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**

Salome Highway

Source: earthsky.org

Automated Flooded Roadway Warning

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

Maricopa County
Department of Transportation

Flood Control District of
Maricopa County

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
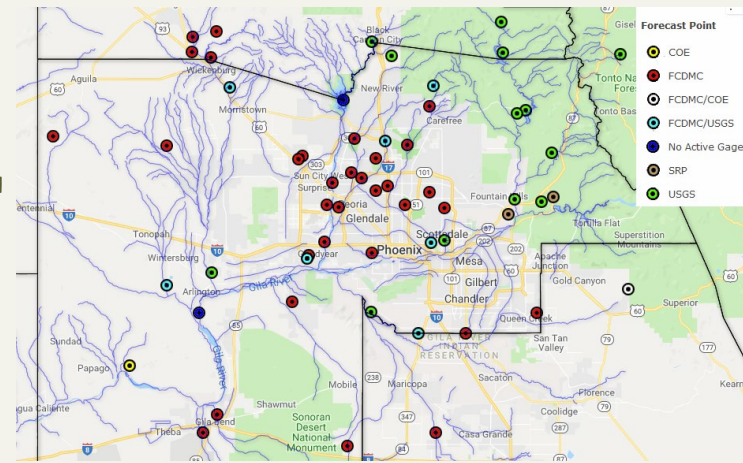- Existing Rain Gauges

Old Stage Road (New River)

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
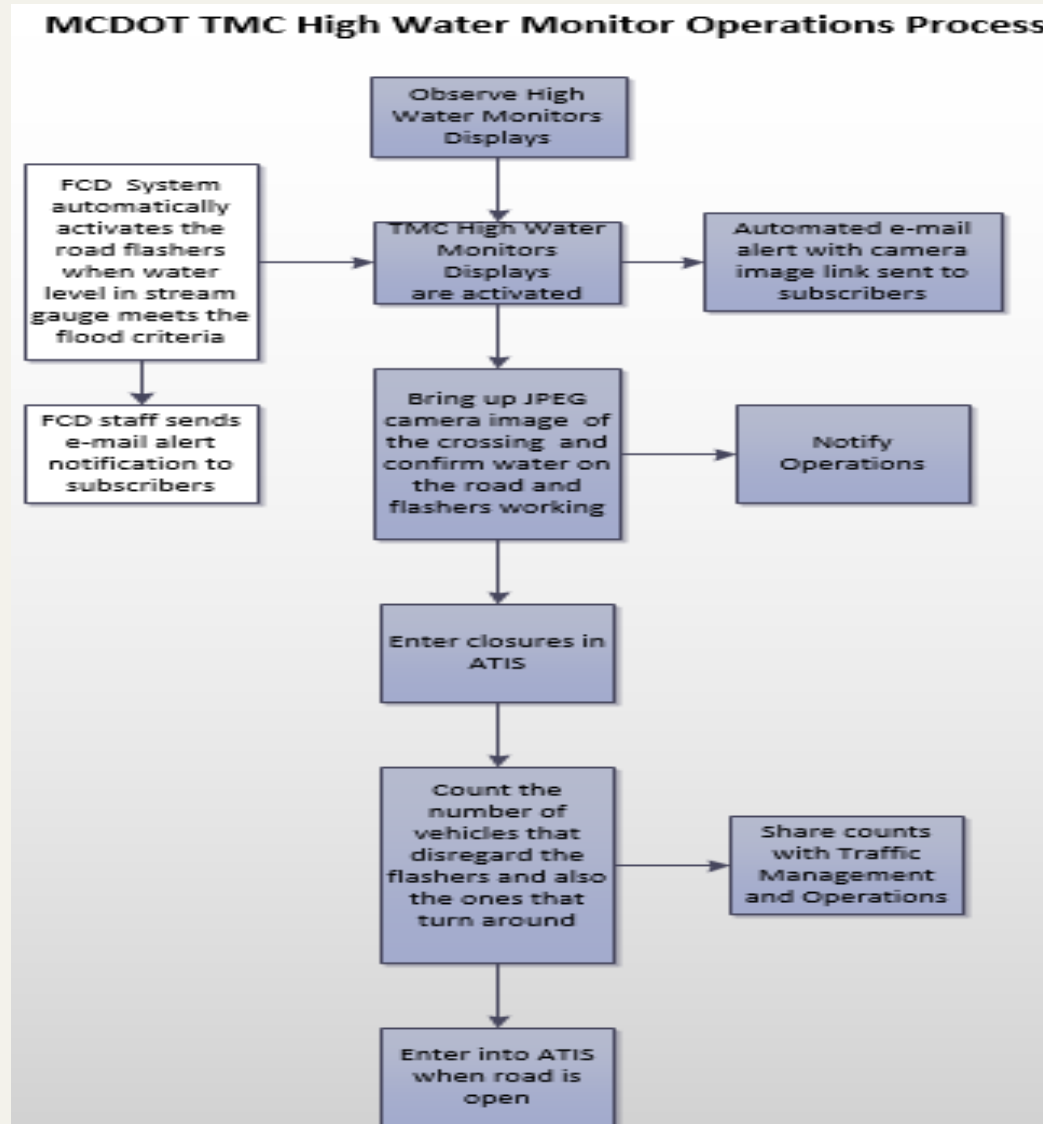
System Objectives

