



# Connected Corridors Face-to-Face Meeting

Tuesday, Dec 6th, 2016 – 1:30 – 3:30 pm  
Caltrans D7 HQ



Dec 6th, 2016



# Agenda

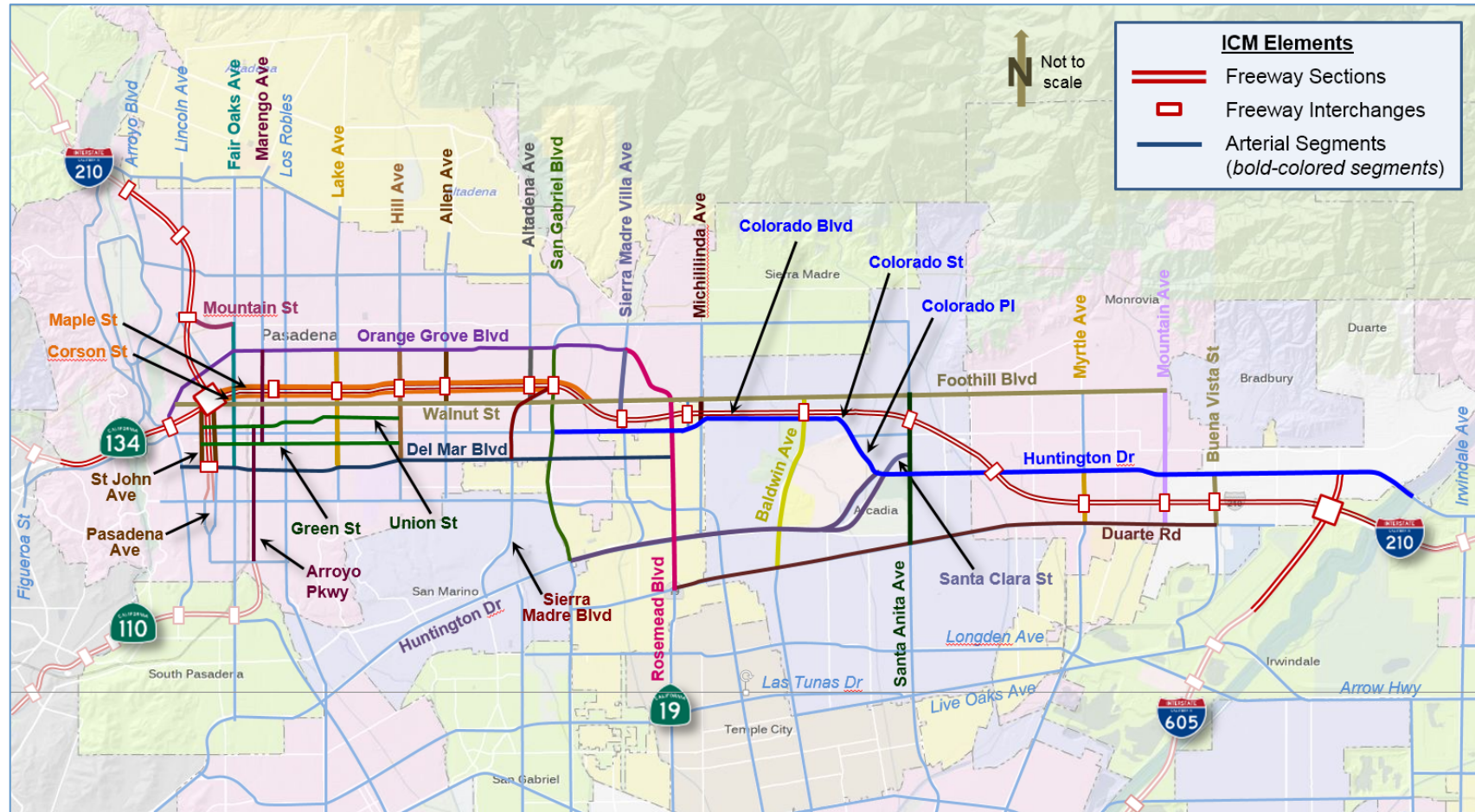
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- **Introductions**
- **Schedule Update**
- **Outreach**
- **High Level Design and Implementation**
  - ▣ Software
  - ▣ Hardware
- **(AMS) – Analysis, Modeling and Simulation**
- **Call for Projects – Final Review**
- **Action Items and Closing**



# Our Corridor: The I-210

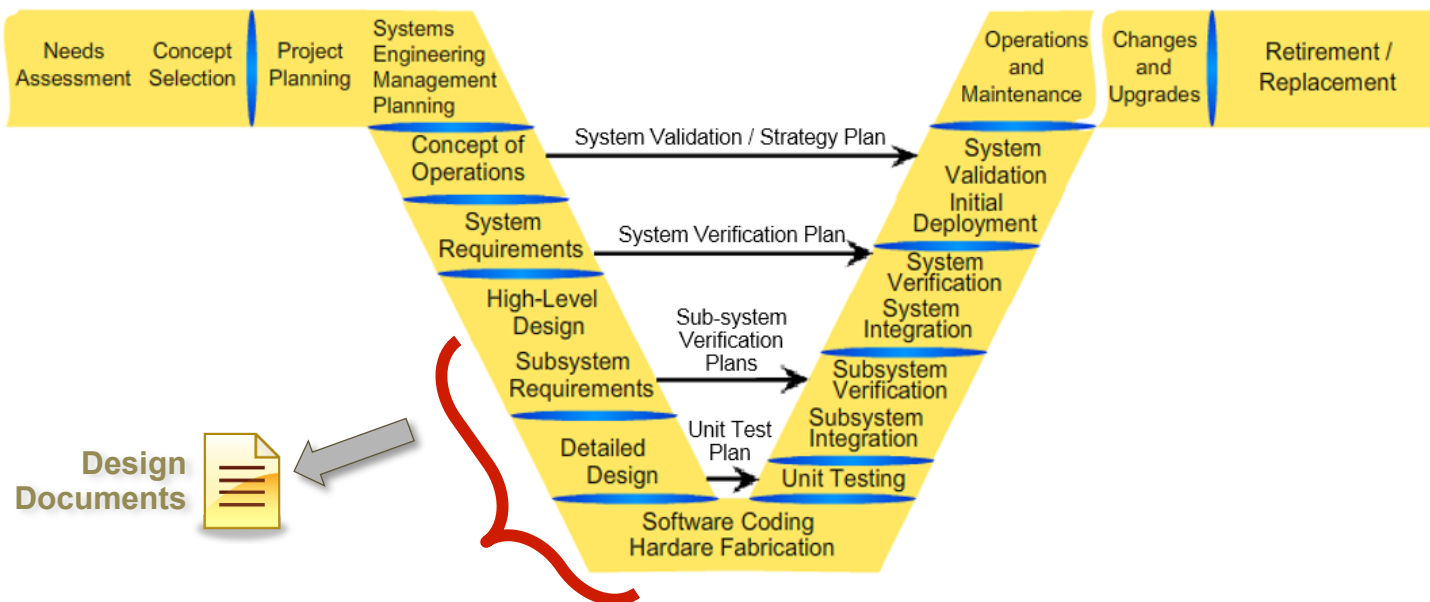
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# Systems Engineering Next Steps

