

# Modern Roundabouts

An Informational Presentation Prepared For:

Transportation Research Board Roundabout Conference  
Vail, CO May 2005

*“Roundabout implementation in constrained urban environment -  
achieving proper design while minimizing impacts”*



**BY : Mark T. Johnson, P.E.**

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# Presentation Outline

- Review 4 Case Studies of how roundabouts achieved transportation solutions
  - Illustrate the 'Principle' Based Design Methodology utilized to achieve these solutions
  - Demonstrate that roundabouts are not homogenous and require proper design for optimal operations
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# Case Study #1

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# *Mount Horeb, WI*

## Problem Statement

- Traffic ~2,000 VPH
- 6% Heavy Truck
- Average 7 crashes per year
- Signals knocked down 2-3 times per yr



# *Mount Horeb, WI*

## Problem Statement

- Poor Pedestrians Mobility
- Peak Hour Congestion (LOS D-F)
- Business Access Not so good



# Alternatives Evaluation

## Conceptual Design

Signalized

Roundabout



# Mount Horeb, Wisconsin STH 78/92

## Roundabout Alternative

### Modern Roundabout Improvement

- » PROS
- » Avoids Residential Impacts
- » Preserves Business Access
- » Provide Future Capacity
- » Truck Movements Improved



**GUEST COLUMN**

# Beware the scourge of traffic circles

By Robert A. Hall

**T**he Wisconsin State Journal tried to disguise the bad news by using a British word to make it sound quaint. But the headline Saturday — “Mount Horeb to get first roundabout in the county” struck ice in our hearts.

We are refugees from that quintessential East Coast state, New Jersey. And trust me, it's not the Sopranos that make the Garden State frightening — it's the traffic circles.

# OPINION

Wisconsin State Journal

Rotaries!

Sopranos!

Dentistry!

Make no mistake, what they plan to build in gentle Mount Horeb is a traffic circle. You'll find traffic circles widely used out East, though once you get into New England, they're called “rotaries.” All are bad, but none are worse than New Jersey's. If you've seen the movie with a vacationing family stuck endlessly rounding a traffic circle, you know what I mean.

turn left. Don't say we didn't warn you.

*Hall is executive director of the American Academy of Cosmetic Dentistry in Madison.*

