RESEARCH

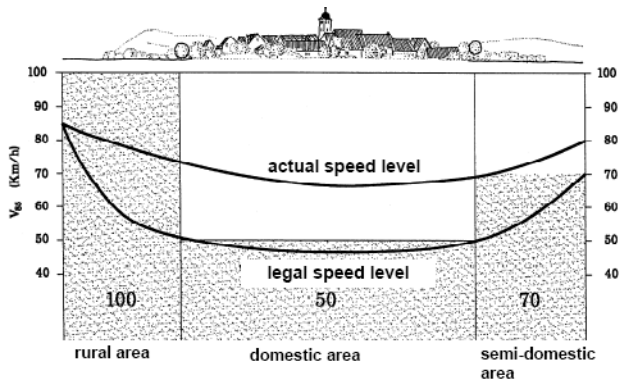
Research Notes

RSN 09-03 December 2008

Roadway Design Treatments for Rural to Urban Transitions

As cities continue to grow, transportation agencies are increasingly challenged with developing elements for transitioning roadway corridors at locations where highways change from high speed rural environments to more suburban/urban environments. Traffic operating speeds in these transition corridors are typically high, even at locations with reduced posted speed limits.

In recent years, engineers have used traffic calming features for local roadway systems that are characterized by low operating speeds and traffic volumes. Similar or additional traffic/speed calming features need to be developed and tested for highways that carry significant volumes of through traffic, such as major arterials.



Source: *Berger and Linauer 1998*[1]

An ODOT Research study, lead by Karen Dixon at Oregon State University, reviewed research evaluating potential traffic calming strategies for rural-to-urban transitions on high speed highways. Driving simulator evaluations were conducted to assess several design features that simulated physically or perceptually narrowing the road at these transition locations.

The full-scale driving simulations took place on the DriveSafety DS-600c simulator at Clemson University. The driving simulator had four projector screens: three forward screens that provided a 120-degree field of view; and one rear screen that provided a 40-degree rear field of view. The car was a 1989 Mitsubishi Galant with functional steering, acceleration, braking, automatic transmission, and turn signals.

Simulator studies of roadway design treatments are growing increasingly common. Such studies allow for a high degree of experimental control, ease of data collection, relatively low expense, and greater safety for the test subjects. A considerable amount of research has been conducted to establish the absolute and relative validity of simulators. These studies have shown that simulator behavior can predict road behavior.

Based on potential treatment strategies identified in the literature review, perceived suitability for such treatments to be assessed using a driver simulator study, and preliminary testing, six treatments were selected for full-scale simulator evaluation.

[1] Berger, W. J., and M. Linauer. (1998). *Raised Traffic Islands at City Limits-Their Effect On Speed*. Institute for Transport Study, Vienna, Austria.

The specific transition treatments included in the full-scale simulations were:

- Layered landscape;
- Gateway with lane narrowing;
- Median treatment only;
- Median with gateway treatment;
- Medians in series without pedestrian crosswalks; and
- Medians in series with pedestrian crosswalks.

None of the tested design treatments had a dramatic effect on speed. The most effective treatments were those which:

- forced a horizontal maneuver;
- drew driver attention visually with signs; or
- positioned the driver in closer lateral proximity to roadside or median objects.

The best treatments for reducing speed were:

- Medians in series with pedestrian crosswalks;
- Medians in series with no pedestrian crosswalks;
- Median with gateway; and
- Gateway with lane narrowing.

In particular, the medians in a series with and without pedestrian crosswalks resulted in slowed driver speed adjacent to the treatment, though observed speeds remained marginally higher than the posted speed limit at these locations.

Though minor speed reductions also occurred at the "gateway with lane narrowing" treatment, and to some extent at the "layered landscape" treatment, these perceived improvements were extremely small and generally not statistically significant.

Forward view from full-scale driving simulator.

For more information, contact Mark Joerger at 503-986-3464
or via e-mail: *Mark.D.Joerger@odot.state.or.us*

A final report has been published and is available on the ODOT Research Unit website at:
http://www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/2008/Rural_to_Urban.pdf

Oregon Department of Transportation

Research Unit
200 Hawthorne Ave. SE, Suite B-240
Salem, OR 97301-5192

Telephone: 503-986-2700
FAX: 503-986-2844

For more information on ODOT's Research Program and Projects, check the website at

http://egov.oregon.gov/ODOT/TD/TP_RES/