


Presents:

# Thinking Through Roundabout Design


Roundabout Specialist: **Scott Ritchie, P.E., President**



## Roundabout Design

- ◆ Through All My Years of Designing Roundabouts & Teaching the Principles of Roundabout Design, I've Learned There are No Substitutes to Actually **Thinking Through a Roundabout Design**
- ◆ Engineers' Quest for "The Standards"
- ◆ One Must Focus on the Principles of Rbt Design
- ◆ We Must Also Learn to Sense the Design or Experience the Rbt Design as a Driver


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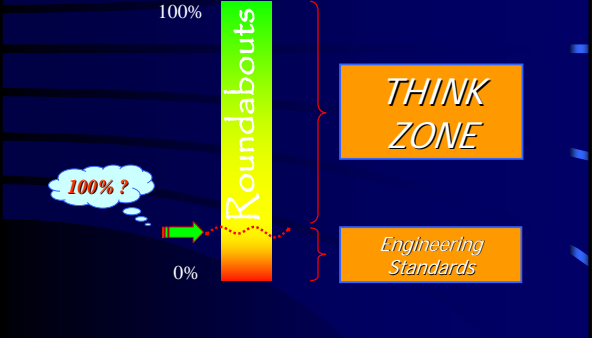
## Focus on Principles

◆ Good Rbt Design has:	◆ Good Roundabout Design has:
– Sound Engineering Stds	– Synergy
– Calculated Capacity	– Good Composition
– Measurable Safety	– Based on Design <u>Principles</u>
– Balanced Entry Speeds	– Smooth Entries and Exits
– Truck Capabilities	– Site Specific Design
– Specific Ped Facilities	– Properly Sized ICD / ICDs
– Proper <u>Deflection</u> (#1 key)	– Comfortable to the Public
– No Entry Path Overlap	– Positive Driving Experience
– Still Not Standardized	– No Cookie Cutter Methods
	– Not Simpler Design

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## Thinking Through Rbt Design



**THINK ZONE**

**Engineering Standards**

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## Holistic Design

- ◆ The Engineer's Focus on "The Standard" Hinders the Creative Process and Often Prevents the Finding of an Optimized Solution!
- ◆ Where is the "Comfort" Std? / Composition Std?
- ◆ How Does the Engineer Standardize Synergy?
- ◆ The Designer Must Think Through or **FEEL** a Roundabout Design as a Whole!
- ◆ To Be A Good Roundabout Designer, One Must Use BOTH Sound Engineering Practices AND a Holistic Design Approach

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## Synergetic Composition


- ◆ Holistic Design is Based on Synergetic Composition!
  - Synergy Means: "The Whole is Greater than the Sum of its Parts."
- ◆ Common Sense, Design Practices Focused on the Principles of Rbts, as well as Plenty of Experience and Design Practice are Critically Important!
- ◆ Field Time With Roundabouts is also KEY
  - Nothing Replaces Real World Experience!
- ◆ The Way to Achieve Synergy in Rbt Design is through the Creative Process...
- ◆ **The Designer Must Use BOTH the Left & Right Sides of the Brain!**

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**RTE** **Two Hemispheres of Thinking**

### Which Way is the Figure Rotating?

◆ Counterclockwise?  
(LT Arm & LT Leg Out)



◆ Clockwise?  
(RT Arm & RT Leg Out)

Video of Rotating Figure

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**RTE** **Can You Shift Your Brain's Current?**

◆ Counterclockwise or Facing Backward:  
(LT Arm & LT Leg Out)

◆ Clockwise or Facing Forward:  
(RT Arm & RT Leg Out)

◆ **Left Brain**

- Logical
- Sequential
- Rational
- Analytical
- Objective
- **Looks at Parts!**



◆ **Right Brain**

- Holistic
- Intuitive
- Random
- Synthesizing
- **Looks at Wholes!**

**Can You See It Facing BOTH Ways??**

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**RTE** **Combining Left & Right**

- ◆ Open Your Mind to New Solutions / Possibilities...
- ◆ Design a Very Basic Layout Holistically → **RT Brain**
- ◆ Analyze Specific Details in the Design → **LT Brain**
- ◆ Review & Revise...
- ◆ Step Back, Review the Design's Composition...
  - How Does it Flow? How Does it Drive? → **RT Brain**
- ◆ Revise Again... Make it Better!

