Project Summary

Texas Department of Transportation

0-6106: Lane Assignment Traffic Control Devices on Frontage Roads and Conventional Roads at Interchanges

Background

In Texas, the frontage road system serves a very important role in providing a link between highways and the arterial roadway network. As the Texas Department of Transportation (TxDOT) seeks to optimize interchange operations, approaches are widened to provide additional capacity. However, upstream the number of lanes may be less than at the intersection, which may present challenges in conveying the proper lane assignment to drivers.

What the Researchers Did

For this project, researchers conducted surveys of TxDOT districts and state departments of transportation to assess existing practices regarding lane assignment, and conducted focus groups and interviews of drivers. Through the driver focus groups and interviews, researchers gained valuable insight as to how drivers respond to current signing and pavement marking concepts, and what they perceive their needs to be for guidance on lane assignment when approaching intersections.

Researchers then developed and tested two signing concepts on approaches to freeway/cross-street interchanges. These signs were intended to give drivers indication of which lanes to use for desired turning movements.

What They Found

The TxDOT district surveys were very similar to those conducted with other state departments of transportation. Respondents suggested that engineering judgment is extensively used in making decisions regarding lane assignment signs and markings. There are typically no standard guidelines regarding number or spacing between signs or sign placement distance. Some states (and TxDOT districts) have developed policies and typical applications for use within their jurisdictions, but they vary widely.

The focus groups and driver surveys gave insight on driver expectations and preferences regarding lane use signing and markings. Highlights included:

- Most drivers do not feel advance pavement markings are necessary on simple two-lane frontage roads, but signing is desired.
- At more complex intersections, use of only *lane assignment pavement marking arrows* across all lanes may convey adequate information, with the "ONLY" text optional.
- Lane assignment signs should be split for approaches of more than four lanes. Signs may depict turn-only and optional turn lanes. Signing for through lanes does not appear to be critical information to drivers.

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- The “lane addition taper graphic” can be utilized to show where lane additions will occur. However, the use of taper geometry is most effective where downstream geometry varies from driver expectations.

For the field tests of the two signs, researchers generally found fewer drivers making incorrect lane choice and fewer illegal movements, even though the changes were subtle.

What This Means

Researchers provided considerations for intersection lane use signing and markings including:

- More aggressive signing is required when there is limited sight distance.
- When possible, use overhead signing.
- Always sign all turn movements, not just the exclusive turn lanes.
- Use symbols (such as arrows over text) for lane guidance on guide signs.
- Supplement lane assignment regulatory signs with an “AT SIGNAL” plaque when feasible. Drivers’ wording preference for a plaque added to the bottom of a lane assignment sign is “AT SIGNAL.” Researchers recommend the addition of this plaque, especially when drivers do not have a clear view of the road geometry downstream.
- Supplement lane assignment signs with advance arrow pavement markings for exclusive turn lanes when feasible.
- When lane assignment signs must represent more than four lanes, consider splitting the sign into a left- and right-mounted signs and only show the exclusive and optional turn movements.
- Utilize lane addition taper graphics on lane assignment signs placed in advance of the lane widening, especially with geometries that may violate driver expectations, or when the lane widening is blocked from view (see figure). These signs should be placed before the flare in the roadway.

- Placement for lane assignment signs should be as consistent as possible. R3-8 signs should generally be placed within 150 feet of the intersection stop line and, if necessary, within 150 feet of where lanes are added on approach. If R3-8 modified signs (with the taper geometry on the sign) are used, they should be located at or within 150 feet upstream of where lanes begin to add via taper. If traffic tends to queue upstream of where lane adds are made, consider adding additional R3-8 modified signs (with the taper geometry) at least 500 feet upstream.

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