

# NCHRP 3-65: Applying Roundabouts in the United States

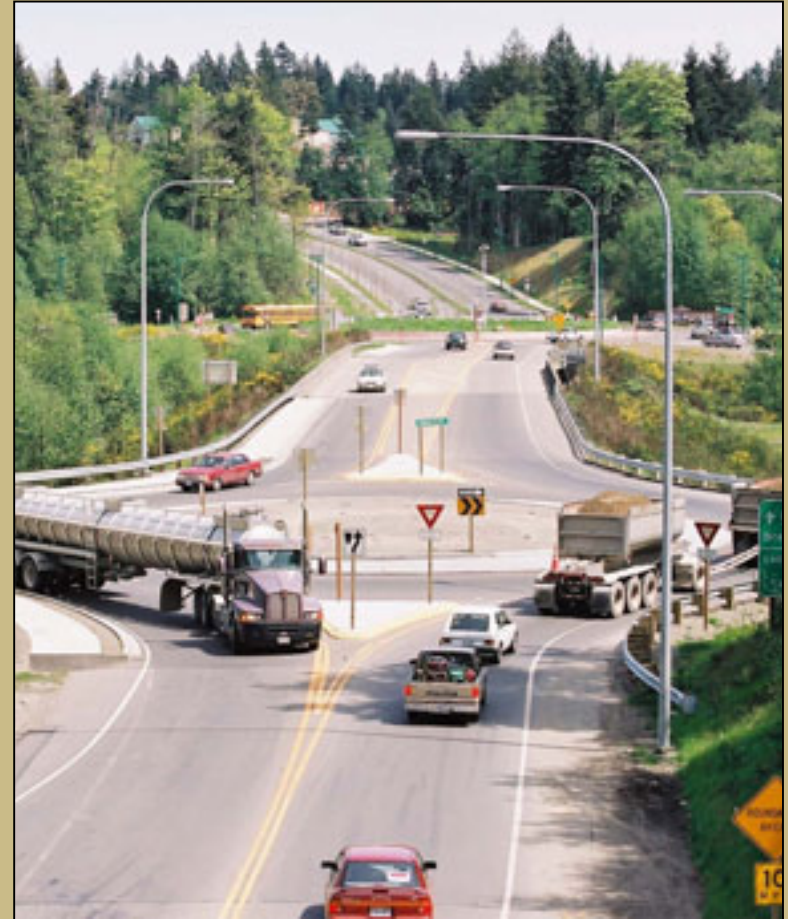
## Status Report

*Lee A. Rodegerdts, P.E.*

*TRB Annual Meeting*

*Washington, DC*

*January 15, 2004*



# Topics of discussion

- **Project team**
- **Project scope and key objectives**
- **Highlights of recent data collection activity**
- **Upcoming activities**



# Project team

- **P.I.: Lee Rodegerdts (KAI)**

- *(Bruce Robinson, Co-P.I. Emeritus)*

- **USA**

- *Kittelson & Associates, Inc.*

- *University of Idaho*

- *Rensselaer Polytechnic Institute*

- *George Mason University*

- *David Harkey*

- *John Mason*

- **Australia**

- *Rod Troutbeck*

- **Canada**

- *Bhagwant Persaud*

- **Germany**

- *Werner Brilon*

- **United Kingdom**

- *Richard Hall*

# Project objective

- Produce a set of operational, safety, and design tools, calibrated to U.S. roundabout field data.



# Overview of research tasks

1. **Summarize existing relationships**
  2. **Model formulation**
  3. **Data collection plan**
  4. **Interim report**
  5. **Execute the approved data-collection plan**
  6. **Inventory U.S. roundabout sites**
  7. **Operational performance methods**
  8. **Safety performance methods**
  9. **Design criteria**
  10. **Final report**
- Completed  
Dec. 2002
- Essentially  
complete
- Beginning  
these tasks

