Connected Corridors
Face-to-Face Meeting

Tuesday, September 17th, 2019
1:30 – 3:30 pm
Monrovia
Agenda

☐ 1:30 - 2:00 – Program Review

☐ 2:00 - 2:20 – Call for Projects Update

☐ 2:20 – 2:30 – Kapsch update

☐ 2:30 – 2:50 – Response Plans and Prediction

☐ 2:50 – 3:00 – Closing

- Next Meeting at Duarte – Tuesday October 29th
- (Monrovia, Duarte, Caltrans, County, Arcadia, Pasadena)
Schedule Discussion – System Testing

- We anticipate system launch in the second half of next year
  - Goal – Ready for the ITS World Congress in LA in October 2020
  - The actual full launch date is fluid due to ITS element purchase and installation

- We anticipate system testing starting in January
  - All initial C2C interfaces (sans McCain) completed in October
  - ATMS upgrade moved to production in October
  - Testing of ability to set plans on bench controllers in September
  - Ability to generate response plans in December based on input from ATMS
  - Kapsch initial release ready in December
  - System testing to begin in January
  - Possible live testing on selected routes where ITS elements are available in second quarter 2020
Systems Engineering Status

Diagram showing the life cycle of systems engineering with stages including:
- Needs Assessment
- Concept Selection
- Project Planning
- Systems Engineering Management Planning
- System Validation / Strategy Plan
- Concept of Operations
- System Requirements
- High-Level Design
- Subsystem Requirements
- Detailed Design
- Software Coding
- Hardware Fabrication
- Unit Testing
- Subsystem Verification
- Subsystem Integration
- Subsystem Verification Plans
- Unit Test Plan
- System Verification
- System Integration
- System Validation Initial Deployment
- Operations and Maintenance
- Changes and Upgrades
- Retirement / Replacement
Field elements working consistently at about 95% - When working!
I-210 – Freeway Data Quality – Data Outages

% of 5-min Lane Points Observed (ML/HOV) I-210 W

- 18-days outage
- 14-days outage
- Two 1-day outages
I-210 – Impacted by District 7 outages

- District 7 outages cause severe impacts on I-210

EB data availability almost exactly the same as WB (shown)
D7 has frequent, large-scale outages starting in May 2019
Signal Plans – Stakeholder Progress

- **Signal plan review and validation**
  - Pasadena intersections programmed with CC flush plans
    - 13 intersections along Corson and Maple
    - 10 additional signals to be programmed in the next 2 weeks
    - 23 out of 79, so we are on our way
  - LA County status
    - Next week LA County will finish the review and determine a schedule for developing the revised traffic signal timing sheets and to conduct the bench testing of the timing.
  - Arcadia status
    - Ready to begin – Need to discuss with Kevin
  - TSMSS
    - Awaiting feedback from Caltrans
Response Plan Generation (Planning Mode)

- Completed reviewing the response plan data model.
- Began coding the data model changes into the rules engine.
- Began extracting response plans from Aimsun into rules engine.

- More on this later in the presentation.
We created and deployed the C2C network connection monitors for the Test and Research (Integration) stacks, to complement the monitor for the Development stack.

We have observed (and are investigating) the following items based on one month’s worth of results from the Development stack:

- One of our Dev Arcadia readers experiences significant intermittent connectivity, and the other does not; likewise for the LACO pair.
- We get occasional connections to what should be a not-yet-deployed Pasadena server.

We have made progress with RIITS personnel on secure user access to the ICM application via a client VPN. We are diagnosing the supporting network configuration.
ICM Reader

Network

Agency Data Source

Socket test

App test

App

App
Dev/C2C Connectivity, 28-Day Summary
Arterial Summary

- **Data management**
  - Arcadia’s TCS server and the IEN
    - Collect, process and generate a weekly data report
    - Due to configuration changes in Arcadia, we extracted a new set of historical flow-occupancy profiles for the detectors in Arcadia using data retrieved in Year 2019.
  - Data Hub
    - Retrieve TMDD Inventory and Status messages 24/7
    - Enabled a function that runs 24/7 to detect Inventory Changes for arterial detectors.

