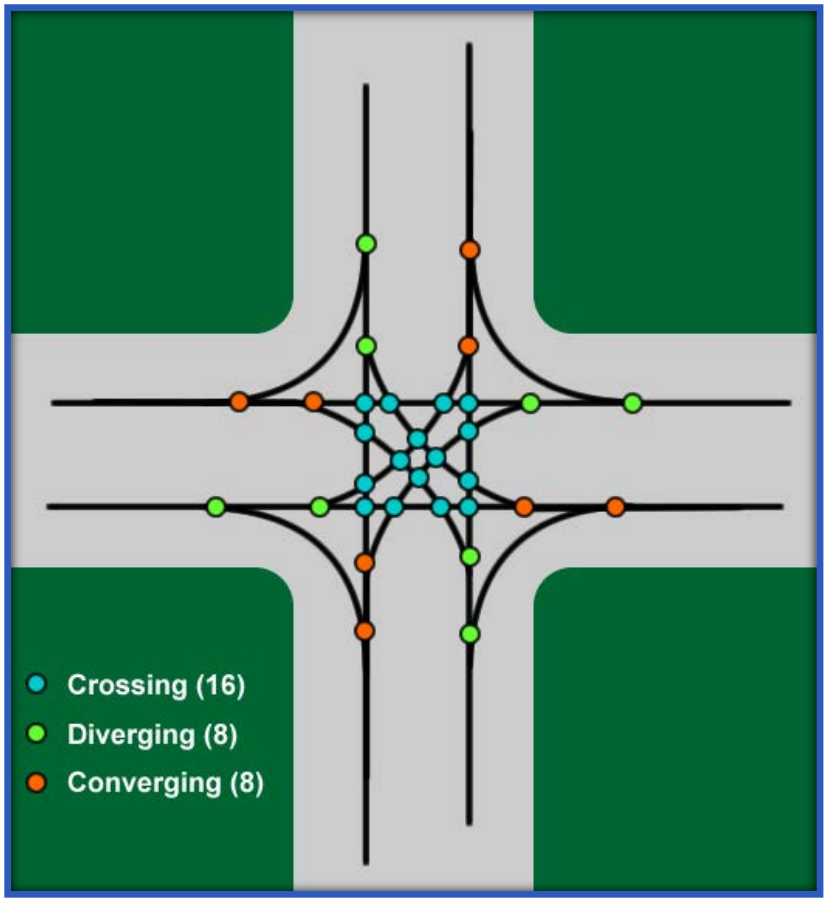


U Turns

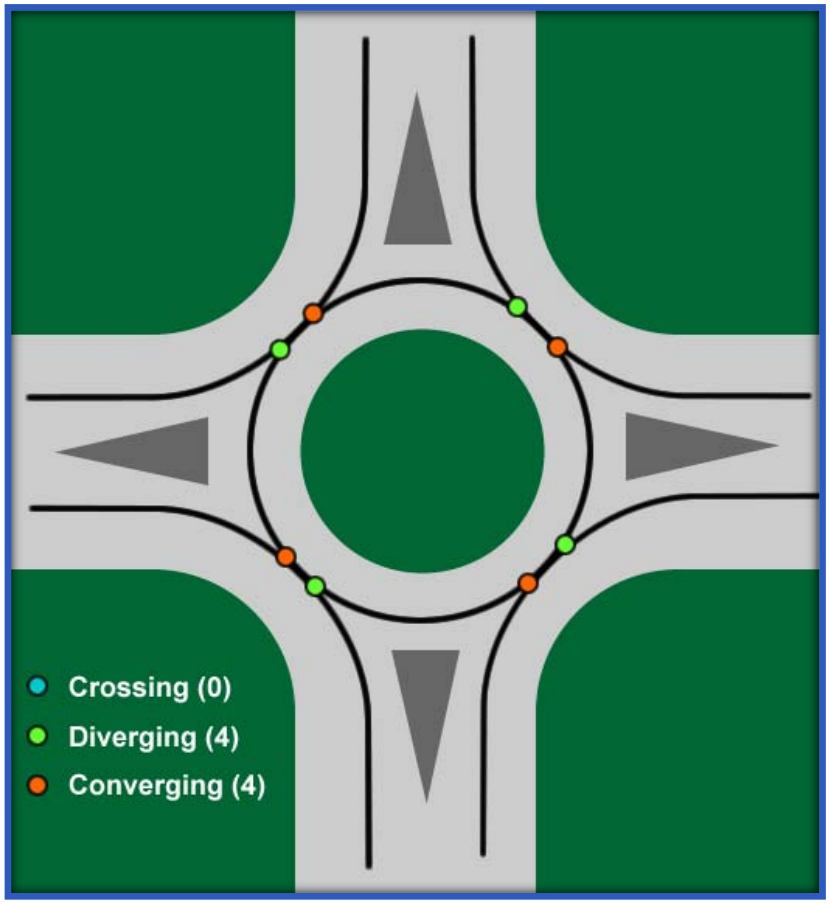
When Entering Roundabout

Vehicle Conflict Points

4-legged Intersection
32 Conflict Points



Roundabout
8 Conflict Points



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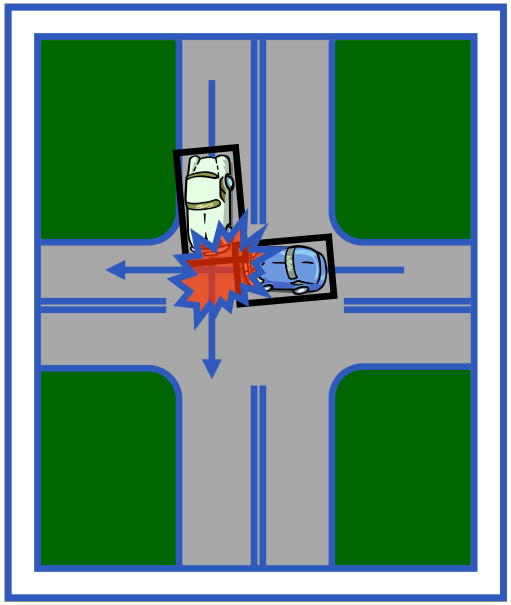
Source: FHWA

