Applying System Management through Intelligent Transportation Systems (ITS) to Reduce Greenhouse Gas Emissions

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California Actions

AB 32: The Global Warming Solutions Act of 2006

SB 375: Sustainable Communities and Climate Protection Act of 2008

SB 391: Sustainable Communities Strategies

Executive Order S-03-05: GHG limit of 80% below 1990 levels by 2050
Managing Prior State Highway System (SHS) Investments

Proposition 1B: $4.5 Billion for performance improvements on the SHS.

- Corridor Mobility Improvement Account (CMIA)
- 90 Projects completed or near completion
  - Required Corridor System Management Plans (CSMP’s) – intent - improved management & operations

- Traffic Light Synchronization Program (TLSP)
  - 73 projects allocated
  - 43 projects under construction
Demonstrable transportation network improvements in safety, performance, reliability and environmental sustainability.

Map-21 Nation Goals

Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads

Infrastructure condition - To maintain the highway infrastructure asset system in a state of good repair

Congestion reduction - To achieve a significant reduction in congestion on the National Highway System

System reliability - To improve the efficiency of the surface transportation system

Environmental sustainability - To enhance the performance of the transportation system while protecting and enhancing the natural environment

Reduced project delivery delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion.
• Proactive real time system management (ramp metering, signal light synchronization, etc)
• Proactive demand management (mode, travel time and re-routing)
• Reduced Delay - Increased Travel Time Reliability - Reduced GHG
Transportation investments have more impact if built on this foundation.
System Management Vision

- **Current State**
  - Systems Tools and Functions: Separated
  - Data & Information: Historical
  - Decision & Business Process: Reactive
  - Resources: Static Assignment
  - Capital Process: Planning → Design → Operations

- **Future State**
  - Systems Tools and Functions: Integrated
  - Data & Information: Real-Time
  - Decision & Business Process: Proactive/Predictive
  - Resources: Dynamic Assignment
  - Capital Process: Planning & Design Ops & Maintenance
Caltrans’ 5 Goals of System Management

1. Create a system management culture.

2. Performance-based framework for all TMS work activities and funding prioritization.

3. Establish a well-maintained and high-performing TMS infrastructure that supports real-time traffic management.

4. 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.

5. Renew consensus on and adhere to critical statewide standards.
Establishing a well-maintained and high-performing TMS infrastructure that supports real-time traffic management.

- 3472 Closed Circuit Televisions (CCTV)
- 790 Changeable Message Signs (CMS)
- 1061 Miles of Fiber Optic Trunk-line Cable
- 3472 Ramp Meters Operational
- 4175 Vehicle Detection Locations
- 4753 Traffic Signal Intersections
- 30,000+ Individual Vehicle Detectors
Freeway / Arterial Management

Integrated Communication between Traffic Management Centers (TMC)

Caltrans Performance Measurement System (PeMS) – The base of the System Management Pyramid and decision support system

Corridor Wide Adaptive Ramp Metering and other strategies

Playbooks/Scenarios

Equals - Integrated Corridor Management (ICM)
Active Traffic Management

- Dynamically manage nonrecurring congestion based on prevailing traffic conditions (incidents and events)
- Focuses on trip reliability, decreased travel times, and reduced travel delay resulting in reduced GHG
- Maximizes the efficiency of the Corridor
- Increases throughput and safety through integrated systems using new technologies
State TMC to Local TMC Integration
The First Step to Freeway / Arterial Management (Corridor Management)

- Availability of real-time traffic information to motorists
- Improved responsiveness to incidents and events
- Enhanced communications
- Improved traffic flow and safety
- Reduced congestion and GHG emissions
Corridor Wide Adaptive Ramp Metering:
A series of meters simultaneously operated within a corridor based on current traffic conditions.

Benefits:

- Reduce mainline congestion
- Decrease travel time
- Increase throughput/speed
- Improve safety
- Reduce GHG
Assessing System Performance
Caltrans’ Freeway Performance Monitoring System (PEMS)

- A centralized traffic data warehouse
- Near real-time and historical data
- Collected through automated detection
- Over 37,000 detectors deployed on urban freeways throughout California
California Connected Corridors Program
Information Bringing Vehicles, Infrastructure and People Together

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

Operational strategies & improvements are typically low cost with high return on investment in terms of reducing delay

- Ramp metering reduces delay by 30%

- Traffic light synchronization reduces delay by up to 45% - City of San Ramon, “Crow Canyon Road Traffic Light Synchronization Project Benefit Analysis,” 2011

- Active lane management can reduce peak hour travel delay by 75% - Northbound 110 / I-5 Dynamic Lane Management System (Active Traffic Management System) project in Los Angeles)
Corridor System Management Plans (CSMP) illustrate the ROI value of operational improvements on Caltrans’ operated roadways.

Operational strategies & improvement projects are typically low cost and provide high performance returns; including reducing GHG emissions.
Thank You!

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