Roundabout Design Guides In Practice

Presents:

Roundabout Design Guides In Practice

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Three Sources of Knowledge

1) Design Guides
   - Excellent Resource ~ Not STANDARDS!
   - Guides are Mostly for SLR (Lack Correct Details on MLR)
   - Within are Some Good Principles of Design

2) Computer Models
   - Check Your Entry Lane Configurations (Bypass?)
   - Empirical Models (Also Theoretical Gap Models)
   - Mostly for MLR or Verifying SLR

3) Expert Heuristic Knowledge of Qualified Designer
   - Skill at using Guides and Models
   - Designs Using the Principles of Rbt Design (Not Standards)
   - Uses BOTH Sides of Brain for an Optimized Design

Rbt Guides in Practice

- Through All My Years of Designing Roundabouts & Writing Rbt Design Guides, I’ve Learned There are No Substitutes to Thinking Through a Rbt Design
  - Common Sense / Judgment
  - Good Composition
  - Use BOTH Sides of Brain (...See Presentation on CD)

- Engineering Nature is to Standardize Everything!
- Must Focus on the Principles of Good Rbt Design
- Use Guides as a Resource

Example of a Rule that should be Replaced by a Principle

Deflection Matters ~ Not Centerlines

Designer’s Composition

100% Designs

0% Rndabouts

Design Guides & Computer Models

Designer’s Composition

ACCEPTABLE

PREFERRED

UNACCEPTABLE

Alignment Offset Left
Radial Alignment
Alignment Offset Right

Many Engineers Justify BAD Designs w/ Guide’s Text
Many Point to Guides Improperly or as Standards
Design GUIDE not Design RULES!
“The Guide Says...”

- If a Number is Used in a Guide, is the Number Therefore Always Acceptable for a Design?
- Actual Design Review Case Study:
  - Some Guides State Circulatory Roadway Width 1.0 to 1.2 Times the Maximum Entry Width
    - 18’ Entry = 20’ Circulatory Roadway (Good)
  - Yet the Designer Used a 26.5’ Entry Width (Inappropriate for SLR = TWO 13’ lanes!)
    - 26’ Entry = 32’ Circulatory Rdwy (Guide Says)...
  - 32’ = Two-Lane Rbt!
  - Designer Justified 26.5’ Entry for Wb-67 Trucks
  - SLR < 18-20” and Work for WB-67 Trucks!
  - Again, Don’t Justify BAD Designs w/ Guide’s Text

Path Overlap?

- Does NOT Work!

Guide’s Idea on No Overlap

- NOT A Good Design Practice
- Does NOT Work w/out Good Entry Design
- Does NOT Ensure No Path Overlap!

Meets Guidelines... Does it Work?

- LW Not Equal - 14'/16’... Safer!
- CW Not Equal - 15'/17’... Safer!
- Centerlines Right of Center of Rbt
  - Yet Balanced 25mph Speeds & Good Deflection!
- No Entry Tangent
  - Yet No Path Overlap Either!

Doesn’t Meet Guide... Works!

- LW Not Equal - 14'/16’... Safer!
- CW Not Equal - 15'/17’... Safer!
- Centerlines Right of Center of Rbt
  - Yet Balanced 25mph Speeds & Good Deflection!
- No Entry Tangent
  - Yet No Path Overlap Either!
  - But it ALSO Works For WB-67’s Side By Side THROUGH Rbt Too! (NB & SB)
Thinking Through Trucks

WB-67
Stays In Lane
THROUGH
Roundabout
(Outside Lane)
US 93 / SR 89, Wickenburg, AZ
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Some Say This Can’t Be Done Without More Impacts...
Not True!

Do You Believe Everything Printed?

Some Guides Have Opinions
NOT Supported
By the Masses or Other Entities

Do You Believe Everything Printed?

Some Guides Have Opinions
NOT Supported By Facts

The Guide Says...

Focus On Principles

What’s the ICD?
(Several ICDs!)

What Circulatory Rdwy Width?
- SLR → 2 → 3

Entry / Exit Radii...

Trucks Work In Lane
No Issues!

US 60 / US 93, Wickenburg, AZ
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Focus On Principles

- Different Types of Roundabouts Require Different Design Techniques
- Different Design Methods Apply to Different Situations
- Different Site Issues/Req’mts = Different Solutions
- Designing Roundabouts Properly Are As Far as You Can Get From ‘Cooker Cutter’ Design OR as Specified in a Tables or Figures w/in Guides...
- Engineers Point to Guides Improperly or as Standards

Improper Use of Guides

- Guides Typically Address Model Situations
  - 90 Angles with 4 Legs at SLR
  - OR 2 Lane Entries, 2 Circ., 2 Exits For All 4 Legs
- How Often Does This Occur in Practice? – Rarely
  - Find in Guide Multiple ICDs, Ellipse, 5 Legs, skews...
- Engineers Often Limit Rbts To “The Guide”
- City of Springfield, Oregon stated: “We approve roundabout designs based on Design Principles... not specific standards.” This is Exactly Correct!

Thinking Through Rbt Design

Original Design (By Others)

REVISED Design (By RTE)

Cut & Paste From Guide?

- Be Careful of Figures in Guides... Use as INTENDED
- Often, They Are Not Actual Designs
- Yet I See Engineers Cut & Paste Figures As Designs OR They Warp Their Design To Match the Figure - Assuming It Will Function Properly!
- Guides Are Trying to Help the Designer
- Usually on a Specific Issue for Each Figure
- Don’t Manipulate Your Design to Match the Figure - Not Guide’s Intended Use!

Conclusions

- Guides Are Definitely Needed & Useful Resource
- But Guides Generalize & Cover Model Situations - 10% (?) of Actual Design Practice
- Most Intersections Have Unique Lane Configurations, ROW Constraints, Truck %’s, Skewed Angles, Etc...
- There is No Standard Rbt Design to Apply
- Don’t Assume Your Design Works Simply Because it Follows “The Guide”!

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Conclusions

- **I Fully Support Guides** (I Help Write Many)

- Guides Are A Conglomeration of Information
- Think of All Those Who Contributed & Help Write...
  - Other States, Other Design Experts, Etc...

- While Each May Be Capable w/in Specific Field, Using Parts from RTE, Parts From Kittleson, Parts From WisDOT, or Specifics w/in Guides, May Not Produce A Good Rbt Design or Even a Desired Result!

- Although I Support Guides...
- I Do Not Support HOW Guides Are Often USED
- I Do Not Support Many Specifics (#s/Figs) Shown
- Use the Guide as it is Intended (Reference/See Cover)
- Don't Justify a Poor Design With the Guide!

- Does the Design Work with **Capacity & Safety**?
- Does the Design Flow & Have Good Composition?
- These Things Matter Most! Then Check Details...

- Ask For Help With Anything Roundabout Related...

Roundabout Questions:

*Scott Ritchie, P.E., President*

***Roundabouts & Traffic Engineering***

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Designing & Implementing Roundabouts Nationwide

Fools the Best Reviewers

Original Design (By Others)