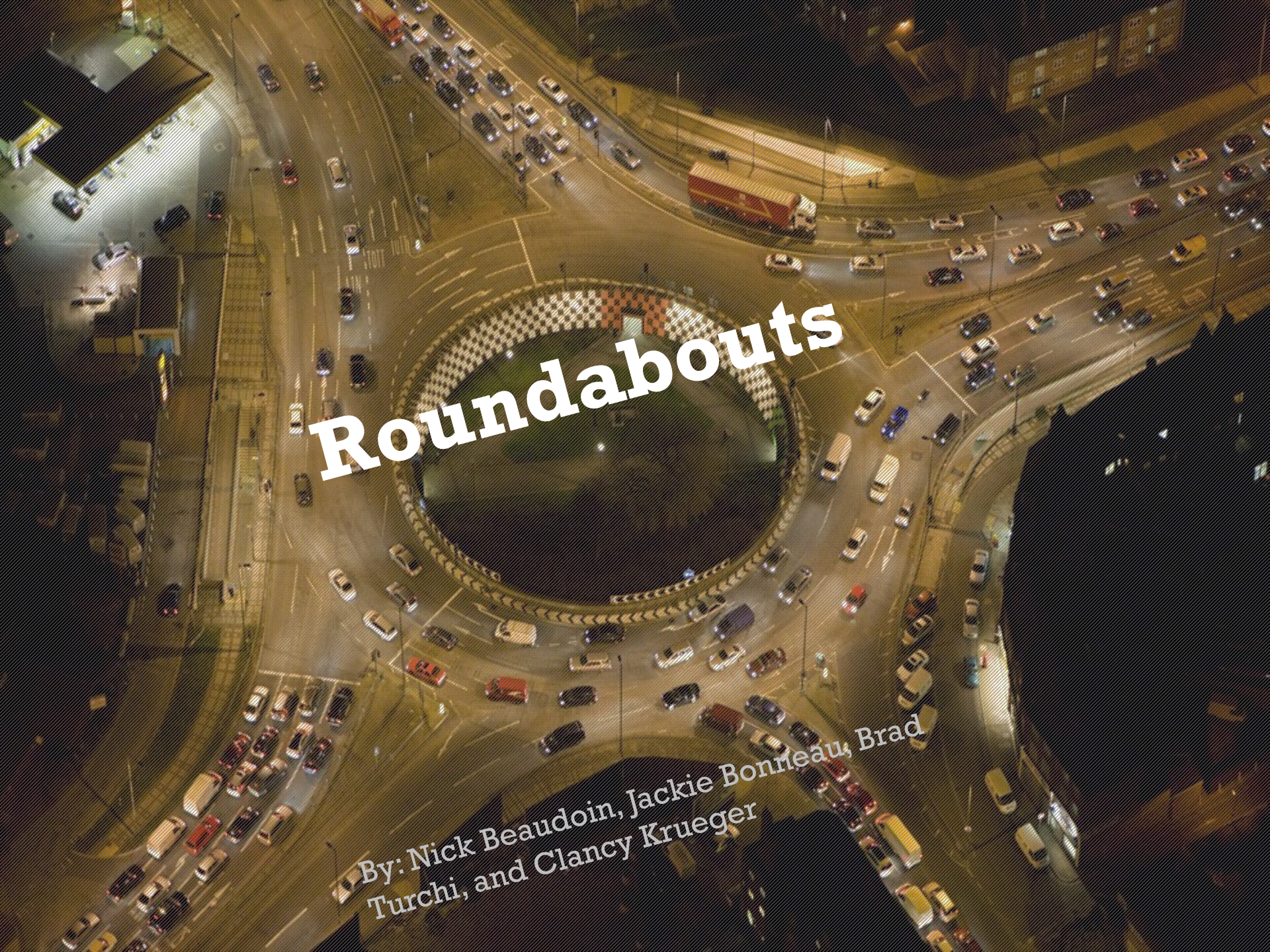


Roundabouts

By: Nick Beaudoin, Jackie Bonneau, Brad Turchi, and Clancy Krueger

Presentation Overview

- Definition
- History
- General Design
- Rotaries vs. Roundabouts
- Safety Issues
- Cyclists
- Capacity & Delays
- Public Opinion
- Traffic Flow
- Special Types
- UMass Roundabout

Definition

Yield-at-Entry:

- Right-of-way.
- Yield sign
- Small diameter

Deflection for Entering Traffic:

- No tangential entries permitted
- No straight movement
- Low entry speeds

Flare:

