



# Connected Corridors Face-to-Face Meeting

Tuesday, March 10<sup>th</sup>, 2020

1:30 – 3:30 pm

LA County

March 10<sup>th</sup>  
2020



# Agenda

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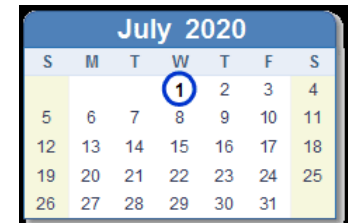
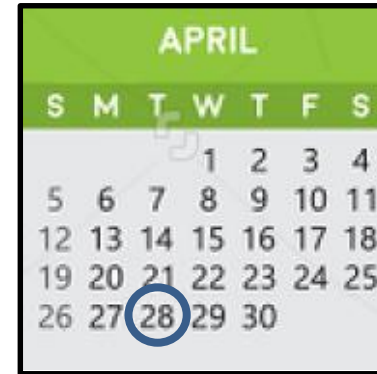
- **1:30 - 2:00 – Program Review**
- **2:00 - 2:20 – Call for Projects Update**
- **2:20 – 2:40 – Kapsch update**
- **2:40 – 3:15 – DSS Test Launch Update**
- **3:15 – 3:20 – Closing**
  - ▣ Next Meeting at LA Metro – Tuesday April 28<sup>th</sup>
  - ▣ (Monrovia, Duarte, LA Metro, Caltrans, County, Arcadia, Pasadena)



# Joe is Retiring – We need a party on April 28th

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- ❑ This is the last face to face I will lead (I will attend the next one)
- ❑ Zema will lead the next one on April 28th
- ❑ There will be a little going away celebration after the April 28<sup>th</sup> face to face at 3:30 for all of us.



## ■ Imperial Western Brewing

### ❑ In Union Station

❑ 800 N. Alameda St.

❑ Los Angeles, CA 90012

❑ <https://www.imperialwestern.com/>

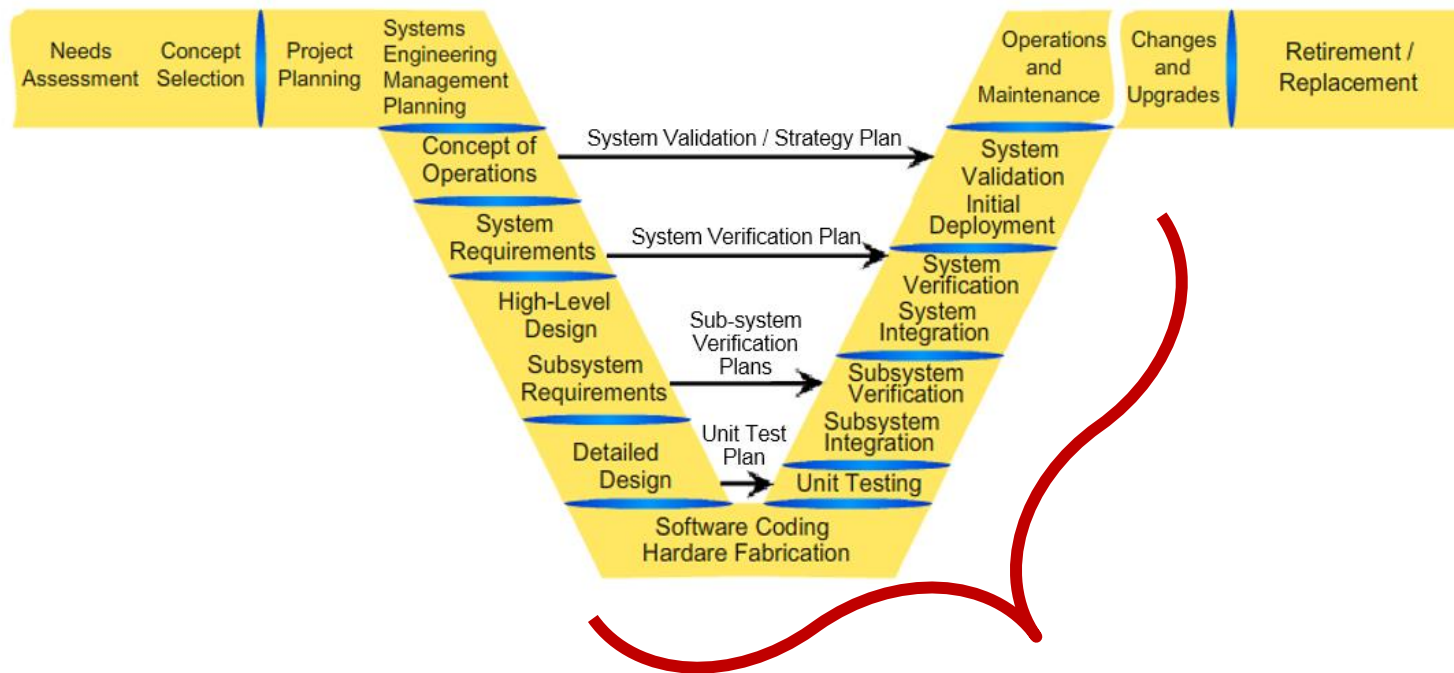


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# I-210 Overall Summary

# Systems Engineering Status

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# Schedule – Till Launch (Page 1 of 2)

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- ☐ **Complete Call for Projects Procurement** – **January 2020**
- ☐ **ATMS Incident Management to Production** – **March 2020**
- ☐ **Deploy DSS Test System** – **April 2020**
- ☐ **Complete Deployment/Release Hardening** – **May 2020**
- ☐ **Complete ATMS Modifications** – **June 2020**
- ☐ **Prediction running in the cloud** – **July 2020**
- ☐ **Complete McCain C2C** – **July 2020**
- ☐ **Loop Data Received from ATMS** – **August 2020**
- ☐ **Rules Engine running in the cloud** – **October 2020**
- ☐ **All ITS Elements Installed in Field** – **September 2020**



# Schedule – Till Launch (Page 2 of 2)

7

- ☐ **Integrate Lane Closure System** – September 2020
- ☐ **All data (sans signs) being received** – October 2020
- ☐ **Estimation running in Cloud** – December 2020
- ☐ **Performance Management System Available** – December 2020
- ☐ **Complete C2C Sign Interfaces** – January 2021
- ☐ **Complete Version 1.0 System Release** – February 2021
- ☐ **System Test and Validation** – March/May 2021
- ☐ **Before Study** – March to May 2021
- ☐ **Launch Pilot** – May 2021



# Schedule – Pilot Launch to Pilot Completion

8

- ☐ **Before Study** – March to April 2021
- ☐ **Pilot Launch** – May 2021
- ☐ **Kapsch** – May 2021 – September 2021
- ☐ **Parsons** – September 2021 – January 2021
- ☐ **Interim Benefits Analysis** – January 2022
- ☐ **Telegra** – January 2022 – May 2022
- ☐ **After Study** – March to April 2022
- ☐ **Kapsch** – June 2022 – September 2022
- ☐ **Procurement of CMS system** – August 2022
- ☐ **Procurement of Aimsun** – August 2022
- ☐ **Pilot complete** - September 2022





# DSS Test Launch - Goals for April 2020

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- **Anthony to show demonstration later in presentation**
- **Expected outcomes**
  - ▣ Response plans and metrics for review by stakeholders
  - ▣ Metrics for use in benefits analysis
- **Functions running real-time 24/7**
  - ▣ Capture incidents and data on freeways and arterials
  - ▣ ATMS C2C and Incident Capture in production and communicating with data hub and CMS
  - ▣ Kapsch CMS application in production
- **Response Plan generation on demand**
  - ▣ Response plan generation using rules engine, estimation and prediction
  - ▣ Historical and real-time modes



# Networking and Center to Center Connectivity

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## □ **Production ATMS**

- ▣ “Request-response” TMDD dialogues work
- ▣ “Subscription update” TMDD dialogue challenges due to networking arrangement supporting app’s multi-node cluster configuration

## □ **TSMSS**

- ▣ TransCore configured server, now devices “participate” in ICM TMDD dialogues
- ▣ Workaround found for “subscription update” challenges (similar to, but different from, production ATMS issues)

## □ **ICM User Secure System Access (via Kapsch application)**

- ▣ LACO user setup in progress; reconciling with LACO connectivity policies

# Networking and Center to Center Connectivity

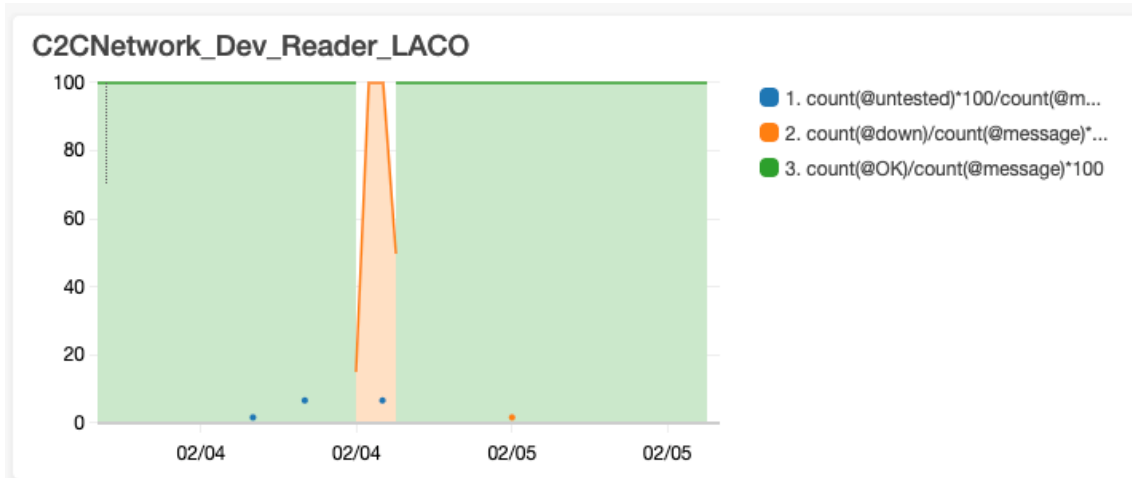
11

- **Ongoing weekly meetings between RIITS, D7 and PATH**
  - ▣ Working together to acquire updated firewall/VPN and improved support
- **System monitoring**
  - ▣ Discussions ongoing
  - ▣ Metro and Caltrans leading the effort



# Transient outage, ICM → LACO communications

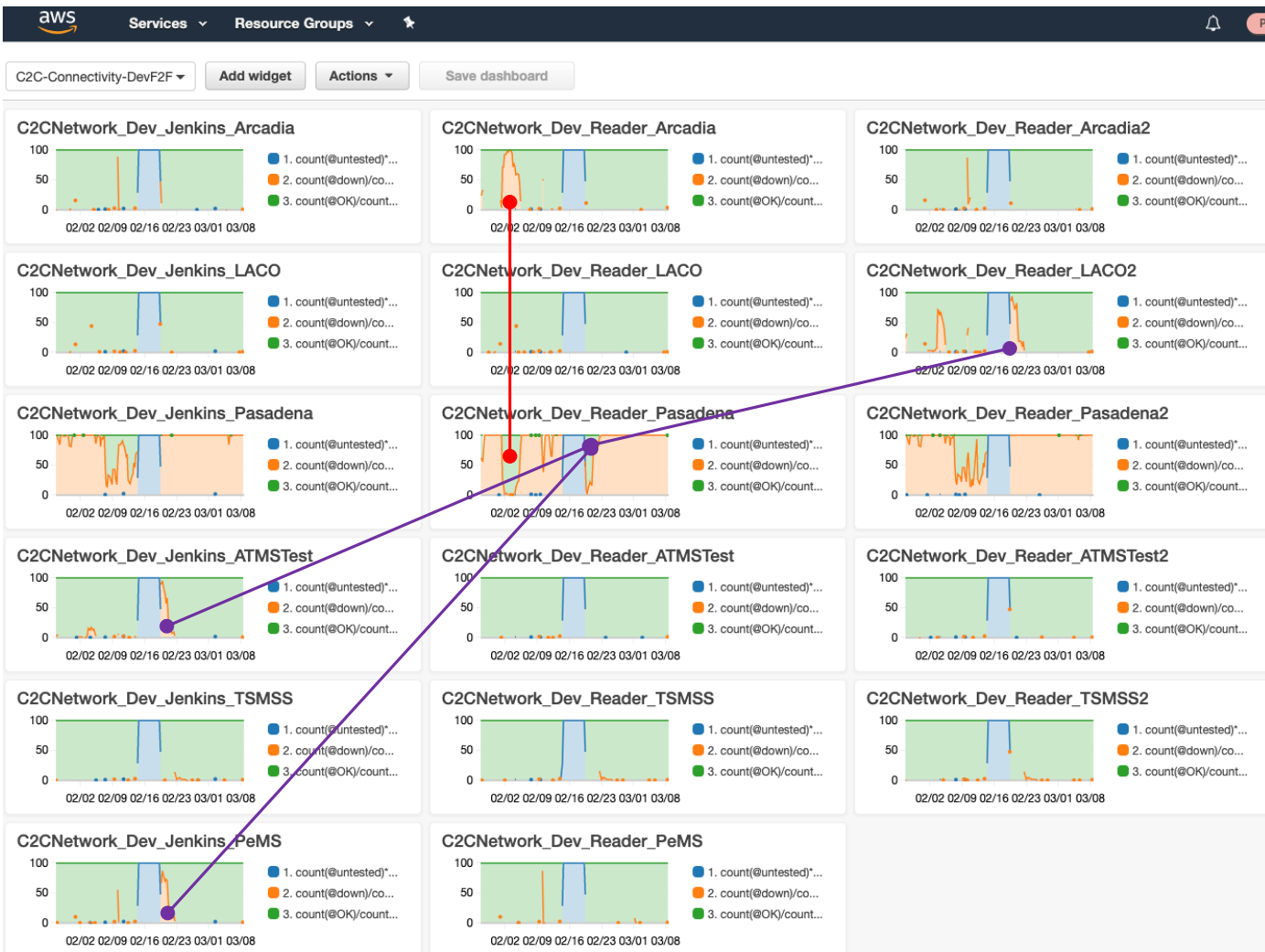
12



- ICM → LACO communications outage for several hours, afternoon of February 4, 2020
- Investigated; cause unknown
- RIITS, Parsons looking at connection reliability

# C2C Connectivity good since last Face-to-Face

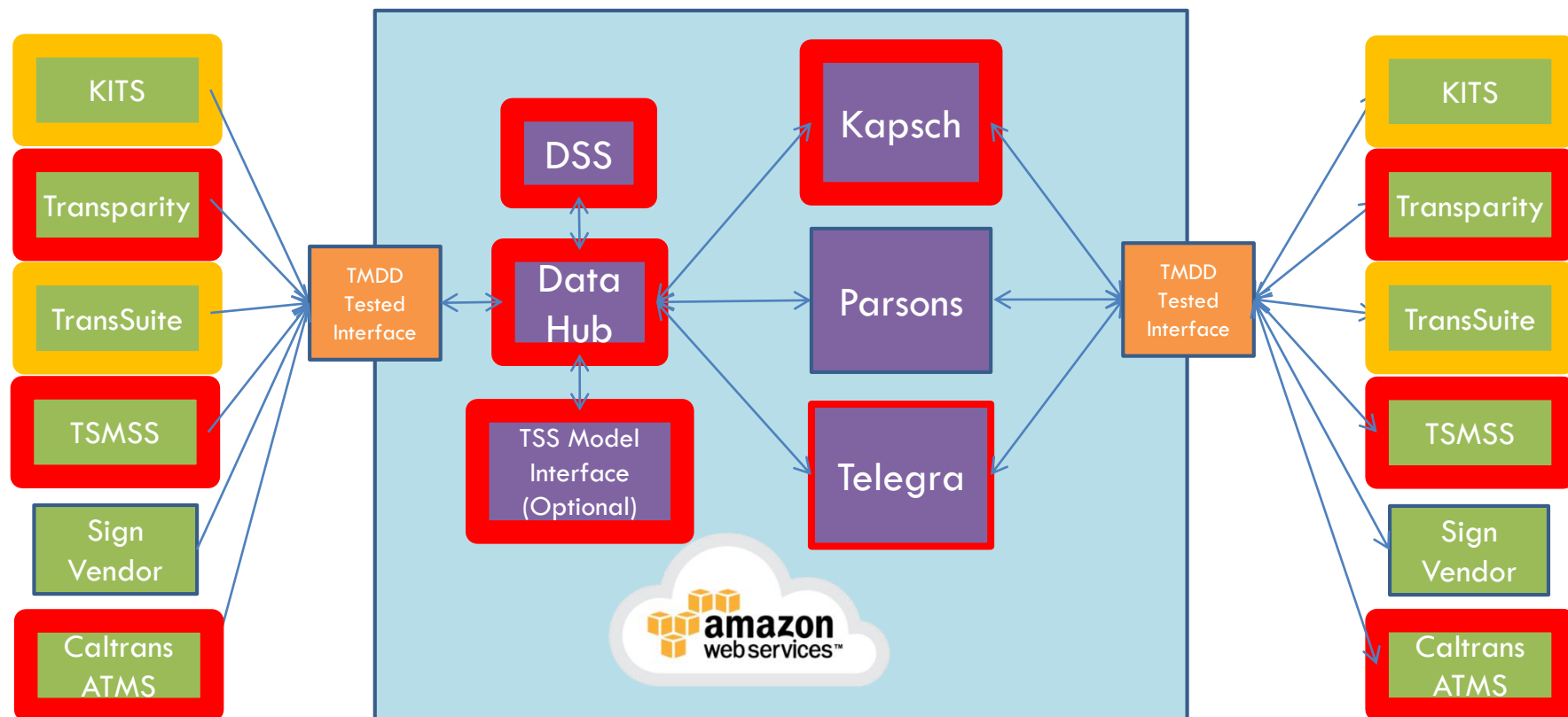
13



- Blue band represents redeployment of ICM development environment
- So-called “ghosting” behavior still observed, monitored

# C2C Interface Implementations - Status

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# Systems Development and Integration

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## □ Priorities

### ▣ Production system initial stand-up

- Kapsch deploying to production environment.

### ▣ Improve release frequency – goal is new release to test every week

- Increasing number of components that are containerized. Hub Mongo processors, persistence components
- Verifying new deployment strategy for releases and addressing issues as they are identified

### ▣ Updates

- New release of interface specification – Unique identifiers across jurisdictions for ITS elements, command targets in response plans, minor fixes
- Deployment of persistence within Development environment



# Systems Development and Integration

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## □ Priorities

### ▣ Support AMS efforts for launch

- Continued implementation of estimation, prediction, rules launch
- Assisting AMS team to integrate estimation, prediction, and rules components
- Assisting with live incident capture and response plan development, connecting AMS estimation, prediction, and rules to live data pipelines.





# Systems Integration

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## □ Pasadena

- Actively working with McCain on integration with Transparency test endpoint. McCain working on TMDD subscription fixes. Target deployment in April.

## □ Corridor Management System

- Will be implementing new specification with fixes and improvements for response plan implementation and unique identifiers.