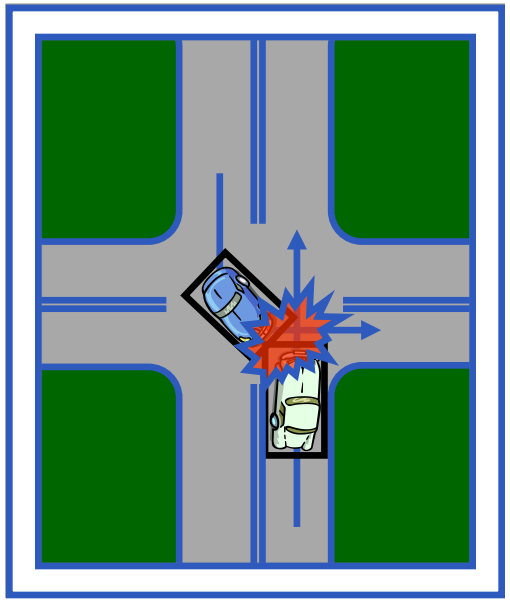
Types of Crashes

4-legged Intersection

Angle

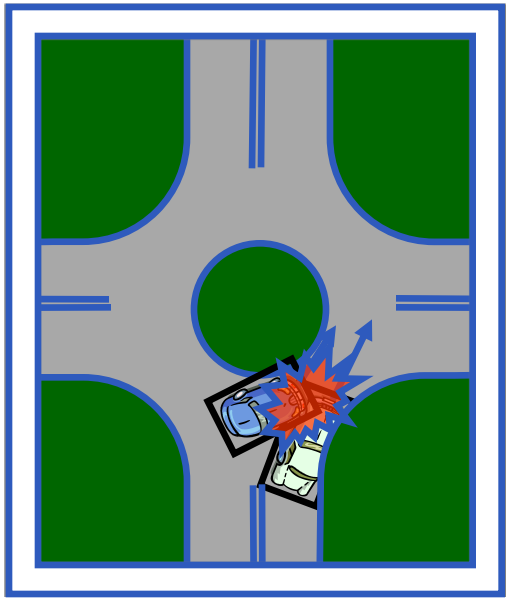


Left turn



Roundabout

Sideswipe



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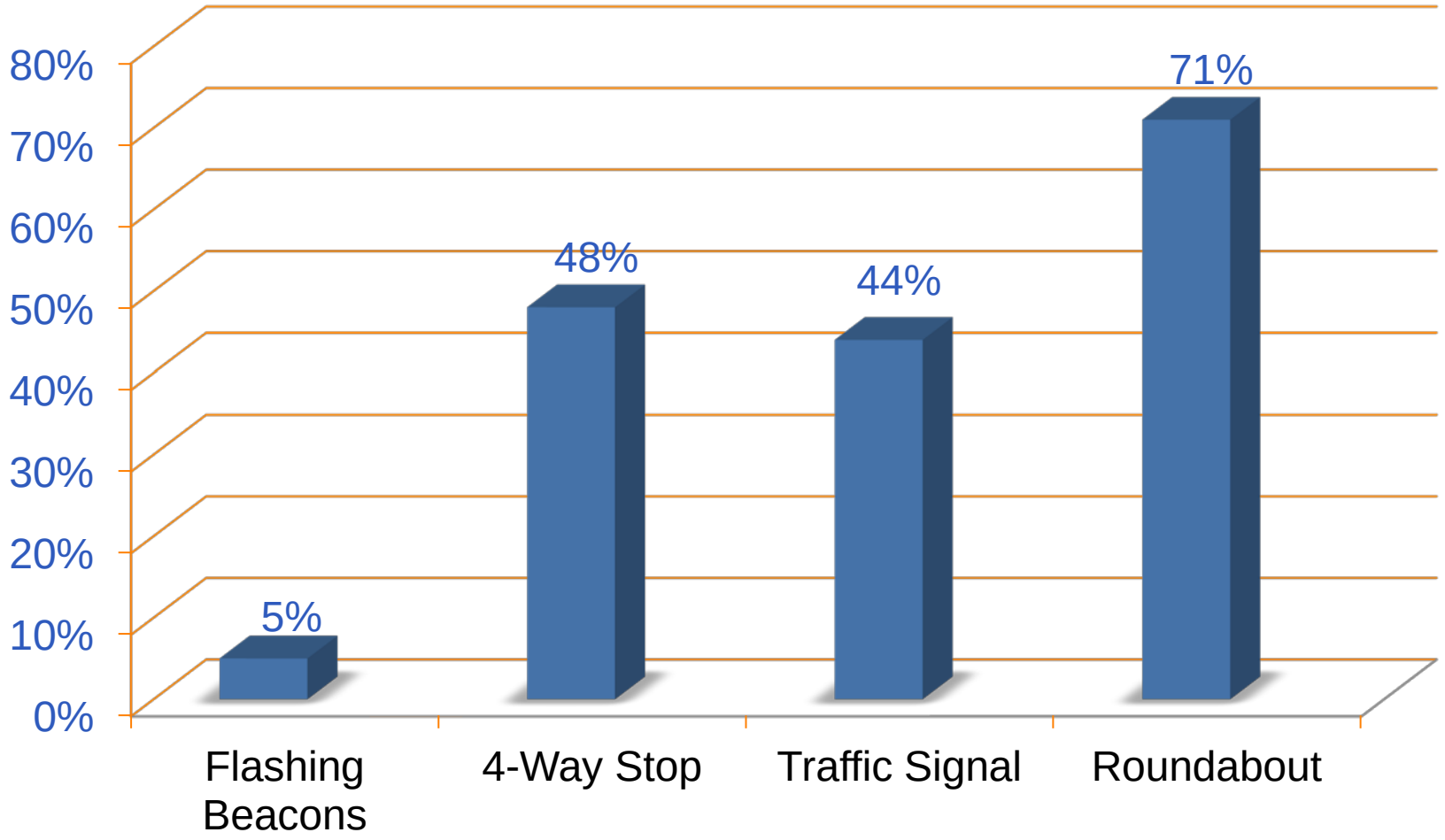
Source: FHWA

Anticipated Crash Reduction

Crash reduction percentages are based on a change from two-way stop control



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Level of Service

Level of Service (LOS) is a qualitative assessment of a road's operating conditions. At intersections, it is a measure of delay experienced by motorists traveling through the intersection.

