Road Hazard Motorist Warning Systems

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Maricopa County, AZ Quick Facts

- 4th Largest County by Population
- Population of 4.2 Million People
- 9,224 Sq. Miles
- 27 Cities and Towns Within the County Boundaries
- Larger than Some States
Outline

• Automated Flooded Roadway Warning
• Dust Detection and Warning

Source: earthsky.org
Automated Flooded Roadway Warning

- Program with Maricopa County Flood Control District (FCD)
- Identify Locations
- Develop Criteria
- Prioritize Locations
Automated Flooded Roadway Warning

Criteria

• Is Flow Capable of Moving Vehicles
• Known Fatalities
• Residence or Responder Access
• ADT
• MCDOT Response Time
• Potential for Roadway Debris
• Potential for Roadway Damage
Automated Flooded Roadway Warning

Criteria (continued)

- Night Time Visibility
- Recent Storm Events
- Frequency of Road Closures
- Future Bridge
- Right-of-Way
- Radio Path
- Existing Rain Gauges
Automated Flooded Roadway Warning

Approach
- Agreement – FCD/MCDOT
- Implement 2 locations/year

Infrastructure
- FCD
- MCDOT
System Objectives

• Independently Monitor the Existing Flashing Beacons
• Notify designated agency representatives (MCDOT and/or Flood Control) via e-mail when the Existing Flashing Beacons activate
System Objectives

• Provide always-on snapshot camera images of each flashing beacon and the low point in the roadway
• Operate continuously without access to utility power or landline communications
• Provide diagnostics to monitor the health of the equipment
TMC Monitoring Process Diagram

MCDOT TMC High Water Monitor Operations Process

1. FCD System automatically activates the road flashers when water level in stream gauge meets the flood criteria

2. FCD staff sends e-mail alert notification to subscribers

3. Observe High Water Monitors Displays

4. TMC High Water Monitors Displays are activated

5. Bring up JPEG camera image of the crossing and confirm water on the road and flashers working

6. Notify Operations

7. Enter closures in ATIS

8. Count the number of vehicles that disregard the flashers and also the ones that turn around

9. Share counts with Traffic Management and Operations

10. Enter into ATIS when road is open
Dust Detection and Warning
Dust Storms in Arizona

- October 2013 – dust storm related crash on I-10, **kills three people**

- Since 2000, dust has contributed to **1,207 collisions** resulting in **40 fatalities** and **1,136 injuries**.

- The ‘Season’ for dust storms in Pinal County is usually associated with the summer monsoons, but has been extending into the fall
Project Background

- ADOT applied for and received federal funds to design and construct a novel dust warning system on the I-10.

- Part of larger project to realign and widen I-10 in this area.

- Dust system includes use of existing infrastructure, deployment of new infrastructure and development and integration of software at the Traffic Operations Center (TOC).
Project Objectives

- Provide advanced/early warning of blowing dust approaching and within the corridor;
- Detect dust conditions that are not detected by other sources (such as the NWS);
- Provide real-time video to allow the ADOT TOC to have ‘eyes on the road’;
- Disseminate real-time information to motorists within or approaching corridor focus area; and
- Implement lowered speed limits within corridor focus area in response to dust conditions.
Project Description

- I-10 from MP 209 to MP 219 in Pinal County, AZ
- Devices that will be used:
  - **DMS** – inform drivers of storm/visibility conditions
  - **CCTV** – allows ADOT staff to visually confirm storm and conditions
  - **Dust Detection Devices** – spot detection and long-range detection
  - **Loop Detection System** – on mainline
  - **Variable Speed Limit (VSL) Signs** – activates when storm is imminent to reduce speed limits
Technologies Considered

1. Optical Forward Scatter Visibility Sensor
2. Road Weather Information System (RWIS)
3. C-Band Doppler Radar
Technologies Considered

4. X-Band Radar
5. Video Analytics with Pattern Recognition
Systems Operation Overview

- New software automates system functions in response to detected weather conditions
- **Example:**
  If spot visibility detectors detect visibility below set threshold, it will automatically:
  - Send an alert to the TOC and other agencies (NWS; Pinal County, DPS, etc.);
  - Display CCTV feeds on video wall;
  - Lower speed limit with VSL
  - Display pre-defined message on DMS.
Status

• Construction in progress (duration - 640 Days)
• Expected Completion: October 2019
• Cost: $8 million
Thank You!

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