Arizona DOT
Transportation Systems Management and Operations (TSM&O)

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ADOT Baseline Condition - Pre TSM&O

Many functions existed but not unified

- Traffic Operations Center was combined with ITS Project Management (under Operations)
- Traffic Safety and Records was combined with Traffic Engineering Design (under Development)
- Regional Traffic Engineers/Traffic Maintenance were under separate District Engineers (under Maintenance)
- Statewide Traffic Maintenance (Signing, Striping, Signal coordination) were supervised by Design Section (under Development)

ADOT TSM&O Progress

Division created with existing groups

- TSM&O functions brought into single leadership

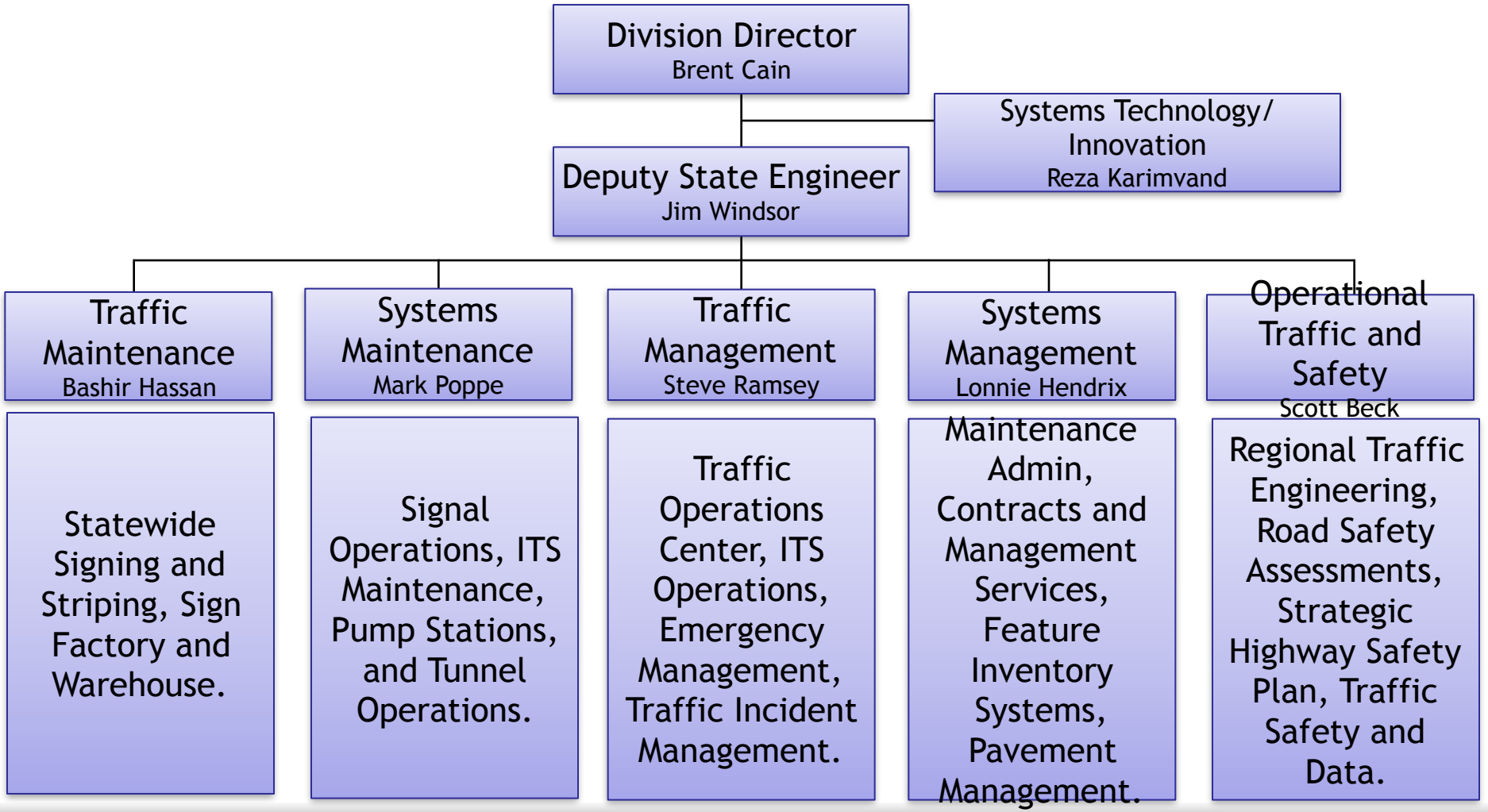
Strategic Plan nearing completion

- Consultant hired to bring national best practices
- Identify short-term to long-term initiatives/ goals