- **Data quality analysis on TMDD messages**
  - LA County
    - We discussed with KH the Data Quality Report of LACO TMDD.
    - Document generated describing how to convert coordination tables in a timing sheet into TMDD messages of Intersection Signal Control Schedule. Provided to KH

- **System requirements for traffic estimation in the DSS**
  - Developed detailed system requirements for traffic estimation data interfaces.
  - Completed the document “Data Interface Requirements for Traffic Estimation”
Detector health report in Arcadia

Arcadia Detector Health in 2019

Time

Health (%)
Daily Detection of ITS Inventory Changes

6 new detectors have been added to Station 2408

A email are sent out to notify the changes

Inventory changes occur at the following detectors:
- New detector inventory for station:2408 and detector:10049
- New detector inventory for station:2408 and detector:10047
- New detector inventory for station:2408 and detector:10048
- New detector inventory for station:2408 and detector:10046
- New detector inventory for station:2408 and detector:10050
- New detector inventory for station:2408 and detector:10051

Perform daily analysis to identify any changes in Detector Inventory
Quality Analysis of TMDD Messages

-- LACO

PATH
UC Berkeley
8/05/2019
1. Summary

In this document, we aim to provide instructions on how to convert coordination tables into TMDD messages and a timing sheet. Section 2 includes examples of actual coordination tables for the intersection Rosemead Bl @ Del Mar Bl (ID:3374). These examples include:

- Table 1: Time of Day
- Table 2: Exception Days
- Table 3: Floating Holidays

In Section 3, we provide detailed descriptions of the TMDD Data Format Instruction Signal Control Schedule, which is also available in the Connection Corridor System Interface Design Specification document. Depending on how to handle Floating Holidays and Exception Days, we present two different approaches to constructing the TMDD messages. More detailed instructions are provided in the rest of the document.

2. Example: Coordination Tables for Rosemead Bl @ Del Mar Bl (ID:3374)

2.1 Time of Day Tables

2.2 Holiday Tables

PATH
410 McLaughlin Hall, MC 1720
Berkeley, CA 94720
United States
Data interfaces for traffic estimation

Data Interface Requirements for Traffic Estimation

Qijian Gan
ggan@berkeley.edu

PATH
410 McLaughlin Hall, MC 1720
Berkeley, CA 94720
United States

(Version 4.0)
Aimsun Model

- Some statistics:
  - 2579 signal control plans
  - 7312 detectors
  - Over 1000 lane miles of roadway
  - 4242 road sections
  - 1748 nodes
  - 395 trip origin/destination nodes
Aimsun Model Updates

- **Input data**
  - Updated some of the PeMS detector data used for calibration reference to reflect maintenance activities on detectors over the past 6 months
  - Received a first set of average flow rates extracted from the detectors linked to Arcadia’s TransSuite system

- **Detector mapping**
  - Updated the mapping of detectors in Arcadia to match the current setup observed in the TransSuite system

- **Traffic signals**
  - Updated timing parameters along Maple and Corson to match updated timing sheets received from Pasadena
Aimsun Model Updates

- **Ramp metering**
  - Updated the control parameters of several ramp meters to match new timing sheets received from Caltrans (many with changes since November).
  - Changed how the Ramp Metering API read flow rates (from veh/hr instead of veh/min or veh/3 min)

- **Driver response to incidents**
  - Tweaked various triggers used to simulate driver response to unusual queueing along the freeway and detour arterials

- **Demand modeling**
  - Some tweaks in the modeling of the weekday, Saturday, and Sunday traffic demands
Response Plan Development

- Incident information
  - Entered 4 incidents into the ATMS system to obtain the incident information for use in testing

