Connected Corridors
Face-to-Face Meeting

Tuesday, April 30th , 2019
1:30 – 3:30 pm
LA County

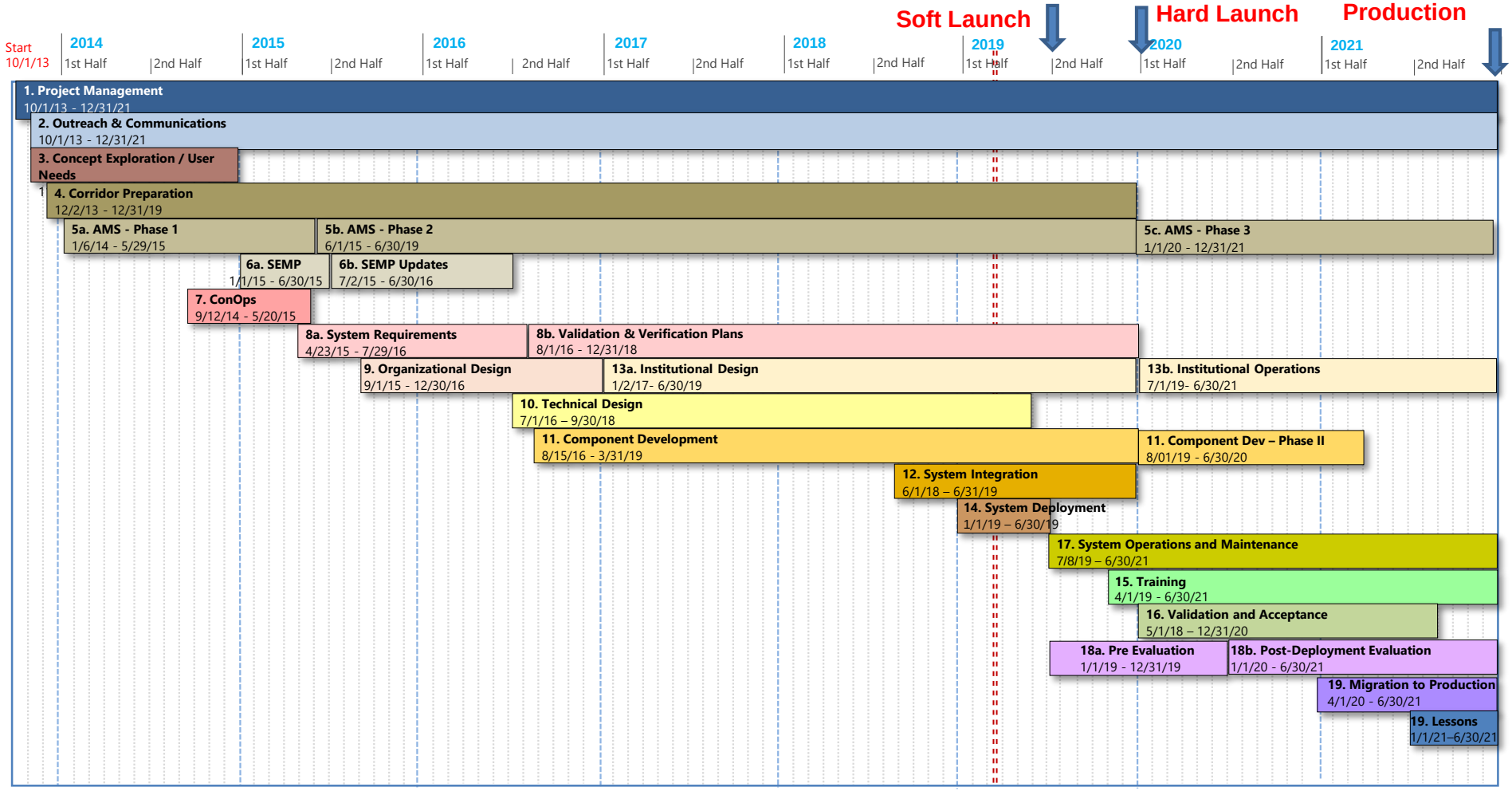
Agenda

- **1:30 - 2:00 – Program Review – Joe**
- **2:00 - 2:30 – Call for projects update - Ning**
- **2:30 - 2:50 – Signal Timing - Anthony**
- **2:50 - 3:00 – Closing**
  - Next Meeting at Arcadia – Tuesday June 11th
  - (County, Arcadia, Caltrans, Pasadena, Monrovia, Duarte)

PATH Contract has been approved!

