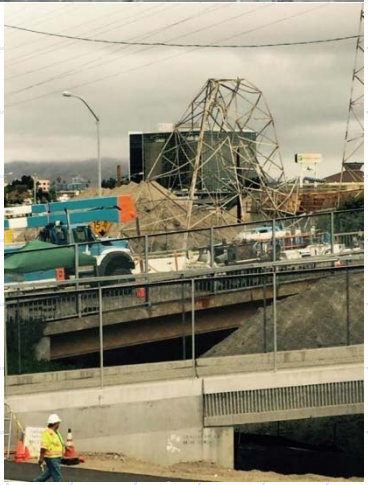
San Mateo Smart Corridor Incident and Daily Activity Management

City/County Association of Government of San Mateo County Board Meeting

6:30 p.m., October 12, 2017 SamTrans Building (Auditorium)



C/CAG - John Hoang, Program Manager
jhoang@smcgov.org
Caltrans, District 4 – Traffic Operations
S. Sean Nozzari, Deputy District Director
sean.nozzari@dot.ca.gov 510-286-6345
Min Y. Lee, Senior Transportation Electrical Engineer
min.y.lee.dot.ca.gov@dot.ca.gov 510-286-4624

Outline

- San Mateo Smart Corridor Background
  - Needs, Goals and Objectives
  - Process Taken and Implementation
- Caltrans' Mobility Focus Areas
- San Mateo Smart Corridor Briefing
  - Incident Management
    - PG&E High Voltage Tower Collapse
    - Recreational Vehicle Fire
    - Police Action near Routes 92
  - Day-to-Day Usage
  - Moving Forward
  - Questions

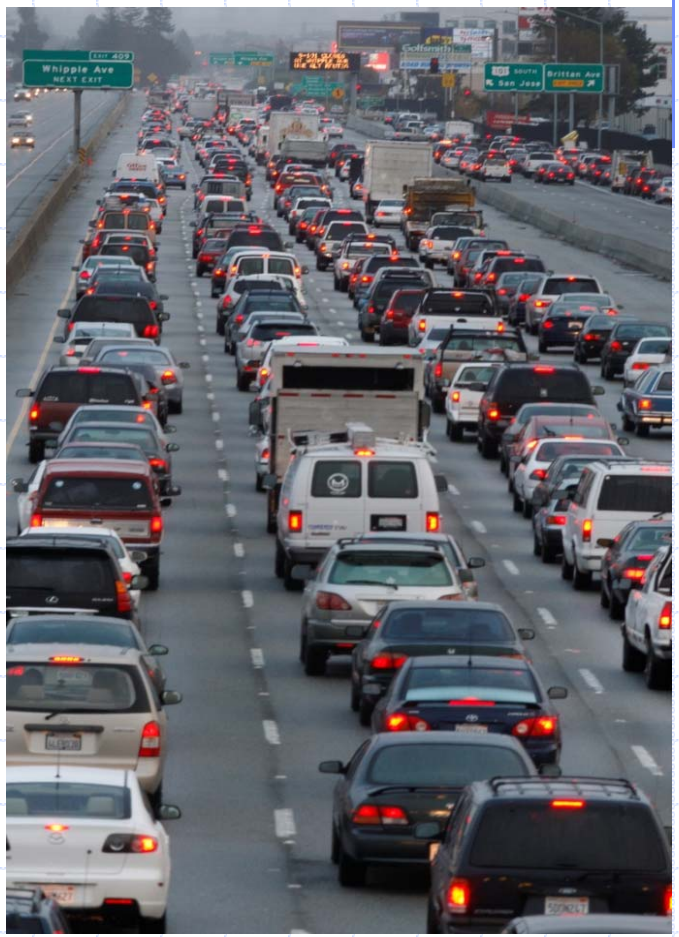
San Mateo County Smart Corridor Project

Background

San Mateo County Smart Corridor

Needs

- Coordinate operations and sharing of resources 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



Goals

- Implement Intelligent Transportation Systems (ITS) solutions and strategies for countywide traffic management
- Establish cross jurisdictional coordination and cooperation
- Enable cities and Caltrans to proactively manage day-to-day traffic, during special events, and facilitate traffic impacts due to major incidents on the freeway
- Implement infrastructure that allows for expansion to meet future demands, capabilities, and integration with new technology

Objectives

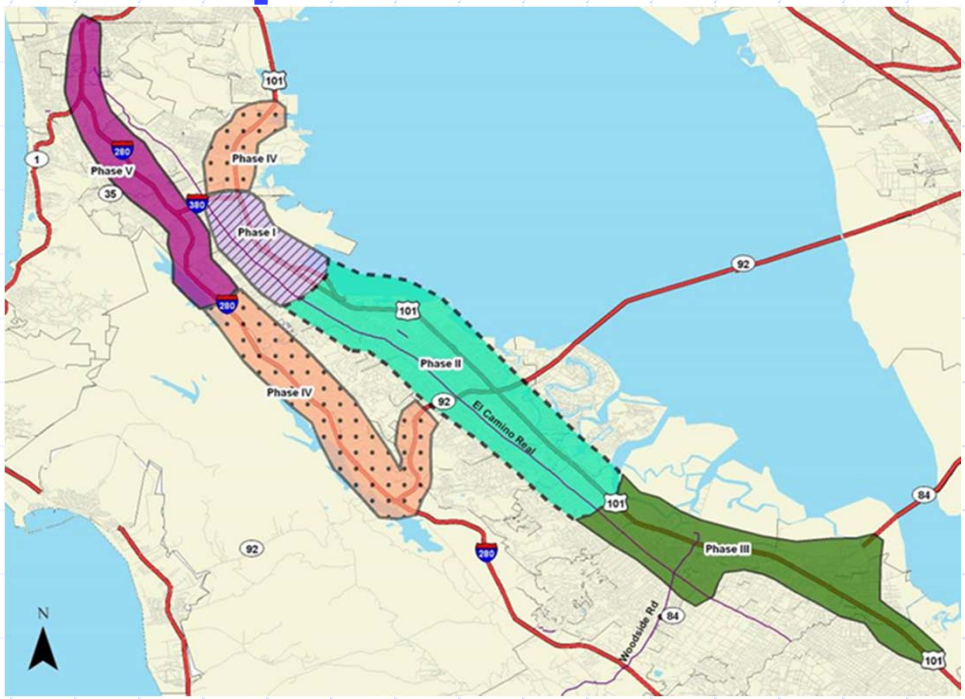
- Enable ability to monitor real time traffic conditions and adjust signal timing remotely
- Enable shared control and operation
- Improve traffic flow, Improve mobility, Optimize vehicle throughput, Reduce traffic delays, Improve travel time reliability

San Mateo County Smart Corridor

Process Taken

- Assembled Working Group (2007)
  - City traffic engineers, Law Enforcement, Fire, Caltrans
- Together established Alternative Routes
- Inter-Agency Agreements
  - MOU on ownership and maintenance of equipment
  - Coop Agreements between Caltrans and cities
- Established Stakeholder Working Group (All cities on the corridor are represented)
  - Reviewed and approved incident response plan
  - Continue to meet (quarterly)
  - Improve communication on the ground level
  - Continue to fine-tune incident response practice
  - Share lessons learned

