Connected Corridors
Face-to-Face Meeting

Tuesday, Dec 8th, 2015 – 1:30 – 3:30 pm
Caltrans D7 HQ
Agenda

- Introductions
- Overall Connected Corridors Schedule
- ICM Phased Implementation
- Outreach
- Schedules of Associated Projects
- Metro Funded Project Details
- Requirements Update
- Response Plan Generation
- Evaluation Plan
- Action Items and Closing
Our Corridor: The I-210
System Engineering “Vee” diagram

- **Planning:** Resource Allocation and Concept Refinement
- **Definition:** Requirements, System Architecture and Response Strategies
- **Build:** System Implementation and Testing
- **Operation:** Deployment, Operation and Evaluation
Systems Engineering Next Steps

- **Systems Requirements** – What should the ICM system do
- **Design Documents** – How will the requirements be met
I-210 Pilot Schedule

1. Project Initiation & Management
   10/1/13 – 9/28/18

2. Outreach & Communications
   10/1/13 – 9/28/18

3. Concept Exploration & User Needs
   11/1/13 – 12/26/14

4. Corridor Preparation
   12/2/13 – 9/30/16

5a. AMS - Phase 1
   1/6/14 – 5/29/15

5b. AMS - Phase 2
   6/1/15 – 10/5/17

5c. AMS - Phase 3
   10/9/17 – 9/28/18

6. SEMP
   12/29/14 – 6/26/15

7. ConOps
   9/12/14 – 5/20/15

8a. System Requirements
   4/23/15 – 3/30/16

8b. Validation Plan
   4/18/16 – 5/4/16

9. Organizational Design
   9/1/15 – 4/29/16

10. Technical Design
    2/8/16 – 2/28/17

11. Component Development
    3/10/16 – 5/10/17

12. System Integration
    4/6/16 – 7/24/17

13. Institutional Deployment & Operations
    5/2/16 – 9/28/18

14. Technical Deployment
    5/23/16 – 10/5/17

15. Training
    7/25/17 – 1/14/18

16. System Validation & Acceptance
    4/6/16 – 10/6/17

17. System Operations
    10/9/17 – 9/28/18

18. System Evaluation
    4/21/15 – 9/28/18

19. Lessons Learned
    6/20/18 – 9/28/18
ICM Step by Step Implementation
# Capability Maturity Matrix (CMM) for ICM

<table>
<thead>
<tr>
<th></th>
<th>Level 1: Silo</th>
<th>Level 2: Centralized</th>
<th>Level 3: Partially Integrated</th>
<th>Level 4: Multi-modal Integrated</th>
<th>Level 5: Multi-modal Optimized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional</strong></td>
<td>Inter-agency Cooperation</td>
<td>Agencies do not coordinate their operations</td>
<td>Some agencies share data but operate their networks independently</td>
<td>Agencies share data, and some cooperative responses are done</td>
<td>Operations are centralized for the corridor, with personnel operating the corridor cooperatively</td>
</tr>
<tr>
<td><strong>Integration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Funding</strong></td>
<td>Single Agency</td>
<td>Lead Agency tracks funding</td>
<td>Coordinated funding through Lead Agency</td>
<td>Cooperatively fund deployment projects</td>
<td>Cooperatively fund deployment and operations and maintenance projects</td>
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<tr>
<td><strong>Technical</strong></td>
<td>Traveler Information</td>
<td>Static information on corridor travel modes</td>
<td>Static trip planning with limited real-time alerts</td>
<td>Multi-modal trip planning and account-based alerts</td>
<td>Location-based, on-journey multi-modal information</td>
</tr>
<tr>
<td><strong>Integration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Data Fusion</strong></td>
<td>Limited or Manual</td>
<td>Near real-time data for multiple modes</td>
<td>Integrated multi-modal data (one-way)</td>
<td>Integrated multi-modal data (two-way)</td>
<td>Multi-source multi-modal data integrated and fused for operations</td>
</tr>
<tr>
<td><strong>Operational</strong></td>
<td>Performance Measures</td>
<td>Some ad hoc performance measure based on historical data</td>
<td>Periodic performance measures based on historical data</td>
<td>High-level performance measures using real-time data</td>
<td>Multi-modal performance measures in real time</td>
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<tr>
<td><strong>Integration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Decision Support</strong></td>
<td>Manual coordination of response</td>
<td>Pre-agreed incident response plans</td>
<td>Tool selection of pre-agreed plans</td>
<td>Model-based selection of pre-agreed plans</td>
<td>Model-based creation of incident response plans</td>
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<tr>
<td><strong>System</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Where we started
Where we are now if different from where we started
1) Should not jump too many levels at once
2) Should not have processes at very different levels

