Connected Corridors
Face-to-Face Meeting
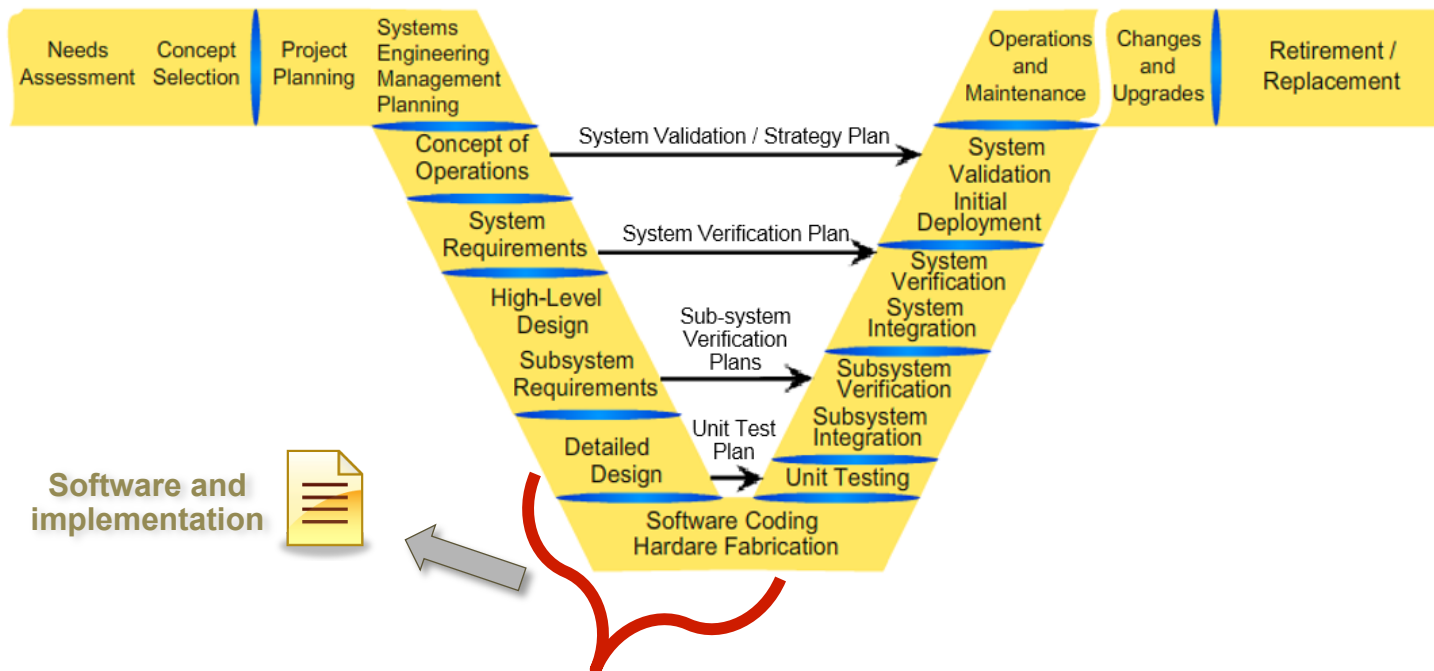
Tuesday, Jan 16th , 2018 – 1:30 – 3:30 pm
Duarte

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

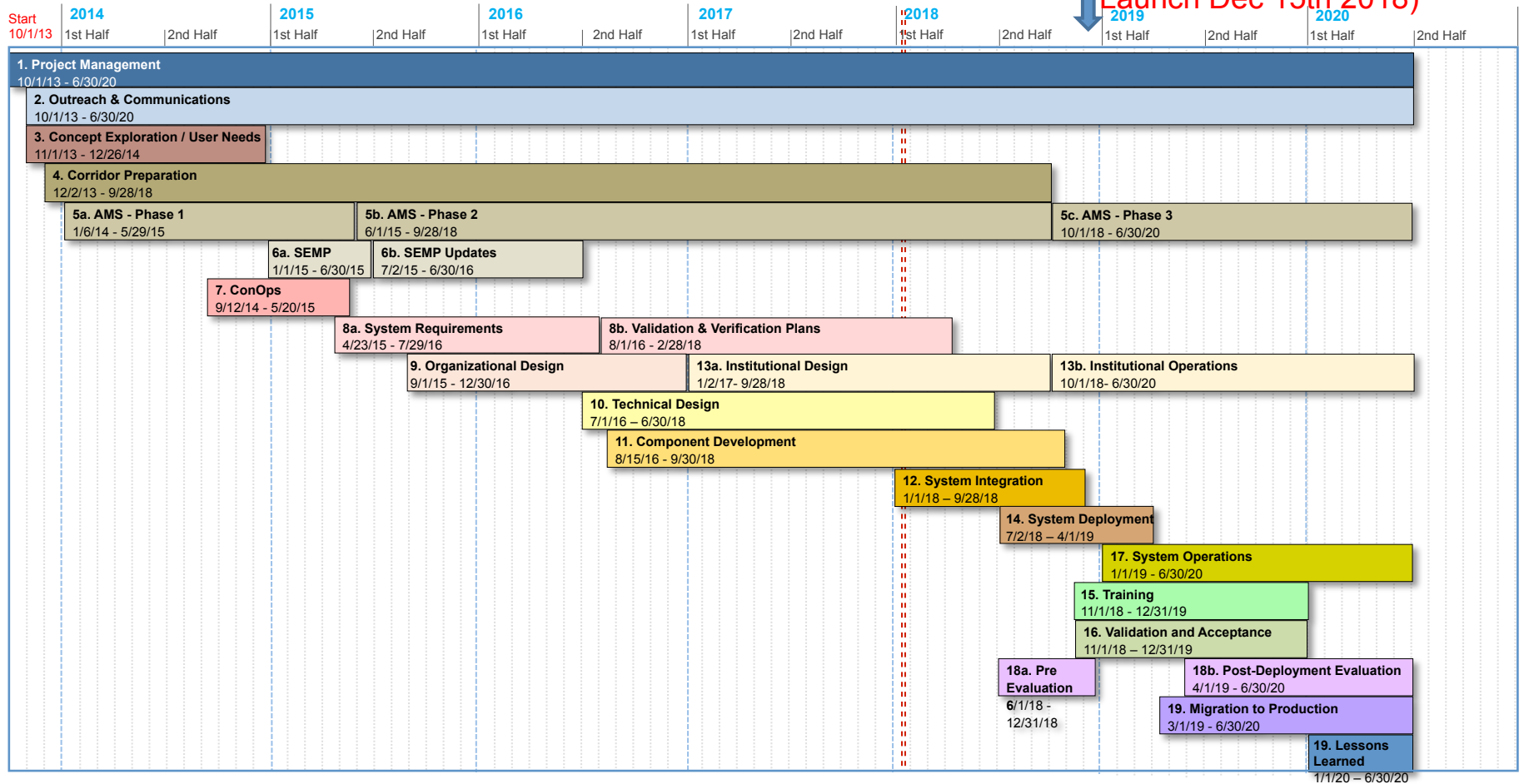☐ **Design Documents – How will the requirements be met**

☐ **Hardware and Software – Building the system**

Schedule

Launch Dec 15th 2018)

Start 10/1/13	2014		2015		2016		2017		2018		2019		2020	
	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half

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

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

3. Concept Exploration / User Needs
11/1/13 - 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

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

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

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

14. System Deployment
7/2/18 – 4/1/19

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

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

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

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

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**

Systems Engineering

- **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 of 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**