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



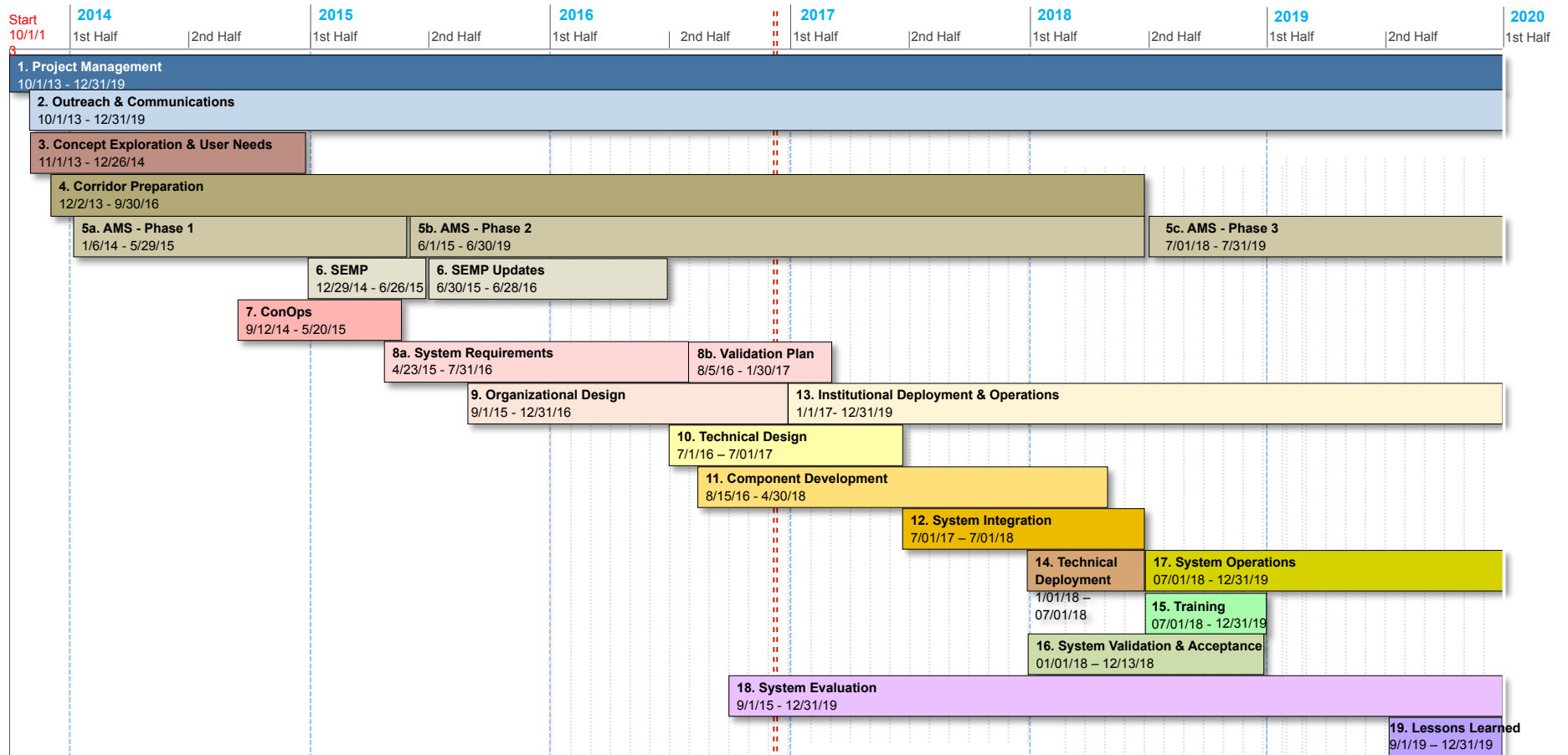


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## Schedule Update

# Schedule

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# Outreach and Communications

# Outreach

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- ❑ **Project Charter**
  - ▣ Caltrans approval this week
  - ▣ Approved by all other stakeholders
  - ▣ Signatures are next
  
- ❑ **Positive mention of Connected Corridors at the Focus on the Future Conference today**
  - ▣ Malcolm Dougherty – Caltrans
  - ▣ Susan Bransen – CTC
  
