

Best Practices for Road Weather Management

Version 2.0

Alabama DOT Low Visibility Warning System

In March 1995 a fog-related crash involving 193 vehicles occurred on the seven-mile (11.3-kilometer) Bay Bridge on Interstate 10. This crash prompted the Alabama Department of Transportation (DOT) to deploy a low visibility warning system. The warning system was integrated with a tunnel management system near Mobile, Alabama.

System Components: Six sensors with forward-scatter technology are used to measure visibility distance. The visibility sensors are installed at roughly one-mile (1.6-kilometer) intervals along the bridge. Traffic flow is monitored with a Closed Circuit Television (CCTV) surveillance system. Video from 25 CCTV cameras is displayed on monitors in the tunnel control room. Field sensor data are transmitted to a central computer in the control room via a fiber optic cable communication system. The computer controls 24 Variable Speed Limit (VSL) signs and five Dynamic Message Signs (DMS), which are used to display advisories or regulations to motorists.

System Operations: Two system operators staff the tunnel control room 24 hours a day. When fog is observed via CCTV operators consult the central computer, which displays visibility sensor measurements by zone. The warning system is divided into six zones which can operate independently. Depending on visibility conditions in each zone, operators may display messages on DMS and alter speed limits with VSL signs (as shown in the table).

Alabama DOT Low Visibility Warning System Strategies

Visibility Distance	Advisories on DMS	Other Strategies
Less than 900 feet (274.3 meters)	"FOG WARNING"	Speed limit at 65 mph (104.5 kph)
Less than 660 feet (201.2 meters)	"FOG" alternating with "SLOW, USE LOW BEAMS"	<ul style="list-style-type: none"> • "55 MPH" (88.4 kph) on VSL signs • "TRUCKS KEEP RIGHT" on DMS
Less than 450 feet (137.2 meters)	"FOG" alternating with "SLOW, USE LOW BEAMS"	<ul style="list-style-type: none"> • "45 MPH" (72.4 kph) on VSL signs • "TRUCKS KEEP RIGHT" on DMS
Less than 280 feet (85.3 meters)	"DENSE FOG" alternating with "SLOW, USE LOW BEAMS"	<ul style="list-style-type: none"> • "35 MPH" (56.3 kph) on VSL signs • "TRUCKS KEEP RIGHT" on DMS • Street lighting extinguished
Less than 175 feet (53.3 meters)	I-10 CLOSED, KEEP RIGHT, EXIT ½ MILE	Road Closure by Highway Patrol

When the speed limit is reduced, notices are automatically faxed to the DOT Division Office, the Highway Patrol, and local law enforcement agencies in Mobile and neighboring jurisdictions (i.e., Daphne and Spanish Ford). If necessary, system operators request that the Highway Patrol utilize vehicle guidance to further reduce traffic speeds. During vehicle guidance operations a patrol vehicle with flashing lights leads traffic across the bridge at a safe speed.

Transportation Outcome: Although labor-intensive, the warning system has improved safety by reducing average speed and minimizing crash risk in low visibility conditions.

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Implementation Issues: The original system design included a vehicle detection subsystem, backscatter visibility sensors, and automated activation of signs. Bridge deck construction precluded the installation of inductive loop detectors and vibration prevented the use of microwave vehicle detectors. Thus, the vehicle detection subsystem had to be eliminated. Visibility sensors with backscatter technology were deployed along the bridge in Fall 1999. However, problems with accuracy and reliability caused the DOT to replace them with forward-scatter visibility sensors in 2000.

The tunnel control room was modified to incorporate monitoring and control functions for the warning system, which began operating in September 2000. By 2004, control of the warning system will be transferred to a new Traffic Management Center that is currently under construction.

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