



Florida Department of Transportation Research

Synthesis of Visibility Detection Systems

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Florida is among the top states with collisions due to fog, smoke, and heavy rain. Most recently, a crash on I-75 near Gainesville, Florida, resulted from combined fog/smoke, leading to a pile-up of a dozen cars and a half dozen tractor-trailers. Eleven died and 18 injured. Not only did the visibility conditions lead to the collisions, it also hampered efforts to locate and rescue victims.

This widely reported incident raised awareness of fog/smoke hazards and related crashes, an ongoing issue in Florida. Statistics show that poor-visibility collisions are more likely to cause death or serious injury than other collisions. However, mitigating these incidents is difficult due to their unpredictability and the inadequacy of traffic control techniques to guide drivers' actions.

In this project, University of Central Florida researchers examined reduced visibility countermeasures, providing a synthesis of implemented systems, both fixed and mobile. Researchers also examined the underlying unpredictability of when and where systems are needed. They prioritized areas of Florida for implementation using GIS and other analyses.

Researchers examined existing systems in three categories: domestic, foreign, and aviation. Eighteen states had visibility detection in various stages of implementation. Researchers detailed where the systems were installed and their basic components. System features, such as miles monitored, sensors, communications, and cost, were summarized. Systems in England, Austria, the Netherlands, Finland, and Saudi Arabia were also reviewed. Aviation systems, which are highly standardized and widely deployed, were examined in some detail.

Researchers analyzed fog/smoke-related crashes in Florida in depth, finding over 1700 fatal crashes due to rain and over 300 due to fog/smoke for the years 2001-2010. The literature revealed extensive work on rain- and snow-related crashes,



Under foggy conditions, a sharp turn to the right is all but invisible. Excessive speed and poor lighting can make this situation a hotspot for visibility-related crashes

but much less work on fog/smoke-related crashes. An inventory of fog- and smoke-related crashes for the years 2005 through 2010 was drawn from Florida Department of Transportation databases. A cluster analysis helped identify hotspots for fog/smoke-related collisions across the state. Most incidents were head-on or rear-end collisions. While the highest collision rates of this type were in dense traffic areas, like Jacksonville or Tampa, many fog/smoke-related crashes occurred on undivided two-lane rural roads. On rural roads identified as hotspots, medians, appropriate speed limits, and lighting could reduce the possibility of collisions under low visibility conditions.

Through this project, researchers identified a number of systems that can detect visibility problems and provide warning messages to drivers in real time. However, technology is not the only solution to the problem. Better identification of hotspots for fog/smoke collisions with appropriate engineering solutions can help reduce the number of incidents. Effective implementation of these measures promises to save lives on Florida's roadways.

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For more information, visit <http://www.dot.state.fl.us/research-center>