- Input data processing
  - Completed a program to extract incident information, selected detours, requested ramp metering, and requested signal control changes from response plane messages

- Metrics to evaluate response plans
  - Continued analyzing the metrics produced by various incidents to assess their potential impacts and usefulness on decision-making
**Ramp Metering Information**

- **Waiting on updated information on ramp meters for the following freeway sections** *(Information at PATH for these generally date back to 2007-2009)*

<table>
<thead>
<tr>
<th>I-210 Extension EB</th>
<th>I-210 WB</th>
<th>SR-134 EB</th>
<th>SR-134 WB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincoln</td>
<td>Citrus</td>
<td>Orange Grove</td>
<td>Fair Oaks</td>
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<tr>
<td>Mountain</td>
<td>Azusa NB</td>
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<td>Orange Grove</td>
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<td>Azusa SB</td>
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<td>I-605 Connector</td>
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<td>Lincoln</td>
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</tbody>
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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

- KITS
- Transparity
- TransSuite
- Sign Vendor
- Caltrans ATMS
Systems Development and Integration

- **Priorities**
  - **Improve system functionality**
    - Completed workflow processing improvements for data pipelines, incident management. Currently in test.
    - Exposed control of data pipelines (including start and stop commands) to Corridor Management System.
    - Completed implementation of internal cloud DNS services.
  - **Improve release frequency – goal is new release to test every 2 days**
    - Designing containerization strategy and use of AWS Elastic Container Service. Will improve developer speed, release quality, and system failure recovery time and resilience.
    - Decreased common dependencies in system components to allow breakup of deployments into smaller, independent elements. Will continue this effort.
    - Improved integration testing in dev environment to increase release quality.
Systems Integration

- **Pasadena**
  - Detailed design comments provided.
  - Updated documents provided to us:
    - Caltrans I210 C2C McCain TMDD HLD (High Level Design) – Final
    - Caltrans I210 C2C McCain TMDD SDD (Detailed Design) – Final (comments addressed)
    - Caltrans I210 C2C McCain TMDD Function Bench Testing (Verification Plan)
  - Awaiting testing endpoint

- **LA County**
  - Data quality report provided to Kimley Horn.
  - Began bench testing of setting and terminating signal plans yesterday
    - This morning we did a successful signal change request and verified it transitioned to a new plan
    - We hope to test the termination request later today.
Systems Integration

- **Arcadia**
  - Awaiting signal plan termination information from Transcore
  - Will then do bench testing of setting/terminating a signal

- **TSMSS**
  - Awaiting entry of sensor information into TSMSS

- **ATMS**
  - Continuing testing of changes to accommodate arterial incidents. Have identified some issues that have been corrected so testing can continue.
  - Important that we get at least a portion of the new ATMS functions migrated to production
  - Meeting with Caltrans, Parsons and PATH scheduled for Oct 4th

- **Corridor Management System**
  - Provided draft of minor changes to data interfaces for review by Kapsch
Containerization Objectives

- Packaging in container assures application behavior remains the same regardless of where deployed
  - Dev/test/integration/production
  - Local developer environment vs. cloud
  - Across CT Districts and Corridors

- Simplifies service configuration

- Version container images – manage full package (OS/Dependencies/Operating System), not just the application

- Better quality deployments, better quality code, reduce “infrastructure as code” complexity

- Faster deployments

- Faster recovery upon failure – containers are much smaller, take much less time to start (seconds vs minutes)
What are Containers?

- Self contained package of operating system, application, dependencies, and configuration. Everything is packaged together at the time of the software build process.

