

***The J-Turn Intersection:
Design Guidance & Safety Experience***

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ABSTRACT

A rural expressway is a high-speed, multi-lane, divided highway with partial access control. It is typically divided by a wide, depressed median and consists of both at-grade intersections and grade separated interchanges. Converting undivided rural two-lane highways into expressways is a popular highway safety improvement as expressways make passing easier and drastically reduce the likelihood of head-on and opposite direction sideswipe collisions. However, at-grade intersection collisions on rural expressways are reducing the safety benefits that should be achieved through conversion. The underlying problem seems to be that expressway intersections present challenges to crossing and left-turning minor road drivers attempting to select gaps in the far-side expressway traffic stream.

State Transportation Agencies (STAs) have experimented with several intersection safety treatments at problematic two-way stop controlled (TWSC) rural expressway intersections to improve their safety performance while trying to avoid signalization or grade separation. One of these treatments is the J-turn intersection design. This paper describes the J-turn intersection design concept, examines existing design guidance, and documents the experience of the Maryland State Highway Administration and the North Carolina Department of Transportation with this innovative intersection design. The assumed safety benefit of J-turn intersections is that they reduce the potential for right-angle collisions (particularly far-side right-angle collisions) by replacing direct crossing and left-turn maneuvers from the minor roads at TWSC expressway intersections with right-turns and downstream U-turns. Naïve before-after crash data comparisons conducted at four sites reveal that this intersection design concept can offer superior safety performance as compared to a typical TWSC rural expressway intersection.

Note: This research was conducted as part of NCHRP 15-30, “Median Intersection Design for Rural High-Speed Divided Highways”, which has yet to be approved and published.