Connected Corridors
Face-to-Face Meeting

Tuesday, January 29th, 2019
1:30 – 3:30 pm
Duarte
Agenda

☐ 1:30 - 2:00 – Program Review – Joe

☐ 2:00 - 2:15 – Call for projects update - Ning

☐ 2:15 - 3:20 – Kapsch presentation and work in progress

☐ 3:20 - 3:30 – Closing
  - Next Meeting at LA County – Tuesday March 12th
  - (County, Arcadia, Caltrans, Pasadena, Monrovia, Duarte)
Monica Kress

- Deputy Division Chief for Mobility
  - Caltrans Headquarters
  - Division of Traffic Operations

- Monica has a BS in Electrical Engineering and Computer Science from UC Davis

- She has worked at Caltrans since 1991

- Her current focus is on “moving people and goods” by utilizing transportation system management and new technologies
MOU Signed
Major Milestones
Ali Selected as TSM&O Champion
Monica’s Bio
Ken’s Bio
Rupinder’s Bio
Rules, Estimation, Prediction
Center to Center (C2C) Update

Note that the USDOT has shown interest in the Rules article
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<td>3. Concept Exploration / User Needs</td>
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<td>6a. SEMP</td>
<td>1/6/14 - 6/30/15</td>
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<td>7/2/15 - 6/30/16</td>
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<td>7. ConOps</td>
<td>3/12/14 - 5/20/15</td>
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<td>8a. System Requirements</td>
<td>4/23/15 - 7/29/16</td>
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<td>8b. Validation &amp; Verification Plans</td>
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<td>8/1/16 - 12/31/18</td>
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<td>9. Organizational Design</td>
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<td>12. System Integration</td>
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<td>14. System Deployment</td>
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<td>17. System Operations and Maintenance</td>
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<td>18a. Pre Evaluation</td>
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<td>19. Lessons</td>
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<td>1/1/21 - 6/30/21</td>
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<td>Hard Launch</td>
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Systems Engineering Next Steps

- Design Documents – Details of interfaces and implementations
- Hardware/Software – Building the system
- Integration – Subsystems will come on line this year
Summary
Freeway Data Quality – Excellent!

- Core I-210 sensor availability goals achieved for 5 straight weeks

<table>
<thead>
<tr>
<th>Freeway Section</th>
<th>Direction</th>
<th>Sensor Availability Percentage</th>
<th>Sensor Availability Target</th>
<th>Proposed New Target Date</th>
<th>Accomplished</th>
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<tbody>
<tr>
<td>I-605 PM 22.93 - 28</td>
<td>North</td>
<td>84.5%</td>
<td>90%</td>
<td>1/30/2019</td>
<td>1/30/2019</td>
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<tr>
<td></td>
<td>South</td>
<td>83.9%</td>
<td>90%</td>
<td>1/30/2019</td>
<td>1/30/2019</td>
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<tr>
<td>I-210 PM 25 - 43.25</td>
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<td>90%</td>
<td>1/30/2019</td>
<td>12/1/2018</td>
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<tr>
<td></td>
<td>West</td>
<td>92.4%</td>
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<td>1/30/2019</td>
<td>12/22/2018</td>
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<tr>
<td>SR-134 PM 11.4 - 13.5</td>
<td>East</td>
<td>96.3%</td>
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<td>1/30/2019</td>
<td>1/22/2019</td>
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<td></td>
<td>West</td>
<td>96.6%</td>
<td>90%</td>
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<td>1/22/2019</td>
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<tr>
<td>I-210 PM 22.6 - 25</td>
<td>East</td>
<td>13.9%</td>
<td>90%</td>
<td>5/1/2019</td>
<td></td>
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<tr>
<td></td>
<td>West</td>
<td>15.9%</td>
<td>90%</td>
<td>5/1/2019</td>
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</table>
Signal Plans and DSS Review

- **Pasadena Signal Plan Review & Approval**
  - Flush plans for most of Corson, Maple, and Walnut-Foothill routes submitted for review

- **Caltrans Signal Plan Review & Approval**
  - Flush plans and space-time diagrams on Baldwin@Foothill submitted for review
  - On going discussions with Samson from Caltrans

- **Arcadia Signal Plan Review & Approval**
  - Flush plans for part of Huntington route entered into D4 database format
Response Plan Generation

- Mike Jenkinson (HQ) visited Berkeley for a detailed response plan generation review.

- We implemented the first RP scoring criterion: differentiating plans by benefit & impact, with time of day and day of week sensitivity.