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[Logo Images]
Implementation Guidelines

- **CMM Implementation Guidelines**
  - Should be careful in jumping too many maturity levels
  - Should try to be near the same level in each category

- **By moving step by step through this map we codify our current strategy and provide a structure for it**
  - Continuing to build our relationships/communication through common activities
  - Building out our solutions manually and in gradual automation
  - Trying out our solutions to discover what works well and what can be improved – Before we fully automate them
  - Provide time for people to absorb and adapt to the changes in corridor management
Moving up the Maturity Levels

- We will begin planning how to move step by step through the maturity levels as we plan for our final goals.

- Of Note:
  - Samson’s team is ready to start meeting with the CC stakeholders to discuss and develop intersection timing plans as part of the response planning exercise.
  - D7’s CMS system is now ready to display multi modal travel time information in real time, we need to discuss targets and work out other details.
  - TMS pilot effort will start on January 1st, and provide focus on the keep up and monitoring of TMS elements functionality in the corridor.
  - Lisa is working on agreements/MOU frameworks.
Where do we want to be on Traveler Info

- Level 1 - Static information on corridor travel modes
- Level 2 - Static trip planning with limited real-time alerts
- Level 3 - Multi-modal trip planning and account-based alerts
- Level 4 - Location-based, on-journey multi-modal information
- Level 5 - Location-based, multi-modal proactive routing

- 511 Would do this?
Outreach and Communications
Outreach and Communications

- **Traffic Executive Committee Meeting with Mike Antonovich on Dec 16th**
  - Ali to present the latest version of the newsletter and give a brief summary on the status of the CC Pilot and DCCM
  - Lisa will attend

- **Continuing discussions with Sacramento Assembly Transportation Committee on 1st quarter 2016 hearing**

- **SCAG has included the I-210 Pilot in the 2016 RTP/SCS draft document**
Outreach and Communications

- PIO requirements meeting is under development; likely will take place the week of December 14th
- Next “agreement” is under development; draft prior to next Face-to-Face for stakeholder review
- Ongoing discussions on which system engineering documents to share with public on the web site
- Connected Corridors website undergoing update
Schedules of Related Efforts
Goals in re Related Efforts

- **Considerations**
  - Maintain consistency with the LA County Regional ITS Architecture
  - Maintain consistency with Caltrans Strategic Systems
  - Maintain consistency with existing and planned organizational structures

- **Existing systems/interfaces**
  - Information Exchange Network (IEN) – LA County DPW
  - Regional Integration of ITS (RIITS) – Metro
  - 511 – Metro
  - PEMS (Performance Management System) – Caltrans
  - Caltrans Reorganization around Corridors
City and County Schedules

- **Duarte and Monrovia on KITS**  
  Completed

- **County to bring KITS onto IEN**  
  December 2015

- **IEN Contractor Selection**  
  Spring 2016

- **Pasadena i2 intersection change-over**  
  December 2016

- **Caltrans Signals on TSMSS**  
  June 2017

- **IEN Replacement System operational**  
  October 2017
Metro Related Efforts

- **511 Upgrade**
  - Issue RFP
  - Upgraded system installed
    - Completed
    - IVR: 11/16; Apps: 6/17

- **RIITS Upgrade**
  - Issue RIITS Modernization RFP
  - Updates to RIITS
    - Completed
    - Late 2016