Data Hub and DSS Detailed Design (Draft)
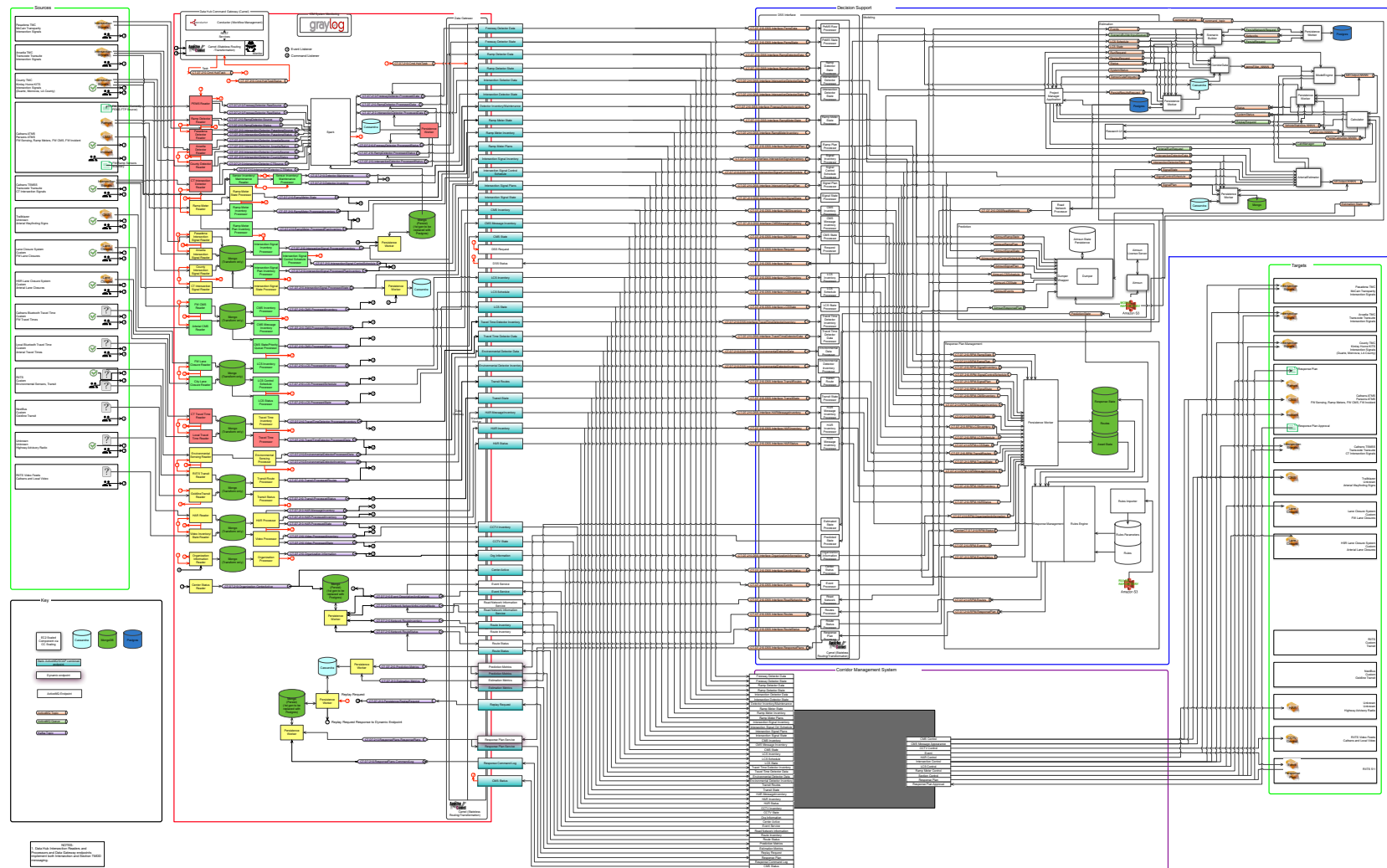
Other Items

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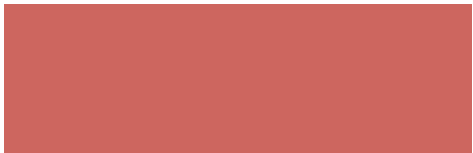
- A preliminary draft copy has been mailed to each of you

- 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

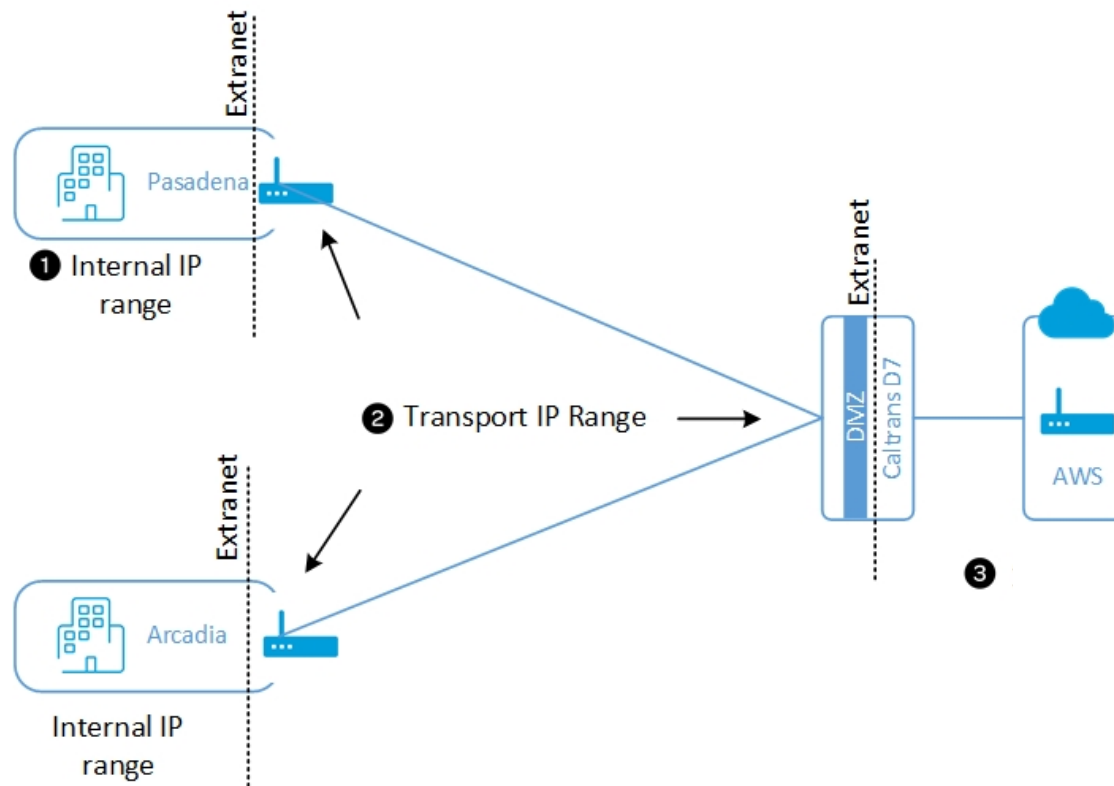- Require fiber distances, fiber power and loss budget to finalize design

Phase 2 Overview
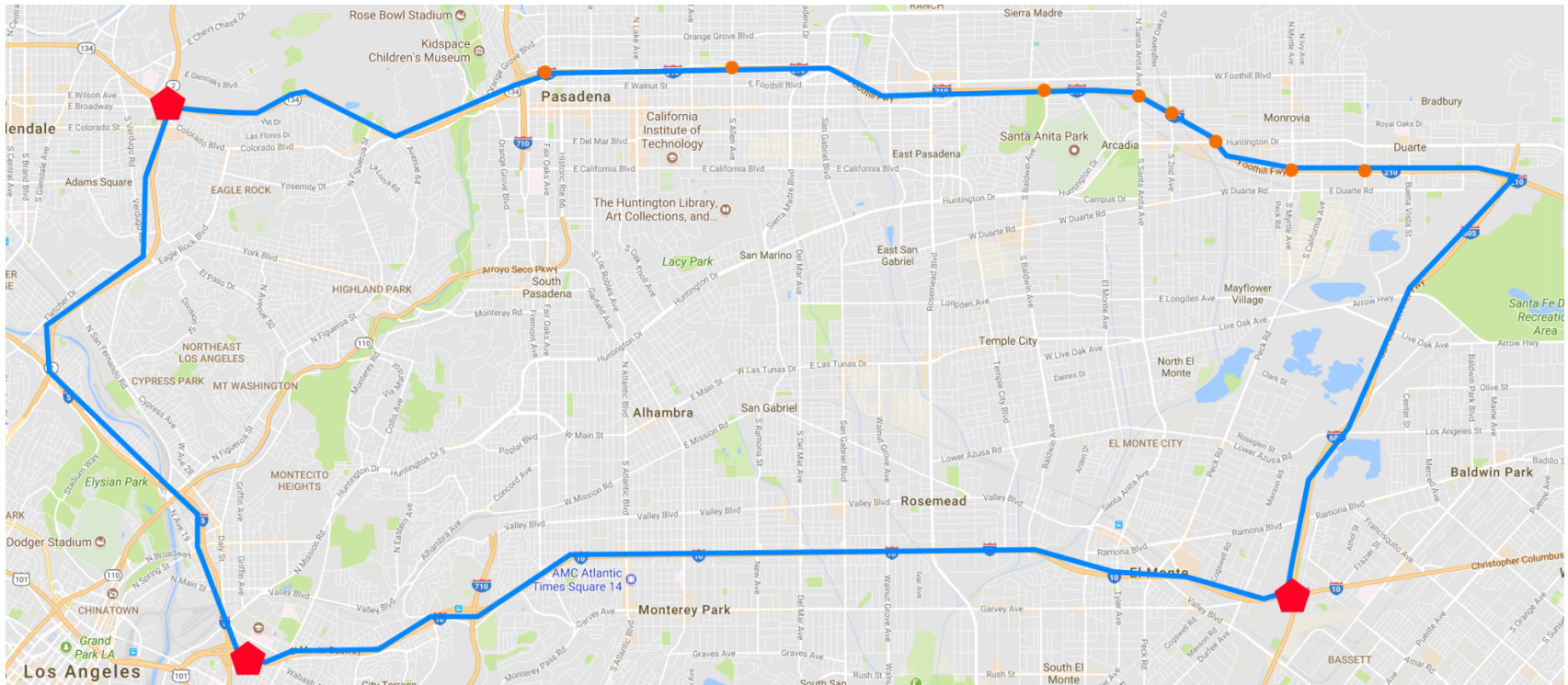
Next Step: Select Transport IP Addresses

