

Transportation Research Board  
National Roundabout Conference  
Kansas City, MO

## Quantifying Safety Impacts of Roundabouts at High Speed Rural Intersections

**Hillary Isebrands, P.E.**  
Iowa State University  
Department of Civil, Construction and Environmental Engineering

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## Definitions...

1. High Speed 40+
2. Rural

Image Source: Google Earth



### Rural Roundabouts in North America

	Site	City	County	Intersection
1	Quebec	Chambly	La-Vallee-du-Richelieu	Fichette Blvd/Arne-Le-Seigneur Blvd
2	Ontario	Waterloo	Washington	Townline rd/Can-Amira Pkwy
3	CT	Killingworth	Middlesex	Rte 80/Pk 91
4	KS	Paola	Miami	K-68/old Kansas City Rd/Hedge Lane
5	KS	Garnett	Anderson	US 50/US 169
6	KS	Florence	Marton	US-50 & US-77
7	MD	Ilseeds	Cecil	MD 2131/Seeds Rd/Ek Mills Rd (Lanzl Circle)
8	MD	Jarrettsville/North Harford	Harford	MD24/MD165
9	MD	Lohan	Anne Arundel	MD 2MD 408/MD 422
10	MD	Cearfrees/Hagerstown	Washington	MD 65/MD 258 Cearfrees Pike
11	MD	Federalburg	Caroline	MD 307/MD 313/MD 315
12	MD	Lisbon	Howard	MD 94/MD 144
13	MD	Lisbon	Howard	MD 94/Old Fredrick Road
14	MD	Millington	Kent	US 301 NB Ramps/MD 291
15	MD	Millington	Kent	US 301 SB Ramps/MD 291
16	MD	Rising Sun	Cecil	MD 273/MD 276
17	MD	Rosemont	Frederick	MD 17/MD 180
18	MN	New Prague	Scott	SH 13/CR 2
19	NV	Carson City	Carson City	5th St/Edmonds
20	OR	Verbot	Washington	Cornelius-Schefflin Rd/Verboot rd
21	OR	Verbot	Washington	Martin-Marsh Rd/Verboot rd
22	WA	Duvall	King	SR 233/IE 1240
23	WA	Spokane	Spokane	SR206/ML Spokane park Drive/Bruce Road

## Need for Research

- Consistently large numbers of fatalities and injury crashes at rural intersections – alternative treatments needed
- No comprehensive rural safety analysis for United States and Canada
- Statistics needed for decisions makers to compare safety of roundabouts to signals and stop controlled intersections
- Relationship of approach traffic control and geometry with approach speeds not quantified
- FHWA support thru High Risk Rural Roads Program to fund safety improvements on rural collectors and local roads

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### Intersection has long been a deadly site

## Two teens die in U.S.-50/77 collision

Source: Kansas DOT

### Research Objectives

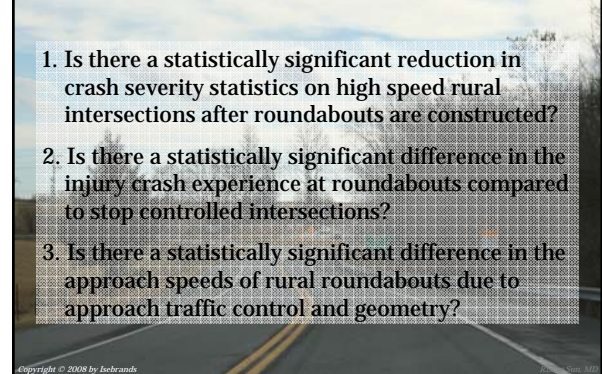
- o Before and after statistical safety analysis
- o Comparative statistical safety analysis
- o Comparison of injury crash statistics based on traffic control
  - o Injury crashes per 100 Million vehicles
- o Analyze driver speeds on approaches
  - o Traffic control
  - o Geometry



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### Research Questions

1. Is there a statistically significant reduction in crash severity statistics on high speed rural intersections after roundabouts are constructed?
2. Is there a statistically significant difference in the injury crash experience at roundabouts compared to stop controlled intersections?
3. Is there a statistically significant difference in the approach speeds of rural roundabouts due to approach traffic control and geometry?



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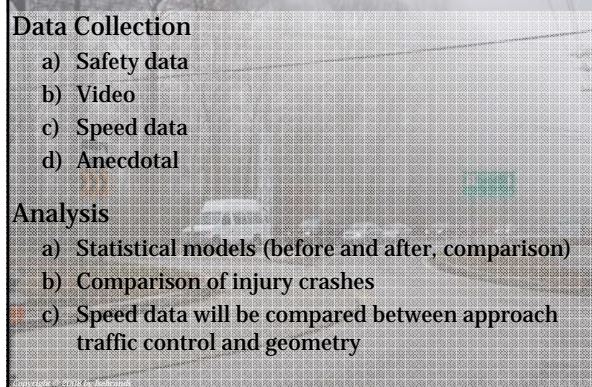
### Research Approach

**Data Collection**

- a) Safety data
- b) Video
- c) Speed data
- d) Anecdotal

**Analysis**

- a) Statistical models (before and after, comparison)
- b) Comparison of injury crashes
- c) Speed data will be compared between approach traffic control and geometry



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### Data Collection



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### Advanced Traffic Control

1. Warning Signs
2. Warning Signs with Flashing Lights
3. Rumble Strips



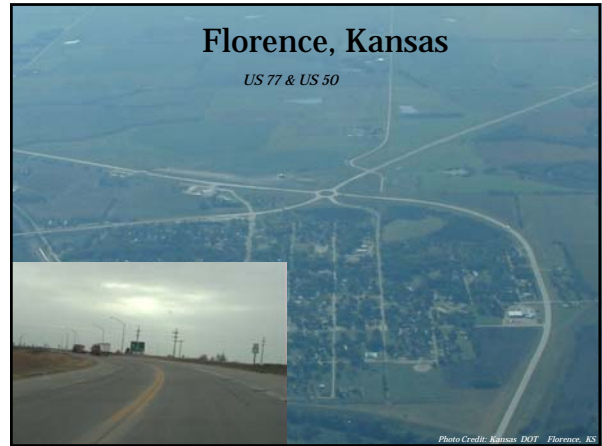
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### Paola, Kansas

*Kansas 88/Old Kansas City Road/Hedge Lane*



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**Safety**

- o Before & after study (Parsaud et al., 2001)
- o Crash Reduction
  - o 23 Intersections (rural and urban)
    - o All crashes - 40%
    - o Injury Crashes - 80%
  - o 5 Intersections (single lane, rural, stop control)
    - o All crashes - 58%
    - o Injury Crashes - 82%
- o Consistent with internationally studies

**Before & After Crash Analysis**  
*Preliminary*

**Descriptive statistics** (Isebrands, 2007)

11 Intersections

- o 89% reduction in injury crashes
- o 64% reduction in total crashes

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