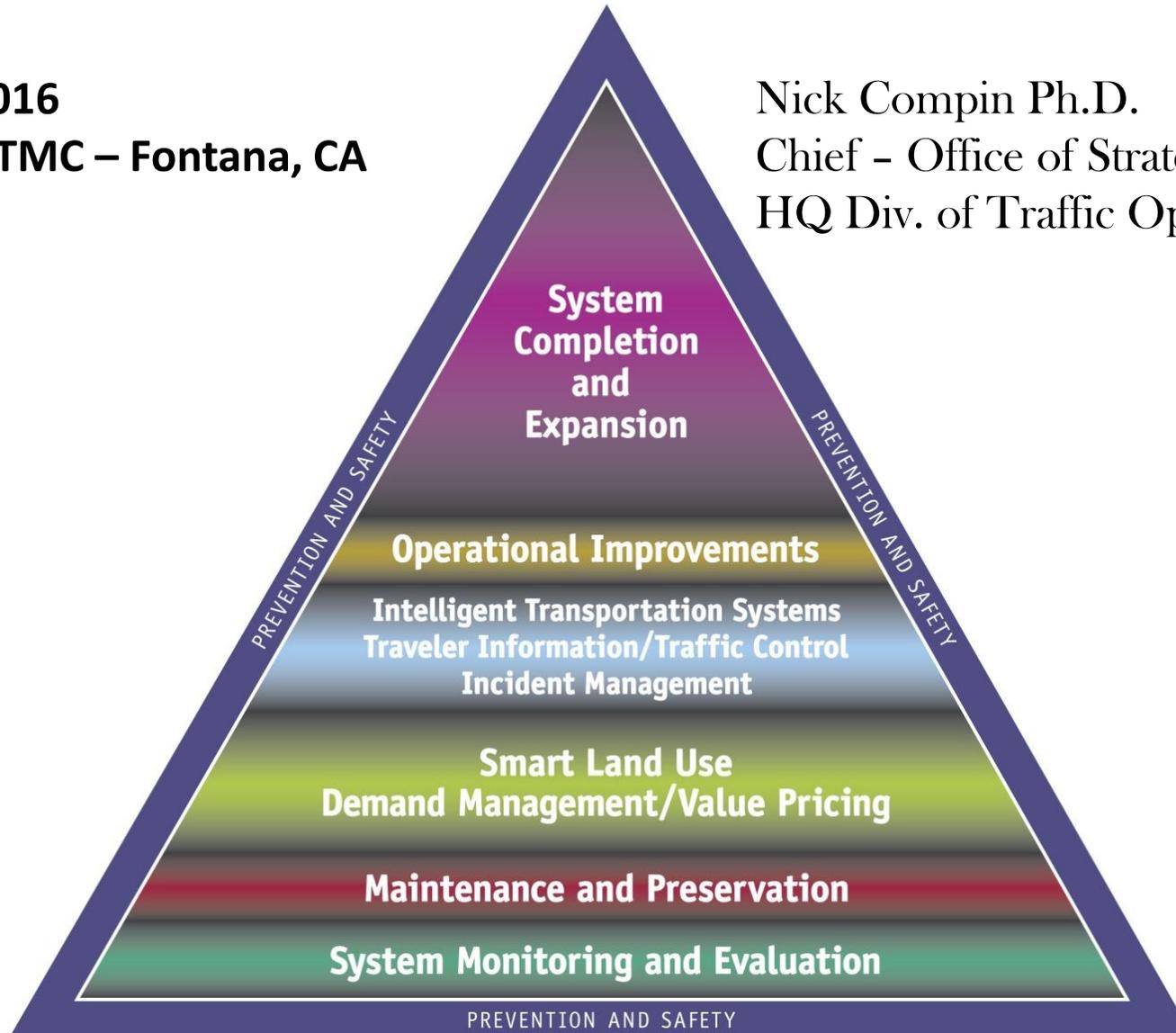


# Regional Operations Forum Transportation Systems Management & Operations

## TSMO Caltrans Statewide Perspective

July 19-21, 2016  
Caltrans D-8 TMC – Fontana, CA

Nick Compin Ph.D.  
Chief - Office of Strategic Development  
HQ Div. of Traffic Operations



**Transportation Investments have more impact if built upon this foundation**

## The Promise of TSMO

“We promise **travelers and shippers** that we will **manage** traffic and incidents as well as provide timely and accurate travel information so that they can make informed decisions to **minimize their unexpected delay and improve the safety** of their travel.”

SHRP2 L17 Technical Report

# Transportation Systems Management & Operations

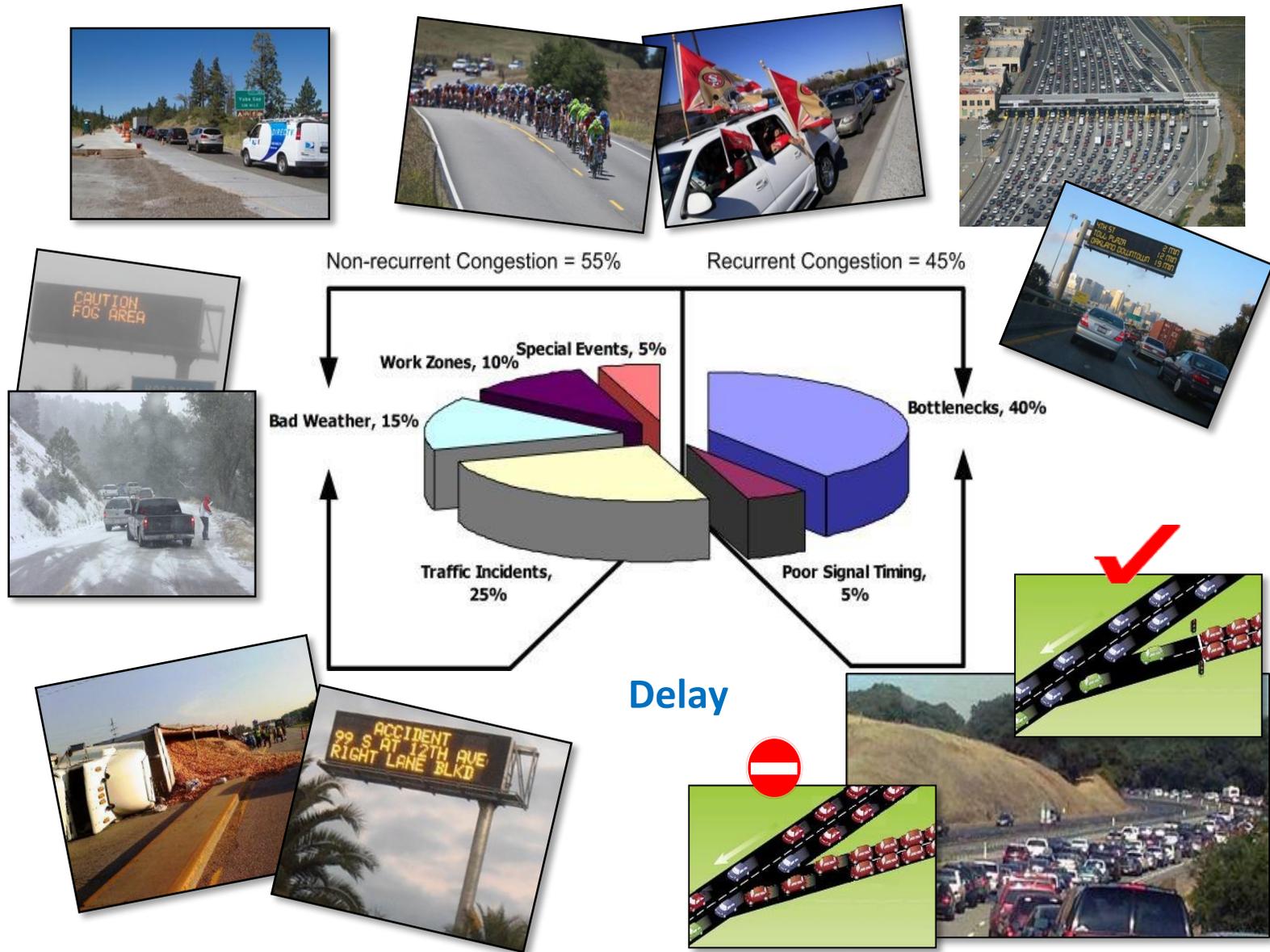
## Traditional Approach to Managing Transportation

