Connected Corridors
I-210 Pilot Project

User Needs Workshop

Feb 27, 2014
Agenda

Introduction
   Project Overview, Schedule, Corridor Description

User Needs Workshop
   I-210 Project Definition
   Operational Scenarios and Strategies Approach
   Users and Users Needs
   Performance Metrics

Additional Project Discussions (as time allows)
   Marketing Needs
   MOUs/Agreements
   Infrastructure and Resource Needs
Introduction

Purpose of Today’s Workshop *(Define Project Concept)*
- Get you more familiar with project details and goals
- Reach consensus on project definition, integration, strategies approach
- Reach consensus on users and users needs
- Reach consensus on performance metrics (to measure success)
- If we have time, logistics (marketing, MOUs/Agreements, resources, risks)

I-210 Project Overview and Goals

Near Term Key Tasks and Efforts

I-210 Project Milestone Schedule

Few Examples of ICMs in Other Regions

I-210 Project Corridor Description
**Project Overview**

- **ICM California**
  - Caltrans is leading the effort for the State
  - I-210 Connected Corridors Pilot – Replicable in fifty corridor segments over the next ten years

- **Coordination** – A lot of progress has been made

  **Key partners engaged (D7, Metro, LACDPW)**

  **Cities engaged (Pasadena, Arcadia, Duarte, Monrovia)**

  **Intro and technical meetings with the partners and cities**
I-210 Pilot Project Goals

- **Bring together corridor stakeholders** to create an environment for mutual cooperation, including sharing knowledge, developing working pilots, and researching and resolving key issues.

- **Formulate a roadmap** for the cost-effective implementation of future innovations.

- Develop and deploy an integrated, **advanced decision support system** for use by the stakeholders as they actively manage the corridor.

- Develop a **set of performance measures** to quantify the successes of the Connected Corridors pilot project.

- **Demonstrate project effectiveness** that can lead to additional phases and funding for more advanced tools and capabilities.

- Develop a pilot system that **can be replicated** on other corridors and be a model for other corridors in the state and country.
Near Term Key Tasks & Efforts

- Understand data needs
- Characterize the corridor
- Share data
- Prepare studies
- Request funding for resources

- Next steps
  - Simple coordination between agencies
  - Bring system together (automated)
  - Keep moving forward
Communications & Outreach

- **Near-term activities**
  - Presentations to several LA Metro subcommittees late February/early March
  - Meeting with San Gabriel Valley Council of Governments on March 18
  - Meetings with City Councils, Technical Advisory Committees, and/or City Managers (to be confirmed)

- **Public announcement of the I-210 Connected Corridors Pilot**
  - Brainstorm/planning meetings just getting started
    - First meeting to be held March 12th
    - To include Caltrans District 7 Public Relations personnel & Project Manager, LA Metro, PATH
    - Will keep cities and county informed as planning progresses
    - Any ideas? Please forward to Lisa Hammon
I-210 Pilot Project Milestone Schedule

2014
- Project Initiation & Management: 10/1/13 - 12/31/13
- Outreach & Communications: 10/1/13 - 12/29/13

2015
- Corridor Preparation: 11/1/13 - 10/1/16
- Analysis & Modeling & Simulation: 11/1/14 - 2/1/14
- STMP: 2/1/14 - 12/12/14
- ConfOps: 8/20/14 - 2/5/15
- System Requirements: 12/31/14 - 5/18/15
- Organizational & Technical Design: 3/30/15 - 2/4/16

2016
- Component Development: 6/2/15 - 5/16/16
- System Integration: 7/2/15 - 8/2/16
- Technical Deployment: 10/29/15 - 8/31/16
- Institutional Deployment: 7/23/15 - 1/14/16
- System Validation & Acceptance: 5/12/15 - 10/20/16
- System Operations: 10/20/16 - 10/31/17

2017
- Lessons Learned: 5/13 - 12/31/17

2/27/2014
## Existing ICM Efforts (United States)