# NJ - Rotary

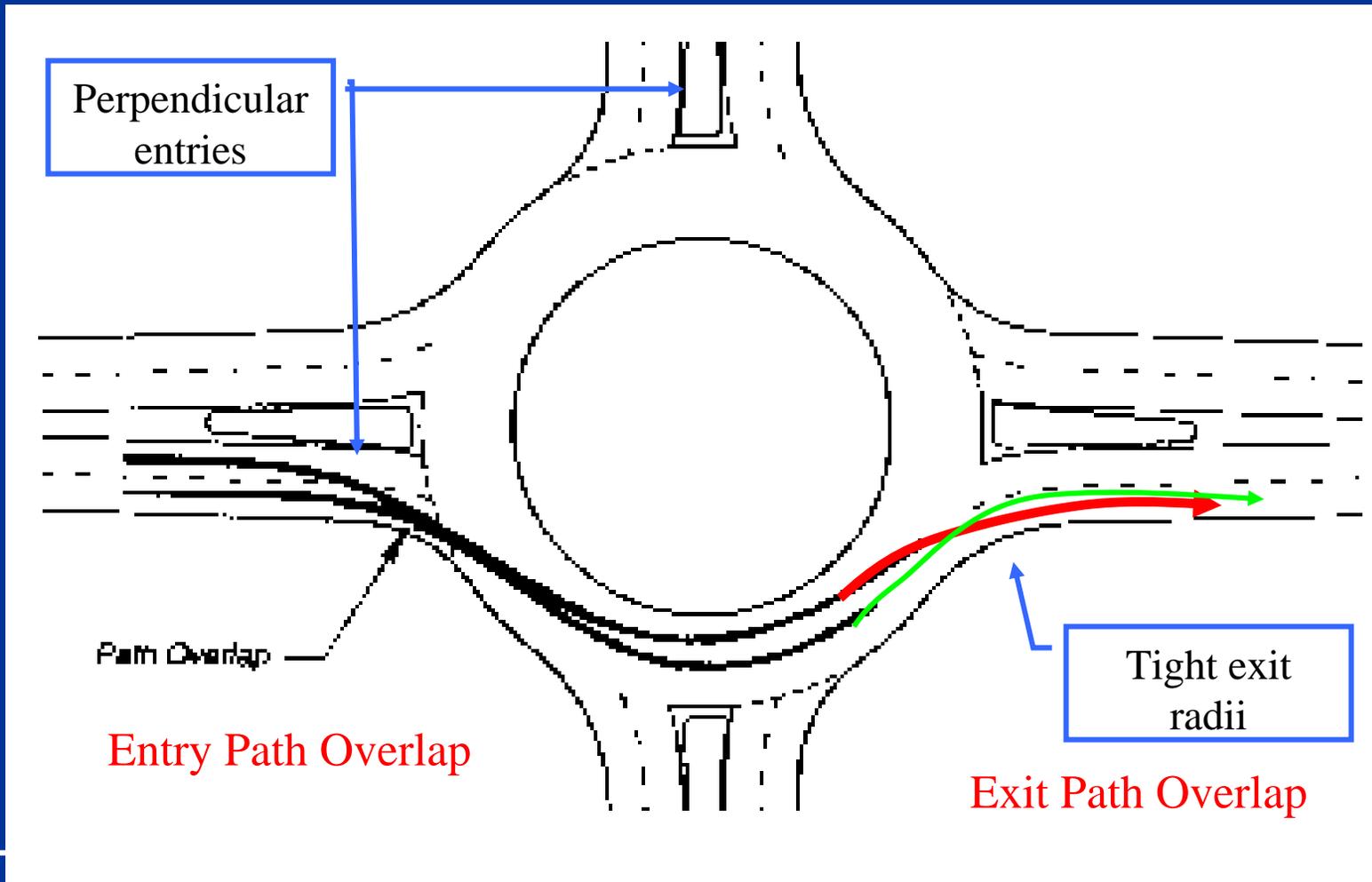
Trenton, NJ



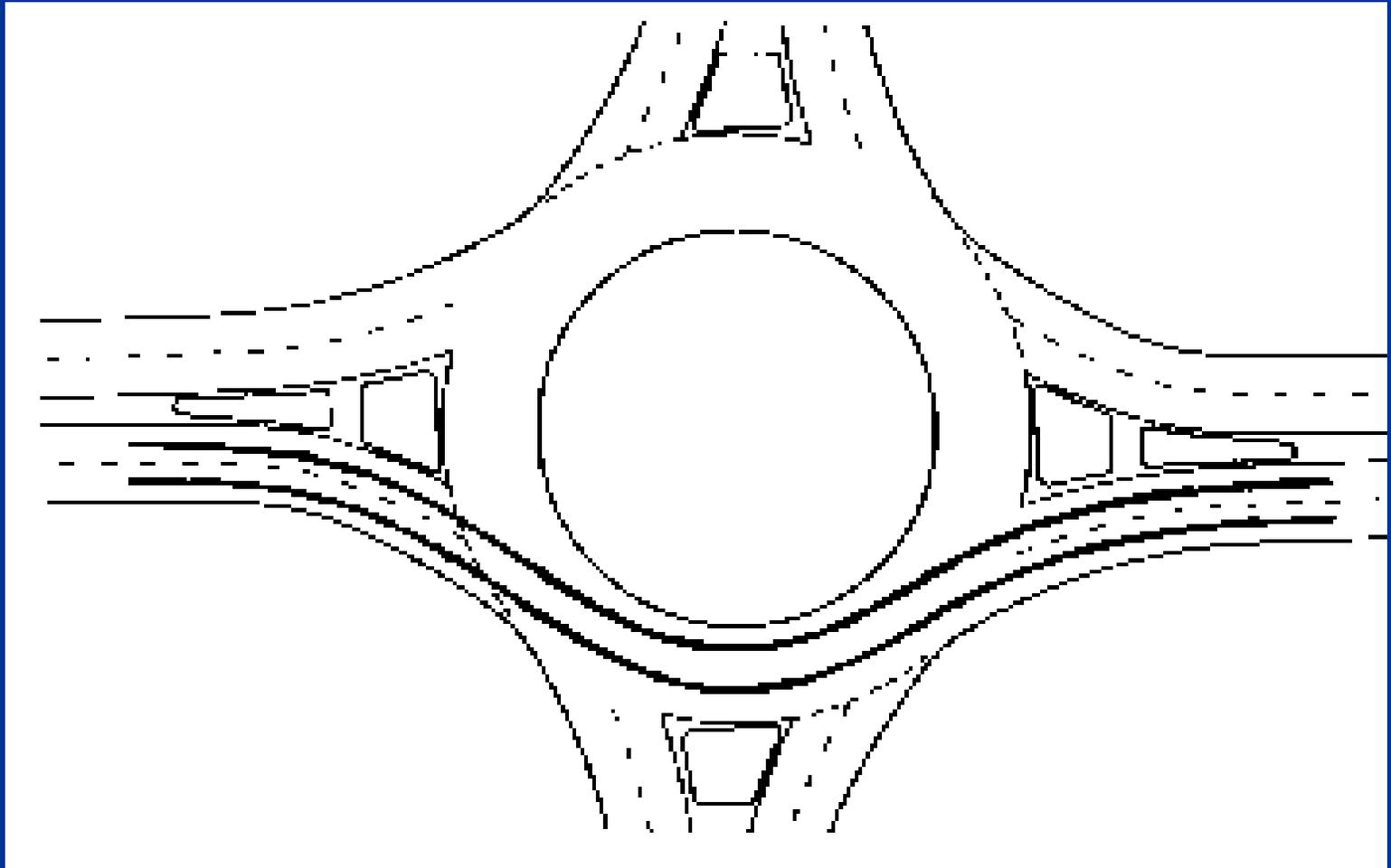
# Final Design

- Capacity & Geometric Refinement
  - Design for Trucks 6% (WB-62)
  - Ensure Sight Distances Envelopes
