



# City of Nashua Transportation Toolkit: Traffic Control Devices, Signals and Roundabouts

March 2008

#3062-185



## City of Nashua



# Overview

This presentation will:

- Provide a Traffic Signal Primer
- Discuss purposes and types of traffic control devices
- Describe the purpose and application of roundabouts



# Signage

- Manual on Uniform Traffic Control Devices (MUTCD) is the guiding document for traffic signage.
- Safety, regulation, warning and direction
- Must fulfill a need, command attention, convey a clear and simple meaning, command respect from road users and give adequate time for a response
- Located where traffic engineering data specifies
- For vehicles, pedestrians and cyclists



# Pavement Markings

- The MUTCD guides agencies in the color and types of markings that can be used to mark the roadways.
- The MUTCD also establishes guidelines for the widths and patterns of pavement marking lines.



# Pavement Markings

## Lines

- White lines delineate the separation of traffic in the same direction or mark the right edge of pavement.
  - Solid white line = crossing the line is discouraged
  - Double solid white line = changing lanes is prohibited
  - Dashed white line = changing lanes is allowed
  - Fog line = white lines along the edge of the road marking the outer edge of a roadway



# Pavement Markings

## Lines

- Yellow lines delineate the separation of traffic in opposite directions or mark the left edge of the pavement on divided roadways, one-way streets, and ramps.
  - Double solid yellow line = passing in both directions prohibited
  - Solid yellow line = a no passing zone when it lies immediately to the left of the lane
  - Dashed yellow line = passing vehicles allowed when it is safe to do so



# Traffic Signal Advantages



- Provide for the orderly movement of traffic
- Increase the traffic-handling capability of an intersection
- Reduce frequency and severity of some types of accidents
- Interrupt heavy traffic flow which allows other traffic to cross
- Can be coordinated to provide consistent flow along a corridor



# Traffic Signal Disadvantages

If improperly designed and installed:

- Sometimes cause excessive delay
- Excessive disobedience of the signal indications
- Increased diversion of traffic to less adequate routes in order to avoid the signal
- Significant increases in the frequency of collisions (especially rear-end collisions)





# Traffic Signal Warrants

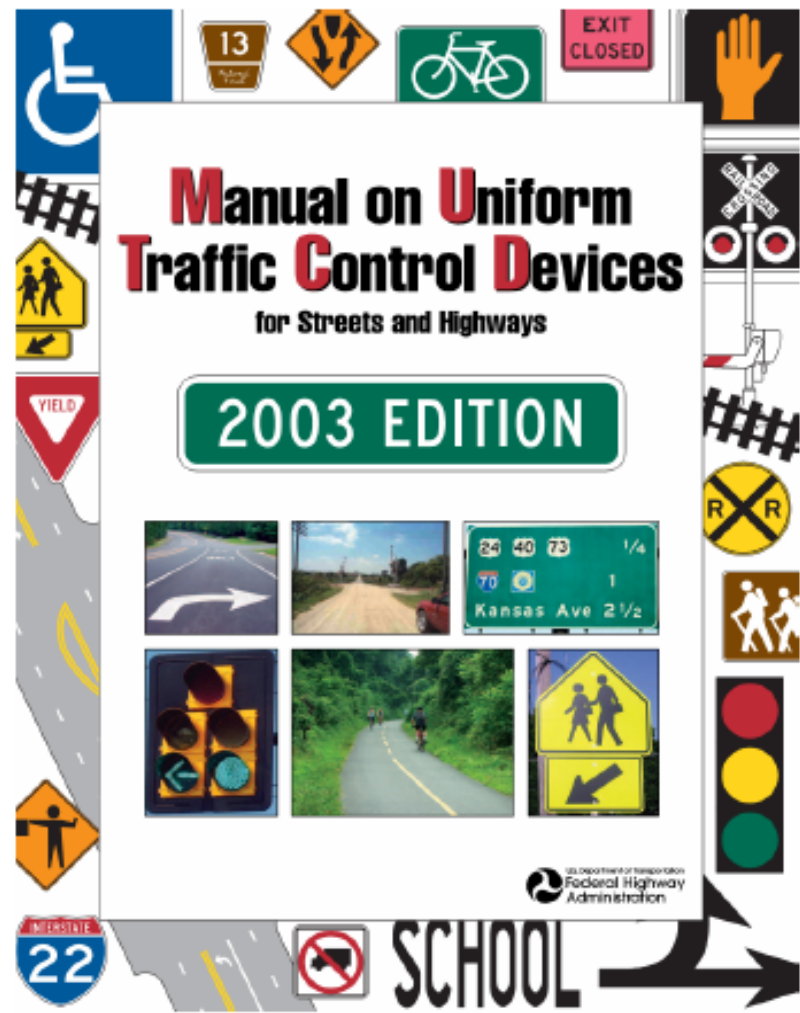
- The installation of a traffic signal requires a *Signal Warrant Analysis*.
- Circumstances that justify the installation of a traffic signal include:
  - Accident experience
  - Pedestrian crossing
  - School crossing
  - Peak-hour traffic volume