- Can be deployed anywhere and will operate the same regardless of where they are deployed

- Different from virtual machines
  - VMs abstract infrastructure
  - Containers abstract applications
  - Much smaller footprint than VM’s
  - Much smaller startup time than VM’s
AWS Elastic Container Service

- We will use AWS Elastic Container Service
  - Integrated service orchestration for containers
  - Benefits of using ECS and containers:
    - Easier deployment automation – especially easier to maintain
    - Autoscaling – more computing power when load increases, automated recovery upon failure
    - Load balancing – efficient use of computing resources, reduced cost
    - Security integration – use security already built
    - Simplified networking – maintain existing networking infrastructure
    - Monitoring

![Diagram of AWS Elastic Container Service features: Autoscaling, Load balancing, IAM, Networking, Logging, Monitoring]
I-210 Connected Corridors
Face-to-Face Meeting

City of Monrovia,
Community Center, 119 W. Palm Avenue, Monrovia, CA 91016
Tuesday, September 17, 2019
1:30 – 3:30 pm
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
SYSTEM CONSULTING SERVICES

SCOPE OF WORK
## Project Objective

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

<table>
<thead>
<tr>
<th>#</th>
<th>Package Description</th>
<th>Contract #</th>
<th>Contract Status</th>
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<tbody>
<tr>
<td>1</td>
<td>Bluetooth – Iteris Velocity</td>
<td>07A4470</td>
<td>Completed</td>
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<td>2</td>
<td>Bluetooth – BlueToad</td>
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<td>Awarded, in Progress</td>
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<td>3</td>
<td>New Controller Cabinets</td>
<td>07A4603</td>
<td>Under DPAC Review</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>
<td>07A4480</td>
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<tr>
<td>6</td>
<td>Video Detection System</td>
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<td>7</td>
<td>Data Communication Module and Video Detection Software Upgrade</td>
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<td>8</td>
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<td>Static Signs – Caltrans, in Progress</td>
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<td>9</td>
<td>Environmental Stations with Air Quality Sensors and Open Data Systems</td>
<td>07A4388</td>
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## Project Area

<table>
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<tr>
<th>#</th>
<th>Package Description</th>
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<th>Metro &amp; Caltrans</th>
<th>City of Pasadena</th>
<th>City of Arcadia</th>
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<th>City of Duarte</th>
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Project Area (cont.)
UPDATE ON

PACKAGES 1-9
# Target Timeline - P1, P2, P4, P6, P9

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<th>Year</th>
<th>2018</th>
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<td>1 2 3 4 5 6 7 8 9 10 11 12</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>Testing &amp; Acceptance</td>
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<tr>
<td>Training</td>
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- **Soft Launch of I-210 CC System (Est.)**
# Target Timeline - P3, P5, P7, P8

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<th>Year</th>
<th>2019</th>
<th>2020</th>
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<tbody>
<tr>
<td>Month</td>
<td>6 7 8 9 10 11 12</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
<tr>
<td>Prepare Submittal</td>
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P3: Being Reviewed by DPAC  
P5: To be Reviewed by DPAC  
P7: Being Reviewed by DPAC  
P8: Being Reviewed by DPAC

Hard Launch of I-210 CC System (Est.)
## Update on 9 Packages

<table>
<thead>
<tr>
<th>Pkg. #</th>
<th>Package Name</th>
<th>Contract #</th>
<th>Project Status</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Bluetooth – Iteris</td>
<td>07A4470 PTM</td>
<td>• NTP: 7/10/2018&lt;br&gt;• Kick-off Meeting: 7/30/2018&lt;br&gt;• Submittal Approved: 8/16/2018&lt;br&gt;• Installation &amp; Testing Completed on 5/29 &amp; 5/30/2019&lt;br&gt;• Accepted by Arcadia, Documents Submitted&lt;br&gt;• Completed</td>
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<tr>
<td>2</td>
<td>Bluetooth – BlueToad</td>
<td>07A4477 DBX</td>
<td>• NTP: 7/10/2018&lt;br&gt;• Kick-off Meeting: 7/30/2018&lt;br&gt;• Submittal Approved: 10/12/2018&lt;br&gt;• Installation QC checklist &amp; Test Procedure: Ready&lt;br&gt;• LA County: VM server configured on 5/15/19; field installation starting 9/24/19&lt;br&gt;• Pasadena: working with the City on communications architecture and the hardware/software needed&lt;br&gt;• Expected to be completed: November 2019 (80%)</td>
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</tbody>
</table>
## Update on 9 Packages (cont.)