- **The PATH contract was approved on April 19th**
- **The next contract should be completed by end of May**
- **These contracts position us to deliver the pilot**
- **We are also better positioned for fan out to the rest of LA and California**

Schedule – Requires Updating

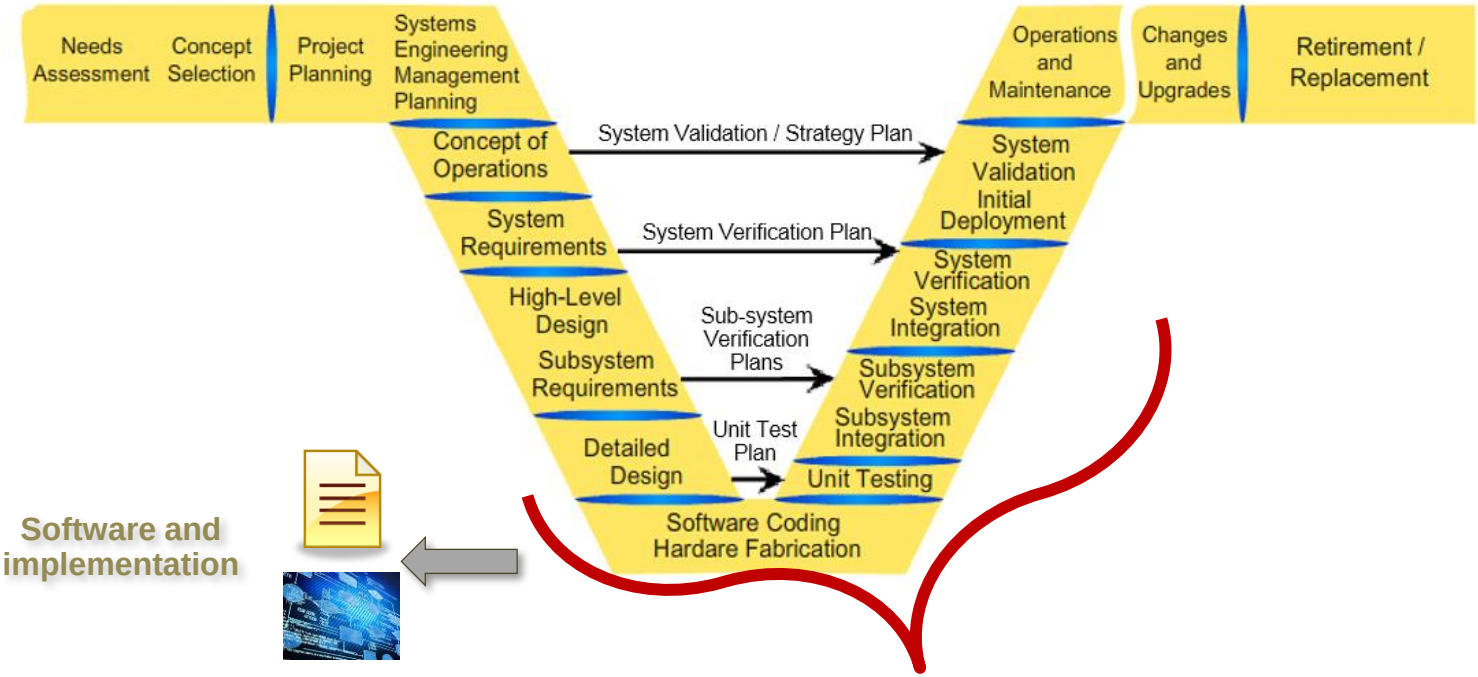


Schedule Discussion

- **Our schedule is going to slip due to:**
  - PATH contract being awarded later than expected
  - Procurement of arterial ITS elements on hold as Caltrans studies the best way to procure them
  - Need to work out some issues related to hiring subcontractors
- **Schedule may slip but we are moving forward every day**

Systems Engineering Next Steps

- Design Documents – Details of interfaces and implementations
- Hardware/Software – Building the system
- Integration – Subsystems will come on line this year



Summary

Freeway Data Quality

- Core I-210 sensor availability solidly accomplished
- SR-134 and I-605 fluctuating around target goal
- Seven confirmed configuration errors fixed

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	79.5%	90%	na	na	5/1/2019
	West	70.3%	90%	na	na	5/1/2019
I-210 PM 25 - 43.25	East	91.6%	90%	3/16/2019		
	West	92.1%	90%	3/2/2019		
SR-134 PM 11.4 - 13.5	East	94.5%	90%	4/27/2019		
	West	96.6%	90%	4/27/2019		
I-605 PM 22.93 - 28	North	78.0%	90%	4/13/2019	4/27/2018	
	South	75.3%	90%	4/20/2019	4/27/2018	

