Connected Corridors
Face-to-Face Meeting

Tuesday, Jan 16th, 2018 – 1:30 – 3:30 pm
Duarte
Agenda

- 1:30-2:00 - Summary of program
- 2:00-2:20 – MOU - Mort
- 2:20-2:40 - Update on communications – Kali
- 2:40-3:00 - Call for projects requirements - Parsons
- 3:00-3:20 - Sign requirements - Erlan
- 3:20-3:30 - Closing: Next meeting location in Monrovia?
Systems Engineering Next Steps

- **Design Documents** – How will the requirements be met
- **Hardware and Software** – Building the system
Schedule

1. Project Management
10/1/13 - 6/30/20

2. Outreach & Communications
10/1/13 - 6/30/20

3. Concept Exploration / User Needs
11/11/13 - 12/26/14

4. Corridor Preparation
12/2/13 - 9/28/18

5a. AMS - Phase 1
1/6/14 - 5/29/15

5b. AMS - Phase 2
6/1/15 - 9/28/18

5c. AMS - Phase 3
10/1/18 - 6/30/20

6a. SEMP
1/1/15 - 6/30/15

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 - 2/28/18

9. Organizational Design
9/1/15 - 12/30/16

10. Technical Design
7/1/16 – 6/30/18

11. Component Development
8/15/16 - 9/30/18

12. System Integration
1/1/18 – 9/28/18

13a. Institutional Design
1/2/17 - 9/28/18

13b. Institutional Operations
10/1/18 - 6/30/20

14. System Deployment
1/1/19 - 6/30/20

15. Training
11/1/18 - 12/31/19

16. Validation and Acceptance
11/1/18 – 12/31/19

17. System Operations
1/1/19 - 6/30/20

18a. Pre Evaluation
6/1/18 - 12/31/18

18b. Post-Deployment Evaluation
4/1/19 - 6/30/20

19. Migration to Production
3/1/19 - 6/30/20

19. Lessons Learned
1/1/20 – 6/30/20

Launch Dec 15th 2018)
Risks

- **Short Term Risks**
  - Dynamic Message Sign Design and Purchasing
  - Other Call for Projects ITS Design and Purchasing
  - Contracting for Traffic Control System Interfaces

- **Launch Risks**
  - Integration at a rapid pace
  - Arrival of Traffic Control Systems
  - COTS Integration
  - Contracting
6

Summary
Charter and MOU

- Updated charter approved and distributed – Thank you
- MOU – Mort to discuss later in presentation
Human and Organizational Design

- Tarek from SMG met with
  - Caltrans D11
  - SANDAG
  - Caltrans D4
- Discussed human requirements for our CC effort
- Tarek to present results later this month
Version 1.0 of the System Interface Doc/Data Dictionary
- Provided to all of our vendor partners
- This is important: All vendors can now develop to a common interface specification
- This interface permits auto generation of interface objects which should speed development and reduce errors
TMDD Interfaces to Data Hub

- **Traffic Control Systems**
  - Kimley Horn
    - Caltrans working on contract
  - TransCore
    - Have started development
    - Provided first UI with TMDD output
    - Delivery schedule to be provided this week
  - McCain
    - Caltrans working on contract

- **ATMS – Caltrans (CMS Signs, Ramps)**
  - Reviewing detailed design document
  - Looks good
COTS (Purple Box) - ICMS

- **Companies who are participating:**
  - Kapsch
  - Parsons
  - Telegra

- **Update**
  - Have now met with all vendors
  - All meeting went well
  - We are now reviewing documents (licenses, confidentiality, scope of work, etc) as the vendors kick off their efforts.
  - Companies want to make sure that the official procurement will be completed by first half of 2020
  - We will be sending out an RFI to request recommendations on amount of funding to allocate for the purchase
Design and Construction

- **210 TMS Upgrade**
  - Making Progress – Can Caltrans update?