Phase 2 Components

Chassis Physical Specifications

	OD-48-HD	OD-32	OD-16	OD-12	OD-6	OD-4
Rack Space	10 RU	9 RU	3 RU	3 RU	2 RU	1 RU
Weight	18 lbs	37 lbs	28.5 lbs	28.5 lbs	12.5 lbs	1.6 lbs
App Slot	46	30	15	11	5	3
Mgr Slot	2	2	1	2	1	1

Hub Sites   Field Sites
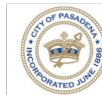
Design Comparisons

Benefits	Option 1: Separate channels/ agency	Option 2: Separate channels/ function	Option 3: Single channel for ICM
Availability (Most)	★★★	★★★	★★★
Agency Impact (Least)	★	★★	★★★
Capacity (Most)	★★★	★★	★
Cost (Least)	★	★★	★★★
Logical Config (Least)	★★★	★★	★
Scalability (Most)	★	★★	★★★
Security (Most)	★★★	★★	★★

★ Good   ★★ Better   ★★★ Best

Traffic Flow – Phase 1 (VPN to RIITS)
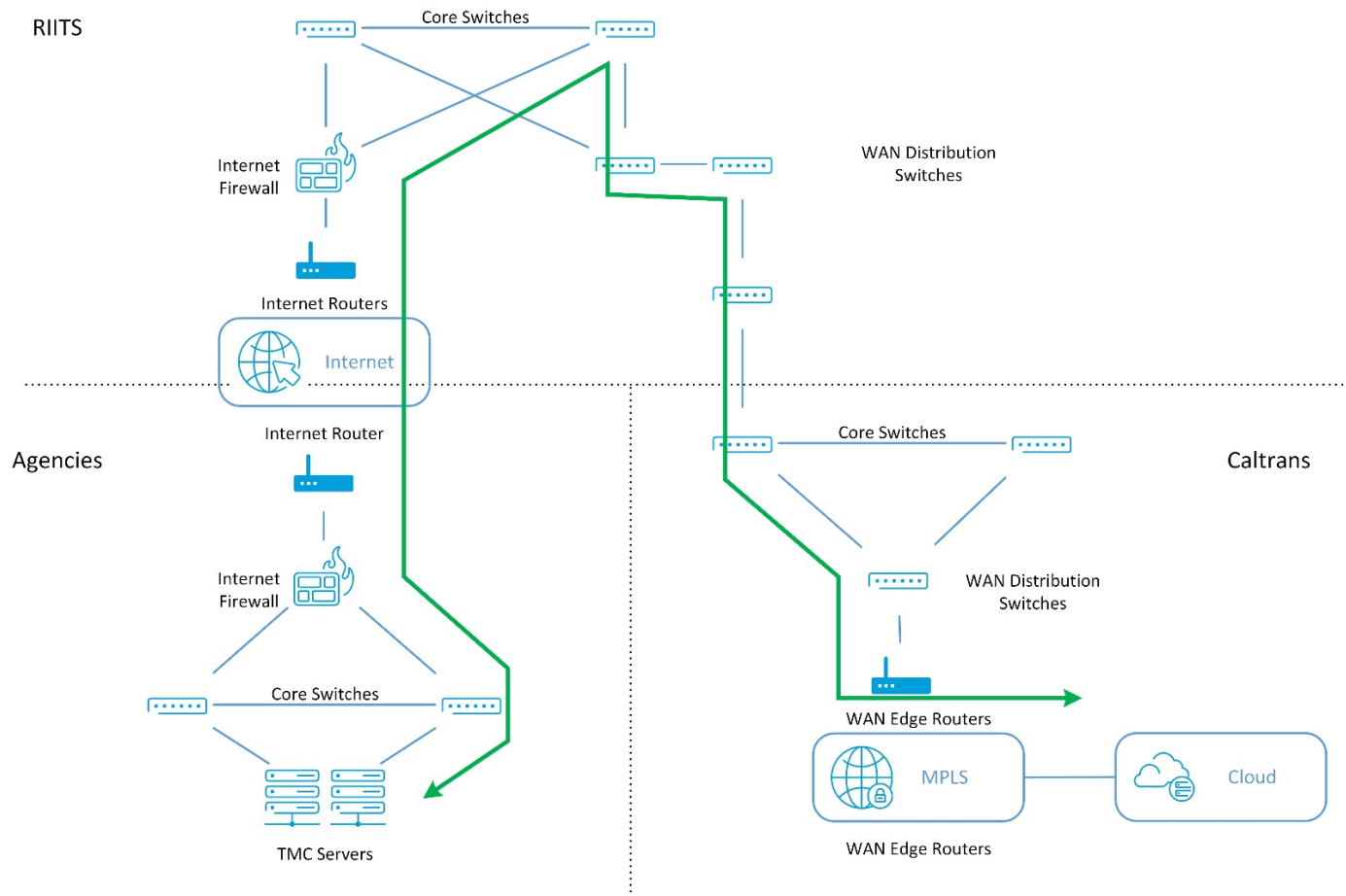
Next Steps

- 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
      Budget   = $ 1,629,800
      Requested   = $ 2,150,643 $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

		Pasadena	Arcadia	Monrovia	Durate	LA County	Total	Original	Requested
Package 1 - Bluetooth (Velocity)									
	Original	-	5	-	-	-	**5**	$ 15,200	
	Requested	-	4	-	-	-	**4**		$ 18,024
Package2 - Bluetooth (BlueToad)									
	Original	12	0	6	3	5	**26**	$ 122,000	
	Requested	11	0	4	2	5	**22**		$ 208,708
Package 3 - New Cabinets									
	Original	7	1	-	-	-	**8**	$ 222,500	
	Requested	7	1	-	-	-	**8**		$ 271,897
Package 4 - Communication Upgrade									
	Original	-	0	15	5	2	**22**	$ 302,500	
	Requested	-	2	27	11	5	**45**		$ 417,038
Package 5 - Controllers									
	Original	8	6	3	-	-	**17**	$ 109,600	
	Requested	7	2	3	-	-	**12**		$ 114,063
Package 6 - Video Detection System									
	Original	9	3	5	3	2	**22**	$ 730,000	
	Requested	9	3	5	3	2	**22**		$ 924,416
Package 7 - Data Comm Module / VDS SW Upgrades									
	Original	11	13	2	1	4	**31**	$ 128,000	
	Requested	8	15	3	1	4	**31**		$ 196,497
									$ 1,629,800	**$ 2,150,643**
									Added Funds	$ 520,843

