Roundabouts in a System of Intersections

1. Signals and Roundabouts in Close Proximity
2. A System of Roundabouts

Queue Length – Consider "Spill-over" Effects from Adjacent Intersections

- Photo shows queue "spill-over" from adjacent signalized intersection blocking roundabout exit

Traffic Signals Near Roundabouts

- Minimum spacing between roundabouts and traffic signals should be established by 95th percentile queues for each
- Usually roundabouts experience less queuing than signalized intersections, so the queues for the signals will govern, but not always…

Roundabouts and Coordinated Signal Systems

- It is generally undesirable to have a roundabout located near a signalized intersection
- A corridor analysis may show the roundabout as a good option.
- Traffic queues that extend into adjacent intersections need to be analyzed further.

Corridor of Roundabouts and Signals (Happy Valley Road, AZ)

Platoon Dispersion

System Analysis and Design Considerations

- Design of the system generally follows the principles of isolated roundabout design, but analysis/modeling requires two steps:

1. Model as an isolated intersection – deterministic models
   - Arcady, HCM/Sidra)

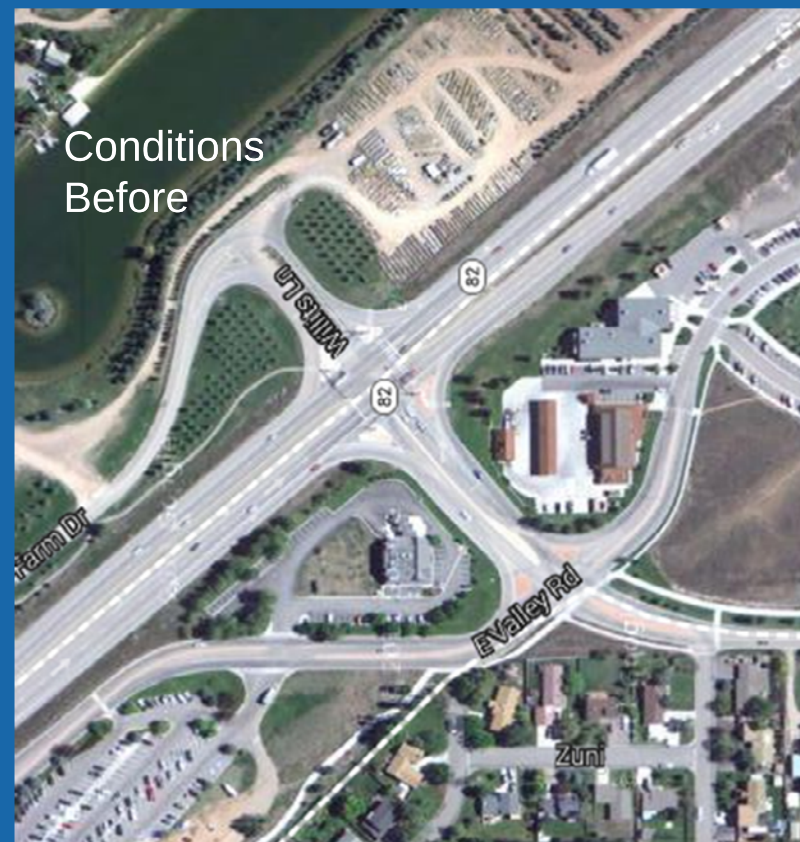
2. Model as a system – stochastic models (simulation)
   - VISSIM, Paramics, Synchro

System Analysis and Design Considerations (Cont'd.)