- **Network Communication**
  - To be discussed in detail later by Kali

- **Call for Projects (ITS Elements) – Allen**
  - To be discussed in detail later by Parsons

- **Call for Projects – Signs and Sign Software**
  - To be discussed in detail later by Erlan from Iteris
Cloud to Caltrans

- Greg and Amahayes working on implementation of Cloud to Caltrans communication
  - Transport – Netbond
  - IP space allocation – Prod, Test, Dev and Research
  - Next is internal IPs to external address (outsider firewall) mapping
Data Quality

- **Freeway - Data Quality Meeting**
  - I-210 PM 22.6 - 25
    - EB 13.9% --- steady
    - WB 2.9% --- steady
  - I-210 PM 25 - 43.25
    - EB 63.0% --- Bad: we normally see about 88-93%
    - WB 57.5% --- Bad: We normally see about 85-90%

- **IEN Data**
  - Good news: We have solved the connection issue we had in the past months.
  - The detector health in the past week:
    - 51% for LACO,
    - 65% for Monrovia,
    - 61% for Duarte.
  - A lot of detectors are categorized as "Bad" because they keep reporting zero or constant values.
  - Thanks.

- **Pasadena Data**
  - Received one month of Pasadena data
  - Hopefully will occur every month

- **Arcadia**
  - Steady at 80%
Estimation of Corridor Traffic State

- **Freeway**
  - Work in progress
  - Improving data quality is enabling this

- **Arterial**
  - Integrating Pasadena data
  - Continuing migration of Matlab code to Java
  - Hope to have first corridor wide arterial estimation running by end of 1st quarter

- **Estimation is needed for**
  - Display of current state
  - Possible information for rules
  - Seeding of prediction simulations
Response Plan Generation – Next Steps

- **Meeting on Dec 5th**
  - Successful meeting held to demonstrate use of the model to recreate several real world incidents
  - Then suggestions were made on timing plan modification and other network changes that showed improvement throughput

- **Next set of meetings**
  - Jan 31st when we will spend most of day building detailed response plans for the corridor.
  - Additionally, a meeting has been planned with Caltrans for the 30th.
  - Also, Tom Choe will be stopping by to speak with Caltrans Managers in advance of the meeting on the 30th.
Data Hub and DSS Software

- DSS Response plan management design defined
- Continuing discussions with Caltrans IT – defining tasking, roles for system operations and maintenance
- Developing intersection signal data pipelines in data hub
- Working to further define PeMS modifications for corridor reporting
- Completed data interface specifications – released v1
- Finishing verification plan – release early February
Other Items

- **511**
  - Need to work with Kali and Ilan on this.

- **Arterial Lane Closure – Arterials**
  - We will be using the Caltrans arterial lane closure system.

- **PEMS**
  - Proposal received and being reviewed.
  - Meeting held with Iteris to discuss design details.
MOU
Mort
MOU

- A preliminary draft copy has been mailed to each of you

- Table of contents includes:
  - 1- the purpose,
  - 2- the content,
  - 3- roles and responsibilities,
  - 4- o&m of the equipment,
  - 5- use it to allocated budget,
  - 6- need signature,
  - 7- provide comments.
Communication
Kali
Status Update

- **Phase 2 network design**
  - Network capable of splitting a single fiber optic into multiple channels each with dedicated bandwidth
  - IP addressing added to RIITS scope
  - Provides a medium for organizations to transport data
  - Network components now include switches, routers, or firewalls

- **Phase 1 VPN connections**

- **Drafted Bill of Materials using MRV as an example but have not selected a vendor**
IP Addressing and Protocols

- Fiber network provides physical connectivity between the agencies.
- RIITS will provide and manage the physical demarcation where Caltrans and agencies connect.
- Logical part of the network such as routing and IP address numbering will now be managed by RIITS.
- Routing and IP address schemes required for logical connectivity needs to be defined.
- Require fiber distances, fiber power and loss budget to finalize design.
Phase 2 Overview
Next Step: Select Transport IP Addresses
# Phase 2 Components

