

# focus on

# rural highway safety

## Examining traffic safety on rural expressways

**Expressways provide most of the mobility of interstates at significantly less up-front cost. But other factors need to be considered when determining overall corridor costs.**

LIKE MANY STATES, Iowa is constructing rural expressways at a relatively fast clip. But few studies have been conducted about their safety performance.

Now recent research indicates that, although expressways are very safe at low traffic volumes, their crash rates and crash severity increase as traffic volumes increase. This finding begs some additional research.

### The appeal of expressways

Expressways are multi-lane, divided, arterial highways. Like interstate highways, expressways can support high traffic volumes and speeds.

Since 1996 the Iowa DOT has improved more than 275 miles of two-lane highway on Iowa's 2,275-mile Commercial Industrial Network (CIN) to four-lane, rural expressway; additional miles are scheduled for conversion in the next decade.

The idea is that by providing high-speed, high-capacity corridors between major business and industrial centers, expressways support Iowa's goal of fostering economic development and diversification.

### Reasonable initial investment

Because expressways provide only partial access control, they require significantly less investment to design and build than do roadways designed to interstate standards.

Consider the savings: Most expressway intersections are at-grade. A few have traffic signals, but the majority rely on stop signs on the crossing roadways only. Unlike interstate highways, which require full access control, expressways require

- few, if any, interchanges and related overhead bridges
- fewer access rights to purchase from adjacent landowners
- less expensive cross-sections, depending on design standards

Expressways provide most of the mobility of interstates at significantly less up-front cost. But other factors, like roadway safety, need to be considered when determining overall costs of a corridor.

### Safety-related implications

Researchers at CTRE and at CH2M HILL in Minnesota analyzed three years of crash data for expressway segments in Iowa and Minnesota. They focused on crash history as a function of the mainline level of traffic.

**Crash rates.** Researchers found a non-linear relationship between crash frequency (the number of crashes per unit of time per unit of roadway) and traffic volume.

That is, they found that crash rates consistently increase with traffic volumes. See figures at right.

**Intersection crashes.** They also found that the percentage of crashes at expressway intersections increases as traffic volume increases.

In Minnesota the percentage of crashes at intersections more than doubles (27 percent to 59 percent) from the lowest traffic volume intervals to the highest. In general, Iowa expressways carry lower volumes than those in Minnesota, but the trend regarding intersection crashes is the same.

**Crash severity.** Finally, by applying Minnesota's crash severity weight index to the datasets, researchers concluded that, in both Minnesota and Iowa, crashes become more severe as traffic volumes increase.

Researchers speculate that at some level of traffic, safety may be compromised to such a degree that the expressway is no longer the most cost-effective option.

### What's next?

The next goals for expressway safety research may be twofold:

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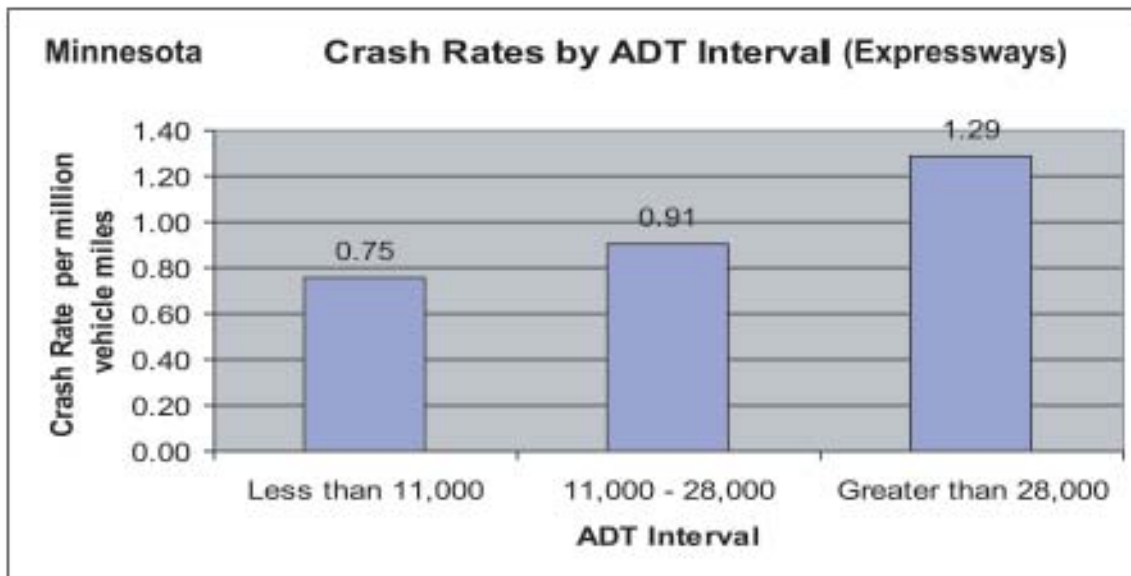
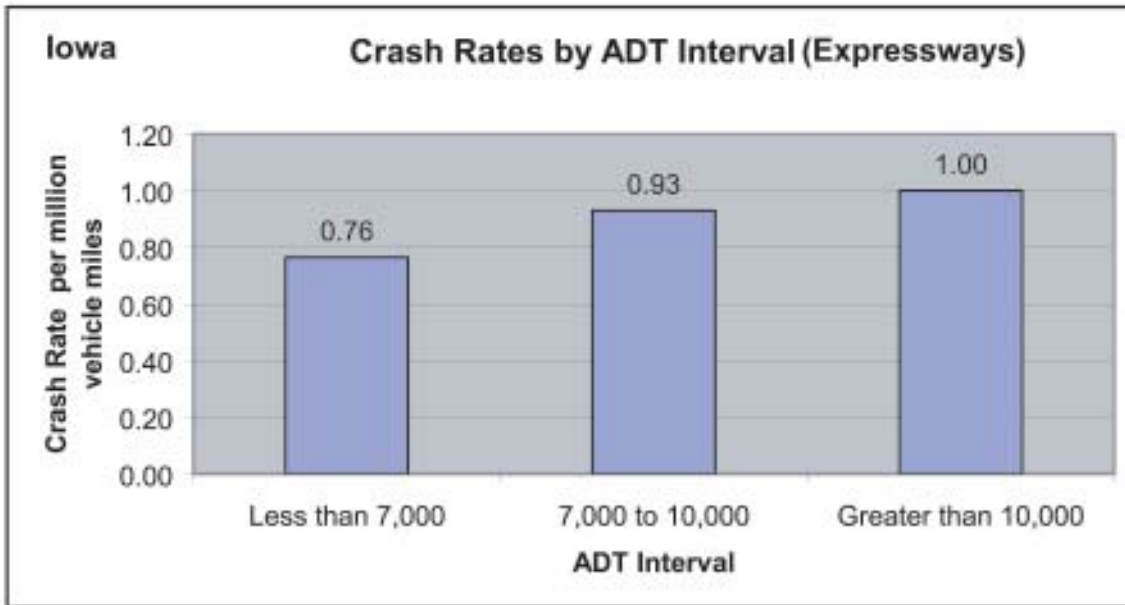
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(1) to better understand expressway crashes so that countermeasures, other than reduced access control, may be designed, and eventually

(2) to develop guidelines that would allow highway agencies to proactively identify when conversion from expressway to interstate design standards is warranted.

**For more information**

Contact Tom Maze, professor of civil engineering, Iowa State University, 515-294-9459, [tmaze@iastate.edu](mailto:tmaze@iastate.edu), or Howard Preston, project manager, CH2M HILL, 651-688-8772, [hpreston@ch2m.com](mailto:hpreston@ch2m.com). •



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