## □ Kapsch (Corridor Management System)

- Verified Kapsch interface with ATMS for incident capture. Next steps to work on incident lifecycle management and response plans



# Systems Integration

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## □ **ATMS**

- ▣ ATMS moved to production
- ▣ But - Communication issues exist between the ATMS and the Data Hub
- ▣ Created and provided demonstrations to Caltrans personnel
- ▣ Working on prioritization of updates and fixes
- ▣ Continuing testing of changes to accommodate arterial incidents. Continue to identify and correct issues.

## □ **C2C for Dynamic Message Signs**

- ▣ We have met with the sign vendor and his vendors

## □ **TSMSS**

- ▣ Data being received. Verifying structure and basic content of feed.

# TSMSS – Initial Data Analysis

19

- **Generated 44 page report – Results:**
  - **Detector Inventory**
    - Incorrect unit in “Device-Location”
    - Missing fields of “Device-Description”, “Device-Control-Type”, “Controller-Description”, and “last-Update-Time”
  - **Detector Data**
    - OK
  - **Detector Status**
    - OK
  - **Intersection Signal Inventory**
    - Incorrect unit in “Device-Location”
  - **Intersection Signal Timing Pattern Inventory**
    - The sum of phase splits in each ring does not match the cycle length
    - There are strange values in “Maximum-Green-Duration” and “Vehicle-Clearance-Duration”
  - **Intersection Signal Control Schedule**
    - Not available from TSMSS
  - **Intersection Signal Status**
    - The attribute “Intersection-Signal-Ring-Status” is missing

## Quality Analysis of TMDD Messages – TSMSS

PATH  
UC Berkeley

March 7, 2020



Metro



# I-210 Connected Corridors Face-to-Face Meeting

Los Angeles County DPW TMC 900 South Fremont Avenue,  
Annex Building 1st floor  
Tuesday, March 10, 2020  
1:30 – 3:30 pm

Mar 10, 2020



# Agenda

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- **I-210 CC Arterial Systems Improvement Project  
System Consulting Services - Overview**
- **Status of 9 procurement package**
- **Next Steps**





Metro



# I-210 CONNECTED CORRIDORS ARTERIAL SYSTEMS IMPROVEMENT PROJECT SYSTEM CONSULTING SERVICES

## STATUS OVERVIEW

Mar 10, 2020



# Project Objective

23

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

#	Package Description	Contract #	Contract Status	Target
1	Bluetooth – Iteris Velocity	07A4470	Completed, Contract Closed	May 2019
2	Bluetooth – BlueToad	07A4477	Awarded, in Progress	Jun 2020
3	New Controller Cabinets	07A4761	Awarded, in Progress	Q3-4,2020
4	Communication Upgrades	07A4479	Installation Completed	Mar 2020
5	Firmware/Timing Plan Updates/Controller Upgrades	07A4480	Awarded, in Progress	Q3-4,2020
6	Video Detection System	07A4481	Installation To be Completed	Apr 2020
7	Data Communication Module and Video Detection Software Upgrade	07A4755	Awarded, in Progress	Q3-4,2020
8-1	DMS Procurement	07A4792-3	Awarded, in Progress	Jun-Jul 2020
8-2	DMS Integration	07A4794	Awarded, in Progress	Feb 2021
8-3	DMS & Static Sign Installation	N/A	To be handled by stakeholders	Q3-4,2020
9	Environmental Stations with Air Quality Sensors and Open Data Systems	07A4388	Awarded, in Progress	Q2-3,2020



# Project Area

24

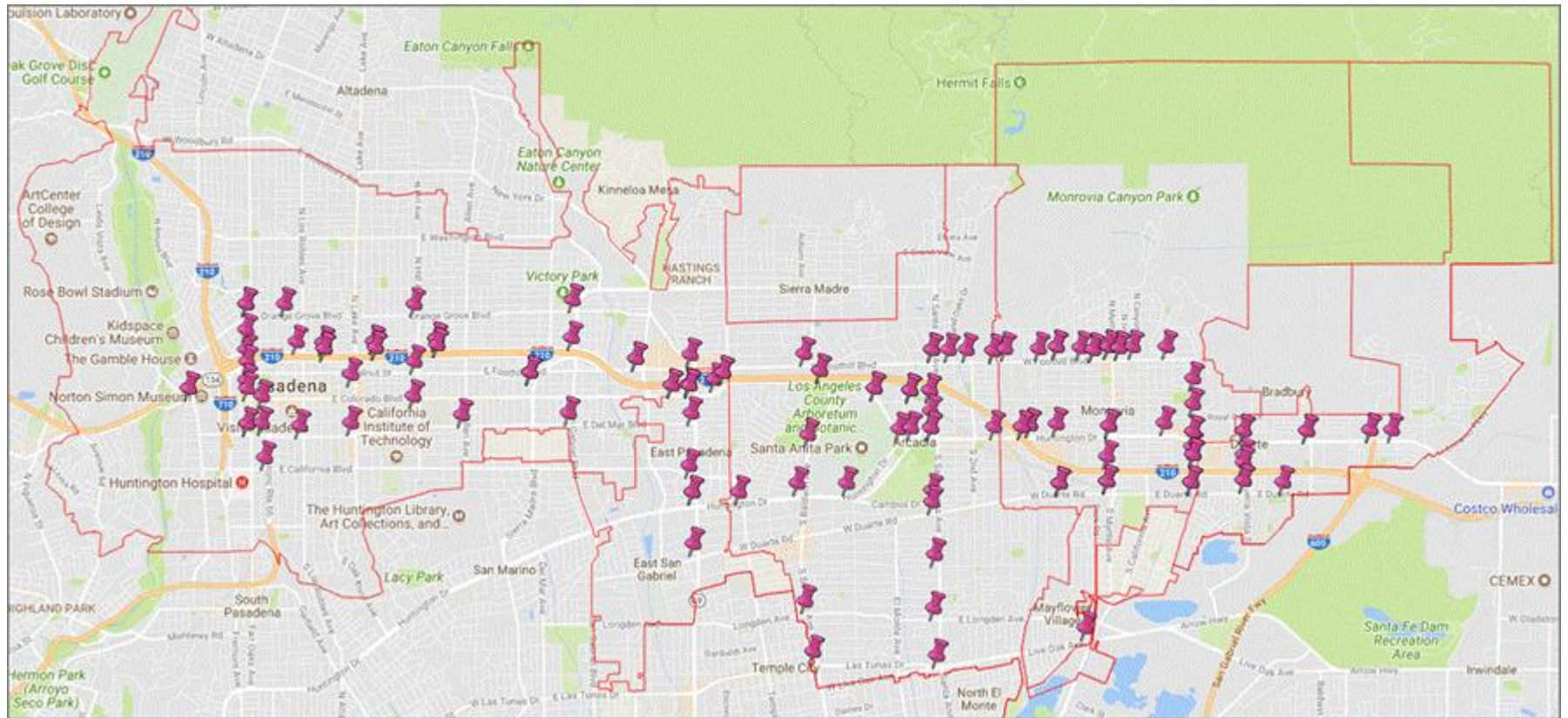
#	Package Description	Contract #	Metro & Caltrans	City of Pasadena	City of Arcadia	City of Monrovia	City of Duarte	LA County
1	Bluetooth – Iteris Velocity	07A4470	√		√			
2	Bluetooth – BlueToad	07A4477	√	√		√	√	√
3	New Controller Cabinets	07A4603	√	√	√			
4	Communication Upgrades	07A4479	√		√	√	√	√
5	Firmware/Timing Plan Updates/Controller Upgrades	07A4480	√	√	√	√		√
6	Video Detection System	07A4481	√	√	√	√	√	√
7	Data Communication Module and Video Detection Software Upgrade	07A4755	√	√	√	√	√	√
8-1	DMS Procurement	07A4792-3	√	√				√
8-2	DMS Integration	07A4794	√	√				√
8-3	DMS Installation	N/A	√	√				√
9	Environmental Stations with Air Quality Sensors and Open Data Systems (ODS)	07A4388	√					





# Project Area (cont.)

25





# UPDATE ON PACKAGES 1-9

Mar 10, 2020



# Package Status – Pkg # 1

27

Pkg. #	Pkg.	Contract #	Project Status
1	Bluetooth – Iteris Velocity	07A4470 PTM	<ul style="list-style-type: none"> <li>• NTP: 7/10/2018</li> <li>• Kick-off Meeting: 7/30/2018</li> <li>• Submittal Approved: 8/16/2018</li> <li>• Installation &amp; Testing Completed on 5/29 &amp; 5/30/2019</li> <li>• Accepted by Arcadia, Documents Submitted</li> <li>• Completed</li> </ul>



# Package Status – Pkg # 2

28

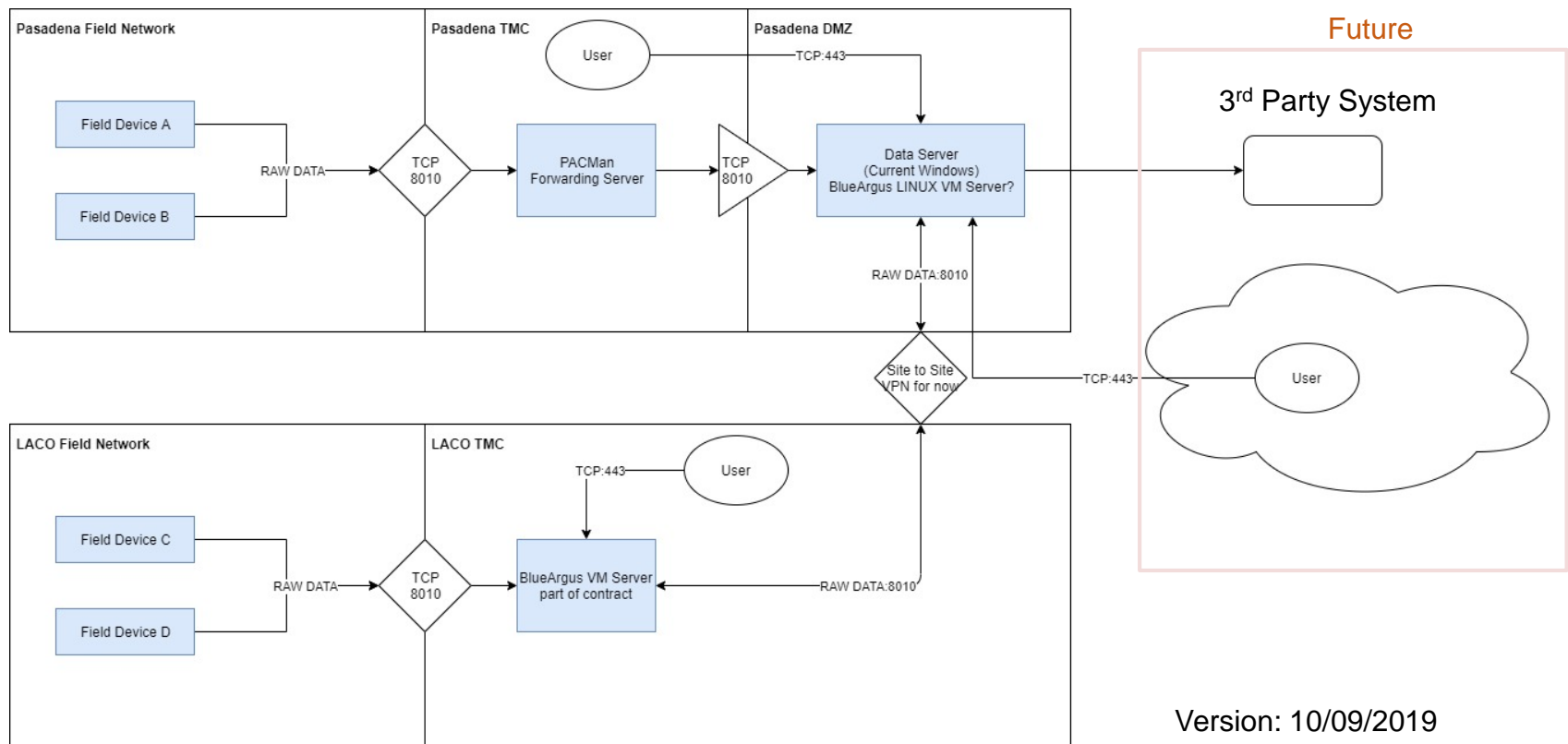
Pkg. #	Pkg.	Contract #	Project Status
2	Bluetooth – BlueToad	07A4477 DBX	<ul style="list-style-type: none"> <li>• NTP: 7/10/2018</li> <li>• Kick-off Meeting: 7/30/2018</li> <li>• Submittal Approved: 10/12/2018</li> <li>• Installation: <ul style="list-style-type: none"> <li>• LA County, Monrovia, Duarte: 10 locations done; LACo VM server configured on 5/15/19; working on LA Co &lt;-&gt; Pasadena VPN connection</li> <li>• Caltrans: 1 location without existing comms. Equipment delivered to LA County</li> <li>• Pasadena: scheduling server installation at TMC &amp; field installation at 11 locations (Mar 2020)</li> </ul> </li> <li>• Site Testing: <ul style="list-style-type: none"> <li>• LA County: completed</li> <li>• Pasadena: to be scheduled after installation</li> </ul> </li> <li>• System Testing: <ul style="list-style-type: none"> <li>• To be scheduled after installation &amp; site testing</li> </ul> </li> <li>• Expected to be completed: June 2020 (90%)</li> </ul>



# Package Status – Pkg # 2

29

## □ P2 - BlueToad Travel Time System – Comm. Architecture



# Package Status – Pkg # 3

30

Pkg. #	Package Name	Contract #	Project Status
3	New Controller Cabinets	07A4761 Crosstown	<ul style="list-style-type: none"> <li>• <b>Advertised: 9/26/19</b></li> <li>• Awarded: 2/11/2020</li> <li>• NTP: 2/19/2020</li> <li>• Kick-off Meeting: 2/25/2020</li> <li>• On-going: <ul style="list-style-type: none"> <li>• Site Installation Inventory &amp; Material Submittal &amp; Permit application</li> </ul> </li> <li>• Expected to be completed: Q3-Q4, 2020</li> </ul>



# Package Status – Pkg # 4

31

Pkg. #	Package Name	Contract #	Project Status
4	Communication Upgrades	07A4479 Kanaan Construction	<ul style="list-style-type: none"> <li>NTP: 7/13/2018</li> <li>Kick-off Meeting: 7/30/2018</li> <li>Submittal &amp; RFI Approved: 5/6/2019</li> <li>Equipment procured</li> <li>Installation of 35 locations: completed</li> <li>Testing: completed</li> <li>Testing Reports: submitted on 1/13/2020</li> <li>Original Scope: Completed</li> <li>Next steps: <ul style="list-style-type: none"> <li>Close all RFIs</li> <li>Additional 2 POE extenders to be installed at 1 location (Approved CO) in Mar 2020</li> </ul> </li> <li>Discussion <ul style="list-style-type: none"> <li>7 locations in LA County – no communications yet</li> <li>Option 1 : Waiting until RIITS network and L3 Switches are available – Q3-4, 2020</li> <li>Option 2: Install 4 additional radios – out of budget</li> </ul> </li> </ul>





# Package Status – Pkg # 5

32

Pkg. #	Package Name	Contract #	Project Status
5	Firmware/Timing Plan Updates/Controller Upgrades	07A4480 CPE, Inc	<ul style="list-style-type: none"> <li>NTP: 7/17/2018</li> <li>Kick-off Meeting: 7/30/2018</li> <li>Submittal Reviewed but Required hardware/firmware changed per Stakeholder Comment</li> <li>Contractor revised price estimate (\$128,892.50) lower than original amount (\$171,600.00) – reviewed &amp; approved by stakeholders                             <ul style="list-style-type: none"> <li>Arcadia</li> <li>Pasadena</li> <li>LA County</li> <li>Caltrans</li> </ul> </li> <li>Material Submittals – approved</li> <li>Materials Procurement – in progress</li> <li>Installation Permits – in progress</li> <li>Est. Duration: 6 months</li> <li>Expected to be completed: Q3-Q4, 2020</li> </ul>





# Package Status – Pkg # 6

33

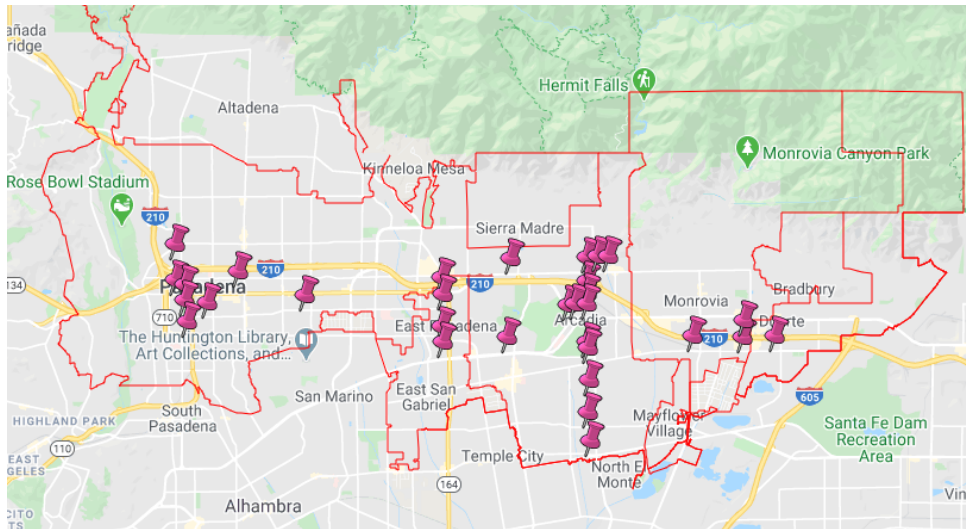
Pkg. #	Package Name	Contract #	Project Status
6	Video Detection System	07A4481 Traffic Loops Crackfilling, Inc	<ul style="list-style-type: none"> <li>NTP: 7/10/18</li> <li>Kick-off Meeting: 7/30/18</li> <li>10/9/18: Conducted Site Survey</li> <li>10/18/18: Submittal approved</li> <li>Installation: <ul style="list-style-type: none"> <li>21 out of 22 installations are completed (2 LA County, 5 Monrovia, 3 Arcadia, 8 Pasadena, 3 in Duarte)</li> <li>1 location in Pasadena: conduit too small. Boring 3" rigid conduit is approved. Installation has started on 3/9/202 and will take 1-2 weeks.</li> </ul> </li> <li>Acceptance Testing: in process</li> <li>Expected to be completed: April 2020 (90%)</li> </ul>



# Package Status – Pkg # 7

34

Pkg. #	Package Name	Contract #	Project Status
7	Data Communication Module and Video Detection Software Upgrade	07A4755 Crosstown	<ul style="list-style-type: none"> <li>Advertised: 1/2/2020</li> <li>Awarded: 2/11/2020</li> <li>NTP: 2/19/2020</li> <li>Kick-off Meeting: 2/25/2020</li> <li>On-going: <ul style="list-style-type: none"> <li>Site Installation Inventory &amp; Material Submittal &amp; Permit application</li> </ul> </li> <li>Expected to be completed: Q3-Q4, 2020</li> </ul>



## 30 Locations:

- 4 locations in LA County
- 1 location in City of Duarte
- 3 locations in City of Monrovia
- 8 locations City of Pasadena
- 14 locations in City of Arcadia

# Package Status – Pkg # 8-1, 8-2, 8-3

35

Year	2020												2021						
Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7
DMS Procurement																			
DMS Delivery																			
DMS Installation																			
DMS Integration																			
DMS System Testing																			
Training																			



April 2021, Hard Launch of I-210  
CC System (Est.)