LOS is measured on a scale of A to F, with free-flow conditions rated as LOS A and congested conditions rated as LOS F.

Existing Conditions (2011)

Intersection Control	Delay (seconds)	Level of Service
Existing (Two-way Stop)	54 (30) [2]	F (D)
Four-way Stop	16 (11) [1]	C (B)
Traffic Signal	14 (10) [1]	B (B)
Roundabout	**10 (8) [1]**	**B (A)**

AM Peak Hour (PM Peak Hour)

[1] Average delay per vehicle (seconds)
[2] Average delay for the approach with the highest delay (seconds)

Future Conditions (2034)

Intersection Control	Delay (seconds)	Level of Service
Existing (Two-way Stop)	147 (157) [2]	F (F)
Four-way Stop	40 (17) [1]	E (C)
Traffic Signal	21 (23) [1]	C (C)
Roundabout	**15 (10) [1]**	**C (A)**

AM Peak Hour (PM Peak Hour)

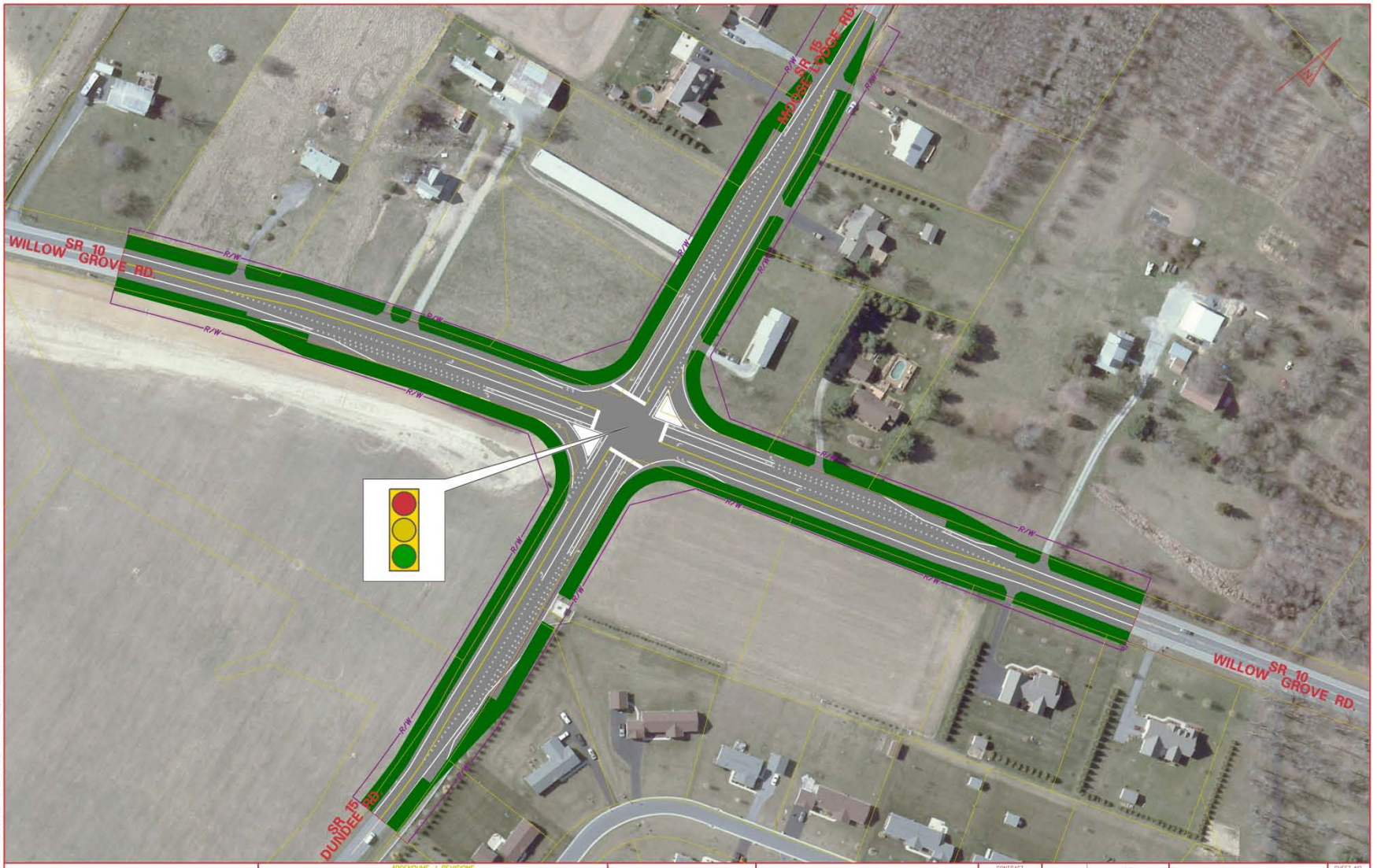
[1] Average delay per vehicle (seconds)
[2] Average delay for the approach with the highest delay (seconds)

