

Safety at a crossroads

Problem intersections meet with creative solutions

Source: PUBLIC WORKS MAGAZINE

Publication date: 02/01/2006

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A lot of action occurs at an intersection. Cars and trucks speed in from all directions, stopping, turning, changing lanes. Introducing other variables—such as poor visibility, bad weather, inadequate signage, and human error—to these hubs of activity leads to a recipe for disaster.

According to the Federal Highway Administration, approximately 40% of all automotive collisions occur at intersections. Also, intersection crashes account for 50% of injury crashes and 21% of all roadway fatalities. In 2001, for example, there were nearly 3 million intersection-related crashes in the United States, causing 8876 deaths.

Motivated by such tragic numbers and personal experience—one of his eight children died in a collision—one Congressman has called for a full disclosure of the nation's intersection crash statistics. Sen. Mike DeWine (R-Ohio) sponsored a number of provisions in the recently passed \$300 billion highway bill designed to bring attention to several problem areas that befuddle transportation safety. His efforts include programs designed to raise awareness about vehicle and roadway safety, improve driver education and licensing, ban the sale of remote devices used to change traffic signals, and step up traffic safety law enforcement.

Among the causes championed by DeWine include the Safe Streets and Highways provision. Co-sponsored by Sen. Jay Rockefeller (D-W. Va.), the provision would fund a mandatory program requiring states to identify, rank according to severity, and publicly disclose a list of its most dangerous roads and intersections.

“The public has a right to know where dangerous roads and intersections are in their communities, and where these tragic deaths are occurring,” said DeWine. “That way, residents can not only make sure improvements are being made, but they can make responsible decisions when driving their families or handing their keys to young drivers.”

Signaling a Solution

For the past eight years, one innovative program has sought to improve safety at problem intersections. In the mid-1990s, the city of Detroit approached the Dearborn-based Michigan arm of the American



Photo: Breann Gonzalez
Sen. Mike DeWine (D-Ohio) has pushed a number of highway bill measures geared toward increasing public awareness and safety, including the Safe Streets and Highways provision, which would require states to identify and publicize their most

Automobile Association (AAA) with concerns about problem areas within its boundaries, including intersections. The mayor and a team of AAA traffic safety engineers put their heads together to come up with a plan.

dangerous intersections.

“AAA worked with the city to identify problem locations to conduct an initial assessment of the safety issues and what kind of analysis was needed,” said Jeffrey Bagdade, a traffic engineer who previously worked with AAA. “The best source of data was the Michigan crash database from the State Police. Once we combed through that, we pulled individual collision reports to make sure we actually knew what was going on.” Details from the crash data—including the position of vehicles involved, the nature of damage sustained, and the severity of crashes—further informed the engineers.

After its initial assessment, the team zeroed in on specific intersections to target. They conducted a study of each site and performed a benefit/cost analysis to determine what improvements, if any, would be feasible and economical. AAA worked with the city of Detroit to identify potential funding sources for improvements. The city used existing federal safety funds; they also received money from the state earmarked for road upgrades.



Photos: AAA Michigan

The project moved relatively fast; the assessments began in 1996 and improvements at the first three Detroit intersections were completed in 1997. Initial success motivated other agencies to join the program—the Michigan DOT, the city of Grand Rapids, and Wayne County (home to Detroit) jumped in.

According to Bagdade, the extent of enhancements varies from intersection to intersection. “Common improvements that we implemented included increasing the size of the signals,” he said. “Most urban areas used smaller signal heads—8 inches in diameter, the minimum. We recommended upgrading to larger 12-inch heads, making sign improvements, adding left-turn green arrows, and placing extra signal heads at the far left of the intersection.”

Prior to improvements (top), the crash-prone intersection of 7 Mile Road and Dequindre Street in Detroit had small, 8-inch-diameter signals, left turn prohibition, and no dedicated left turn lane.

Based on recommendations by engineers from AAA, the city created a dedicated left-turn lane, added a protected left-turn arrow, and replaced the signal lenses with brighter 12-inch lenses (bottom).