DMS lead time: 16 weeks

DMS Pole lead time: 18 weeks



# Package Status – Pkg # 8-1

36

Pkg. #	Package Name	Contract #	Project Status
8-1	Advanced Traveler Information Systems: DMS Procurement	07A4792-3 Elan Moyal	<ul style="list-style-type: none"> <li>• Advertised: 10/25/19</li> <li>• Awarded: 12/2/ 2019</li> <li>• Kickoff meeting: 12/19/2019</li> <li>• Material Submittals &amp; procurement: in progress</li> <li>• Expected to be completed: June-July 2020</li> </ul>

Item	Total	Caltrans	LACO	Pasadena	Status
DMS	21	2	2	17	Approved (lead time: 16 wks)
Poles	19	0	2	17	Approved (lead time: 18 wks)
Pull boxes	21	2	2	17	Changed Requirement, updating submittal
Power & Comm Cables	11,000 ft	TBD	TBD	TBD	Approved
Radios	12	0	0	12	Approved
Signal Control System	3	1	1	1	Evaluating options
Servers	3	1	1	1	Changed Requirement, updating submittal



# Package Status – Pkg # 8-2

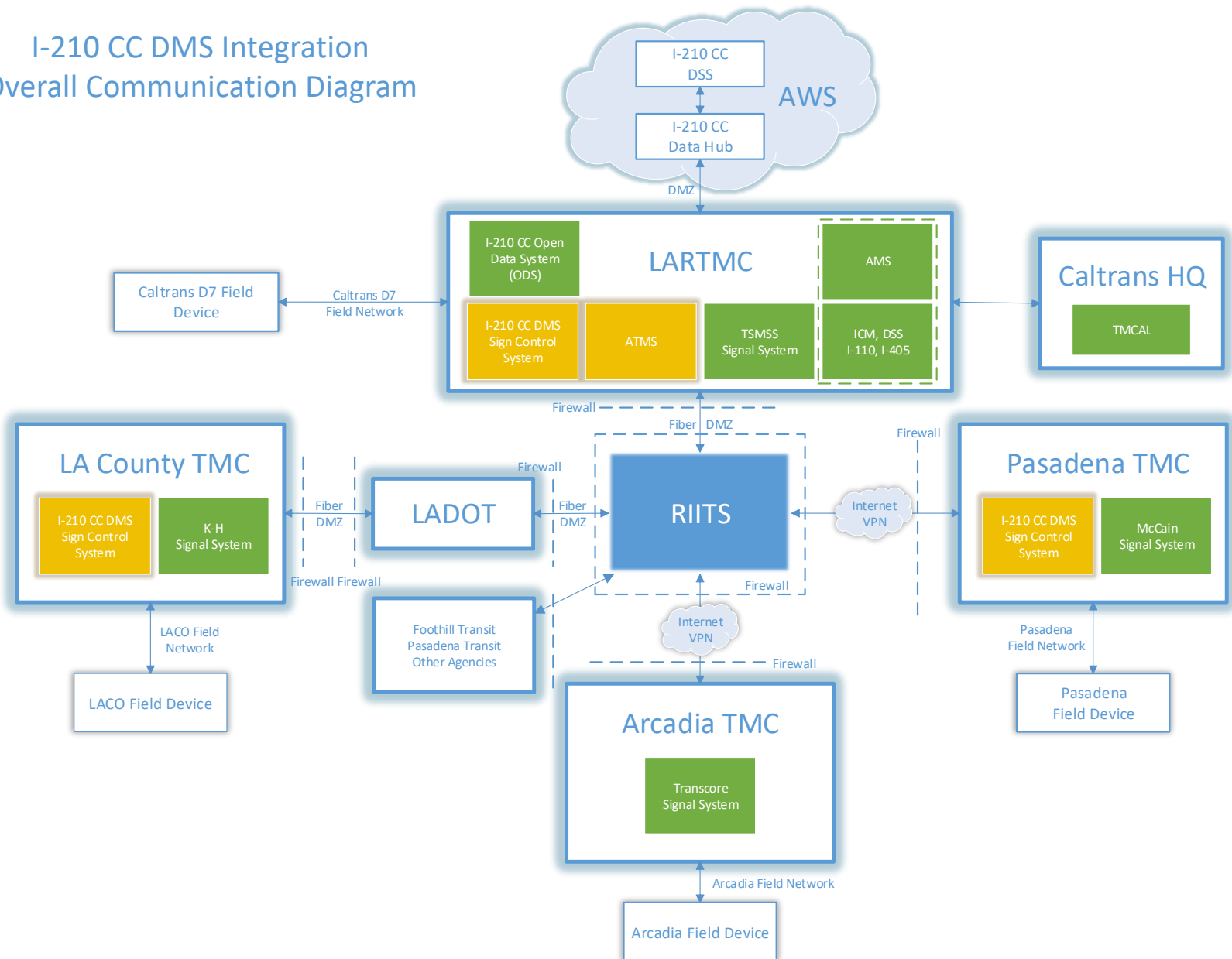
37

Pkg. #	Package Name	Contract #	Project Status
8-2	Advanced Traveler Information Systems: DMS Integration	07A4794 Parsons	<ul style="list-style-type: none"><li>• Advertised: 11/14/19</li><li>• Awarded: 1/3/ 2020</li><li>• Kickoff meeting: 1/14/2020</li><li>• Working on<ul style="list-style-type: none"><li>• System architecture diagrams – draft in review</li><li>• Installation quality checklist – draft ready</li><li>• ATMS Integration – define development tasks</li></ul></li><li>• Expected to be completed: : Q1 2021</li></ul>



# I-210 CC DMS Integration Overall Communication Diagram

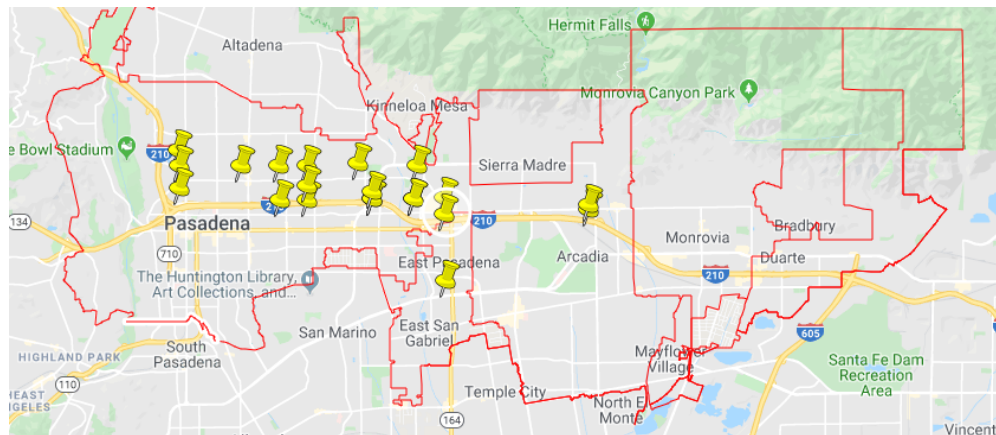
38



# Package Status – Pkg # 8-3

39

Pkg. #	Package Name	Contract #	Project Status
8-3	Advanced Traveler Information Systems: DMS & static sign Installation	N/A to be handled by Caltrans, LAPDW, & Pasadena	<ul style="list-style-type: none"> <li>DMS Installation: <ul style="list-style-type: none"> <li>To start after hardware &amp; software are delivered (May-June 2020)</li> <li>LA County: start after Aug – Oct 2020</li> <li>Pasadena: expected Jun – Sep 2020</li> </ul> </li> <li>Static Signs Installation: <ul style="list-style-type: none"> <li>Ordered by Caltrans Maintenance Group: Jul. 2019</li> <li>take 9-12 months (Est. Jul 2020)</li> <li>Installation will be handled by Caltrans</li> </ul> </li> <li>Expected to be completed: Q3-Q4, 2020</li> </ul>



# Package Status – Pkg # 9

40

Pkg. #	Pkg.	Contract #	Project Status
9	Environmental Stations with Air Quality Sensors and Open Data Systems (ODS)	07A4388 Cal Poly Pomona	<ul style="list-style-type: none"> <li>NTP: 6/29/18</li> <li>Kick-off Meeting: 7/12/18</li> <li>Environmental stations                             <ul style="list-style-type: none"> <li>Roadside study done</li> <li>Field installation done – 6/7/19</li> <li>Collect data and analyze data - ongoing</li> </ul> </li> <li>ODS                             <ul style="list-style-type: none"> <li>Coordination w/ Foothill Transit &amp; Pasadena Transit</li> <li>Coordination w/ PATH                                     <ul style="list-style-type: none"> <li>Data Specification</li> <li>Sample Response Plan</li> <li>Inventory of Road Network, Signal ID</li> <li>To start testing with response plan generated by DSS</li> </ul> </li> <li>Coordination w/ Caltrans                                     <ul style="list-style-type: none"> <li>Communications Architecture - done</li> </ul> </li> </ul> </li> <li>Expected to be completed: Q2-Q3 2020</li> </ul>





# Next Steps

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- ❑ Package 2: Install TMC & field equipment in Pasadena
- ❑ Package 3: Confirm site installation inventory and submit material submittal
- ❑ Package 4: Install 2 additional POE extenders at 1 location, close contract
- ❑ Package 5: Complete material procurement
- ❑ Package 6: Complete installation at 1 location in Pasadena & complete acceptance testing
- ❑ Package 7: Confirm site installation inventory and submit material submittal
- ❑ Package 8-1: Continue procurement; coordinate with 8-2
- ❑ Package 8-2: Develop integration plan
- ❑ Package 8-3: Track 8-1 status
- ❑ Package 9: Support setting up comms & system testing



# **Thank You and Questions?**

Mar 10, 2020



**kapsch** >>>  
challenging limits

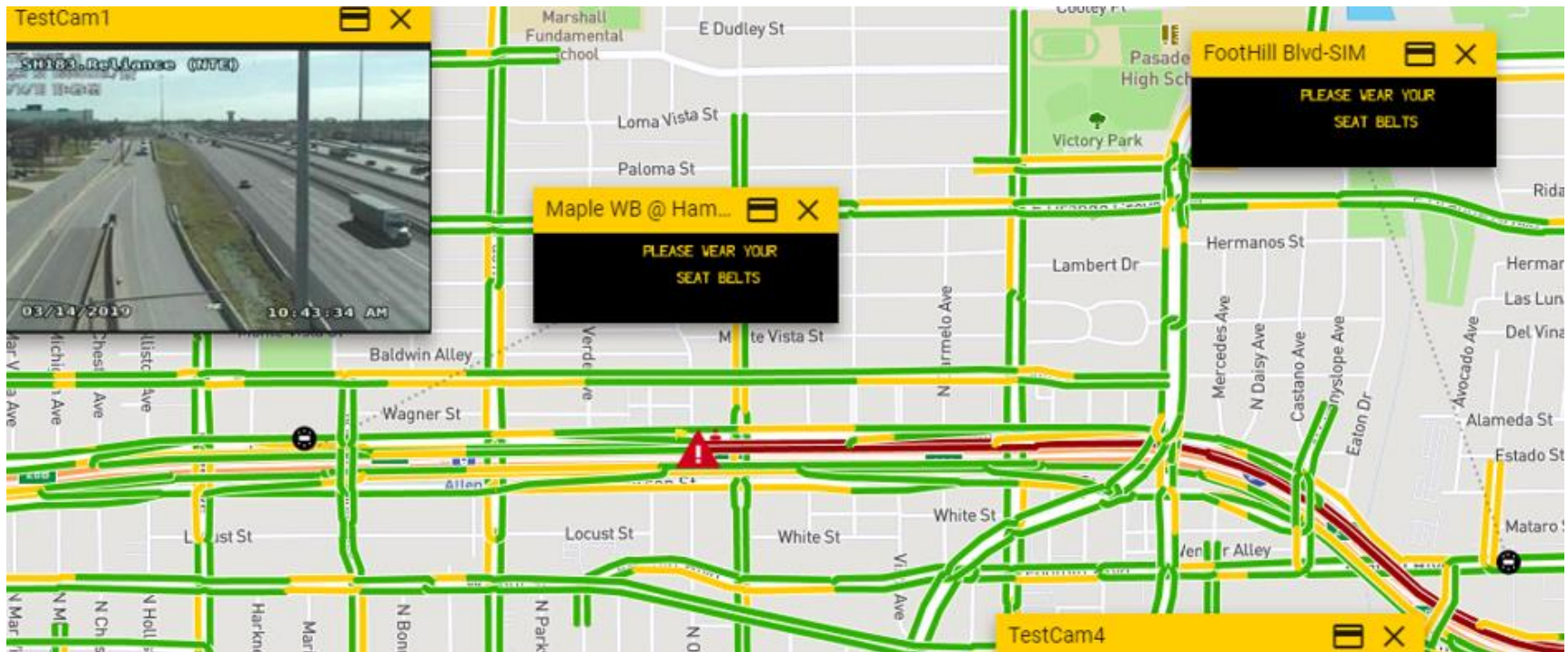
# I-210 CALTRANS Pilot, March 10<sup>th</sup>, 2020

Kapsch TrafficCom

*Integrated Corridor Management*

# I-210 Integrated Corridor Management Kapsch Update

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Tim O'Leary  
March 10, 2020

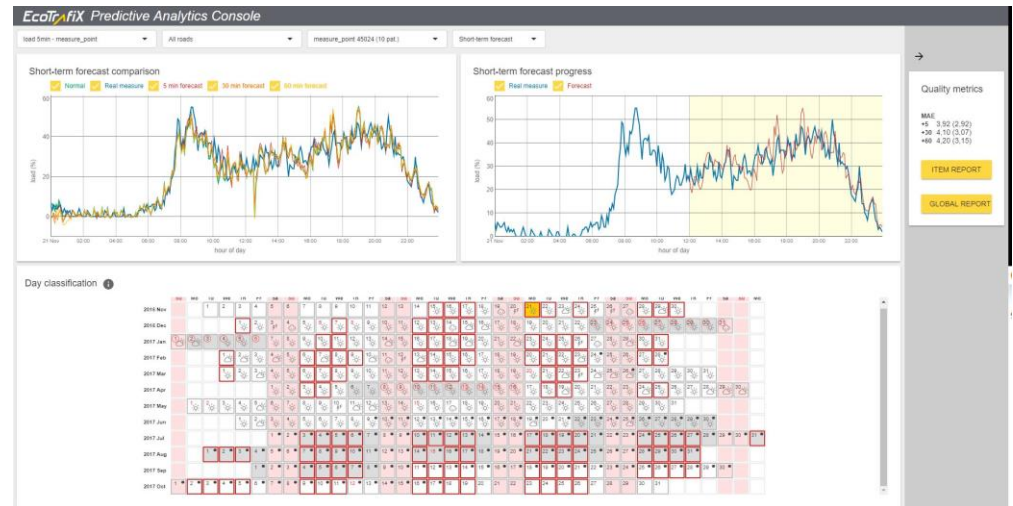
# EcoTrafIX Product Status

45

❑ EcoTrafIX V3.2 scheduled for June 2020

❑ In progress:

- Improve roadway link incident creation
- Waze integration
- Regional Map device filters
- Regional Map transparent layers



# EcoTrafIX Interface Status

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## Good progress:

- ❑ EcoTrafIX receiving events from ATMS
- ❑ EcoTrafIX forwarding ATMS events to PATH's Hub
- ❑ EcoTrafIX ready to receive Response Plans from DSS
- ❑ Created accounts for LA County and Arcadia
- ❑ Working on production environment deployment





# EcoTrafIX Interface Status

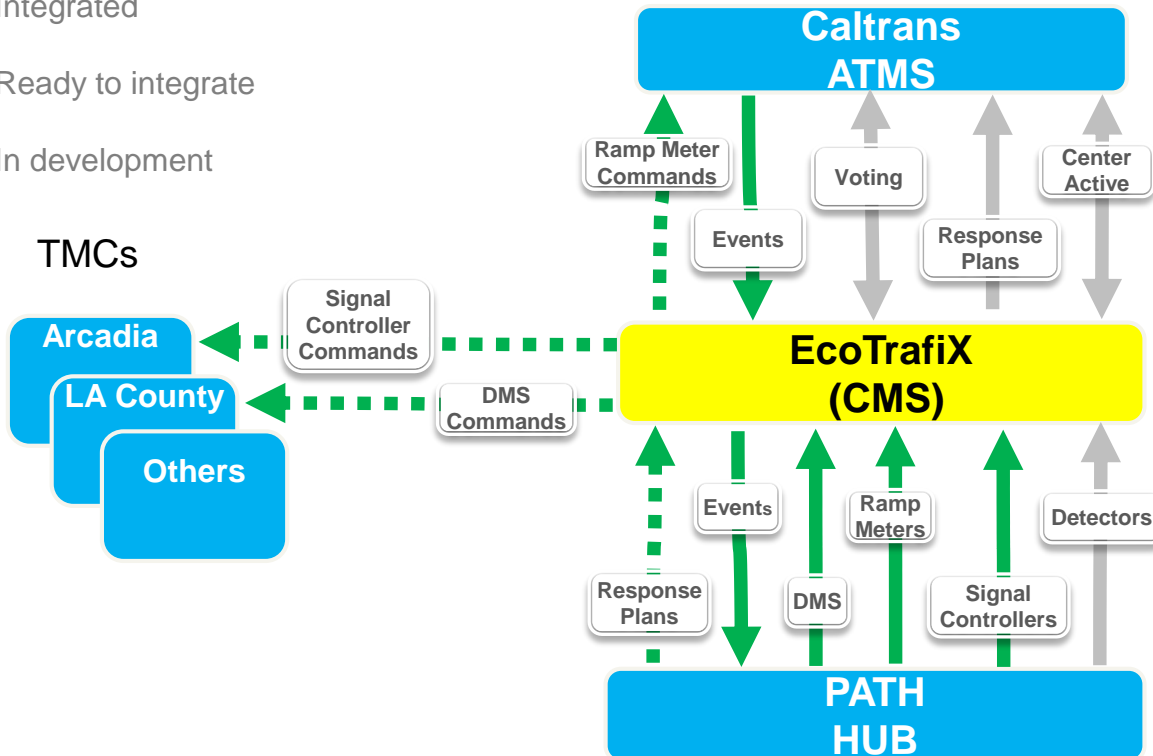
47

## Interface

→ Integrated

→ Ready to integrate

→ In development



# EcoTrafIX Status

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## Next Steps

- Deploy EcoTrafIX V3.1: multiple closed links/lanes
- Request TMCs execute device commands
- DSS send Response Plans to EcoTrafIX
- EcoTrafIX exchange Voting with ATMS
- EcoTrafIX send Response Plans to ATMS