- We designed the threshold check – based on anticipated queue growth – for whether or not a freeway incident merits a DSS response. This is now being coded.

- We are initiating discussions with stakeholders on how trucks should be handled during an incident.
C2C Networking

- Very close on establishing connectivity between LA County and Caltrans

- Network configuration is in progress to support end-to-end communications between the ICM system and City of Pasadena via the RIITS fiber connection.

- We have requested additional D7/RIITS firewall and NAT configurations to support increasing numbers of stakeholder and AWS endpoints that are coming on-line.

- We are agreeing on final management and responsibilities for the network configuration

- Kali – Would you like to add any points?
C2C Interface Implementations - Status

KITS
Transparity
TransSuite
Sign Vendor
Caltrans ATMS

DSS
Data Hub
TSS Model Interface (Optional)

Kapsch
Parsons
Telegra

TMDD Tested Interface

TMDD Tested Interface

Caltrans ATMS
Sign Vendor
TransSuite
Transparity
KITS
TMDD Interfaces to Data Hub

- **Traffic Control Systems**
  - TransCore – Arcadia and Caltrans
    - Installed in Arcadia, planned for install in Caltrans in February
    - We are now reading data from Arcadia
    - We have identified certain data and reliability issues
  - McCain - Pasadena
    - In development, install in April
  - Kimley Horn – LA County, Monrovia and Duarte
    - In development, install in April
    - As soon as we have connectivity to the LA County server we can start testing

- **ATMS – Caltrans (CMS Signs, Ramps)**
  - We are testing out the interface and have read data
  - We have identified some updates that are needed
  - Parsons is now preforming updates to the ATMS and we will restart our testing when those are completed
Systems Development and Integration

- **Cloud Infrastructure**
  - Cloud Automation is working. D7 private network dev and test environments have replaced PATH’s public accessible deployments.
  - Added cloud-based system configuration to support automation
  - Adding improvements for automation of credentials

- **DSS**
  - Continued working on response plan generation and workflow orchestration between DSS, Datahub, and Corridor Management System.
    - Early version of termination plan
Systems Development and Integration

- **Data Hub**
  - Working on persistence of pipelines and replay capability
  - Finalizing endpoints for Corridor Management System integration

- **Corridor Management System**
  - Integration with Kapsch
  - Integration with Telegra Corridor Management System (with the ATMS) on hold – networking issues

- **Integration (Data Sources)**
  - Started integration with ATMS – identified some minor issues, will continue
  - Prepared requirements for ATMS update
What is Cloud Automation and Why Do We Use It?
Our system is partitioned into instances
Cloud Automation – System Design

- Up to 4 Virtual Private Clouds (VPCs) with Networking and Security (Dev, Test, Integration, Production)

- Data Hub and DSS
  - >50 AWS EC2 instances (servers) sized dependent upon need
  - Spark ML and Clustered Computing, 3 Messaging Systems, 5 Databases

- CMS
  - Three Vendor Systems of Differing Configuration
What?

- Use AWS Tools to Automate Deployment – Dev, Test, Integration, Production
- Use AWS Tools to Automate Updates
- Automate Security Implementation
- Uses Pre-Defined Configuration Information
- A little over 2 hours from almost nothing to a full system ready to start
Why?

- Manual Deployment is time intensive
- Repeatable for other corridors – New corridors brought up with focus on corridor operations and functionality, not infrastructure
- More configurable and flexible – swapping out of components such as the Corridor Management System is easier
- Scalable – new pipelines for new data sources or increased load can be handled by just changing configuration and adding or altering running systems (more servers or bigger servers)
- Fast reaction time to change – No hardware to buy, install, operate
- Operating costs scale better – more infrastructure added for smaller incremental labor costs
I-210 Connected Corridors
Face-to-Face Meeting

Tuesday, January 29th, 2019
1:30 – 3:30 pm
Agenda

- I-210 CC Arterial Systems Improvement Project
  System Consulting Services – Scope
- Expected Timeline
- Status of 9 procurement package
- Next Steps
I-210 CONNECTED CORRIDORS ARTERIAL SYSTEMS IMPROVEMENT PROJECT SYSTEMS CONSULTING SERVICES

SCOPE OF WORK

January 29, 2019
## Project Objective

- Assist Caltrans D7 to manage and coordinate the execution of the 9 arterial ITS improvement projects