- Predict future (long range) traffic volumes
- Fund major capital projects to provide additional capacity

This only addresses 45% of the congestion problem

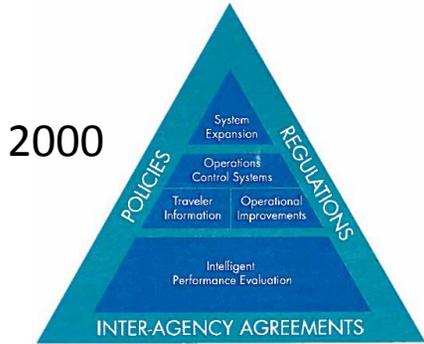
- Also becoming more and more difficult to provide new capacity

## New Focus on Managing Transportation



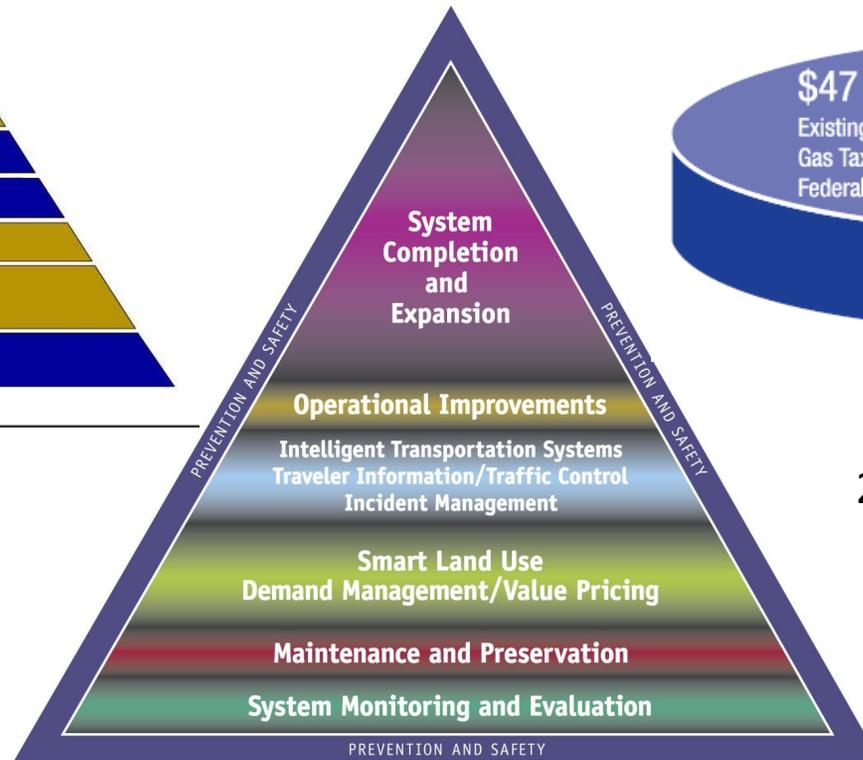
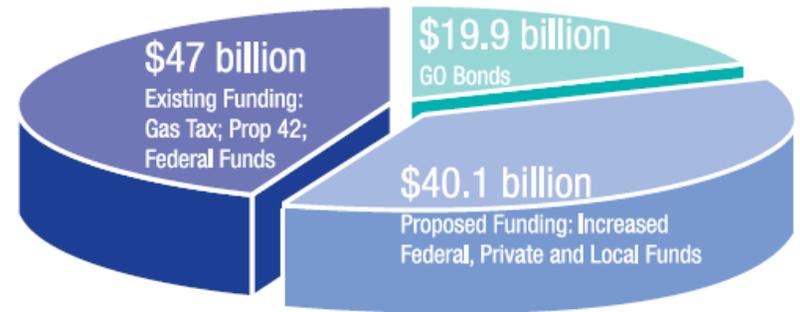
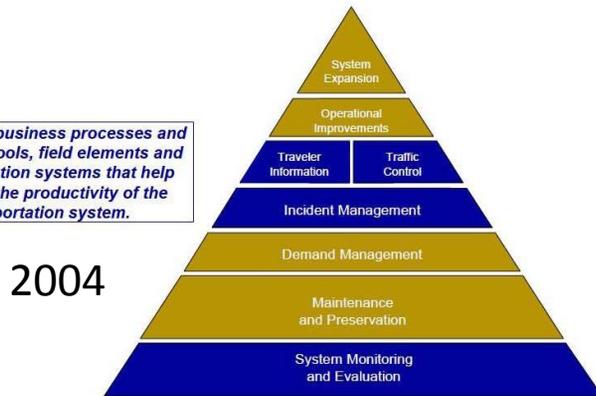
# TSMO

## Strategic Growth Plan / CMIA Legacy



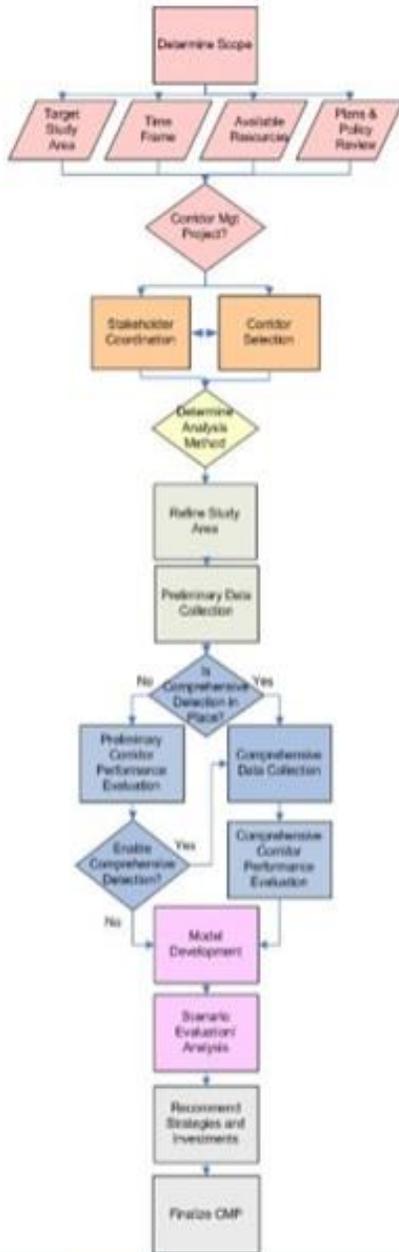
 **Governor Arnold Schwarzenegger's Strategic Growth Plan: Transportation Investments for Mobility and Quality of Life**

*TMS are the business processes and associated tools, field elements and communication systems that help maximize the productivity of the transportation system.*



**Transportation Investments have more impact if built upon this foundation**

# TSMO and Corridor System Management Planning

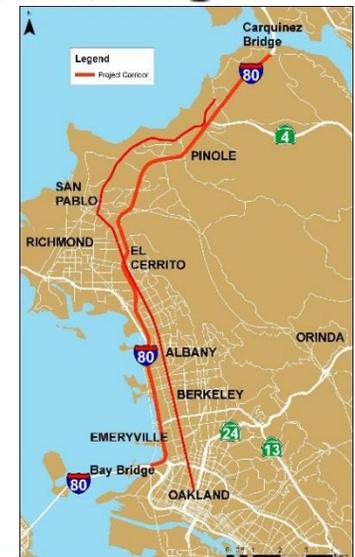


## A Corridor System Management Plan responds to the following questions:

- How is a travel corridor performing?
- Why is it performing that way?
- What system management strategies best address the problems?