# Thank You!

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**Kapsch TrafficCom**

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USA**

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**timothy.oleary@Kapsch.net**

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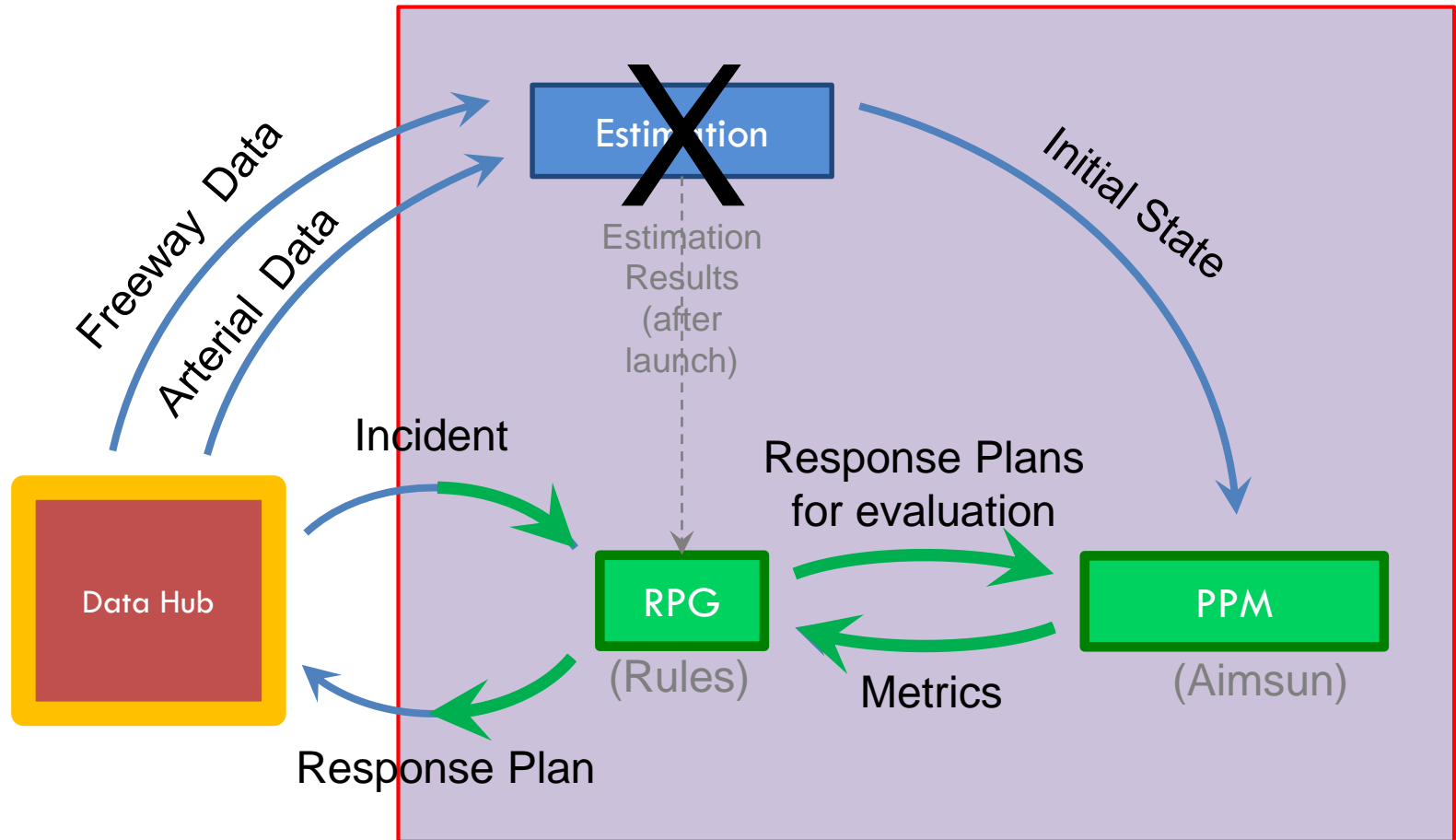


50

# Test Launch

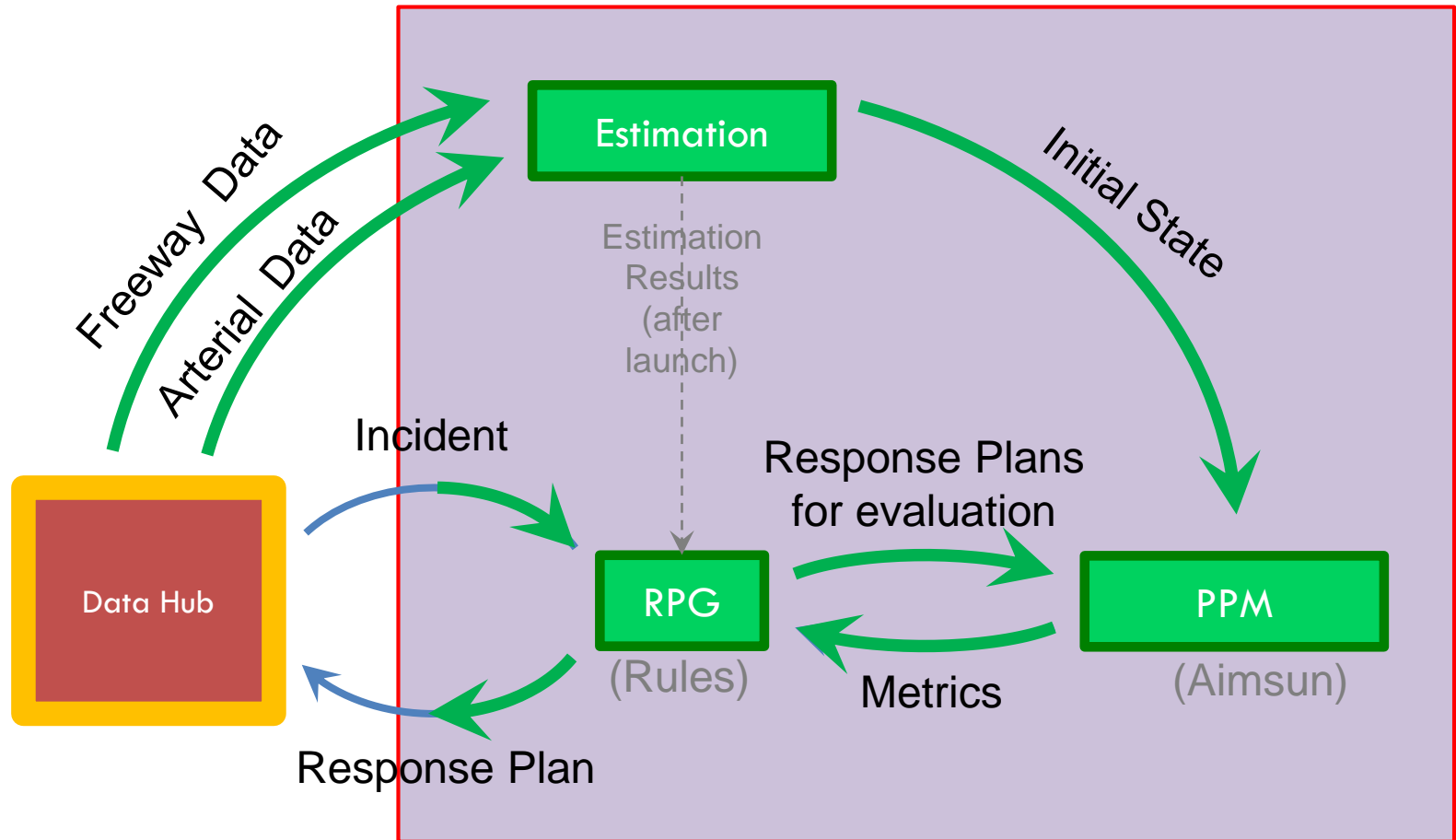
# Last time for January Demo...

51



# Today's Demo

52



# Test DSS Goals for April

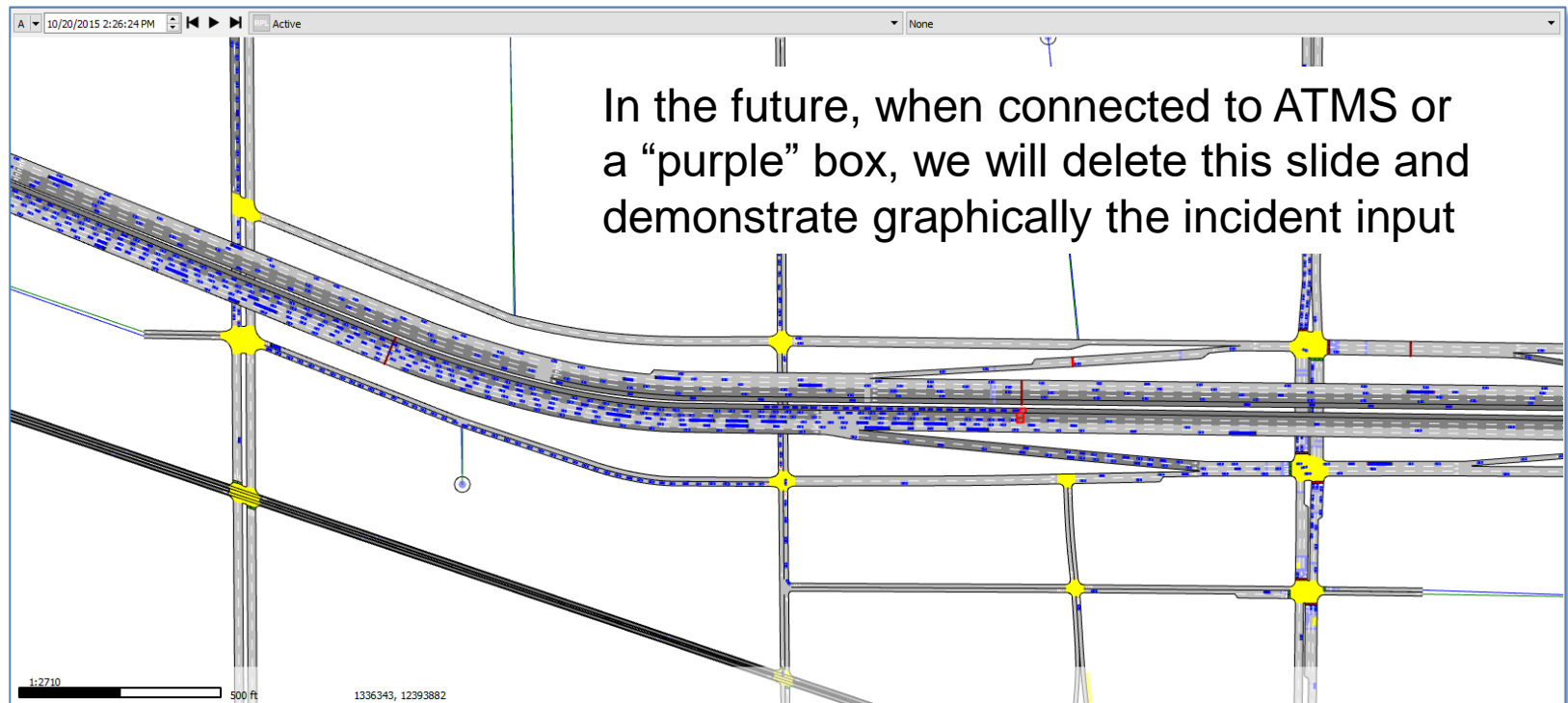
53

- **Functions running real-time 24/7**
  - ▣ Capture incidents
  - ▣ Capture data on freeways and arterials
- **Functions running on demand**
  - ▣ Estimation, PPM (Prediction), and RPG (Rules)
  - ▣ Historical and real-time modes
- **Expected outcomes**
  - ▣ Response plans and metrics for review by stakeholders
  - ▣ Metrics for use in benefits analysis
  - ▣ Ability to demonstrate operation
  - ▣ Find and fix bugs
  - ▣ Move forward with system integration

# Incident Location

54

- **HOV and two mainline lanes blocked near Myrtle exit**

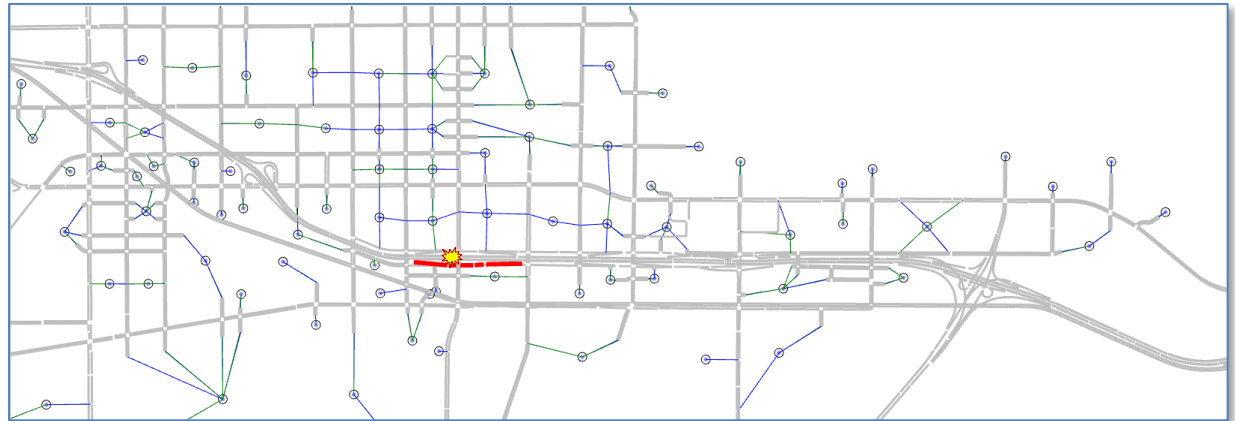


# Detours Activated

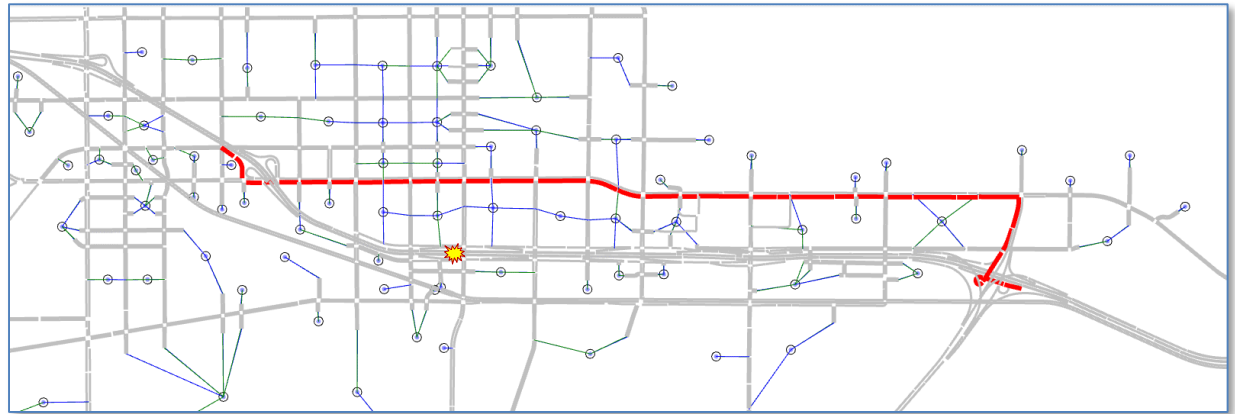
55

## □ HOV and two mainline lanes blocked near Myrtle exit

*Myrtle off-ramp to  
Myrtle on-ramp*



*Huntington off-ramp to Mount  
Olive/I-605*

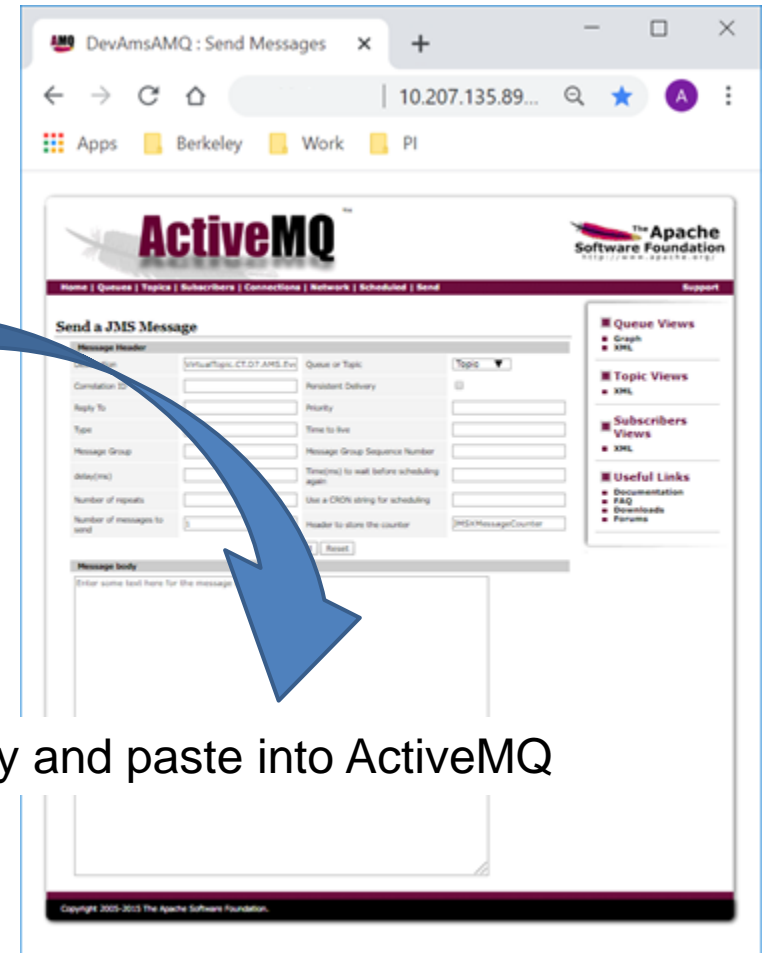


# Demo Kickoff

56

In future, the incident will be entered from an ATMS or “purple box” system

```
1 fev.JsonFixedForPredictionMyrtle.json
2 {
3   "message-header": {
4     "organization-sending": { "organization-id":
5       "Caltrans-D7"},
6     "organizations-receiving": {
7       "organizations-receiving-item": [{
8         "organization-id": "Datahub"}]},
9     "message-type-version": 2,
10    "message-number": 1,
11    "message-time-stamp": {
12      "date": "20200125",
13      "time": "1579596260765",
14      "offset": "-0800"
15    }
16  },
17  "event-reference": {
18    "event-id": 1242245,
19    "event-update": 1,
20    "update-time": {
21      "date": 20200125,
22      "time": 1579595984438,
23      "offset": "-0800"
24    }
25  },
26  "event-indicators": { "event-indicator": [
27    { "status": "confirmed",
28      "severity": "minor",
29      "planned-event-class": "incident",
30      "active-flag": "yes"
31    }
32  ] },
33  "event-headline": {
34    "headline": { "accidents-and-incidents": "multi
35      vehicle accident",
36    "headline-element": 1
37  },
38  "event-element-details": { "event-element-detail": [{
```