# Traffic Signal Warrants

1. Warrant 1, Eight-Hour Vehicular Volume: vehicle volume thresholds for 8 hours on an average day
2. Warrant 2, Four-Hour Vehicular Volume: vehicle volume thresholds for 4 hours on an average day
3. Warrant 3, Peak Hour: vehicle volume threshold for one hour on an average day (unusual cases only, e.g. manufacturing plants)
4. Warrant 4, Pedestrian Volume: pedestrian volume threshold
5. Warrant 5, School Crossing: school children crossing the major street
6. Warrant 6, Coordinated Signal System: when an additional signal is needed
7. Warrant 7, Crash Experience: severity and frequency of crashes warrants a signal
8. Warrant 8, Roadway Network:





# Traffic Signal Options

Traffic signals are not always the most appropriate solution for controlling traffic at an intersection. Other options include:

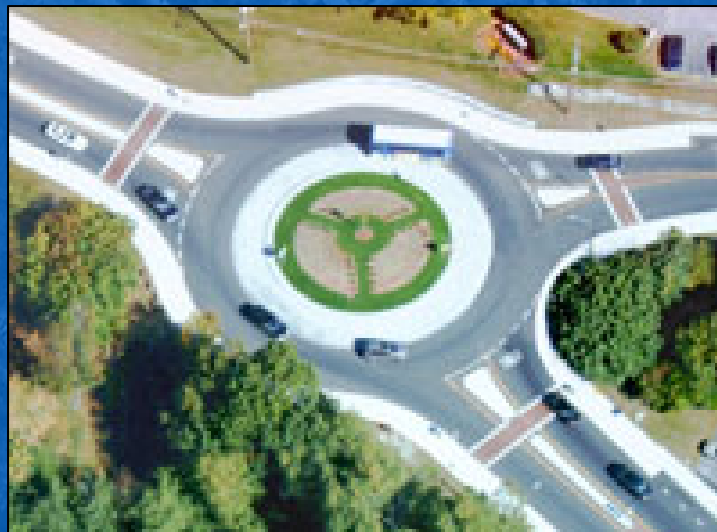
- Installation of signs along the major route warning motorists of the approaching intersection
- Installing flashing beacon to supplement stop sign control
- Installing a roundabout
- Various other options





# Roundabouts

- What is a roundabout?
- What are the advantages of roundabouts?





# Roundabouts

- A roundabout is a circular one way intersection.
- A roundabout IS NOT a traffic circle or rotary.

## Traffic Circles and Rotaries

- Generally designed before 1950
- Large diameter-400 ft or more
- Designed to allow high volumes of traffic to enter, traverse and exit without losing speed

## Roundabouts

- Generally built after 1990
- Small diameter- 100 to 200 ft
- Designed to reduce traffic speed entering and traveling in roundabout
- Replacement for stop signs or traffic signals





