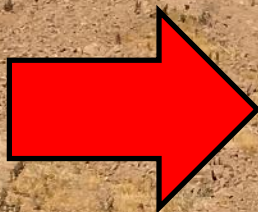


Why do we need a Dust Detection System

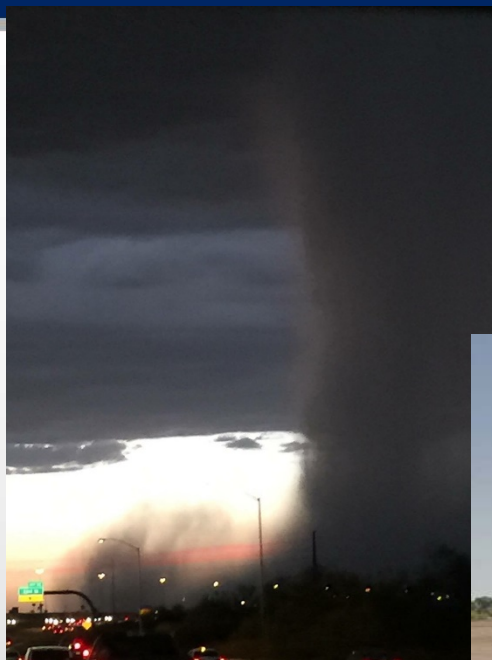


This is why





Causes



Dust Related Crashes

- Aug 2010 to Aug 2015
 - 3 Fatal
 - 5 Incapacitating
 - 27 Non-Incapacitating
 - 6 Possible
 - 42 Property Damage Only
- 83 crashes in 5 years





DUST DETECTION



DUST DETECTION

I-10, Sunshine Blvd. to Picacho Peak Rd.

What is a Dust Detection System?

- Radar Detects Approaching Storm
- Sensors Measure Visibility
- Software Determines Appropriate Speed
- Software Sends Messages to VSL and DMS
- CCTV Verifies Conditions
- Pavement Sensors Measure Speed



Challenges: VSLs

Unexpected Results



Challenges: VSLs



- White on black versus black on white
- FHWA requested the change
- Had to upload new software update to the sign



Lessons Learned

- ✓ Don't specify equipment that can only be delivered by a single supplier
- ✓ Do consider the final location of the radar during design (we got lucky)
- ✓ Always consider where power and comm is coming from
- ✓ Coordinate early with utilities (not always easy)
- ✓ Allocate adequate budget for new utilities