  - Utilities, Drainage, Vertical
  - Lighting, Signing , Markings
-

# Vehicle Path Overlap Sudden lane change



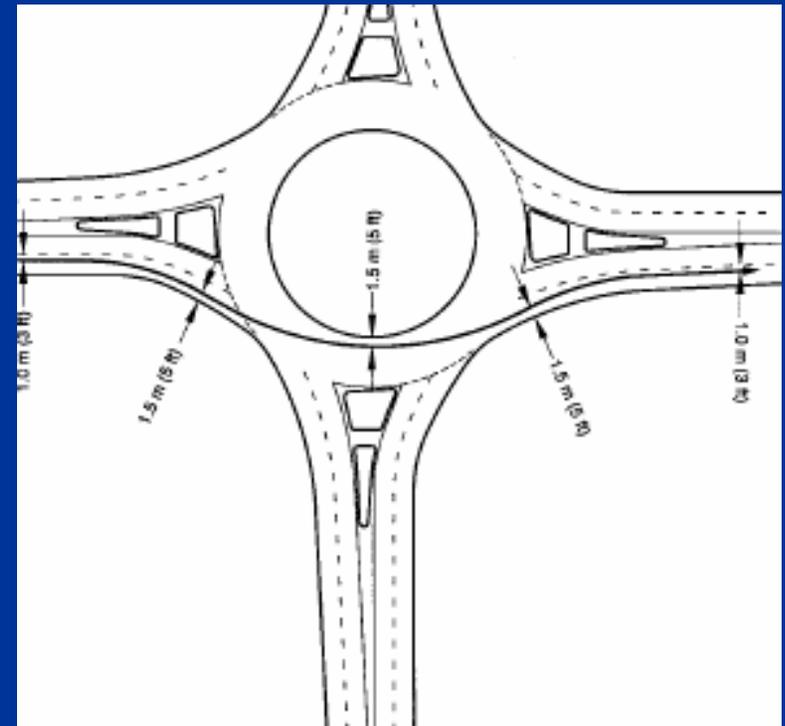
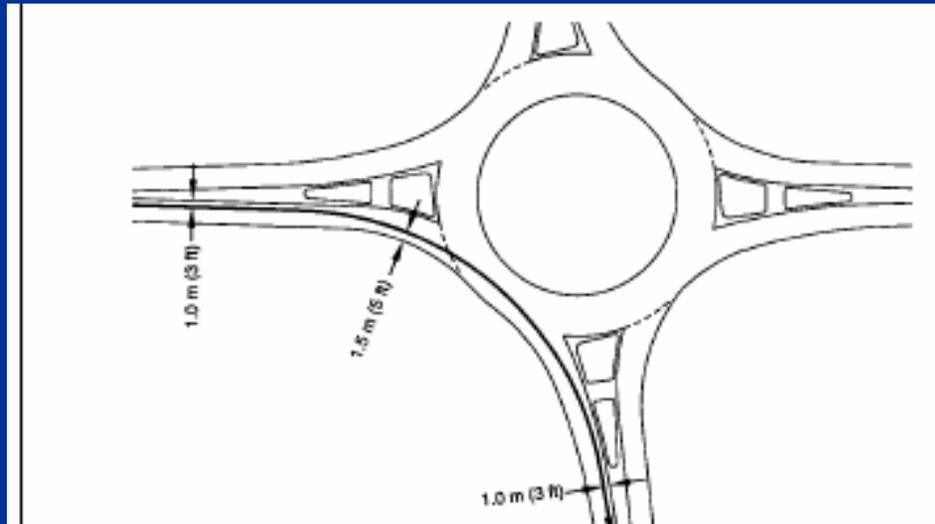
Correct Geometry is safe  
and provides full capacity



