Away from Isolation: Caltrans Arterial Management

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CALTRANS TRAFFIC OPERATIONS
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Agenda

- Introduction
- Basic Facts
- Past
- Present
- Future
- 2070s and Cabinets
Basic Facts

- 5,000 “State” traffic signals statewide
  - Conventional Highways
  - Ramps
- District 4 O&M 980 of 1341
- 9 Engineers, 2 Seniors
- Operations & Development Branches
- 5 Maintenance Crews within “Specialty Region”
Basic Facts

- CCTV Cameras
- Vehicle Detection Stations
- Ramp Meters
- Changeable Message Signs
- Highway Advisory Radios
- 511 Traveler Information System
- 24/7 Transportation Management Center
Past

- Model 170 Signal Controllers
- No remote access to signal from TMC
- Incident response with field staff
  - Input at each controller
  - No access to CCTV
- Limited coordination with adjacent city signals
- TOD Coordination
- Reactive
- Minimal Asset and resource management
- Limited interagency communications
Past

- Early 2000s
Present

- With help of locals – Identify common regional needs
  - Mitigate impacts of traffic congestion on local streets due to major freeway incidents
  - Coordinated operations between Caltrans and Local Agencies to address recurrent congestion
  - Remote management capability of traffic signals from City and Caltrans TMC
  - Ability to monitor traffic conditions and collect traffic data along corridor
Adding Arterial Management Strategies

- Surveillance
  - Traffic
  - Infrastructure

- Traffic Control
  - Adaptive Signal Control
  - Advanced Signal Systems
  - Transit Signal Priority
  - Bicycle & Pedestrian
  - Special Events

- Lane Management
  - HOV Facilities
  - Reversible Flow Lanes
  - Pricing
  - Lane Control
  - Variable Speed Limits
  - Emergency Evacuation

- Parking Management
  - Data Collection
  - Information Dissemination

- Information Dissemination
  - Dynamic Message Signs (CMS)
  - In-Vehicle Systems (IVS)
  - Highway Advisory Radio (HAR)

- Enforcement
  - Speed Enforcement
  - Traffic Signal Enforcement

• Integrated Corridor Management
• Smart Corridors

• Previously Deployed in District 4

• Research with DSRI

Diagram - FHWA
District 4 Corridor Projects

- **San Mateo Smart Corridor Project**
  - C/CAG Sponsored
  - Construction - Systems Integration Phase
  - Route 82, 84, 109, 114 and local streets near US-101 from I-380 and Palo Alto

- **I-80 ICM (Freeway and Arterial)**
  - ACTC sponsored
  - Construction - Systems Integration Phase
  - Arterial segment covers Route 123 and local streets near I-80 between Bay Bridge and Carquinez Bridge

- **I-880 ICM North Alameda Segment Project**
  - MTC Sponsored
  - Systems Engineering - Project Report Phase
  - Route 185, 61, 112 and local streets near I-880 from I-980 to San Leandro
New Capabilities for Traffic Ops and TMC

- Monitoring and Control of Traffic Signals from TMC & Maintenance
  - Kimley-Horn Integrated Transportation System (KITS®) Traffic Signal System and ATMS
- Motorist Information & Guidance on Arterials
  - Trailblazers
  - Dynamic Message Signs
- Surveillance of Critical Intersections on Arterials
  - CCTV
- Arterial Congestion Detection
  - System Detectors
- Arterial Traffic Data
  - System Detectors
- Fiber Optic Communications Network for Arterial and Freeway Systems
Trailblazer Signs

- Alternate route guidance
- Installed at decision points
Incident Response Process

START: Incident Detection
- Operator Confirms Incident on Freeway
  - System Offers Strategies or Operator Looks-up Strategies
  - Operator Confirms or Modifies Strategy
  - Operator Deploys Strategy and Notifies Affected Local Agencies
  - Operator Monitors Conditions and Adjusts Strategy
END: Resume Normal Operations

- Turn ON Trailblazers and DMS
- Monitor CCTV at Critical Locations
- Implement preapproved signal timing plans

![Map with Incident Location]
I80 ICM Overview

- Traffic Signal Management
- Adaptive Ramp Meters
- Message Signs
  - Changeable Message Signs
  - Variable Advisory Speed Limit Signs
  - Lane Use Signs
  - Information Display Boards
  - Arterial Trail Blazer Signs
- Highway Advisory Radios
- Closed Circuit TV Cameras
- Vehicle Detection Stations
- Controlled by ICM Management System
Corridor Challenges

- Diverse equipment environment
  - Cabinets
  - Signal controllers and systems
    - Response plans
    - Common signal system platform
  - Detection shortages
  - Video systems
- Institutional agreements
  - Exchange of funds
  - Shared maintenance
  - Agreement on “Flush” plans
- Performance measures
  - Incident conditions
  - Collection of data
Other Challenges

- Protection of equipment and communications
- Keeping pace new technologies and standards and strategies
  - Adaptive Control
  - TSP
  - Traveler Info
  - Ped / Bike
- Staffing
- Liabilities
Statewide Perspective

- **Traffic Signal Management Business Plan**
  - Performance and Efficiency
  - Integration with the freeway transportation management systems and TMCs
- **Statewide TSC**
  - Policies
  - Recommendations
- **Functional Managers Meeting**
  - Resources
Statewide Perspective

- TRAC and IMMS
- Data and proactive approach
Statewide Perspective

- ICM / “Connected Corridors”
  - Corridor Management Concept
  - I-80 and I-210 (D7) are “Pilot Corridors”
  - Standards and policies for future expansion
- Link to Caltrans Goals and Objectives
  - Transportation System Management & Operations (TSM&O)
  - Improve Efficiency vs. More Capacity
Moving Forward

- **2016:** 30% signals remotely accessible from TMC
- **2016:** 300+ State O&M signals upgraded to Model 2070
- **2016-17:** Integration of San Mateo Smart Corridor System with I-80 ICM and ATMS
- **2017:** 550+ City and Caltrans signals part of ICM/Smart Corridors
- **2020:** 75% of State signals remotely accessible from TMC (Statewide Goal)
- Connected Vehicles Deployment and Bus Rapid Transit
Future of 2070

- Model 2070 is “NEW” Standard
  - Draft Model Spec - December 1993
  - 2010 – Initiate replacement plan for 10,000 controllers
  - Used for Signals, Ramp Meters, Detection Stations, CMS
- New variant of 2070 = 2070LX
  - 100X Faster - ATC Standard ~ Linux
- Security is now a priority
  - State furnished cabinet, controller and specialty modules
  - HQ Traffic Ops develops and publishes specifications known as TEES
Cabinets

Smart Corridor Cabinet (334)

Connected

Fiber Optic Patch Panels

Network Switches

CCTV Equipment

Power Distribution Assembly

Traffic Signal Cabinet (332)

Model 2070

Input File “Detection”

Power Distribution Assembly

Output File “Signals”
Questions?

Safety

Mobility