# A Roundabout is not a Traffic Circle

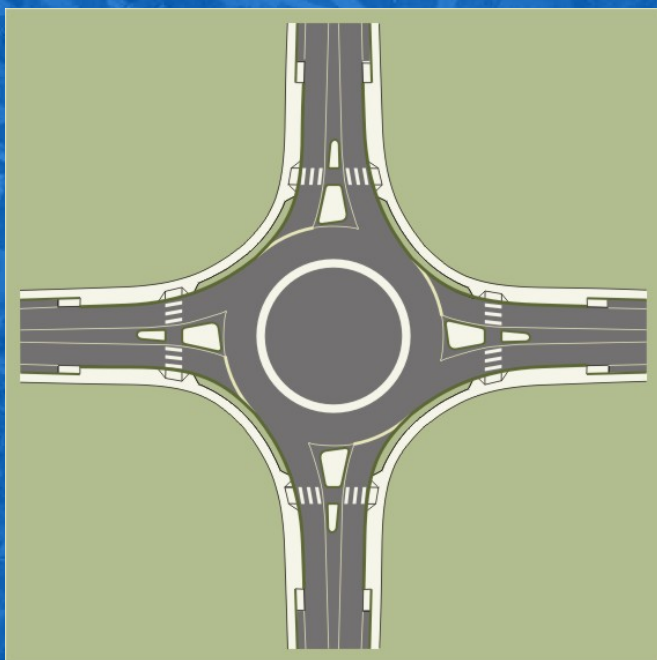


Source: NHDOT Bureau of Highway Design





# The Modern Roundabout



- The modern roundabout includes many design features that make it a safe and effective means of controlling traffic at complex intersections.
- The diameter of the inner circle creates a tight turn that requires drivers to slow down in order to navigate.
- Curved entry ramps and triangular splitter islands, located where the road meets the roundabout also force drivers to enter the roundabout more slowly.
- Well defined crosswalks allow safe pedestrian crossing. The splitter islands serve double duty as crossing islands, providing a place to wait in the middle of the street until the way is clear.

Source: NHDOT Bureau of Highway Design





# Advantages of Roundabouts

Replacing traffic lights or stop signs with a roundabout can:



Main Street roundabout in Nashua

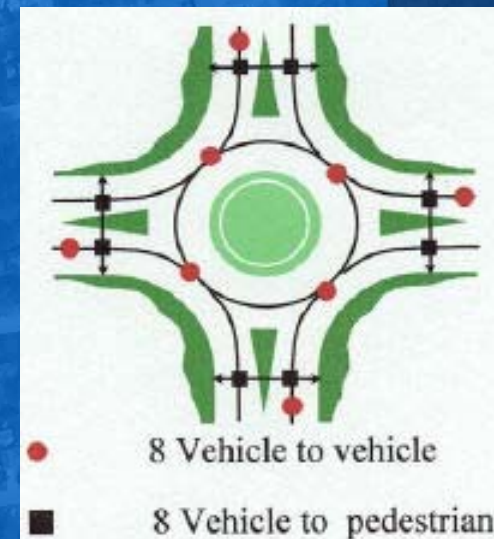
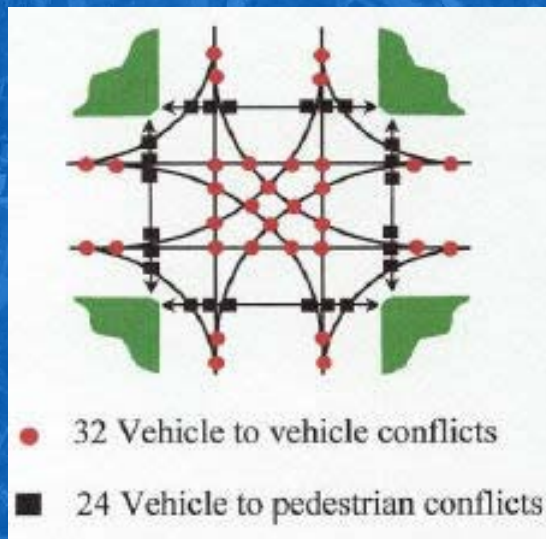
Source: NHDOT Bureau of Highway Design

- Improve safety
- Improve efficiency
- Provide safe access for pedestrians and cyclists
- Provide traffic calming
- Create a space for decorative plantings
- Lower maintenance than a signal



# Roundabouts and Crash Reduction

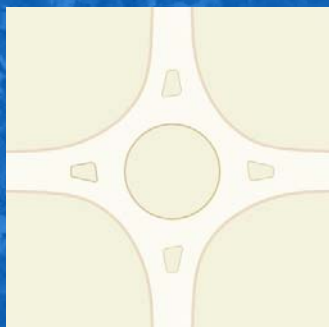
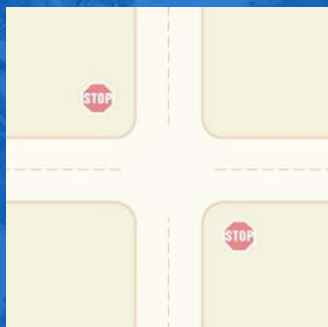
- The geometry of a four-way intersection creates nearly 60 conflict points.
- Replacing the intersection with a roundabout creates 16 conflict points.