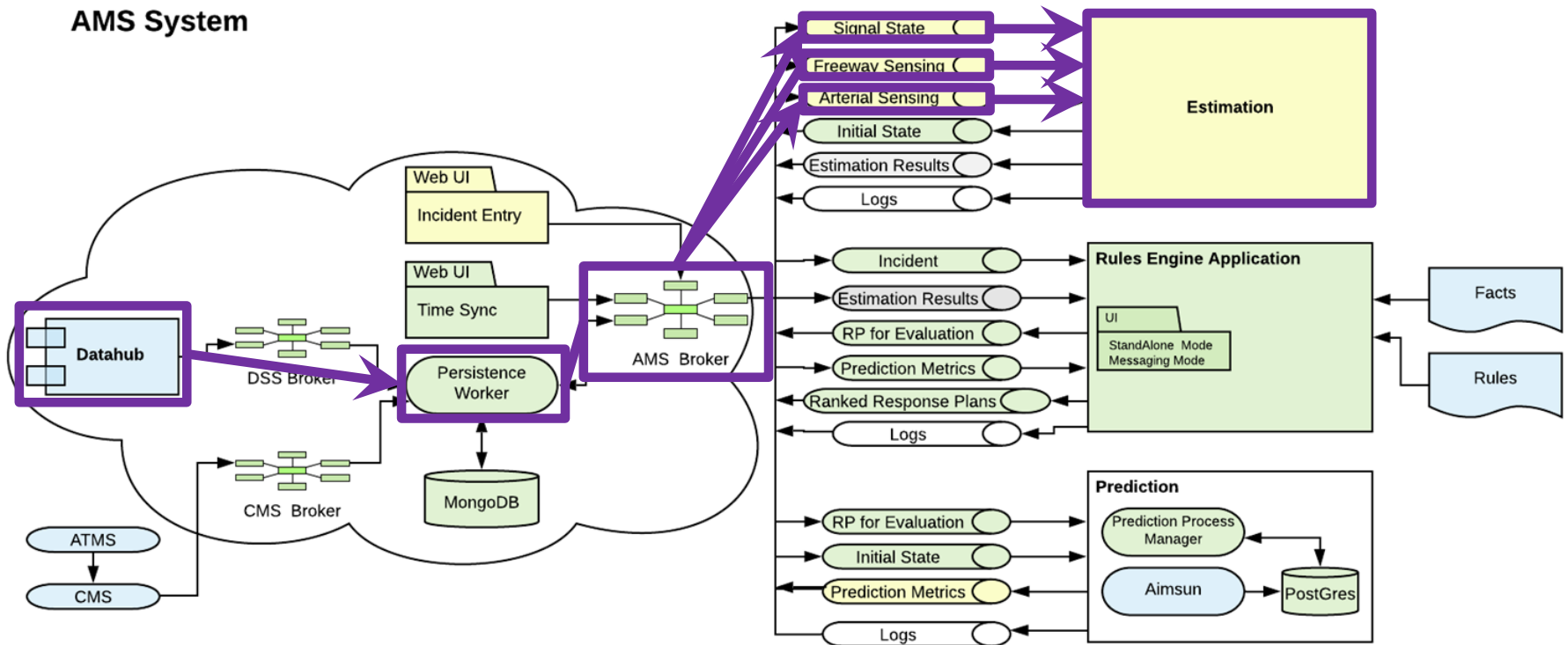
Copy and paste into ActiveMQ



# Estimation Integration

57

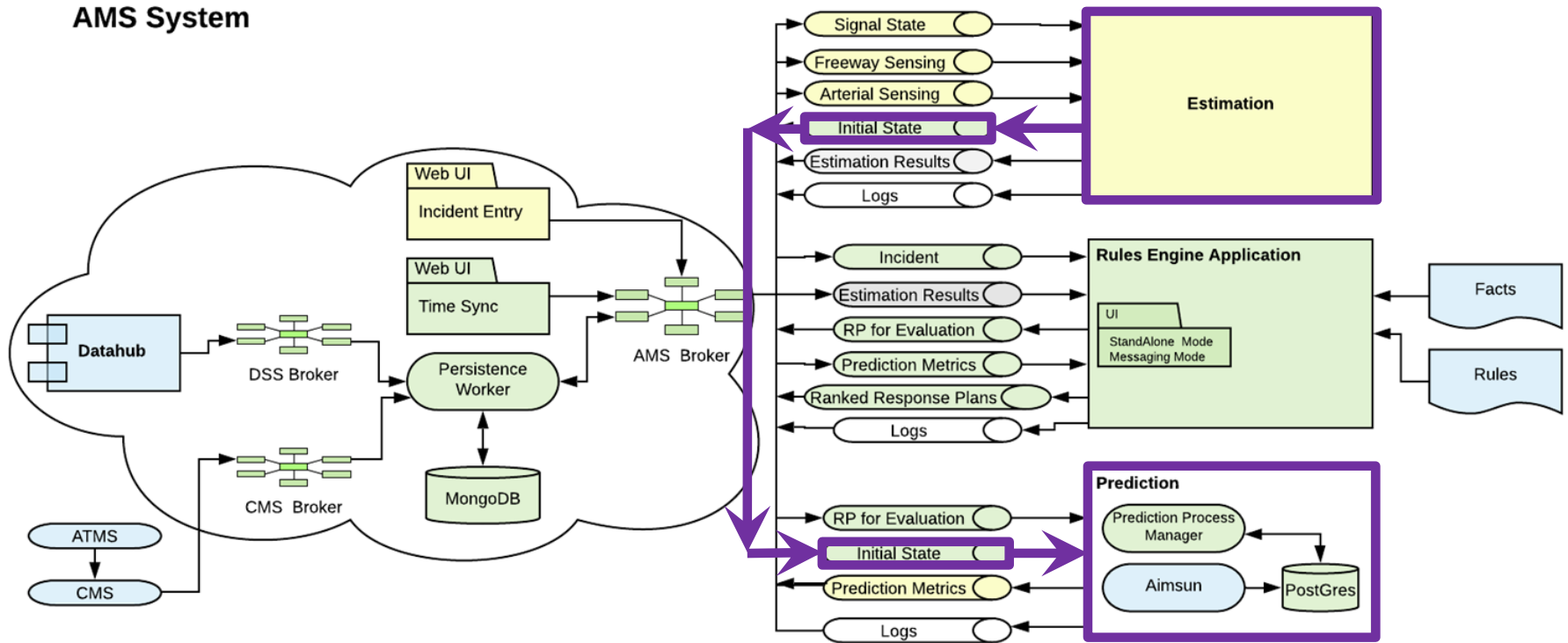
## AMS System



# Estimation Integration

58

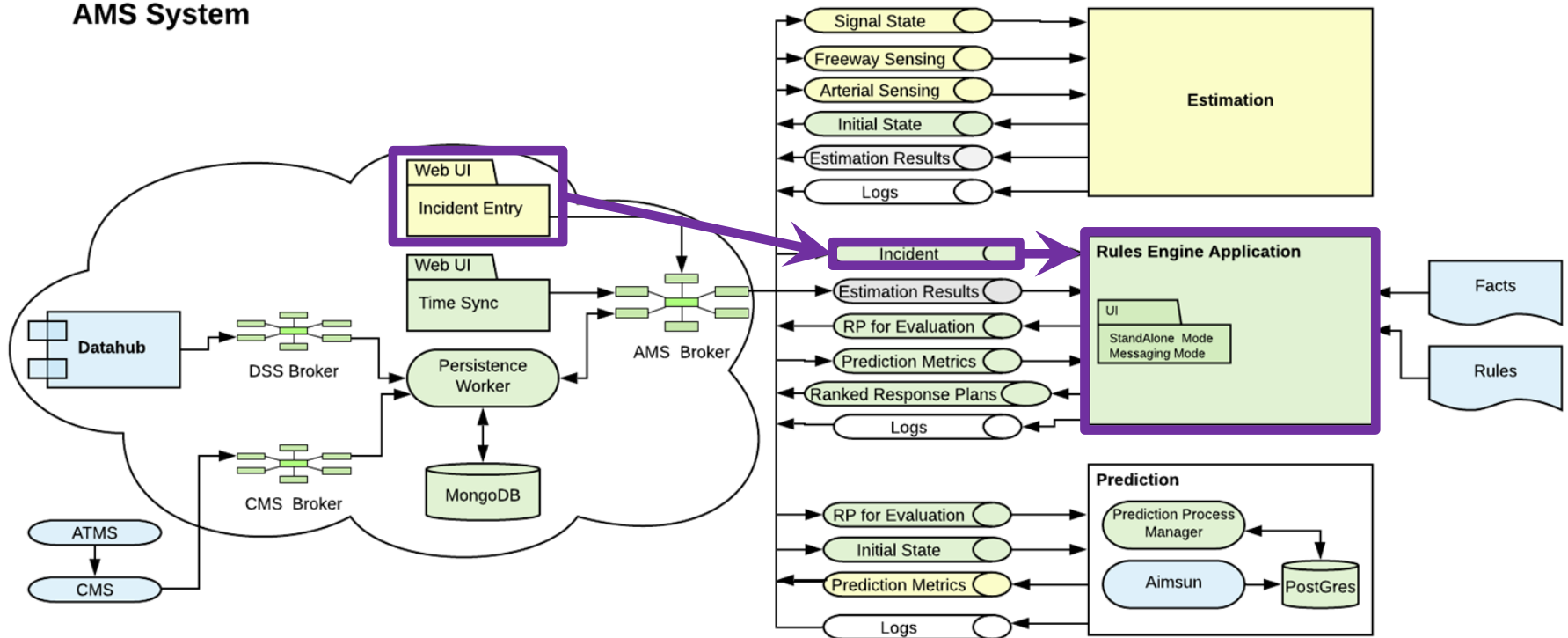
## AMS System



# Test Launch Demo Overview

59

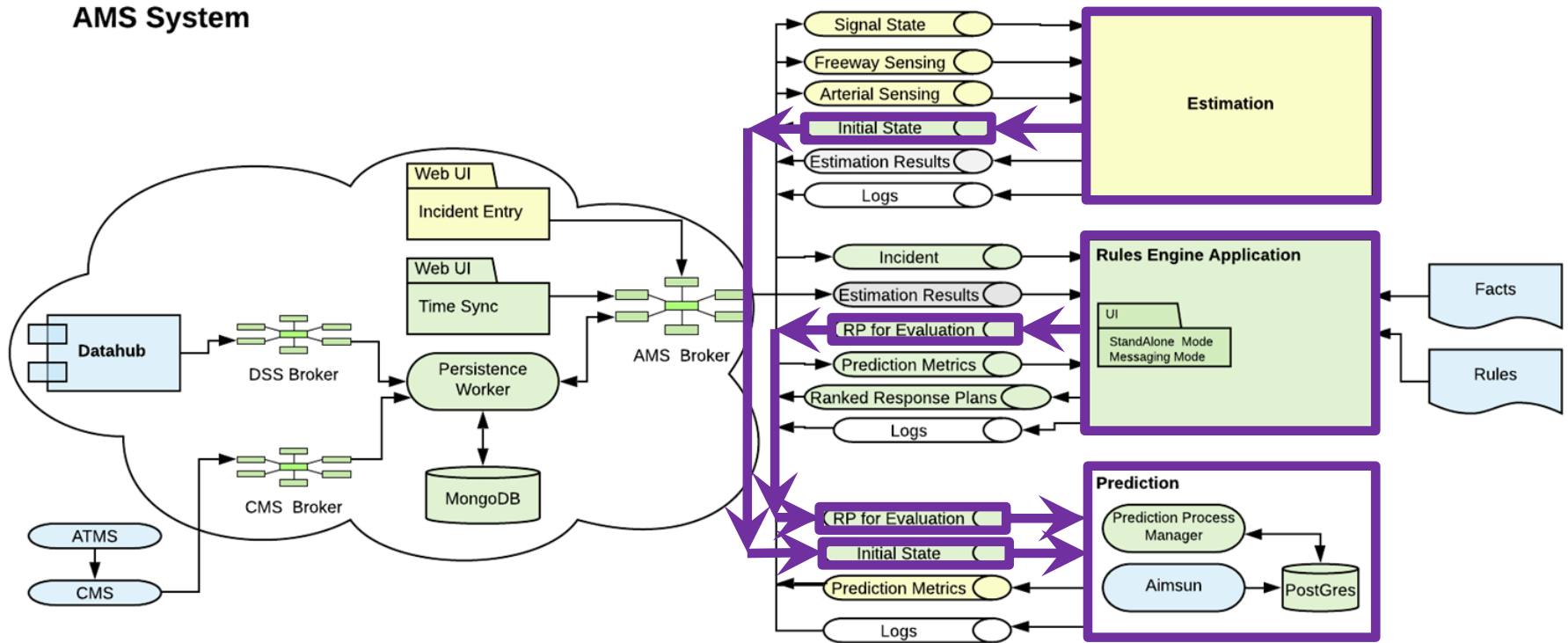
## AMS System



# Integration of Initial State

60

## AMS System

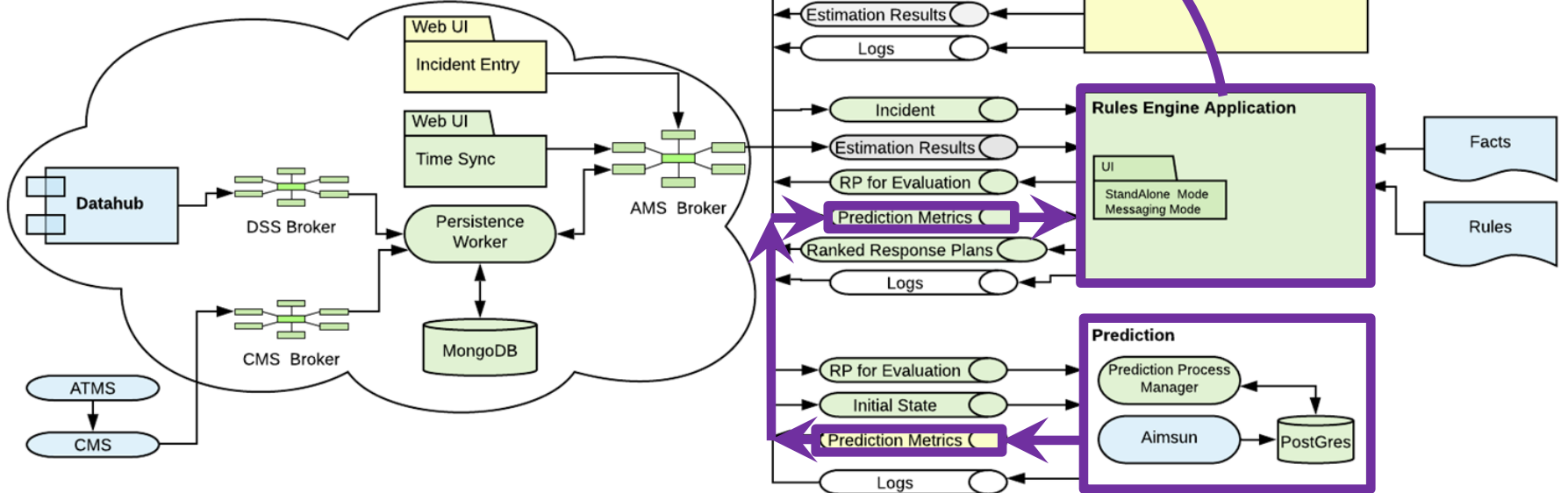


# Test Launch Demo Overview

61

## Scorecard

Incident														
1,200 TR @ San Gabriel														
Response Plan Evaluated														
Evaluation Period														
Number of Simulation Runs														
Ramps														
Travel Times														
Stats - Area (Zones 3-4-5-6)														
Stats - Frey Mainline, HOV, Connectors														
Stats - Detour #1														
Stats - Detour #2														
Ramp														
Upstream	Downstream	On-Ramp	Off-Ramp	Queue	RT	RT	RT	RT	RT	RT	RT	RT	RT	RT
7737	8033	7554	7554	7554	7554	7554	7554	7554	7554	7554	7554	7554	7554	7554
6950	6950	6950	6950	6950	6950	6950	6950	6950	6950	6950	6950	6950	6950	6950
625	625	625	625	625	625	625	625	625	625	625	625	625	625	625
5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%



# Resulting Score Card

62

Incident		I-210 EB @ San Gabriel																					
Response Plan Evaluated		WB_Art_Foothill_Michillinda_SanGabriel 135																					
Simulation Period		13:00 - 14:00      60 min																					
Evaluation Period		13:15 - 14:00      45 min																					
Number of Simulation Runs		1																					
Ramps		Screenline	Travel Times			Stats - Area (Zones 3-4-5-6)				Stats - Fwy Mainline, HOV, Connectors				Stats - Detour #1				Stats - Detour #2				Fwy Queue	
Upstream	Dwnstrm		Fwy	Detour	Detour																		
Off-Ramps	On-Ramps		Queue	#1	#2	VTM	VHT	Total	VTM /	SR-134 → Off-Ramp Detour #1 (Myrtle)				EB_Art_Evergreen_Myrtle_Myrtle				EB_Art_Colorado-Huntington_Huntington-Monrovia				Queue	
vehs	vehs	vehs	min	min	min	veh-mi	veh-hrs	veh-hrs	mph	veh-mi	veh-hrs	veh-hrs	mph	veh-mi	veh-hrs	veh-hrs	mph	veh-mi	veh-hrs	veh-hrs	mph	Length mi	
o	8913	3276	135896	41.8	2.9	15.2	163,174	6,982	4,197	23.37	48,170	2,774	2,118	17.36	488	41	2	12	2,675	201	10	13.32	5.85
	9407	3542	137137	42.5	3.4	13.9	163,953	6,879	4,075	23.83	47,696	2,885	2,237	16.53	531	49	3	11	3,609	218	8	16.57	4.82
e	494	266	1241	0.7	0.4	-1.3	779.1	-102.3	-122.1	0.46	-473.6	110.8	119.1	-0.83	42.4	8.2	0.4	-1.13	934.2	17.0	-1.3	3.25	-1.03
%	5.5%	8.1%	0.9%	1.8%	13.9%	-8.6%	0.5%	-1.5%	-2.9%	2.0%	-1.0%	4.0%	5.6%	-4.8%	8.7%	20.0%	17.2%	-9.4%	34.9%	8.4%	-13.9%	24.4%	-17.6%