## Objective:

Performance based decision making.

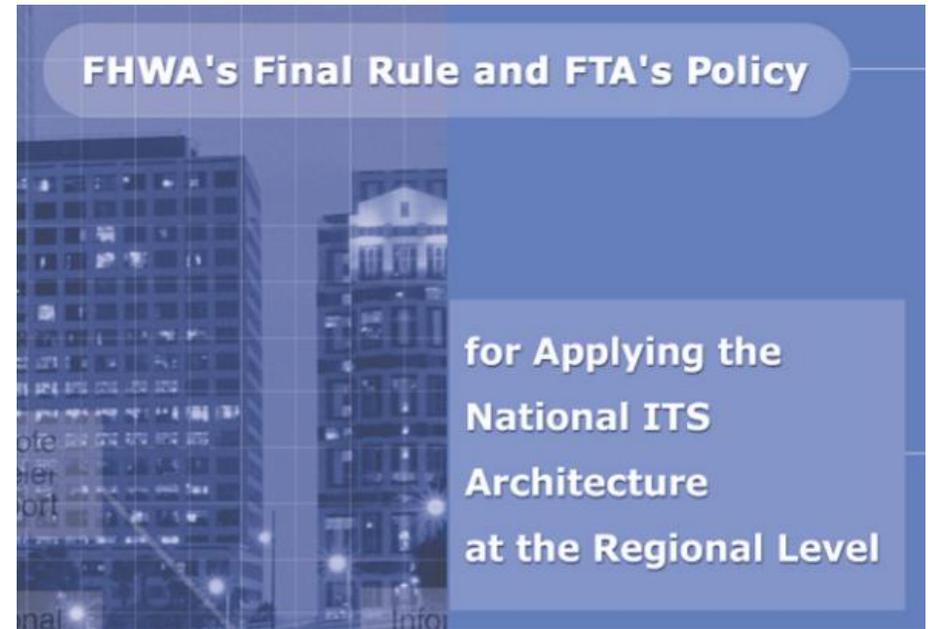


# TSMO Coordination: ITS Mainstreaming efforts



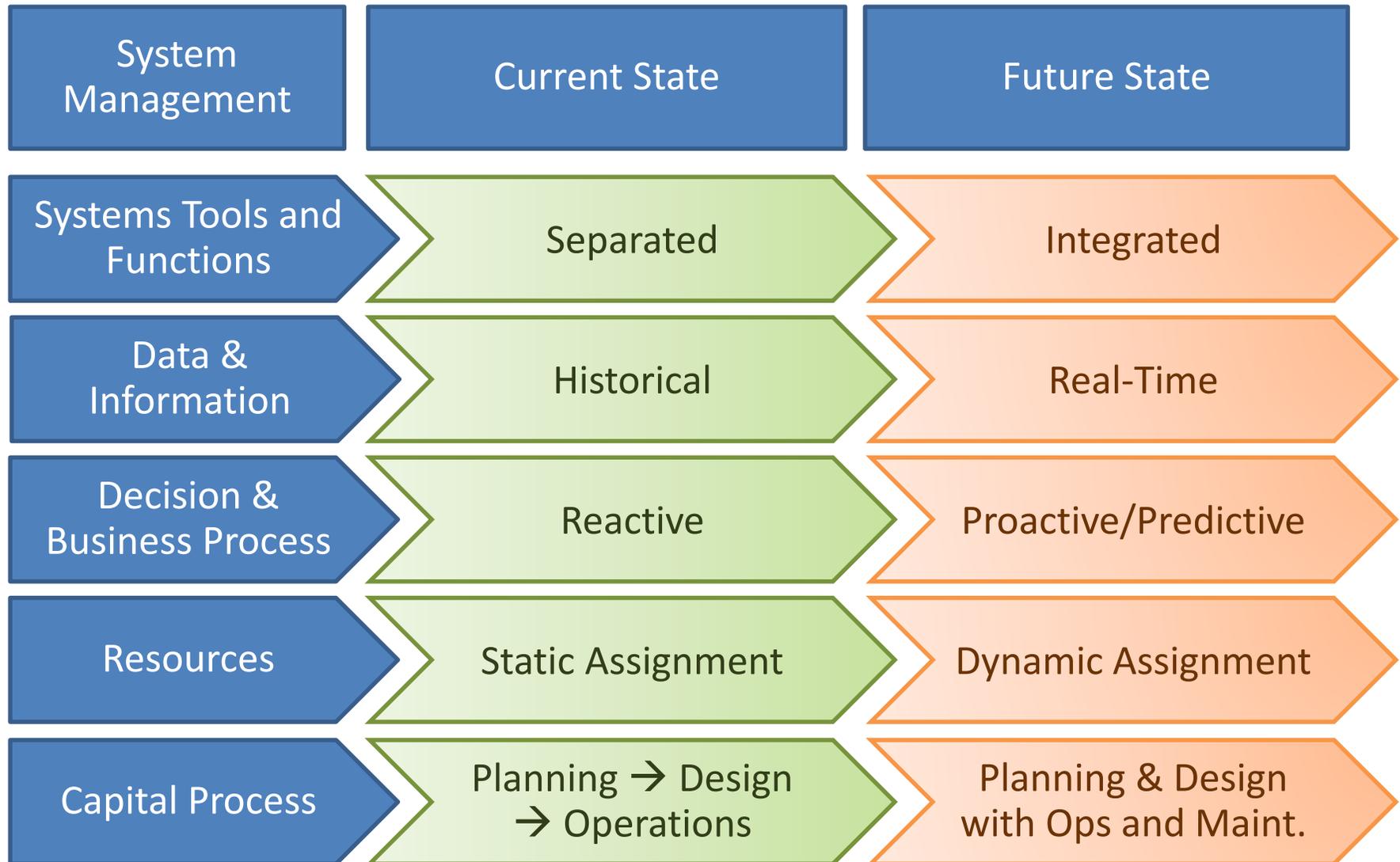
*ITS Mainstreaming initiatives*  
*ITS Architecture requirement*

ITS SystemBuilder  
Statewide ITS Architecture Update



# Transportation Systems Management and Operations

## Current and Future State



## Shaping Our Future

- *TSMO Goals and Policy (TMS Business Plan - 2013)*
- *California Transportation Investment Program Needs – 10 Yr Performance Based*
  - ***Making the case for operational investments, link to goals - Fix It First***
- *SHRP2 Implementation - TSMO Implementation Plan – Regional Ops Forums/CMM Workshop*
- *D3 RCTO / ITS-Operations Plans*

# Transportation Systems Management & Operations

## ***TSMO Goals \****

*System Management Culture / Performance-Based / Well-Maintained / Cooperative Management / Consensus on Standards /*