- Extra lanes before entry
- Wider circulatory roadway

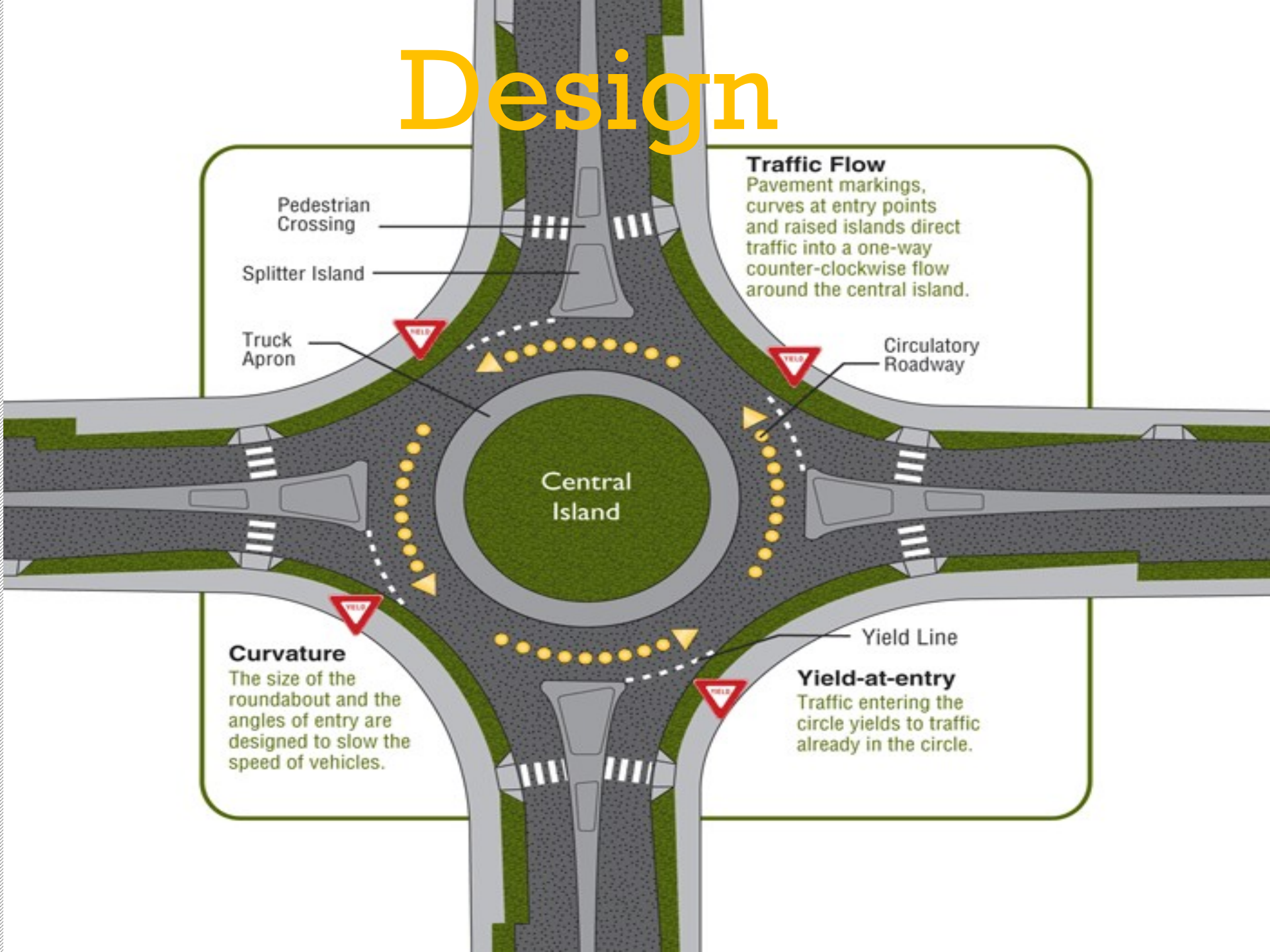
History

- 1904: First rotary in the U.S. built around New York City's Columbus Circle
- 1909: First British roundabout built in Letchworth Garden City
- 1905 On: Hundreds of large circles and rotaries built in Canada and the U.S.
- Mid-1950's: Rotaries began to fall out of favor in North America
- 1960's: British engineers re-engineered circular intersections during the mid-1960s and Frank Blackmore invented the mini roundabout
- 1966: The modern roundabout was developed in the United Kingdom
    - "Give-Way" Rule

History (Continued)

- The first modern roundabout in the United States was constructed in Summerlin, Nevada in 1990.
  - Leif Ourston
- 1995: First roundabout freeway interchange in the nation
  - Leif Ourston
- 1998: Avon, Colorado installed five roundabouts between the I-70 interchange and the Beaver Creek Mountain ski resort
- There have been several roundabouts have since been installed in almost every state
  - 2,300 roundabouts in the U.S. (As of December, 2009)
    - 160 in Utah

Design


Pedestrian Crossing
Splitter Island
Truck Apron
Central Island
Circulatory Roadway
Yield Line
Traffic Flow
Pavement markings, curves at entry points and raised islands direct traffic into a one-way counter-clockwise flow around the central island.
Curvature
The size of the roundabout and the angles of entry are designed to slow the speed of vehicles.
Yield-at-entry
Traffic entering the circle yields to traffic already in the circle.