INTEGRATION

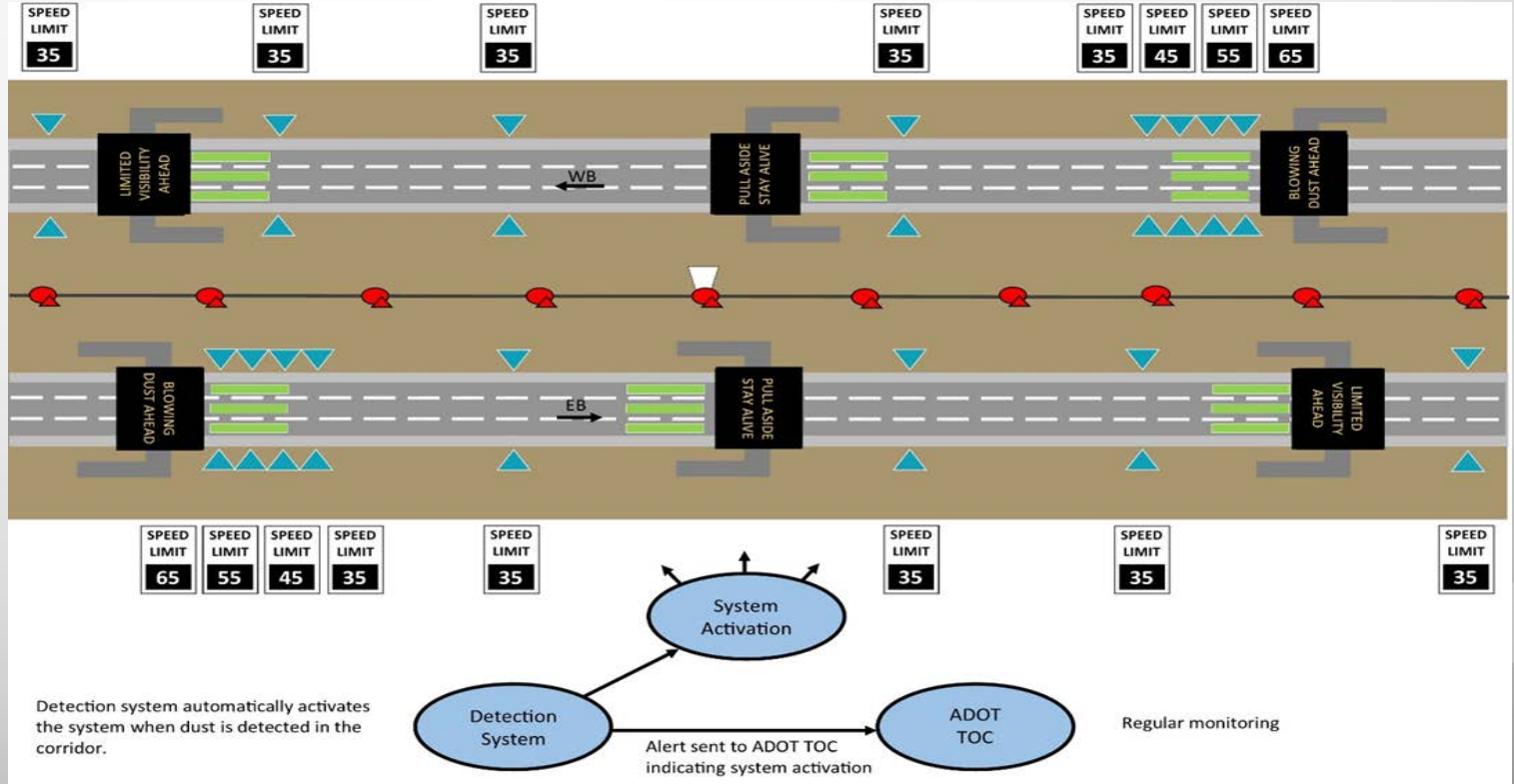
Equipment is powered from several power sources to ensure uninterrupted service. To make the sub-rack non-energized, disconnect all power sources.

How are we going to make this thing work?

**DUST DETECTION**

I-10, Sunshine Blvd. to Picacho Peak Rd.