- 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

I-10, Sunshine Blvd to Picacho Peak Rd   CONSTRUCT SAFETY IMPROVEMENTS
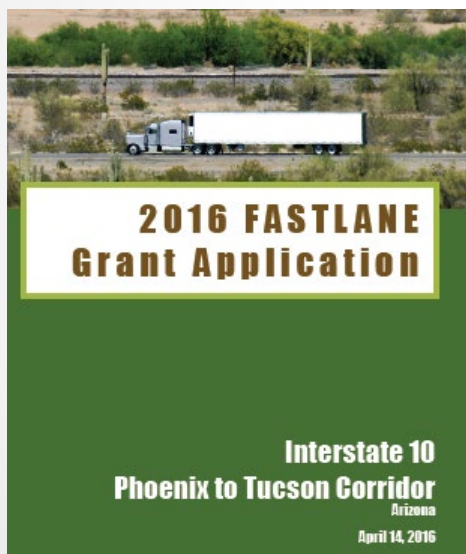
Dust Detection and Warning

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**
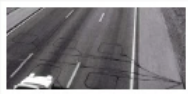- Devices that will be used:
  - **DMS** – inform drivers of storm/visibility conditions
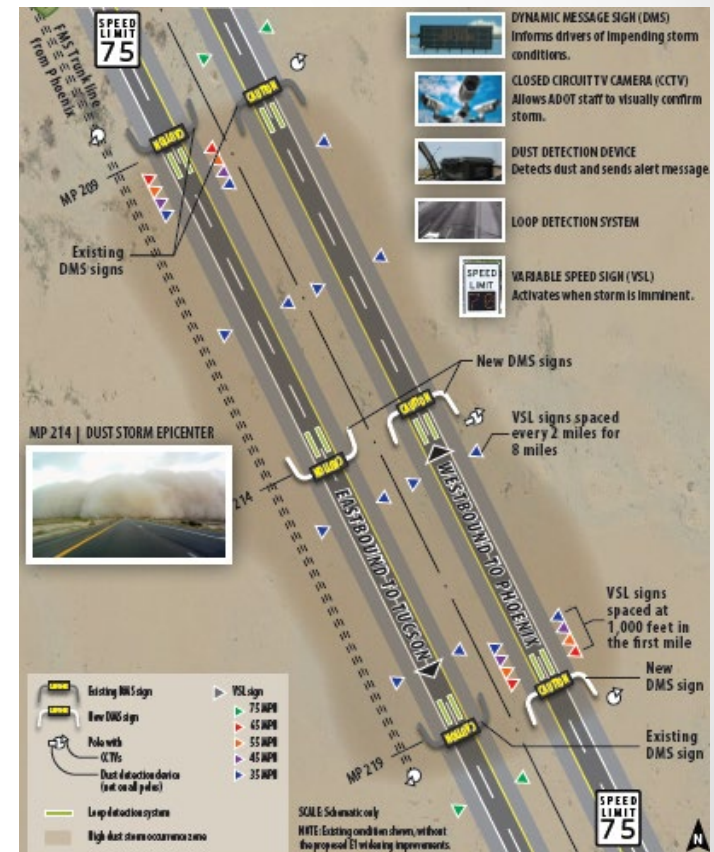 - **CCTV** – allows ADOT staff to visually confirm storm and conditions
