Connected Corridors
Face-to-Face Meeting

Tuesday, April 10th, 2018 – 1:30 – 3:30 pm
Pasadena
Agenda

- 1:30-2:10 - Summary of program
- 2:10-2:30 – MOU - Mort
- 2:30-2:50 – Call for Projects update - Parsons
- 2:50-3:10 – Update on communications - Kali
- 3:10-3:20 – Sign update - Mort
- 3:20-3:30 – Closing – Next Meeting at D7 – May 22nd
Systems Engineering Next Steps

- Design Documents – Details of interfaces and implementations
- Hardware/Software – Building the system
- Integration – Subsystems will come on line this year
Updated Schedule

1. Project Management 10/1/13 - 6/30/20
2. Outreach & Communications 10/1/13 - 6/30/21
3. Concept Exploration / User Needs
4. Corridor Preparation 12/2/13 - 6/30/19
  5a. AMS - Phase 1 11/14 - 5/29/15
  5b. AMS - Phase 2 6/1/15 - 6/30/19
  5c. AMS - Phase 3 7/1/18 - 6/30/21
  6a. SEMP 1/6/14 - 5/29/15
  6b. SEMP Updates 7/2/15 - 6/30/16
  7. ConOps 9/12/14 - 5/20/15
  8a. System Requirements 4/23/15 - 7/29/16
  8b. Validation & Verification Plans 8/1/16 - 6/30/18
  9. Organizational Design 6/1/15 - 12/30/16
  10. Technical Design 7/1/16 - 9/30/18
  11. Component Development 8/15/16 - 3/31/19
  12. System Integration 6/1/18 - 5/31/19
  13a. Institutional Design 1/2/17 - 6/30/19
  13b. Institutional Operations 7/1/19 - 6/30/21
  14. System Deployment 1/1/19 - 6/30/19
  15. Training 4/1/19 - 6/30/21
  16. Validation and Acceptance 5/1/18 - 12/31/20
  17. System Operations and Maintenance 7/8/18 - 6/30/21
  18a. Pre Evaluation 1/1/19 - 12/31/19
  18b. Post-Deployment Evaluation 1/1/20 - 6/30/20
  19. Migration to Production 4/1/20 - 6/30/21
  19. Lessons 1/1/21 - 6/30/21
  20. Caltrans Operation Launch July 8, 2019

Start 10/1/13
Summary
Nick submitted a Budget Change Request (BCP) for funding for human and consulting resources

- For 25 corridors in California
- It is likely it will take time for this to be approved
Signal Timings

- **Started the development of response timing plans**
  - We have created and loaded 150 plans (out of 450) into Aimsun for testing

- **Aimsun testing framework**
  - We have finished building software to permit automated placing of incidents in Aimsun.
Communication

- **Cloud to Caltrans**
  - Connection between the Amazon Cloud and Caltrans D7 is up and running.
  - This is a milestone.

- **With Amahayes configuring the D7 firewall/VPN configuration we now have secure access to:**
  - The D7 TransCore server
  - D7 ATMS Test Server

- **Kali to discuss VPN and fiber interconnect later in presentation**
TMDD Interfaces to Data Hub

- **Traffic Control Systems**
  - Kimley Horn – LA County, Monrovia and Duarte
    - RFP released
  - TransCore – Arcadia and Caltrans
    - Going well
    - Provided test server
    - Initial test delivery scheduled for April/May
  - McCain - Pasadena
    - Caltrans working on contract

- **ATMS – Caltrans (CMS Signs, Ramps)**
  - Test plan delivered by Parsons
  - On track for a June delivery
COTS (Purple Box) - ICMS

- **Companies who are participating:**
  - Kapsch – Kick off meeting in early May
  - Telegra – Planning to participate in testing of Transcore and ATMS interfaces
  - Parsons – Awaiting results of Transcore testing

- **Update**
  - Still awaiting responses to RFI on rough system costs. Should be soon.
Data Hub and DSS Software

- **Focus on the Transcore and Parsons C2C interface**
  - Management
  - Design, test, deployment discussions
  - Building out of the data pipelines to support testing
  - Refinement of response plan TMDD structure

- **Continuing to automate system deployment in anticipation of moving components to the Caltrons’ Amazon cloud**

- **DSS Interface**

- **Performance and maintenance improvements in our SPARC cluster**
Design and Construction

- 210 TMS Upgrade - Allen
- Call for Projects (ITS Elements) – Allen
- Call for Projects – Signs and Sign Software
  - To be discussed in detail later by Mort
PEMS Usage Scenario Meeting

- PEMS is the performance measurement and comparison subsystem of Connected Corridors

- Would like to meet with interested stakeholders to ensure the product does what is needed

- Will be setting up a meeting for April 25th in Arcadia
MOU
Mort
Call for Projects
Parsons
Communication

Kali
Status Update

- **VPN between City of Arcadia and Caltrans**
  - Connect traffic control system via Transcore software to Caltrans
  - Implement IP connection to Caltrans
  - Design IP management plan
  - Complete physical fiber connections between Arcadia and Caltrans

- **VPN between City of Pasadena and Caltrans**
  - Connect traffic control system via McCain software to Caltrans

- **Connection between County of Los Angeles and Caltrans**
  - Connect traffic control system via Kimley-Horn software to Caltrans