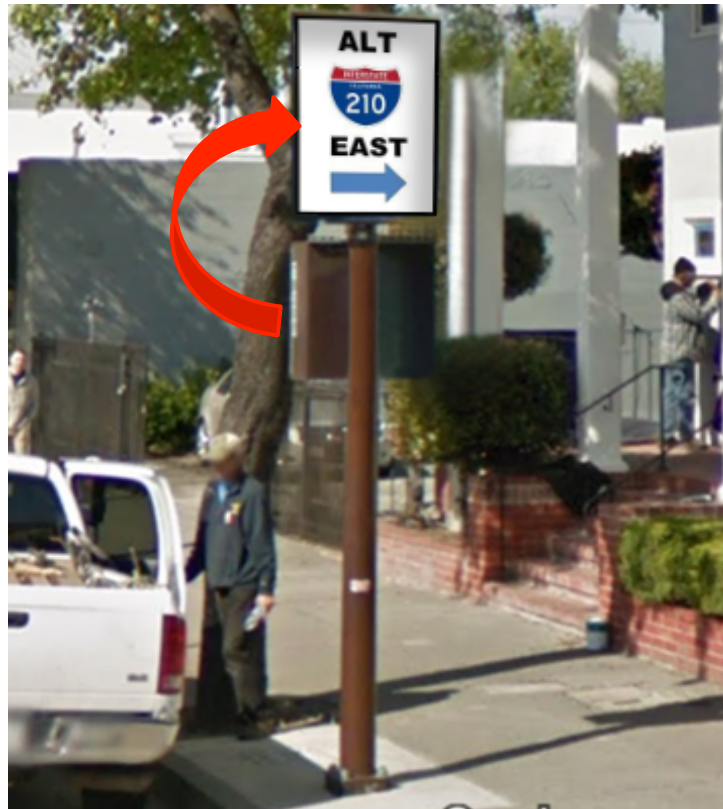# Alternate Route Update
Erlan - Iteris

Equipment Update
Locations Update
Bid Estimate
Bid Specifications
Next Steps

Locations Update
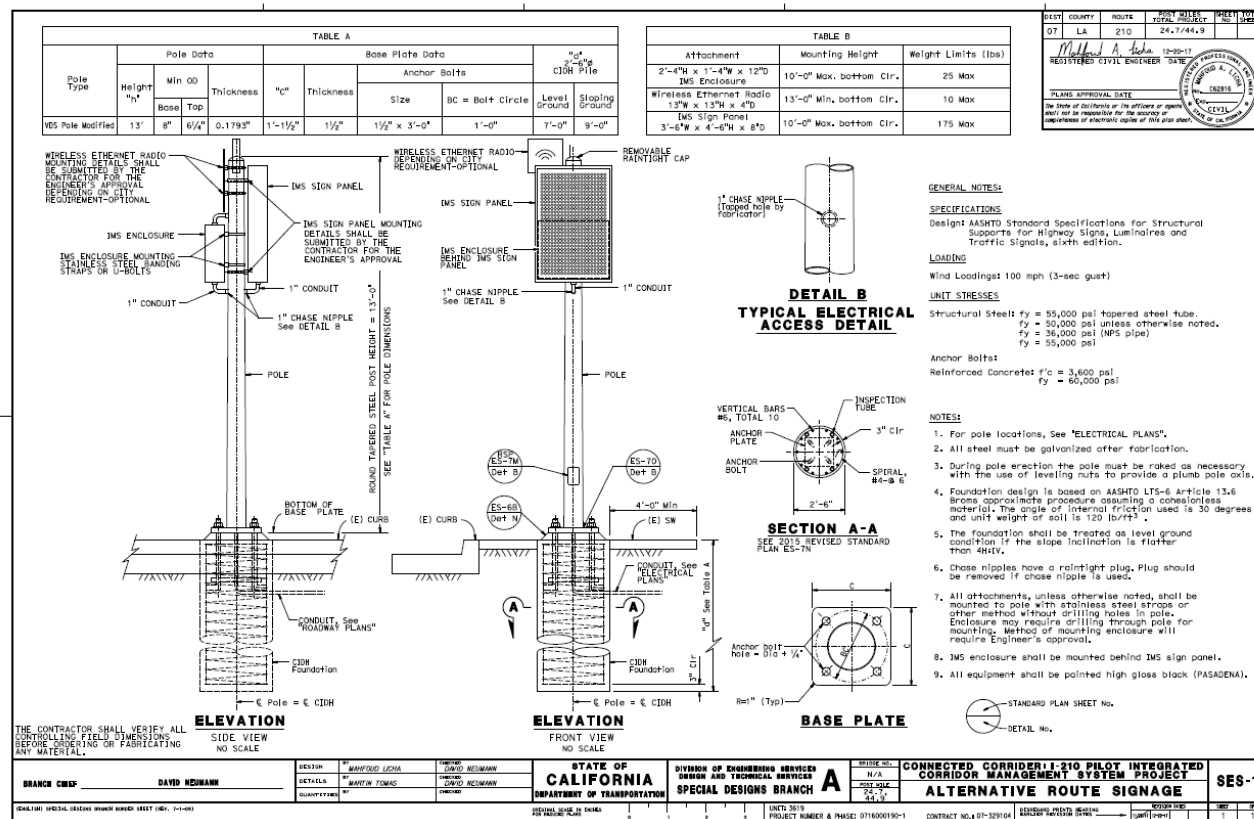
Bid Estimate

Bid Specifications

Next Steps

Equipment Update (CMS)

Sign: Full Matrix LED (3' x 4')

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*

Static Sign Location Update

□ **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

TO OR SOUTH

M4-5   M3-3

101

SOUTH →

G78-1 (CA)

INTERSTATE

80

G27-1 (CA)

→

M6-1

Sign Location Field Review

□ **Conduit Capacity**

    □ Performed conduit fill calculations based on the MUTCD

        ■ 25% fill for new runs

        ■ 35% for existing runs

P
B

P
B

New Sign

Controller Cabinet

Existing Loops
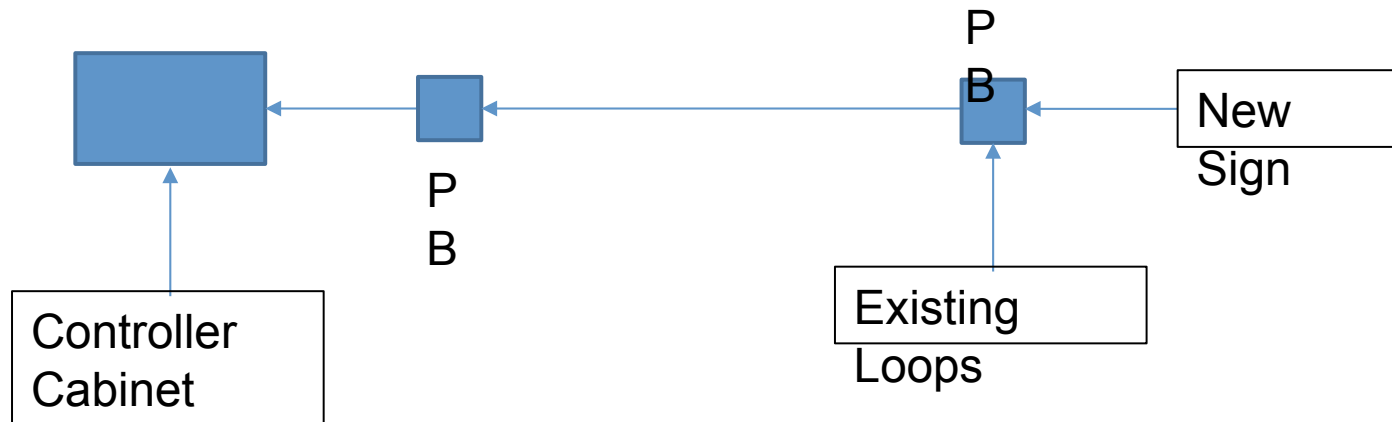
Field Review Results

- **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
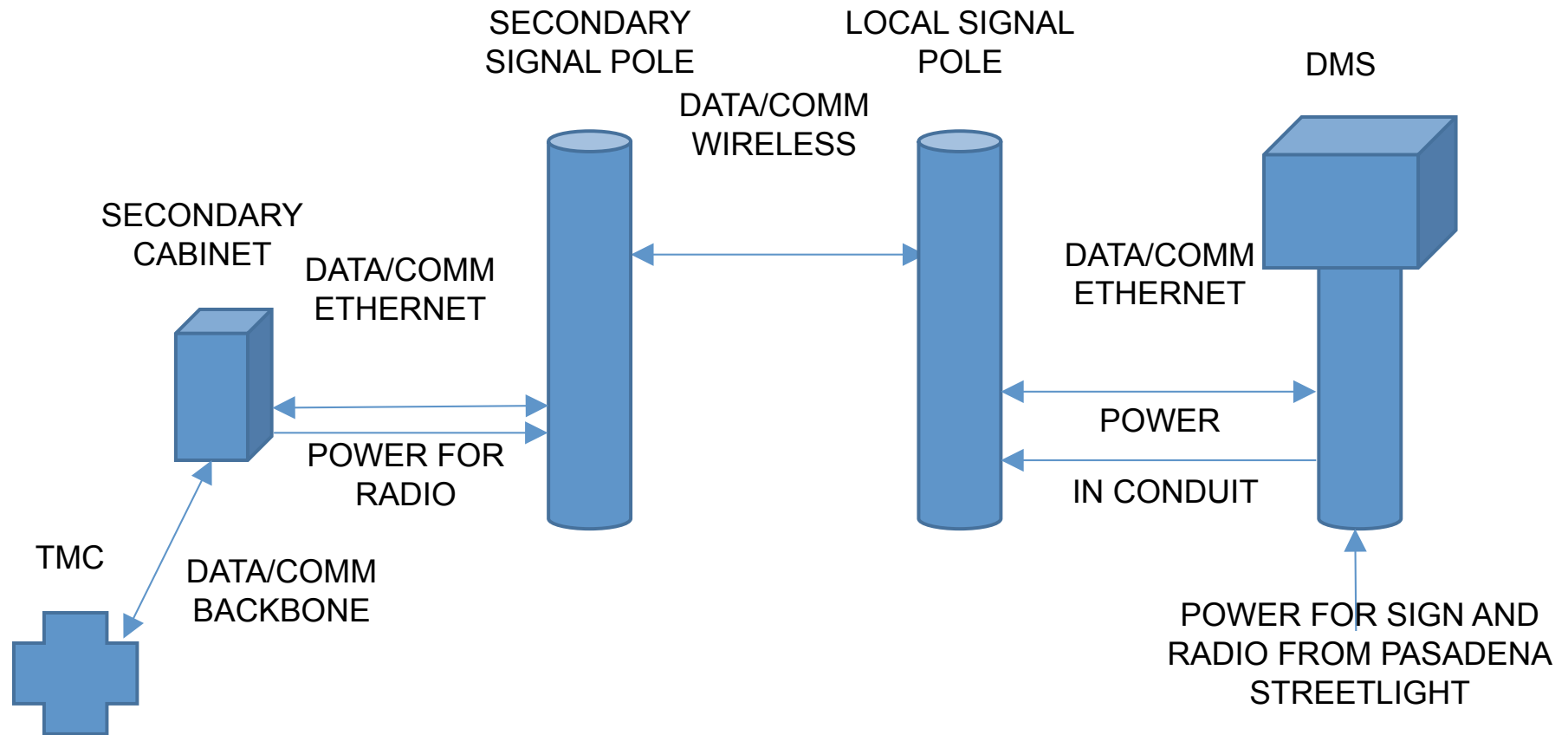
DMS with Wired Connection Example