<table>
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</thead>
</table>
| 3      | New Controller     | 07A4603    | • Disqualified: Bids came above the SB limit (314k).  
• Procurement Package revised per Stakeholder comments on Pkg. 5  
• Cancelled by DPAC in the week of 3/15/19  
• Revised package being reviewed by DPAC  
• Expected to be advertised by: 10/22/19  
• Expected to be awarded by: 11/18/19  
• Expected to be completed: 1st Quarter, 2020 |
| 4      | Communication Upgrades | 07A4479    | • NTP: 7/13/2018  
• Kick-off Meeting: 7/30/2018  
• Submittal & RFI Approved: 5/6/2019  
• Equipment procured  
• Installation QC checklist & testing plan being prepared  
• Installation being scheduled  
• Expected to be completed: November 2019 (80%) |
## Update on 9 Packages (cont.)

<table>
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</table>
| 5      | Firmware/Timing Plan Updates/Controller Upgrades | 07A4480 CPE, Inc | - NTP: 7/17/2018  
- Kick-off Meeting: 7/30/2018  
- Submittal Reviewed but Required Equipment changed per Stakeholder Comment  
  - Contractor revised price estimate ($115,695.80) lower than original amount ($171,600.00) – reviewed by stakeholders with minor comments  
  - To finalize the revised submittal with the contractor  
  - To present to DPAC for approval  
  - Expected to be completed: 1st Quarter, 2020 |
## Update on 9 Packages (cont.)

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<td>Video Detection System</td>
<td>07A4481</td>
<td>• NTP: 7/10/18&lt;br&gt;• Kick-off Meeting: 7/30/18&lt;br&gt;• 10/9/18: Conducted Site Survey&lt;br&gt;• 10/18/18: Submittal approved&lt;br&gt;• Installation:&lt;br&gt;  • 18 out of 22 installations are completed (2 LA County, 5 Monrovia, 3 Arcadia, 8 Pasadena)&lt;br&gt;  • 3 locations in Duarte – pull boxes &amp; conduits are full; City has finished the rewiring at 1 location, will finish the other 2 locations by 9/27/19. Installation scheduled on 10/8-9/19&lt;br&gt;  • 1 location in Pasadena: conduit too small. Proposed action is approved. Installation being scheduled.&lt;br&gt;• Expected to be completed: November 2019 (90%)</td>
</tr>
<tr>
<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;• Originally cancelled by DPAC;&lt;br&gt;• Revised Package being reviewed by DPAC&lt;br&gt;• Expected to be advertised by: 10/22/19&lt;br&gt;• Expected to be awarded by: 11/18/19&lt;br&gt;• Expected to be completed: 1st Quarter, 2020</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>
</table>
| 8      | Advanced Traveler Information Systems            | N/A           | • Divided to 3 parts:  
  • DMS Procurement – to be awarded by 11/18/19  
  • Integration – to be awarded by 11/18/19  
  • Static Sign Procurement - ordered by Caltrans Maintenance Group, may take up to 6 months  
  • Expected to be completed: 2nd Quarter, 2020 |
| 9      | Environmental Stations with Air Quality Sensors and Open Data Systems (ODS) | 07A4388 Cal Poly Pomona | • NTP: 6/29/18  
  • Kick-off Meeting: 7/12/18  
  • Environmental stations  
    • Roadside study done  
    • Field installation done – 6/7/19  
    • Collect data and analyze data - ongoing  
  • ODS  
    • CPP continuously coordinates with PATH  
    • Face-to-Face Meeting w/ Foothill Transit & Pasadena Transit on 10/10/19  
  • Expected to be completed: 1st Quarter, 2020 (80%) |
Next Steps