TSM&O staffing structure

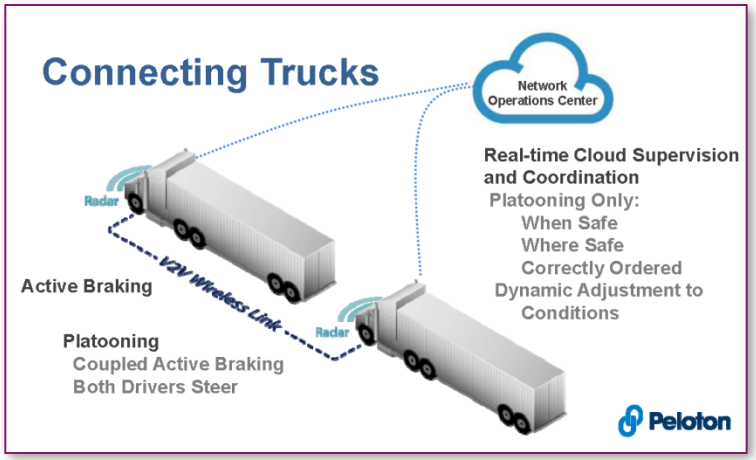
- Currently evaluating additional efficiency gains across the different groups within TSM&O
- “Deep Dive” process identifying overlaps and waste

TSM&O Division Organization



Systems Technology/Innovation

- Evolutionary/Rapid Technologies
  - Connected & Automated Vehicles
  - DSRC Communication
  - SPaT Challenge
- Freight
  - I-10 Corridor Coalition
  - Smart Truck Parking
- Project Development
  - Current Project Support
  - Innovation Deployment



Traffic Maintenance

- Statewide Signing
  - Refine/create asset management system
  - Prioritize sign maintenance

- Statewide Striping
  - Develop system LOS measurement
  - Balance in-house vs contractor nee through “Deep Dive”

Systems Maintenance

- Traffic Signal Operations
  - Traffic Signal, Ramp Meter, CCTV, and DMS Maintenance
  - Update Traffic Signal Infrastructure in order to deploy ICM Timing Plans

- Phoenix Lighting, Pumps, Tunnels
  - P3 contracts for privatizing
  - Conversion to LED

Traffic Management

- Traffic Operations Center (TOC)
  - DPS Co-location
  - Improve remote access to field equipment (signals, cameras, ramp meters)
  - Integrated Corridor Management (ICM)
  - Measure uptime for devices
- Traffic Signal Communication
  - Network signals in rural corridors
  - Update timing coordination plans statewide

Traffic Management

- Traffic Incident Management
  - Train the trainers
  - Quick clearance policy
  - Alt Route/ICM
- Emergency Management
  - COOP/COG
  - SEOC/DEMA/Web-EOC
  - Fire, flood, special events
- Road Weather Management
  - ASU Meteorologist in TOC
  - Winter-storm management