Implementation



- Phases I, II, and III
  - 25 miles of interconnected communication network
- Next Step: Portions of Phase IV and Phase V (South San Francisco, Brisbane, Daly City, Colma)

San Mateo County Smart Corridor Project Background

Constructed Phase

- **Stakeholders identified alternate routes known as "Smart Corridor Routes"**

What We Have Done

- Deploy infrastructure along major arterials corridors parallel to freeways
  - Install fiber optics communication network
  - Implement new signal system software integrating city-owned and Caltrans traffic signals
  - Install CCTV cameras, signage, vehicle detection
- TMC
- Regional Communications
- System Integration

Equipment	Local	State	Total
Traffic Signals	85	153	266
CCTV Cameras	113	150	263
Trailblazer Signs	46	67	113
Dynamic Signs	-	8	8
Vehicle Detection	20	17	37

San Mateo County Smart Corridor Project Field Elements:

Traffic Signal Controller Upgrades

Timing Values for Asset:9002 El Camino -Hillsdale

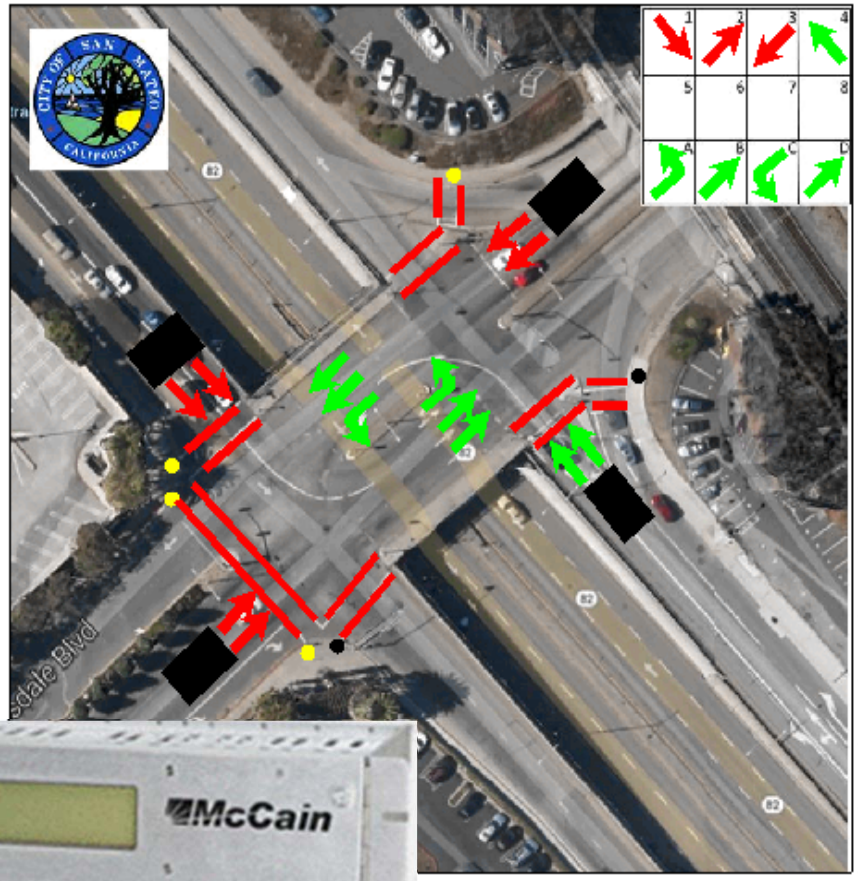
Status	Pattern	Master Dial	Local Dial R1	Transition R1	Date
Online	1	63	116		4/10/15
Operation	Pattern Mode	Offset Number	Local Dial R2	Transition R2	Time
Nominal	Time Of Day	1	0	Free	16:56:03

	Cycle	Offset	1 EBL	2 WBT	3 SBL	4 NBT	5 WBL	6 EBT	7 NBL	8 SBT
Database	140	87	43	34	42	21				
Previous	140	87	25	36	59	20				
Current			25	34	46	12				

Vehicles								
Overlaps								
Pedestrians								
Phase Calls								
Ped. Calls								
Overlap Ped. Calls								

Active Priority	0	Priority Type		Hide Graphics

LRV	1	2	3	4	5	6	7	8
Interval								
Local Calls								
Remote Calls								



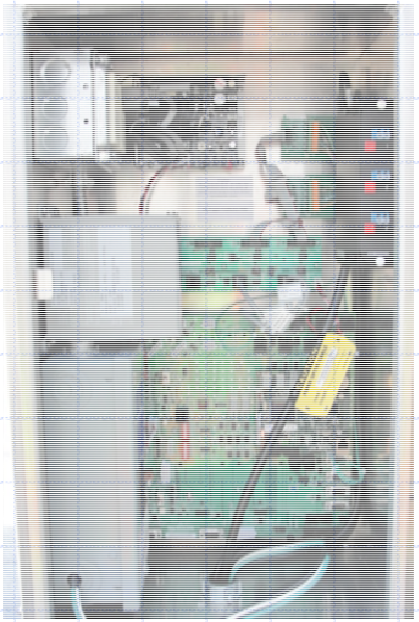
9002: El Camino -Hillsdale Line: 172.22.127 Section:

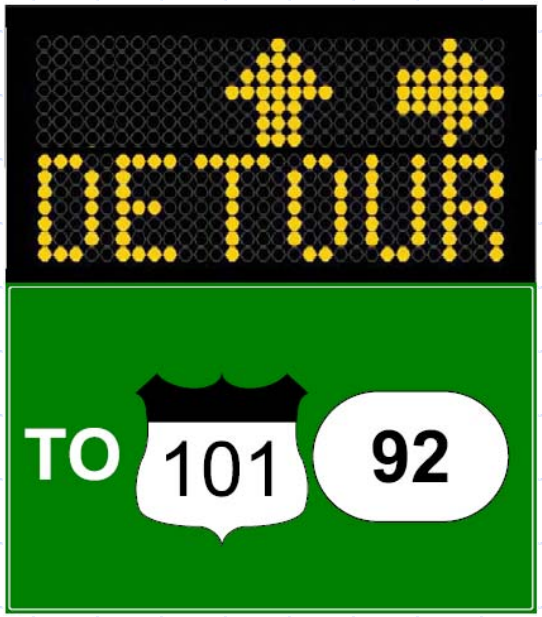
Server: COMM SERVER D4 Drop: 1 IP: 172.22.127.1

San Mateo County Smart Corridor Project Field Elements:

Trailblazer Signs

- Alternate route guidance
- Installed at decision points





San Mateo County Smart Corridor Project Field Elements:

Arterial Dynamic Message Signs

- Additional traveler information
  - Route guidance
  - Lane closures
  - Travel times
  - Incidents
- El Camino Real @ 84, 92, 380

San Mateo County Smart Corridor Project Field Elements:

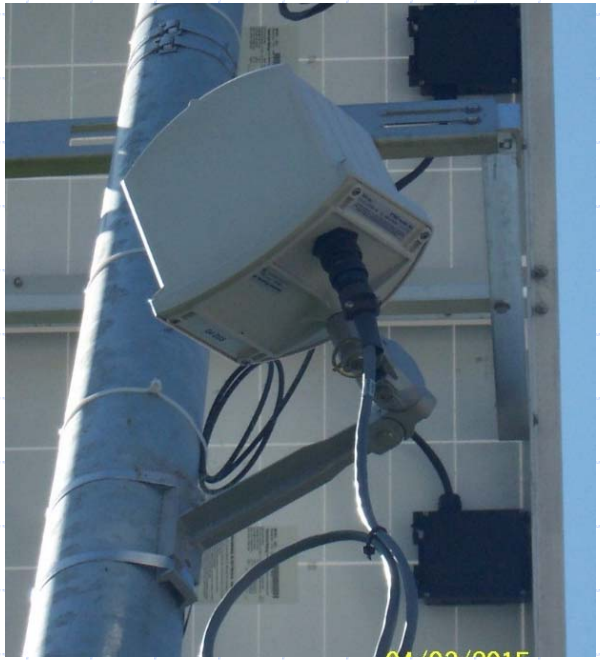
CCTV Cameras

- At Critical Locations
- Connected to Video Management System

San Mateo County Smart Corridor Project Field Elements:

Vehicle Detection Stations

- Collect traffic data
- Help detect congestion incidents



San Mateo Hub and TMC's

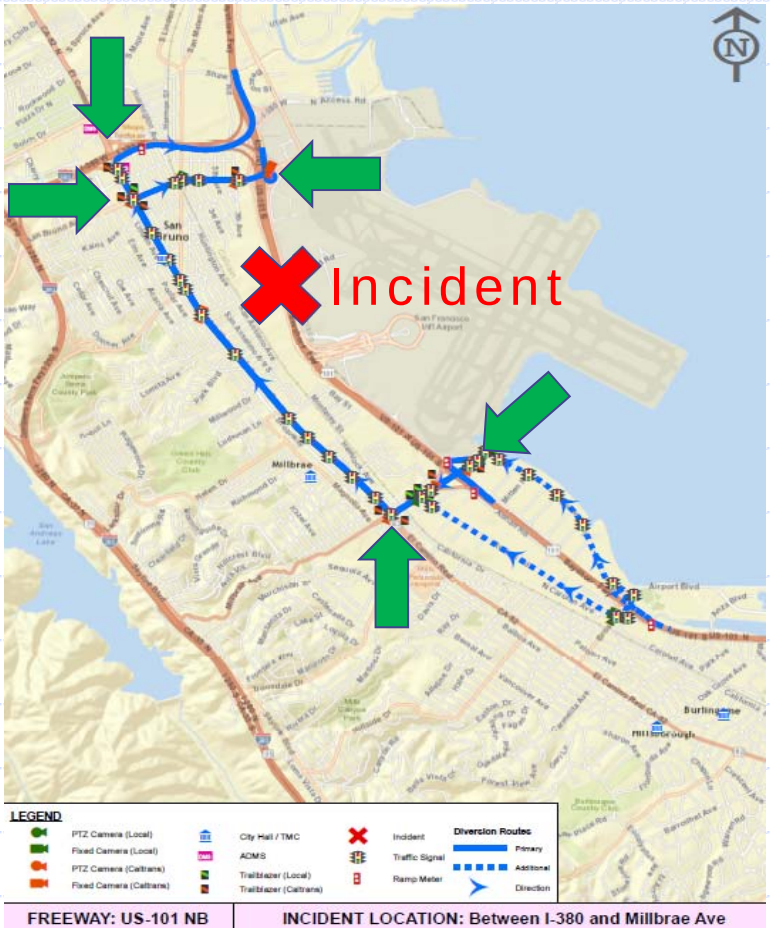
- San Mateo Hub (in San Mateo Police Department)
  - Communications equipment
  - Servers

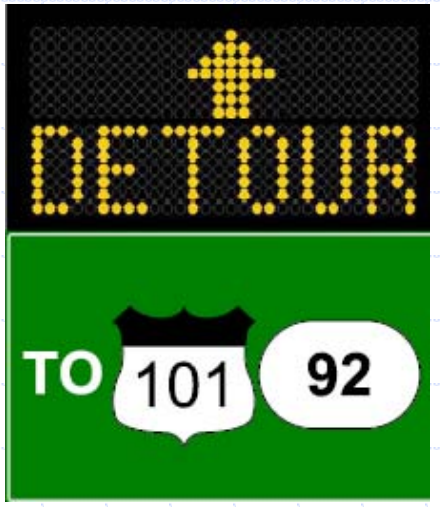
- City TMC
  - Connected to San Mateo Hub via fiber
  - Operator Workstation
- Caltrans TMC
  - Connected to San Mateo Hub
  - BART fiber (future)

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



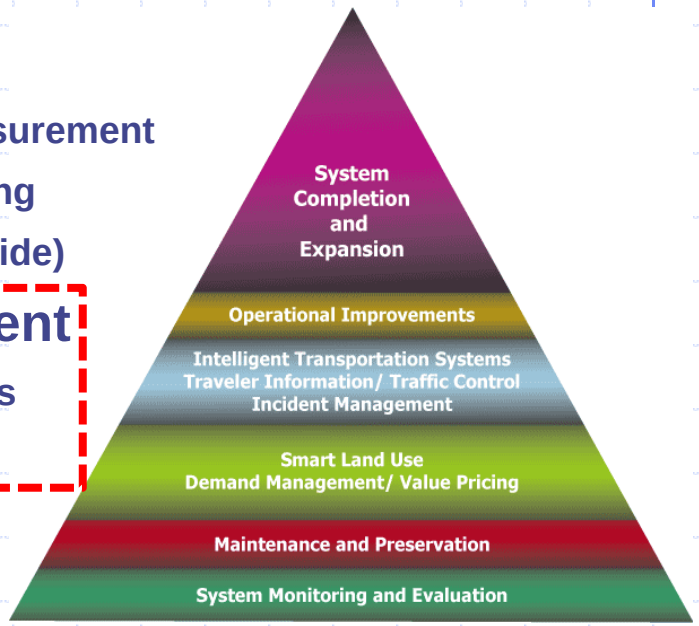


Caltrans' Mobility Focus Areas

Mobility Focus Areas

Transportation System Management & Operations (TSMO)

- **Transportation Management System**
  - Build-out (TMS)
  - Adaptive Ramp Metering
- **Emergency Management**
  - System Monitoring & Performance Measurement
  - Incident Management & Disaster Planning
  - Traveler Information (Regional & Statewide)
- **Integrated Corridor Management**
  - Integrated Freeway & Arterial Operations
  - Transit/Rail, Pedestrians, & Bicyclists
- **Operational Improvements & System Completion**
  - Managed Lanes (High Occupancy Vehicle/Toll Lanes)
  - Strategic Improvements
- **Embrace New Technology**
  - Connected/Automated Vehicles & Infrastructure