Arterial Data Quality

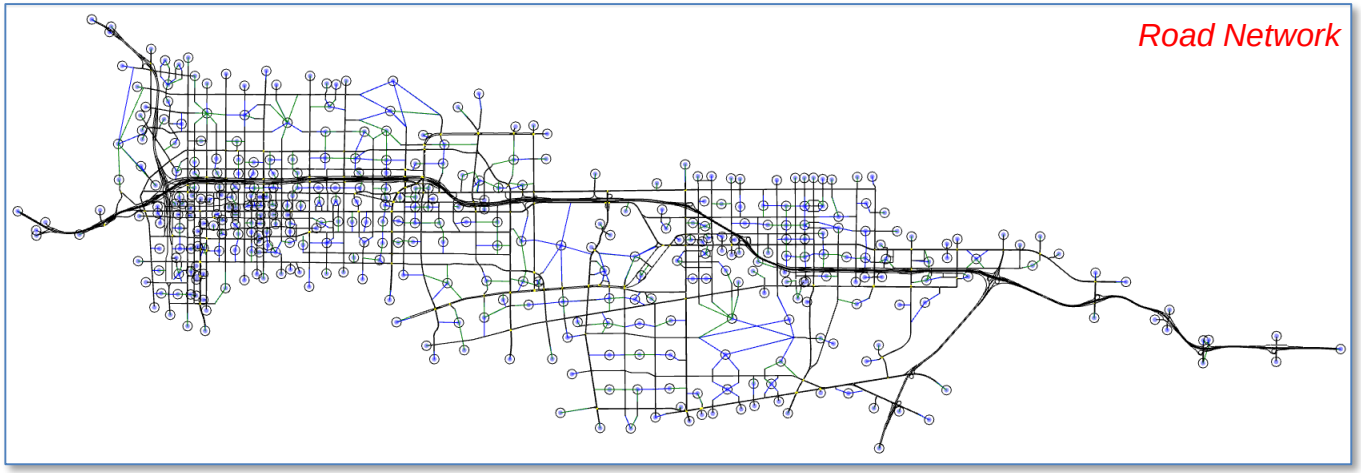
- **Arcadia**
  - We continue to collect and process data from two data sources: Arcadia's TCS server and the IEN.
  - A weekly detector health report in Arcadia is sent to the CC modeling team.
  - Arcadia is steady at 80%
- **LA County**
  - Jason from Kimley Horn reminded us that the County KITS system requires a review of its configuration data before the data can be trusted
- **Pasadena**
  - We are not reviewing Pasadena data yet
- **Caltrans**
  - Awaiting the addition of detector configuration data to the Caltrans TSMSS system