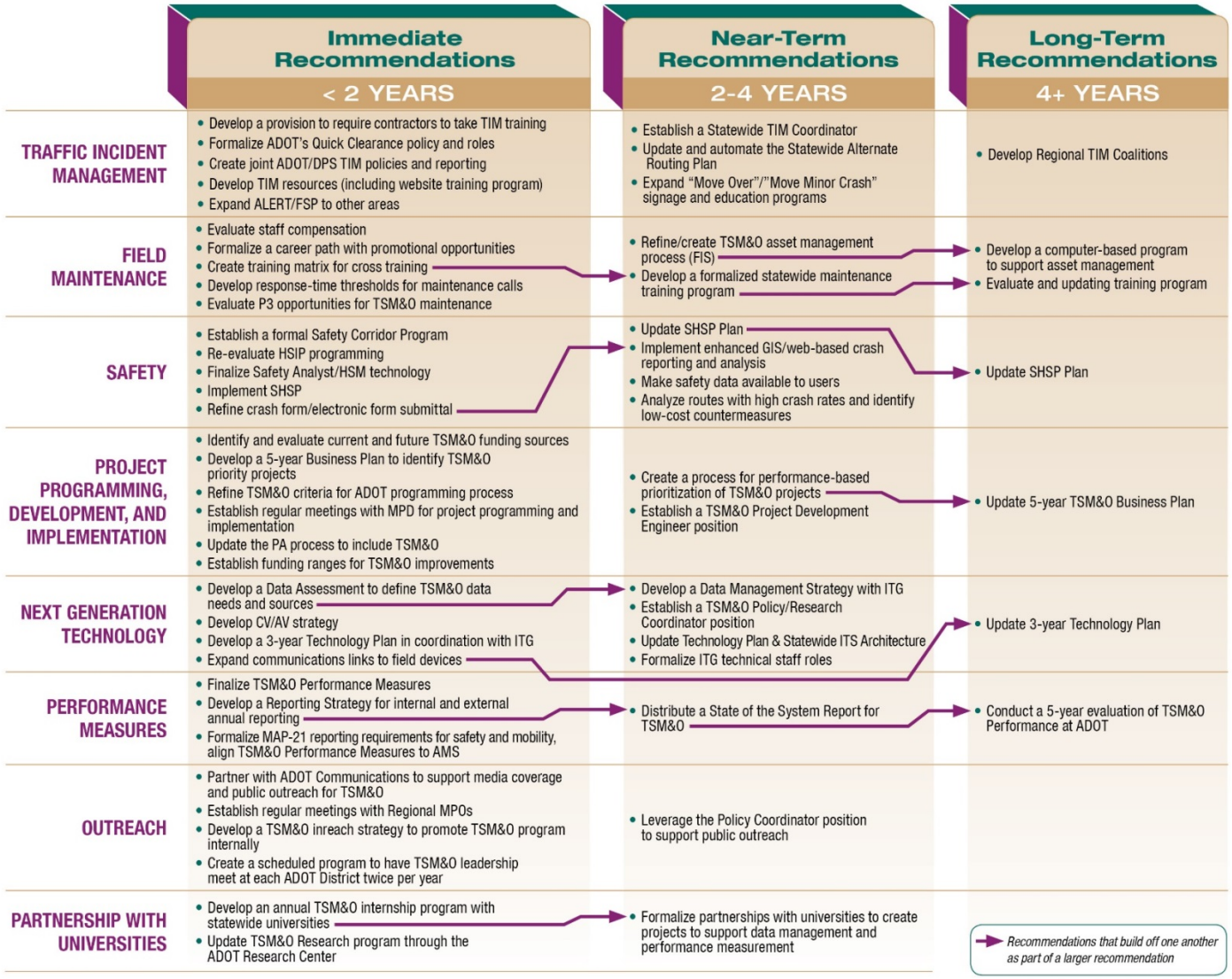
Systems Management

- Pavement Preservation
  - Statewide procurement - data
- Statewide Permitting (Over-size Loads)
  - Reduce timeframe for over-dimensional freight permitting
- Feature Inventory System
  - Improve asset management tool

Operational Traffic and Safety

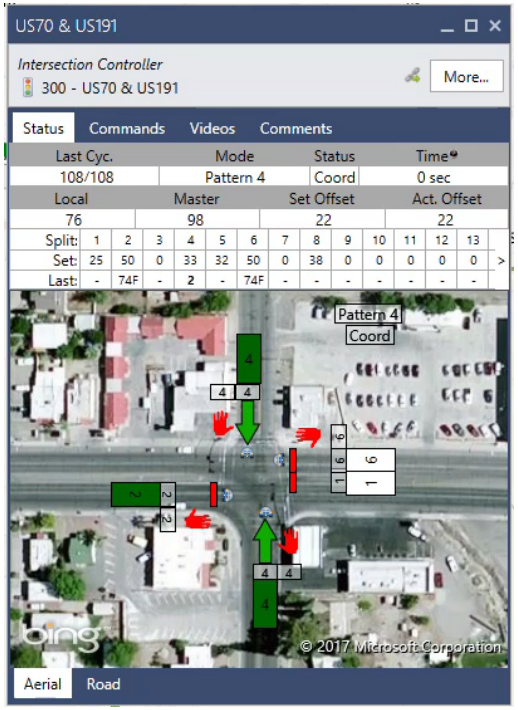
- Speed Limits
  - Variable speed limit (weather)
  - Safety Corridors (enforcement)
- Work Zone Safety
  - Deploy zipper merge
  - Identify Smart WZ technology
- Crash Records
  - Improve electronic submittals
  - Statewide query tool
- SHSP and HSIP Programming
  - Focus on MAP-21 target and re-distribute

