



0-6810: Guidelines for Applying Right-Turn Slip Lanes

Background

Right-turn slip lanes are advantageous to motorists because they reduce delays by separating right-turning traffic from adjacent lanes and accommodating higher-speed right turns. The right-turn slip lane channelizing island may also provide a refuge area for crossing pedestrians, reducing their exposure by allowing them to cross the roadway in two stages. However, right-turn slip lanes may encourage higher-than-intended vehicular speeds and create conflicts among motor traffic, pedestrians, and bicyclists. Accordingly, right-turn slip lane designs should create a balance between the safety and mobility of all roadway users.

The purpose of this research project was to examine guidance provided in recent National Cooperative Highway Research Program reports 3-72 and 3-89, as well as other previous research, and then develop design guidelines and standard drawings for implementation within the Texas Department of Transportation (TxDOT) *Roadway Design Manual*. The guidelines cover both new construction and retrofitting treatments. The new construction guidance provided for urban and suburban intersections is inspired by the City of Ottawa's "urban smart channel" design that incorporates a sharp angle of entry into the cross street (~70 degrees) and delineates a

narrow turning path for passenger cars using pavement markings, while providing adequate pavement width to accommodate larger design vehicles.

What the Researchers Did

The project included the following components:

- A review of published literature on the design and operation of right-turn slip lanes as well as relevant TxDOT design guidance.
- Focus group meetings with TxDOT staff to discuss the synthesis findings.
- Production of design guidelines for new construction of and retrofitting treatments for right-turn slip lanes that accommodate mobility as well as pedestrian and bicyclist safety.
- Production of construction standard drawings for the design of right-turn slip lanes with and without auxiliary lanes.

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What They Found

This research project yielded the following findings:

- Pavement markings can be used to delineate a narrow path for passenger cars and enforce a sharp angle of entry into the cross street. These features promote lower-speed turns for smaller vehicles. The use of pavement markings enables the turning roadway to be designed to provide adequate pavement width to accommodate larger vehicles.
- Rural roadways that are not frequented by pedestrians can have a right-turn slip lane with a flatter angle of entry into the cross street and are more conducive to the use of acceleration lanes.
- The crosswalk should be located in the middle of the channelized roadway and perpendicular to the turning roadway.
- “Ladder” pattern crosswalk markings are recommended because the transverse lines delineate the crossing location and help pedestrians with visual impairments with way finding, while the longitudinal markings enhance the visibility of the crosswalk for motorists.
- Installation of poles, signs, and drainage structures should avoid pedestrian walkways; when pedestrian facilities are not installed, care should be taken when placing these features to avoid the anticipated or planned location of future pedestrian walkways and landing areas.

- Deceleration lanes allow motorists to slow down before negotiating the turn and help pedestrians identify vehicles intending to enter the slip lane.
- Acceleration lanes are discouraged in urban and suburban environments because they generally promote higher speeds and render the slip lane difficult to cross for pedestrians.
- Installation of additional pavement markings, signing, and other treatments should be considered to retrofit existing right-turn slip lane locations exhibiting one or more of the following issues: absence of proper refuge for pedestrians, motorist noncompliance in yielding to crossing pedestrians, pedestrian noncompliance with the crosswalk location, high speeds in the channelized roadway, low visibility of crossing pedestrians, and excessive head turning to spot oncoming traffic.

What This Means

Researchers conclude that guidance specific to right-turn slip lanes should be incorporated into the TxDOT *Roadway Design Manual*, and the guidance should facilitate the safety and mobility of all road users. It should also address both new construction and retrofitting treatments. The research team worked closely with the Project Monitoring Committee and others at TxDOT to develop such guidance and the associated construction standards.

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