Project Summary

Texas Department of Transportation

0-5278: Managing Freeway Operations During Weather Events

Background

Weather events affect traffic on every roadway in the nation and have concerned transportation agencies for many years. Even minor weather events can cause slick pavement, reduce travel speeds, increase speed variability, increase delay, and increase the potential for crashes. Many states, including Texas, are implementing weather monitoring systems to help prepare for inclement weather and operate the transportation system during major weather events. The goal of this research was to help the Texas Department of Transportation (TxDOT) develop a structured, systematic approach for managing traffic during weather events. The focus was on common weather events – such as fog, high winds, heavy rains, and snow and ice storms – that impact traffic operations day-to-day.

What the Researchers Did

To achieve the project goal, researchers:

- Conducted a survey of selected TxDOT districts to determine what information traffic management center (TMC) operators need to manage traffic operations during weather events.
- Conducted a literature review to assess systems and technologies that other states have deployed to manage traffic during weather-related events.
- Reviewed current weather-related detection and monitoring technologies.
- Assessed the magnitude of the impact of different weather events on traffic operations using historical traffic detector and weather information.

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Using this information, researchers developed concepts of operations to guide TMC operators in responding to different types of weather-related events, including limited visibility conditions, ponding and flash flooding, high winds, severe thunderstorms, tornados, and winter storms. They developed a catalog of advisory, control, and treatment strategies (ACTS) that operators could use to manage traffic operations during various weather events. In addition, researchers proposed messages that TxDOT TMC operators could use on dynamic message signs (DMSs) for different types of weather events. Finally, an assessment framework was developed to enable TxDOT to integrate weather information from the National Weather Service and other private weather providers into its TMC operations software.

What They Found

This research showed that, as in many states, some districts in TxDOT have already deployed devices and systems to help them better manage traffic during weather events, but only to address situations at a local level. In order to improve safety and maximize efficiency, TxDOT should develop traffic management strategies that address weather events on a regional basis. This process involves improving the level of communications and cooperation not only between agencies in a region, but also internally between sections within a district. The research also found that significant advances have been made recently in weather monitoring technologies that will allow TxDOT to expand its monitoring capabilities of the transportation network.

What This Means

With greater expansion of technologies, TxDOT will be able to be more proactive in responding to and managing traffic operations on a regional basis. The generic concepts of operations developed in this research effort provide TxDOT TMC operators with a starting point for developing plans and procedures for managing traffic operations specific to their regions. A district can take these generic concepts of operations for different weather events and adapt them to fit within the context of an individual district. The ACTS catalog will help TxDOT operators determine what strategies can be implemented in their individual regions and districts to address specific needs. Using the candidate messages and response criteria, each TxDOT district can develop a comprehensive plan for managing traffic operations during weather events that will improve safety and maximize efficiency for its region.

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