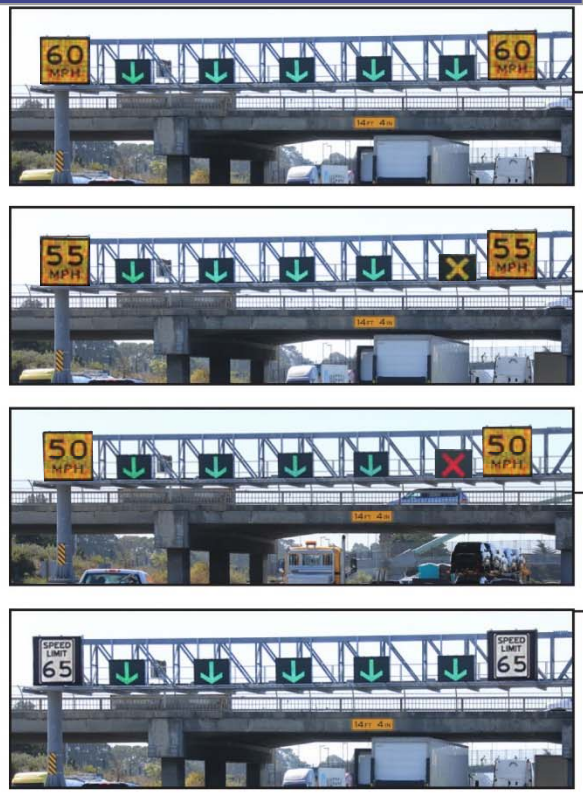


San Francisco Bay Area: Integrated Corridor Management

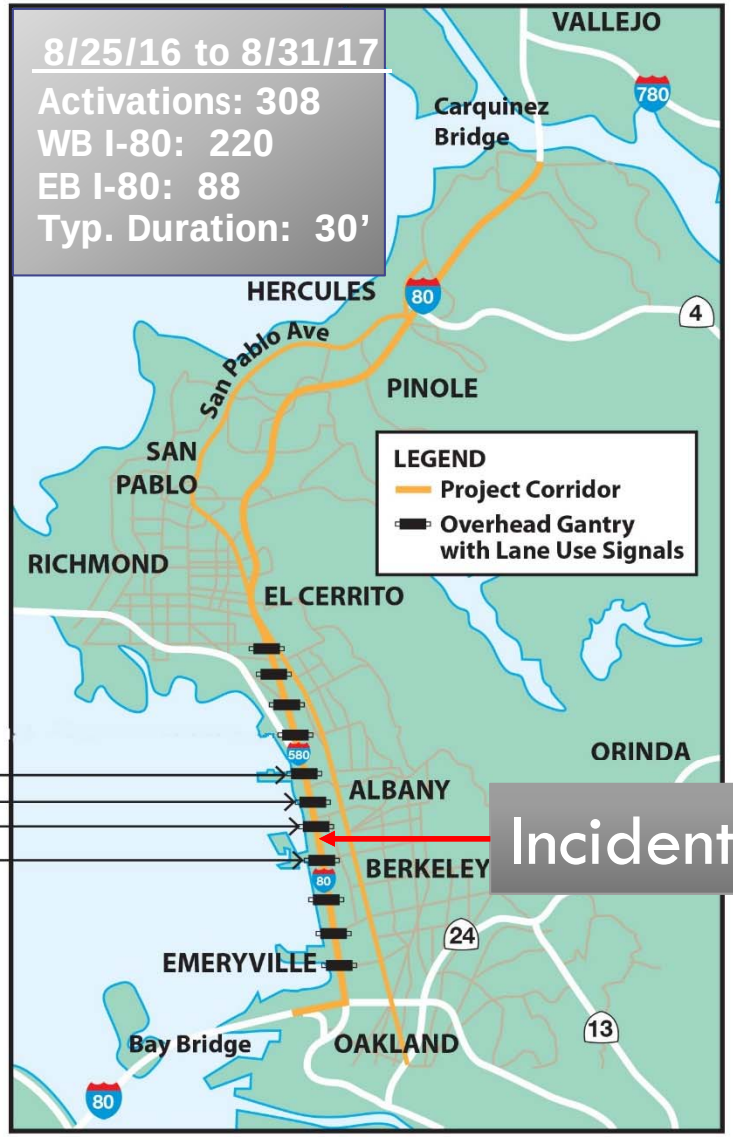
I-80 Smart Corridor

Freeway: Electronic signs on overhead gantries turn ON upstream of an incident, and immediately past.

Open
Blocked
Merge
Open



8/25/16 to 8/31/17
Activations: 308
WB I-80: 220
EB I-80: 88
Typ. Duration: 30'

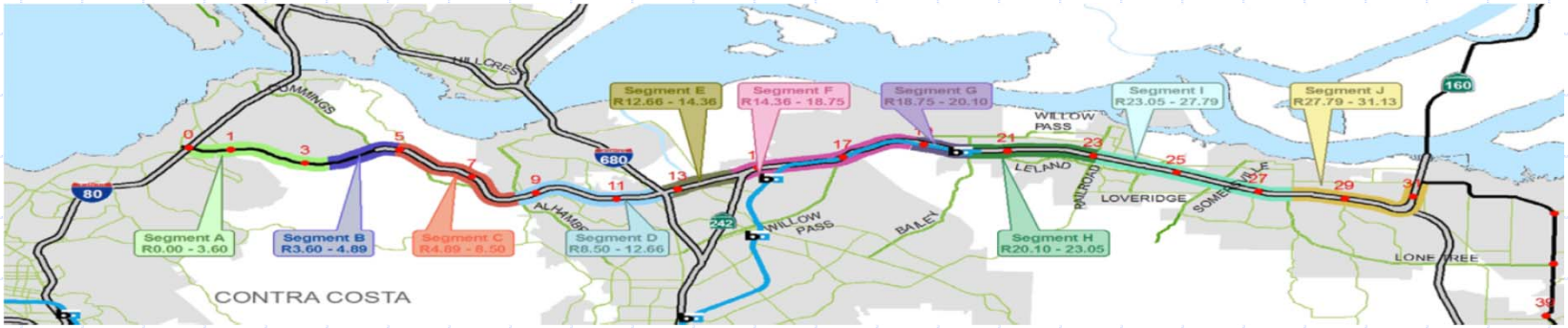


Freeway Information Display Board

Arterial: Trailblazer Signs turn ON and signal "flush plan" implemented along main arterial to guide traffic back to freeway