TSM&O Strategic Plan



Project Programming, Development and Implementation

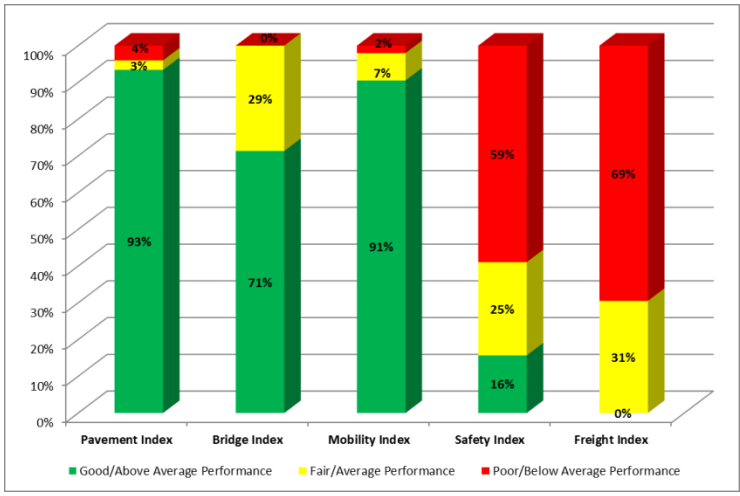
- Identify current and future funding sources
- Develop a 5-year TSM&O Business Plan and identify priority projects
- Work with other Divisions to refine TSM&O criteria for ADOT programming
- Establish regular meetings with MPOs
- Development Engineer to support TSM&O's programming needs

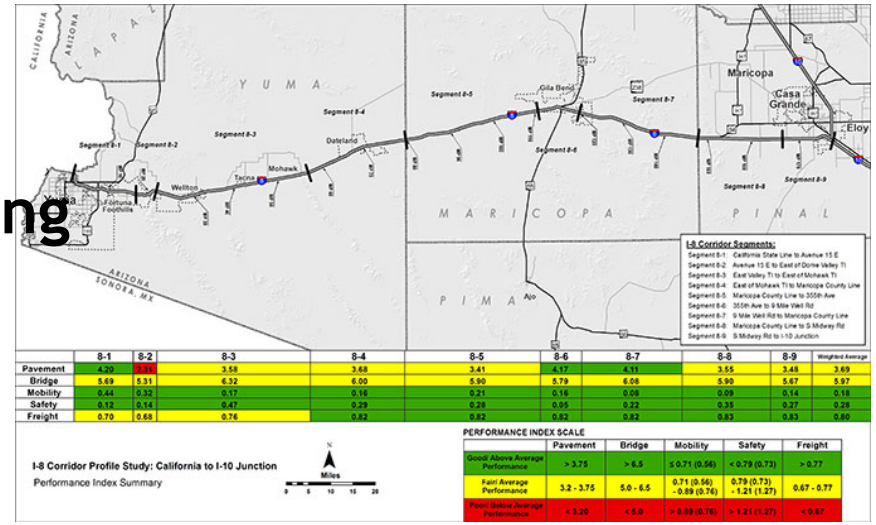


Performance Measures

- **Finalize recommended and required TSM&O performance measures**

- **TSM&O performance reporting program**
  - **Frequency of reporting**
  - **Format of reporting**
  - **Responsibility for reporting**
  - **Alignment with P2P**





Research Partnering and Career Development

- Partnership with Universities
  - Create research projects through ADOT Research
  - Identify data management and performance measure opportunities
  - Utilize internships to promote TSM&O careers

THE UNIVERSITY OF ARIZONA.