Source: NHDOT Bureau of Highway Design



# Roundabouts and Crash Reduction



- In an urban environment, replacing a two-way stop sign intersection with a roundabout reduced the number of crashes from 143 to 102.
- The severity of crashes that did occur were reduced because of slower driving speeds in the roundabout.
- Injuries resulting from crashes were reduced by 81% because all vehicles must slow and yield when entering the roundabout.

Source: NHDOT Bureau of Highway Design





# Roundabouts and Congestion Reduction

- Traffic must only yield upon entering the roundabout, not come to a complete stop.
- Cars are constantly being filtered through the roundabout.
- Roundabouts result in an 89% reduction in traffic delays and a 56% reduction in stopped traffic (Insurance Institute for Highway Safety).



# Roundabouts in New Hampshire

Hanover (2)– NH 10 8,000 ADT

Keene – Court Street 10,000 ADT

Keene – NH 101 (Const.) 50,000 ADT

Meredith – US 3/ NH 106 (Const.) 14,000 ADT

**Nashua – Main Street 12,000 ADT**

**Nashua – NH 130 Broad Street 16,000 ADT**

Pelham – Town Center 21,000 ADT

Pembroke – US 3 (Design) 17,000 ADT

Plymouth – US 3/NH 175A (Const.) 12,000 ADT

Rye – Foyes Corner (Const.) 20,000 ADT

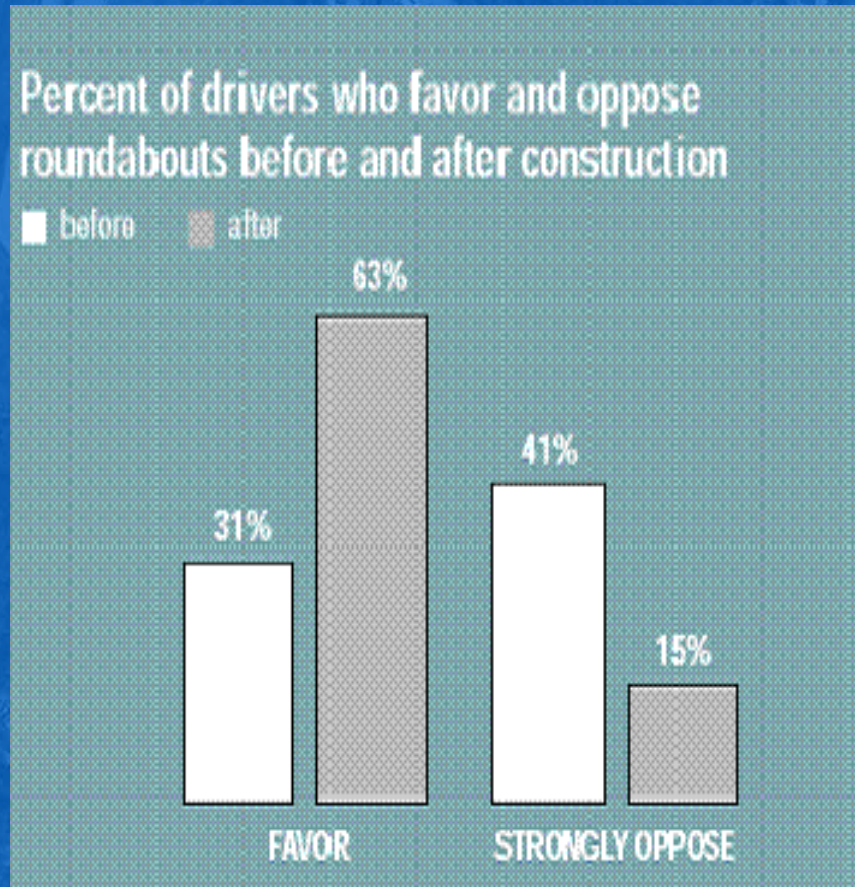


# Roundabouts and Public Opinion

- Often are undesired by public, initially
- Fear of the unknown, possibility of confusion while on the roundabout and negative experiences with rotaries commonly cited as reasons for objection
- With use, the ease, safety and efficiency of roundabouts often adjusted public opinion



# Roundabouts and Public Opinion



Source: Insurance Institute for Highway Safety, Status Report 36:7 (2001) 3



# Before – College St., Asheville, NC





# After - College St., Asheville, NC







Questions or Comments?

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