San Francisco Bay Area: Integrated Corridor Management

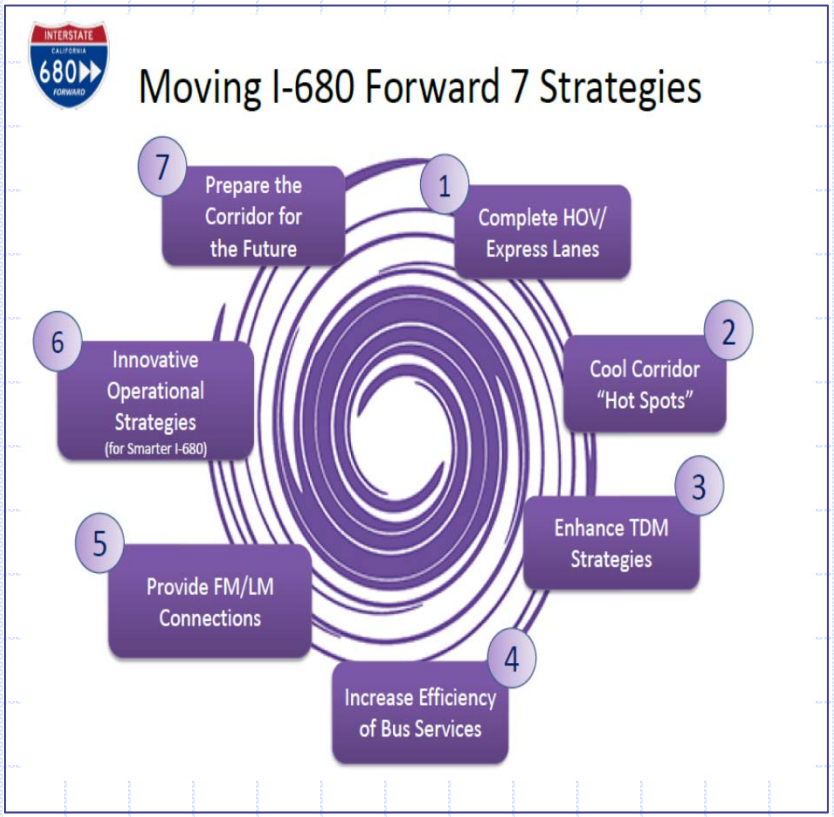
State Route 4 Smart Corridor



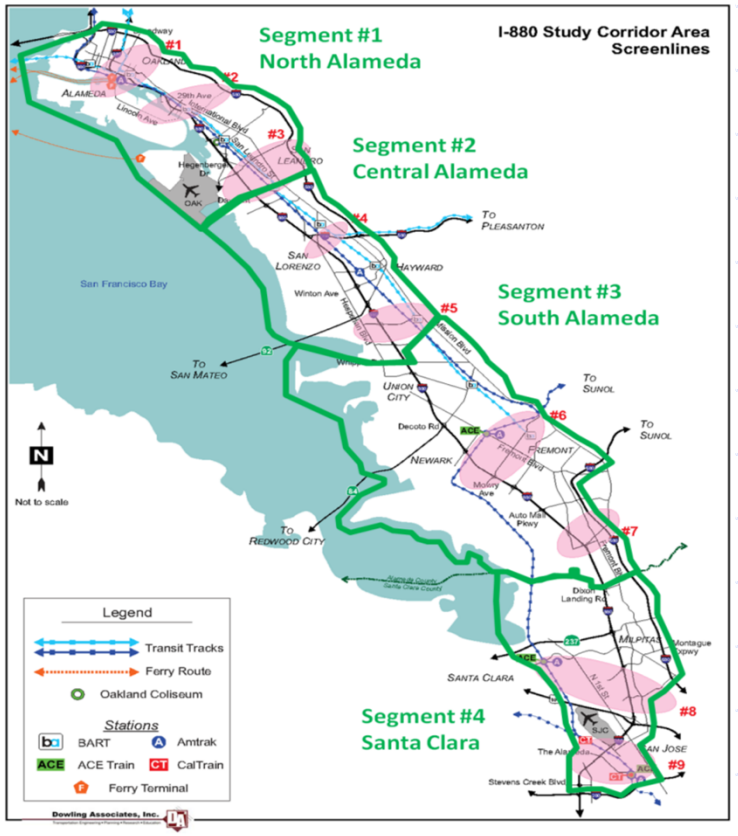
- Approximately 30 miles from I-80 to SR-160 through seven cities
- In planning stage
- 18 month schedule: Prepare Concept of Operations & High Level System Requirements for:
  - Corridor Ramp Metering
  - Incident Management
  - Travel Demand Management

San Francisco Bay Area
Integrated Corridor Management

25 miles
Contra Costa I-680 Smart Corridor
Benicia Bridge-Alameda Co. Line)



32 miles
Alameda I-880 Smart Corridor
Oakland – San Jose



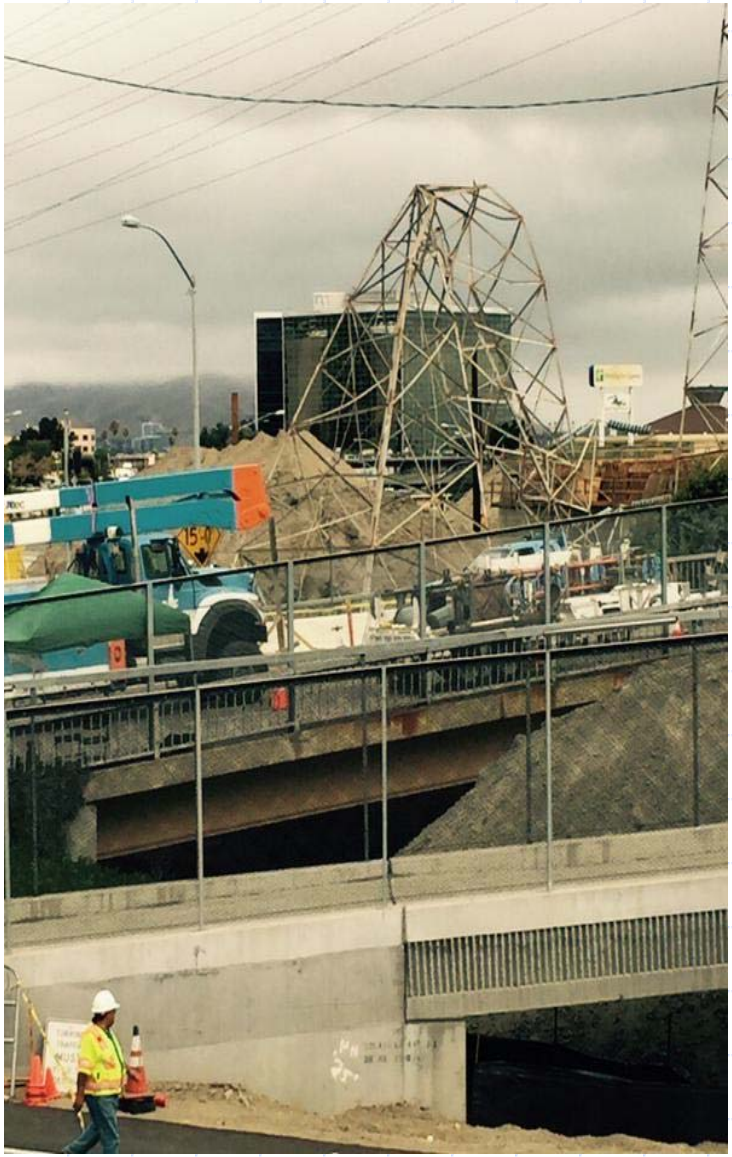
San Mateo Smart Corridor Briefing

Incident Management

- **We used the Smart Corridor for the incidents below**
  - **PG&E High Voltage Tower Collapse in Burlingame on August 28, 2015**
  - **Recreational Vehicle Fire in San Carlos on October 20, 2016**
  - **Police action near Route 92 in San Mateo on April 28, 2017.**

Incident Management

PG&E Power Transmission Tower Collapse



- Construction contractor hit PG&E Tower causing it to collapse on Friday night in both directions August 28, 2015.
- Southbound lanes were reopened the next day.
- Northbound lanes were reopened on Monday at 4:15 a.m.
- Broadway over crossing was reopened on Monday at 9:00 a.m.