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Corridor Type</th>
<th>Lead Agencies</th>
<th>Activities</th>
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<tbody>
<tr>
<td>I-15 Diego</td>
<td>Suburban</td>
<td>SANDAG</td>
<td>• ConOps and System Requirements developed in 2008</td>
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<td>• Simulation evaluation in 2009-2010</td>
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<td>• System launched <strong>October 2013</strong></td>
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<td>• Currently in evaluation phase</td>
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<tr>
<td>US-75 Dallas</td>
<td>Suburban &amp; urban</td>
<td>DART</td>
<td>• ConOps and System Requirements developed in 2008</td>
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<td>• Simulation evaluation in 2009-2010</td>
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<tr>
<td>I-80 Bay Area</td>
<td>Suburban &amp; urban</td>
<td>MTC / Caltrans</td>
<td>• ConOps developed in 2010</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Groundbreaking in October 2012</td>
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<td></td>
<td>• Expected to be completed <strong>Summer 2015</strong></td>
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<tr>
<td>I-95 / I-395</td>
<td>Rural, Suburban &amp; Urban</td>
<td>Virginia DOT</td>
<td>• ConOps development initiated in 2012</td>
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<tr>
<td>Virginia</td>
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<td>• Currently developing deployment plan &amp; partnerships</td>
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San Diego

- **Freeway - Arterial Integration**
  - I-15 north of San Diego
  - Center City Pkwy, Pomerado Rd, Black Mountain Rd, Kearny Villa Rd
  - Traffic-responsive on-ramp metering
  - I-15 HOT Managed Lane System
  - Traffic-responsive (plan selection) signal control
  - Arterial/ramp metering signal coordination

- **Transit services**
  - MTS bus, NCTD bus, NCTD Sprinter Commuter Rail
  - Vehicle rerouting around incidents
  - Service increase in response to event/incidents
Dallas

- **Freeway - Arterial Integration**
  - 20-mile section of US-75
  - Frontage roads, Greenville Ave, Coit Road
  - Predefined diversion plans
  - HOV access restrictions during incidents
  - New signal timing plans for Greenville Ave
  - Event-specific timing plans

- **Transit services**
  - DART Light Rail, DART Bus
**SF Bay Area**

- **Freeway - Arterial Integration**
  - 20-miles section of I-80 from Bay Bridge to Carquinez Bridge
  - San Pablo Avenue
  - Coordinated ramp metering
  - Lane use management system (close lanes ahead of incidents)
  - Traffic signal flush plan
  - Trailblazer signs

- **Transit Integration**
  - BART, AC Transit bus network
I-210 Project Corridor Description

Segment 1

End of corridor slightly east of I-605

to Arroyo Blvd

to Figueroa St (freeway only)
Arterial Traffic Control
Light-Rail, Transitway & Commuter Rail

- LA Metro Silver Line
- LA Metro Gold Line
- Metrolink San Bernardino
- Gold Line Foothill Extension Phase 2A
- Gold Line Foothill Extension Phase 2B

Late 2015 Planned Opening

Key stations and routes: West Covina, Del Mar, La Canada, Sierra Madre, Arcadia, Duarte, Irwindale, Alameda, Citrus, San Dimas (Planned), Covina, El Monte Bus Station, El Monte, Baldwin Park.
Express Commuter Buses

- Metro Silver Line
- Metro Gold Line
- Gold Line Foothill Extension Phase 2A
- Gold Line Foothill Extension Phase 2B
- Metrolink San Bernardino

Light Rail / Commuter Train Station
User Needs Workshop

Pre-Workshop Meetings
I-210 Pilot Project Definition
Operational Scenarios
Define Integration
Define Incidents and Strategies Approach
Define Users and Identify Users Needs
Define Performance Metrics
Purpose of Today’s Workshop *(Define Project Concept)*

- Get you more familiar with project details and goals
- Reach consensus on project definition, integration, strategies approach
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- If we have time, logistics (marketing, MOUs/Agreements, resources,)
Pre-Workshop Meetings Summary

- **Pilot Project**
  - Project is needed, if nothing else to improve coordination and collaboration
  - Start with incident and event management with freeway-arterial integration
  - Incorporate transit/parking as feasible

- **Integration Development**
  - May be challenging with different TCS/ATMS and software modifications needed
  - Arcadia offers to use its TransSuite for beta testing at sample segment
  - System should be transparent, allowing all direct users to see same things
  - Concerns include staff support resources, increased communications costs, and review turnaround time