- ❑ **Next Connected Newsletter getting ready for release**



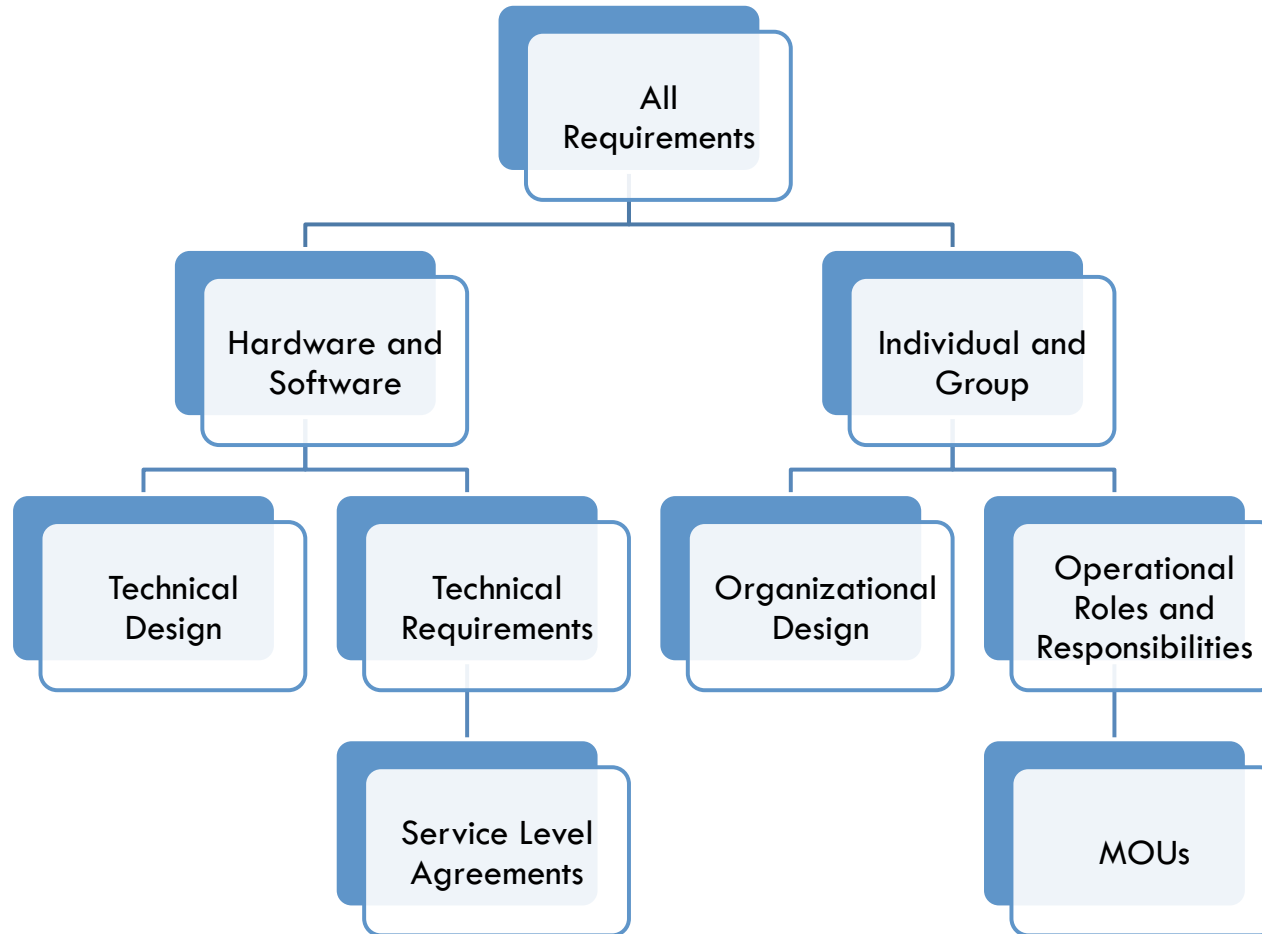


# High Level Design



# High Level Design

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# Validation Plan – Ready for Review

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PARTNERS FOR ADVANCED TRANSPORTATION TECHNOLOGY  
INSTITUTE OF TRANSPORTATION STUDIES  
UNIVERSITY OF CALIFORNIA, BERKELEY

## Connected Corridors: I-210 Pilot Integrated Corridor Management System

### System Validation Plan

December 2, 2016



Partners for Advanced Transportation Technology works with researchers, practitioners, and industry to implement transportation research and innovation, including products and services that improve the efficiency, safety, and security of the transportation system.



# Subcomponents - Schedule

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		2016	2017				2018			
		4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Quarter	4th Quarter
Org and Personnel	Personnel	Define	Design	Assign	Assign	Assign	Ready	Deploy	Release	Run
	Training	Define	Design	Build	Build	Build	Train	Train		
Software	ATMS	Define	Design	Contract	Build	Build	Test/Int	Deploy	Release	Run
	IEN	Define	Contract	Build	Build	Build	Test/Int	Deploy	Release	Run
	Closures	Sample	Decision	Implement	Implement	Test	Test/Int		Release	Run
	Call for Projects (SW)	Contract	Design	Build	Build	Build	Test/Int	Complete	Release	Run
	TSMSS	Design	Build	Test/Int				Deploy	Release	Run
	Data Hub	Design	Build	Build	Build	Build/Load	Test/Load	Deploy	Release	Run
	Purple Box	Design	Contract	Build	Build	Build	Test/Int	Deploy	Release	Run
	511 Integration	Define	Design	Build	Build	Build	Test/Int	Deploy	Release	Run
	RIITS Integration	Define	Design	Build	Build	Build	Test/Int	Deploy	Release	Run
	Video	Define	Design	Design	Build	Build	Test/Int	Deploy	Release	Run
	PEMS	Specs	Design	Contract	Build	Build	Build	Test/Load	Release	Run
Hardware	Call for Projects (HW)	Contract	Design	Build	Build	Build	Complete	Test/Int	Release	Run
	I-210 Project	Build	Build	Build	Build	Test/Int	Deploy		Release	Run
Data	City Data	Pas	Mon/Dua	Quality	Quality	Ready			Release	Run
	210 Data	Quality	Quality	Quality	Ready					
AMS	Modeling	Design	Build	Build	Build	Build	Test/Int	Deploy	Release	Run
	Rules Engine	Define	Design	Build	Build	Build	Test/Int	Deploy	Release	Run
	Rules	Determin	Determin	Determin	Determin	Determin	Load/Test	Deploy	Release	Run
	Response Plans	Design	Design	Build	Build	Test	Test/Int	Deploy	Release	Run
System Integration	System Integration		Build	Build	Build	Build	Build	Test	Release	Run



