Work Zone and Incident Electronic Notification System:
Connected Vehicle Work Zone (CVWZ)

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## Work Zone Technology Comparison

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<th>Queue Warning</th>
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<th>Incident Detection</th>
<th>Speed Limit</th>
<th>Automated Enforcement</th>
<th>Entering/Exiting Vehicle Notification</th>
<th>Performance Measurement</th>
<th>In-Vehicle Signage and Alerts</th>
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<td>Static</td>
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<td>Traveler and Personnel Report</td>
<td>Fixed</td>
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<td>Record s Static &amp; Fixed</td>
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<tr>
<td><strong>Smart Work Zone</strong></td>
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<td>Signs, Dynamic Fixed Points</td>
<td>Fast Detection</td>
<td>Variable, Fixed Point, CMS</td>
<td>Capture Images</td>
<td>CMS Warnings</td>
<td>Sensor based</td>
<td>511, WAZE, Google...</td>
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<td><strong>Connected Vehicle Work Zone</strong></td>
<td>Real-Time Continuous</td>
<td>Dynamic, In-Vehicle Info, Continuous</td>
<td>Vehicle Based Detection</td>
<td>Variable, Vehicle Based</td>
<td>RESCU EME</td>
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<td>Vehicle Based</td>
<td>Direct: Visual, Auditory, Haptic Messages and Alerts</td>
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System Architecture: Connected Vehicle
This concept of operations considers both

- Freeway Scenario (ADOT)
- Arterial Scenario (MCDOT)
Arterial: MC-85 Road

- Major Freight Corridor
- Long Project Duration
- Available Alternate Routes
- Challenging Industrial Area
Performance Measures (Concept)

Vehicle Trajectory Data

Joint Distribution of lane change location, speed, vehicle class

Spatial Speed Distribution, by vehicle class, traffic management
Connected Vehicle WZ Prototype 2.0

- Fan
- AC Inverter
- Cellular Antenna
- Cobalt Controller with CVCP
- Thermostat
- DC-DC Converter
- Fuse Block
- Cell Modem

National Operations Center of Excellence
Prototype Ver 2.0

Summary
• 12 Volt Battery 1.2 Amp Draw
• 58 BTU/Hour Heat Gain
• Passive Cooling: Cross Vented Enclosure
• 90 Watt Solar Panel will Sustain Operation
• One Car Battery will provide 24 hours of Autonomy

Loads:
• 5 VDC Regulated CVCP in VME Chassis (5.5 Watt)
• 48 VDC POE Savari DSRC Radio (9.7 Watt)
• 12 VDC Cradlepoint Cell Router (0.4 Watt)
CV Prototype Installation
Freeway Scenario
ADOT Freeway Project: Eastbound I-10 at Loop 202
87th Ave - ALERT

Use FMS system for 110V power supply
Use existing signal for 110V power supply
Challenges to Implementation

- Coordination with multiple groups & divisions within the Department
  - Construction work zone are in separate a division
- Software & Cloud approval through IT services
  - AZRAMP certification
- FCC Licencing
  - Height limitations
- Antenna Placement
  - Current DSRC limits range to 1km
  - Need more due to higher speeds = spaced farther apart
- POE limits distance from power source