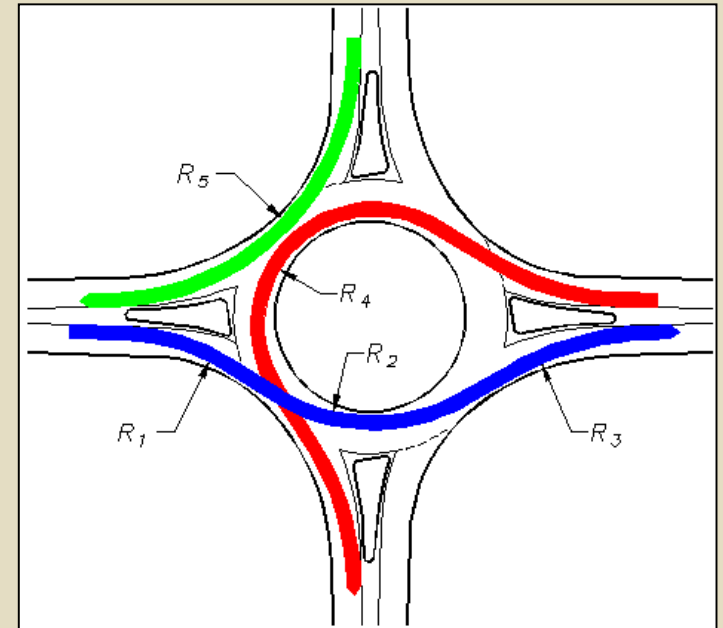
## TASK 7: Operational performance methods

- Evaluate existing operational analysis models using U.S. data
- Identify traveler behavior at U.S. roundabouts
- Refine or develop estimates of capacity, delay, and queues
- Develop new HCM procedure



# TASK 8: Safety Performance Methods

- Comparisons of “before” and “after” safety performance
- Models relating crashes to traffic and geometric characteristics
- Explore speed-related models



## TASK 9: Design Criteria

- Refine geometric and traffic control design criteria used for roundabouts
- Make assessments of pedestrian and bicycle behavior and effectiveness of observed treatments
- Upcoming NCHRP 3-78: Address visually impaired pedestrians at roundabouts





# TASK 6: Inventory U.S. Roundabout Sites

- Update and expand inventory of U.S. roundabouts
- Provide in formats usable for future research

The image displays two overlapping Microsoft Excel spreadsheets. The background spreadsheet, titled 'Microsoft Excel - Maryland.xls [Read-Only]', contains a table with columns A through N. Row 1 is labeled 'State' with the value 'MD'. Row 2 is 'Type of plan' with 'Hardcopy'. Row 3 is 'Scale' with '1:50'. Row 4 is 'Measuring uncertainty'. Row 5 is 'Linear' with '± 2'. Row 6 is 'Angle' with '± 2'. Row 7 is 'Radius' with '± 0'. Row 8 is 'Apron type (1=Raised, 2=Painted)' with '1'. Row 9 is '6 input geometric parameters in Fodel'. Row 10 is 'Hard to get from the plan'. Row 11 is 'N/A in the plan'. Below this is a table of 'Basic parameters' with columns for 'Inscribed circle diameter', 'Entry width', 'Approach half width', 'Effective flare length', 'Entry radius', 'Entry angle', 'Circulating width', 'Exit width', 'Departure width', 'Exit radius', 'Truck apron', 'Central island diameter', and 'Width'. The 'North Approach' row has values: 120, 15, 12, 33, 60, 20, 20, 18, 12, 60, 12, 60, 13. The 'West Approach' row has values: 120, 15, 12, 40, 60, 20, 20, 18, 12, 60, 12, 60, 17. The 'South Approach' row has values: 120, 15, 12, 19, 60, 19, 20, 18, 12, 60, 12, 60, 15.

The foreground spreadsheet, titled 'Microsoft Excel - one lane sites final data.xls [Read-Only]', shows a table with columns A through M. Row 1 is the header: 'Filename', 'Time', 'FirstQTime', 'EntryTime', 'ExitTime', 'Upstream event', 'Conflict Time', 'Ave Delay', 'Con + Exit Flow', 'Con + Entry Flow', 'Proportion time'. Rows 2 through 36 contain data for various roundabout sites, such as 'MD06-N1-2.08.00.xls', with values for each parameter. The 'Filename' column lists the site ID and the 'Time' column shows the time in minutes. The 'Proportion time' column shows the proportion of time spent in each state.