# Job Descriptions and Duties/Tasks

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PARTNERS FOR ADVANCED TRANSPORTATION TECHNOLOGY  
INSTITUTE OF TRANSPORTATION STUDIES  
UNIVERSITY OF CALIFORNIA, BERKELEY

## I-210 Pilot System Requirements:

### Job Descriptions and Duties/Tasks

September 9, 2016



Partners for Advanced Transportation Technology works with researchers, practitioners, and industry to implement transportation research and innovation, including products and services that improve the efficiency, safety, and security of the transportation system.

- Corridor Champions
- Corridor Manager
- Corridor Technical Manager
- Corridor Data Analyst
- Traffic Engineers
- Data Analysts
- Software Engineers
- Electrical Engineers
- Database Administrators
- Stakeholders
- Maintenance Staff
- Information Technology Support
- Information Technology Security
- TMS/TCS Operators
- Transit Field Supervisors
- Public Information Officers
- First Responders
- Outreach and Communications Manager



# JOB DESCRIPTIONS AND DUTIES/TASKS BY AGENCY

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Job Title	Caltrans	LA County	Pasadena	Arcadia	Monrovia	Duarte	Metro	Metro Transit, Foothill Transit, Pasadena Transit	CHP, fire, police, etc.
Corridor Champion	✓	✓	✓	✓	✓	✓	✓		
Corridor Manager	✓	✓					✓		
Corridor Technical Manager	✓	✓					✓		
Corridor Data Analyst	✓	✓					✓		
Traffic Engineers	✓	✓	✓	✓	✓	✓			
Data Analysts	✓	✓	✓	✓	✓	✓			
Software Engineers	✓	✓	✓	✓					
Electrical Engineers	✓	✓	✓	✓	✓	✓			
Database Administrators	✓								
Stakeholders	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintenance Staff	✓	✓	✓	✓	✓	✓			
IT Support	✓	✓					✓		
IT Security	✓	✓					✓		
TMC Operators	✓	✓	✓	✓					
Transit Field Supervisors								✓	
Public Information Officers	✓	✓	✓	✓	✓	✓	✓		
First Responders									✓
Outreach and Communications Manager	✓								



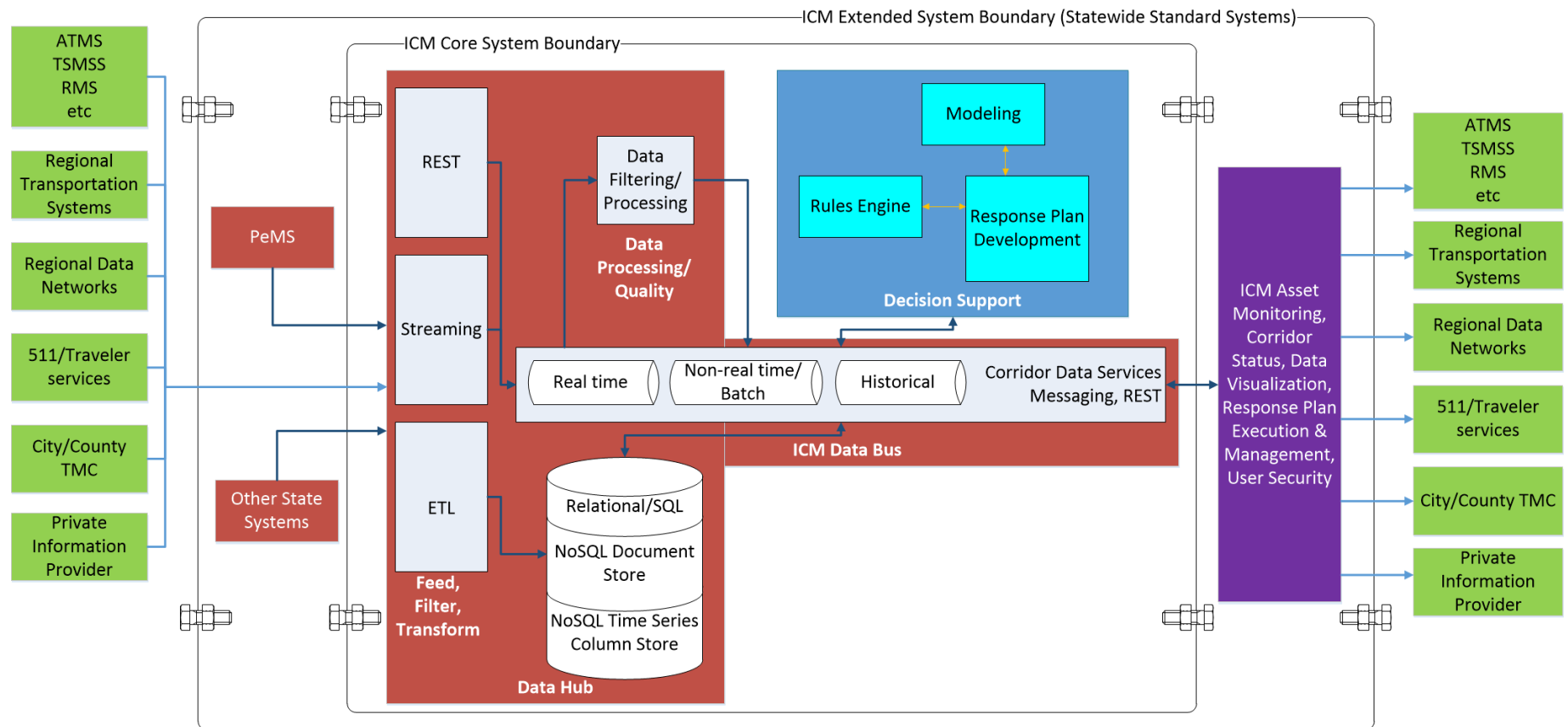


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# Software

# Current Proposed ICM Architecture

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# LA County – IEN

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## □ **County Response to CC Requirements:**