- **Create a system management culture.**
- **Performance-based framework for all TMS work activities and funding prioritization.**
- **Establish a well-maintained and high-performing TMS infrastructure that supports real-time traffic management.**
- **Cooperatively develop and implement real-time (active) traffic management to optimize flow, safety and aid regions and the State to meet greenhouse gas reduction (GHG) targets from transportation.**
- **Renew consensus on and adhere to critical statewide standards.**



*\* From Caltrans 2013 TMS Business Plan*

## Caltrans TSMO Progress

- ***2015-2020 Caltrans Strategic Management Plan – e.g., Stewardship and System Performance Goals***
- ***Draft TSMO Director’s Policy-08 & Draft ITS DD-70***
- ***25 Top Priority Corridors***
- ***National Engagement***
  - 2012 SHRP2 Capability Maturity Model Self Assessment
  - SHRP 2 Lead Adopter Federal Technical Assistance \$200,000 – Approved Implementation Plan
- ***Integrated Corridor Management - Connected Corridors D-7 Pilot***
- ***Transportation Management System Pilot Corridors Study***
- ***Regional Operations Forums/Capability Maturity Model Self Assessments***
- ***Caltrans TSMO Steering Committee***
- ***Planning for Operations Steering Committee***

# Transportation Systems Management & Operations Progress

## 2015-2020 Caltrans Strategic Management Plan

**System Performance Goal 4-** *“Utilize leadership, collaboration, and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.”*

- Top 25 Corridors (real-time system info)
- ICM Implementation Plans – by 2018, 5 corridors (I-210, I-80, SR-57, I-110, SR-91)
- ICM Implementation – by 2020, 3 corridors (I-210, I-80, ?)



# Transportation Systems Management & Operations

## TSMO Cornerstones

- TSMO Policy: Draft DP-08 R1

California Department of Transportation

Serious drought.  
Help save water!

### *Director's Policy*

<i>Number:</i>	DP-08-R1
<i>Effective Date:</i>	TBD by DBFS Administrator
<i>Supersedes:</i>	DP-08 (12/30/1992), DP-26 (08/2006)
<i>Responsible Program:</i>	Traffic Operations

*TITLE* Transportation System Management and Operations

### *POLICY*

In order to optimize California's transportation system's performance for all system users and modes, the California Department of Transportation (Caltrans) commits to effective Transportation System Management and Operations (TSM&O). TSM&O is the integration of projects, business processes, systems, technology, performance measurement, organization and workforce to actively and efficiently manage California's transportation system. In partnership with others, Caltrans uses TSM&O to preserve system capacity, while improving safety, security, reliability, and sustainability.

### *INTENDED RESULTS*

The intent of this policy is to promote TSM&O strategies as crucial tools in meeting Caltrans mission to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability. TSM&O strategies are essential to a performance-based decision making process Caltrans will use to improve the efficient and effective operation of the transportation network. Examples of TSM&O strategies include:

- Ramp metering
- Traffic signal synchronization
- Intelligent Transportation Systems (ITS)
- Real time traveler information
- Incident and special event management
- Managed lanes
- Traffic Management Plans (TMPs)
- Dynamic lane management



# Transportation Systems Management & Operations

## TSMO Cornerstones

- **Intelligent Transportation Systems: DD-70-R1**

California Department of Transportation

*Serious drought.  
Help save water!*

### *Deputy Directive*

*Number:* DD-70-R1

*Refer to  
Director's Policy:* DP-08-R1  
Transportation System  
Management

*Effective Date:* TBD

*Supersedes:* DD-70 Transportation  
Management Systems  
(06-05-02)

*Responsible  
Program:* Maintenance &  
Operations

*TITLE* Intelligent Transportation Systems

#### *POLICY*

The California Department of Transportation (Caltrans) implements Intelligent Transportation Systems (ITS) that support full Transportation System Management (TSM) to improve the safety, reliability, and efficiency of multi-modal transportation throughout the State. Caltrans supports deployments of integrated transportation services that support TSM strategies while making the best use of limited resources, and engaging in long-term planning for technological solutions to transportation problems.

#### *DEFINITION/BACKGROUND*

ITS enables coordinated and integrated service systems to improve the security, performance, and cost-effectiveness of transportation services, vehicles, and infrastructure. This policy promotes an information-based transportation network that enables a performance-based evaluation of the State's transportation network. Caltrans partners with metropolitan planning organizations and regional transportation planning agencies that maintain regional ITS architectures throughout the state. This policy promotes the use of a systems engineering methodology to ensure that Caltrans' systems and projects are developed to meet the needs of the traveling public, state, regional, and local stakeholders.

ITS—Electronics, communications, or information processing used singly or in combination to improve the efficiency and safety of surface transportation systems.

ITS Architecture—A common framework for ITS interoperability comprising logical and physical components to satisfy a defined set of user services.



# Transportation Systems Management & Operations

## TSMO Cornerstones: Capability Maturity Model (CMM)

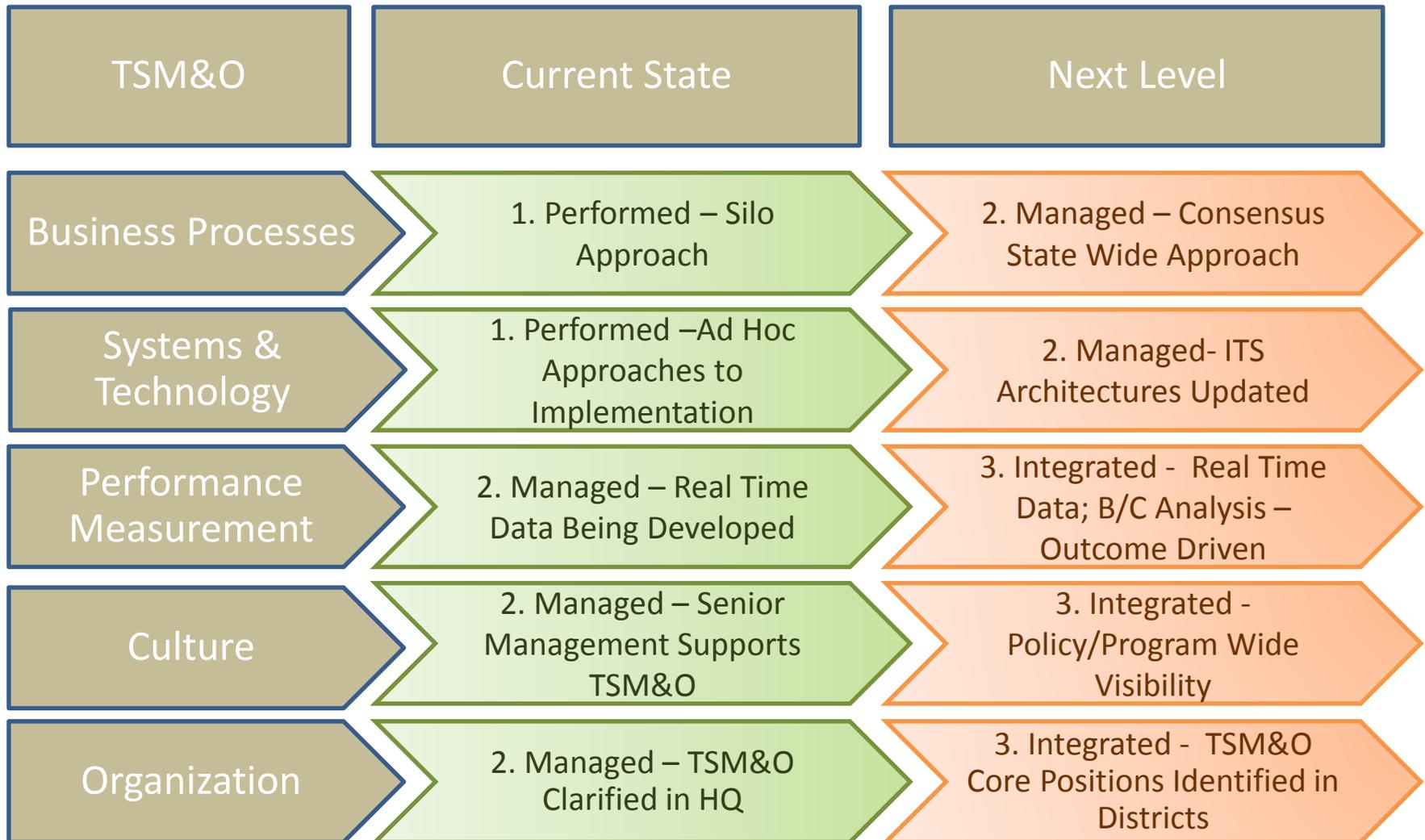
Excerpt from: AASHTO TSM&O One-Minute Guidance Evaluation