3. Compute the expected queues for each approach
   - Design entries to provide sufficient queuing space between the roundabouts
     - Provide increased separation; or,
     - Provide additional entry lanes to reduce queues; or,
     - Minimize queuing between the roundabouts by limiting the capacity of the inbound approaches
4. Iterate to balance # of lanes, lane use, queues & lane continuity

Basalt, Colorado

- Less than 500ft spacing
- Long Cycle lengths



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South Golden Road
Golden, Colorado (2002)

- Vibrant community corridor – attractive for businesses
- Slower speeds but faster travel times
- Improved vehicular access to business
- Traffic flows increased 22% since 2001.
- Pedestrians access to business improved
- Improved safety (>50%)
- 60% increase in retail sales
- Additional retail/office space constructed on the corridor since roundabout installation

Sedona, AZ (Before 5 Roundabouts)

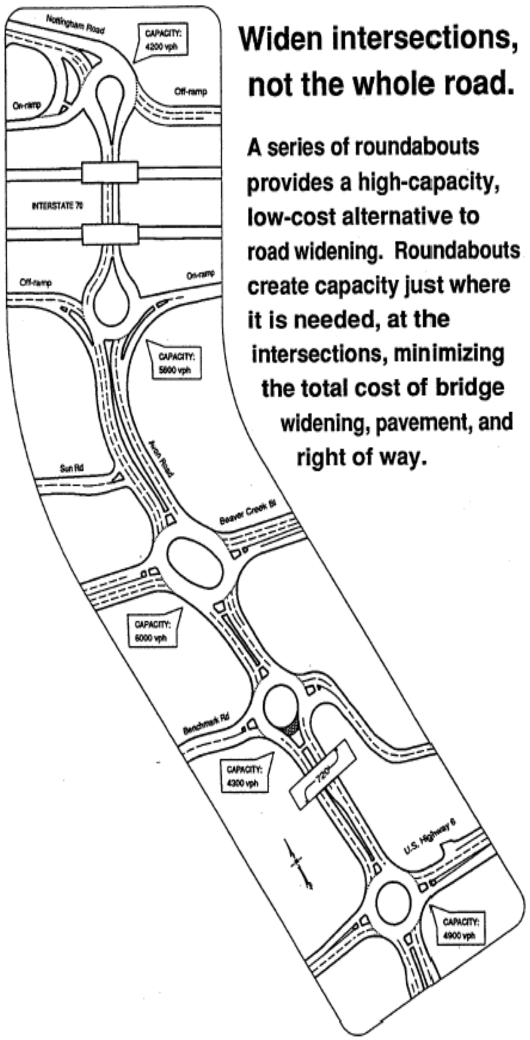
Sedona, AZ (5 Roundabouts)

- Kept the roadways narrow
- Improved mobility without adversely impacting access
- Calmed traffic – reduced speeds, uniform speeds
- Shortened pedestrian crossings
- Beautified intersections

Roundabouts in Corridors

- Intersections (nodes), not road sections (links) are the bottlenecks in urban road networks
- Focus should be on maximizing intersection capacity rather than widening roads
- Signalized intersections require dedicated turn lanes with sufficient storage to avoid queue spillback into through traffic lanes
- Roundabouts often require more space at the intersection, but less upstream and downstream

Avon, CO: Five Roundabout Corridor Replaced Traffic Signals 1997



Widen intersections, not the whole road.

A series of roundabouts provides a high-capacity, low-cost alternative to road widening. Roundabouts create capacity just where it is needed, at the intersections, minimizing the total cost of bridge widening, pavement, and right of way.