# Data collection effort

- **350+ roundabouts in U.S.**
  - *Many are low volume residential – of little use to project*
  - *Most of the remaining are not operating with any periods of continuous queuing*
  - *Many are recently constructed*
- **Data collection effort is satisfying multiple purposes**
  - *Operations model*
  - *Safety model*
  - *Design guidance*
  - *Pedestrian and bicycle observations*
- **Model development is timely but is constrained by available data**

# Types of data collected

## ■ Geometric data

- *Received for 140+ sites*
- *Varying quality*
- *Parameters extracted for 76 sites*

## ■ Safety data

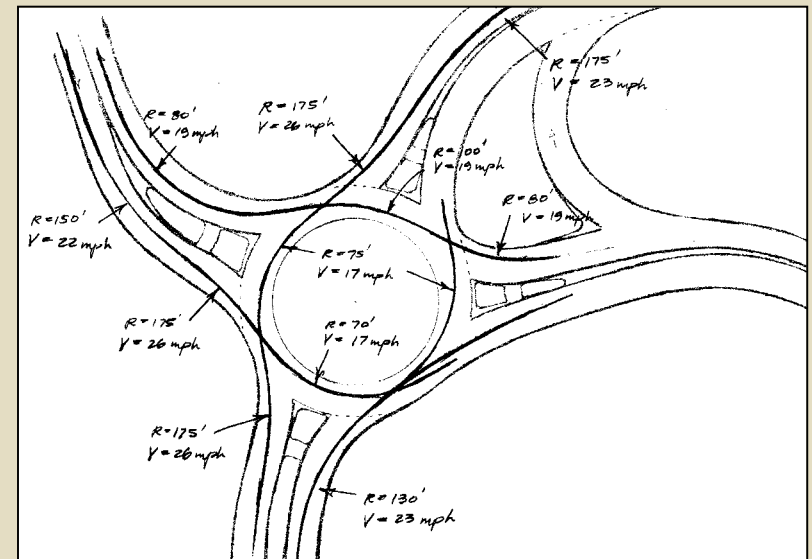
- *Individual crash records or summaries received for 100+ sites*