- Package 2: Start installation in LA County; Finalize Comm. architecture & material procurement in Pasadena TMC
- Package 3: Tracking status
- Package 4: Prepare documentations; Start installation
- Package 5: Prepare justification for DPAC review
- Package 6: Schedule installation & testing
- Package 7: Tracking status
- Package 8: Tracking status
- Package 9: Support coordination
Thank You and Questions?
I-210 CALTRANS Pilot, September 17, 2019

Kapsch Update

Integrated Corridor Management
In progress:

- Product upgrade completed
  - Agency Response Plan Voting
  - Handle unexpected inventory/status ordering
  - Configure Ramp Meter icons
  - Handle full device inventory messages (vs. one-at-a-time)

- Provide import/export access to EcoTrafiX Response Plans

- Associate incidents with multiple ICM links/lanes and arterial movements (major product update scheduled December 2019)
EcoTrafiX Interface Status

➢ Publish Events to Hub – ready to integrate with DSS
➢ Receive Events – simulated until ATMS is available in AWS
➢ Response Plans – ready to receive from DSS
➢ Traffic Signals live from Arcadia & some LA County signals
➢ DMS – receiving from Hub
➢ Ramp Meters – receiving from Hub (simulated from ATMS)
➢ Response Plan Item Execution – ready to integrate with TMCs
EcoTrafiX Status

Integrated
Ready to integrate
In development

TMC
Arcadia
LA County
Others

Caltrans
ATMS

Ramp Meter Commands
Center Active
Voting
Events

Response Plans

EcoTrafiX
(CMS)

Ramp Meters
Detectors

Response Plans

DMS

Signal Controllers

PATH
HUB

Detectors

DMS

Signal Controllers

Response Plans

DMS Commands

Signal Controller Commands
EcoTrafiX Status

Next Steps

Integrate with PATH’s Hub
- EcoTrafiX send Events to HUB
- DSS send Response Plans to EcoTrafiX

Integrate with CALTRANS ATMS
- ATMS send Events to EcoTrafiX/HUB
- EcoTrafiX exchange Voting with ATMS
- EcoTrafiX send Response Plans to ATMS
- EcoTrafiX exchange Center Active with ATMS
Response Plans and Predictions
Response Plan Components

- **Response Plan**
  - Detour Routes
    - Passenger Cars
    - Trucks
    - Buses
  - Intersection Signal Control Requests
    - On routes
    - Not on routes
  - Ramp Meter Control Requests
    - On routes
    - Not on routes
  - Equipment Requests
    - Trucks
    - Cars
  - Personnel Requests
    - Traffic Engineers
    - Safety Personnel
    - Others
  - Information Dissemination
    - Travelers
    - Corridor Operators
      - Roadway Operators
        - Transit Operators
        - Parking Operators
        - First Responders
        - Emergency Services
      - CMS Messages
      - Har Messages
      - 511 Services
      - Fixed Devices
      - Portable Devices
      - 3rd Party Info Providers
Three Topics for Discussion

- **Response plan types**
  - Main incident response plans
  - After incident/recovery plans
  - Termination plans

- **Creation of response plans from Aimsun**
  - Automatic creation of files to be read into the rules engine

- **Prediction**
  - Response plans are read into Aimsun
  - Additional information is added
  - Model is run
  - Model output is processed to generate metrics which are passed back to the DSS
Response Plan Flow

1) Incident created
   - Response plans generated
   - Response plans run in Aimsun
   - Metrics are generated
   - Response plans are ranked
   - Response plan is selected
   - Response plan is implemented

2) Incident state revisited and new response plans generated as above

3) Incident is cleared
   - Post incident/ recovery response plan is generated and approved

4) Response plans are terminated
   - Using the post incident recovery response plan which includes termination instructions
Response Plans

- Response plans will exist in pairs
- There will be 2 response plans for each incident response
  - Incident
    - Initial Action
    - Potential Termination actions if needed
  - Post Clearance
    - Post Clearance
    - Termination
Response Plan Groupings

A  Response
A  Response Termination
A  Post-Clearance
A  Post-Clearance Termination

B  Response
B  Response Termination
B  Post-Clearance
B  Post-Clearance Termination
The initial ICM response to an incident may include components such as:

- Special intersection signal coordination
- Ramp meter changes
- Messages for signs
As the incident evolves, the ICM may suggest a change in response.