- **Completed alternate network connection to Caltrans**
Status Update Continued

- Completed draft network section of Core System High-Level Design document

- Obtaining additional support from Metro for bench contracts
  - Project management and statement of work for physical fiber connection for Arcadia
    - WB RTE 210 and Santa Anita
    - EB RTE 210 and Baldwin Ave
    - Arcadia fiber distribution hub
  - Project management and statement of work to furnish and install network equipment
  - Project management and statement of work for video distribution
Phased Approach

- **Use existing connections to transmit traffic data to Caltrans Amazon Cloud (AWS)**

- **Phase 1 – Transmit traffic data only (no video data)**
  - Site-to-site VPN over the Internet
    - Caltrans Amazon Cloud
    - RIITS (Required)
    - Caltrans
  - MPLS VPN with Netbond (Completed)

- **Phase 2 – Transmit traffic data and video**
  - 10 Gbps fiber network backbone with 1Gbps bandwidth/agency
Phase 1 – Site to Site VPN
Phase 2 – Fiber Network
Transition Phase
Traffic Flow – Phase 2
Traffic Signal Bandwidth Consumption

- **Traffic Signals**
  - **Arcadia** communicates with approximately 59 intersections
    - Bandwidth consumption was observed at ~ 1 Mbps
  - **Pasadena** operated approximately 340 traffic signals
    - Traffic signal data is low and we can anticipate Pasadena’s consumption based on Arcadia’s data flow
      - 340 intersections / 59 intersections ≈ 6 x 1 Mbps ≈ 6 Mbps
      - 100 intersections / 59 intersections ≈ 2 Mbps x 1 Mbps ≈ 2 Mbps
  - **LACO** operates approximately 500 intersections on their KITS system
    - 500 intersections / 59 intersections ≈ 8.5 x 1 Mbps ≈ 8.5 Mbps
    - 56 intersections / 59 intersections ≈ 1 Mbps x 1 Mbps ≈ 1 Mbps
**Traffic Signal Bandwidth Consumption**

- **Video Streaming**
  - After discussing anticipated usage with all agencies the following assumptions were agreed upon
    - Typical Camera utilization = 4 – 8 cameras
    - Max Camera Utilization = 12
  - CCTV camera bandwidth consumption can be configured
    - Assuming each camera requires 4 Mbps
      - Typical bandwidth = 16 Mbps - 32 Mbps
      - Max bandwidth = 48 Mbps
  - Video sharing, however, is typically not distributed at such high bandwidth
    - LACO streams video at 256 kbps which is a fraction of the calculated bandwidth shown above
Arterial Message Signs
Sign Status

- RFO is complete and has been provided to Caltrans for review
- All issues have been resolved
- PATH has completed mark-ups of as built drawings for use by Caltrans’ project manager
## Bid Proposal Items

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ESTIMATED QUANTITY</th>
<th>ITEM (Per Exhibit A, Scope of Work)</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>36</td>
<td><strong>Dynamic Message Signs</strong>, including labor, communication, power, materials to mount to pole, and traffic control</td>
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<tr>
<td>2.</td>
<td>36</td>
<td><strong>Modified VDS pole</strong> (see plan), including labor and materials to install</td>
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<tr>
<td>3.</td>
<td>36</td>
<td><strong>Pull boxes</strong>, including labor and materials to install</td>
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<tr>
<td>4.</td>
<td>10</td>
<td><strong>Wireless communication</strong> between new signs and controller cabinets, including labor and materials to install</td>
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<tr>
<td>5.</td>
<td>9</td>
<td>Static painted signs</td>
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<tr>
<td>6.</td>
<td>1</td>
<td>Join and Extend of fiber conduit at one location in Arcadia. See Section C, No. 10.</td>
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<tr>
<td>7.</td>
<td>4</td>
<td>Training Sessions</td>
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<tr>
<td>8.</td>
<td>4</td>
<td>Installation, testing, and training as specified for the Sign Control Systems in Attachment 5</td>
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<tr>
<td>9.</td>
<td>4</td>
<td>Servers/Computers to run traffic software</td>
</tr>
<tr>
<td>10.</td>
<td>2</td>
<td>Dual Wireless Radios – required at two locations for line of sight challenges as shown in Attachment 2 (Central at Myrtle, Central at Mountain). See Section C, No. 8.</td>
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</table>
Each municipality has an accompanying procurement list and set of aerial photos

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Wireless Comm. Installation Includes Two Radios</th>
<th>Power Cable (ft) Including Installation from Sign to Cabinet</th>
<th>Communication Cable (ft) Including Installation from Sign to Cabinet</th>
<th>Communication Extender Including Installation in Cabinet</th>
<th>Wireless Network Switch Including Installation in Cabinet and All Connections</th>
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<tbody>
<tr>
<td>Foothill at Baldwin South</td>
<td></td>
<td>520</td>
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<td>Foothill at Baldwin North [CALTRANS]</td>
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<thead>
<tr>
<th>Intersection</th>
<th>Sign Includes Mounting on Pole, Installation of both Power and Communications</th>
<th>Pole Includes Foundation, Installation</th>
<th>Pull Box Includes Installation and Securing All Necessary Wiring</th>
<th>New Breaker Includes Installation in Cabinet</th>
</tr>
</thead>
<tbody>
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<td>Foothill at Santa Anita (NB)</td>
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<td>1</td>
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<tr>
<td>Foothill at Baldwin North [CALTRANS]</td>
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<tr>
<td>Total</td>
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Aerial Sample

Hatched box = sign location

Red dot = controller location
Thank You

and

Next Meeting

(Suggest May 22\textsuperscript{nd}
at District 7 downtown)