[http://www.aashtotsmoguidance.org/one\\_minute\\_evaluation/](http://www.aashtotsmoguidance.org/one_minute_evaluation/)

Dimension	Level 1	Level 2	Level 3	Level 4
<b>Business Processes</b> <i>(Planning, programming, budgeting, implementation)</i>	Processes related to TSM&O activities ad hoc and un-integrated	Multiyear statewide TSM&O plan and program exists with deficiencies, evaluation, and strategies	Programming, Budgeting, and project development processes for TSM&O standardized and documented	Processes streamlined and subject to continuous improvement
<b>Systems &amp; Technology</b> <i>(Systems engineering, standards and technology interoperability)</i>	Ad hoc approaches outside systematic systems engineering	Systems engineering employed and consistently used for ConOps, architecture and systems development	Systems and technology standardized, documented and trained statewide, and new technology incorporated	Systems and technology routinely upgraded and utilized to improve efficiency performance
<b>Performance Measurement</b> <i>(Measures, data &amp; analytics and utilization)</i>	No regular performance measurement related to TSM&O	TSM&O strategies measurement largely via outputs, with limited after-action analyses	Outcome measures identified and consistently used for TSM&O strategies improvement	Mission-related outputs/ outcomes data routinely utilized for management, reported internally and externally, and archived
<b>Culture</b> <i>(Technical understanding, leadership, outreach, and program authority)</i>	Value of TSM&O not widely understood beyond champions	Agency-wide appreciation of the value and role of TSM&O	TSM&O accepted as a formal core program	Explicit agency commitment to TSM&O as key strategy to achieve full range of mobility, safety and livability/ sustainability objectives
<b>Organization/Workforce</b> <i>(Organizational structure and workforce capability development)</i>	Fragmented roles based on legacy organization and available skills	Relationship among roles and units rationalized and core staff capacities identified	Top level management position and core staff for TSM&O established in central office and districts	Professionalization and certification of operations core capacity positions including performance incentives
<b>Collaboration</b> <i>(Partnerships among levels of government and with public safety agencies and private sector)</i>	Relationships on informal, infrequent and personal basis	Regular collaboration at regional level	Collaborative interagency adjustment of roles/responsibilities by formal interagency agreements	High level of operations coordination institutionalized among key players –public and private

# Transportation Systems Management & Operations Capability Maturity Model – Caltrans Statewide Mgmt

## TSMO Cornerstones: CA Capability Maturity Model (CMM) Self Assessment -2013                      2017-2018 (?)



# Transportation Systems Management & Operations

## ***Achieving TSMO Goals***

*Partnerships / Data / Training / Communication / Integration*

### **Institutional Integration**

Coordination to collaboration between various agencies and jurisdictions that transcends institutional boundaries.

### **Operational Integration**

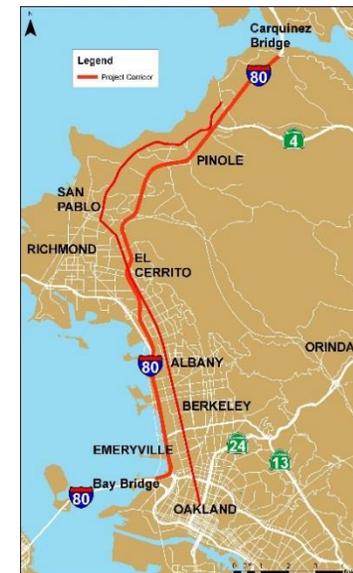
Multi-agency and cross-network operational strategies to manage the total capacity and demand of the corridor.

### **Technical Integration**

Sharing and distribution of information, and system operations and control functions to support the immediate analysis and response.

## Shaping Our Future

- **CA Connected Corridors Program**
  - *I-210 Pilot Corridor*
  - *Corridor Performance Reports Templates*
  - *Technical Assistance and Training*
  - *District 7 Operations (and Planning) Reorganization*
- **Transportation Management System (TMS) Pilot Corridors**
  - *I-80*
  - *I-210/10/605*



## All Partners:

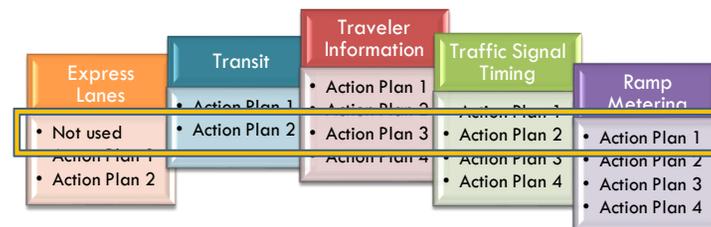
- Enhanced traffic monitoring systems
- Enhanced communication
- Freeway operations
- Arterial operations
- Enhanced traveler information
- Decision support system
- Enhanced data/information sharing



## Local:



## Prop 1B CMIA/Traffic Light Synchronization Program (TLSP) MTC – Freeway Performance Initiative





RSS for Media (Events, Link Data)	Interactive Voice Response (IVR)
ALERT System	My511 Mobile App
Public Website	Links to Social Medias

# Transportation System Management & Operations

## Integrated Corridor Management

While the ICM term is well known, various existing management efforts already support the ICM concept, particularly ITS applications. The key to ICM is integrating existing ITS and management efforts with new concepts and relationships to develop a coherent multi-modal, multi-jurisdiction, corridor-wide transportation management system.



## California Connected Corridors Program

A Statewide Program for the most highly congested un-reliable corridors in CA to lead Integrated Corridor Management in partnership with others – can be replicated

elsewhere

Website: [www.connected-corridors.berkeley.edu](http://www.connected-corridors.berkeley.edu)

