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# Restricted Crossing U-Turns (RCUTs) Brochure

Product 0-7036-P2

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Cooperative Research Program

TEXAS A&M TRANSPORTATION INSTITUTE  
COLLEGE STATION, TEXAS

sponsored by the  
Federal Highway Administration and the  
Texas Department of Transportation  
<https://tti.tamu.edu/documents/0-7036-P2.zip>



## RESTRICTED CROSSING U-TURNS (RCUTS)

### Description

The Restricted Crossing U-turn (RCUT)—also known as J-Turn, Reduced Conflict intersection, or superstreet—is an intersection design that reduces crashes by changing how minor road traffic crosses or turns left at a major road. The change reduces the number of conflict points with other vehicles. At an RCUT, minor road traffic must turn right. Left-turn and through

movements from the minor road are accomplished through the use of a downstream U-turn. For the major road, all movements (left, through, and right) are allowed at the main intersection.

The RCUT typically includes a signalized intersection at the main intersection with the downstream U-turn intersections being signalized or unsignalized. The main intersection requires fewer traffic signal phases than a conventional intersection through the elimination of minor road through and left-turn movements that can result in a reduction in delay.

### Intersection User Groups

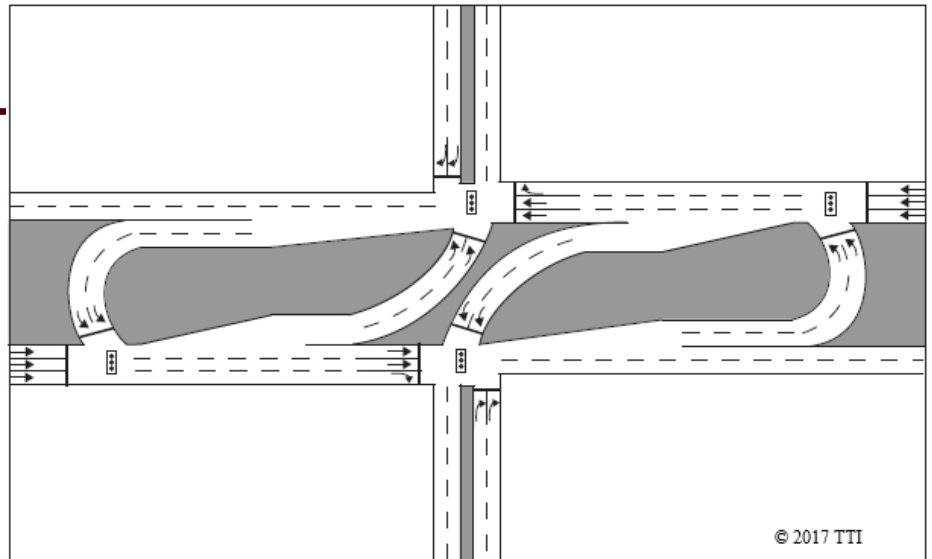
The primary user group for RCUTs usually consists of drivers of passenger vehicles. Drivers of heavy vehicles, including a range of configuration from buses to semitrailers, should also be expected at suburban and rural RCUTs. Drivers of emergency vehicles, such as fire trucks, also comprise a potential user group in urban, suburban, and rural settings. The characteristics of these larger vehicles require additional considerations in the design of the intersection and approaches compared to passenger vehicles. In addition to drivers of motor vehicles, pedestrians and cyclists are commonly found at RCUTs in urban and suburban areas. Provisions for those pedestrians and cyclists to traverse the RCUT must be included in the intersection design. The references at the end of this document provides the latest research on options for pedestrian and bicyclist paths through the main intersection and within the U-turn intersections.

### Benefits

- Reduces delay and congestion for through traffic on major road.
- Reduces the overall number of conflict points.
- Presents all users with fewer conflicting movements to cross at a time.
- When signalized, decreases the number of phases compared to a traditional signalized intersection, resulting in shorter overall traffic signal cycle length and reduced delay.
- Offers the opportunity for controlled midblock crossings at signalized U-turns.

### Design/Implementation Considerations

Innovative intersections are increasingly common nationwide and within Texas and can result in fewer crashes. Within this Texas Department of Transportation (TxDOT) study, the computer simulation found that RCUTs with a 2,000-ft spacing between the main intersection and the U-turn intersection had the highest average speed for the overall corridor, although the speeds when spacing was 1,000 or 1,500 ft was within 5 mph. Depending on the type of design vehicle, the U-turn intersection may benefit from including



a loon (see example of such a design in North Carolina in Figure 1). The design should consider the needs of pedestrians and bicyclists and could include overhead lighting to illuminate bikeway and pathway networks in advance of all intersection crossings.



Figure 1. Example of two-lane U-turn signalized intersection in North Carolina.

### For More Information

Guidelines for designing RCUTs, information on recent research with regards to improving alternative intersection designs for pedestrians and bicyclists, and other resources can be found in the following:

- Brewer, M.A., K. Fitzpatrick, M. Shirinzad, H. Zhou, D. Florence, J. Tydlacka, B. Dadashova, and M. Le. *Research and Findings on Roundabouts and Innovative Intersections for High-Speed and Rural Locations*. Report No. FHWA/TX-22/0-7036-R1. Texas A&M Transportation Institute. College Station, TX. 2022.
- Blackburn, L., M. Dunn, R. Martinson, P. Robie, K. O'Reilly. *Improving Intersections for Pedestrians and Bicyclists Informational Guide*. Report No. FHWA-SA-22-017. Available at: <https://safety.fhwa.dot.gov/intersection/about/fhwas22017.pdf>. 2022.
- Fact Sheets: FHWA Improving Intersections for Pedestrians and Bicyclists. Available at: <https://safety.fhwa.dot.gov/intersection/about/fhwas22041.pdf>. 2022.
- Hummer and Rao. *Safety Evaluation of a Signalized Restricted Crossing U-Turn*. FHWA-HRT-17-082. 2017.

### Success Stories...

- A safety review of an RCUT in Austin as part of the TxDOT study found a lower percentage of left-turn crashes after installation.
- As a proven countermeasure, RCUTs have shown to reduce fatal and injury crashes by 22 percent when converting from a signalized intersection to the signalized RCUT (Hummer and Rao).