# Final Design

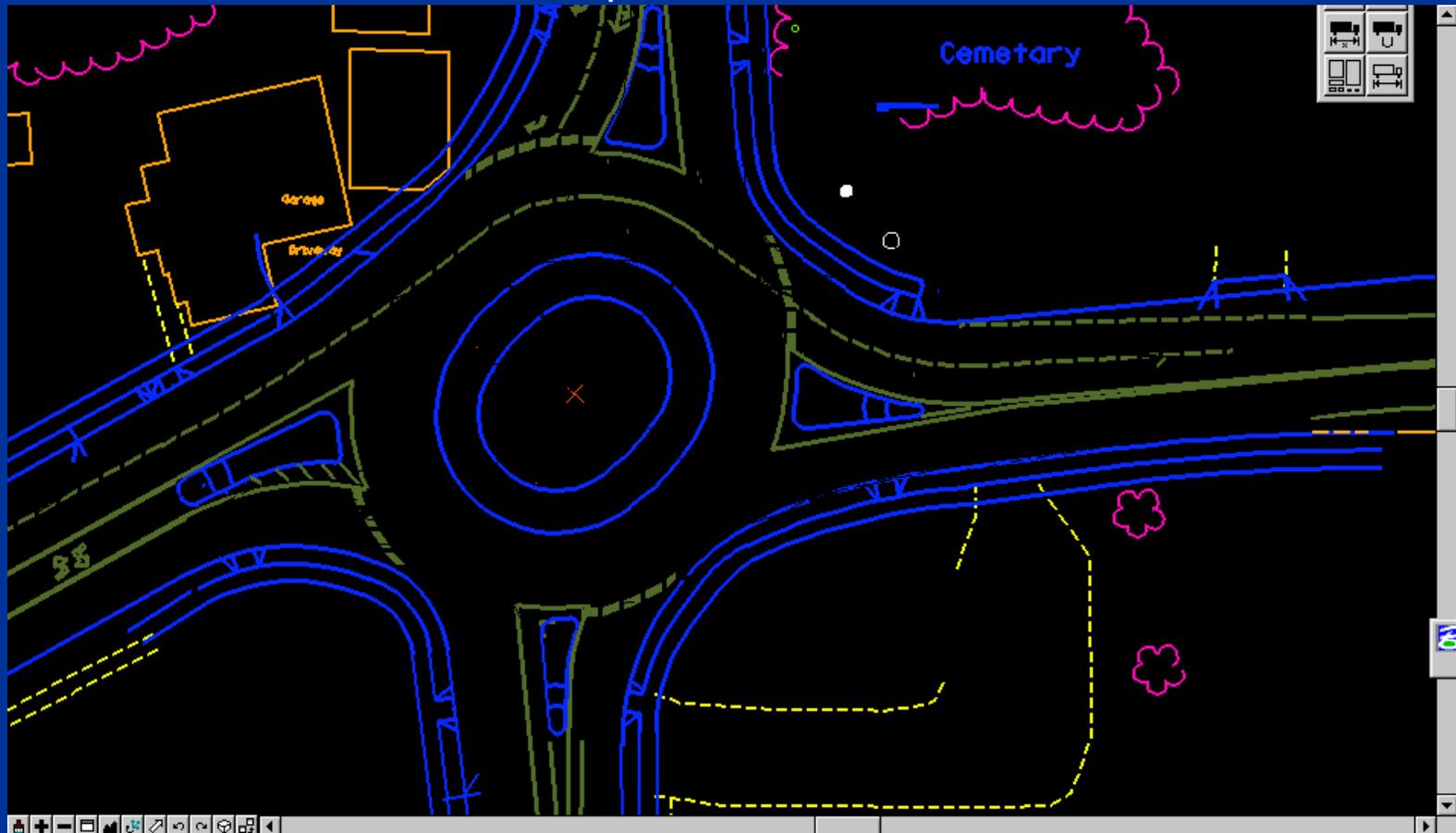
## Fastest Speed Paths

- FHWA Roundabout Geometric Guidelines -



# Final Design

## Fastest Speed Path Curves



# Final Design

Fastest Speed Path Curves



# Final Design

Accommodate Trucks L.T.