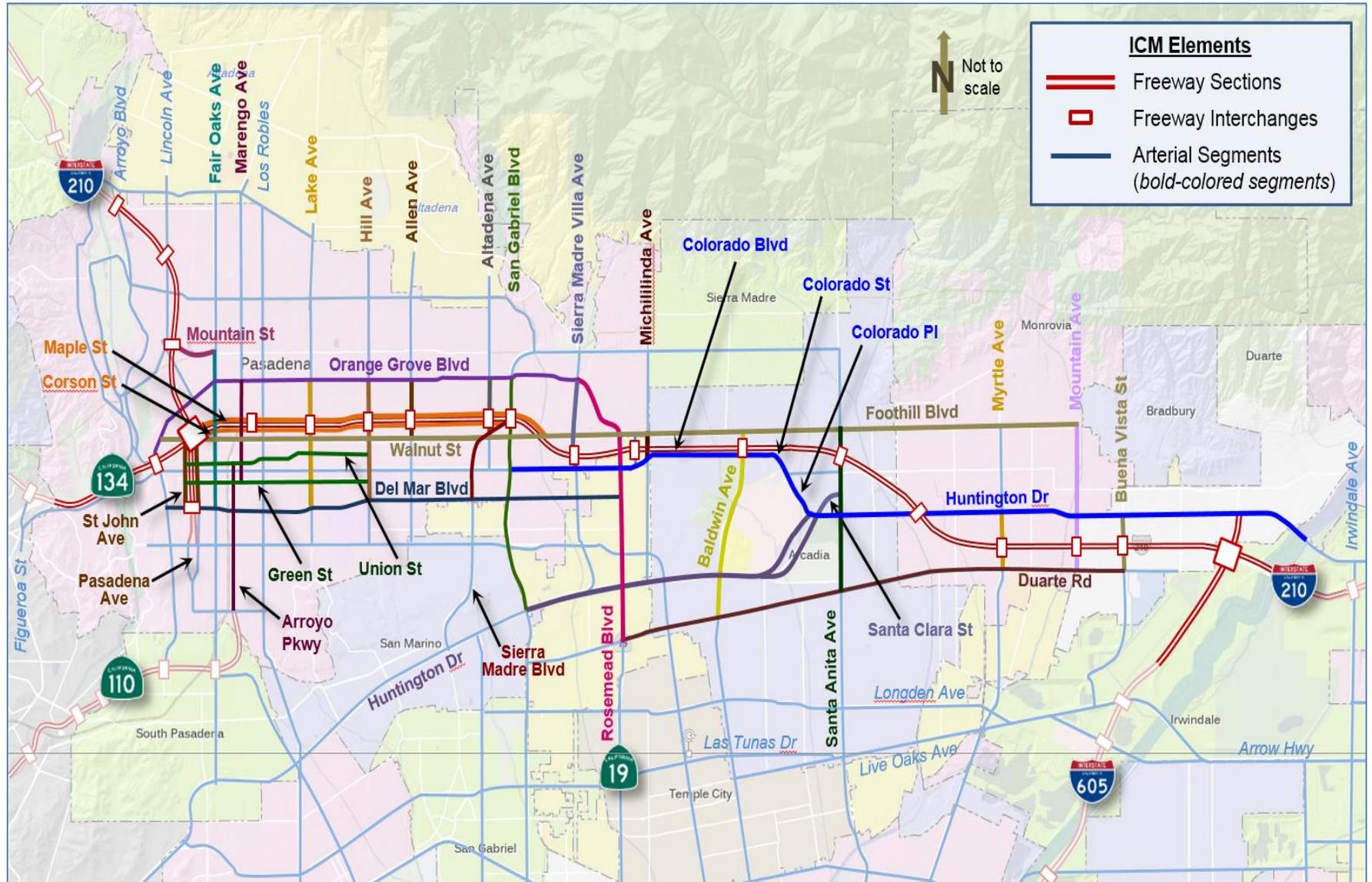


# Connected Corridors - Corridor Selection Criteria

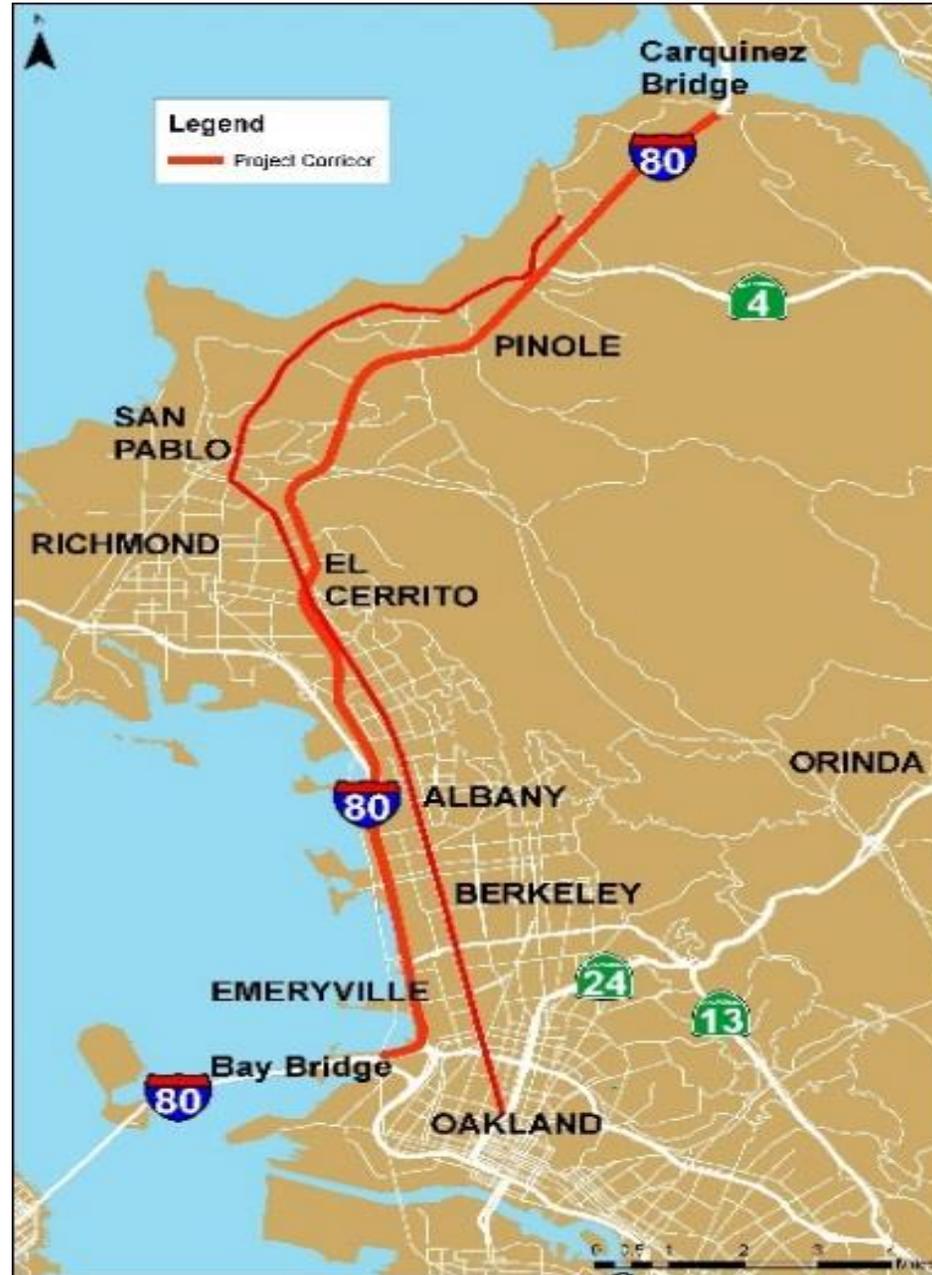
## Traffic Operations Selection Criteria:

- High Annual Vehicle Hours Delay (AVHD) under 35 mph (Corridor ranked in Top 50 most congested corridors for AVHD under 35 mph in California)
- High number of incidents and the incident response time
- High level of partnership participation to improve corridor performance
- Degree of parallel arterial and multimodal capacity
- The number of on and off-ramps connected to parallel local arterials
- Greatest opportunity for or includes local arterial detection and signal synchronization
- Extent of existing TMS field elements e.g., detection health in corridor and on-ramps
- Minimal impact by construction/closures