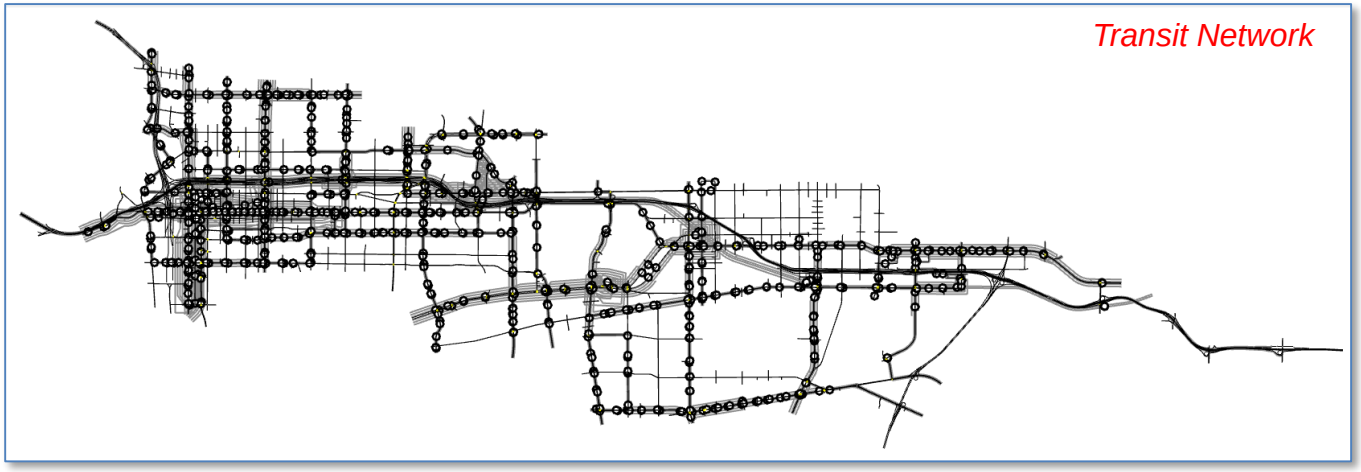
Detailed Arterial Data Quality Analysis

- **Data quality analysis on TMDD messages**
  - Transcore - Arcadia
    - Overall, all available messages are looking good (only some minor issues are found). However, *IntersectionSignalControlSchedule* is still unavailable.
    - We started to process the *IntersectionSignalStatus* data, and found that some signal events (light changes) are missing.
    - We are finishing up the code to construct cycle-based information from the available signal status data. We will provide a final report to TransCore before May 15th.
  - Kimley Horn - LA County, Monrovia, Duarte
    - We reviewed the samples of *DetectorData, DetectorInventory, DetectorStatus, IntersectionSignalInventory, IntersectionSignalTimingPlanInventory* provided by the county.
    - We found that some required attributes are missing while some others are put in the wrong place.
  - McCain - Pasadena
    - We are still working with McCain to fit their data structures, particularly on *IntersectionSignalTimingPatternInventory* and *IntersectionSignalStatus,* into the TMDD format.

Aimsun Model

- **Model Snapshots**



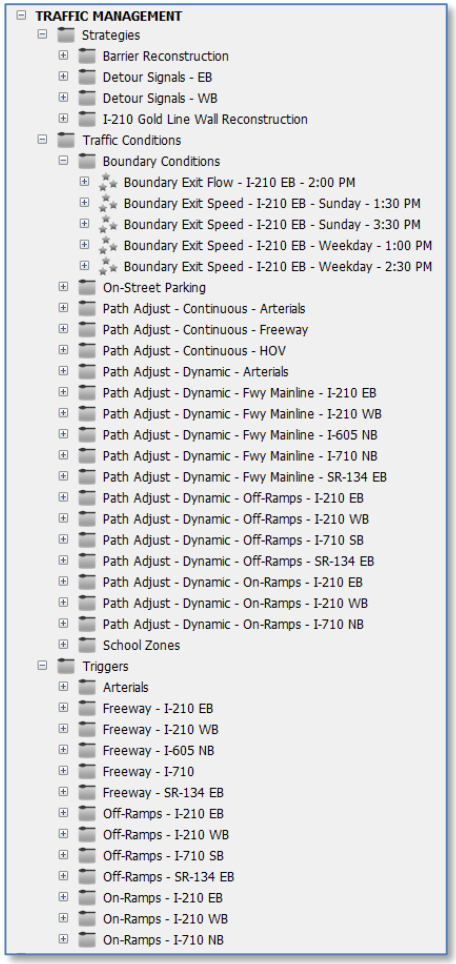


Aimsun Model

- **Main calibration completed**
  - Weekday
  - Saturday
  - Sunday
- **Calibration focused on:**
  - Freeway flows
    - Mainline
    - HOV
    - On/Off ramps
  - Arterials flows on primary detour arterials (to the extent allowed by available data)