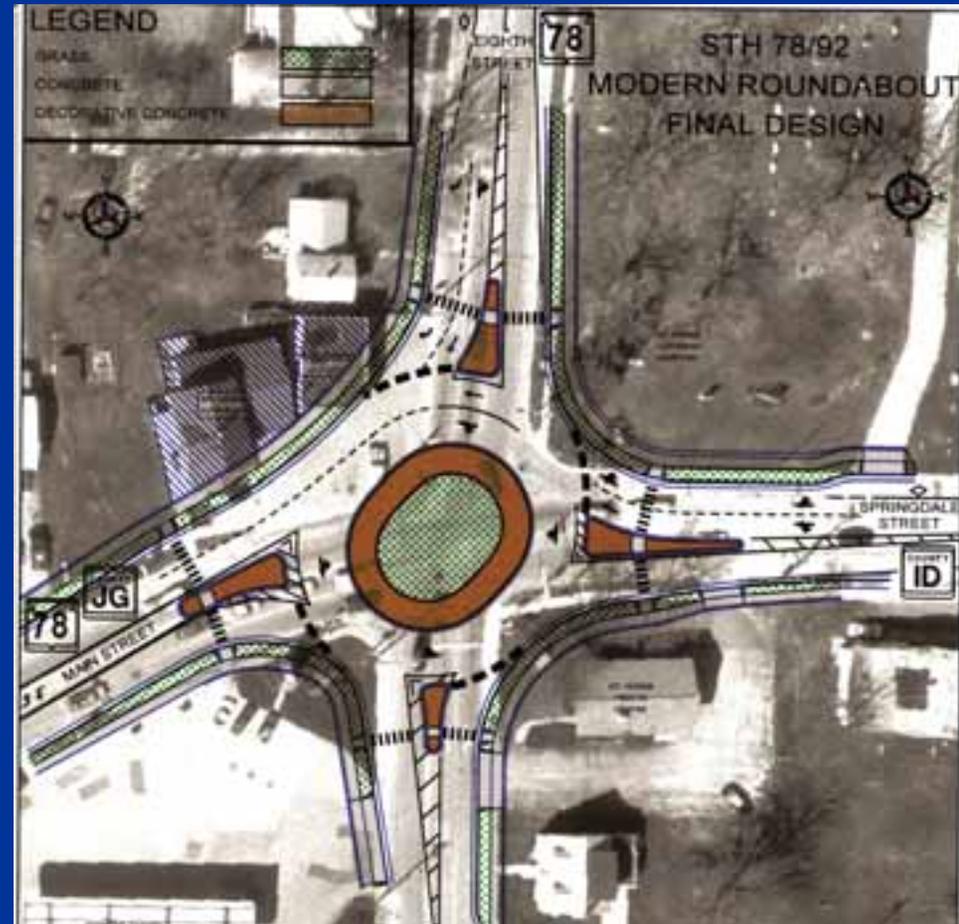
# Mount Horeb, Wisconsin

## STH 78/92

### Final Design

#### Principle Based Design

- » Non-circular
- » Varying width circulating roadway 24'-32'
- » Single and Multi-Lane entries
- » Use of standard pavement marking and signing



# Construction



- 60 (calendar) day construction schedule
  - Opened May 28<sup>th</sup>, 2004 on-time, on-budget
-

# Construction



Missed the guide dots by only 2-3 tenths substantially changed the radii and therefore direction of travel at entry...not good

Scrubbed off

Re-Painted

Poor guidance & creates "Entry Path Overlap"

# Mount Horeb, Wisconsin

Opening Day



# Mount Horeb, Wisconsin



# Mount Horeb, Wisconsin



# Mount Horeb, Wisconsin



# Mount Horeb, Wisconsin



# Mount Horeb, Wisconsin



- Truncated Domes
- Directional Grooving



# Mount Horeb, Wisconsin

## Pedestrian Comparison



# Mount Horeb, Wisconsin

## Pedestrian Comparison



# Mount Horeb, Wisconsin

Operational



# Mount Horeb, Wisconsin

Operational



# Mount Horeb, Wisconsin

Operational



# Mount Horeb, Wisconsin

- 1 fender bender since opening May 28<sup>th</sup>, 2004
- Community is planning 4 more on same road instead of signals



# Case Study #2

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# *Case Study*

## *Wisconsin Rapids, WI*

### *Existing Infrastructure*

*Constrained Urban*

*Safety/Capacity*

*Business/Residential Impacts*

*ROW*

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# *Wisconsin Rapids, WI*

Existing Condition

- Challenging Geometry
- Evaluate Alternatives
  - Costs
  - Operations
  - Business Impacts



# *Wisconsin Rapids, WI*

## Existing Condition

- Challenging Geometry
- Evaluate Alternatives
  - Costs
  - Operations
  - Business Impacts