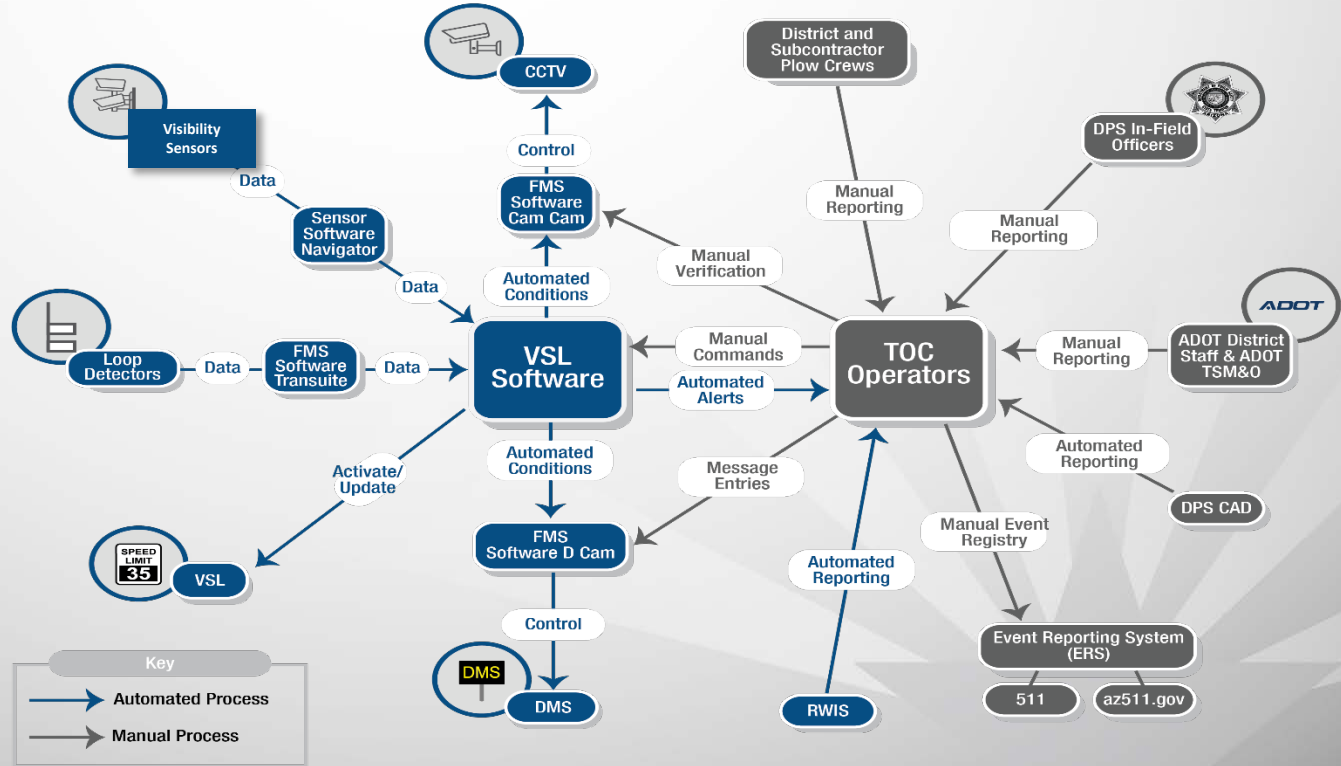
System Layout





Nobody Touches Nothin'

Information Flow Diagram



System Activation Thresholds

- Visibility thresholds drive system activation
- Thresholds based on stopping sight distance criteria

<1800' = lower speed limit to 65

<1500' = lower speed limit to 55

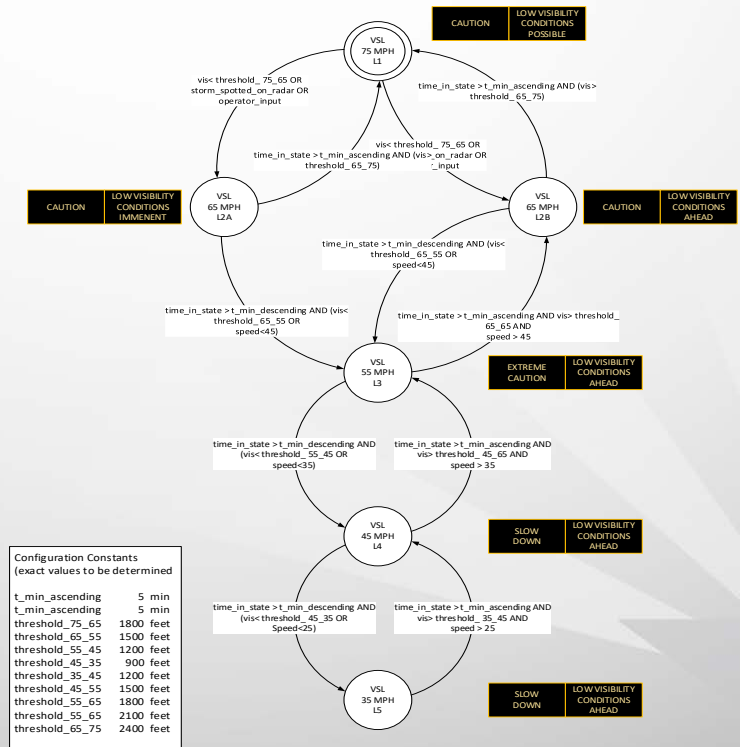
<1200' = lower speed limit to 45

<900' = lower speed limit to 35

System State Diagram

- ✓ If “A” happens, then execute “B”
- ✓ Visibility Parameters
- ✓ Time Parameters



