

# Design Consistency on Corridors

## Abstract

Alternative Intersection and Interchange (AII) designs provide an innovative approach to the geometric and control features at intersections. Nevertheless, most of the AII designs have unconventional ways to maneuver through the intersection such as restriction of movements, crossover of traffic to the opposite side of the road, separating left turning movements, etc. As corridor construction or improvement projects continue to utilize AII designs, there is a concern that drivers might be confused on how to safely navigate a corridor when adjacent intersections may handle movements in different ways, especially left turns. This research investigates the challenges for the corridor-level deployment of AII designs through a state-of-the-practice literature review, a focus group interview, and a driving simulator experiment. The objective of this research is to: 1) identify potential combinations of AII designs which NCDOT may build adjacent to one another, 2) collect data on driver's understanding of AII designs, and 3) figure out drivers' performance when navigating various AII corridors in terms of ability to manage navigation and vehicle control.

The project found that at an intersection spacing of  $\frac{1}{4}$  mile, corridors with predominantly traditional, U-turn based or mixed intersection types had similar driver performance. For specific intersection designs, minor left turns at Median U-turn intersections had the most failures to complete the movement compared to Quadrant and Traditional major left turns performed best, while other intersection and movement combinations did not have increased failed movements compared to Traditional intersections. Hard braking events were observed less often in MUT and RCUT movements when they were in corridors without predominantly traditional intersections. Drivers also had decreased approach speeds and increased failed movements on their first simulator trial which can be attributed to unfamiliarity with the driving simulator, as this did not vary by corridor type or test intersection type. Across all intersection and movement types, there was an increase in failed movements when the preceding intersection was an RCUT.