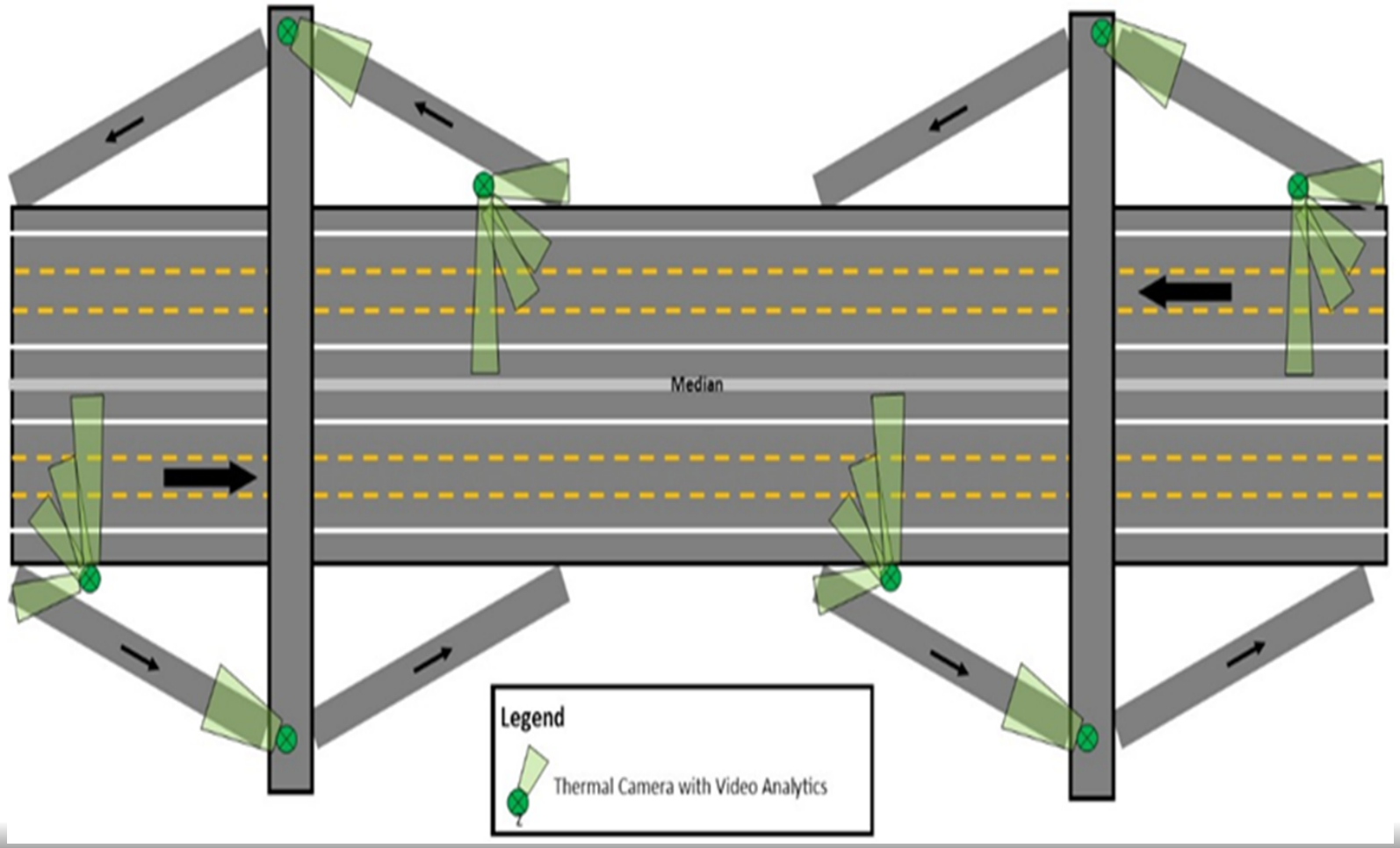
NORTHERN ARIZONA UNIVERSITY

ASU ARIZONA STATE UNIVERSITY

WWD Pilot Deployment

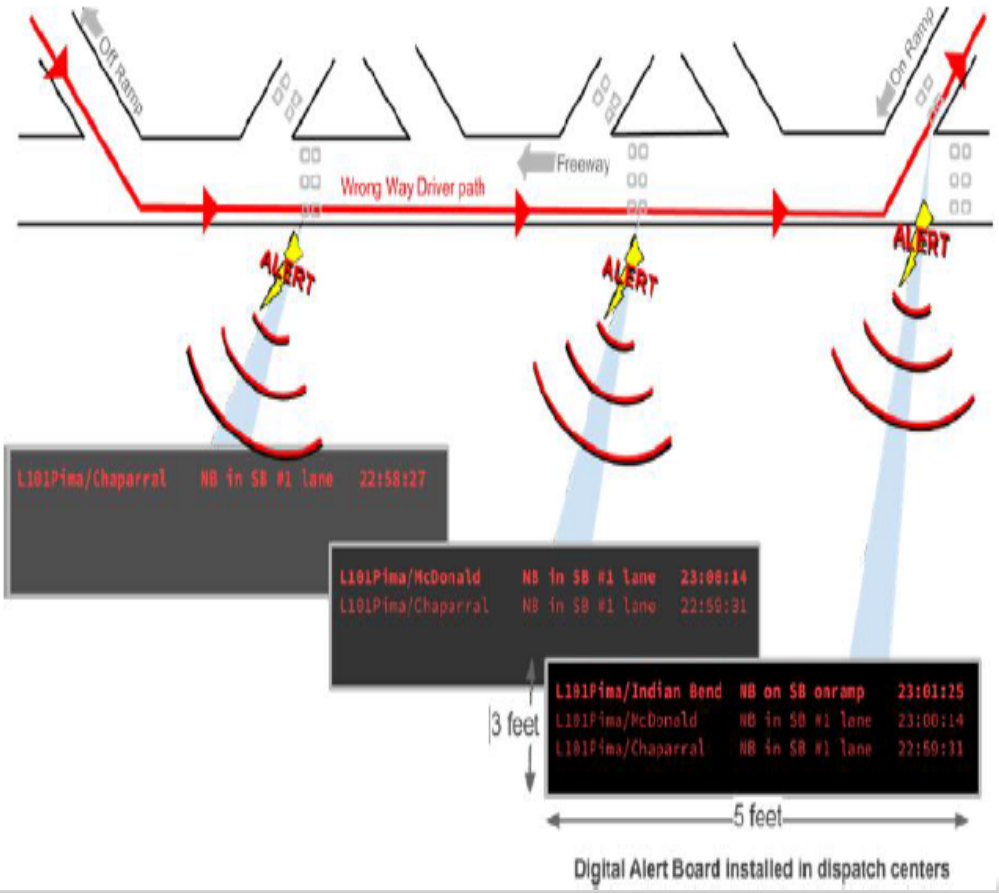
- Detection of a WWD on or entering the freeway
- Notification – ADOT TOC – DPS OPCOMM
- Track - Automatically position and activate CCTV cameras
- Warning - activate DMS WWD messaging

Detection Element