Savings in costly road widening

Avon Fluid Flow

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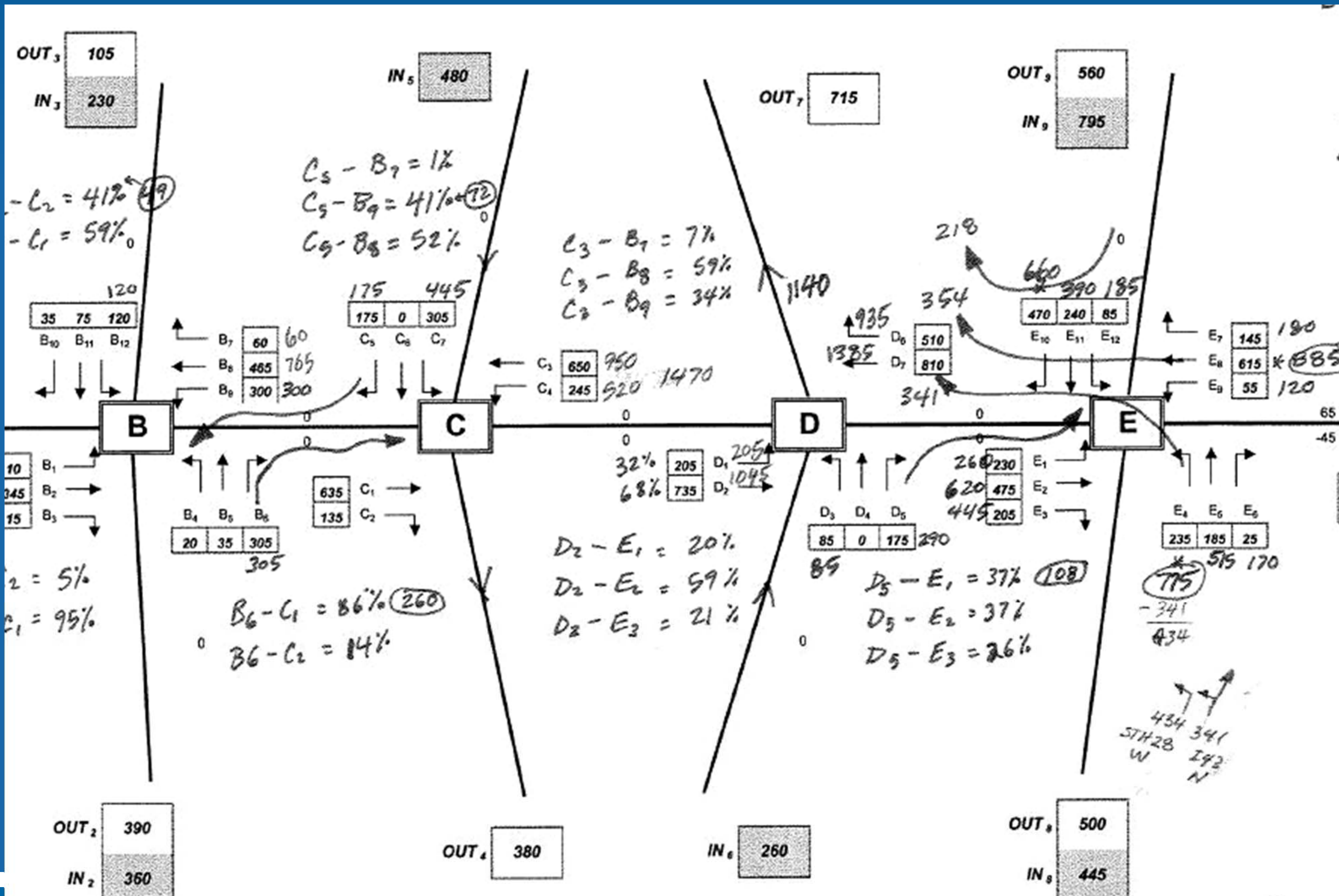
Closely Spaced Intersections – Requires system design methods



Closely Spaced Intersections
US 41/Breezewood Lane

Lane Continuity

New Tools to Evaluate Arterial LOS for Roundabout Corridors - NCHRP 772

- Anticipate new content in Urban Street chapters (16 and 17) of the Highway Capacity Manual 2010 (HCM 2010)
- Provided new performance measurements and evaluation methods accounting for:
  - Free flow speed
  - Influence area – acceleration/deceleration areas
  - Geometric delay
  - Impeded delay (queued/stopped delay)
- Includes a corridor comparison framework to compare the performance of a corridor using roundabouts, traffic signals, and/or stop-controlled intersections