# I-210 Connected Corridors (ICM) Pilot Corridor and TMS Pilot Corridor



# I-80 Smart Corridor and Transportation Management System (TMS) Pilot Corridor

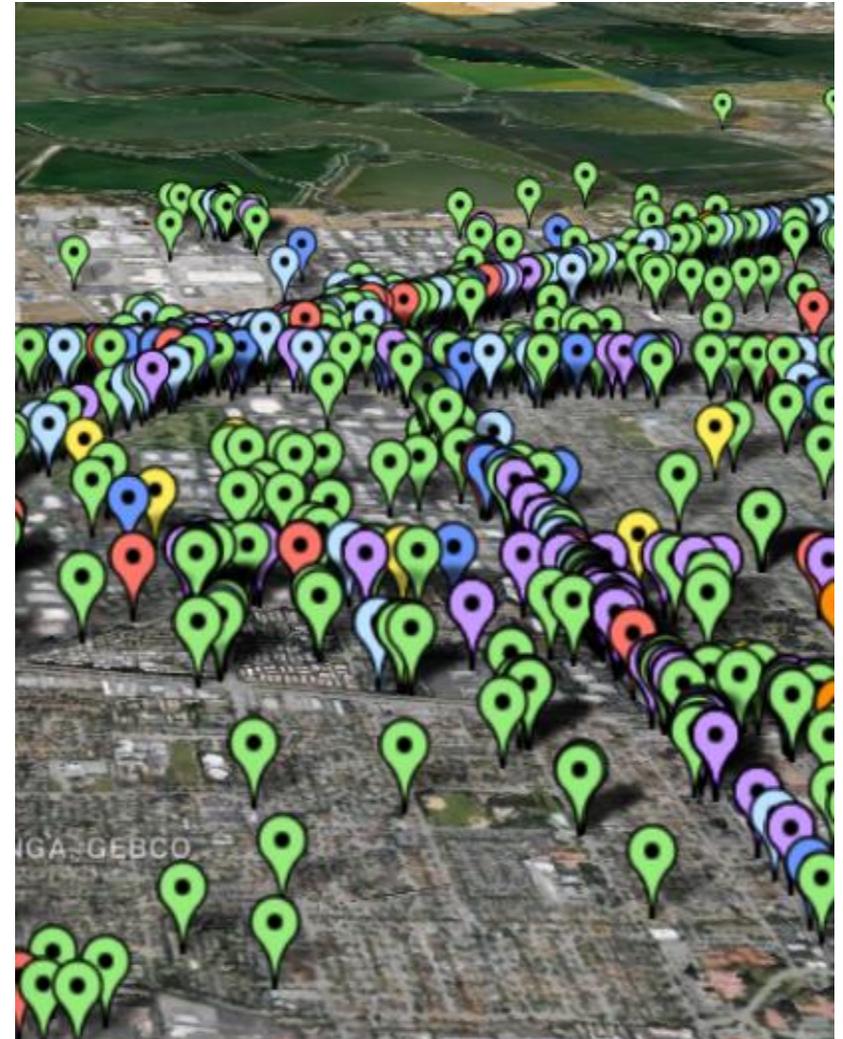


# Orange County Anaheim Triangle – 1<sup>st</sup> Leg SR-57

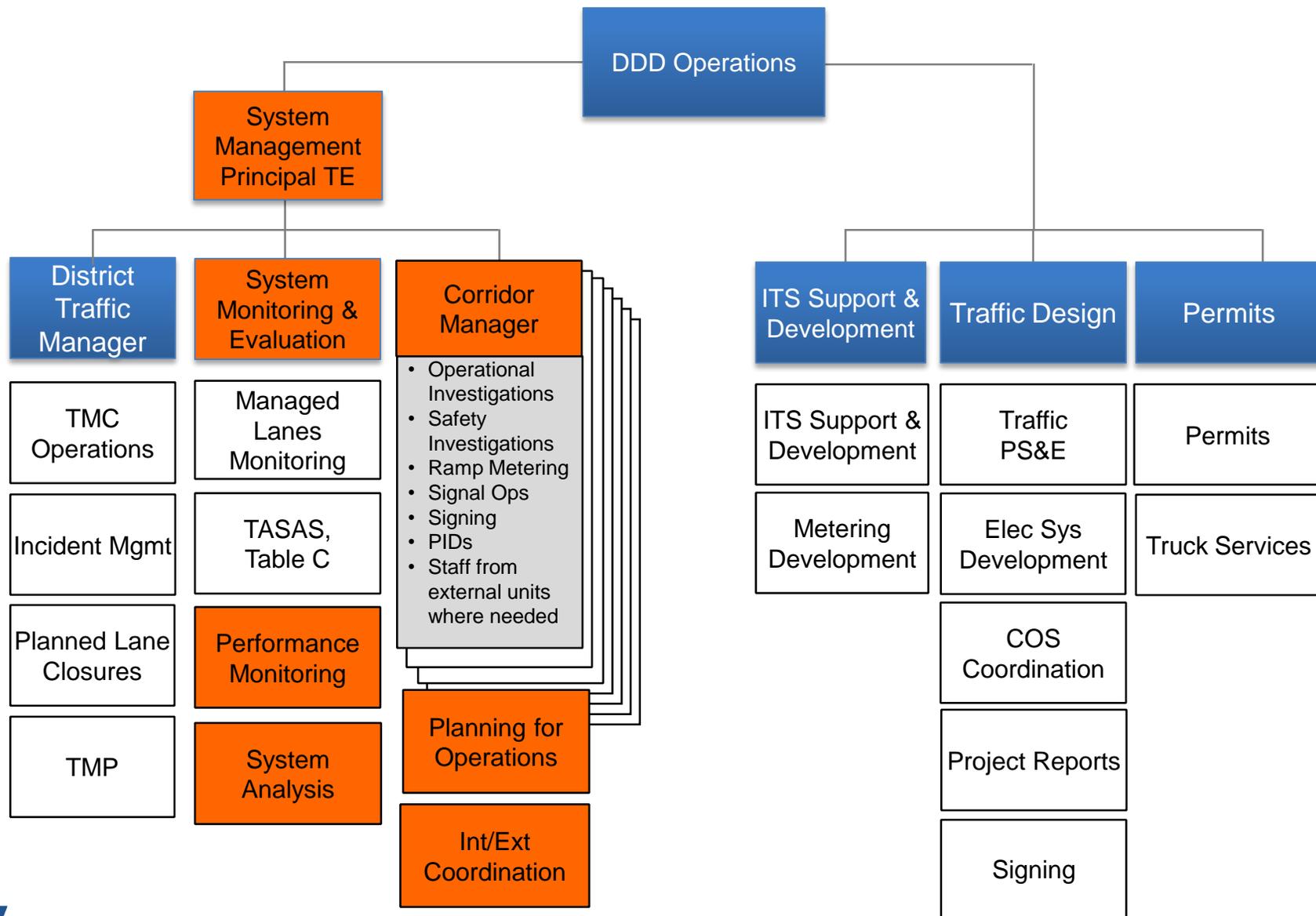


## CA Connected Corridors Program

- Enable existing transportation infrastructure and vehicles to work together in a highly coordinated manner
- Deliver improved corridor performance (safety, reliability, mobility)
- Improve accountability
- Evolve Caltrans to real-time operations and management
- Enhance regional , local and private sector partnerships



# District 7 Traffic Operations Reorganization: Long Term



# Transportation Management System (TMS) Corridor Performance Measurement

Baseline, quarterly and annual gathering and reporting of data:

