

Best Practices for Road Weather Management

City of Dallas, Texas Flood Warning System

In May 1995 a rain event caused widespread flooding in the City of Dallas, Texas resulting in seven roadway fatalities. The City deployed an automated system to monitor water levels at over 40 stream locations near roads and warn motorists of high water until maintenance personnel can barricade dangerous roads.

System Components: The flood warning system consists of stilling wells, Remote Processing Units (RPU), Dynamic Message Signs (DMS), a radio communication system, and a central computer system. A stilling well is comprised of a 3-foot (0.9-meter) long pipe, a pressure transducer, and a float switch to measure stream levels. When high water is detected, RPUs activate sign assemblies and report stream levels to the central computer. Each RPU—which is housed in a pole-mounted enclosure—includes radio communication devices, solar or electrical power systems, and controls to reset sign assemblies. At each monitoring site, one to four sign assemblies are installed near the road to alert motorists. Sign assemblies include electromechanical DMS, two flashing beacons, radio communication devices, and power systems.

System Operations: When water reaches the roadway edge RPUs automatically activate flashing red beacons and change sign messages from “HIGH WATER WHEN FLASHING” to “DO NOT ENTER HIGH WATER”. Sign assemblies send a message back to the RPU to verify proper operation. Remote processing units transmit water level and sign status to the central computer every hour via the radio communication system. When high water is detected by field components, the central computer is immediately alerted and sends alphanumeric pages to maintenance staff who then erect barricades on threatened roads. The central computer also posts road closures on the City’s “Flooded Roadway Warning System” web site (www.ci.dallas.tx.us/sts/html/frws.html). When the water recedes, maintenance staff are paged again to notify them that barricades can be removed and signs assemblies can be reset.



**Flood Warning System
Sign Assembly**

Transportation Outcome: The flood warning system improves roadway safety, as most motorists heed sign warnings and avoid hazardous conditions. Further, since the system was installed in April 2000 no claims related to flooded roads have been filed against the City.

Implementation Issues: During system design the City identified sites warranting motorist notification. Locations with a history of flooding or where drowning deaths had occurred were selected. After field equipment locations were selected, system requirements were established. The City desired a cost effective warning system that could be integrated with existing hydrologic monitoring systems, including the Automated Local Evaluation in Real-Time (ALERT) system and the Supervisory Control and Data Acquisition (SCADA) system.

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System designers considered using gate arms to restrict roadway access. Gate configurations were eliminated due to their high costs and history of damage by vehicles attempting to circumvent them. To reduce deployment costs, solar power supply systems were designed for most monitoring sites. Electric power service was arranged for a few sites in shaded areas. Incorporating RPU's that technicians were familiar with further minimized deployment costs associated with training.

Because the City could be held liable if warning signs do not activate during flooding, all field equipment is serviced and tested frequently. All field components are inspected, cleaned, and calibrated every six months. Once a month, maintenance personnel travel to each monitoring site and manually activate sign assemblies to ensure proper operation.

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Reference(s):

- Lawrence, D., "Innovations in Flood Warning: What's Happening in Dallas?", presented at the 12th Conference and Exposition of the Southwest Association of ALERT Systems, 2000, <http://www.udfcd.org/saas2000/abstracts/Don%20Lawrence%20abstract.html>.

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