Incident Management

Police Action near Route 92

- Police action on April 28, 2017 closed northbound US 101 around 6:15 p.m. Friday evening
- Drivers were diverted off the freeway at Ralston Ave.
- Freeway reopened on Saturday at 12:45 a.m.

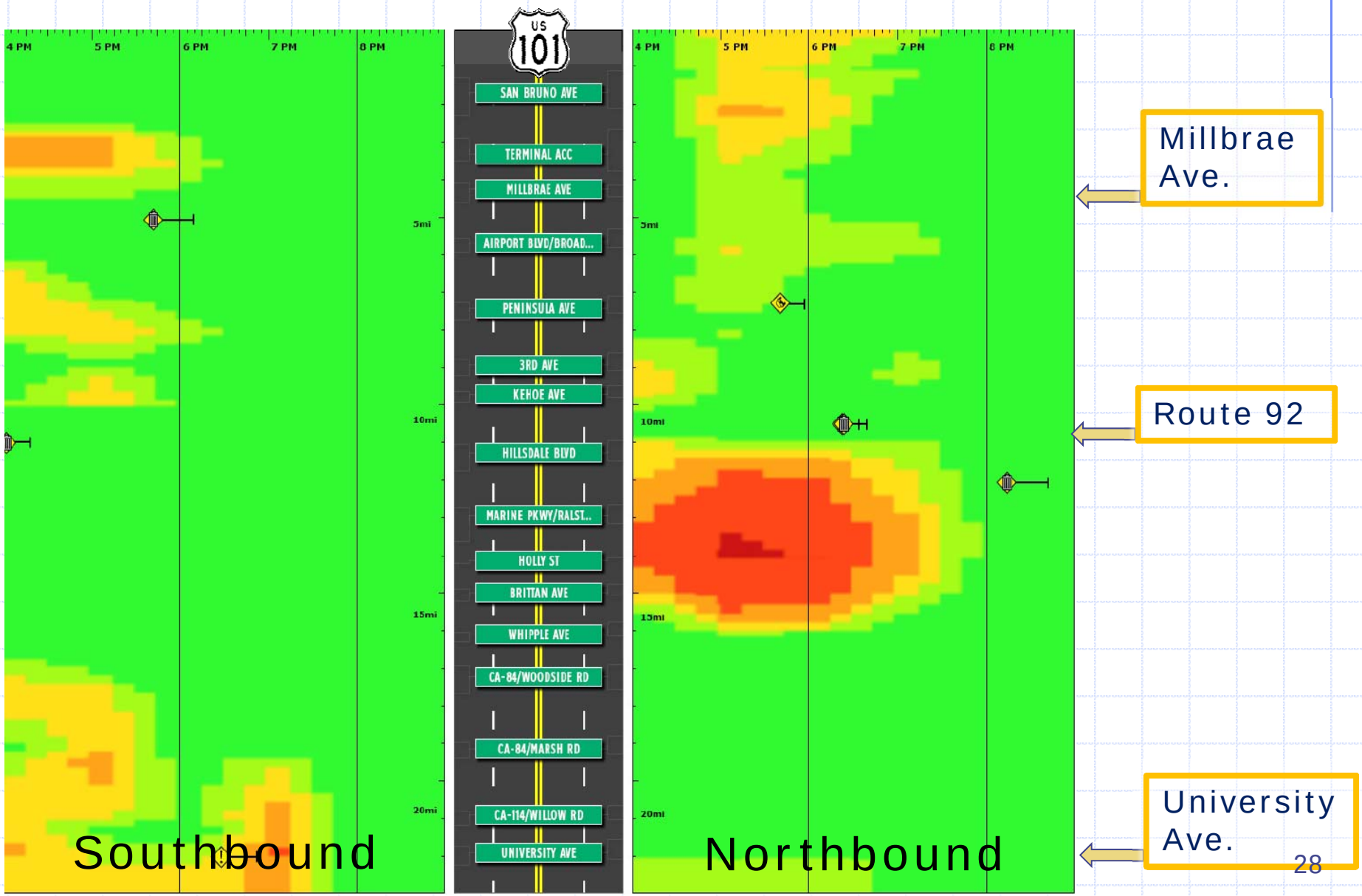
Incident Management

RV Fire Freeway Closure

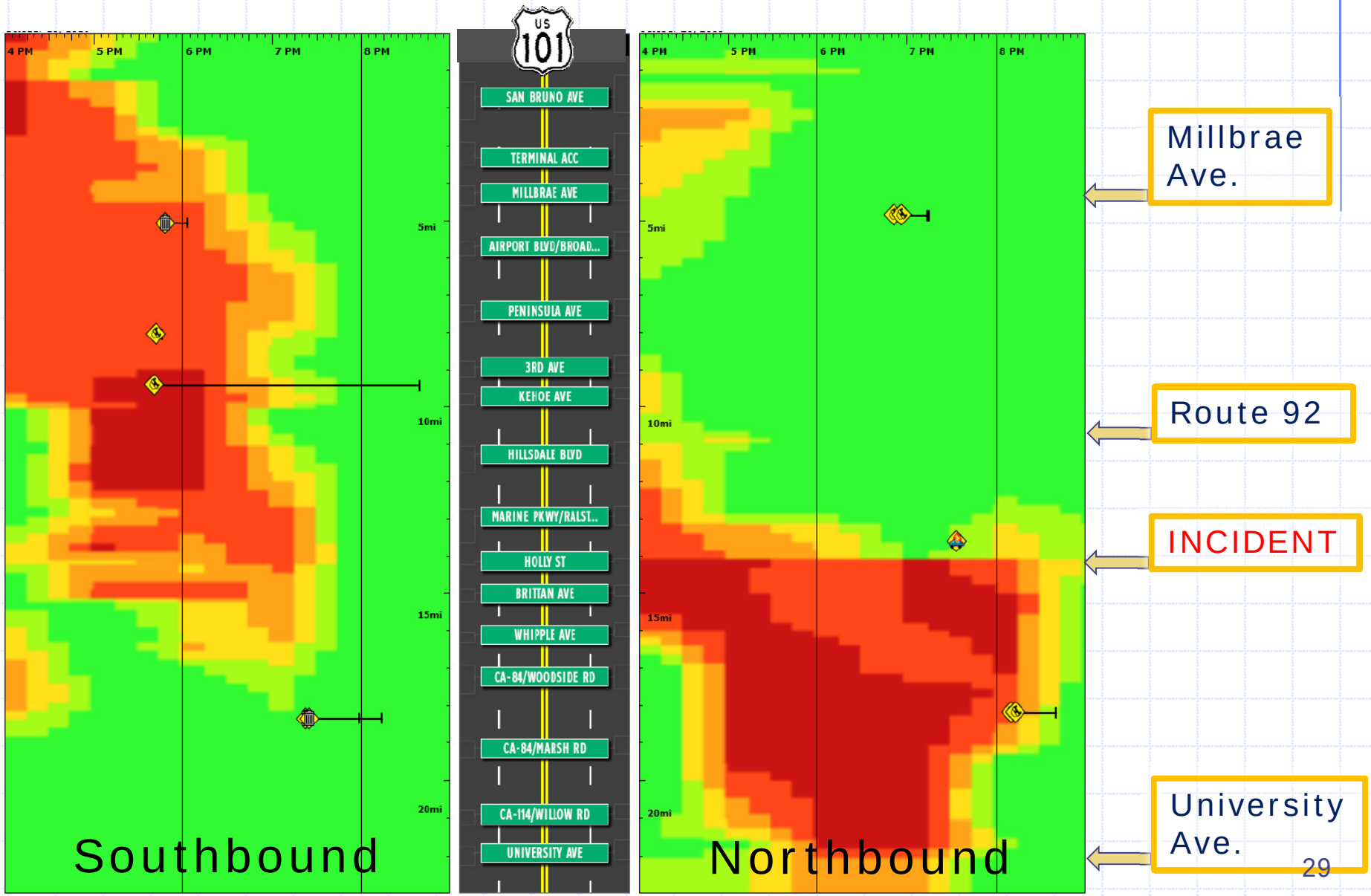
- US101 was closed at 5:15 p.m. in San Carlos on October 20, 2016 due to a fully engulfed recreational vehicle carrying 50 gallon propane tank, and 5 to 10 pound model rockets.