- ▣ A number of requirements agree to
- ▣ However: Update of signal plans and wayfinding signs to be discussed
  - please note that control of agency traffic control systems or field devices is not accounted for in the current IEN XML interface specification. Control aspects for the IEN will be developed after the existing interfaces are integrated into the new IEN (if the Connected Corridor or another project so desires). This effort will be included as a follow up phase of the IEN modernization upon completion of the work associated with migrating the existing IEN to the modernized IEN.

## □ **Are actively working to city data from IEN**

- ▣ Should be able to, but we are working through some technical issues



# General Updates

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- ❑ **Good meeting with IT**
  - ▣ Began discussions on details of involvement and work to be done
  - ▣ Joint training to occur next week
- ❑ **Continued engagement with possible “purple box” partners**
  - ▣ Met with Parsons
  - ▣ Met with Telegra
  - ▣ Met with Kapsch
  - ▣ All have indicated interest in working with us and all have lots of questions
- ❑ **Began researching how to officially advertise for “purple box” partners**
  - ▣ Received proof of concept documents from HQ
  - ▣ Have been discussing with other contractors
  - ▣ Began writing offering



# POC

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## □ Vendors agree

- ▣ There will be no charge by the vendors for the proof of concept
- ▣ Their software will run in the Amazon cloud
- ▣ Their software will be able to be purchased by acquiring a license and not a full scale purchase. This will permit easy scalability of the system.
- ▣ They will interface their system and make necessary adjustments to meet as many requirements as they wish. There will be a subset of requirements that must be met in order to participate in the POC
- ▣ Vendors will agree to let their products run for 1 year once the pilot is launched
- ▣ Vendors may withdraw any time prior to six months before launch

## □ Caltrans agrees to:

- ▣ Utilize the software
- ▣ Not share any product details that are not available through normal use of the system with other vendors
- ▣ Enter into a procurement process starting 6 months after launch and resulting in an RFP 1 year after launch
- ▣ To the extent possible utilize the selected software package for other corridors statewide





# Data Hub Components

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- ❑ **Data Quality**
  - ▣ Debugging PEMS filter
- ❑ **Streaming Data**
  - ▣ Began implementing a Cassandra cluster
- ❑ **Document Data Store**
  - ▣ Accomplished loading of the Kafka data store with signal data
- ❑ **Hierarchical/SQL Based**
  - ▣ Continued refining the Postgis schemas



# Data Hub and DSS

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## □ Rules Engine

- ▣ Met with Parsons, further discussions planned for next week

## □ Response plan generation

- ▣ Solidifying interface and data element specs for event characterization and response plan components

## □ Modeling – (Software not AMS)

- ▣ Freeway Estimation up and running for East Bound 210 – Calibration in process
- ▣ Freeway estimation calibration interface nearing release
- ▣ Working with TSS – Aimsun now able to run in cloud environment



# Caltrans Systems

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## □ **ATMS**

- ▣ Met with Caltrans and Parsons to better understand next steps
- ▣ No major roadblocks identified
- ▣ PATH to generate lower level requirements

## □ **TSMSS**

- ▣ Initial interface for testing (though HQ) to be available by end of year
- ▣ Interface through D7 to be designed

## □ **Lane Closure System**

- ▣ Proof of Concept to be setup in corridor by end of January

## □ **PEMS**

- ▣ Decision made to use PEMS
- ▣ Requirements being generated for upgrades to Corridor PEMS



# RIITS and 511

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## □ RIITS:

- ▣ Transit information from Metro, Foothill and Pasadena Transit should be available
- ▣ Waze information – CC will not use at this point, is event data
- ▣ Here information – Not currently available
- ▣ INRIX data – Historical data available
- ▣ Video sharing – We will begin design with RIITS as hub
- ▣ PATH logins to RIITS and thus to 511 to be provided
- ▣ Kali is main point of contact, he will request resources to assist the CC project

## □ 511:

- ▣ We will send information to 511 describing our reroutes. This will include a general message and a specific message for I-210 commuters.
- ▣ We will use RIITS APIs to send an update at least once every 15 minutes.
- ▣ We should be able to test this out beginning in 2017



# Data





# Freeway data quality

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Weekly Average Data Quality	Eastbound I-210 PM 25 to PM 43.25					
	Fwy-Fwy	HOV	Mainline	Off Ramp	On Ramp	Total
Oct2 - Oct8	33.3%	86.1%	88.4%	77.1%	93.5%	85.9%
Oct9 - Oct15	33.3%	85.5%	86.1%	82.6%	95.8%	85.2%
Oct16 - Oct22	33.3%	83.7%	85.9%	86.2%	95.8%	85.3%
Oct23 - Oct29	33.3%	88.6%	91.1%	86.2%	95.8%	89.2%
Oct30 - Nov5	33.3%	87.3%	89.8%	83.7%	94.0%	87.8%
Nov6 - Nov12	33.3%	94.7%	93.6%	86.2%	96.0%	91.7%
Nov13 - Nov19	33.3%	93.9%	92.5%	87.7%	95.2%	91.0%
Loops in Category	6	35	148	30	24	243