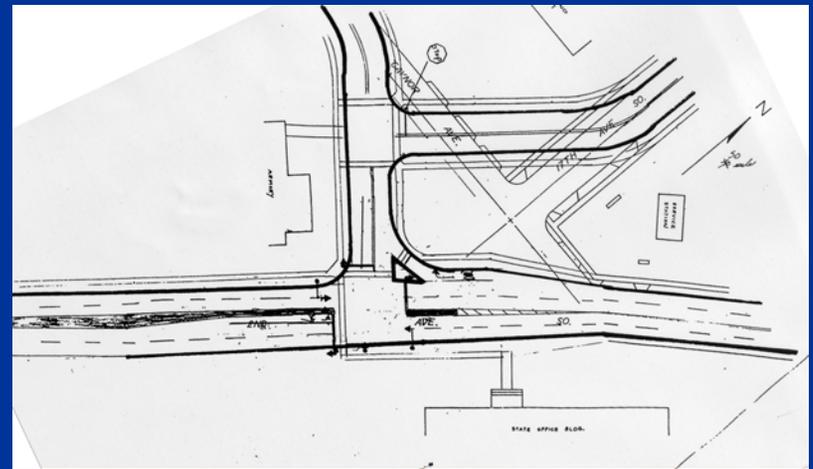
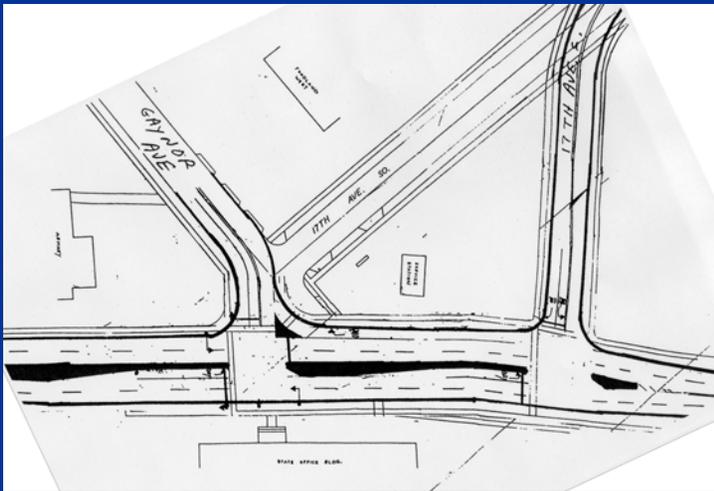
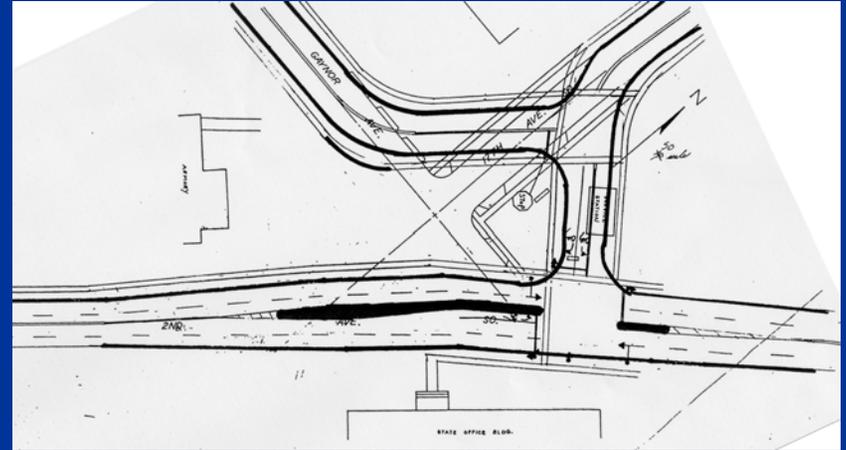
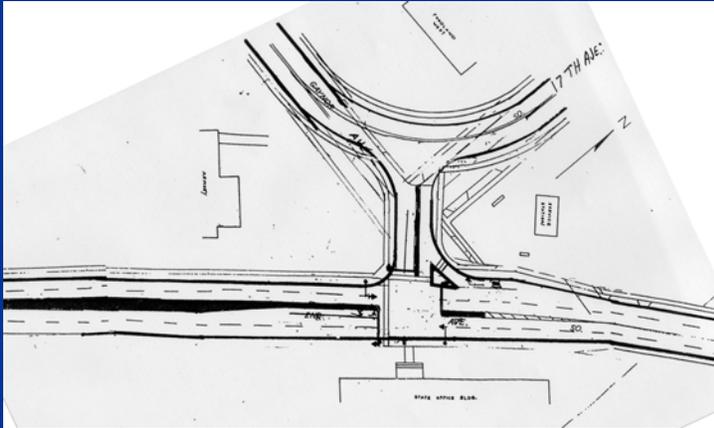
# *Wisconsin Rapids, WI*

Existing Condition



# Wisconsin Rapids

All Conventional Alternatives Create Substantial Residential and/or Business Impacts (High Cost)



# Wisconsin Rapids

## Roundabout



# Wisconsin Rapids Roundabout

## Testimonial

As a resident of the neighborhood for 55 years, Earl Keding, 82, figures the roundabout will control traffic flow.