Simple Wired – Arcadia/Monrovia
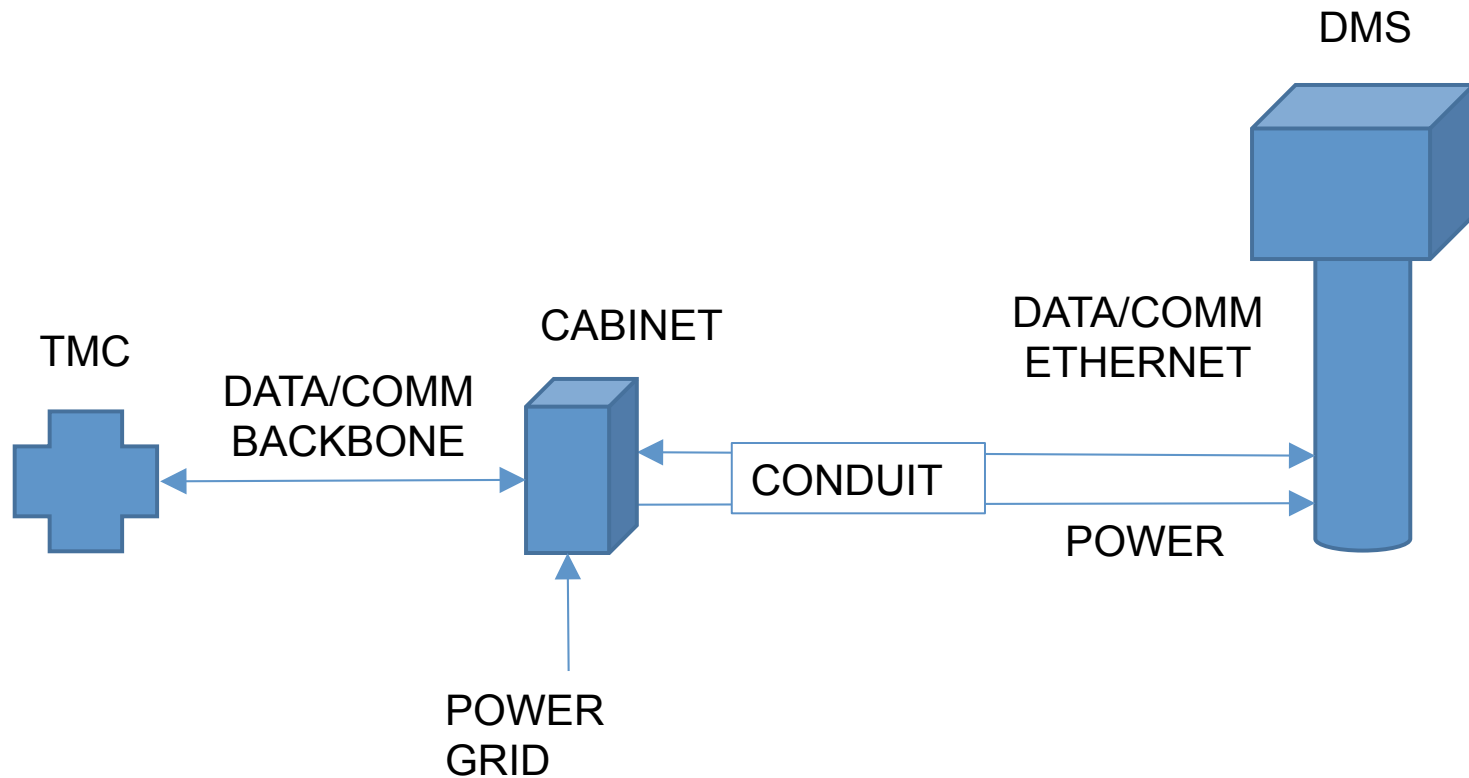
DMS with Wireless Connection Example

Simple Wireless (Intuicom) - Pasadena

SIGNAL POLE

DMS

DATA/COMM WIRELESS

TMC

CABINET

DATA/COMM BACKBONE

DATA/COMM ETHERNET

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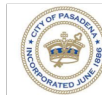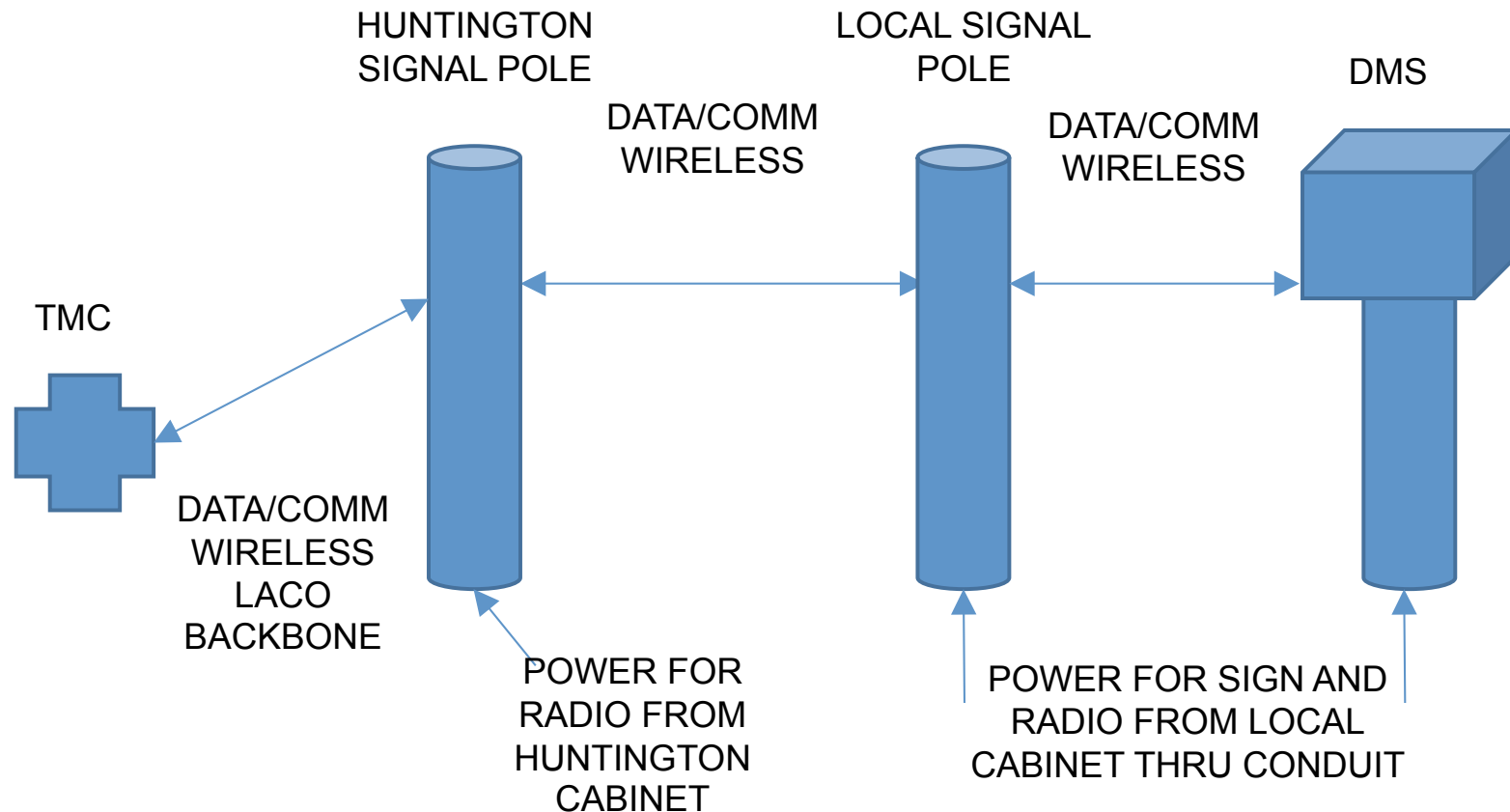
POWER FOR SIGN AND RADIO FROM PASADENA STREETLIGHT
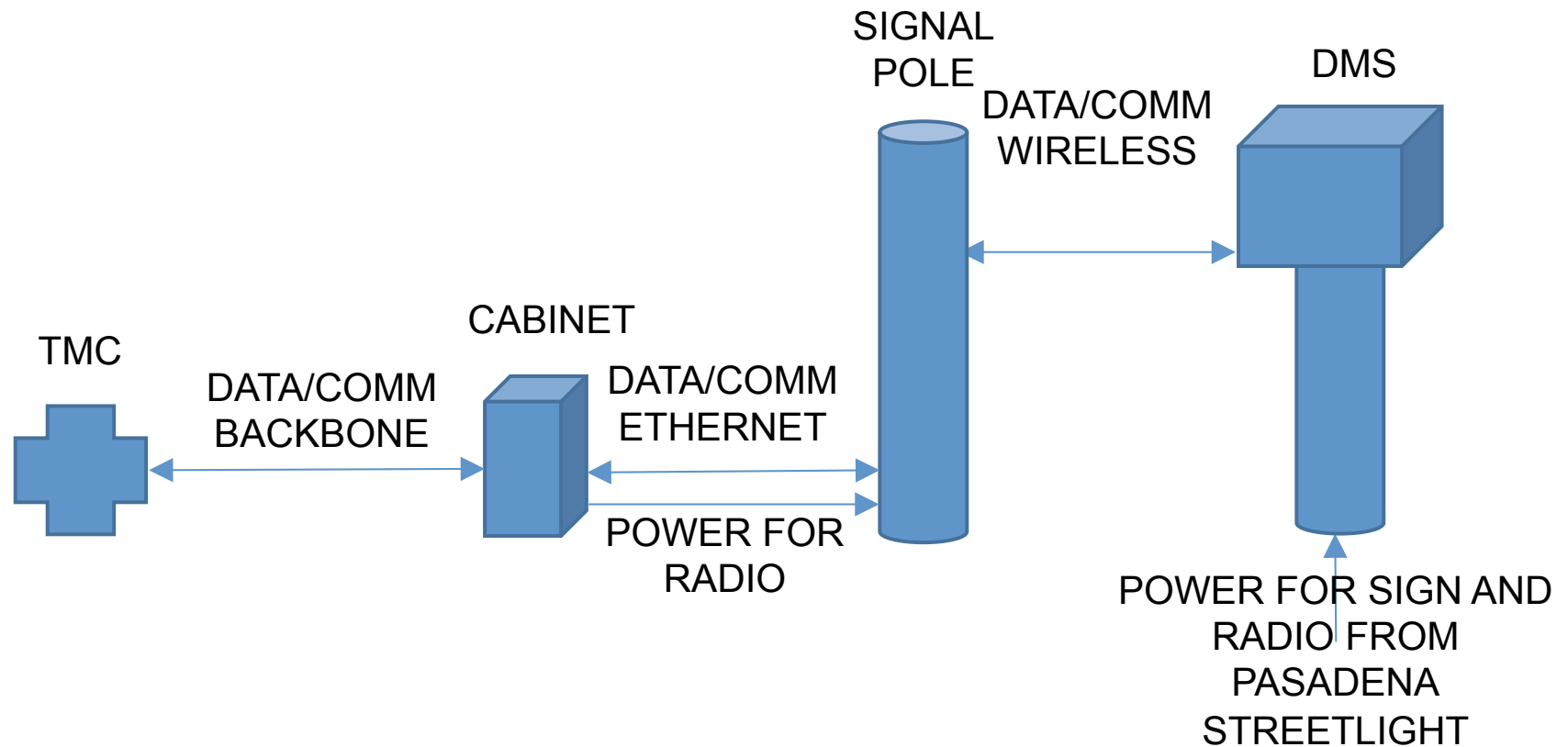
DMS with Wireless Connection