Westbound I-210 PM 25 to PM 43.25					
Fwy-Fwy	HOV	Mainline	Off Ramp	On Ramp	Total
100.0%	66.9%	78.4%	84.8%	84.2%	78.5%
100.0%	66.2%	73.1%	88.0%	83.3%	75.3%
100.0%	64.7%	74.4%	91.4%	83.7%	76.2%
100.0%	68.0%	80.3%	91.9%	87.2%	80.7%
100.0%	69.5%	80.3%	91.4%	87.2%	81.0%
100.0%	73.3%	83.3%	91.4%	87.2%	83.4%
100.0%	76.3%	82.5%	88.1%	86.7%	82.9%
8	38	160	31	28	266

- Eastbound for PM 25 to PM 43.25 has now exceeded 91% for the first time since we started keeping track. Yes!
- Most configuration changes for basic corridor are now completed
- Starting on flow validations
- It seems we may want to start looking into why certain problems occur and why they have such broad impacts.

# **Analysis, Modeling and Simulation**



# Progress on Corridor Model

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- **Updating trip costs**
- **SCAG mapped data to 2016**
- **Have imported AM and PM data into corridor model**
- **Arterial Estimation technique has been being tested, awaiting further validation before moving to pilot system**
- **Internal demo of using arterial estimation to set Aimsun model initial state scheduled for next week.**



# Response Plans / Rules



# Response Plans / Rules

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- **Returning to work on response plan definition and response plan rules engine implementation**
- **Defining the variables that will go into the decision making process that results in a response plan**



# Call for Projects



# Call for Projects

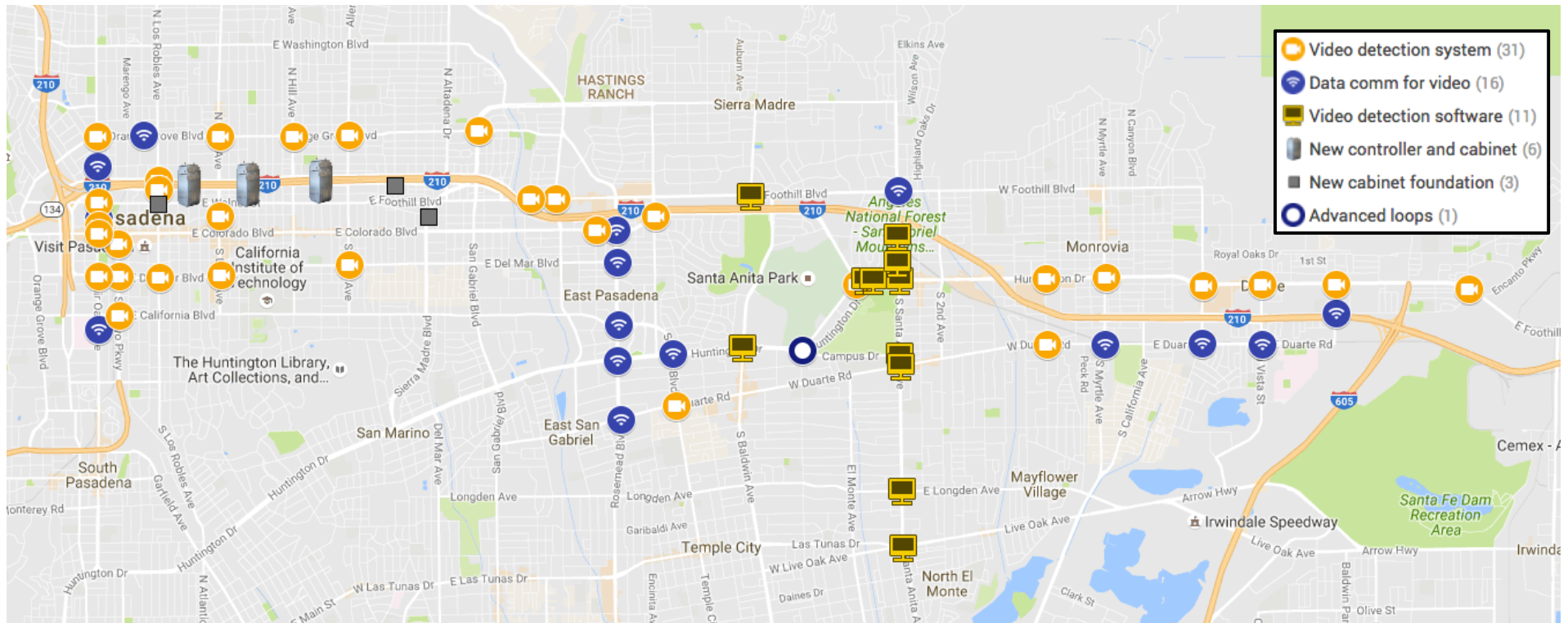
31

- ❑ **Controller firmware upgrades**
- ❑ **Arterial traffic detection improvements**
- ❑ **Bluetooth devices for arterial travel time measurements**
- ❑ **An upgraded (Metro funded) and a new signal (Caltrans funded)**
- ❑ **Environmental stations to measure air quality**
- ❑ **60 arterial ATIS changeable wayfinding sign installations**
- ❑ **Software improvements and communications upgrades to connect corridor infrastructure elements**



