

# Safety effects of roundabout conversions in Carmel, Indiana, the Roundabout City

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**Introduction:** Roundabouts are a proven safety countermeasure for intersection safety. This study examined the safety effects of roundabout conversions in Carmel, Indiana, also known as the "Roundabout City." Doing so is of particular interest because Carmel has a high density of roundabouts and its drivers understand their effectiveness and are familiar with navigating them. This study also adds to the current state of knowledge about innovative double-teardrop roundabouts (i.e., linked roundabouts with teardrop-shaped central islands).

**Method:** Negative binomial models accounting for correlation within site pairs were applied to evaluate the safety effects of converting conventional intersections to roundabouts on total crashes, injury crashes, and property-damage-only (PDO) crashes between study sites and control sites for different roundabout types (single-lane, multi-lane, and double-teardrop). We compared crash data from a 2-year period before the installation of the roundabouts with the 2-year period after the conversions.

**Results:** Injury crashes were 47% lower than what would have been expected without the roundabout conversions. The effects were strongest at the double-teardrop roundabouts, where injury crashes were significantly reduced by 84% and total crashes by 63%. Single-lane roundabouts experienced significant decreases of 51% in total crashes and 50% in PDO crashes (and a nonsignificant decrease of 50% in injury crashes). Multi-lane roundabouts were associated with increases in total and PDO crashes but a 15% decrease in injury crashes, though all were nonsignificant.

**Conclusions:** Overall, the City of Carmel's roundabout program is associated with reductions in injury crashes, which indicates improvements to safety. Single-lane and double-teardrop roundabouts are associated with improvements in the occurrence and severity of crashes.

**Practical applications:** Double-teardrop roundabouts should be considered for installation at interchange terminals to improve highway safety.



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