Wireless Relay (Intuicom) – Pasadena

DMS with Wireless Connection

Wireless Relay (Proxim??) - Duarte

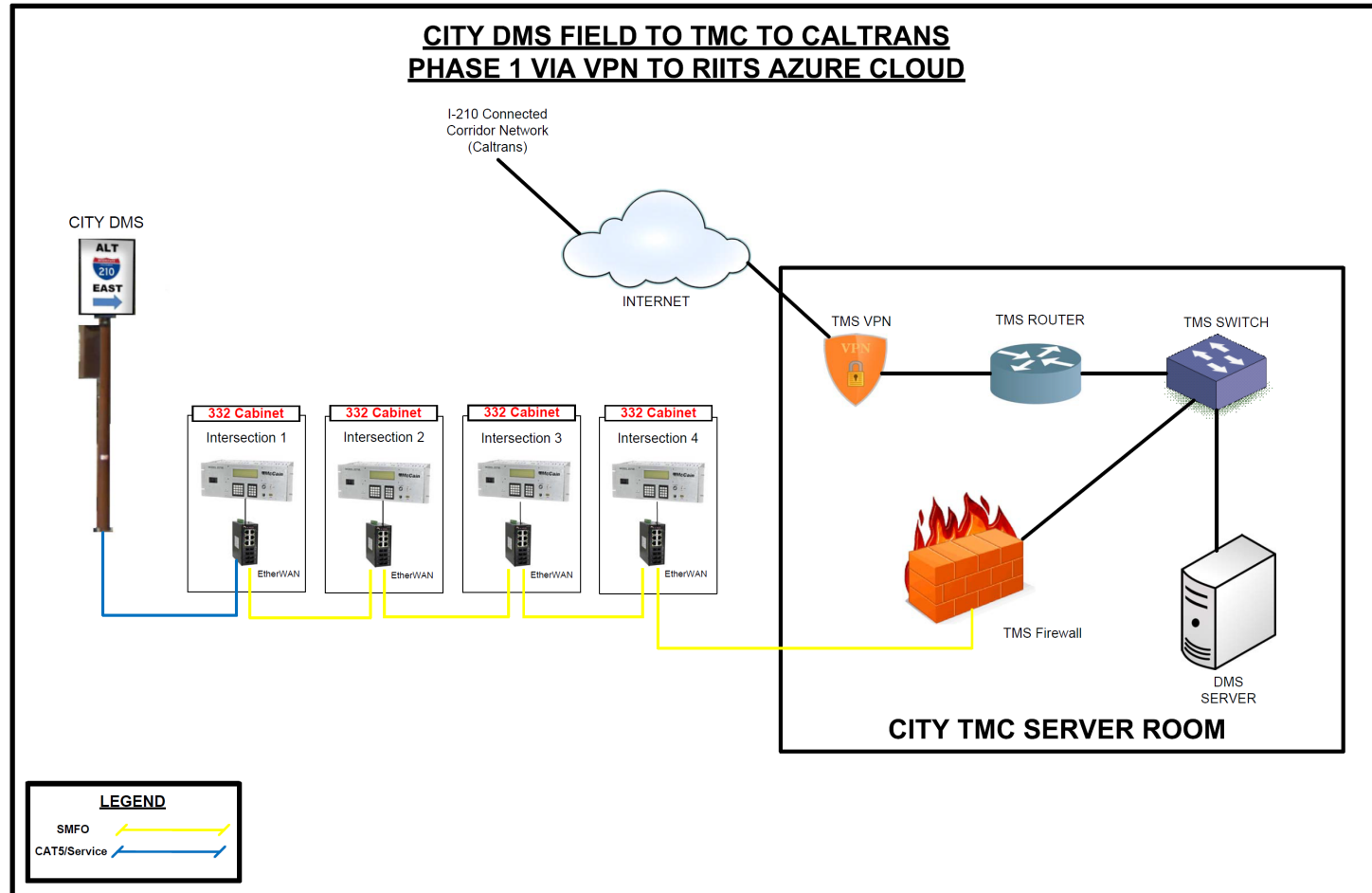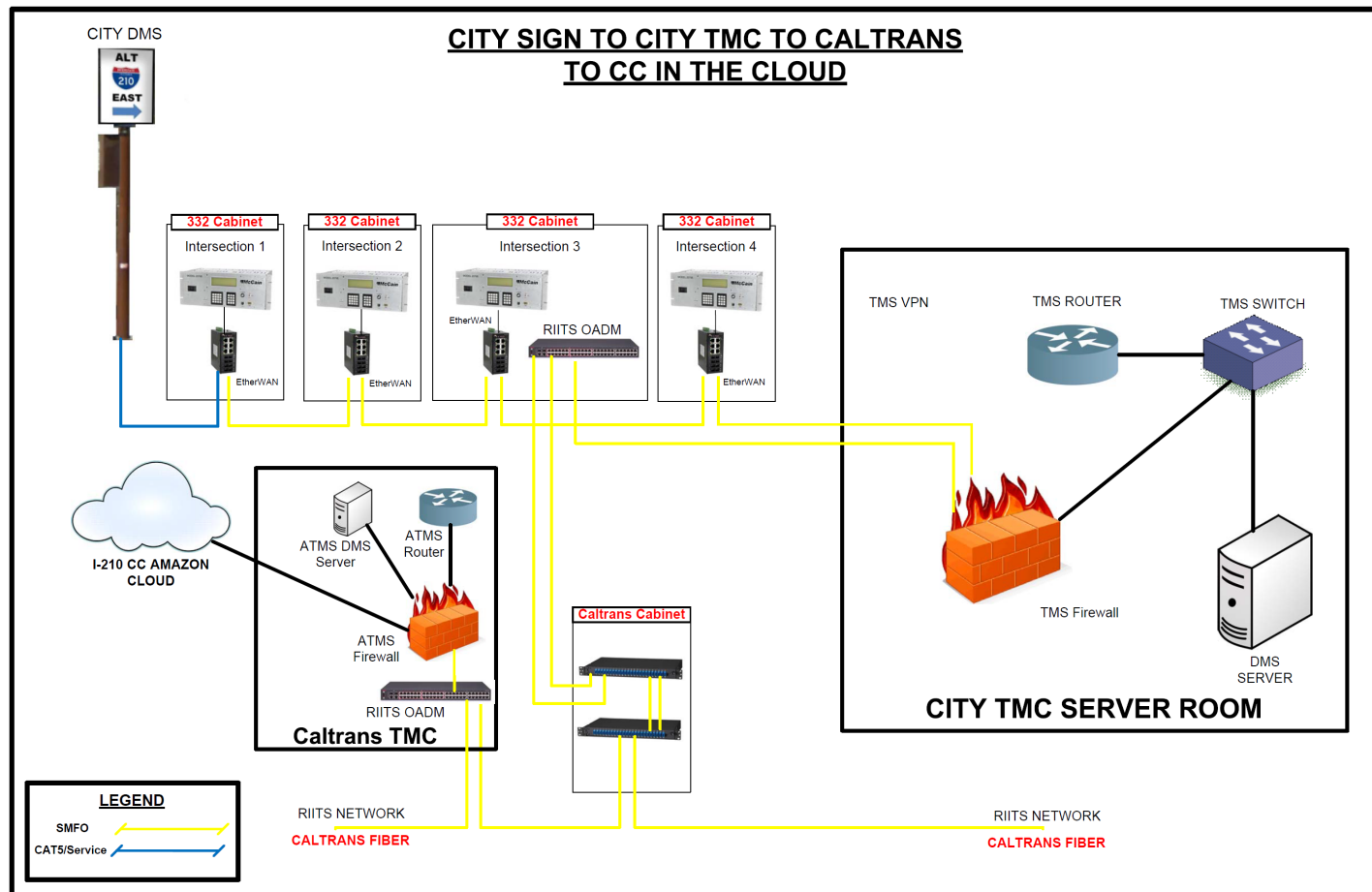HUNTINGTON
SIGNAL POLE