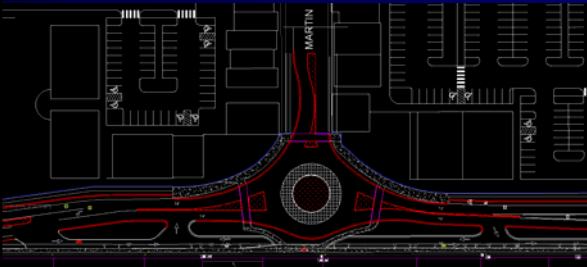
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**RTE** **Synergy w/ Engineering**

- ◆ Designers Should Avoid Simpler or Standardized Design Methods
  - "Everything should be made as simple as possible, but not simpler." A. Einstein
- ◆ Make it Simple to Drive / Simple to Understand
- ◆ Don't Just Draw a Circle or Use a Standard Method
- ◆ Never Constrain Creativity to Identify an Optimal Solution... Use Both Sides of Your Brain!
- ◆ "Example isn't another way to teach, it is the only way teach." A. Einstein

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**RTE** **Thinking Through Rbt Design**




Marcola/Martin, Springfield, OR

**Original Design (By Others)**

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**RTE** **Thinking Through Rbt Design**




Marcola/Martin, Springfield, OR

**REVISED Design (By RTE)**

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**RTE** *Thinking Through Capacity*

- ◆ 1350 SB Rights, Low Left Turns
- ◆ SB Bypass Lane Required
- ◆ HCM Sat Flow Rate = 1750
- ◆ Single or Double?
- ◆ **Two Lane Bypass!**
- ◆ Spiral Left Turn To Outside Lane...

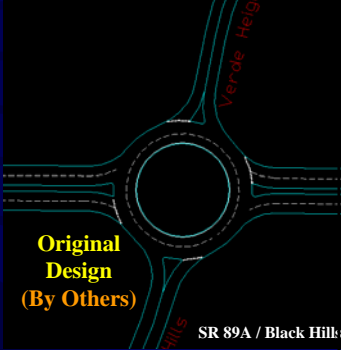


Video: Cotton Lane / Estrella Pkwy, Goodyear, AZ

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**RTE** *Thinking Through Capacity*

- ◆ 450 vph SB Approach
- ◆ 1400 vph Circulating
- ◆ Single Lane Approach
- ◆ Or is it???



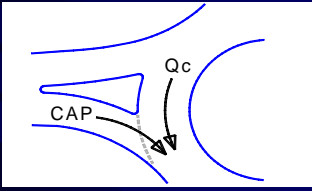
**Original Design (By Others)**

SR 89A / Black Hill

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**RTE** *Thinking Through Capacity*

- ◆ Entry Flow + Circulating Flow ( $Q_c$ ) < 1400 to 1800 (max) ~ **Single Lane Approach**

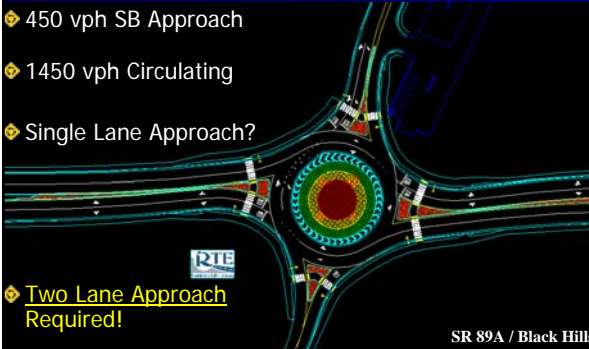


- ◆  $1400 + 450 = 1850\text{vph} \rightarrow$  **TWO Lane Approach**

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**RTE** *Thinking Through Capacity*

- ◆ 450 vph SB Approach
- ◆ 1450 vph Circulating
- ◆ Single Lane Approach?
- ◆ **Two Lane Approach Required!**




SR 89A / Black Hill

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**RTE** *Thinking Through Acute Angles*

**Existing Intersection**




**SLR Required**

US 191 / SR 264, Ganado, AZ

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**RTE** *Thinking Through Acute Angles*

**Existing Truck Movements**



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**RTE** Thinking Through Acute Angles

**140' ICD Circle**

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**RTE** Thinking Through Acute Angles

**200' ICD Circle**

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**RTE** Thinking Through Acute Angles

**Elliptical ICD**

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**RTE** Thinking Through Growth

**Interim Conditions**  
Freeway to Freeway Interchange

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**RTE** Thinking Through Time

**Ultimate Conditions**  
Freeway to Freeway Interchange

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**RTE** Thinking Through Trucks

**WB-67 Stays In Lane THROUGH Roundabout (Outside Lane)**

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**RTE** Thinking Through Trucks

Some Say This Can't Be Done Without More Impacts...

**Not True!**

**WB-67 Stays In Lane THROUGH Roundabout (Inside Lane)**

US 93 / SR 89, Wickenburg, AZ

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**RTE** Conclusions

- ◆ Can Think Through... (\_\_\_\_\_)
- ◆ Thinking Through a Roundabout Design is the REAL Key to Good Roundabout Design & Implementation!
- ◆ Stay Away From Cookie Cutter / Standard Methods!
- ◆ Rbts Can Be Designed Simple for the Public To USE
- ◆ One Must Use Both the Engineering Side AND the Creative Side of Brain!
- ◆ Good Deflection AND a Smooth Design...
- ◆ Does It Work w/ Capacity, Safety & Composition?

◆ Contact Me with Any Roundabout Questions...

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**RTE** Roundabout Questions:

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*Designing & Implementing  
Roundabouts Nationwide*

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