Differences

Rotaries —

- Older
- No Intersections
- Full-Speed Entry
- Lane Changes Allowed
- Very Large

Roundabouts

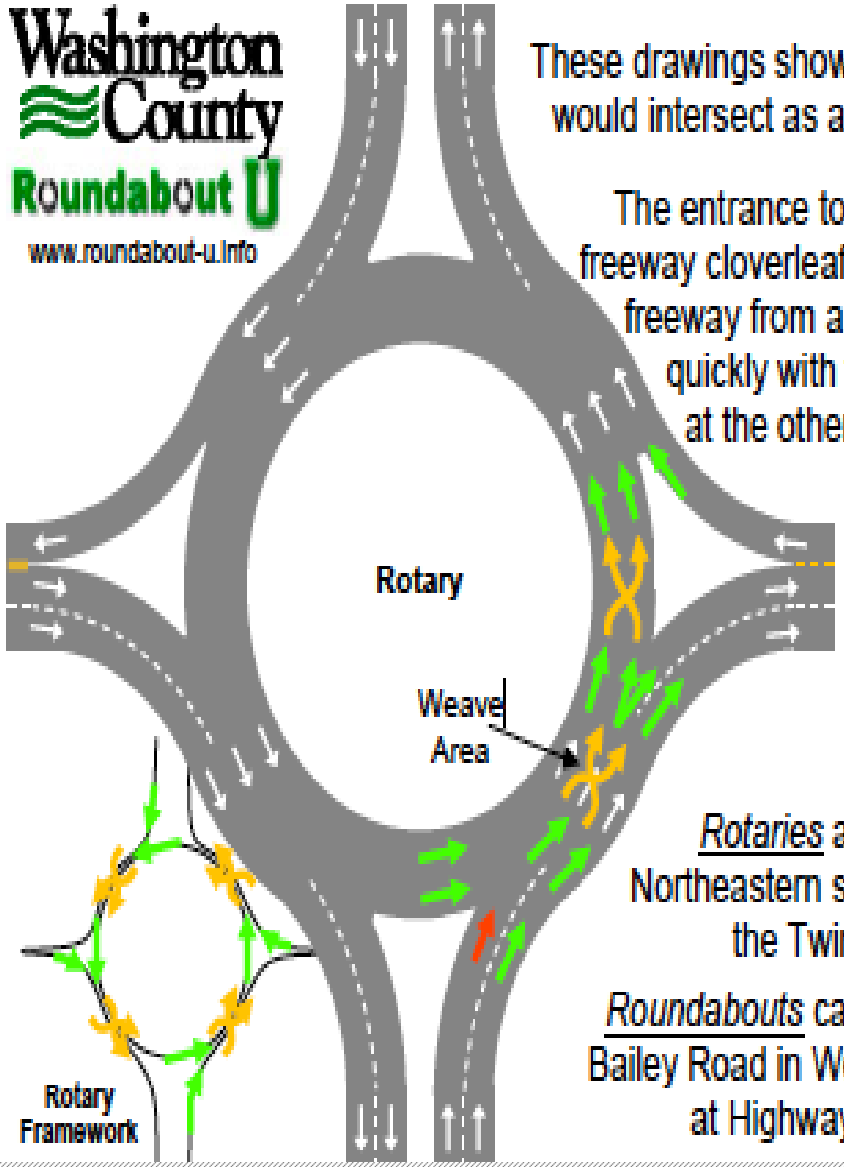
- Newer
- "Crossing Intersections"
- No Lane Changes
- Small in Size
- Low Speeds
- Spiral-Striped

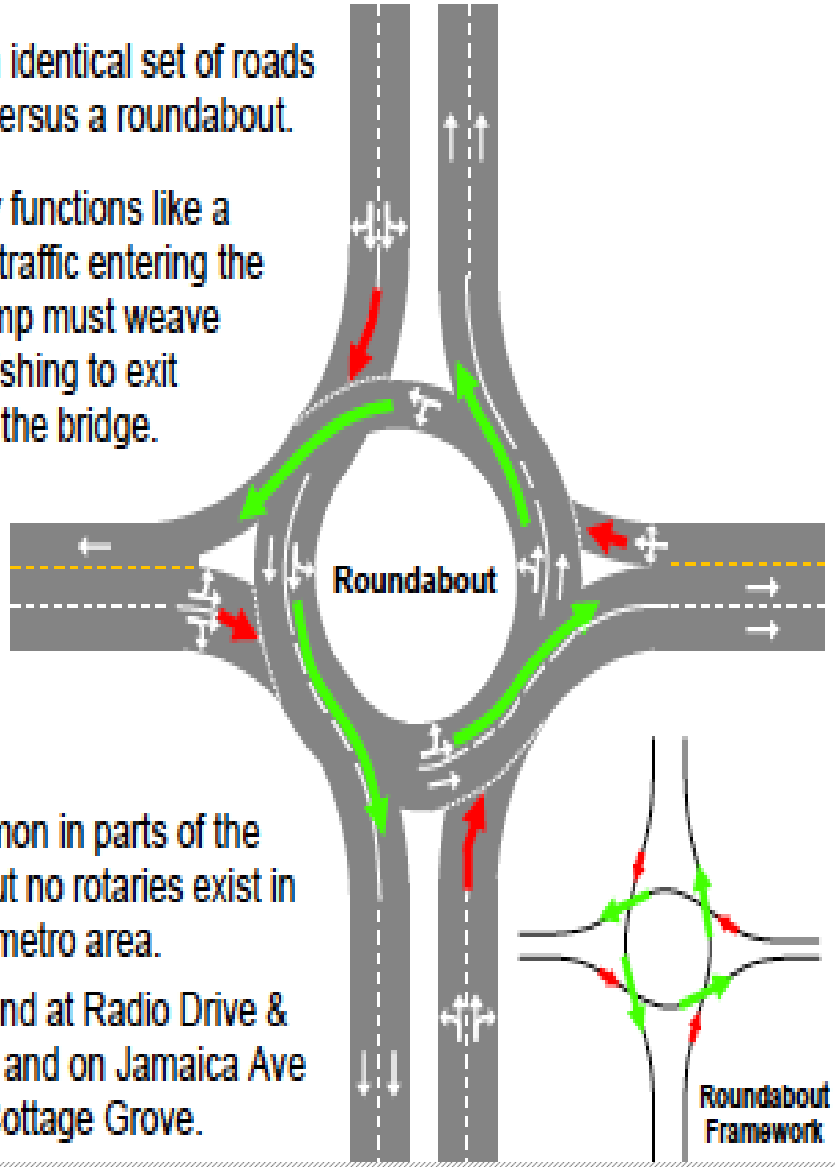
How is a ROTARY Different from a Roundabout?