Other measures included adding or enhancing pavement markings, re-striping intersections, adding turn lanes, enlarging and illuminating signs, and installing “count-down” pedestrian signals. The cost for these upgrades varies. According to Bagdade, the average is \$50,000 to \$100,000 for an intersection undergoing signal improvements and pavement markings. Basic improvements—such as minor sign changes and simple markings—could total as little as \$1000; more ambitious projects involving widening of turn lanes, alterations to medians, and other significant changes could cost up to \$250,000

A total of 400 Michigan sites have been targeted since the program's inception; to date, improvements have been completed at approximately 225 sites. In 2003, researchers from Wayne State University in Detroit evaluated 84 sites involved in the program. The study revealed that the improved sites saw a 25% reduction in crashes, and 40% reduction in injuries, compared to before the changes were implemented.

Additionally, the program has been further expanded to Wisconsin. In November 2005, Bagdade left AAA to work as senior transportation engineer for Berkley, Mich.-based consulting firm Opus Hamilton, one of the companies that conducted the initial assessments in Detroit, but he continues to work with AAA on the intersection project.

Rounding On a Solution

Highway officials have identified the installation of roundabouts—circular intersections in which drivers enter and exit through right turns—as another way to improve traffic safety. According to Tom Mannino, project manager with St. Louis-based engineering firm Horner & Shifrin Inc., roundabouts offer a range of benefits.

“In a roundabout, cars are approaching at a slower speed; therefore, drivers have more time to react to pedestrians, and pedestrians also have more time to react to vehicles,” said Mannino. Collisions at roundabouts typically are less severe and frequent than at traditional intersections. In a December 2002 report, the Maryland Highway Administration indicated that 15 single-lane roundabouts had significantly improved safety at those intersections; analysis showed a 100% decrease in fatal crashes, 82% decrease in injury crashes, and a 60% reduction in overall crashes.

In O'Fallon, Ill., town officials harbored concerns about the intersection of State Street, an arterial roadway, and North Green Mount Road, a collector roadway.

“The location is problematic,” said Dennis Sullivan, director of public works and engineering. “State Street, east and west, has cars traveling in a train-like pattern. As a result, motorists heeding the stop on the north-south road often become impatient and pull out in front of cars on State, causing accidents.”

The city looked at a number of options, most of which were dismissed.

“A four-way stop would cause excessive stopping of traffic on State Street most hours of the day,” said Sullivan. “A traffic light configuration would solve this problem, but is expensive to build and maintain, as well as coordinate with other signalized intersections nearby; it would also cause excessive delays in traffic most of the day based on the traffic distribution.”

According to Mannino, a traffic study prepared by another engineering firm concluded that traffic signals should be installed with left turn lanes. The city council instead voted to pursue an overpass over the CSX railroad, but would need to defer the project until funding could be established. Engineers from Horner & Shifrin brought the idea using a roundabout as an interim improvement to officials, who gave the thumbs up.

“The roundabout best accommodates traffic for now and into the next 20 years, saving motorists time and minimizing pollution,” said Sullivan.

Engineers performed a computer simulation that demonstrated installation of a roundabout at the location would lead to a marked



Photos: Horner & Shifrin
Traffic at the intersection of Obernefemann Road and State Street in O'Fallon, Ill. (top)—already busy thanks to motorists from a nearby interstate—will soon increase when the city's

reduction in air pollutants due to improved traffic flow and minimal traffic delay and congestion. Based on Horner & Shifrin's recommendation, the city applied for and received a Congestion Management and Air Quality (CMAQ) grant for \$365,000 toward the projected total cost of \$500,000. In addition, because the intersection averages more than one crash per month, many involving multiple vehicles, the city is applying for Highway Safety Improvement Program funds to supplement the CMAQ funding already received. This project is scheduled to begin construction this summer and wrap up by September. The city expects a 73% reduction in crashes and improved side street access.

Sports Complex and Community Park opens later this year. A proposed roundabout designed by Horner & Shifrin Inc., shown (bottom), would increase pedestrian safety, increase traffic flow, and reduce air/noise pollution.