## Traffic Operations:

- Safety – Number of incidents, major incident clearance time, and prevention of severe secondary collisions
- Travel Time Reliability/Peak Period Travel Time – TMS element health\*, peak period and total daily delay under 35 mph\*, corridor travel time reliability\*

## Maintenance:

- Level of Service – Timeliness of Maintenance Response:
  - “Preventative Maintenance” checks (K-family electrical performance on time or not)
  - Number of tickets open in TRAC (average, minimum/maximum, days to close)

## Other benefits:

\* Real-time multimodal system information

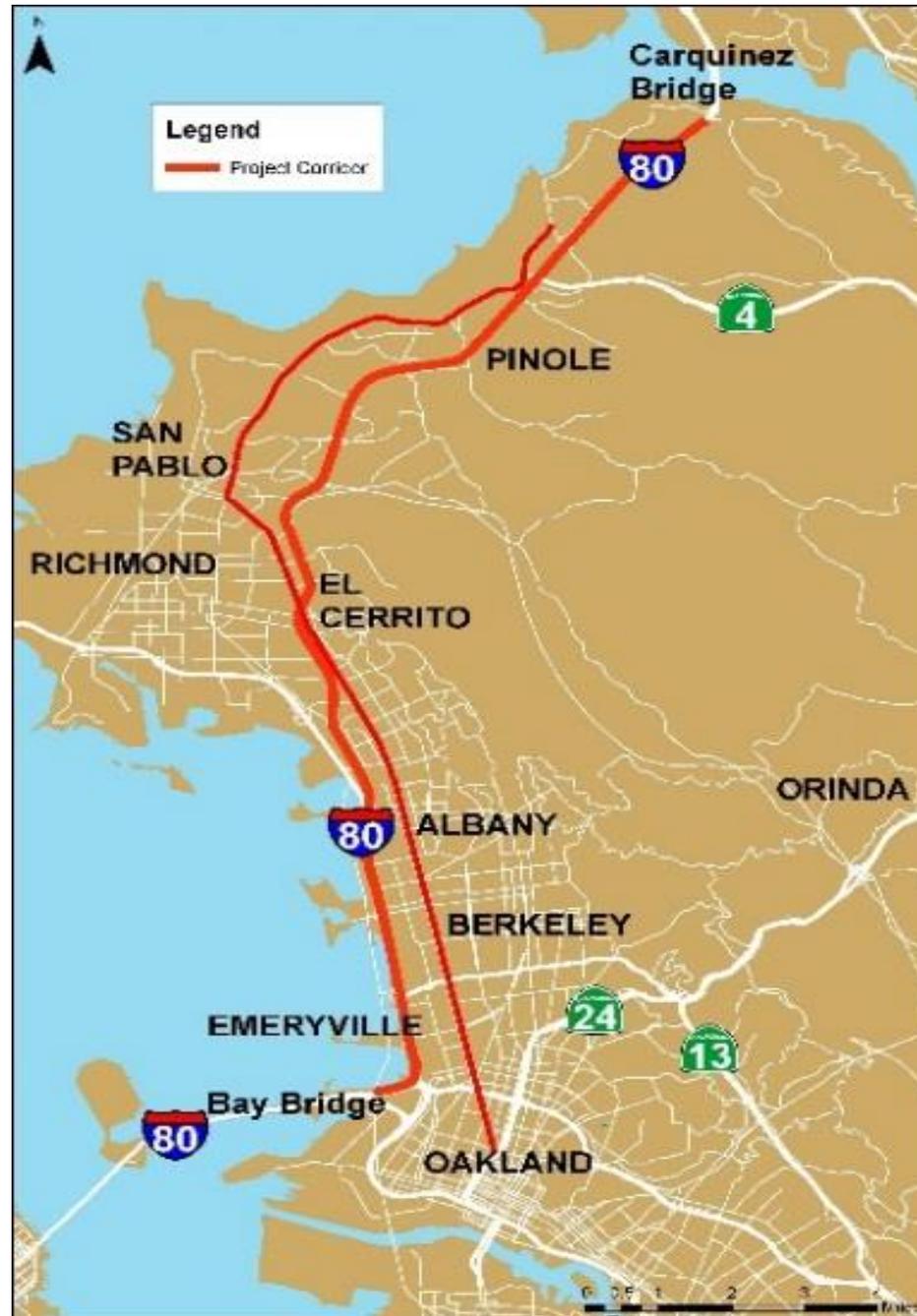
\* Included in 2015-2020 Caltrans Strategic Management Plan



# I-210 Transportation Management System (TMS) Pilot Corridor

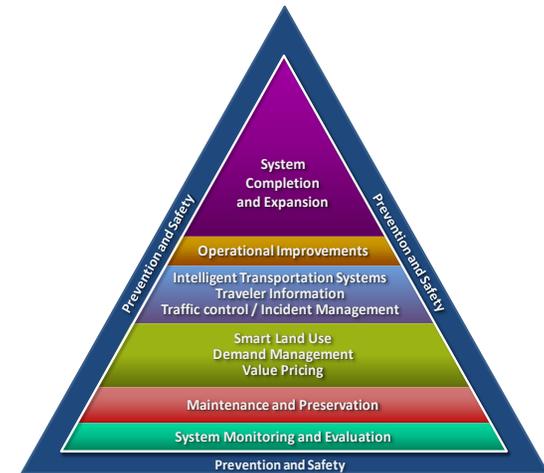


# I-80 Smart Corridor Transportation Management System (TMS) Pilot Corridor



# Ongoing CA TSMO Related Efforts

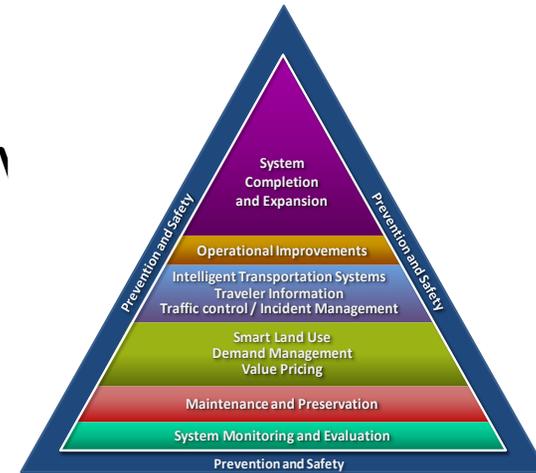
- ❑ Connected Corridors Charter and Concept of Operations (ICM Examples & Templates)
- ❑ Follow on to Organizing for Corridor Management Study and Implementation –
  - ❑ Defining roles, responsibilities and necessary skills (Templates for ICM future)
- ❑ District 12 (Orange Co.) 1-day Regional ICM Workshop with Partners (April 2015)
- ❑ FHWA ICM Assistance \$200,000 – I-210 System Engineering and Management Plan (SEMP)
- ❑ Transportation Management System (TMS) Pilot Corridors Study
- ❑ TSMO Lead Adopter Assistance \$200,000 2015
- ❑ TSMO Lead Adopter Assistance \$50,000 2016



# Ongoing CA TSMO Related Efforts

- ❑ Tailored Regional Operations Forums/ Capability Maturity Model (CMM) Self Assessments
  - ❑ New 3 Day Regional Operations Forum (ROF)/ CMM
    - ❑ D-12 Orange County Aug. 2015
    - ❑ D-4 East Bay Counties Dec. 2015
    - ❑ D-11 San Diego April 2016
    - ❑ D-8 San Bernardino July 19-21
    - ❑ D-3 Marysville Sept....2016

- ❑ Asset Management
- ❑ Caltrans-sponsored research



# Transportation System Management & Operations – Statewide Perspective

*Questions...*