# Infrastructure Upgrades

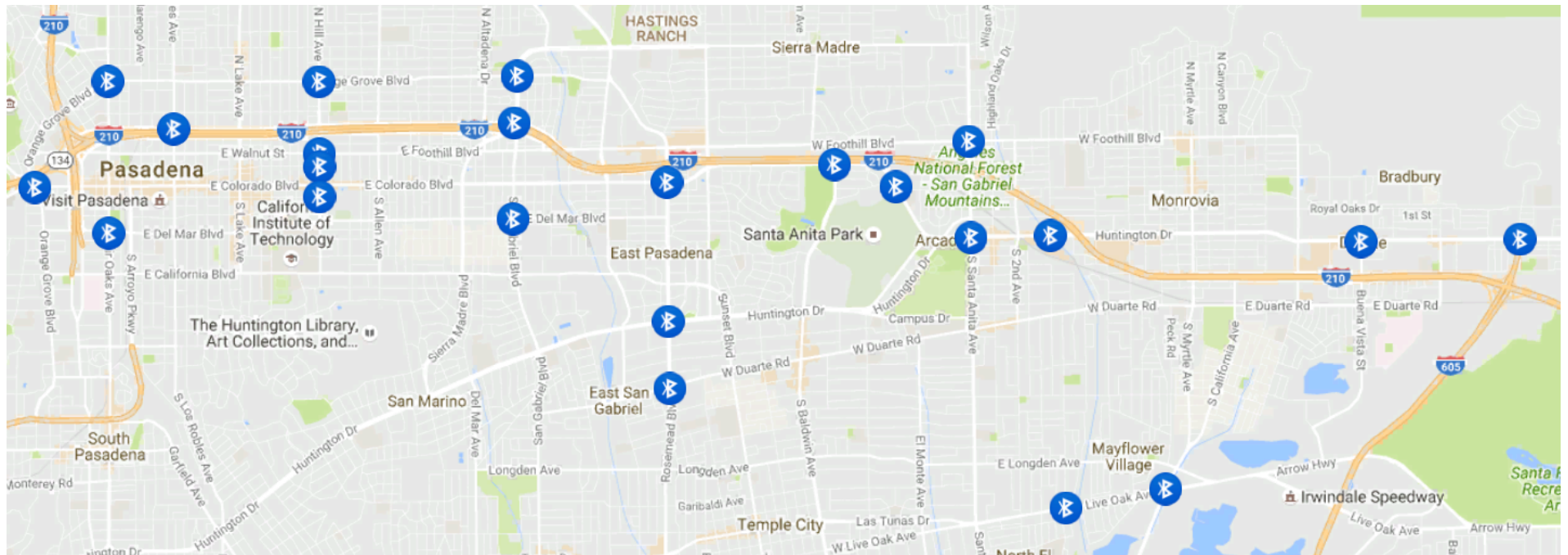
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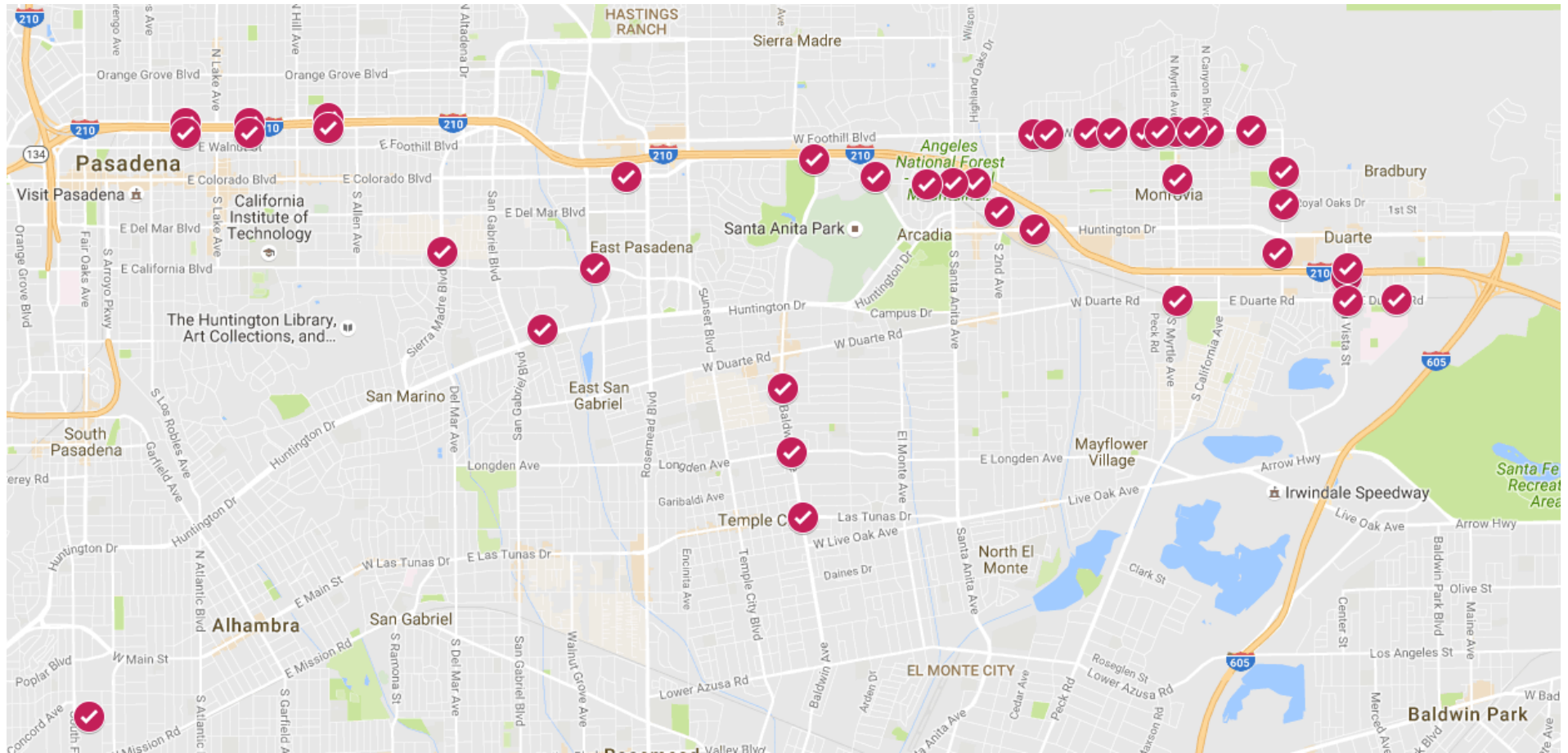
# Bluetooth travel time detectors