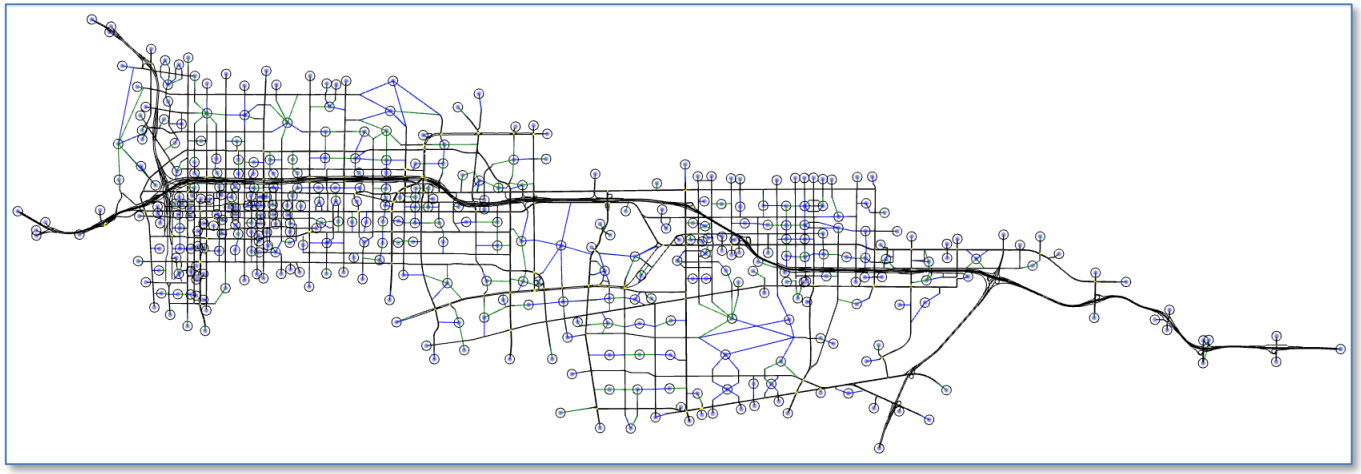
Aimsun Model

- **Special focus on replicating driver behavior in unusual situations i.e. incidents**
  - Development of dynamic triggers pushing vehicles off the freeway when encountering unexpected congestion
- **Completed coding of detour routes**
  - Signal timings to use
  - Where needed, paths that vehicles should follow



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

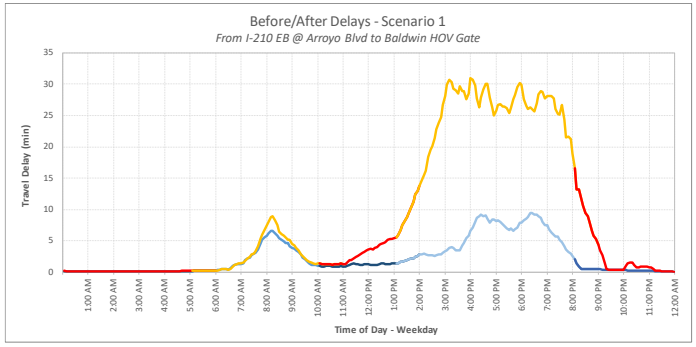


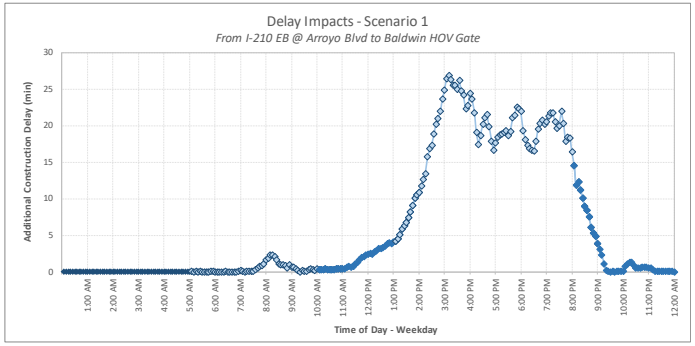
Barrier Reconstruction Project

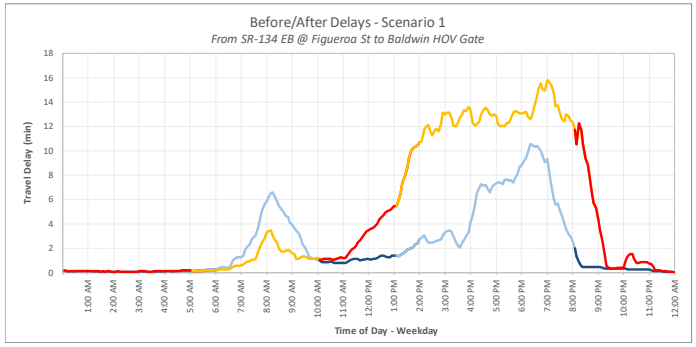
- **Simulation of 8 lane closure scenarios for the replacement of the barrier between I-210 and Gold Line tracks**
  - Four 24-hr weekday scenarios
    - HOV lane closure
    - Nightly closure of 2 mainline lanes
  - Four 58-hr weekend scenarios (Friday 8 PM -> Monday 6 AM)
    - HOV lane closure
    - Nightly closure of 2 mainline lanes
    - Nightly closure of Rosemead and Michillinda undercrossing
- **Development of alternate demand for each scenario reflecting estimated traffic diversion away from corridor**

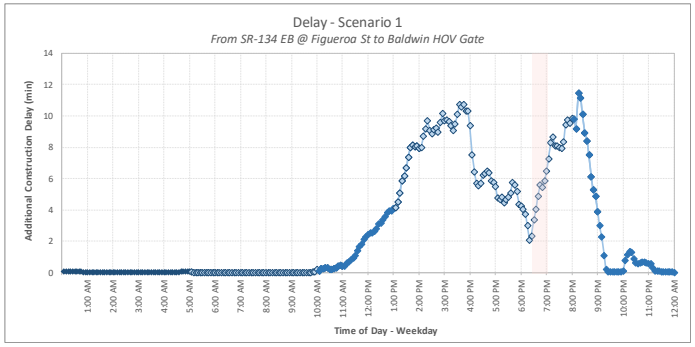
Barrier Reconstruction Project

- **Aimsun model used to assess extent of congestion caused by the various lane closure scenarios**