- **Metro – (More detail later in presentation)**
  - Call for Projects Approval
  - Projects to begin
    - Completed
    - 2016

- **INRIX Data**
  - Currently available (limited data set)
    - Completed
  - Future purchase planned?
    - TBD

- **Work with Waze**
  - TBD
Caltrans Related Efforts

- Rules Engine (DCCM/RSCS) Dec 2016
- Organizing around Corridors 2016
- 210 Improvements (3 good bids) June 2017
- Caltrans Signals on TSMSS June 2017
- PEMS Updates TBD
- Data Hub TBD
I-210 Pilot - Status Summary

- CT, Metro, cities and LA County met on Nov 10, 2015 to refine scope of work that can be constructed with the $6.45 million in Measure R Funds
- Awaiting confirmation from cities and LA County of the current state of their systems in order to develop a priority list of corridor improvements
- CT PM has submitted Finance Letter to HQ on Dec 3, 2015 to obtain approval from DOF to administer the construction contract on city streets
- LA County may want to administer the IEN upgrade for the corridor, which will require a separate agreement with Metro
- Scope of project will be detailed in the Funding Agreement which can be executed in July 2016 after the Metro Board vote
Metro Project Updates

- **Letter of No Prejudice** drafted and submitted by Caltrans to Metro; next step

- **Matching funds:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Total Quantity</th>
<th>Qualified?</th>
<th>Costs</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Install CCTV (for Signal)</td>
<td>41</td>
<td>31 locations are qualified on or adjacent to the ramps.</td>
<td>$1,860,000</td>
<td>There are 41 CCTV cameras to be installed to view the traffic signals and intersection traffic flows 150,000$ each.</td>
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<tr>
<td>Replace Existing Loop Detectors</td>
<td>1</td>
<td>Part of ramp intersections (terminus)</td>
<td>$270,000</td>
<td>Not all RMSs will have loop detectors replaced at the on or off ramps or mainline due to recent projects in the area.</td>
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<tr>
<td>Upgrade Existing Signal Det System</td>
<td>45</td>
<td>Part of ramp intersections (terminus)</td>
<td>$2,700,000</td>
<td>There are 41 State owned, maintained and operated traffic signals in the project area that will have the loop detectors replaced at the intersections.</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$4,830,000</strong></td>
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Metro Funding Improvements

- Detailed spreadsheet showing proposed ITS improvements to be funded using funds received from Metro
  - Additional detection to capture approaching/turning flow rates
  - Ability to send collected data back to TMC
  - Signal controller improvements (mostly for Monrovia and Duarte)
  - New traffic signal required for a freeway off-ramp in Duarte
  - Bluetooth devices for measuring travel times
## Metro Project Update – Request Proposal

### Cost Breakdown:

<table>
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<tr>
<th>Location</th>
<th>Cost Breakdown</th>
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<tr>
<td><strong>Metro:</strong></td>
<td>$6,704,000</td>
</tr>
<tr>
<td><strong>Caltrans:</strong></td>
<td>$4,830,000 (SHOPP Cost share)</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>$11,534,000</td>
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### Details:

<table>
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<th>Project Area</th>
<th>Cost Item</th>
<th>Cost</th>
<th>Subtotal</th>
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<tbody>
<tr>
<td>LA County (Arterial Corridors - Rosemead, Colorado, Foothill)</td>
<td>System detection improvements at County intersections</td>
<td>9</td>
<td>$270,000</td>
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<tr>
<td></td>
<td>Video detection communication modules</td>
<td>4</td>
<td>$10,000</td>
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<tr>
<td></td>
<td>Bluetooth readers to monitor travel times</td>
<td>4</td>
<td>$32,000</td>
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<tr>
<td></td>
<td>Environmental sensor station with air quality sensors</td>
<td>1</td>
<td>$50,000</td>
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<tr>
<td></td>
<td>Install new intersection traffic signal at Central/Buena Vista</td>
<td>1 location</td>
<td>$300,000</td>
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<tr>
<td></td>
<td>Controller firmware/communication improvements</td>
<td>28</td>
<td>$336,000</td>
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<td></td>
<td>Signal detection upgrades at key intersections</td>
<td>7</td>
<td>$210,000</td>
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<td></td>
<td>Bluetooth readers to monitor travel times</td>
<td>4</td>
<td>$32,000</td>
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<tr>
<td></td>
<td>Environmental sensor station with air quality sensors</td>
<td>1</td>
<td>$50,000</td>
</tr>
<tr>
<td></td>
<td>Fiber optic comm along Huntington for city trunkline and video (Gateway to Duarte)</td>
<td>2.5 miles</td>
<td>$528,000</td>
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<tr>
<td>Arcadia (Arterial Corridors - Foothill, Colorado, Santa Anita, Baldwin, Duarte, Loma)</td>
<td>Controller firmware/communication improvements</td>
<td>10</td>
<td>$120,000</td>
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<tr>
<td></td>
<td>Signal detection upgrades at key intersections</td>
<td>10</td>
<td>$300,000</td>
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<tr>
<td></td>
<td>Bluetooth readers to monitor travel times</td>
<td>4</td>
<td>$32,000</td>
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<tr>
<td></td>
<td>Environmental sensor station with air quality sensors</td>
<td>1</td>
<td>$50,000</td>
</tr>
<tr>
<td></td>
<td>Pasadena (Arterial Corridors - Orange Grove, Corson/Maple, Walnut, Union/Green, Del Mar, Colorado, Huntington, St John, Pasadena, Arroyo Pkwy, Fair Oaks, Marena, Lake, Hill, Allen, Sierra Madre, San Gabriel)</td>
<td>Real-time data communications capabilities (2x QuicNet Pro to collect flow data)</td>
<td>2</td>
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<td></td>
<td></td>
<td>Flow data retrieval capability from existing sensors (configuration, detection enhanced)</td>
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<td></td>
<td>Bluetooth readers to monitor travel times</td>
<td>20</td>
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<td>Environmental sensor station with air quality sensors</td>
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<td></td>
<td></td>
<td>Communication with Pasadena ARTS</td>
<td>1</td>
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<td></td>
<td>Other arterial systems</td>
<td>Cost</td>
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</table>
## List of Proposed Corridor ITS Improvements

### Intersection Detection Improvements (Video-Based Systems)

<table>
<thead>
<tr>
<th>Network</th>
<th>Jurisdiction</th>
<th>Intersection</th>
<th>Manufacturer</th>
<th>Traffic Control System</th>
<th>TMC Communication Type</th>
<th>ECS Communication Type</th>
<th>Tiling Emin Date</th>
<th>Number of Pans</th>
<th>Min Cycle Length</th>
<th>Max Cycle Length</th>
<th>Contribution Group</th>
<th>Transit Signal Priority</th>
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<tbody>
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<td>LA County</td>
<td>LA Co.</td>
<td>1 LA</td>
<td>170 LACO-4E</td>
<td>LA County KITS</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2014-01-13</td>
<td>3</td>
<td>120</td>
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<td>2011-08-22</td>
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<tr>
<td>Monrovia</td>
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<td>1 Mon</td>
<td>170 Bi Tran 233E</td>
<td>McClean KITS</td>
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<td>Mountain Ave</td>
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### Intersections with PartIAL video detection (video detection in not all directions)

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<th>Manufacturer</th>
<th>Traffic Control System</th>
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<th>ECS Communication Type</th>
<th>Tiling Emin Date</th>
<th>Number of Pans</th>
<th>Min Cycle Length</th>
<th>Max Cycle Length</th>
<th>Contribution Group</th>
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Caltrans’ Office of Technology
Caltrans HQ and the Requirements Process

- Bi-weekly coordination meetings between Headquarters functional areas, D7 and PATH
- Traveling to D4 to better understand reusability of their systems
- Began reviewing possible schedules and funding for
  - Data Hub
  - Corridor PEMS for LA
- Continue to research possible use of common Lane Closure System
- HQ to review CMM and NCHRP Data Slides
- HQ preparing to review overall requirements
Requirements/Constraints Definition
Requirements Gathering