Notification and Track Elements

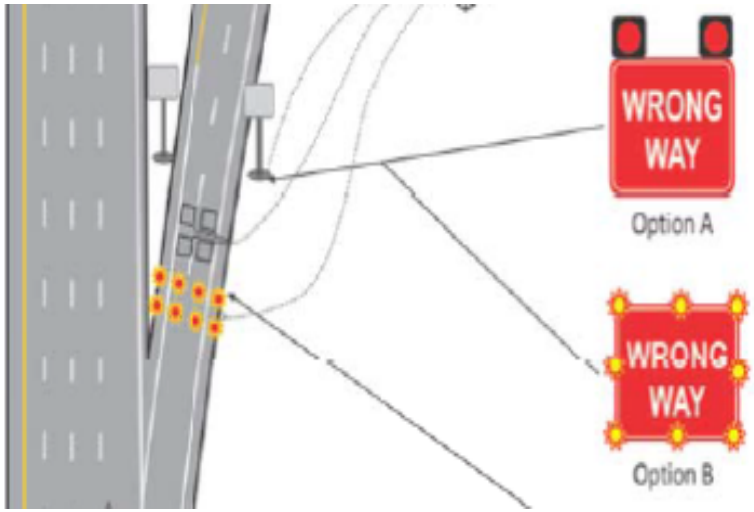
- Digital alert board (TOC and DPS OPCOMM)
- Desktop alert notification
- Email notification
- CCTV Cameras Pre-positior



Digital Alert Board installed in dispatch centers

Warning Element

- Warning to the errant driver (ability to self-correct)
- Dynamic Message signs automatically activated