LOCAL SIGNAL
POLE

DMS

DATA/COMM
WIRELESS

DATA/COMM
WIRELESS

TMC

DATA/COMM
WIRELESS
LACO
BACKBONE

POWER FOR
RADIO FROM
HUNTINGTON
CABINET

POWER FOR SIGN AND
RADIO FROM LOCAL
CABINET THRU CONDUIT

DMS Communication Caltrans

**CALTRANS DMS FIELD TO CALTRANS TMC
TO AMAZON CC CLOUD**

Caltrans DMS

I-210 CC AMAZON CLOUD

ATMS ROUTER

332 Cabinet
Location 1

Ethernet Switch

Caltrans Hub

ATMS Firewall

DMS
SERVER

CALTRANS TMC

LEGEND
SMFO
CAT5/Service

DMS Communication Phase 1

CITY DMS FIELD TO TMC TO CALTRANS
PHASE 1 VIA VPN TO RIITS AZURE CLOUD
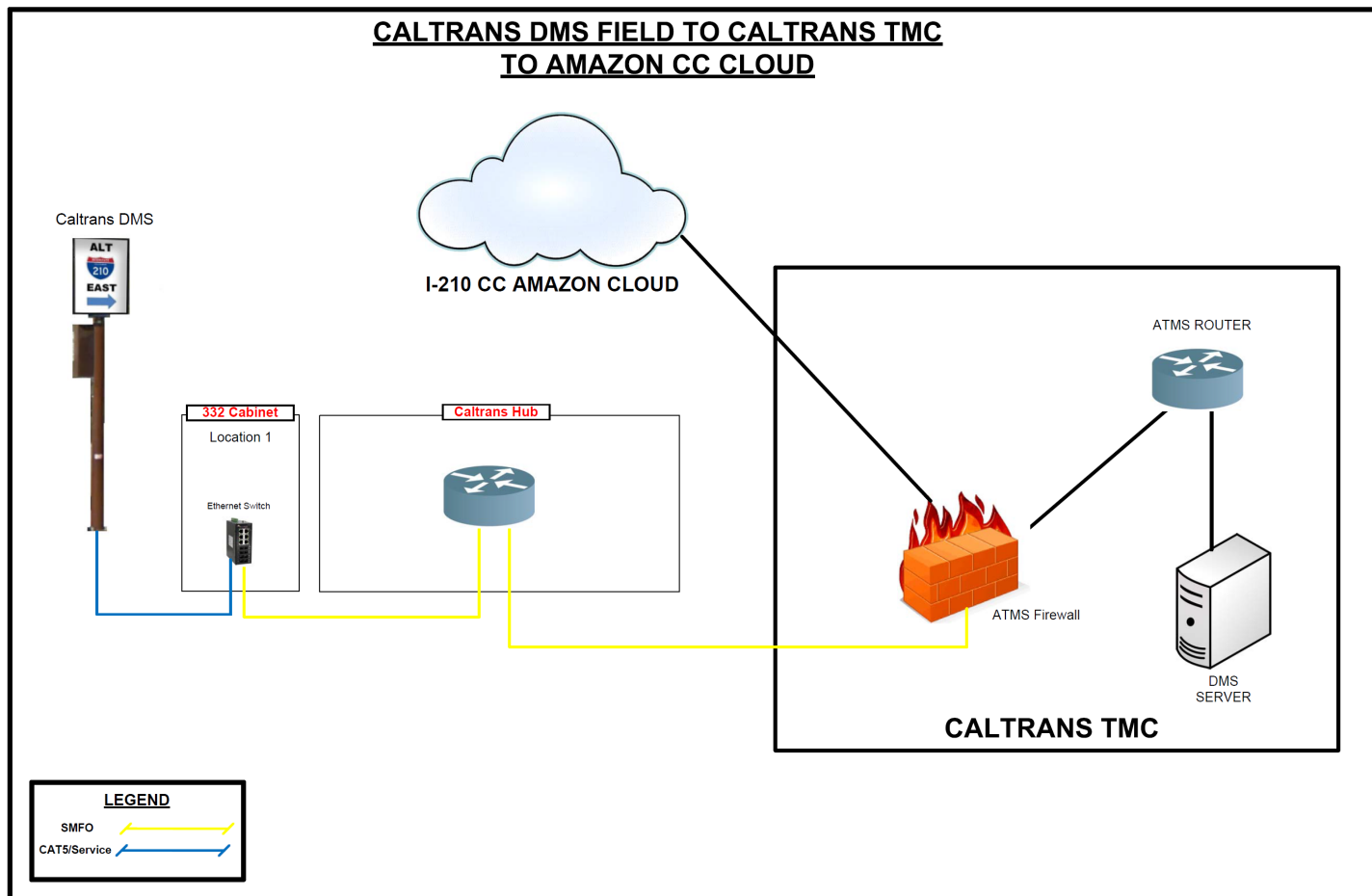
DMS Communication Phase 2