## Productivity - Network

Sub-Score **2,001** veh

Normalization Value **1,000** veh/hr

Normalized Sub-Score **150** points

Weight **0.200**

Score **46.0** points

## Travel Time

### Improvements

**-0.5** min

**-5.0** min

**10** points

**0.300**

## Network Performance

**0.46** mph

**2.00** mph

**23** points

**0.200**

## Productivity - Fwy & Detours

**503.0** veh-mi

**2,000.0** veh-mi/hr

**19** points

**0.200**

## Fwy Queue

### Improvements

**-1.03** mi

**-1.0** mi

**103** points

**0.100**



# Software Development

# Software Development Progress

64

## □ Estimation

- ▣ Estimation generates densities and vehicle queues (needed for Aimsun simulation)
- ▣ Internal visualization tool for testing
- ▣ Integration of workflow into test DSS

## □ Prediction

- ▣ Parallel Aimsun runs now supported in workflow
- ▣ API improvements to run faster

## □ Resolving issues with message content between system components

## □ New code repositories to manage versions and changes

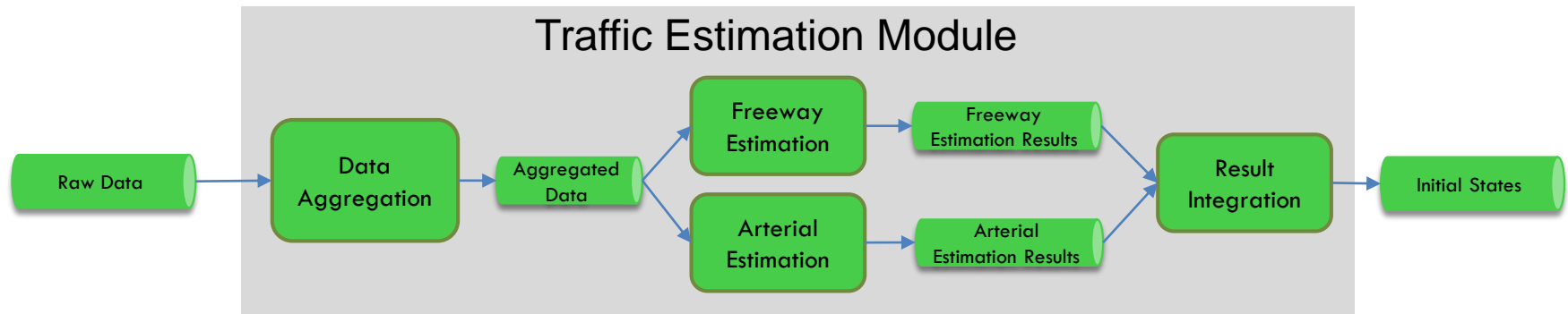


# Traffic Estimation

65

## □ Work flow completed

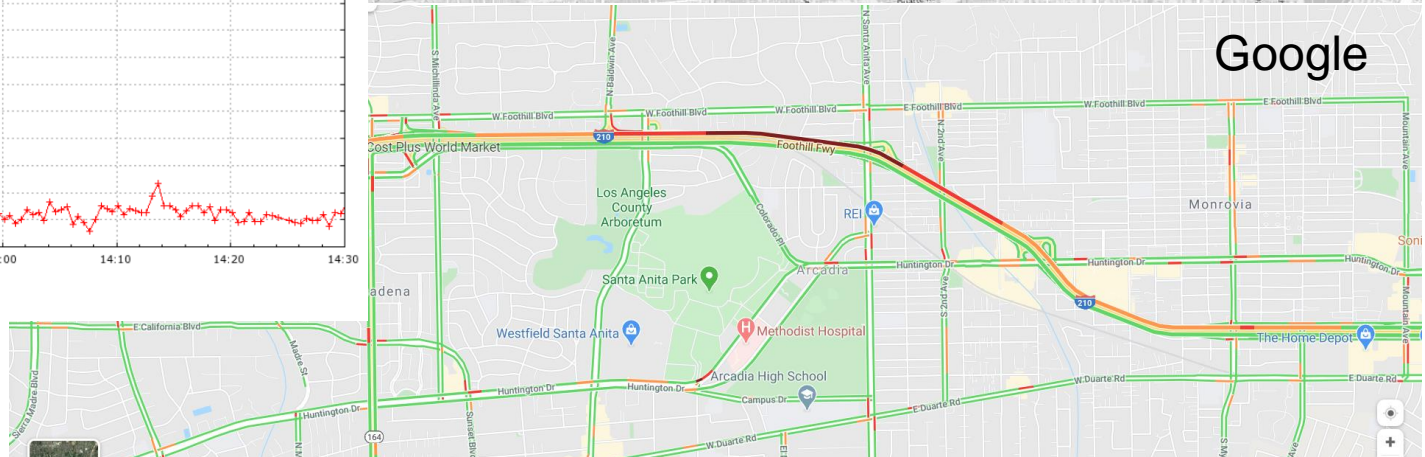
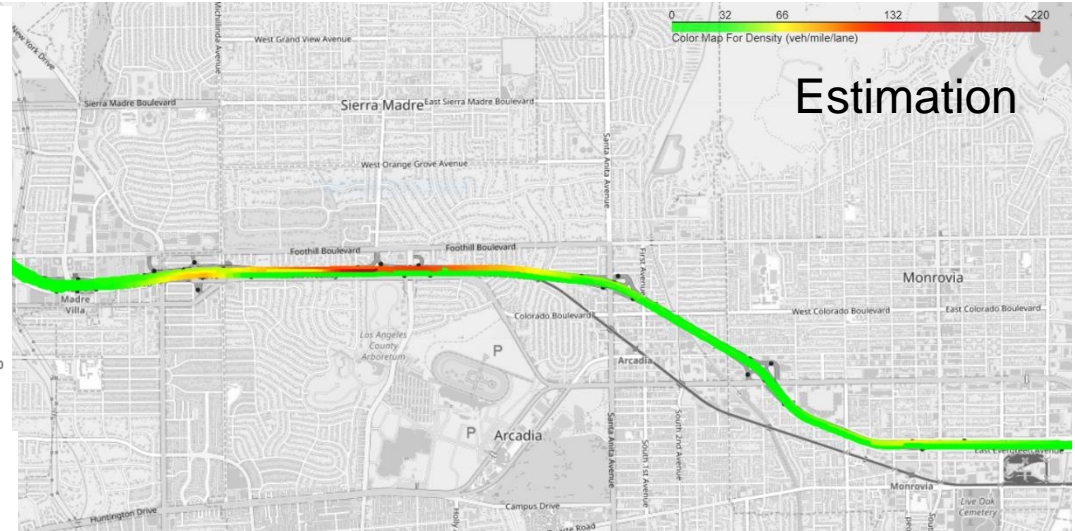
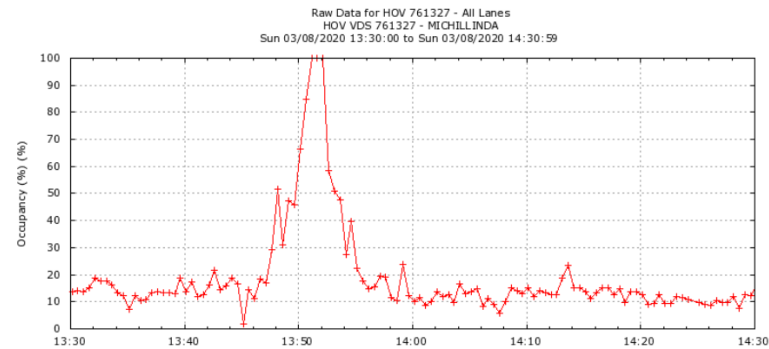
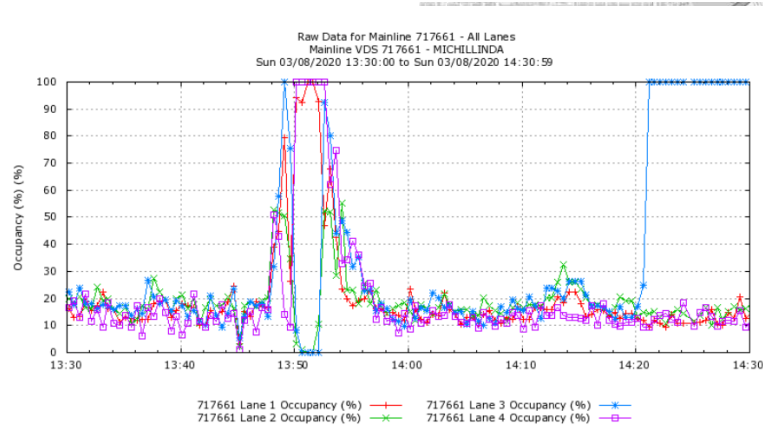
- Raw Data → Data Aggregation → Freeway & Arterial Estimation → Result Integration → Initial States



- Freeway estimation generates density estimates in veh/mi/lane
- Arterial estimation generates 5-min average queues

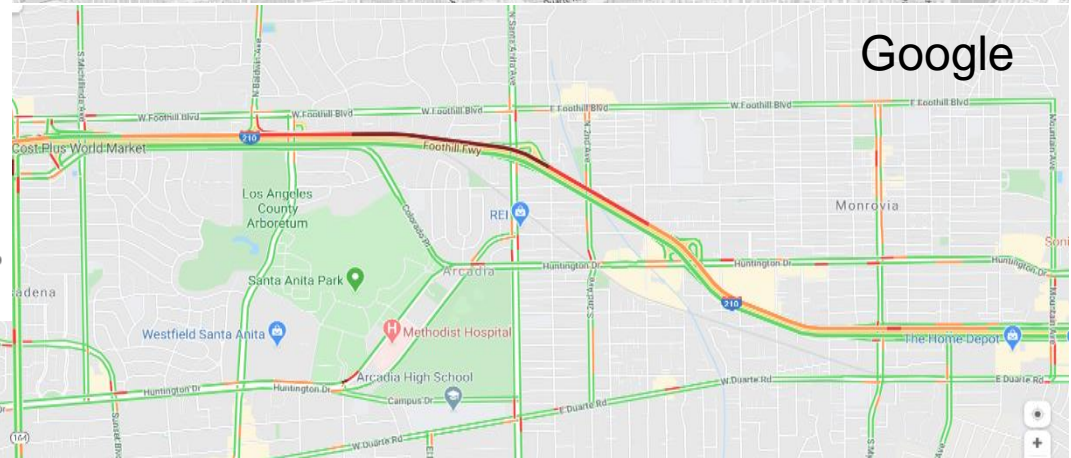
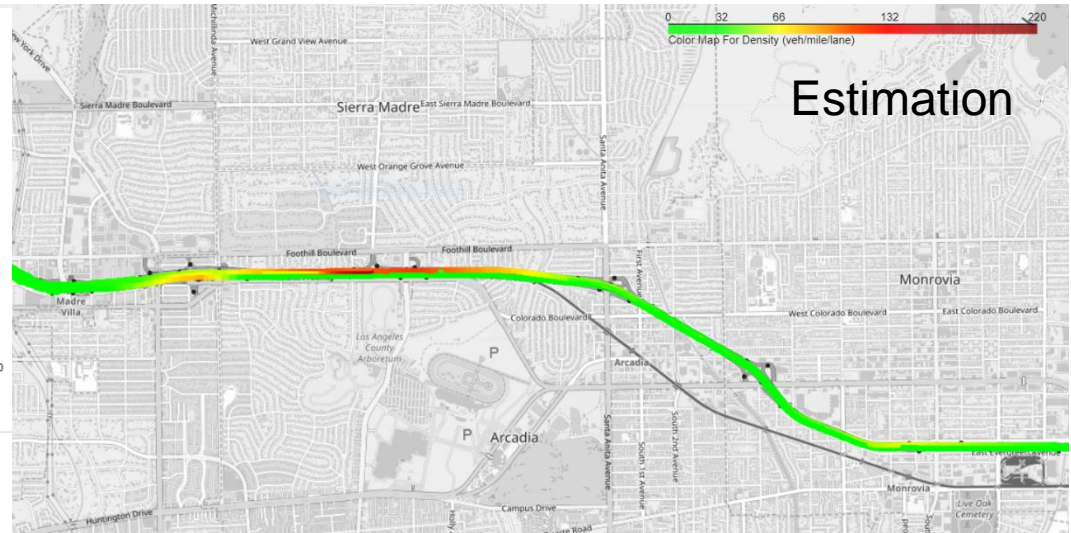
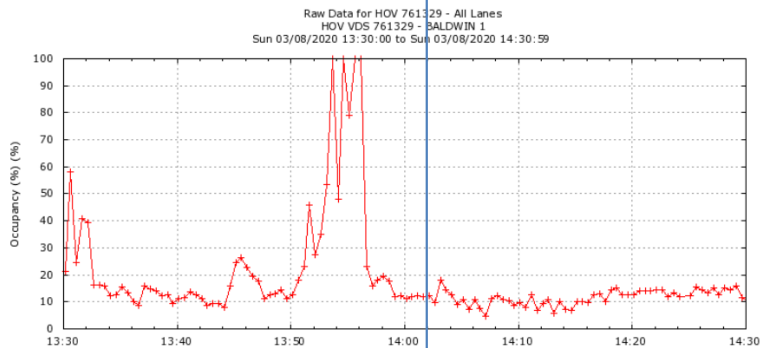
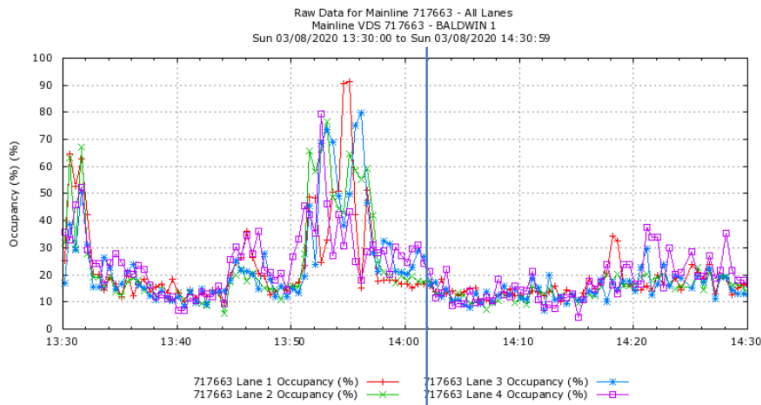
# Freeway Estimation Sunday

66



# Freeway Estimation 14:02

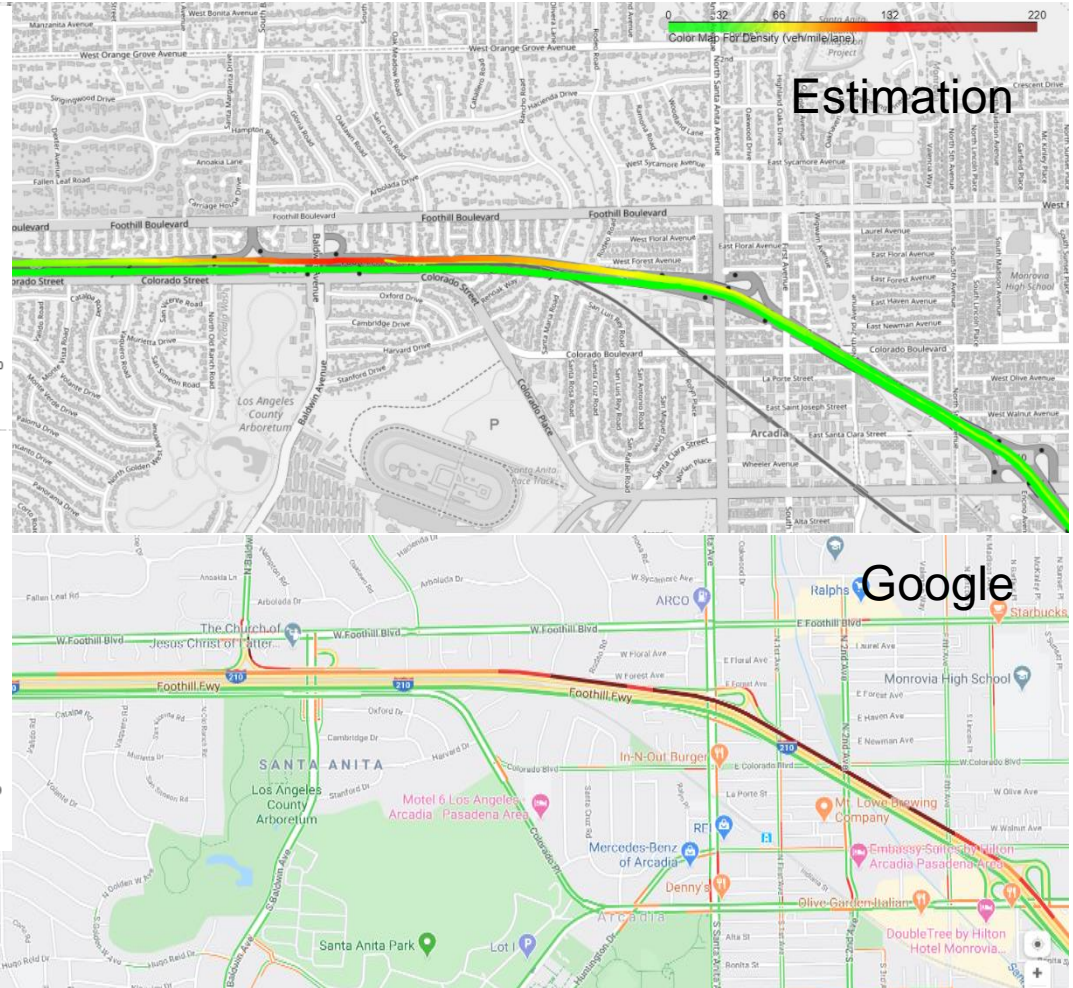
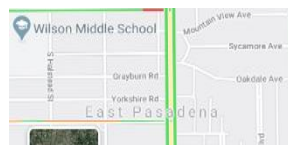
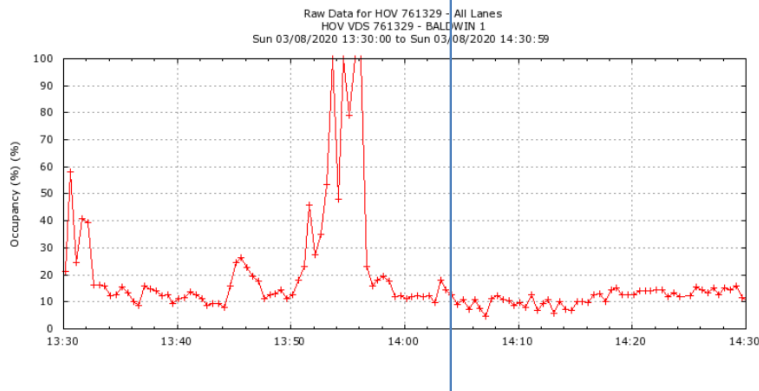
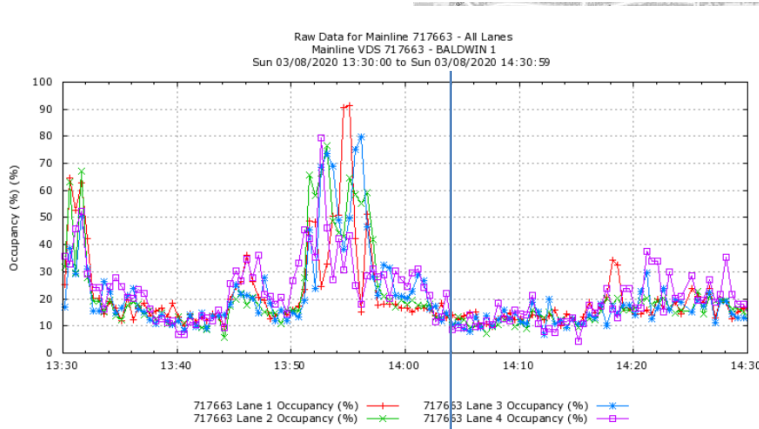
67