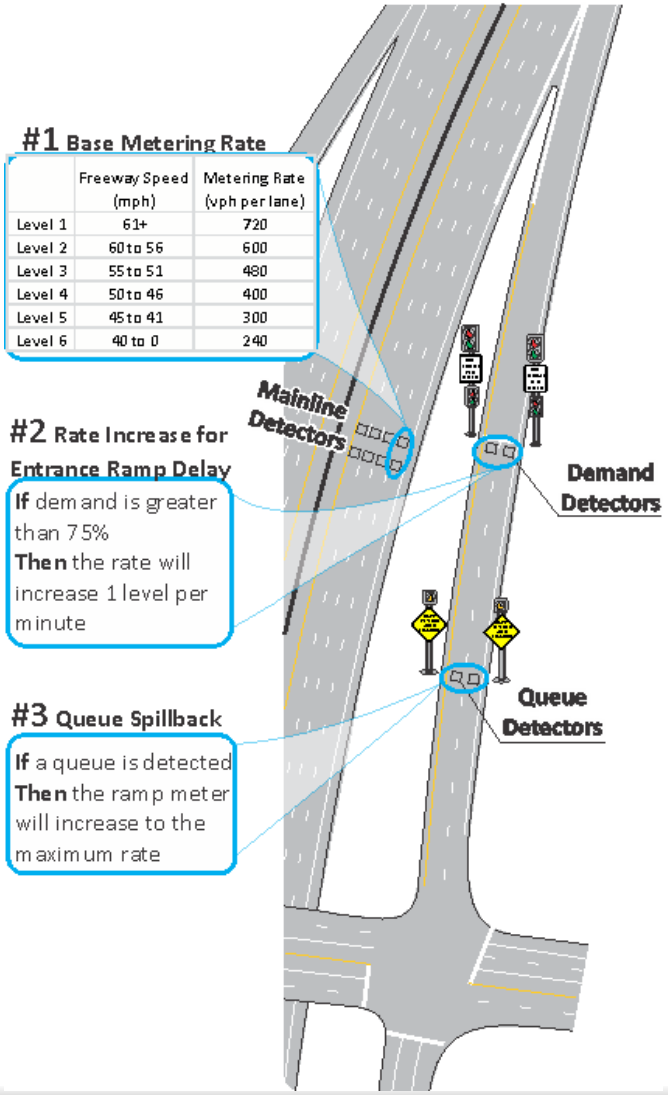
Freeway Bottleneck Mitigation

- Step #1: Identify freeway bottlenecks
  - A Lane drop, merge point, or geometry that is overcapacity
- Step #2: Develop plans
  - Most mitigation plans developed by ADOT Engineers
- Step #3: Implement low-cost, quick improvements
  - Striping changes for smooth, efficient merging
  - Minor roadway widening
  - More aggressive ramp metering to manage demand
  - Signal retiming where exit ramp queues to freeway
  - Digital lane control signing to accommodate shifting AM versus PM demand
  - Most improvements completed by ADOT forces

Example Bottleneck Mitigation

New Striping Creates: 11-foot Auxiliary Lane, 2-foot Shoulder (Narrow)

Next Generation Ramp Metering



- Current Ramp Metering
  - Releases vehicles at maximum rate (about 720 vph per lane)
  - Affect on freeway congestion is likely minimal
- Next Generation Ramp Metering
  - Implementation starting this month
  - More intelligent by automatically reducing the metering release rate, balancing 3 factors – see graphic
  - Goal is to keep the freeway below capacity and above 50 mph
  - Achieving this goal will not be possible at locations that are significantly overcapacity
  - Improved freeway speed is expected at ALL locations

SR 51 SB from SR 101L to SR 202L

- Corridor Adaptive Ramp Metering
  - **Upstream & downstream ramp meters work together:** At locations where ramp meter queues become excessive, the metering rate will be sped up while another ramp meter with less queue will be slowed down
  - **Proactively fight congestion**: Individual ramp meters can "see" traffic detectors miles downstream and meter as needed to keep the corridor below capacity
  - **Cost-effective:** Less than $100k for hardware, software, consultant, and ADOT staff time. New plug-and-play processor chip and software in existing controllers, and new central control software by Intelight.
  - **Algorithm:** Custom algorithm developed for SR 51 using the built-in capabilities of Intelight system.
  - **Benefits:** "Before" and "after" delay will be evaluated. Safety, fuel use, air quality impacts will be evaluated in the future.

Communication Efforts Supporting Operations/TSM&O

- PIOs in Traffic Operations Center, 20/7/365
- Active engagement on social media platforms
- Collaboration with statewide law enforcement
- Management of public-facing elements of 511 system
- PIOs in TIM training
- Communications project manager focused on safety and operations/TSM&O
- Coordination with media, in and out of TOC
- Applying the 'human touch' to communicating info

Questions?