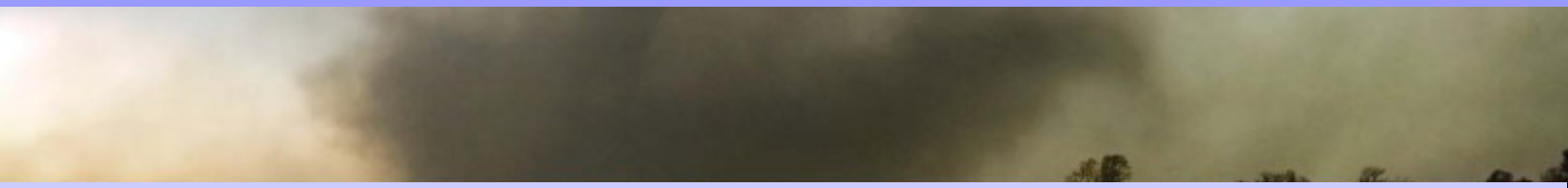



Road Weather Management Best Practices

Version 3.0



The impacts of weather on the nation's road system greatly affect safety, mobility, and productivity. Weather affects roadway safety through increased crash risk, as well as exposure to weather-related hazards. On average 7,130 fatalities and 629,000 injuries occur every year during adverse weather conditions. Weather impacts roadway mobility by increasing travel time delay, reducing traffic volume throughput and speeds, increasing speed variance (a measure of speed uniformity), and decreasing roadway capacity (maximum rate at which vehicles can travel). Further, weather events influence productivity by disrupting access to road networks, and increasing road operating and maintenance costs.

Mitigation Strategies

Three types of road weather management strategies may be employed in response to environmental threats: advisory; control; and treatment strategies. *Advisory* strategies provide information on prevailing and predicted conditions to both transportation managers and motorists. *Control* strategies alter the state of roadway devices to permit or restrict traffic flow and regulate roadway capacity. *Treatment* strategies supply resources to roadways to minimize or eliminate weather impacts. Many treatment strategies involve coordination of traffic, maintenance, and emergency management agencies. These mitigation strategies are employed in response to various weather threats including fog, high winds, snow, rain, ice, flooding, tornadoes, hurricanes, and avalanches.

Purpose of the Best Practice Library

Due to the diverse geography and climates around the nation, state and local governments have deployed a wide variety of mitigation strategies in response to weather impacts. The Federal Highway Administration (FHWA) sought to compile premiere road weather management practices used by states around the nation. The Road Weather Management (RWM) Best Practices Library (BPL) serves to disseminate cutting-edge, innovative and effective mitigation strategies and practices to a national audience. State and local road weather management officials can use the BPL to learn how other states best respond to similar challenges.

The prior version of the BPL, Version 2.0, was released in 2003 and featured 30 practices from municipal and state transportation agencies. At this time, the practices from Version 2.0 are either mainstreamed or have been surpassed by superior solutions. Version 3.0, released in 2012, captures the state-of-the-art, presenting 27 all-new practices that build upon the states' previous successes. This most recent version can be found at the following web link: http://www.ops.fhwa.dot.gov/weather/mitigating_impacts/best_practices.htm

Contents of the BPL

Table 1, subsequently shown, lists the various contributing states and their respective best practices that are highlighted in the BPL.

Examples of Practices Included in the BPL

As an illustration of the content of the BPL and the three mitigation strategies employed, several practices are highlighted here.

An example of an advisory strategy is Florida's bridge wind alerting system. In Florida, high winds from hurricanes and tropical storms are regularly encountered by motorists. Such high winds across bridges pose a danger. To solve this problem, the Florida Department of Transportation (FDOT) deployed wind sensors on some bridges with incidences of high wind events. The system alerts FDOT if the wind speed is above various preprogrammed thresholds. Warnings to motorists and law enforcement can then be disseminated as needed. Now, the system provides a safe, efficient and accurate method to collect and disseminate wind speed information.

In California's Central Valley region, dense fog routinely develops and leads to poor visibility for motorists. In 2009, the state deployed a system to control motorists driving through such potentially dangerous road conditions. On a thirteen mile stretch of CA State Highway 99 south of Fresno, the California Department of Transportation installed sensors and other equipment which determines visibility and traffic characteristics and automatically disseminates the collected data to Changeable Message Signs adjacent

State	Best Practice	State	Best Practice	State	Best Practice
Alabama	Low Visibility Warning System	Iowa	Salt Use Dashboard	New Mexico	Dust Control System
Alaska	Temperature Data Probe Program	Iowa	WeatherView Road Weather Traveler Information System	Pennsylvania	Interstate Restriction System
Arizona	DUST Warning System	Kansas (Kansas City)	Advanced Traffic Management System	South Carolina	Hurricane Traffic Evacuation Operations
California	Fog Detection and Warning System	Kansas	Road Weather Information for Travelers System	South Dakota	Maintenance Decision Support System
California	Icy Curve Warning System	Maryland	Emergency Truck Parking Portal	Tennessee	Low Visibility Warning System
Colorado	One Pass Clearing Operations	Michigan	Measurement of Regain Time	Texas	High Water Detection System
Colorado	Variable Speed Management System	Minnesota	I-35W Smart Lanes: Active Traffic Management	Texas	Pump Station Monitoring System
Florida	Bridge Wind Speed Alerting System	Montana	Equipment Vehicle Management System	Utah	Traveler Information Weather
Idaho	Winter Maintenance Performance System	Montana	Traveler Information System	Vermont	Transportation Operations Center

Table 1. Listing of Practices found in Version 3.0 of the BPL

to the road. These signs inform motorists of upcoming visibility conditions and instruct them to lower their vehicle speed if foggy conditions are present. A typical sensor array can be seen in Figure 1. In the next phase of this project, the information collected from the sensors will be relayed to the state's 511 systems and also its road weather information website. Through timely dissemination of information to motorists, it is anticipated accidents and deaths related to fog will be mitigated.

Figure 1. Typical sensor array for CA's fog detection and warning system

Finally, an example of a treatment strategy is Idaho's winter maintenance performance system. A means was needed to evaluate the benefits that the state's maintenance program was providing during the winter months. In response to this challenge, a system of nearly 90 sensors was deployed at strategic locations in Idaho to collect data on road surface characteristics and local weather. When combined with data from the maintenance program, the effectiveness of various treatments can be derived. This leads to deployment of treatments tailored to be effective for local road conditions.

Anticipated Benefits

The FHWA seeks to provide state departments of transportation (DOTs) and transportation management centers (TMCs) with the best available tools. This set of best practices reflects some of the most effective and innovative mitigation strategies and supporting technologies currently in practice. The primary beneficiaries of this BPL include planners and maintenance staff at DOTs, operators at TMCs and ultimately, the traveling public. FHWA anticipates that with appropriate widespread adoption of these best practices, mobility, safety, and productivity will be increased during inclement weather.

Acknowledgments

The FHWA would like to thank all states and metro areas that contributed towards the BPL.

Requests for additional information on the BPL and requests to have a best practice featured in a subsequent version of the BPL can be submitted to weatherfeedback@dot.gov.

U.S. Department of Transportation
Road Weather Management
1200 New Jersey Avenue, E86-205
Washington DC 20590

Paul Pisano
202-366-1301
Email: paul.pisano@dot.gov
http://ops.fhwa.dot.gov/Weather/index.asp

U.S.Department of Transportation
Federal Highway Administration

"Anytime, Anywhere Road Weather Information"

Road Weather Management Best Practices

Version 3.0

Publication #: FHWA-JPO-13-036