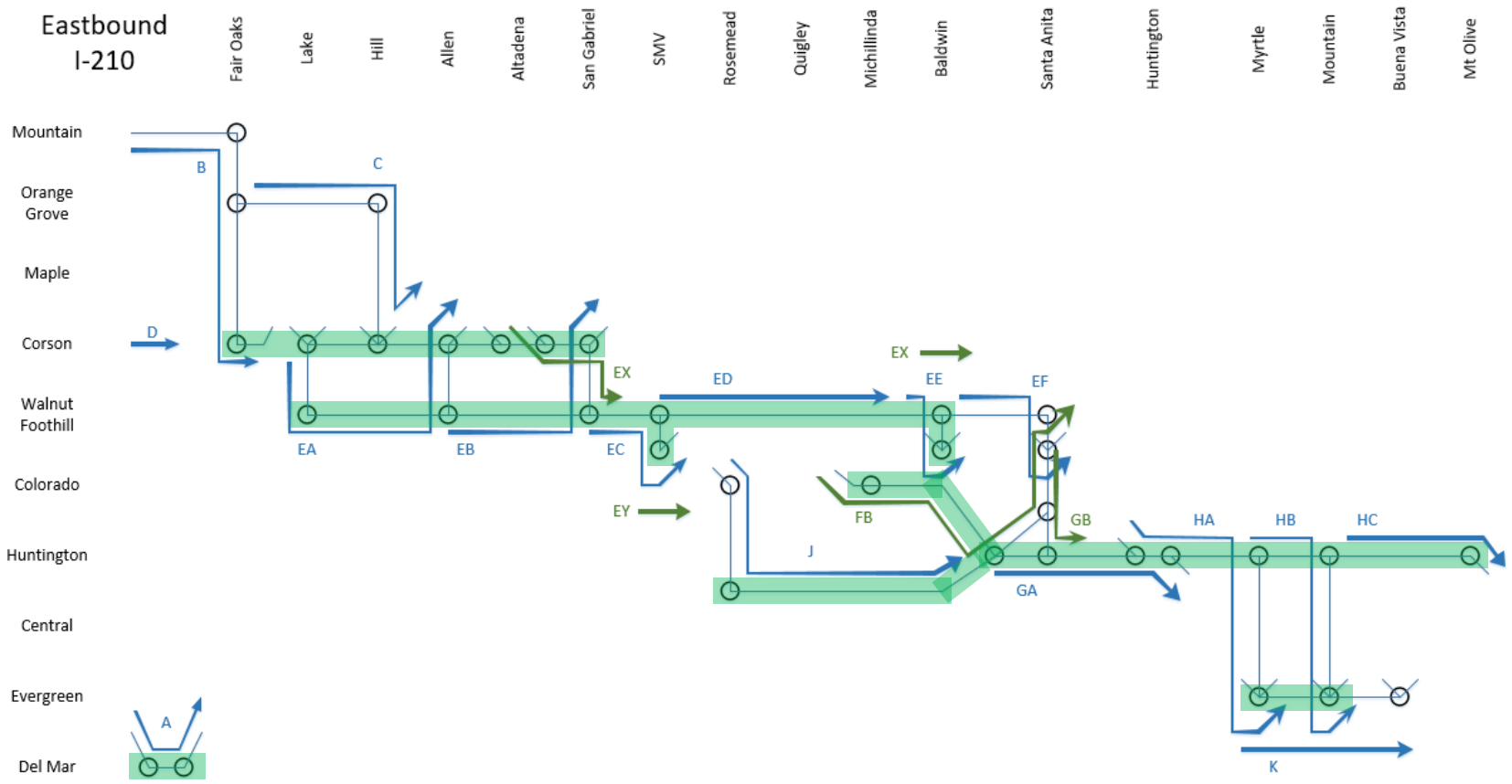








Finalized signal plans (Eastbound)