Washington County Roundabout U
www.roundabout-u.info

These drawings show how an identical set of roads would intersect as a *rotary* versus a roundabout.

The entrance to a *rotary* functions like a freeway cloverleaf, where traffic entering the freeway from a loop ramp must weave quickly with traffic wishing to exit at the other side of the bridge.





Rotaries are common in parts of the Northeastern states, but no rotaries exist in the Twin Cities metro area.

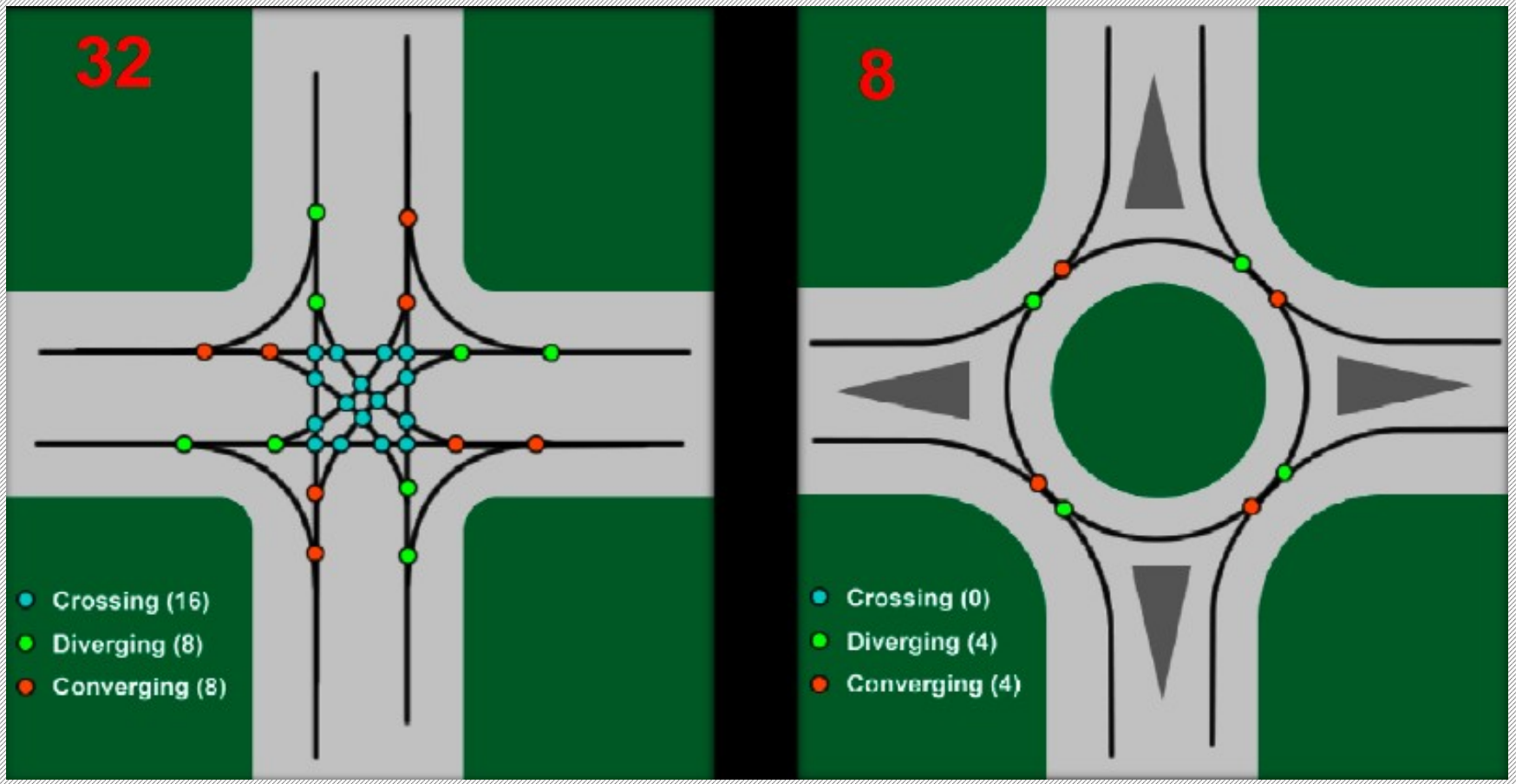
Roundabouts can be found at Radio Drive & Bailey Road in Woodbury and on Jamaica Ave at Highway 61 in Cottage Grove.