  - **Dust Detection Devices** – spot detection and long-range detection
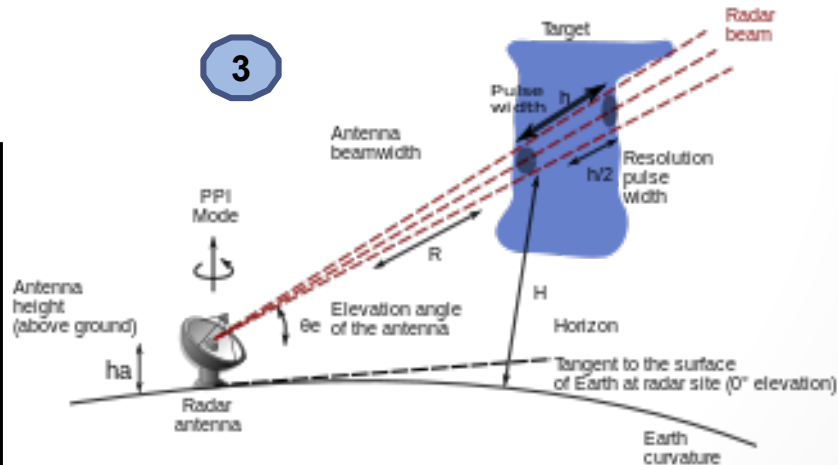 - **Loop Detection System** – on mainline
  - **Variable Speed Limit (VSL) Signs** – activates when storm is imminent to reduce speed limits

Technologies Considered

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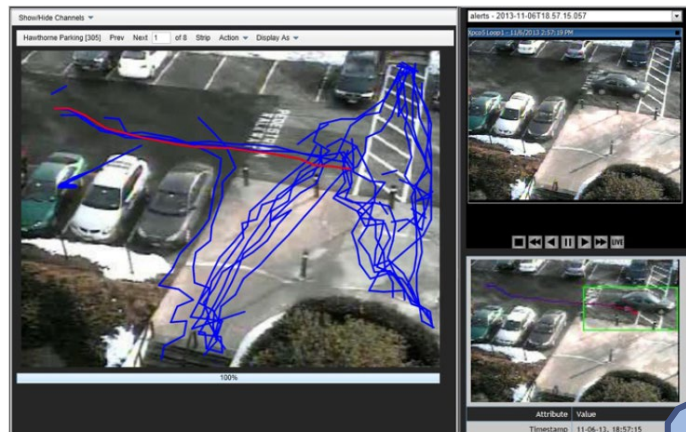
Technologies Considered