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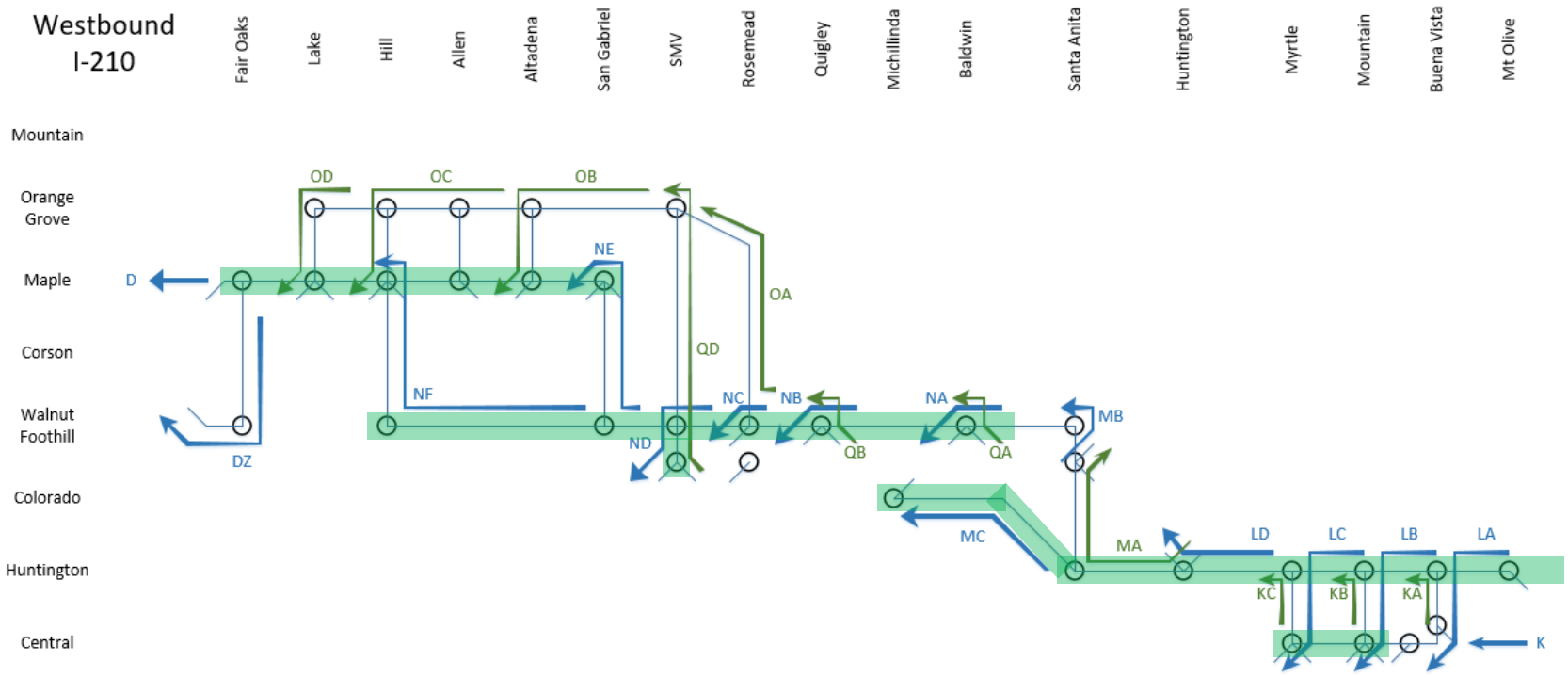