- **System Operations**
  - Automated response system with direct user override capabilities by location and by strategy option and by jurisdiction (liability could be an issue)
  - Performance metrics should include at least travel time and public perception
  - Must take into consideration local residents and local traffic, businesses, bicycles and pedestrians, schools and school traffic, and senior citizen pedestrians
I-210 Pilot Project Definition

- Development and deployment of an ICM system to promote coordinated operations along the I-210

- Initial primary focus on managing incidents/events, with gradual expansion to transit, parking and demand management
Key I-210 Pilot Project Components

- **Traffic & Transit and System Monitoring**
  - Adequate monitoring (freeway, arterials, transit)
  - Monitoring of control devices (signal status, ramp metering data, etc.)
  - Travel demand monitoring (origin-destination patterns)

- **Decision Support System (DSS)**
  - Identification of events/incidents
  - Development of strategies to respond to events/incidents
  - Use of simulation modeling/analytical tools to perform evaluations
  - Make estimates and predictions
  - Select best strategy to implement
  - Process for approving/implementing recommended strategies

- **System interfaces**
  - Traffic monitoring system
  - Communications to system operators
  - Traveler information systems
Potential System Components (Example)
Freeway or arterial incident management (incident response)

1. Incident event
   - Incident occurs on freeway
   - 2 lanes blocked during PM peak

2. Incident detected by ICM monitoring systems (algorithm or CHP report)
   - Incident logged into active event database

3. Congestion event
   - Congestion starts to build/grow on freeway, off-ramps and nearby arterials
   - Congestion hotspots detected
   - Congestion hotspots logged into active event database

4. Evaluation timepoint
   - DSS assesses current operational conditions
   - DSS determines availability of control elements
   - DSS generates several traffic management strategies to address active events based on current operational conditions and asset availability

5. DSS evaluates generated traffic management strategies
   - DSS recommends a strategy for implementation

6. System operators are informed of the recommended course of action
   - Recommended strategy is approved by all affected corridor agencies

7. TMC operators manually activate recommended changes (automated implementation possible)
   - Signal timing plan change
   - Ramp metering rate change
   - CMS messages
   - etc.

8. Incident event
   - Incident is cleared

Continuous control loop
Operational Scenario (Incident Response Example)
Operational Scenario (Post Incident Example)

Freeway or arterial incident management (post incident)

8. Incident event
   - Incident is cleared

9. Congestion event
   - Congestion on freeway and/or arterials drop below action thresholds
   - Removal of incident in active event database
   - DSS will stop considering the incident but will still consider the remaining congestion

10. Evaluation timepoint
    - DSS assesses current operational conditions
    - DSS determines asset availability of control elements
    - DSS generates several traffic management strategies to address active events based on current operational conditions and asset availability

11. DSS evaluates generated traffic management strategies
    - DSS recommends a strategy for implementation

12. System operators are informed of the recommended course of action
    - TMC operators manually activate recommended changes (automated implementation possible)

13. Control event
    - Recommended strategy is approved by all affected corridor agencies
    - No remaining congestion hotspot

14. No remaining congestion hotspot

Continuous control loop
Define Integration

- **Freeway - Arterial System Integration**
  - Caltrans Freeway Ramp Metering
  - Caltrans Ramp Intersections
  - Caltrans Traveler Information (CMS, TMT)
  - Local Arterial Intersections
  - Local Traveler Information (CMS, if any)

- **Transit/Parking System Add-on Integration**
  - Parking Management (available spaces, parking reservation, 2900+ spaces)
  - Metro Gold Line (finish late 2015) and I-10 Silver Line (station departure times)
  - Bus transit

- **Traveler Information**
  - Dedicated I-210 Pilot website (and possibly mobile device App)
  - 511 and agency website integration
  - Media and 3rd party feed
Define Integration

Freeway – Arterial System Integration

**Traveler Information**
- Transit
- Parking
- 511

**Hosted in TMC**

**Decision Support System**

**Caltrans ATMS**

**Input/Output Data Processing (e.g. IEN)**

**Caltrans TMC**

**Pasadena TMC**
- QuicNet Pro
- TransCore Series 2000
- Siemens i2tms
- SCATS

**Arcadia TMC**
- TransCore TransSuite

**LA County TMC**
- Duarte (KITS)
- Monrovia (KITS)
- LA County KITS
Define Incidents and Strategies Approach

- Define incidents/events categories
  - Location(s)
    - Arterial
    - Arterial I/S
    - Freeway ramp
    - Freeway mainline
    - HOV Lane
  - Event Type
    - Stall/Collision
    - Scheduled Closure
    - Police Activity
    - Emergency Event
    - Hazmat Spill
    - Other
  - Lanes Blocked
    - 1 Lane
    - 2 Lanes
    - 3 Lanes
    - ... or
    - % Capacity
  - Impact
    - Minor
    - Major
    - Long