"They've got it marked well and it'll help, because people will have to slow down some," said Keding, who took his turn around the intersection Tuesday.

"I went around it. It's not any worse than any other street."



# Case Study #3

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# Interchanges

Diamond Interchange  
Anchorage Alaska



# SYSTEM EFFECTS

Diamond Interchange  
Anchorage Alaska ~5,500 VPH



# Case Study #4

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# Case Study

## Highway 30/Thompson Drive

### Madison, WI



# Existing Conditions



- *Peak Hour Congestion and Delay*



## 3 Year Crash History

- *10 crashes per year*
- *8 serious injuries/yr*
- *1.2 crashes MEV*
- *80% Injury Crashes*

# Existing Conditions

*Peak Hour Congestion and Delay*



# Existing Conditions

*Missing Sidewalk / No Bike Lanes*



No Bike Lanes



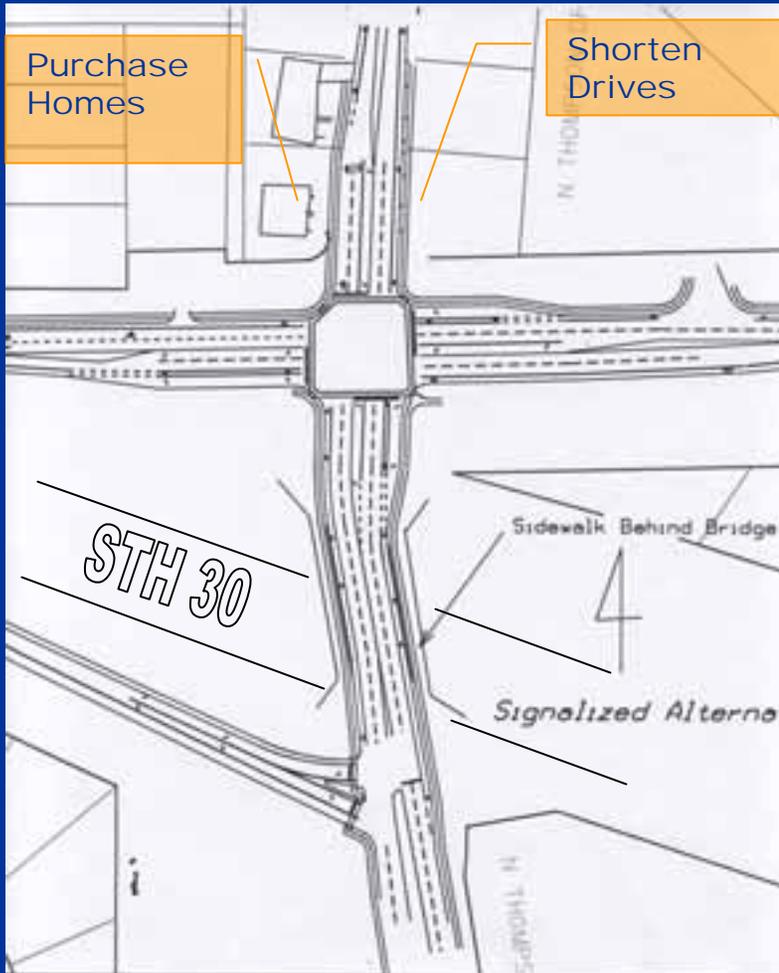
Poor Pedestrian Facilities

# Project Objectives

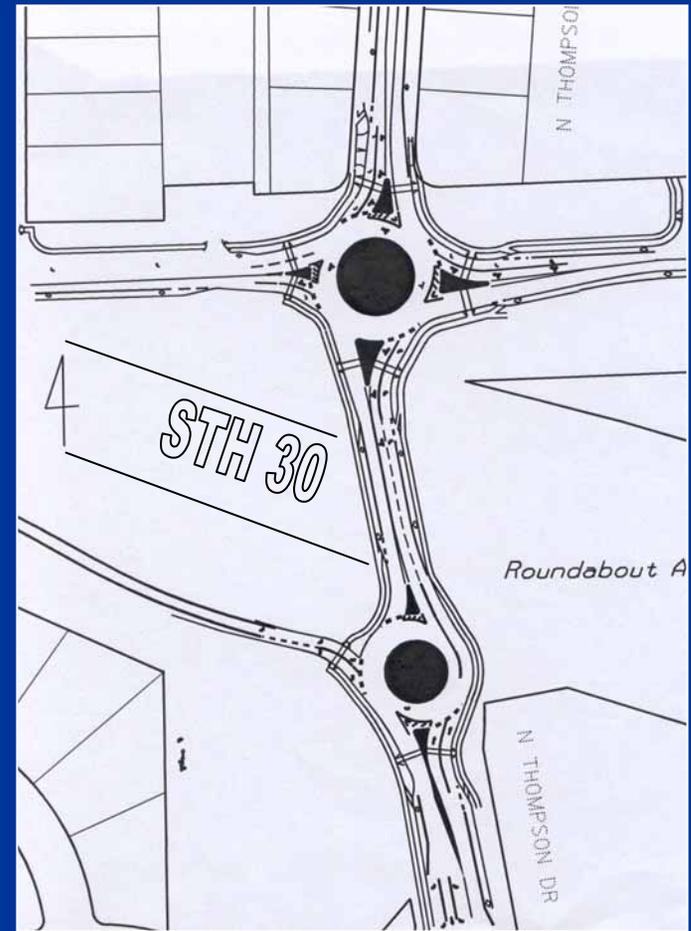
- Improve Safety for all Modes
  - Provide For Future Traffic Growth
  - Provide Pedestrian & Bicycle Connectivity
  