Dust Variable Speed Limit (VSL) State Diagram



DUST Training Simulator

DUST Training Simulator

I-10 near Picacho Peak

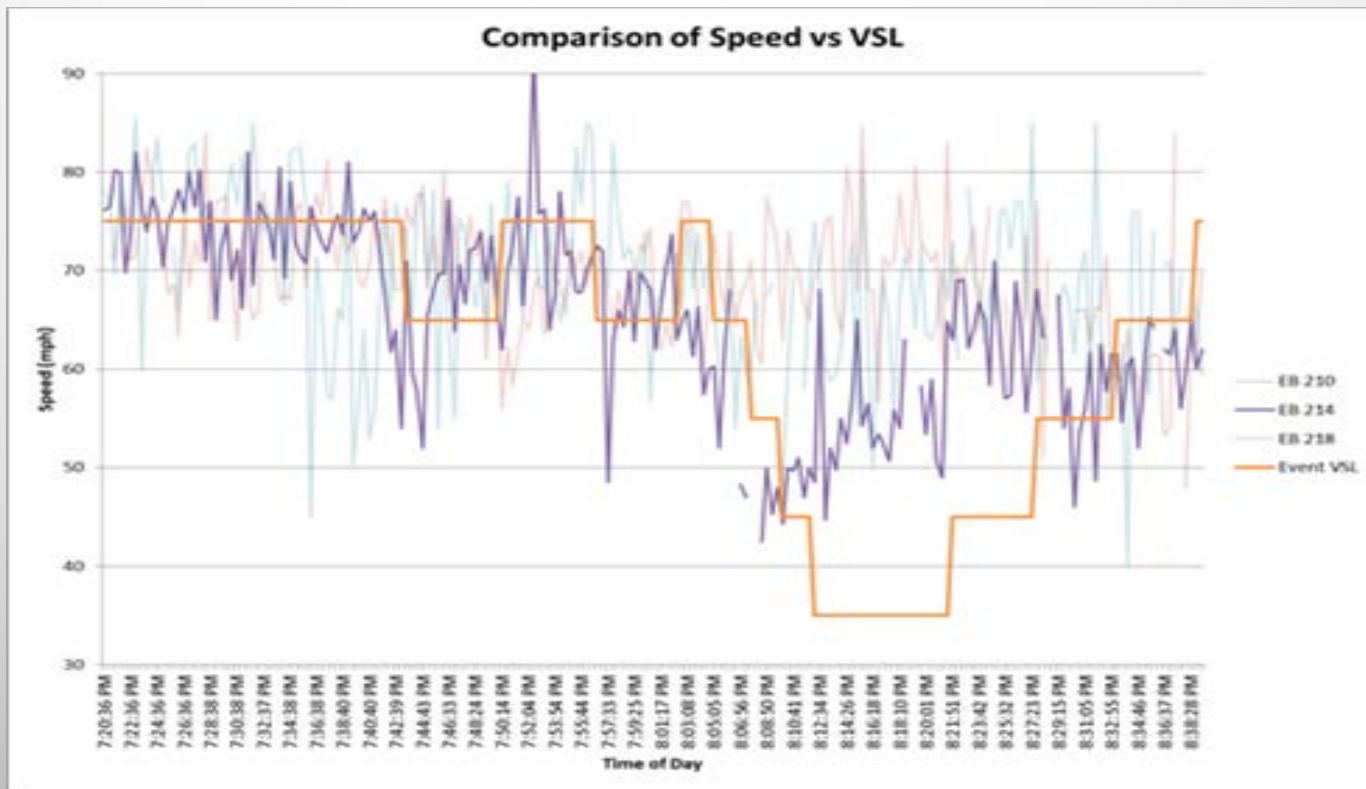
Eastbound Lanes	Westbound Lanes
75 MPH	75 MPH
57 s Going Down	36 s Going Down
75 MPH 	75 MPH 
Auto	Auto
VSL Target 65 MPH	VSL Target 65 MPH

Lessons Learned

- ✓ Budget adequately for integration
- ✓ Start integration sooner
- ✓ Have an offline server to test the system
- ✓ Get basic system operational then add other technologies
- ✓ Include equipment suppliers

A photograph of a two-lane asphalt road stretching into the distance, heavily obscured by a thick, brownish dust or smog that fills the air and obscures the horizon. The sky is overcast and grey.

SYSTEM PERFORMANCE



A photograph of a two-lane road stretching into the distance, completely obscured by a massive, thick wall of brown dust that has risen from the road surface. The sky is overcast and grey, and the overall atmosphere is hazy and oppressive.

QUESTIONS