Safety

- 40% fewer vehicle collisions
  - 80% fewer injuries
  - 90% fewer serious injuries and fatalities
- Reduces emissions by 30%
- 1996-2000: 26% cyclists reported an accident at a roundabout, opposed to 6% at traffic signals
- Increased risks for visual impairments if adjacent footpaths are not properly designed

Vehicle Conflict Points (Safety)

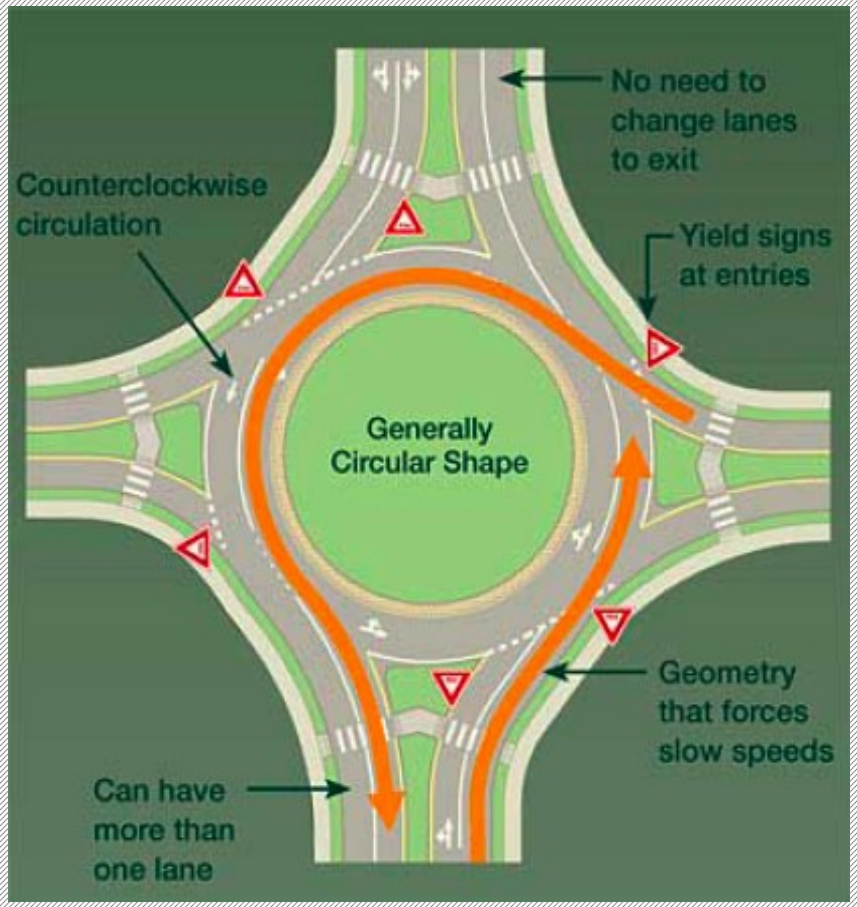
Intersection vs. Roundabout

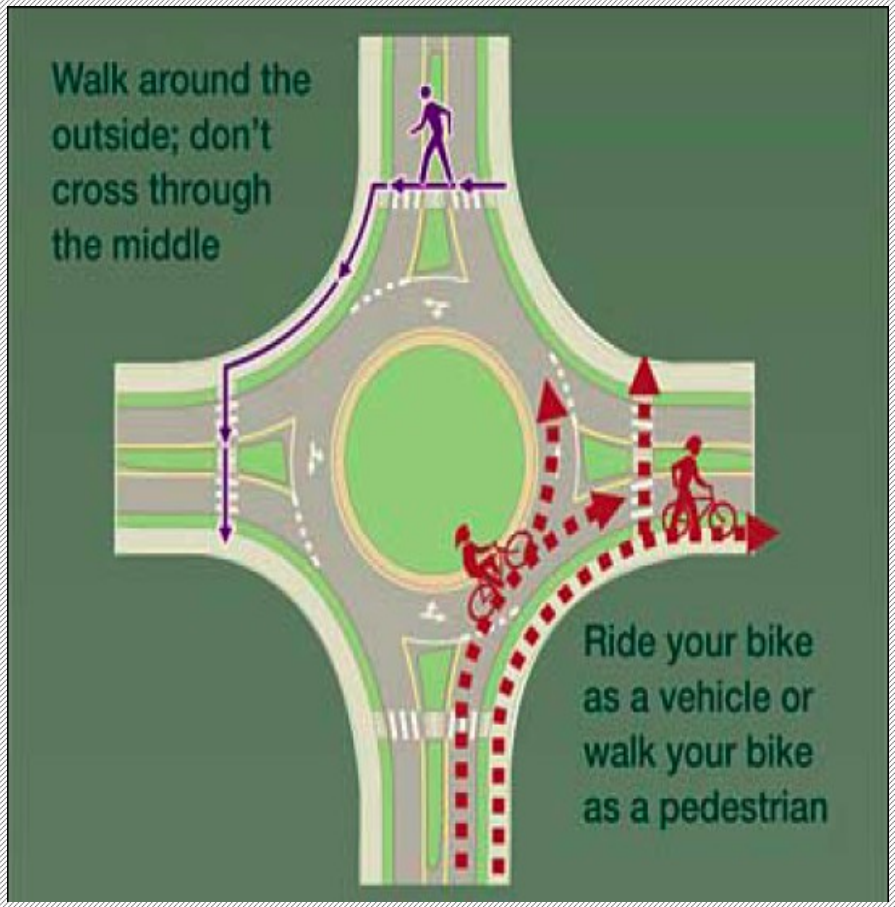


Cyclists

- A high rate of bicycle/motor vehicle crashes occurs when bicyclists are riding around the outside
- Bicyclists' risk is high in all such intersections, but it is much higher when the junction has a marked bicycle lane or side path around its outside