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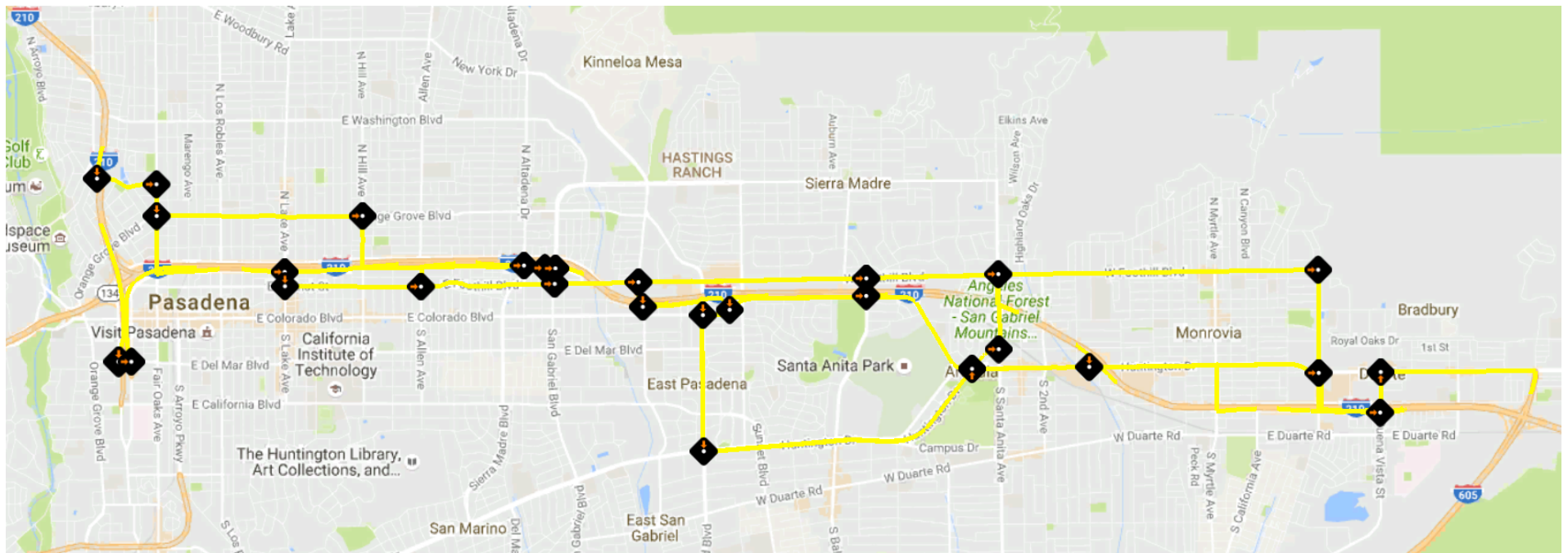
# Firmware/Timing/Comm Upgrades

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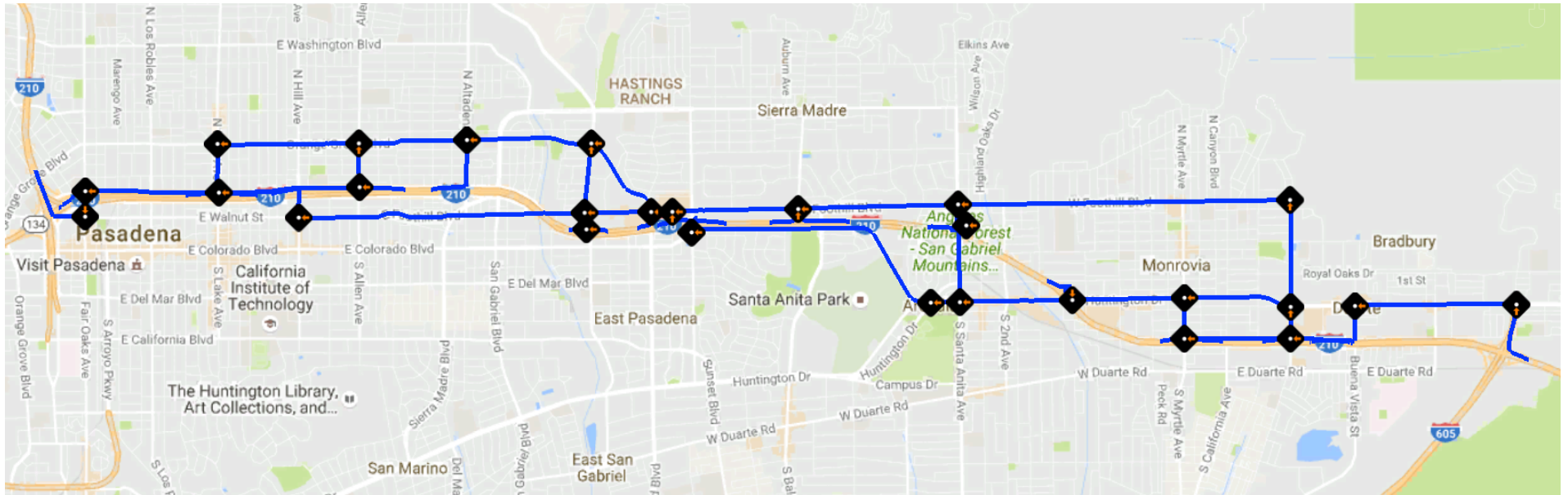
# ATIS Wayfinding, I-210E

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# ATIS Wayfinding, I-210W

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# Action Items and Next Meeting Time





# Thank You