- Northbound drivers were diverted at Woodside Rd.
- Southbound drivers were diverted at Holly St.

- Northbound drivers were diverted at Woodside Rd.
- Southbound US 101 was reopened at 6:24 p.m. and two northbound left lanes reopened at 6:58 p.m.
- At 9:00 p.m., US 101 was fully opened.

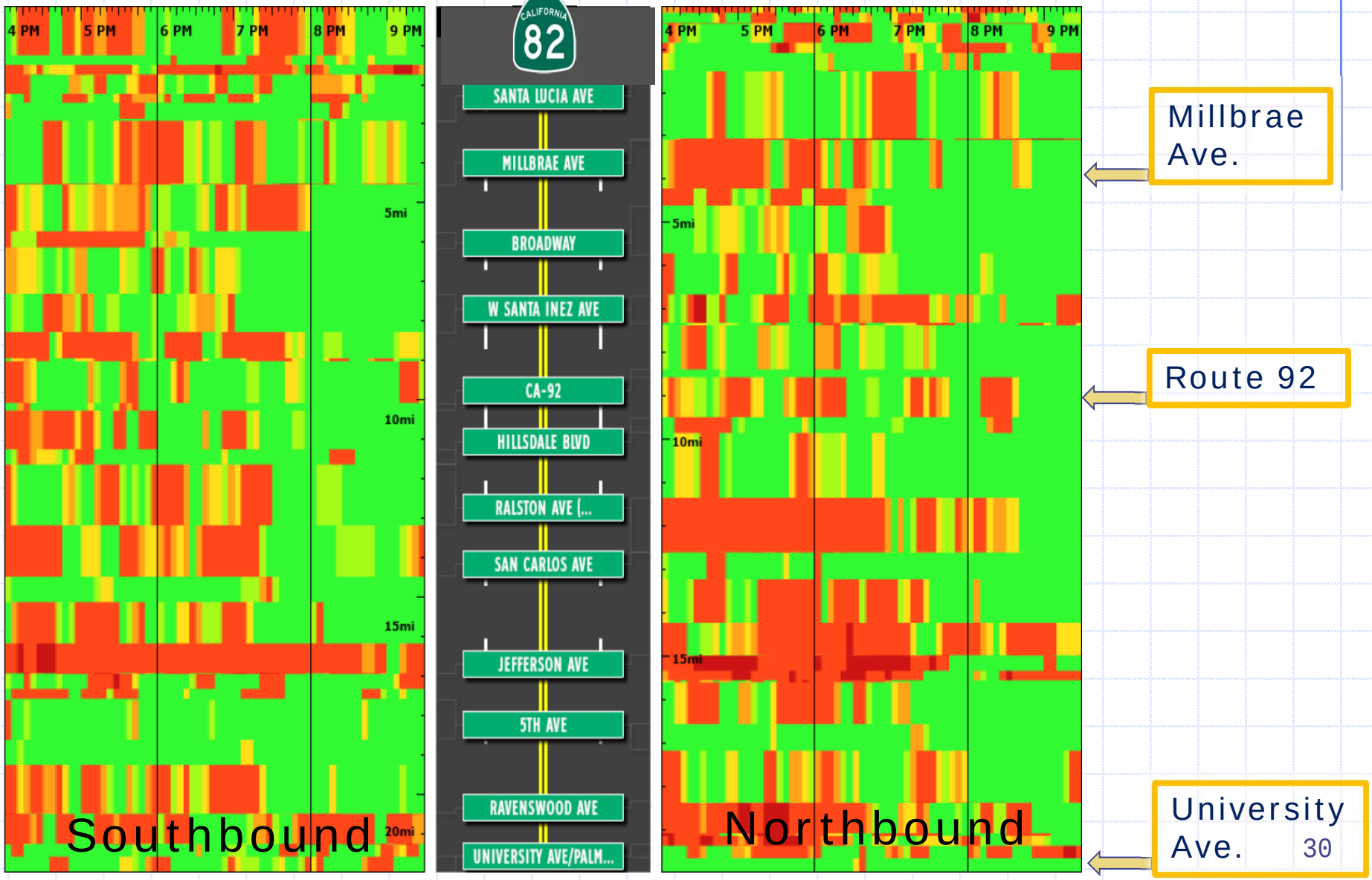
US 101 Typical Day Congestion
(4:00 p.m. to 9:00 p.m., October 13, 2016)