- Collisions typically occur when a motorist is entering or leaving the circular roadway

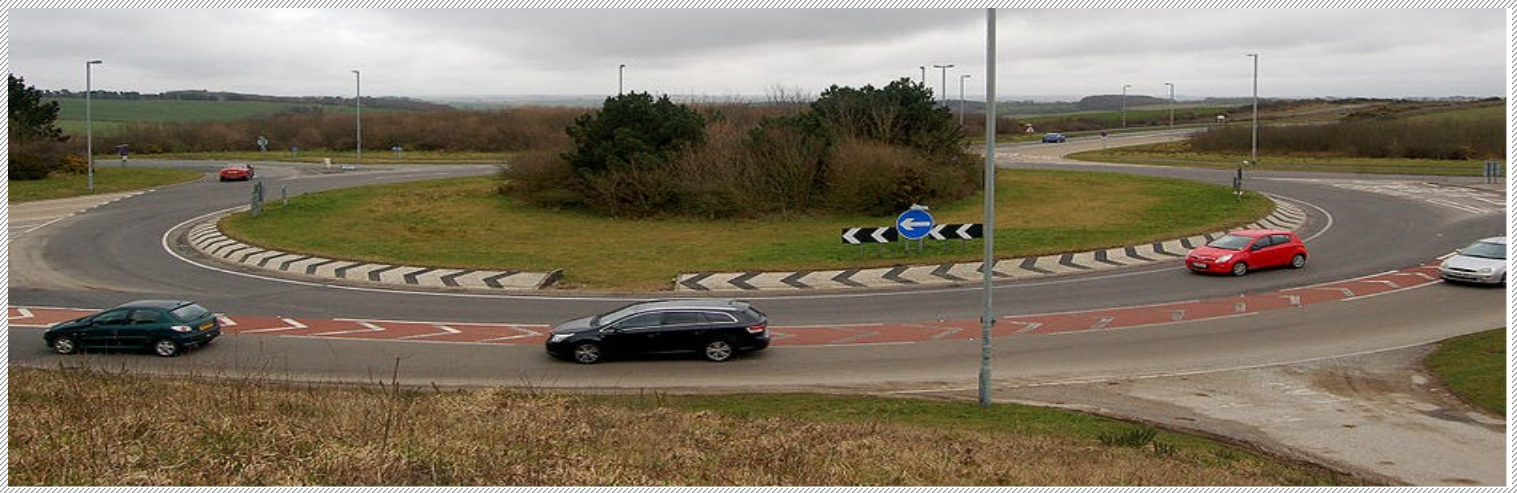
Cyclists (Continued)





Capacity & Delays

- Single-lane roundabout: approximately 20,000 to 26,000 vehicles per day
- A two-lane roundabout: approximately 40,000 to 50,000 vehicles per day
- Decrease delays because they don't require a complete stop
  - Pedestrians can cross at any safe gap
    - When busy, the slow speeds of entering cars can compensate for lack of gaps
- Several software packages exist to help with calculating capacity and queues
  - ARCADY, RODEL, and SIDRA INTERSECTION