4 X-Band Radar
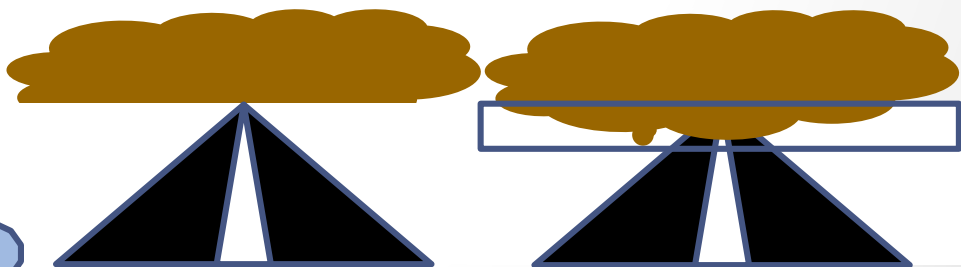
5 Video Analytics with Pattern Recognition

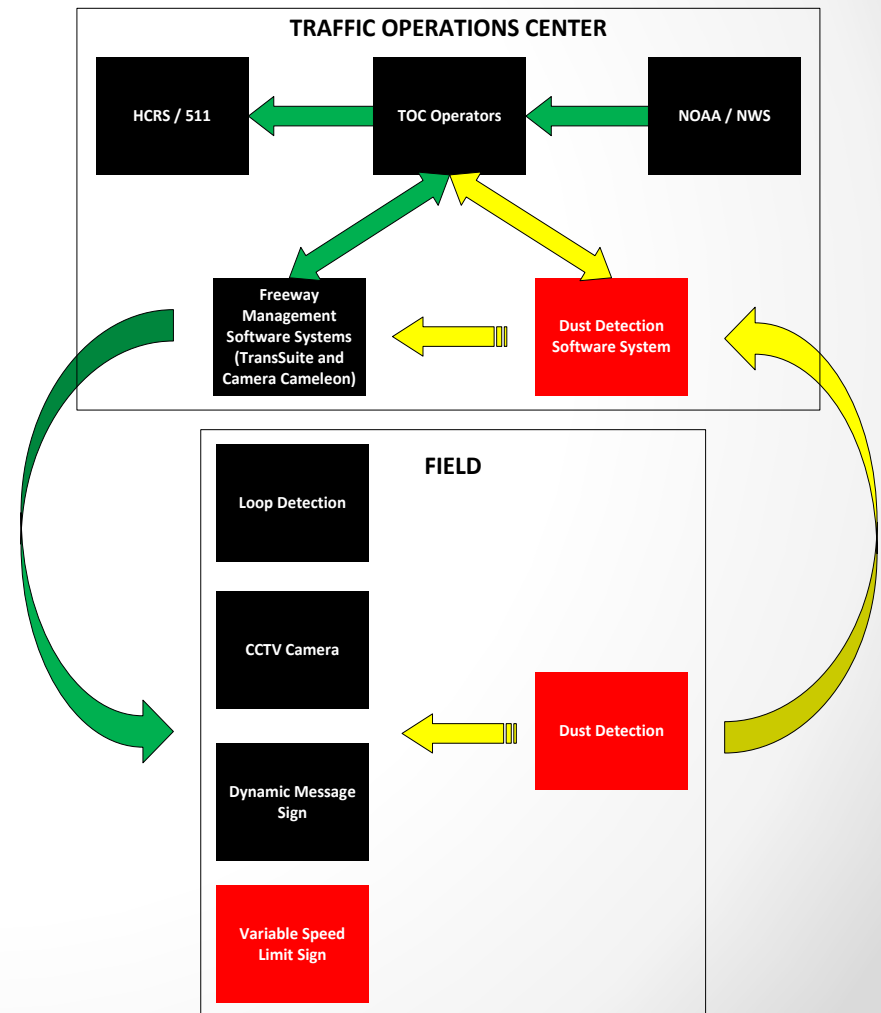Automatic alerts when movement of objects is inconsistent with predefined patterns

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.

TRAFFIC OPERATIONS CENTER

HCRS / 511 ← TOC Operators ← NOAA / NWS

Freeway Management Software Systems (TransSuite and Camera Cameleon)

Dust Detection Software System

FIELD

Loop Detection

CCTV Camera

Dynamic Message Sign ← Dust Detection

Variable Speed Limit Sign

Status

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

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Thank You!

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