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<th>#</th>
<th>Package Description</th>
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<th>Contract Status</th>
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<tr>
<td>1</td>
<td>Bluetooth – Iteris Velocity</td>
<td>07A4470</td>
<td>Awarded, in Progress</td>
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<td>2</td>
<td>Bluetooth – BlueToad</td>
<td>07A4477</td>
<td>Awarded, in Progress</td>
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<tr>
<td>3</td>
<td>New Controller Cabinets</td>
<td>07A4603</td>
<td>Bidder Q &amp; A</td>
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<td></td>
<td>To be awarded in Jan-Feb 2019</td>
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<td>4</td>
<td>Communication Upgrades</td>
<td>07A4479</td>
<td>Awarded, in Progress</td>
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<td>5</td>
<td>Firmware/Timing Plan Updates/Controller Upgrades</td>
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<td>Awarded, in Progress</td>
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<td>6</td>
<td>Video Detection System</td>
<td>07A4481</td>
<td>Awarded, in Progress</td>
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<td>7</td>
<td>Data Communication Module and Video Detection Software Upgrade</td>
<td>07A4601</td>
<td>To be awarded in Feb 2019</td>
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<td>8</td>
<td>Advanced Traveler Information Systems</td>
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<td>Divided to 3 packages</td>
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<td>Environmental Stations with Air Quality Sensors and Open Data Systems</td>
<td>07A4388</td>
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# Project Area

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<th>Metro &amp; Caltrans</th>
<th>City of Pasadena</th>
<th>City of Arcadia</th>
<th>City of Monrovia</th>
<th>City of Duarte</th>
<th>LA County</th>
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Project Area (cont.)
UPDATE ON
PACKAGES 1-9
## Estimated Timeline

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<td>Prepare Submittal</td>
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<td>Equipment Procurement &amp; Delivery</td>
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<td>Test Plan/Procedure</td>
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<td>Training</td>
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- **Initial Testing (mockup) of I-210 CC System**
- **Soft Launch of I-210 CC System**
- **Hard Launch of I-210 CC System**
## Update on 9 Packages

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<th>Pkg. #</th>
<th>Package Name</th>
<th>Contract #</th>
<th>Project Status</th>
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</table>
| 1      | Bluetooth – Iteris Velocity | 07A4470 PTM | • NTP: 7/10/2018  
• Kick-off Meeting: 7/30/2018  
• Submittal Approved: 8/16/2018  
• Equipment ready, Permit Ready  
• Installation & Testing: Scheduled on 2/4 – 2/8/2019 (to be postponed)  
• Preparing Detailed Test Procedure  
• Expected to be completed: Mar 2019 (90%) |
| 2      | Bluetooth – BlueToad | 07A4477 DBX | • NTP: 7/10/2018  
• Kick-off Meeting: 7/30/2018  
• Submittal Approved: 10/12/2018  
• Waiting for Stakeholders’ Decision on the VM Server & IP Address  
• Current Schedule  
  • Configure Server: Jan-Feb, 2019  
  • BlueTOAD Spectra Unit Installation: Feb, 2019  
  • Acceptance Test Plan Completed: Feb – Mar, 2019  
  • Acceptance Test Report: Mar, 2019  
• Expected to be completed: Mar 2019 (80%) |
## Update on 9 Packages (cont.)

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<th>Pkg. #</th>
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<th>Contract #</th>
<th>Project Status</th>
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</table>
| 3      | New Controller Cabinets | 07A4603    | • Disqualified: Bids came above the SB limit (314k).  
• Procurement Package revised per Stakeholder comments on Pkg. 5  
• Has been re-advertised  
• Bid Due Date: Jan 10, 2019  
• Expected to be awarded: Jan-Feb, 2019  
• Expected to be completed: Jun-Jul, 2019 |
| 4      | Communication Upgrades | 07A4479 Kanaan Construction | • NTP: 7/13/2018  
• Kick-off Meeting: 7/30/2018  
• Stakeholder Review Comments Received on Revised Submittal  
• Expected to be completed: Mar 2019 (60%), May 2019 (90%) |
## Update on 9 Packages (cont.)

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| 5      | Firmware/Timing Plan Updates/Controller Upgrades | 07A4480 CPE, Inc | • NTP: 7/17/2018  
• Kick-off Meeting: 7/30/2018  
• Submittal Reviewed and Required Equipment changed per Stakeholder  
  Comment  
• Contractor has been given revised requirements on the controller configuration from all 3 jurisdictions  
• Contractor is coordinating with supplier (McCain) to estimate price change  
• Expected to be completed: Mar 2019 (70%), May 2019 (90%) |
## Update on 9 Packages (cont.)