- **Our “system”**
  - Composed of people, organizations, software and hardware
  - All must work together to accomplish our goals
  - Requirements must specify expectations for each component

- **Requirements gathering**
  - Both an educational and a definitional process
  - Requirements are emergent from interactions among users
Goals and Challenges

- **Goals**
  - Educate stakeholders on what is ICM
  - Reduce risk by refining the scope of the system
  - Obtain agreement among stakeholders on the requirements for the system
  - Ensure that all requirements needed for ICM are listed so that none are overlooked.
  - Provide guidance to funders of the system
  - Provide direction to implementers of the system
  - Ensure we can test the system
  - Provide a template for future ICM efforts

- **Challenges**
  - What level to express the requirements – Breath and Depth
  - Difference between a requirement and a design decision
  - The corridor is alive and changing, how to write requirements reflecting this
  - Stakeholders are new to ICM and can have difficulty specifying certain requirements
Requirements

Each area includes freeways, arterials and transit
Requirements Characteristics

- Description
- Quality Metrics
- Metric Values
- Problem Identification and Resolution
- Maintenance
- Automation
- Related
<table>
<thead>
<tr>
<th>Data Category</th>
<th>Data Program/Management Areas for Assessment</th>
<th>Sample Data Types Included</th>
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<tbody>
<tr>
<td>General</td>
<td>IT Applications, Development, Database Management and Administration</td>
<td>Multiple</td>
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<tr>
<td></td>
<td>Transportation Data Office</td>
<td>Multiple</td>
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<tr>
<td></td>
<td>Data Warehouse Group</td>
<td>Multiple</td>
</tr>
<tr>
<td></td>
<td>Business Intelligence/Dashboard/Reporting Group</td>
<td>Multiple</td>
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<tr>
<td></td>
<td>GIS Group</td>
<td>Geospatial Transportation Features (e.g., road centerlines, rail lines, and ferry routes), land and environmental features, multiple business data layers</td>
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<tr>
<td></td>
<td>Performance Management</td>
<td>Multiple performance measures—system condition, operations, agency efficiency</td>
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<tr>
<td>Travel Data</td>
<td>Traffic Monitoring</td>
<td>AADT, Vehicle Classification, Turning Movements, Volume, Occupancy, Speed, Intersection Level of Service, Travel Time, WIM Data</td>
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<tr>
<td></td>
<td>Planning/Travel Modeling</td>
<td>Household Survey Data, Socioeconomic Data, Network Links and Nodes, Origin-Destination Matrices</td>
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<tr>
<td></td>
<td>Planning/Freight</td>
<td>Commodity flows, supply chain data, bottlenecks, infrastructure</td>
</tr>
<tr>
<td></td>
<td>Bicycle/Pedestrian Program</td>
<td>Bicycle Routes, Bicycle Paths, Bicycle and Pedestrian Counts</td>
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<tr>
<td>System Inventory and Condition Data</td>
<td>Road Inventory</td>
<td>Mileage, Classification, Geometrics, etc.—including Model Minimum Inventory Elements (MIRE)</td>
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<tr>
<td></td>
<td>HPMS (typically combined with Road Inventory)</td>
<td>HPMS Data Elements—full extent and sample (e.g., road inventory, traffic, and pavement)</td>
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<td>Pavement Management</td>
<td>Pavement inventory, IRI, cracking, summary condition, layer history</td>
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<tr>
<td></td>
<td>Bridge Management</td>
<td>Structure inventory and inspection</td>
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<tr>
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<td>Traffic Engineering</td>
<td>Traffic signal inventory, guardrail inventory, sign inventory, railroad crossing inventory</td>
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<tr>
<td></td>
<td>ITS/Traffic Management Center</td>
<td>ITS device inventory, communications infrastructure inventory,</td>
</tr>
<tr>
<td>Facilities Data</td>
<td>Property, Fleet and Maintenance Management</td>
<td>Plant and facilities inventory and condition, fleet inventory and utilization</td>
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</table>
## NCHRP – Data To Support Transportation