Public Opinion

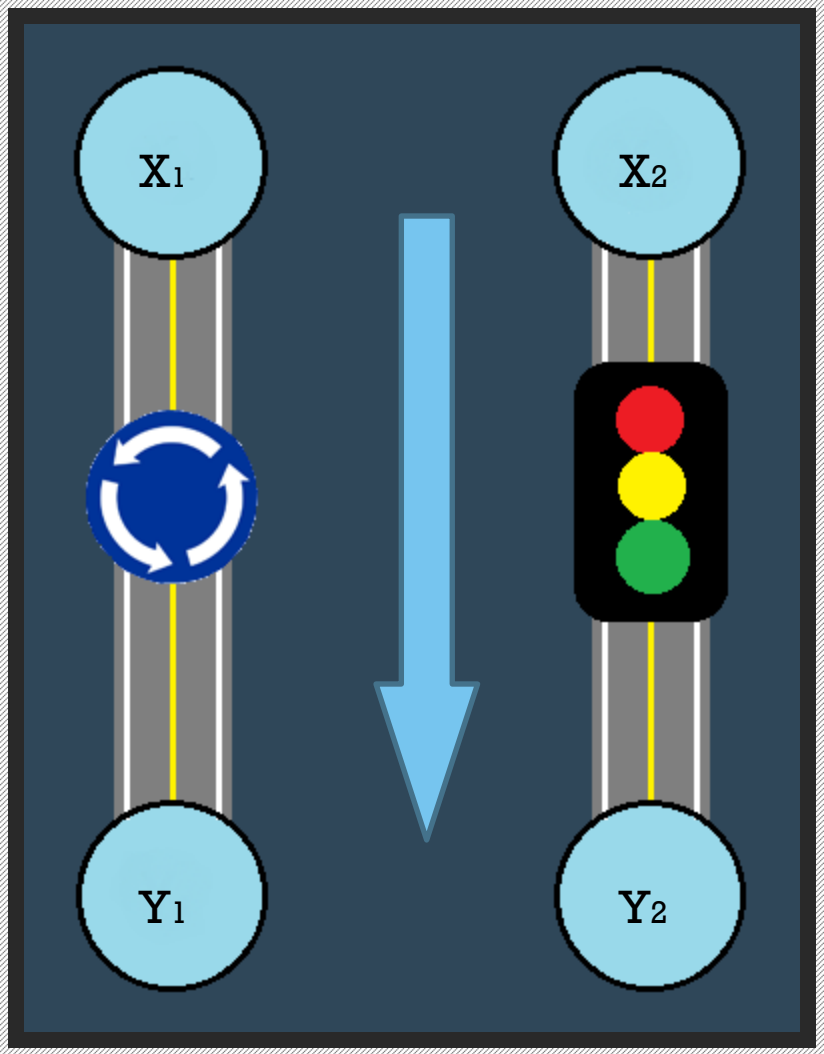
- New roundabouts often are met with some degree of public resistance

- Surveys show that public opinion improves as drivers gain more experience

	Before Construction	After Construction
Strongly Favor	16%	32%
Somewhat Favor	15% (31%)	31% (63%)
Don't Know	14%	9%
Somewhat Oppose	14%	13%
Strongly Oppose	41% (55%)	15% (28%)

Traffic Flow

Roundabout vs. Traffic Light

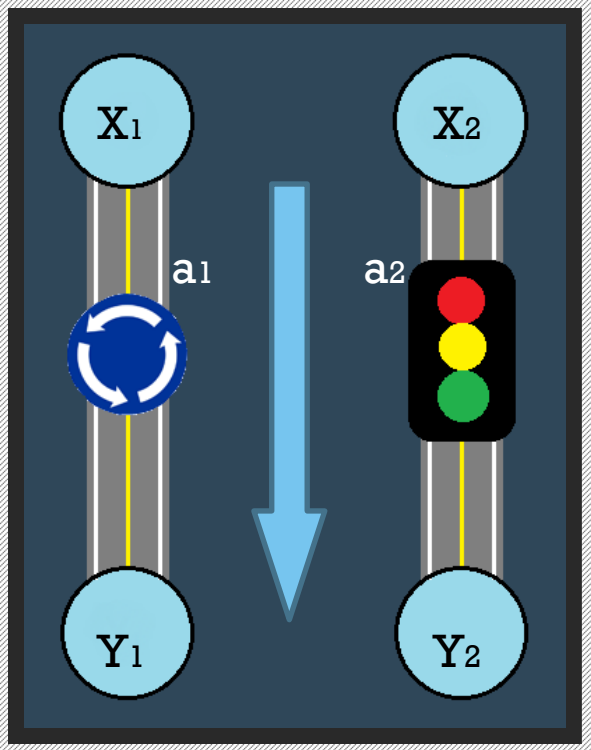


Traffic Flow

- Roundabouts increase traffic capacity by about 40% over traditional intersections.
- Observation: During heavy traffic flow over a 30 minute period, 200 cars got through a traffic light in one direction.
- Each car took 9 seconds on average to make it through the intersection.
- This means 280 cars would make it

Traffic Flow

- 40% increase in traffic capacity = 40% reduction in variable traffic costs.
- 30% time savings = 30% reduction in fixed costs.



$Ca_1 = 6fa_1 + 7$

$Ca_2 = 10fa_2 + 10$

When flow is…

$fa = 2$ (for links 1,2)

$Ca_1 = 19, Ca_2 = 30$

- 37% User Cost Savings

$fa = 10$

$Ca_1 = 67, Ca_2 = 110$

- 39% User Cost Savings

$fa = 50$

$Ca_1 = 307, Ca_2 = 510$

- 40% User Cost Savings

Special Types

- Gyratory systems
- Mini-Roundabouts
- Raindrop Roundabouts
- Turbo Roundabouts
- Motorway Roundabouts
- Controlled Roundabouts
- "Magic" Roundabouts
- Roundabouts with Trams
- Roundabouts with Railways
- Hamburger / Cut-Through Roundabout