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<td>6</td>
<td>Video Detection System</td>
<td>07A4481</td>
<td>• NTP: 7/10/2018&lt;br&gt;• Kick-off Meeting: 7/30/2018&lt;br&gt;• Submittal v3 being revised per stakeholder comments on v2 and to be re-submitted&lt;br&gt;• 10/9/2018: Conducted Site Survey&lt;br&gt;• 10/18/18: Submittal approved&lt;br&gt;• Applied Permits (waiting for clearance for a few locations in Pasadena, others are ok)&lt;br&gt;• Installation expected in Feb 2019&lt;br&gt;• Expected to be completed: Mar 2019 (80%), May 2019 (90%)</td>
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<td>7</td>
<td>Data Communication Module and Video Detection Software Upgrade</td>
<td>07A4601</td>
<td>• Disqualified: Bids came above the SB limit (314k)&lt;br&gt;• Resubmittal is being reviewed by DPAC for approval for re-advertisement&lt;br&gt;• Expected to be awarded: Feb, 2019&lt;br&gt;• Expected to be completed: Jul, 2019</td>
</tr>
</tbody>
</table>
## Update on 9 Packages (cont.)

<table>
<thead>
<tr>
<th>Pkg. #</th>
<th>Package Name</th>
<th>Contract #</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Advanced Traveler Information Systems</td>
<td>N/A</td>
<td>• Divided to 3 packages:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Static Sign Procurement</td>
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<td></td>
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<td>• DMS Procurement</td>
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<td></td>
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<td>• Integration</td>
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<td></td>
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<td>• Expected to be awarded: TBD</td>
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<td></td>
<td>• Expected to be completed: TBD</td>
</tr>
<tr>
<td>9</td>
<td>Environmental Stations with Air Quality Sensors and Open Data Systems (ODS)</td>
<td>07A4388 Cal Poly Pomona</td>
<td>• NTP: 6/29/18</td>
</tr>
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<td></td>
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<td></td>
<td>• Kick-off Meeting: 7/12/18</td>
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<td></td>
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<td></td>
<td>• CPP coordinated with Caltrans &amp; Parsons to get test data in TMDD format from D7 ATMS Test Server to feed Open Data System;</td>
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<tr>
<td></td>
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<td></td>
<td>• 11/30/18: Coordination among CPP, PATH, Caltrans. PATH provided architecture diagrams, sample data set; Working with Caltrans on network connection</td>
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<td></td>
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<td></td>
<td>• Feb 2019: Face-to-face meeting in Berkeley</td>
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<td></td>
<td></td>
<td>• Feb 2019: PATH to provide mockup CMS for testing</td>
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<td>• Expected to be completed: Jun, 2019 (90%)</td>
</tr>
</tbody>
</table>
Sign Question from Caltrans to Stakeholders

- We received recommendation from our functional unit here at Caltrans D7 about changing “Detour” to “Alternative” on the G78-1 sign.

- Are stakeholders OK with this?

- Can the lettering stay the same size and have Alternative fit?
Next Steps

- Package 1: Detailed Test Plan/Procedure;
  Coordinate installation/testing schedule with Package 2;
- Package 2: Stakeholder coordination (server & IP address) – 1/31/19
- Package 3: Prepare for kick-off meeting after award
- Package 4: Support Contractor to understand stakeholder comments on revised submittal
- Package 5: Follow up on potential price change and revised submittal
- Package 6: Follow up on installation schedule
- Package 7: Prepare for kick-off meeting after award; PATH to provide timeline
- Package 8: Stakeholders – Decision on 4 off-ramps wayfinding signs (Caltrans)
  PATH – provide dimension information of MUTCD compliant static signs
- Package 9: Track development progress; support coordination
Thank You and Questions?
Kapsch
Presentation and Work in Progress
A new process

- Kapsch is working on their system and would like to get ongoing feedback
- Kapsch will be demonstrating the developing product
- Please understand that this process means that not everything, at this point, will be completed or working as anticipated
- Minimize the amount of rework and misunderstandings
C2C Interface Implementations - Status

- KITS
- Transparity
- TransSuite
- Sign Vendor
- Caltrans ATMS
- DSS
- Data Hub
- TSS Model Interface (Optional)
- Kapsch
- Parsons
- Telegra
- TMDD Tested Interface
- TMDD Tested Interface
- TMDD Tested Interface
C2C Interface Implementations - Status

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- TSS Model Interface (Optional)

- Kapsch
  - KITS
  - Transparity
  - TransSuite
  - Sign Vendor
  - Caltrans ATMS

- Parsons
- Telegra
Thank You and Next Meeting (Suggest Tuesday March 12th at LA County)