## ■ Speed data

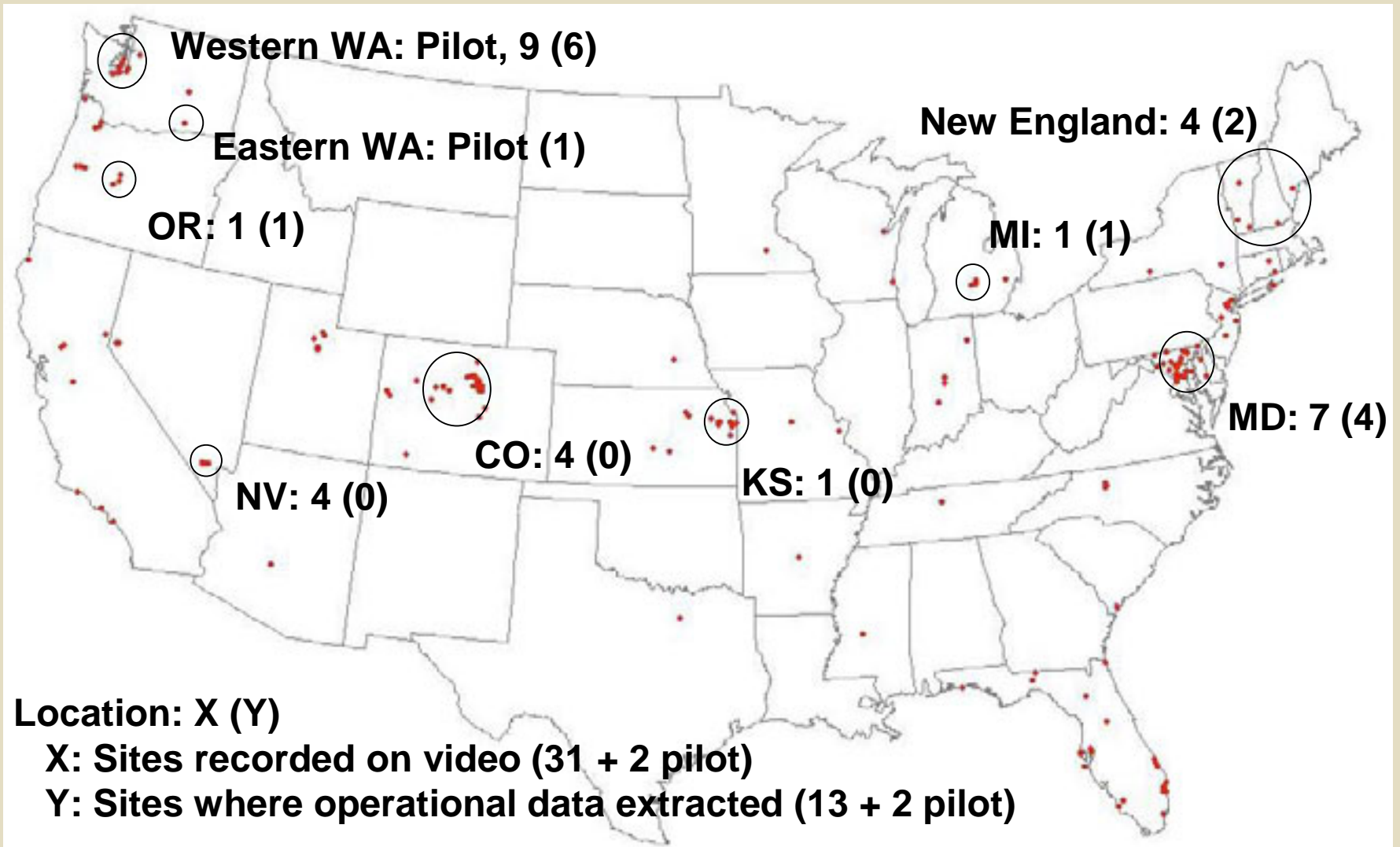
- *Spot speeds measurements in field*

## ■ Video data

- *Gap and delay data*
- *Turning movement information*



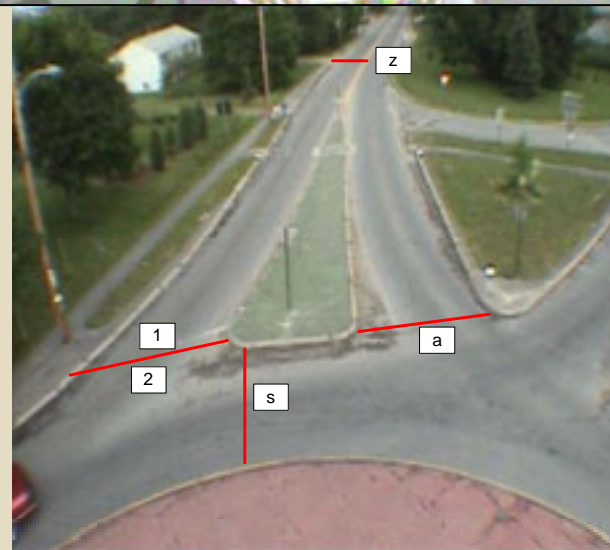
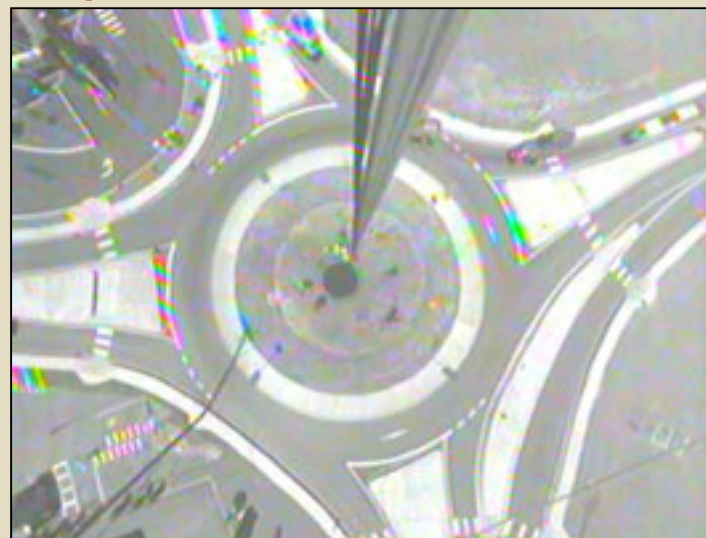
# Video data collection tour



Graphic courtesy of George List

# Overall video data (for all purposes)

- **262 DVDs (+ pilot study)**
  - 166 approaches, 96 omni-directional
- **Time segments containing periods of continuous queuing:**
  - Single-lane: 915 minutes (15 unique approaches)
  - Double-lane: 1,038 minutes (9 unique approaches)
  - 1,953 minutes total
- **Bicycle and pedestrian activity observed:**
  - 649 bicycle events
  - 1,028 “naturally occurring” pedestrian events



# Upcoming activities

- **Identify gaps in data**
- **Test existing operational and safety models against data**
- **Identify behavior of U.S. drivers**
- **Examine possible model formulations if existing models are insufficient to describe observed behavior**
- **Identify potential changes to current design methods**
  - *Changes due to model findings*
  - *Current state-of-the-art thinking*
- **Project completion: June 2005**

# Questions?