Conceptual Design - Roundabout

SR 10 at SR 15
INTERSECTION IMPROVEMENTS

Conceptual Design – Traffic Signal

SR 10 at SR 15
INTERSECTION IMPROVEMENTS



DELAWARE
DEPARTMENT OF TRANSPORTATION

ADDENDUMS / REVISIONS

SCALE
0 60 120 180
FEET

HEP KC,
SR10 & SR15 INTERSECTION
IMPROVEMENTS

CONTRACT T201200802
COUNTY KENT
BRIDGE NO. X
DESIGNED BY: JLC
CHECKED BY:

SIGNALIZED INTERSECTION
CONCEPT PLAN

SHEET NO.
TOTAL SHTS.

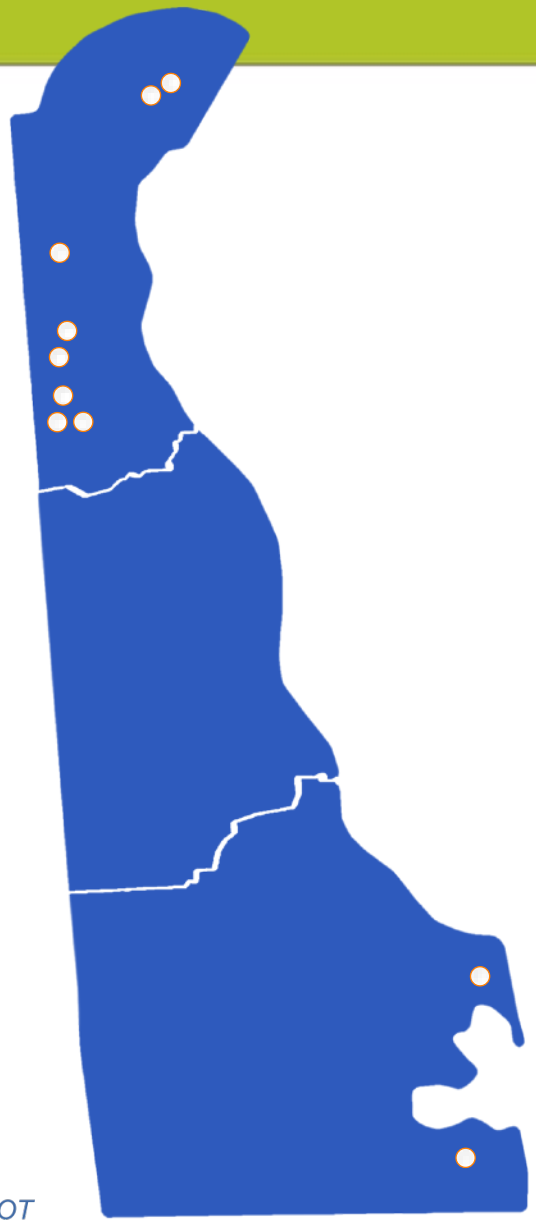
Costs / Right-of-Way Impacts

Intersection Control	Right-of-Way Impacts [1]	Construction and Right-of-Way Cost [1]
Flashing Beacons	-	$100,000 [2]
Four-way Stop	-	$100,000 [2]
Traffic Signal	2.88 acre	$2.17 million
Roundabout	**0.98 acre**	**$ 980,000**