Elements from A that are not used in B are released (terminated).

Field elements in B are given their Plan B instructions. (Some may have been in play as part of A.)
After incident clearance, rather than simply release (Terminate) Plan B, the ICM will transition to a Post-Clearance plan for more efficient recovery.

This works like the A→B transition on the previous slide.
Termination of B Post-Clearance

- Once B’s Post-Clearance has run its course, its elements are released (Terminated).
- The incident and response are now fully resolved in the ICM system.
Response Plan Creation from Aimsun

- New data model for response plans
  - Nicely captures multi-route plans in playbooks and pages
  - Consistency checks implemented to test associations within response plan spreadsheets
Response Plan Spreadsheet Inventory

- **Playbooks (397)**
- **Playbook Associations (397)**
- **Pages (199)**
- **Routes (79)**
Response Plan Spreadsheet Inventory

- **Signal Strategies** (207)
- **Signal Associations** (2623)
- **Signal Plans** (2515)
- **Signal Controllers** (451)
Response Plan Spreadsheet Inventory

- Ramp Meter Strategies (93)
- Ramp Meter Associations (122)
- Ramp Meter Plans (63)
- Ramp Meter Controllers (63)
Response Plan Spreadsheet Inventory

- Wayfinding Strategies (83)
- Wayfinding Associations (84)
- Wayfinding Plans (128)
- Wayfinding DMS (71)
Aimsun Data Processing Overview

Response Plan from Decision Support System → Data Parser → Aimsun Input Files

Aimsun

APIs

Scripts

Simulation Output(s) → SQL Analysis Tool

Data Analysis Commands → Metrics → Data Converter

JSON

Data Sent Back to DSS

Aimsun Output(s)

SQL

JSON

Aimsun Input Files
Input Data Pre-Processing

- Time-of-day Information
  (for determining period to simulate)
- Incident Description
  (for Aimsun Incident Creator API)
- Signal Changes
  Selected Routes
  (for core Aimsun Model)
- Ramp Meter Overrides
  (for Aimsun Ramp Metering API)
- Lane Closures
  (in design)
Data Input into Aimsun

- Time-of-day information
- TOD Tables
- Control Data
- Ramp Meter Overrides
- Incident Descriptions
- Lane Closures
- Signal Changes
  - Selected Routes
- Scenario/Replications ID Selection
- Run command

Aimsun

- Ramp Metering API
- Incident Creator API
- Signal Control Changes Setup
- Policy Activator API

Policy ID Identification Script

Initial States

Prediction Output(s)

Scenario IDs

Policy & Strategy IDs

Run command

Run command

Signal Changes
- Driver Behavior/Routing Changes

Policy Activation Requests

Initial States

SQL
Output Data Processing

Aimsun

Simulation Output(s)

SQL Data Analysis Tool

Data Analysis Commands

Metrics Analysis Output

Filters

Data Converter

JSON Data Sent Back to DSS

One Time Data Extraction Script

Links Belonging to Statistics Zones

Links Belonging to City Areas

Links Belonging freeways
System Testing in January

- Incident information from the ATMS
- Generation of Response Plans
- Prediction output and Metrics
- Ranking of response plans

We will not execute the plans yet as:
- Not all ITS elements are in place
- We are not moving the software to the cloud until testing is done

We will look at what happened during the incident
- See if our predictions were accurate
- Analyze our response plans and determine if they would have helped
Thank You and
Next Meeting
(Suggest Tuesday October 29th at Duarte)