Mini-Roundabout

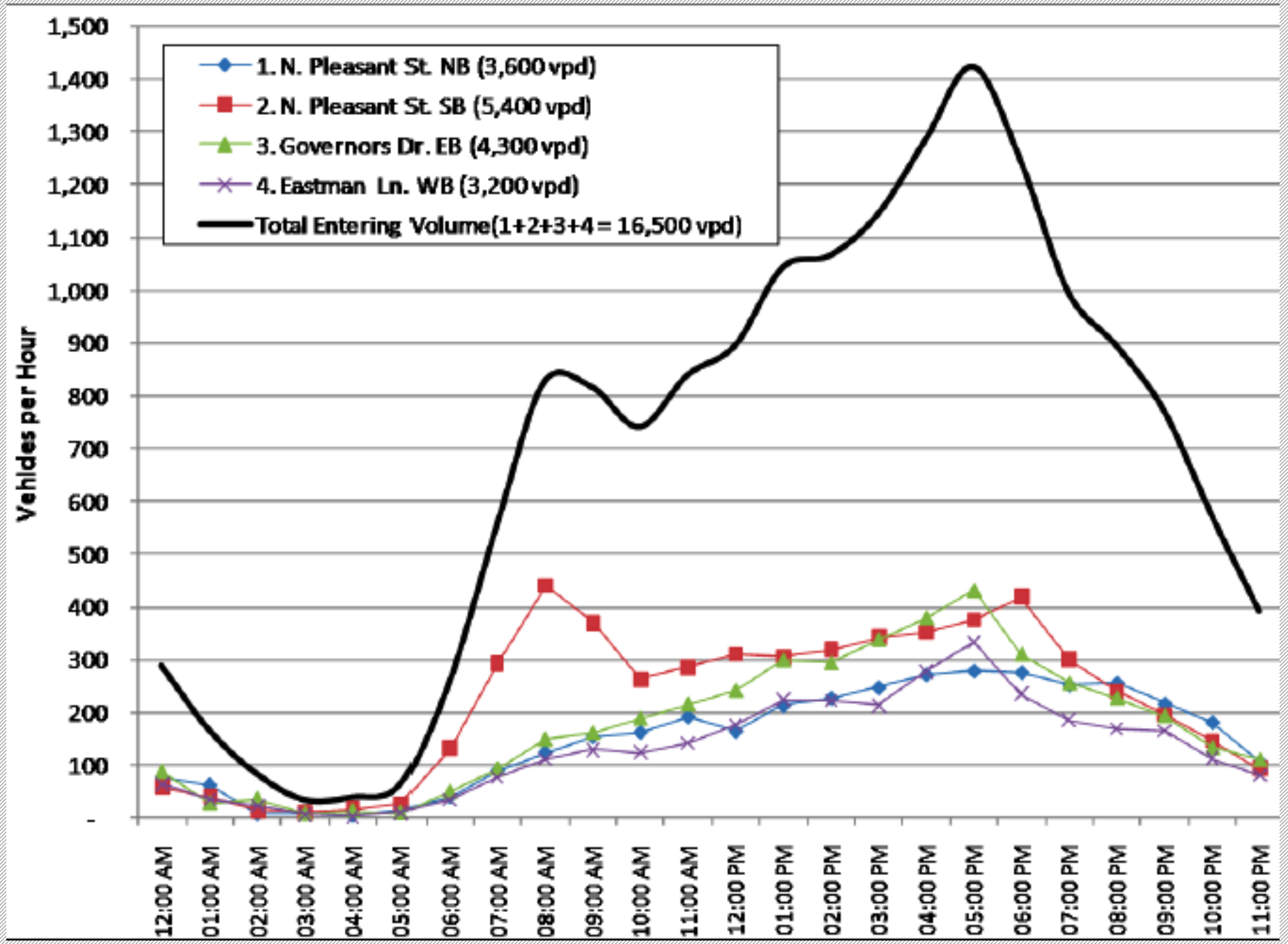
Controlled Roundabout

Raindrop Roundabout

Magic Roundabout

UMASS Roundabout

- North end of campus at the intersection of Governors Drive, North Pleasant Street and Eastman Lane
- Processes more than 15,000 people everyday


1. N. Pleasant St. NB (3,600 vpd)
2. N. Pleasant St. SB (5,400 vpd)
3. Governors Dr. EB (4,300 vpd)
4. Eastman Ln. WB (3,200 vpd)
Total Entering Volume(1+2+3+4 = 16,500 vpd)
Vehicles per Hour
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
-
12:00 AM
01:00 AM
02:00 AM
03:00 AM
04:00 AM
05:00 AM
06:00 AM
07:00 AM
08:00 AM
09:00 AM
10:00 AM
11:00 AM
12:00 PM
01:00 PM
02:00 PM
03:00 PM
04:00 PM
05:00 PM
06:00 PM
07:00 PM
08:00 PM
09:00 PM
10:00 PM
11:00 PM

UMass Roundabout

- $9.5 million utilities project
- Single-lanes, <= 20 miles per hour
- Slightly raised crosswalks for pedestrians and suitable space for bicyclists.
- More efficient way to bring cars, bicycles and pedestrians through the intersection
- Extensive traffic studies indicate that a roundabout design will result in:
  - Greater safety for drivers, pedestrians and cyclists
  - More efficient than a conventional


Thank you!