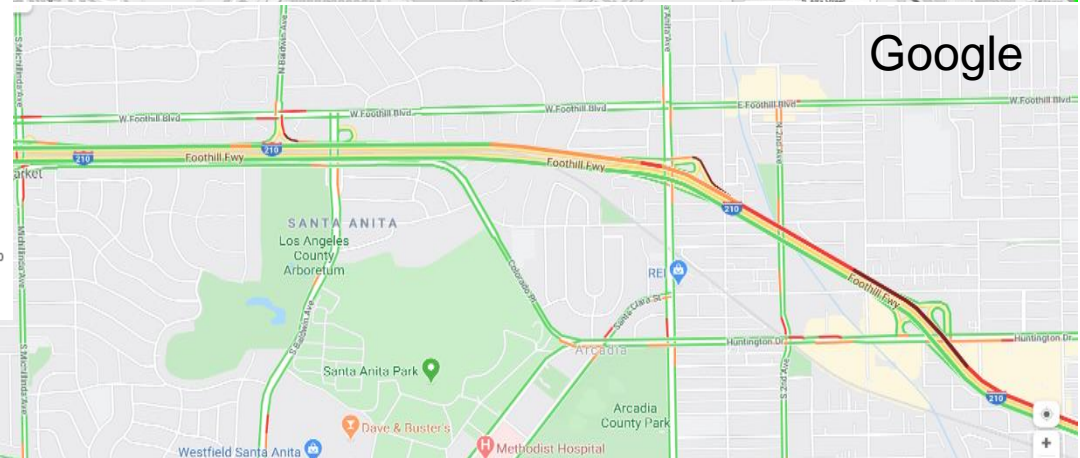
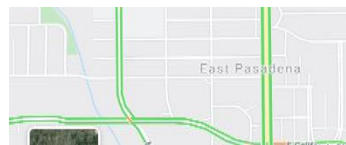
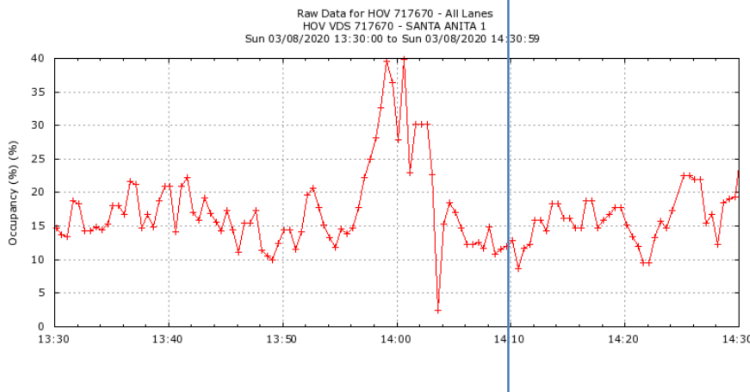
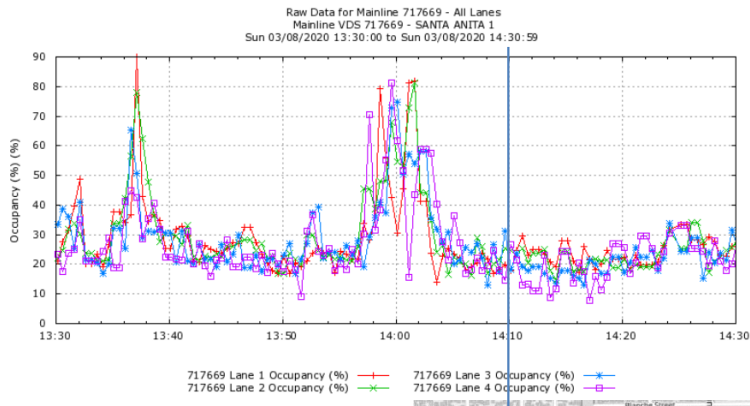
# Freeway Estimation 14:04

68



# Freeway Estimation 14:10

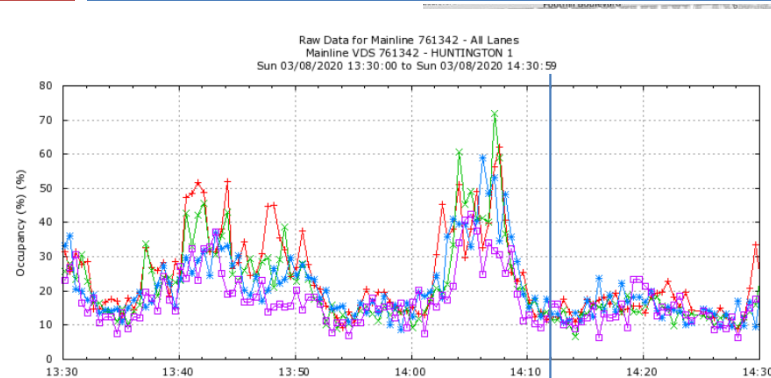
69



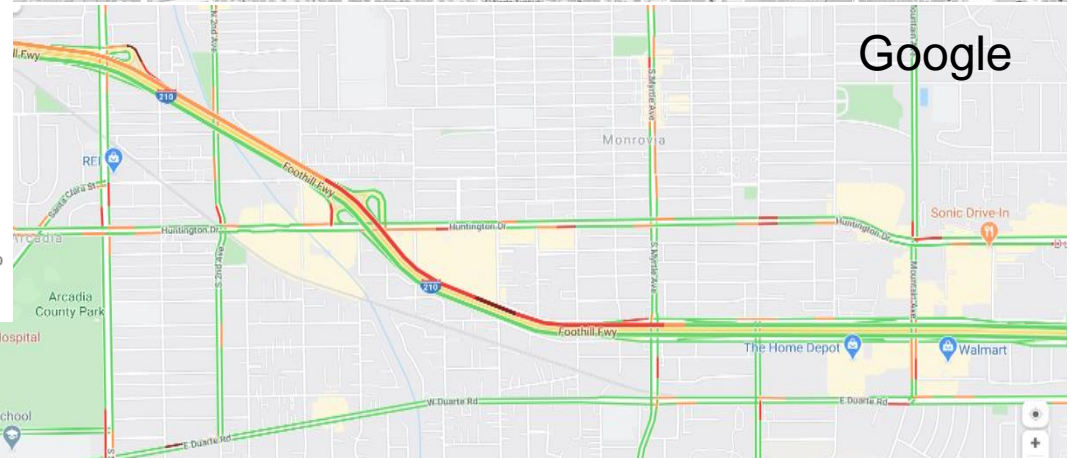
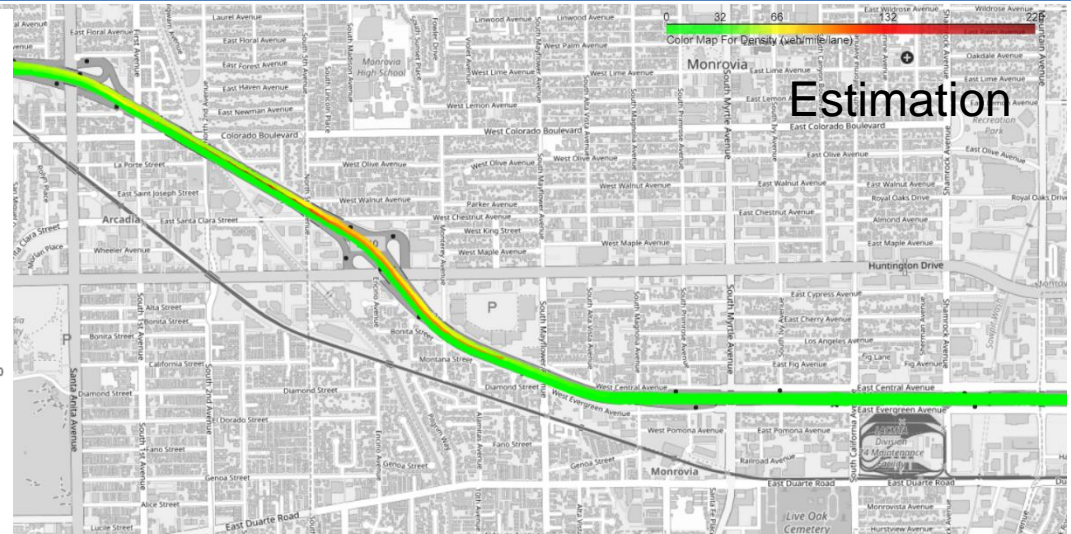
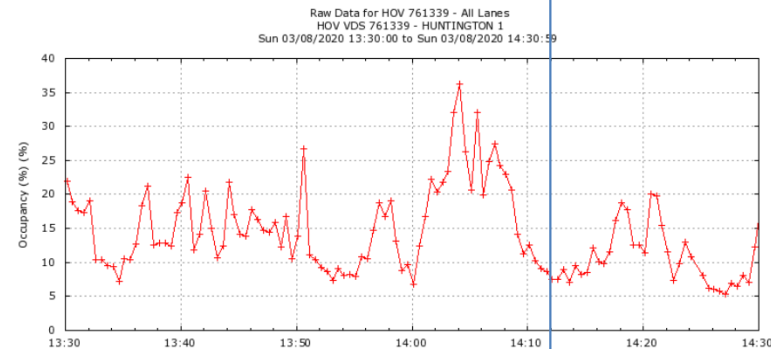


# Freeway Estimation 14:12

70

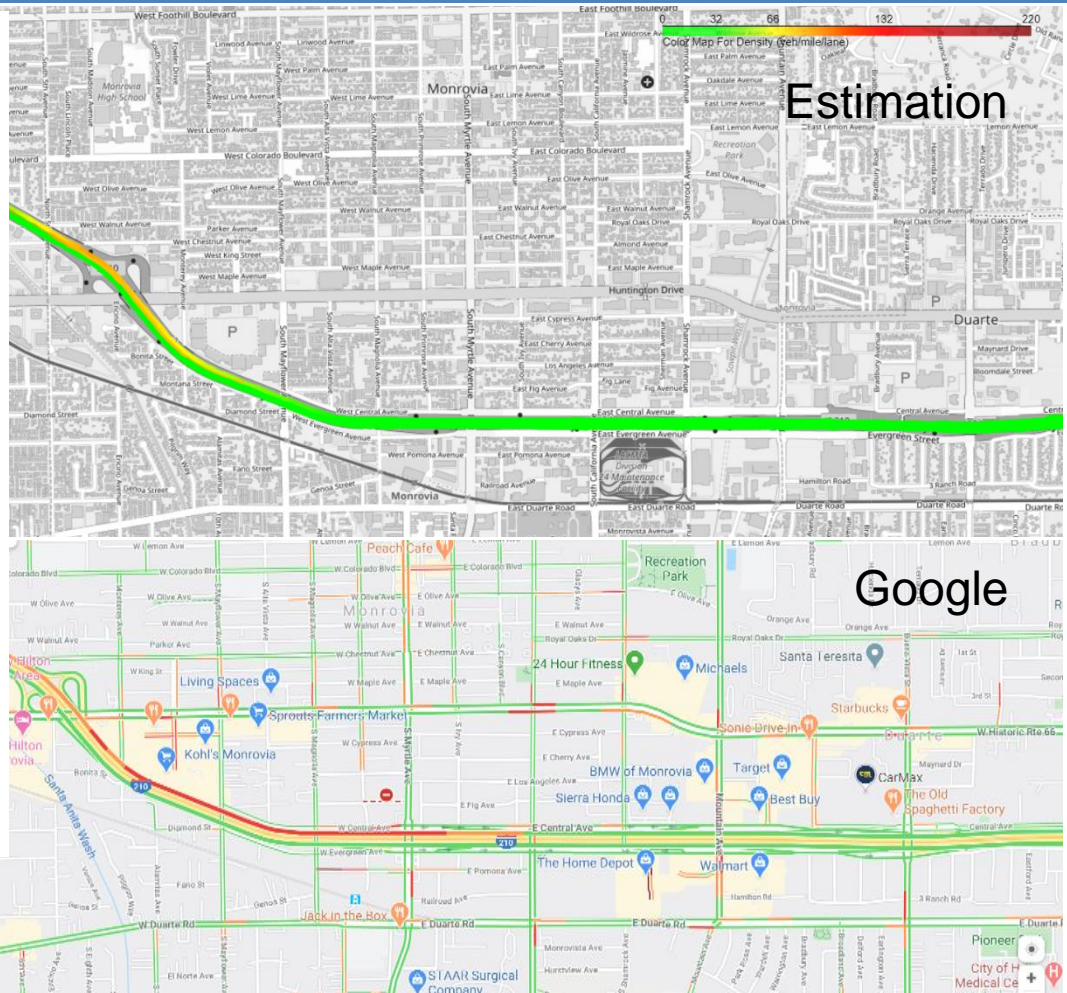
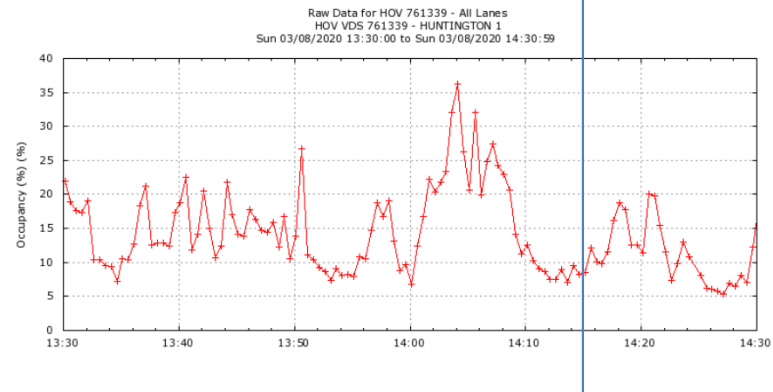
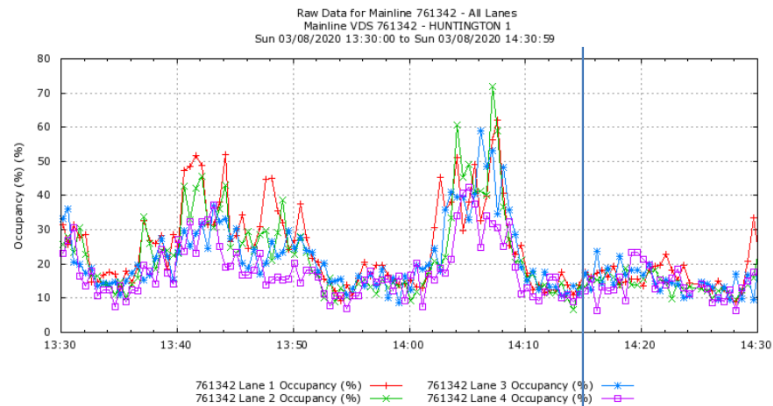


761342 Lane 1 Occupancy (%) —●—  
761342 Lane 2 Occupancy (%) —■—  
761342 Lane 3 Occupancy (%) —▲—  
761342 Lane 4 Occupancy (%) —◆—



# Freeway Estimation 14:15

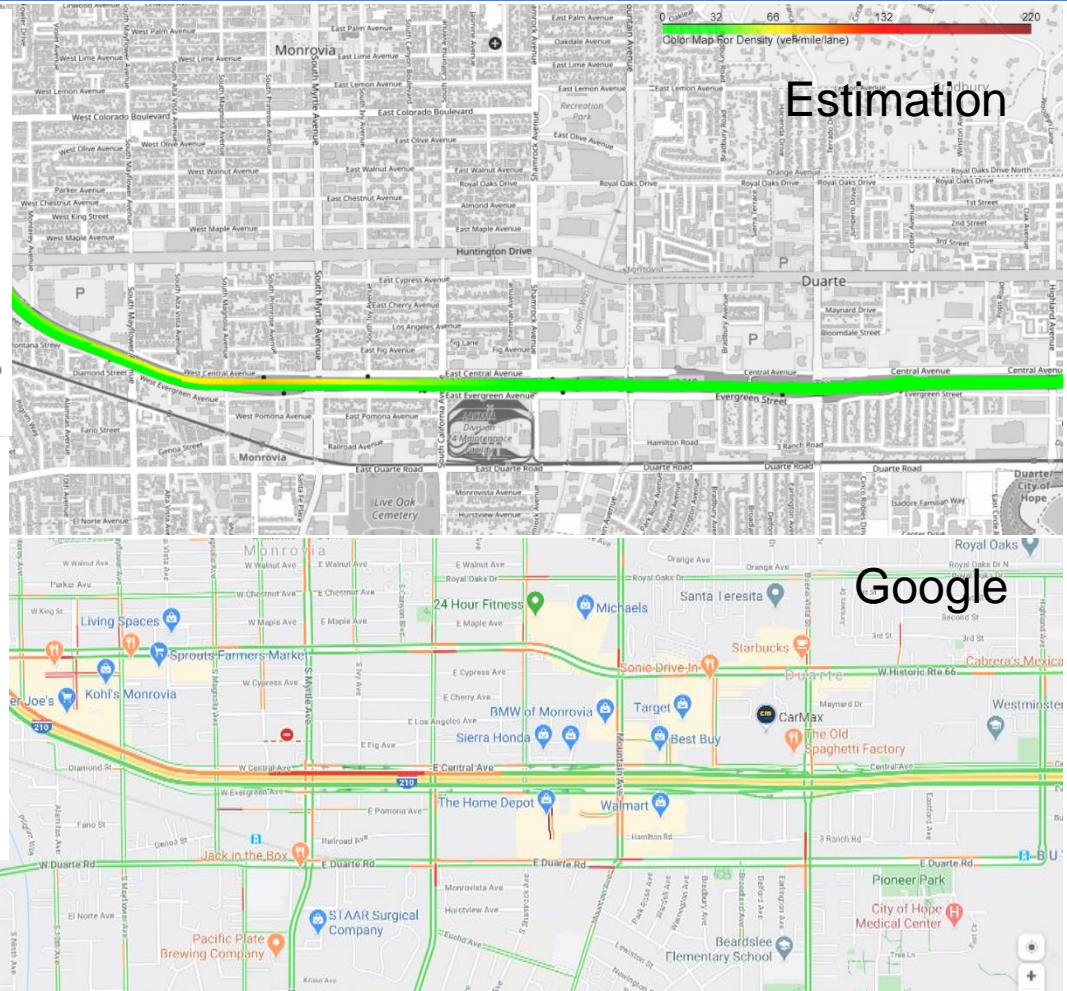
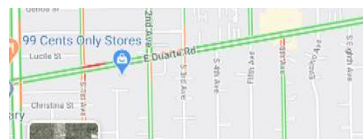
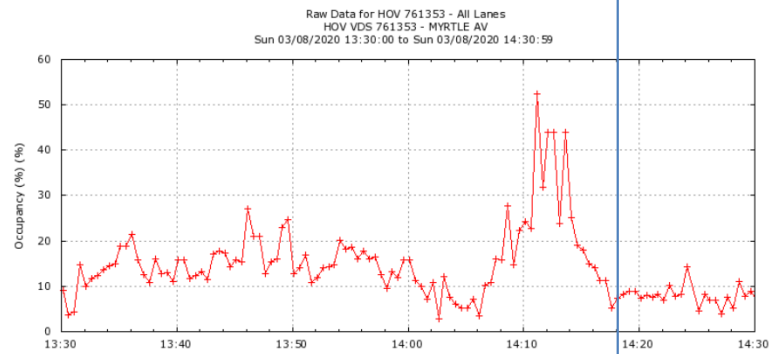
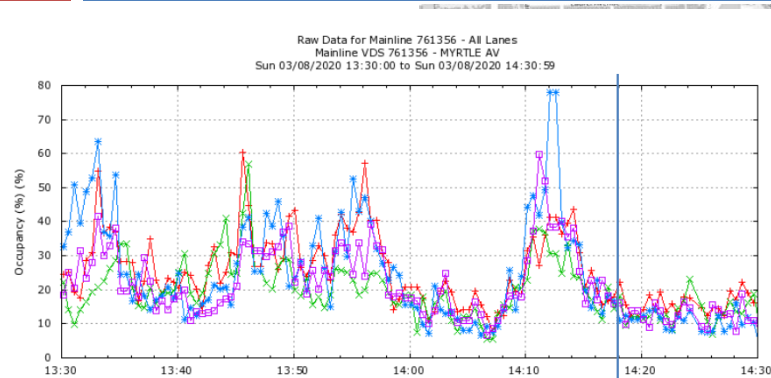
71