[1] Does not include drainage structures and stormwater management facilities

[2] Includes the installation of overhead flashing beacons at the intersection

Roundabouts in Delaware

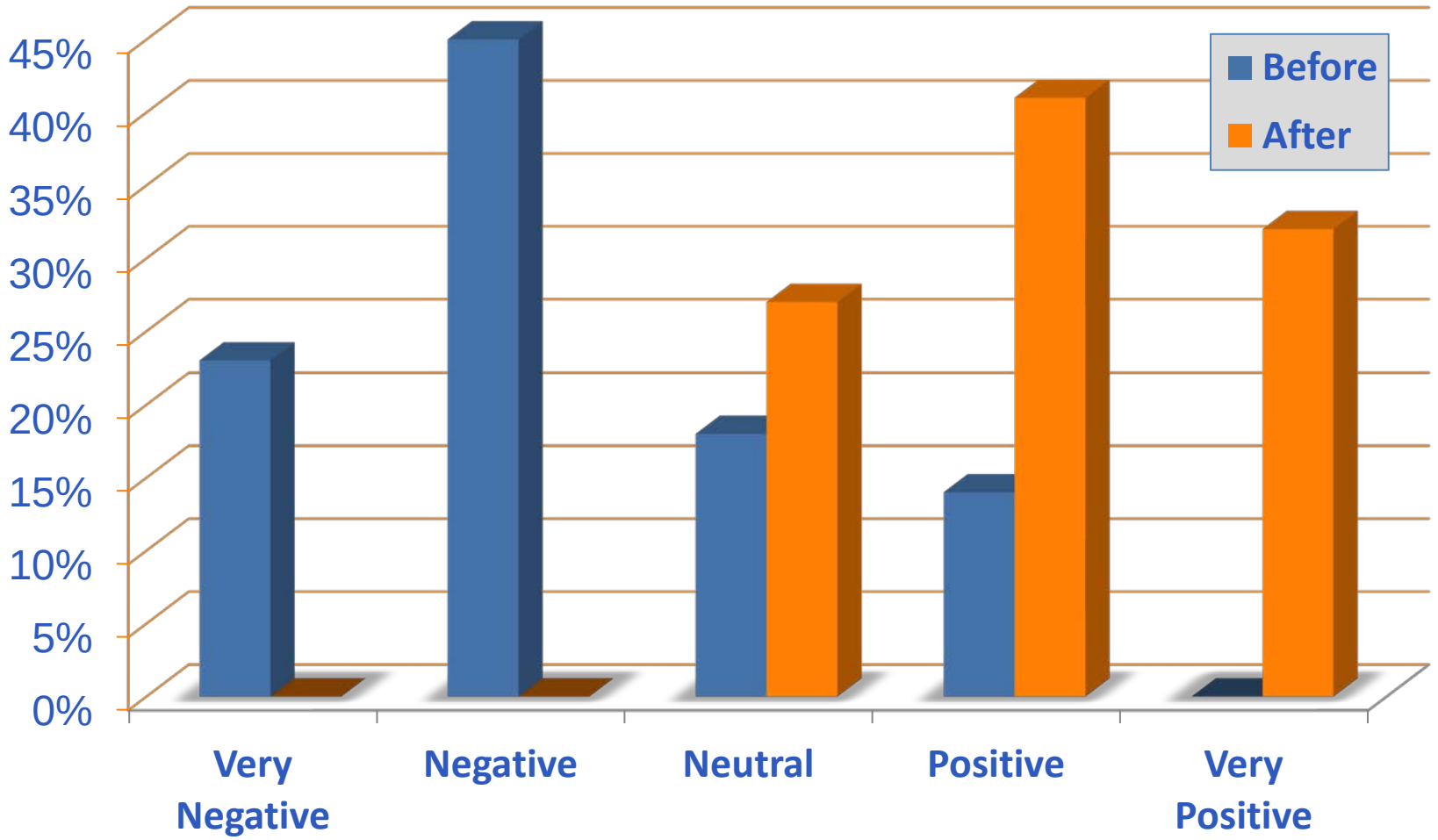


- New Castle
  - Weldin Rd / Carruthers Dr
  - East Park Dr / West Park Dr
  - Lagrange Ave
  - Choptank Rd / Bethel Church Rd
  - Choptank Rd / Churchtown Rd
  - Choptank Rd / Bunker Hill Rd
  - St. Annes Church Rd / Level Rd
  - St. Annes Church Rd / Wiggins Mill Rd
- Sussex
  - Rehoboth Ave / Grove St
  - Substation Rd

Very few complaints received at roundabout locations since implementation

Public Attitude Toward Roundabouts

Before and After Construction



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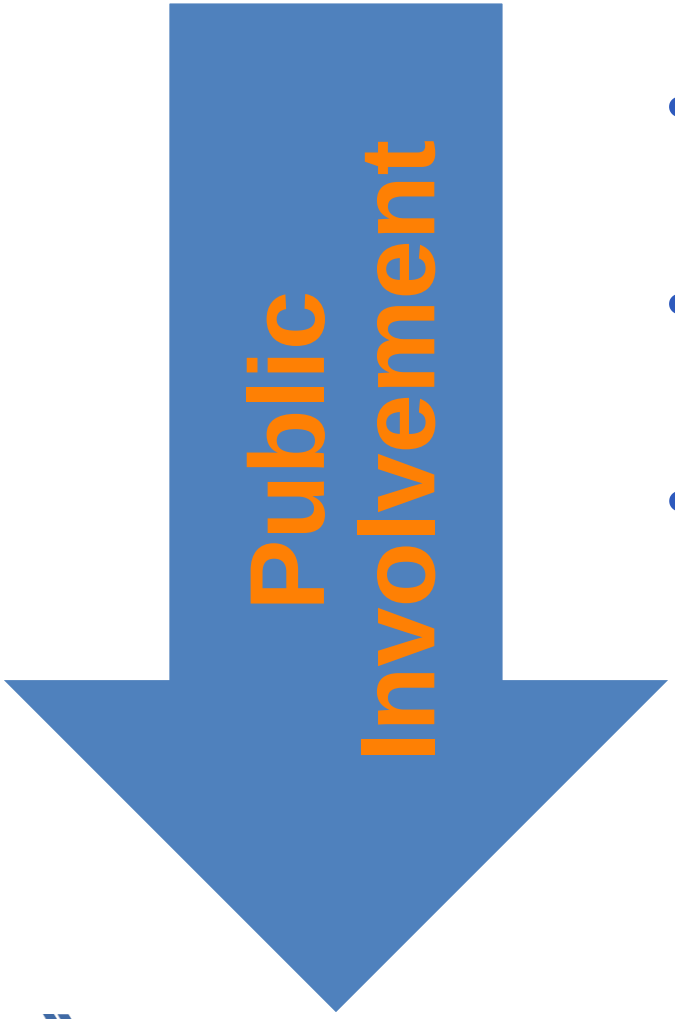
Source: NCHRP Synthesis 264

Conclusion

- Recommendations from prior studies have not reduced the number of crashes
- Roundabout is the preferred alternative
  - Provides the highest level of safety
  - Reduces motorists' delays
  - Lower long term maintenance costs compared to a traffic signal
  - Less right-of-way impacts compared to a traffic signal

Next Steps



- Community Outreach / Conceptual Design
- Final Design/Right-of-Way Acquisition
- Construction and Implementation

This project is funded in the current Capital Transportation Program

Project schedule will be determined by the results of the community outreach efforts and associated impacts to the design process

Questions?