- Develop response strategies to defined incident categories
  - Develop multiple response options (play book of 3-5 options, from low impact to high impact) for each category or type of incident
  - Develop process for best option selection (modeling, analysis, testing, etc.)
Define Strategies Approach

- Download selected response option to all integrated ATMS/TCS
  - Local agency TCS (via IEN? - DSS interface with IEN needed)
  - Caltrans ATMS (via direct or IEN? - development needed)

- Lead agency will be one where incident/event occurs on their facility
  - If local agency, coordinate with Caltrans for evaluation and appropriate response plan
  - If Caltrans, coordinate with the direct adjacent local agency(s); other agencies notified of action taken
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Reach consensus on performance metrics (to measure success)

If we have time, logistics (marketing, MOUs/Agreements, resources,)

Define Users

- **Direct Users (participants - access system/devices)**
  - Operators
  - Maintenance support staff

- **Indirect Users (view conditions and information only)**
  - Supervisors, Managers (if different from Operator)
  - Executives (City Managers)
  - Emergency Responders (Safety Director, Law Enforcement, Fire, etc)
  - Others (SGVCOG staff, Metro staff, 3rd party vendors?)
Identify Users Needs

- **Indirect Users (view conditions and information only)**
  - DSS website for status viewing and for traveler information
  - DSS Mobile device App (I-210 Pilot) dedicated for status viewing and traveler information
  - Traveler information integrated with other system (e.g. 511)

- **Direct Users (participants - access system/devices)**
  - Automated selected response option implementation with manual override
  - Manual override of option (e.g., individual intersection, ramp, by corridor segments)
  - Does not allow for wholesale override? (entire agency system)
Identify Users Needs

- Database for historical data and manage access and control
- System selection of conditions category or type
- Simulation modeling results and shared viewing
- Detailed decision support system recommendations
- Response strategy options and selection
- Download selected option plans to devices instantly (central control)
- Manual override control by location and by corridor segment
- View roadway and control devices conditions for monitoring
- Indicated control devices not working (repair needed)
- Produce traveler information to dedicated site(s)
- Assess impact of strategy deployment
- Assess key performance measures
- Publish information
- Produce management reports including before/after comparison
- Document lessons learned
Define Performance Metrics To Use

- **Higher traveler satisfaction rates**
  - Public perception

- **Mobility/Reliability/Productivity**
  - Travel Time, Delay
  - Travel Time Reliability
  - Volumes, Lane-Mile-Hours

- **Safety and Network Utilization**
  - Reduced Incident Congestion Duration
  - Reduced Collisions, Injuries, Fatalities
  - Percent Utilization of DSS Recommendations

- **Air Quality**
  - Reduced greenhouse gas emissions, vehicle operating cost, VHT
Next Steps

- Compile and Summarize Today’s Workshop Results
- Prepare the Concept of Operations (ConOps)
- Perform Analysis for Funding Requests
Additional Project Discussions

Marketing Needs
MOUs/Agreements
Infrastructure and Resource Needs
Marketing Needs

- **Project Information**
  - Fact Sheet / Brochure
  - Overview Presentation
  - Work Plan (Schedule)
  - Concept of Operations (to be completed)

- **Project Website**

- **Mobile Device App**

- **Other**
MOUs/Agreements

- Keep it simple and general
  - Provide details on required resource commitments
  - Provisions for separate document (agreement required) for operations details and commitments
Infrastructure and Resource Needs

- **Infrastructure (Central Control) Needs**
  - Communications
  - Field Devices Upgrade
  - Controllers and Firmware
  - Performance Measure Devices
  - Intersection Modifications (turn lanes) & Signal Elements
  - Other (crosswalks, trailblazer signs)

- **Development Engineering Support Resources Needs**
  - Staff resources (consultant services)

- **O&M Resources Needs**
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Thank you for your participation