<table>
<thead>
<tr>
<th>Data Category</th>
<th>Data Program/ Management Areas for Assessment</th>
<th>Sample Data Types Included</th>
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</thead>
<tbody>
<tr>
<td><strong>Financial/ Program Management Data</strong></td>
<td>Capital Program/STIP</td>
<td>Federal Obligations, Construction Project Data, delivery performance (on-time, on-budget)</td>
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<tr>
<td></td>
<td>Financial Management</td>
<td>Funding and Allocations, Budgets and Expenditures</td>
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<td>Contracts/Procurement</td>
<td>Contracts, bid tab s</td>
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<tr>
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<td>Operational Agreements</td>
<td>Project Charters, MOU, other</td>
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<tr>
<td><strong>Project Development Data</strong></td>
<td>Design and Materials</td>
<td>Personnel data</td>
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<td>Right-of-Way</td>
<td>Property inventory, transactions, appraisals, deeds</td>
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<tr>
<td></td>
<td>Environmental</td>
<td>Land use, water bodies, wetlands, groundwater, endangered species, historic sites, permits and commitments</td>
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<tr>
<td></td>
<td>Construction</td>
<td>Materials tests, inspections, payments, civil rights, claims, as-built plans</td>
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<tr>
<td><strong>System Operations Data</strong></td>
<td>Incident Management</td>
<td>Incidents (real-time status, incident response time)</td>
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<tr>
<td></td>
<td>Traffic Management</td>
<td>Real-time traffic and travel time data</td>
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<tr>
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<td>Equipment Management</td>
<td>Fleet/Equipment inventory, utilization, cost</td>
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<tr>
<td></td>
<td>Maintenance Management</td>
<td>Work requests, work orders, work accomplishments, resource utilization, cost</td>
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<td></td>
<td>Road Weather Management</td>
<td>Weather/Road Condition (real time and historical)</td>
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<td>Motor Carrier</td>
<td>Motor Carrier safety, operating statistics, IRP, IFTA, oversize/overweight permits</td>
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<tr>
<td></td>
<td>Modal Programs (e.g., transit and ferry)</td>
<td>Operations Statistics (e.g., vehicle miles, passenger miles, and revenues)</td>
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<tr>
<td><strong>Safety Data</strong></td>
<td>Crash Records/FARS Reporting</td>
<td>FARS reports, police accident records, Crash location, Crash frequency</td>
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<td>Safety Planning</td>
<td>Enforcement data (citations and convictions), injury surveillance, road safety audits, behavioral (e.g., seat belt and helmet compliance)</td>
</tr>
<tr>
<td><strong>Customer Relations</strong></td>
<td>Public Affairs</td>
<td>Customer opinion surveys, website transactions, newsletters, press releases</td>
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</table>
Current Status – Requirements Meetings

- **Cities and County**
  - Arcadia
  - Pasadena
  - Duarte
  - Monrovia

- **Caltrans D7**
  - Maintenance
  - Ramps
  - Signals
  - TMT & LCS
  - TMC Operators
  - TMC Support

- **Caltrans HQ**
  - Maintenance
  - PEMS
  - Signals
  - TMT & LCS
  - Office of Technology

- **Metro**
  - Transit

- **SCAG**
  - Planning
Meeting Update

- **Meetings since last face to face**
  - Duarte - Follow up meeting including Public Safety Officer
  - Monrovia - Tina Cherry plus City Engineer and Traffic Maintenance Supervisor
  - Metro Transit
  - Pasadena Transit
  - Meeting with corridor wide first responders – CHP now attending face to face
  - Meeting with corridor wide traffic operations personnel
  - Caltrans Office of Technology – Every Two Weeks

- **To be setup**
  - Meeting with LA County
  - Meeting with PIOs
  - Follow on meetings with 511, RIITS, IEN
I-210 Connected Corridors
Response Plan Definition
Finding a good balance

- **Finding the proper point between**
  - Very simple rules ---------------------------------- Very complex rules
  - Predefined response plan -------------------------- Many elements to make one
  - Defining a response plan for now ---------------- Conditions in the future