# Freeway Estimation 14:18

72

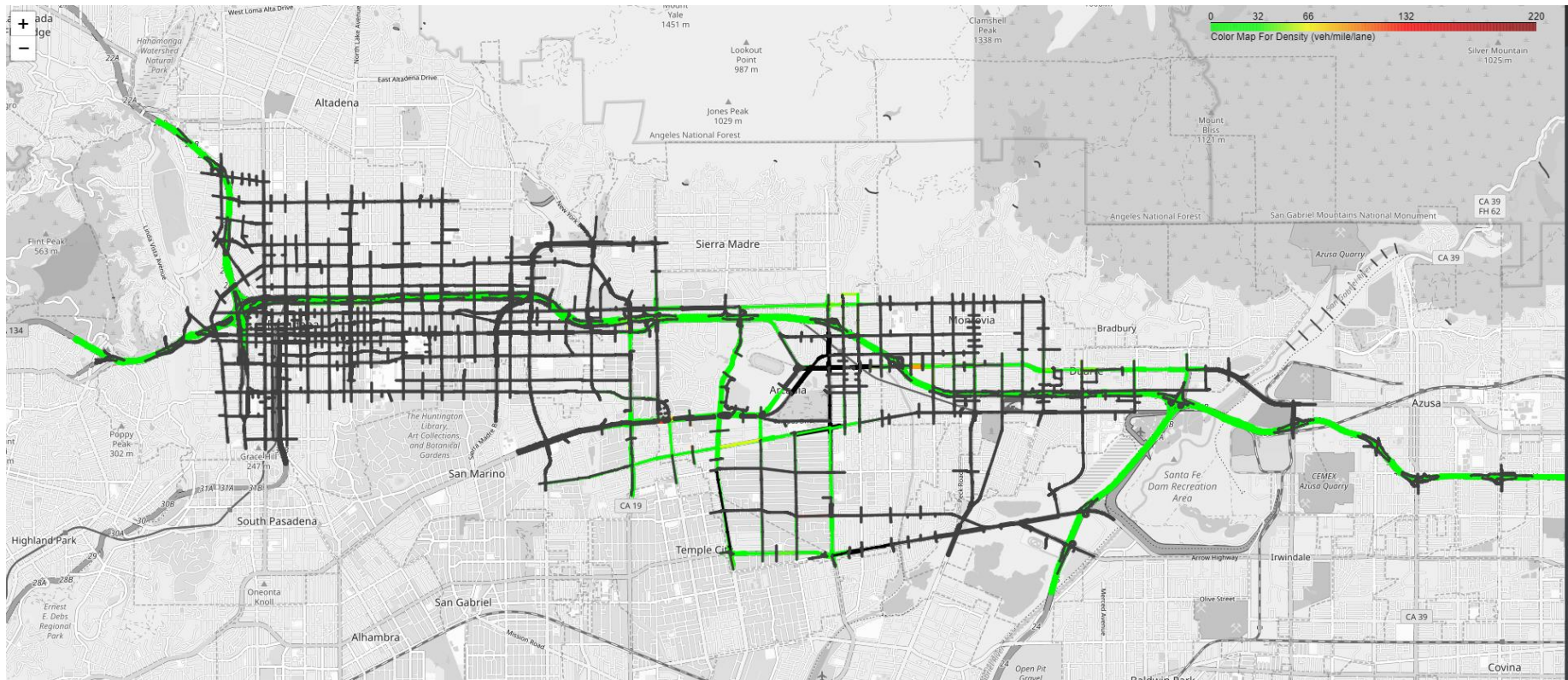




# Arterial Estimation

73

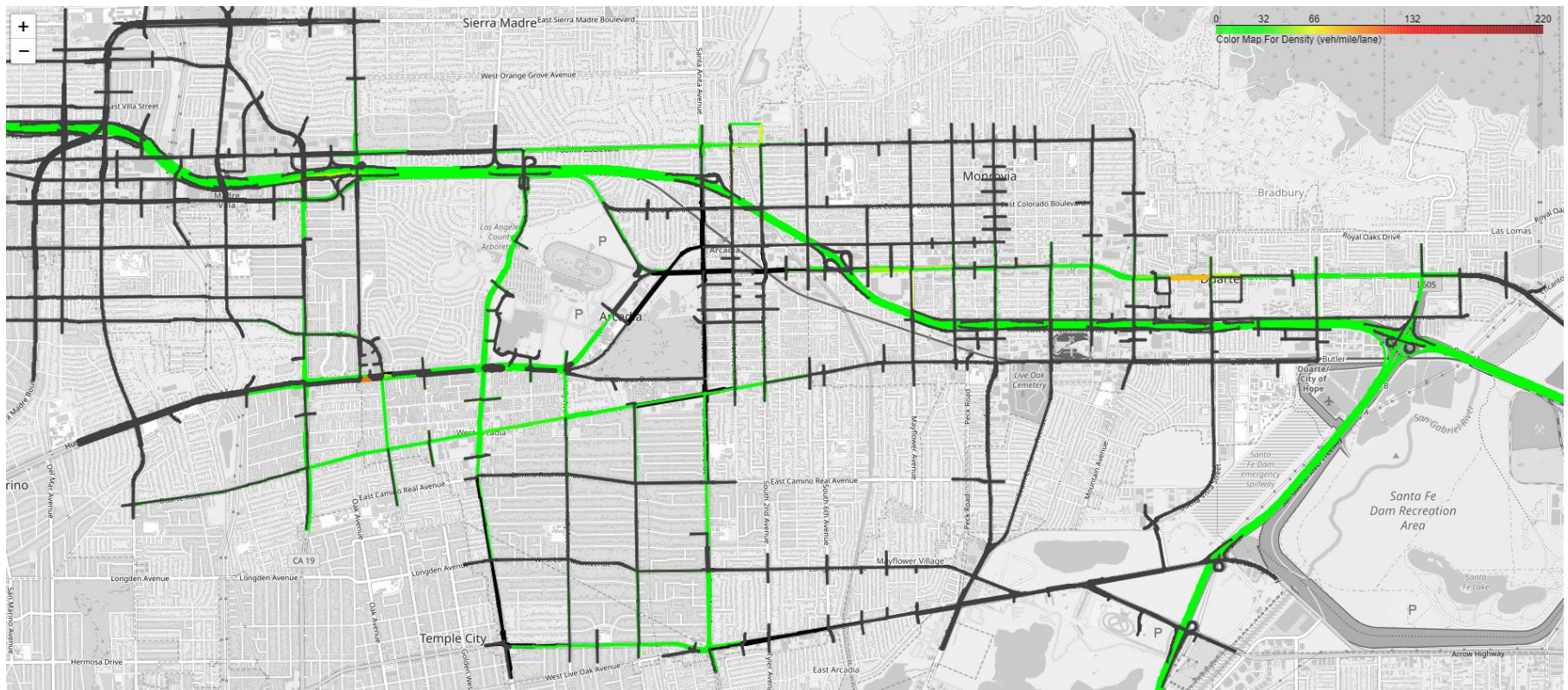
- 2020-03-09 11:40AM



# Arterial Estimation

74

- 2020-03-09 11:40AM



75

# Data Quality



# I-210 – Freeway Data Quality

76

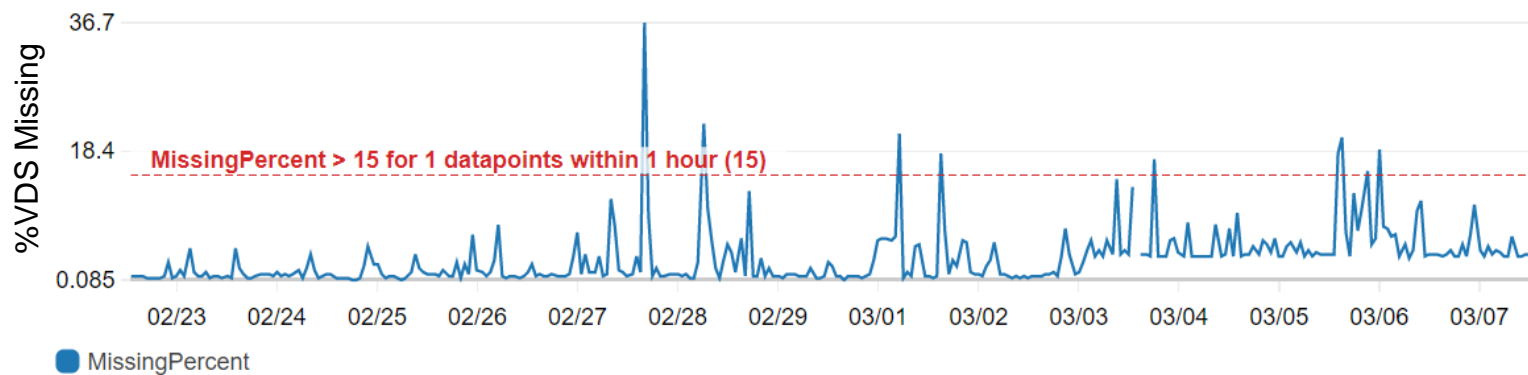
- **Recent sensor data availability is very good**
  - ▣ Daily checks use PeMS 5-min data
  - ▣ Weekly checks use PeMS %Observed

Freeway Section	Direction	Sensor Availability Percentage	Sensor Availability Target	Past Target Accomplishment	Date of Degradation	Proposed New Target Date
I-210 PM 22.6 - 25	East	82.4%	90%	na	na	5/1/2019
	West	88.0%	90%	2/8/2020	3/7/2020	
I-210 PM 25 - 43.25	East	90.1%	90%	3/7/2020		
	West	90.8%	90%	2/8/2020		
SR-134 PM 11.4 - 13.5	East	76.0%	90%	1/18/2020	3/7/2020	
	West	76.8%	90%	1/18/2020	3/7/2020	
I-605 PM 22.93 - 28	North	99.4%	90%	1/18/2020		
	South	90.5%	90%	3/7/2020		

# Real-time I-210 Freeway Data Quality

77

- **Real-time feed for PeMS D7 data on I-210 corridor**
  - ▣ Monitoring percentage of VDS missing every hour
  - ▣ Data drops are typically short-lived
  - ▣ Loss of data will affect estimation results



# Arcadia Data Quality

78

## □ Detector Inventory

- ▣ 543 detectors at 52 intersections
- ▣ 264 of them (at 19 intersections) are on detour routes

## □ Detector Health

- ▣ Overall detector health rate (on detour routes) in 70% range
- ▣ Improvements
  - Huntington @ Sunset is back online since 2020/02/19
- ▣ Major issue for “bad” detectors
  - Keep reporting zero values
- ▣ Kevin tells us that a few intersections, “are offline due to a traffic signal project that should be complete this week with communications re-established soon afterwards.”
  - Santa Anita @ Santa Clara
  - Santa Anita @ Colorado
  - Colorado @ First
  - Huntington@ Santa Clara
  - Huntington @ Santa Anita

# LACO, Monrovia and Duarte

79

## □ **Detector Inventory**

- ▣ 123 detectors at 21 intersections
  - 54 from LACO, 43 from Monrovia, and 26 from Duarte
- ▣ 107 of them (at 18 intersections) are connected to KITS and on detour routes

## □ **Detector Health**

- ▣ 94% health rate for those 54 detectors in LACO
- ▣ 60% health rate for those 43 detectors in Monrovia
  - Issue for “bad” detectors: keep reporting zero values
- ▣ 88% health rate for those 26 detectors in Duarte
  - Port numbers have been updated and IDs in our systems
  - TMDD Date-time Format has been fixed at Huntington @ Mount Olive

80

# Stakeholder Progress



# Response Plans – Stakeholder Progress

81

- **Pasadena (80 CC Intersections)**
  - ▣ 43 intersections are programmed with Connected Corridors flush plans
- **LA County (6 CC Intersections)**
  - ▣ All 6 timing sheets completed and ready for implementation
- **Monrovia and Duarte (17 CC Intersections)**
  - ▣ 3 revised signal plans completed along Huntington



# Response Plans – Stakeholder Progress

82

## □ **Arcadia (19 CC Intersections)**

- ▣ 17 intersections are programmed with Connected Corridors flush plans on Huntington, Foothill, and Santa Anita
- ▣ 2 additional intersections awaiting installation of 2070 controllers on Colorado

## □ **Caltrans TSMSS (15 CC Intersections)**

- ▣ Productive meeting held on March 4<sup>th</sup> with Ken and Samson's team
- ▣ Next steps
  - Continuing validation meetings with Caltrans
  - Goal to load signal plans onto controllers by April



83

## Next Steps

# Next Steps

84

- **Continue systems integration**
- **Include ATMS and CMS into the next demo**
- **Refine plan for demonstration at 2020 ITS World Congress**



# Metrics Discussion

85

- **Caltrans HQ asked us to estimate performance metrics for the I-210**
- **We also looked at how many 1 hour or more incidents there are on the I-210 as part of this study**
- **We ran simulations of multiple lane closures at different times using our detour routes**
- **We also looked at results from the I-15 and the I-80**



# Potential I-210 Activations

86

## □ Frequency of incidents with lane closures on I-210 WB, Jan-Jun 2018

- ▣ Focusing on incidents lasting 30+ minutes
- ▣ Incidents between mileposts 22 and 39 only

Lanes Closed	Number of Events	Average Duration
1	97	1.18 hrs
2	28	2.22 hrs
3	8	2.55 hrs
4	1	2.25 hrs
5+	3	5.08 hrs
	137	



*Extrapolating  
for full year and  
2 directions*

Lanes Closed	Number of Events	Average Duration
1	388	1.18 hrs
2	112	2.22 hrs
3	32	2.55 hrs
4	4	2.25 hrs
5+	12	5.08 hrs
	548	

*548 potential activations / year*

# Potential Benefits – Freeway Operations

87

- **Simulated freeway benefits of response plan activations**
  - ▣ 1-hr incidents similar to those observed
  - ▣ Response plan activated 15 minutes after incident and terminated 30-60 minutes after incident cleared
  - ▣ Evaluation over 2-hour period from start of incident

								Freeway							Screenlines			
Dir	Milepost	Location	Lanes Closed	Ratio Closed	Time	Peak	Duration hrs	VMT veh-mi		VHT veh-hrs		Delay veh-hrs		Speed Change mph	Back Queue (15-mph) mi	Upstrn Off-Ramps	Dwnstrm On-Ramps	Screenline
WB	26.10	Lake	2/6	0.33	12:00 PM	No	1	371	1.1%	-43	-7.6%	-46	-16.7%	5.6	-0.18	151	279	339
WB	26.10	Lake	2/6	0.33	4:00 PM	No	1	2,731	1.2%	-211	-3.1%	-234	-4.8%	1.5	-0.26	198	258	-186
EB	35.60	Buena Vista	3/6	0.50	3:00 PM	Yes	1	336	0.3%	-82	-1.1%	-76	-1.3%	0.2	0.16	128	311	139
EB	30.75	Baldwin	3/6	0.50	4:00 PM	Yes	1	1,959	2.3%	-198	-1.2%	-261	-5.1%	0.8	-0.74	352	705	-153
EB	32.75	Santa Anita	3/5	0.60	12:00 PM	No	1	327	0.3%	4	0.1%	6	0.1%	0.1	-0.05	42	62	172
EB	32.75	Santa Anita	3/5	0.60	4:00 PM	Yes	1	717	0.7%	-128	-2.0%	-105	-2.1%	0.5	-0.25	165	195	196
WB	26.10	Lake	6/6	1.00	12:00 PM	No	1	11,999	7.0%	-554	-7.4%	-658	-11.0%	3.6	-0.73	853	752	251
WB	26.10	Lake	6/6	1.00	4:00 PM	No	1	5,549	3.1%	-297	-3.9%	-345	-5.6%	1.7	-0.80	524	591	1,775

\*Higher VMT with lower VHT  
→ better movement on freeway

# CC I-210 Pilot Performance Impacts

88

## □ Safety

- Reduction in number of crashes: 3% reduction from 548/year to 532/year
- I-80: 3% reduction in incidents WB direction against a 12% increase countywide
- Reduction in first responder exposure by reducing and managing incident-related congestion.





# CC I-210 Pilot Performance Impacts

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## □ Mobility

- ▣ Reduced Delay (for incidents resulting in 1 or more closed lanes for 1/2 hour or more)
  - **Reduction in vehicle hours of travel (VHT). Low/High estimates: (3%-8%) (182,257-290,364 VHT) or (\$3,233,290 - \$5,151,152) per year.**
- ▣ Increased corridor throughput.
  - **Freeway: 0.6% to 4.6% (50-285 Veh/Hr.); Arterials: 1.6% to 9.8%; Corridor: 50-1774 Veh/Hr.**
- ▣ Small increase in Vehicle Miles Traveled (VMT): autos redirected to arterials

# CC I-210 Pilot Performance Impacts

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## □ Reliability

- ▣ Improved Travel Times and Speeds (increase: L- 1.5mph – H - 5.6mph)

## □ Environmental

- ▣ Reduced GHG and particulate emissions from reduced delay & increased speeds
- ▣ Reduced fuel consumption



**Thank You**  
**and**  
**Next Meeting**  
**(Suggest Tuesday April**  
**28<sup>th</sup> at LA Metro)**