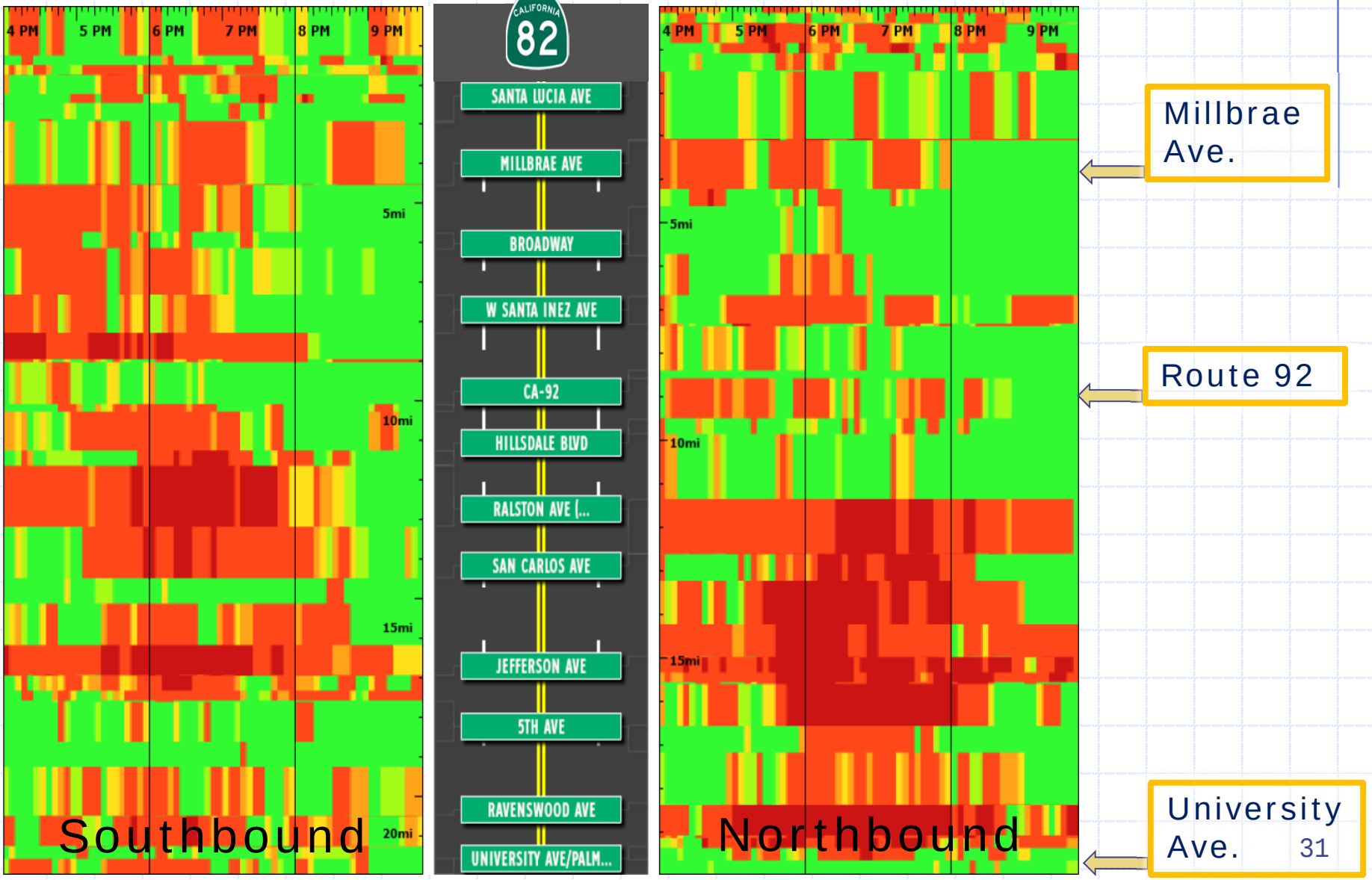
US 101 RV Fire Day Congestion
(4:00 p.m. to 9:00 p.m., October 20, 2016)



El Camino Real Typical Day Congestion
(4:00 p.m. – 9:00 p.m., October 13, 2016)



El Camino Real RV Fire Day
(4:00 p.m. to 9:00 p.m., October 20, 2016)



Day-to-Day Applications

Day-to-Day Applications

Typical

- Monitor traffic conditions
- Update signal timing remotely
- Coordinate signals with local agencies
- Address complaints

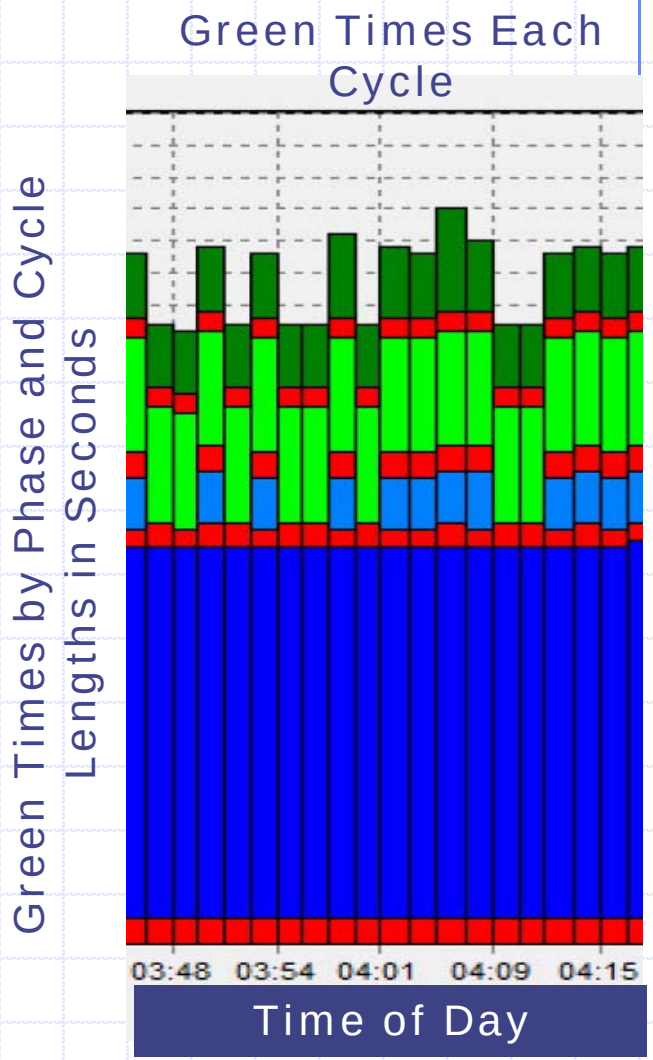
Day-to-Day Applications
Recent Examples

- Ralston Ave. and El Camino Real southbound left turn complaint.
- Coordinating of two closely spaced signals of Harbor Blvd. with El Camino Real and Old County Rd.
- Northbound and southbound US 101 off ramps to Marsh Rd.
- Half Moon Bay retiming.

Day-to-Day Applications

Historical Intersection Timing (HIT) Report

- **With the Smart corridor, we are able to view intersection operation remotely and see how the intersection operates 24 hours a day, everyday, to pinpoint problems and address them quickly.**



Moving Forward

- **Next Steps**
  - Encourage agencies to add signals to the system.
- **Additional Uses beyond current Smart Corridor**
  - Work with agencies to use elements for special events.
  - Enhance communication between local agencies during freeway incident.
  - Partner with researchers and auto manufacturers to utilize Smart Corridor for autonomous vehicles/ connective applications.
- **Expand the Smart Corridor to the Cities of Daly City, Colma, South San Francisco and Brisbane.**

Questions?

Thank you!