Oregon Greenhouse Gas Reduction Toolkit:

Strategy Report

OREGON SUSTAINABLE TRANSPORTATION INITIATIVE

Source: www.pedbikeimages.org / Carl Sundstrom

Yield Signs and Roundabouts

This report describes how the use of yield signs and roundabouts can reduce car idling, improve bicycle traffic flow, and address safety issues.

What is it?

Yield signs and roundabouts are transportation facilities at intersections that increase the efficiency of automobile travel by reducing stopping and queuing, as compared to the "full-stop" controls at stop signs and signalized intersections. When properly designed, these intersections can also improve bicycle and pedestrian safety by keeping speeds low, reducing the number of conflict points, and improving visibility.

A **modern roundabout** is an un-signalized one-way circular intersection in which traffic flows around a center island. The modern roundabout is distinct from neighborhood circles or rotaries in that it requires entering traffic to yield to all circulating traffic, ensuring that circulating traffic is always moving. Roundabouts have design features to control entry speed and minimize neighborhood impacts.

At low-volume intersections, **yield signs** increase the efficiency of automobile and bicycle movement without necessitating a full stop or travel through a roundabout. However, particular care should be given to sight distances, speeds, and intersection volumes when considering yield signs.

How well does it work?

Several studies have shown that roundabouts significantly reduce vehicle idle time at intersections, thereby lowering fuel use and greenhouse gas (GHG) emissions.

- One study of newly constructed or recently modified intersections in Northern Virginia estimated that roundabouts would have reduced vehicle delays by 62 to 74 percent (more than 300,000 hours), and reduced fuel consumption by more than 200,000 gallons.[1]
- A before-and-after study of Kansas roundabouts found significant reduction in delays and a 55-61 percent decrease in measured carbon dioxide emissions after roundabout installation.[2]
- A major US study concluded that modern roundabouts decrease all types of crashes by about 39 percent and injury crashes about 76%. The study projected a 90% decrease in fatal crashes.[3] This is due to lower speeds and decreased possibility of head-on collisions.

However, where congestion is deterring travel, smoother flowing traffic may enable pent-up demand for automobile travel to increase. The effect of this induced demand should be estimated and GHG projections adjusted accordingly.

1 *Bergh, Casey et al. Continued Reliance on Traffic Signals: The Cost of Missed Opportunities to Improve Traffic Flow and Safety at Urban Intersections. (2005) Accessed 6/10/13. http://www.iihs.org/research/paper_pdfs/mf_1848.pdf*

2 *Mandavilli, Srinivas et al. Environmental Impacts of Kansas Roundabouts. Annual Conference of the Transportation Association of Canada. September 2003. Accessed 6/10/13. http://www.tac-atc.ca/english/resourcecentre/readingroom/conference/conf2003/pdfs/russell.pdf*

3 *Persaud, B.N.; Retting, R.A.; Garder, P.E.; and Lord, D. 2001. Safety effect of roundabout conversions in the United States: empirical Bayes observational before-after study. Transportation Research Record 1751:1-8.*

How can it benefit my community?

In addition to reducing GHG emissions, yield signs and roundabouts can:

- Improve mobility by reducing delay
- Improve safety by calming traffic
- Enhance gateways into neighborhoods and districts
- Roundabouts do not rely on signal "warrants", therefore they can be constructed in advance of severe congestion levels
- Improve traffic flow
- May be used to provide stormwater treatment through increased landscaping

What does it cost?

Single lane roundabouts typically cost more to design and construct than traffic signals whereas multi lane roundabouts are about the same cost as large signal projects. The cost benefits of roundabouts over signals is largely achieved when consideration is given to criteria that accounts for reduced crashes and the cost of those crashes compared to signals. Ongoing maintenance costs for roundabouts tend to be higher than for other unsignalized intersections, but less than those for signalized intersections.[4]

Public opinion may also be an impediment to roundabout construction, though many before-and-after surveys have shown that opinion improves significantly once motorists can experience the improved traffic flow firsthand.[5]

Where has it been used?

The **City of Bend, Oregon** proposed its first roundabout in 1997, and was met with overwhelmingly negative responses from the public. After that experience, the City developed a strategy to generate early public support for the project that included materials specifically targeting cyclists, commercial truck drivers, pedestrians, children, and parents.[6] Today, Bend has numerous roundabouts, twenty of which are home to striking pieces of public art.[7]

Numerous other Oregon cities and counties have roundabouts, including **Springfield, Newberg, Astoria, Portland, Clackamas County, and Washington County**.

Where can I learn more?

- Roundabouts Q&A - Insurance Institute for Highway Safey. *http://www.iihs.org/research/qanda/roundabouts.aspx*
- ODOT Roadway Engineering – Roundabouts. *http://www.oregon.gov/ODOT/hwy/engservices/Pages/roundabout_home.aspx*
- Roundabouts: A Proven Safety Solution that Reduces the Number and Severity of Intersection Crashes. Institute of Transportation Engineers. *http://www.ite.org/technical/IntersectionSafety/roundabouts.pdf*
- Bend Roundabout Evaluation and Design Guidelines: *http://www.bendoregon.gov/index.aspx?page=176*

The Toolkit is a component of the Oregon Sustainable Transportation Initiative (OSTI), which was formed to address the requirements of Senate Bill 1059 (2010).

For more information, please visit:

http://cms.oregon.gov/ODOT/TD/TP/pages/ ghgtoolkit.aspx

Oregon Department of Transportation

4 FHWA Report: Roundabout: An Informational Guide. http://www.fhwa.dot.gov/publications/research/safety/00067/index.cfm
5 Status Reportt, Vol. 40, No, 9. (2005) Insurance Institute for Highway Safety. Accessed 6/10/13. http://www.iihs.org/externaldata/srdata/docs/sr4009.pdf
6 http://safety.fhwa.dot.gov/intersection/roundabouts/roundabouttoolbox/docs/or_case_study/or_rdbt.htm
7 http://artinpublicplaces.org