Performance Based Planning with Roundabouts
Traffic Planning Paradigm

Intersections are the TAIL wagging the proverbial DOG

Intersections Dictate, and Roundabouts are a game changer
Presentation Outline

A. **Operational Characteristics:** Opportunities presented with Roundabouts

B. **Project Examples:** Illustrate their Flexibility to achieve Solutions

C. **Application of Design Principles:** Ensure Successful well received projects
INTRODUCTION:

Performance Based Practical Design (PBPD) focuses on performance improvements that benefit both project & system needs.
Traffic Planning with Roundabouts

Operational Characteristics of Roundabouts:

1) Cross Section Widths
   - Dictated by *Signal Saturation* Rate Capacity
   - How many Signals per mile

2) Intersection Spacing Versatility
   - No Progression

3) Access Control Flexibility and Opportunities
   - Slower Speeds, less Queuing = Different Functional Areas
1) Cross Section Widening Comparison

Capacity at intersection with flared entries... = Reduced roadway/structure widening

NCHRP 672: 2.2.4 Spatial Requirements
Roundabouts present opportunities to re-shape the cross section of a corridor

Roadway widening cross section is dictated by signals
Cross Section Example

- **E** = Effective entry width
- **L'** = Flare length
- **V** = Approach roadway width
Cross Section Example

- 1 Lane Approach Roads
- 2-4 Lane Entries
Cross Section Example
2) Intersection Spacing

Operational Characteristics of Roundabouts:

• Progression Not An Issue with Roundabouts
• Can design each entry to address critical connecting queue length
Intersection Spacing Example

Project Team:
MTJ
Wisconsin DOT
Patrick Engineering
One Source Consulting
Intersection Spacing Example

70,000 sq. ft. Mixed Use Commercial Retail Development

600’ C-Store

Grocery Store
Intersection Spacing Example

30-40k ADT Design Year
10% Trucks, OSOW Route
3) Access Management with Roundabouts

Operational Characteristics of Roundabouts:

- Slower speeds and less queuing = **Different Functional Areas**
  - Driveway Access Spacing Flexibility (closer to w/o detrimental effects)
  - U-turn, left turn, RT all have same priority as through movement
  - Improved ingress/egress/circulation

![Diagram of traffic conditions and roundabout layout]

120 x 135' ICD
Access Management - Example

See video at: https://youtu.be/psxlqc89dXE
Roundabout Design and Optimization Example

Three-Lane Entry:

- 40K ADT
Traffic Planning with Roundabouts

Proposed Super Center
225,000 sq ft.
$30M Project
Vacant Land Assessed = $6M

Full or LT Access Precluded by proximity to signal
Traffic Planning with Roundabouts
Traffic Planning with Roundabouts

135' ICD
2. Flexibility
Existing Signal w/right in/out for Side Street
Traffic Planning with Roundabouts
5 Leg

Direct Access to Side street

& Streetcar

Greater Impacts
4 Leg
3/4 access + u-turn = good side street circulation

& Streetcar Line
Design Principles

Foundational Principles that Promote Safety for all modes

Key to Success is understanding and adherence to these Principles & Design Composition
Foundational Design Principles

Roundabout Design Principles

- Safety Speed Control
- Entry Angles’ (Phi, view angles)
- Maximize Angle between legs
- Driver Expectancy
- Context
Roundabout Design for Safety and Operations

Pedestrian Facilitation:

• Speed control – Foundational
• Wayfinding treatments enhancements
• Bollards
• Landscaping features to direct pedestrians to crossings
• Pedestrian crossing enhancements
• Ped Beacons – HAWK – RRFB
• Raised crossings

Photo by Ken Sides
Design Principles for Safety and Operations

Optimization

IH94 Cottage Grove WI
Design Principles for Safety and Operations

Optimization

IH94 Cottage Grove WI (Overlay)
Design Principles for Safety and Operations

- Ensure optimal safety and ease of use and comfort for all modes
- Incorporate operational benefits into our traffic planning/design processes
- Ensure public acceptance

Traffic Planning with Roundabouts
Practical Design
Traffic Planning with Roundabouts

Saved $20M

GHD/Omni-Means & MTJ Design
Saved $30M

GHD/Omni-Means & MTJ Design
Thank You/Questions

Mark T. Johnson, P.E.
MTJ Roundabout Engineering

- Key Contributor to WIDOT Roundabout Design Program
- Co-Author of FHWA 2010 Roundabout Guide
- FHWA Authorized P2P Reviewer