## Chassis Physical Specifications

<table>
<thead>
<tr>
<th></th>
<th>OD-48-HD</th>
<th>OD-32</th>
<th>OD-16</th>
<th>OD-12</th>
<th>OD-6</th>
<th>OD-4</th>
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<td>Rack Space</td>
<td>10 RU</td>
<td>9 RU</td>
<td>3 RU</td>
<td>3 RU</td>
<td>2 RU</td>
<td>1 RU</td>
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<td>37 lbs</td>
<td>28.5 lbs</td>
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<td>App Slot</td>
<td>46</td>
<td>30</td>
<td>15</td>
<td>11</td>
<td>5</td>
<td>3</td>
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<td>Mgr Slot</td>
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<td>2</td>
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</table>

**Hub Sites**

**Field Sites**
## Design Comparisons

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Option 1: Separate channels/agency</th>
<th>Option 2: Separate channels/function</th>
<th>Option 3: Single channel for ICM</th>
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<tbody>
<tr>
<td>Availability (Most)</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>★★★★★</td>
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<tr>
<td>Agency Impact (Least)</td>
<td>★</td>
<td>★★★★</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Capacity (Most)</td>
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<td>★★★★</td>
<td>★★★★</td>
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<tr>
<td>Cost (Least)</td>
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<td>★★★★</td>
<td>★★★★★</td>
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<tr>
<td>Logical Config (Least)</td>
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<td>★★★★</td>
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<tr>
<td>Scalability (Most)</td>
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<td>★★★★</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Security (Most)</td>
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<td>★★★★</td>
<td>★★★★</td>
</tr>
</tbody>
</table>

- ★ = Good
- ★★ = Better
- ★★★ = Best
Traffic Flow – Phase 1 (VPN to RIITS)
Next Steps

- Identify connectivity points between Caltrans and agencies
- Issue Statement of Work to complete fiber connectivity
- Issue Statement of Work to complete VPN connections
- Obtain fiber distances and estimates on fiber power/loss budgets
- Finalize number of channels needed per location
- Issue procurement for network components
- Communication Under Bridge at Huntington and Encino
Call for Projects

Paul Shibley - Parsons
Timeline

- Met Face-to-Face with Stakeholders  
  August 2 – 21
- Distributed Updated Equipment List  
  September 1
- Distributed Procurement Packages to Stakeholders  
  September 7
- Integrated updates / comments  
  Sept 21 – Oct 31
- Provided Caltrans with Engineering Cost Estimate  
  October 10
- Distributed Updated Procurement Packages  
  November 2
- Provided Updated Engineering Cost Estimates  
  November 8
- Presented Budget ‘Challenge’ at Nov’17 Face-to-Face  
  November 14
- Additional Funding Arranged; Received comments from final reviewers  
  December 28
- Final Updates Distributed (Caltrans and Jurisdictions)  
  January 4

- Caltrans Procurement Underway
Status

Well Defined Procurement Packages with scope reviewed by ALL Stakeholders

Procurement Summary – 7 Procurement Packages

<p>| | |</p>
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<tr>
<td>Requested</td>
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$521,000 over funding

Additional Funds found to meet all requests, with no scope reductions

All Packages have been Locked Down, Submitted to Caltrans Procurement and Distributed to appropriate Jurisdictions

Caltrans Procurement Process is underway
## Procurement List & Quantity

<table>
<thead>
<tr>
<th>Package</th>
<th>Bluetooth (Velocity)</th>
<th>Bluetooth (BlueToad)</th>
<th>New Cabinets</th>
<th>Communication Upgrade</th>
<th>Controllers</th>
<th>Video Detection System</th>
<th>Data Comm Module / VDS SW Upgrades</th>
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<tbody>
<tr>
<td></td>
<td>Pasadena</td>
<td>Arcadia</td>
<td>Monrovia</td>
<td>Durate</td>
<td>LA County</td>
<td>Total</td>
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<td>5</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<td>31</td>
<td>$128,000</td>
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<td>1</td>
<td>4</td>
<td>31</td>
<td>$196,497</td>
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- **Added Funds**: $520,843
Alternate Route Update
Erlan - Iteris

Equipment Update
Locations Update
Bid Estimate
Bid Specifications
Next Steps
Equipment Update (CMS)

Sign: Full Matrix LED (3’ x 4’)

[Image of a Full Matrix LED sign with an arrow pointing to it]
Equipment Update (Pole)