- **For example**
  - When generating possible routes how complex does this become
  - When generating response plans how many reroutes, plans, messages to consider
Response Plan Creation

1. Incident Verification
   - Incident Characterization
   - Impact Assessment
2. Determination of Available Detours
3. Analysis of Control Elements along Detours
4. Selection of Response Elements from Pre-Approved Lists of Actions
5. Determination of Diversion Likelihood at each Ramp and Intersections
6. Determination of Messaging Requirements
7. Determination of Resources Availability
8. Creation of Incident Response Scenarios
9. Scenario Evaluation
10. Selection of Scenario to Recommend
11. Determination of Messaging to Travelers
12. Determination of Agencies Affected by Plan
13. Review/Approval of Recommended Plan
14. Integration of Requested Manual Changes
15. Implementation of Recommended Plan
Response Plan Creation (1/5)

1. Incident Verification
   - Incident Characterization
   - Impact Assessment

2. Determination of Available Detours
   - Ranked list of suitable detour alternatives
   - Alternatives for cars, trucks, buses

3. Analysis of Control Elements along Detours
   - Affected Signalized Intersections
   - Available Timing Plans
   - Affected On-Ramps & Off-Ramps
   - Available Metering Rates
   - Lane Assignments, Queue Storage & Other Physical Characteristics
   - Transit Elements
Response Plan Creation (2/5)

4. Selection of Response Elements from Pre-Approved Lists of Actions
   - Timing Plans
   - Ramp Metering Rates
   - Special Intersection Control Items
   - Transit modification items (both routes and pickup/drop off locations)
   - Other modifications based on the detour route considered but outside the route itself (for instance, timing changes at adjacent intersections feeding traffic to the route)

5. Determination of Diversion Likelihood at each Ramp and Intersections
Response Plan Creation (3/5)

6. Determination of Messaging Requirements
   • Fixed CMSs to activate
     - Devices to activate
   • Mobile CMSs
     - Deployment locations
     - Equipment needed

7. Determination of Resources Availability
   • Availability of ITS elements
     • Traffic signals
     • Ramp meters
     • Fixed CMS devices
     • Mobile CMS devices
     • Other equipment
   • Network closures
     • Planned closures
     • Other incidents
   • Other rule-based restrictions

8. Creation of Incident Response Scenarios
Response Plan Creation (4/5)

9. Scenario Evaluation
   • Determination of corridor delays and other relevant metrics
   • Evaluation of developed scenarios and “do nothing” scenario

10. Selection of Scenario to Recommend
    • Aim to select scenario with best evaluated performance metric
    • Consideration of constraining rules

11. Determination of Messaging to Travelers
    • Messages to post on fixed CMSs
    • Messages to post on mobile CMSs
    • Information to disseminate via 511
    • Information to disseminate via 3rd party information providers

12. Determination of Agencies Affected by Plan
    • Agencies operating devices to be modified by recommended plan
Response Plan Creation (5/5)

13. Review/Approval of Recommended Plan
   - Determination of individual within each affected agency responsible for reviewing approving recommended plan
   - Automated approval possible if so desired

14. Integration of Requested Manual Changes
   - Integration of modifications to recommended plan submitted by individual agencies

15. Implementation of Recommended Plan
Detailed Response Plan Generation

- Meetings to continue first quarter
- Tom Choe, Francois, Samson to meet with cities and counties to define response plans
- Goal: Start responding to incidents in the Spring of 2016
  - We need to both define and test response plans.
  - This includes signal timing and ramp metering adjustment during incidents, PCMS display on detour routs and so on
  - Samson’s team is ready to start meeting with the CC stakeholders to discuss and develop intersection timing plans as part of the response planning exercise
I-210 Connected Corridors
Project Evaluation Framework

June 9, 2015
Before/After Study Technical Memo

- Ready for review by all stakeholders
  - Evaluation approach and methodology
  - Metrics
  - Data collection needs

- Revisit in January
Action Items and Next Meeting Time
Thank You