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**
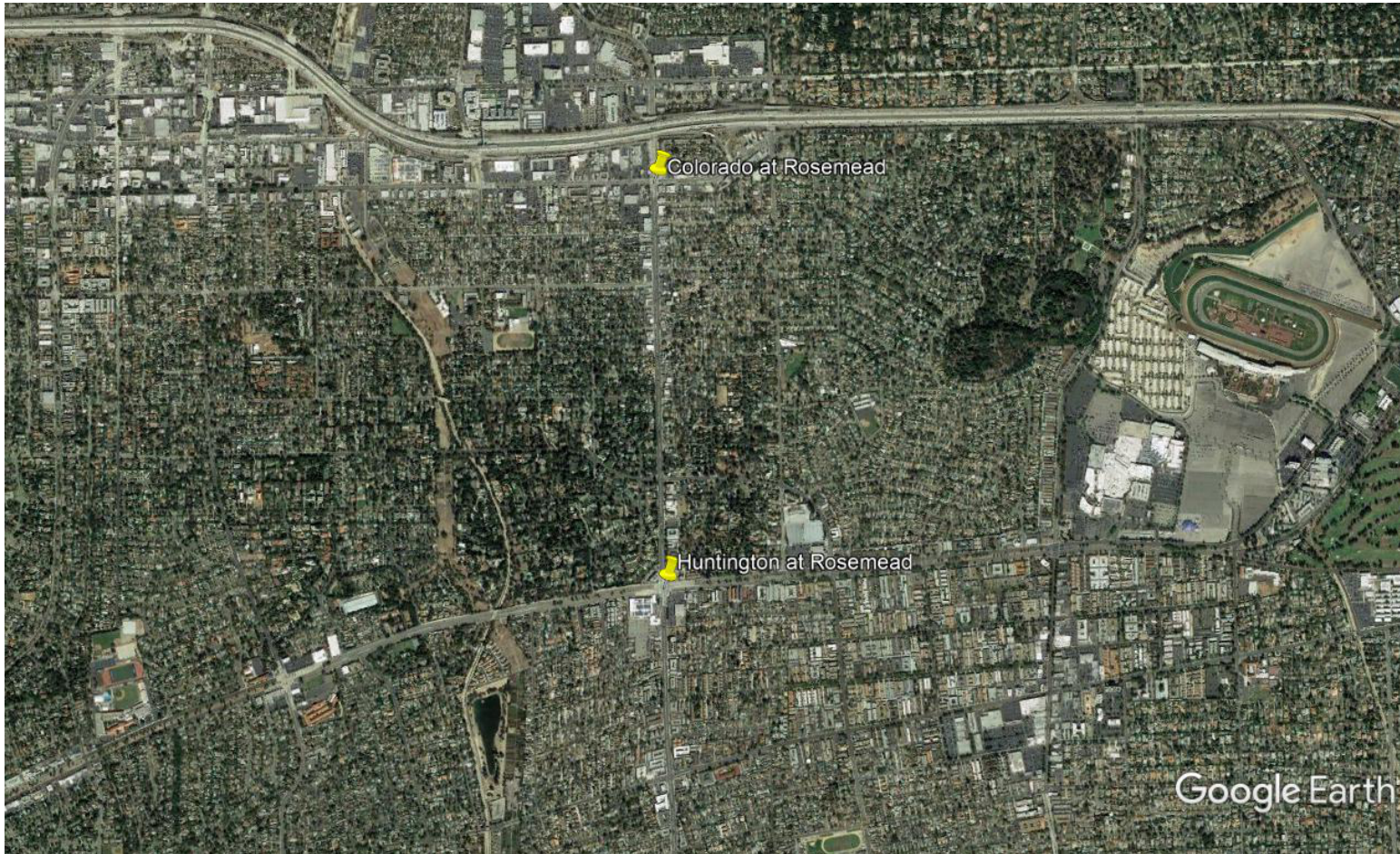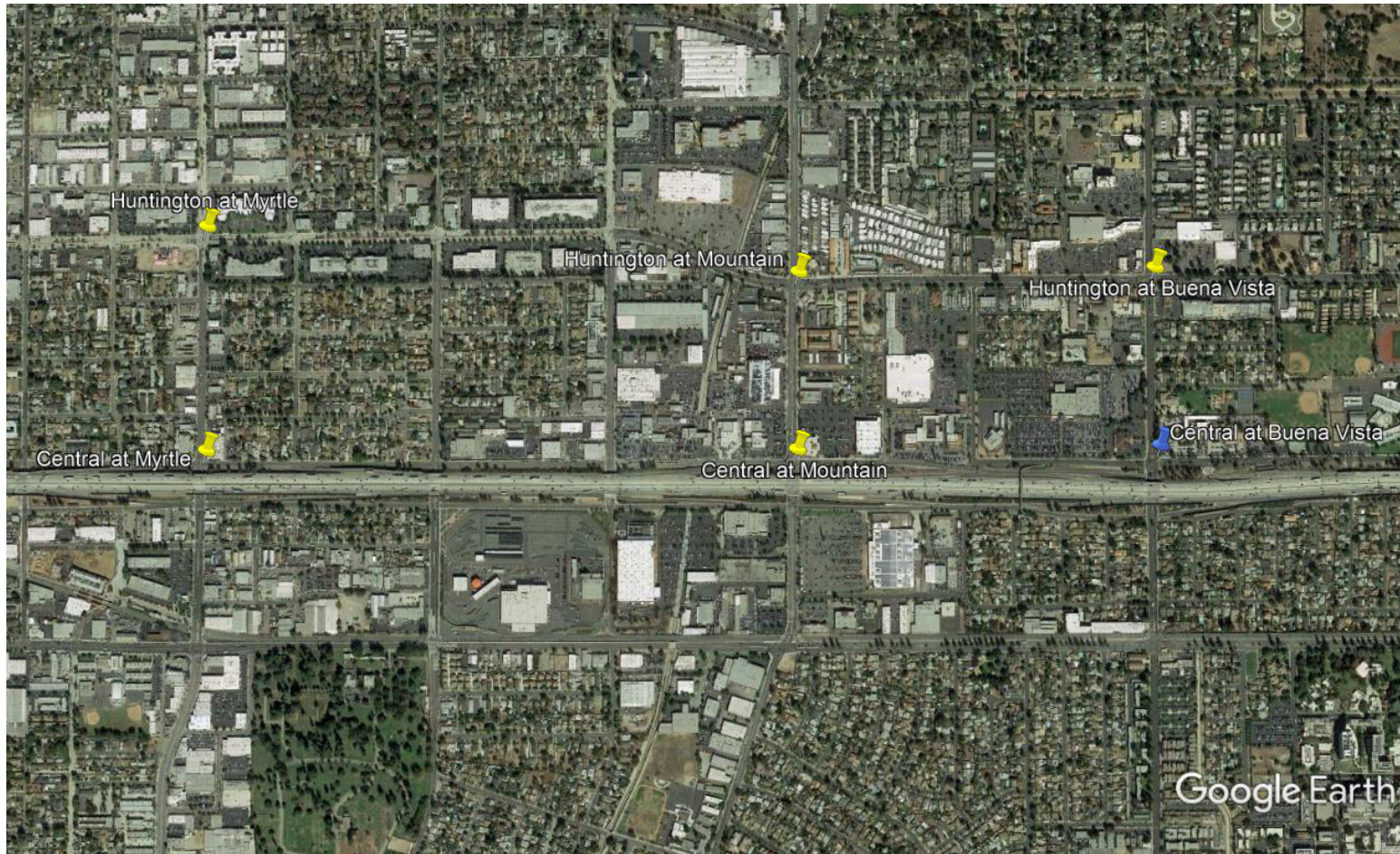
Pasadena
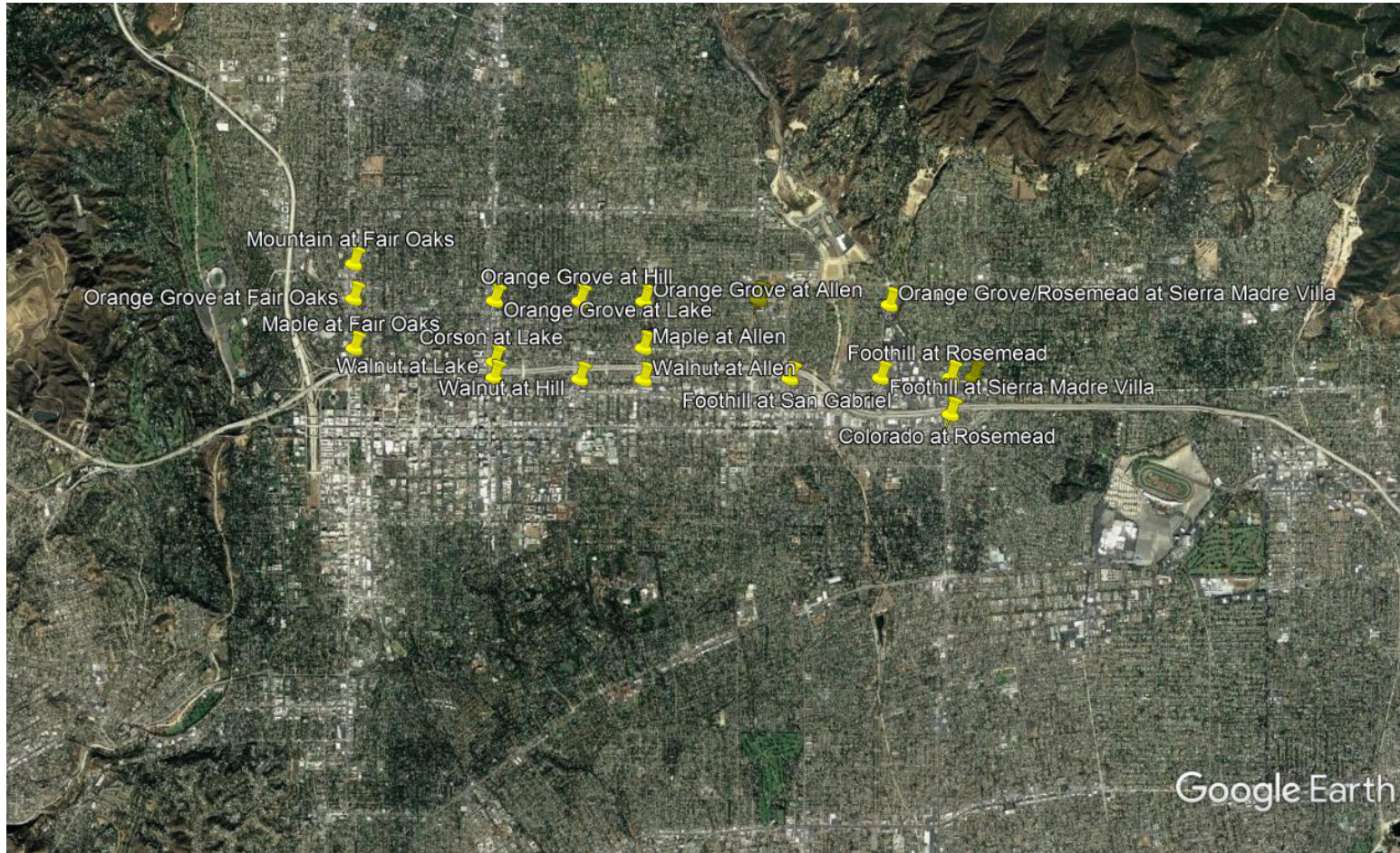
Arcadia

Los Angeles County

Monrovia/Duarte

Thank You
and
Next Meeting
(Suggest Feb 27th
in Monrovia)