- **Pole: Modified Pole from San Mateo Project**
DMS Sign Location Update

- **16 Locations, 18 Signs in Pasadena**
  - 5 locations are at Caltrans-owned signals

- **7 Locations, 9 Signs in Arcadia**
  - 3 locations are at Caltrans-owned signals

- **2 Locations, 3 Signs in Monrovia**
  - 1 location is at a Caltrans-owned signal

- **2 Locations, 2 Signs in Unincorporated County Land**
  - 2 locations on Rosemead owned by LACO

- **1 Location, 2 Signs Shared Monrovia & Duarte**

- **3 Locations, 3 Signs in Duarte**

**TOTAL = 37 signs**
Eight locations will have static painted signs of two types:
- Three in Caltrans ROW
- Two in Arcadia
- One in Pasadena
- One in Duarte
- One in LACO

Type 1

Type 2

OR

SOUTH

G78-1 (CA)

G27-1 (CA)

M5-1

M3-3

M4-5

INTERSTATE
Sign Location Field Review

- **Conduit Capacity**
  - Performed conduit fill calculations based on the MUTCD
    - 25% fill for new runs
    - 35% for existing runs

![Diagram](image-url)
Field Review Results

- **Feasible**
  - Any location where there is sufficient conduit capacity between the controller cabinet and the proposed sign location

- **Not Feasible**
  - Any location that does not have sufficient capacity and will require some or all of the following:
    - Wireless Communication
    - Alternate Power
    - New Conduit

- **Existing**
  - Locations where a sign is already in place
DMS with Wired Connection Example

Simple Wired – Arcadia/Monrovia

- TMC
- DATA/COMM BACKBONE
- CABINET
- CONDUIT
- DATA/COMM ETHERNET
- POWER
- POWER GRID
- DMS
DMS with Wireless Connection Example

Simple Wireless (Intuicom) - Pasadena

TMC

DATA/COMM BACKBONE

CABINET

DATA/COMM ETHERNET

POWER FOR RADIO

SIGNAL POLE

DATA/COMM WIRELESS

DMS

POWER FOR SIGN AND RADIO FROM PASADENA STREETLIGHT
DMS with Wireless Connection

Wireless Relay (Intuicom) – Pasadena

SECONDARY SIGNAL POLE
DATA/COMM WIRELESS
LOCAL SIGNAL POLE
DATA/COMM ETHERNET
DMS

SECONDARY CABINET
DATA/COMM ETHERNET
POWER FOR RADIO
DATA/COMM BACKBONE
TMC

POWER FOR SIGN AND RADIO FROM PASADENA STREETLIGHT

POWER IN CONDUIT
DMS with Wireless Connection

Wireless Relay (Proxim??) - Duarte

HUNTINGTON SIGNAL POLE
DATA/COMM WIRELESS
POWER FOR RADIO FROM HUNTINGTON CABINET

LOCAL SIGNAL POLE
DATA/COMM WIRELESS
POWER FOR SIGN AND RADIO FROM LOCAL CABINET THRU CONDUIT

DMS

TMC
DATA/COMM WIRELESS
LACO BACKBONE
DMS Communication Caltrans
DMS Communication Phase 2
Bid Specifications and Estimate

Specifications
- A shorter scope-of-work
  - Procuring & installing equipment
    - Comm. and Power
  - F2C Software
  - C2C
  - Static Sign

Estimate
- Hardware
  - Signs, Poles, Pull Boxes, Wireless Equipment, Extenders, Power & Comm Cables, Static Sign
- Software
  - Four F2C Licenses, C2C Software
- ~$1.2 million
Next Steps

- Obtain final approval of sign locations, communication and power from all agencies
- Update the Bid Specifications per agency feedback and to reflect the findings of the field assessment
- Farid is working with Caltrans regarding approval process for power for signs and use of poles for wireless radios
- Josh and Erlan will work with Duarte and Monrovia to finalize their locations
Pasadena
Arcadia
Los Angeles County
Monrovia/Duarte
Thank You and Next Meeting (Suggest Feb 27th in Monrovia)