  - Minimize Residential Encroachment
  - Preserve Residential 'Character'
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# STH 30/Thompson Drive - Madison

## Signal Alternative

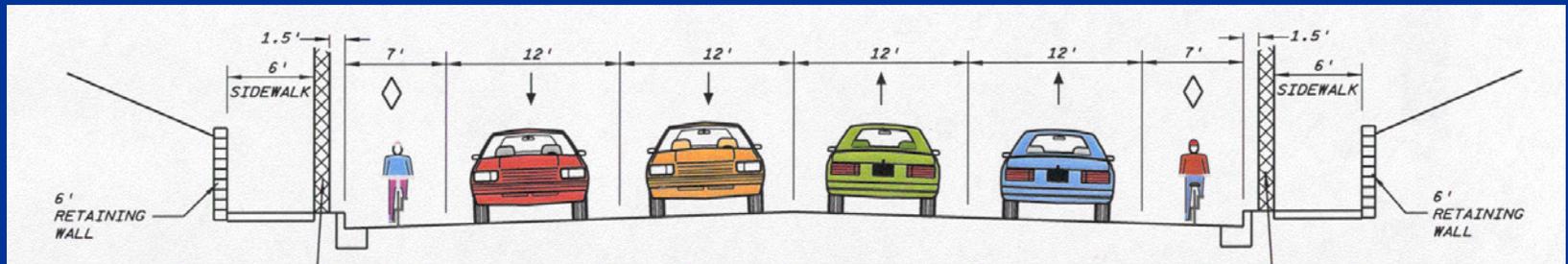


## Roundabout



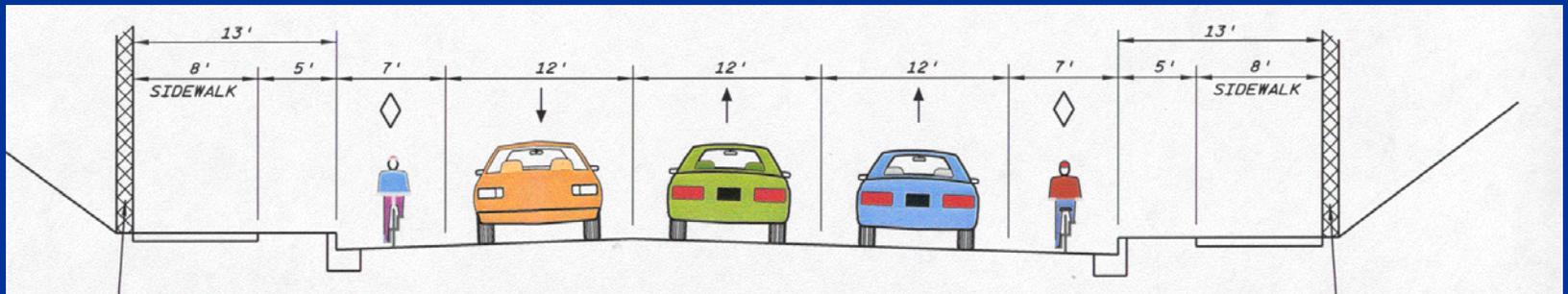
# Alternatives Analysis

*Signal Alt = 4-Lane Cross-Section*



# Alternatives Analysis

*Roundabout = 3-Lane Cross-Section*



# *Thompson Drive*



# *Thompson Drive*



# *Thompson Drive*



# *Thompson Drive*



# *End / Summary*

- Roundabout Design is Based on:
  - Traffic/Transportation Engineering Science and Principles
  - Alternative Analysis Necessary
  - Roundabouts are Not a Cure All
- Significant benefits can be achieved
- Correct Design Required for Optimal Operations