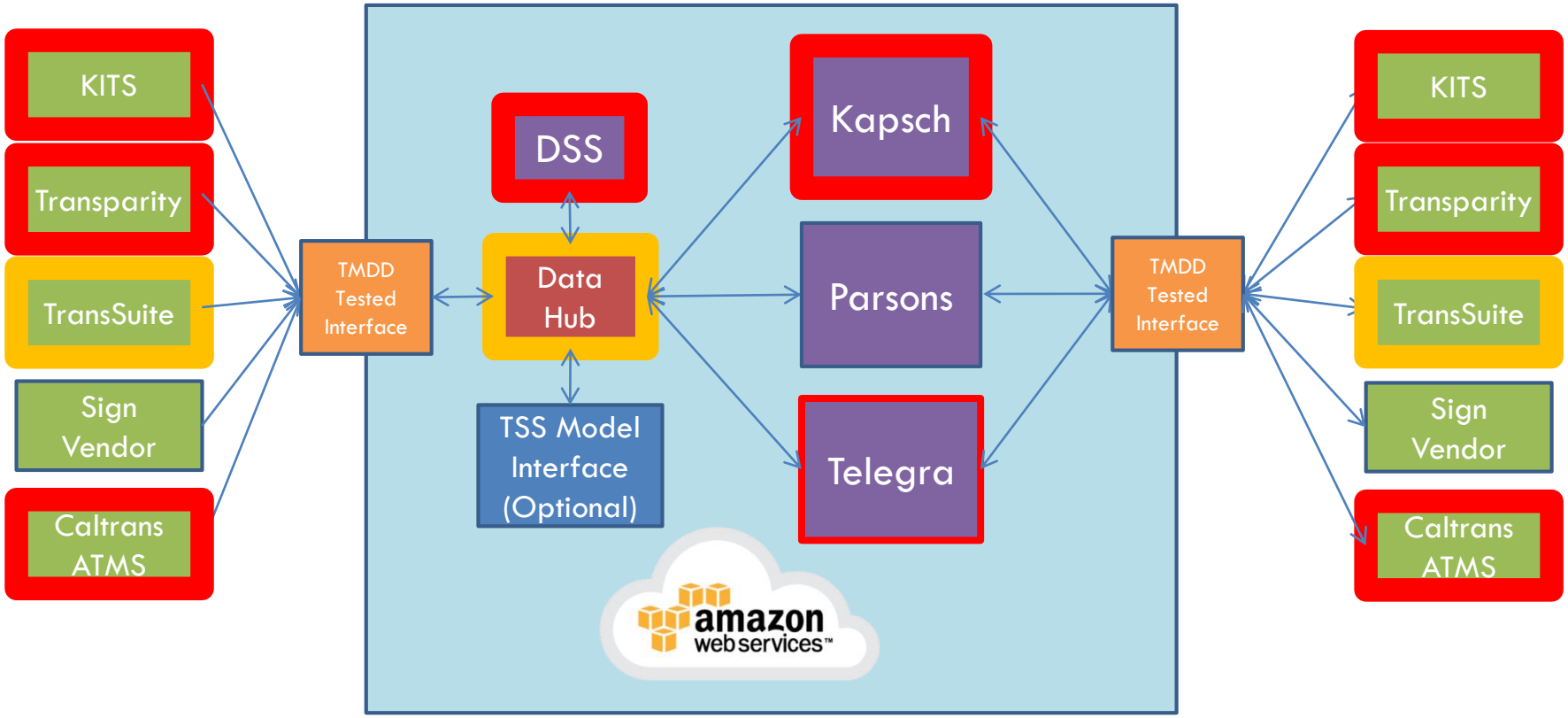
C2C Networking

- **All major network connections are established!**
  - Pasadena VPN connection established and tested
  - TSMSS connections tested
  - Telegra developer VPN established
  - LA County Connection working
  - Arcadia Connection working
- **Egress from ICM to HQ PeMS data server was rerouted through RIITS. Data flowing again after extensive troubleshooting; RIITS configuration clean-up is pending.**
- **D7 and RIITS provided network and firewall configuration support for the third ICM software environment (Development, Test, Integration)**

Response Plan Generation (Planning Mode)

- **Continued work on the desk top response plan generation functions**
  - This is where users will update, review and test rule changes
  - Currently data is imported from the Aimsun model into the rules
    - With AMS team, reviewed I-210 plan data spreadsheet updates
    - Regularized many of the response plan generation log messages
    - Determined how to run the desktop app in an "export all possible route strategies, regardless of incident" mode to facilitate consistency checks of input spreadsheets
  - Greg and Michelle continued to review response plan generation in detail, in support of upcoming documentation.

C2C Interface Implementations - Status



Systems Development and Integration

- **Cloud Infrastructure**
  - Working with Kapsch to assist in deployment, primarily granting permissions as required
- **DSS**
  - Working to get new subcontract in place to bring primary consultant developer back
- **Datahub**
  - Working to speed deployments and releases, improve system reliability/quality
  - Improving test harness

Systems Integration

- **Arcadia**
  - Reviewed data and completed identification of minor issues. Will now start process to correct the issues.
- **Pasadena**
  - Working through design with McCain
- **LA County**
  - Started integration work – working through dialogs with test data. Actual data now available and will begin testing with real data. Still looking good.

Systems Integration

- **ATMS**
  - Beginning weekly meetings with Parsons on Friday
  - Parsons has already made changes that we need to start testing
  - Parsons indicated that they will have the ATMS modifications update completed and ready for integration testing by the week of May 20th.

I-210 Connected Corridors
Face-to-Face Meeting

Annex Building 1st floor
Los Angeles County DPW TMC 900 South Fremont Avenue,
Tuesday, April 30th, 2019
1:30 – 3:30 pm

Agenda

- 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

March 12, 2019

Project Objective

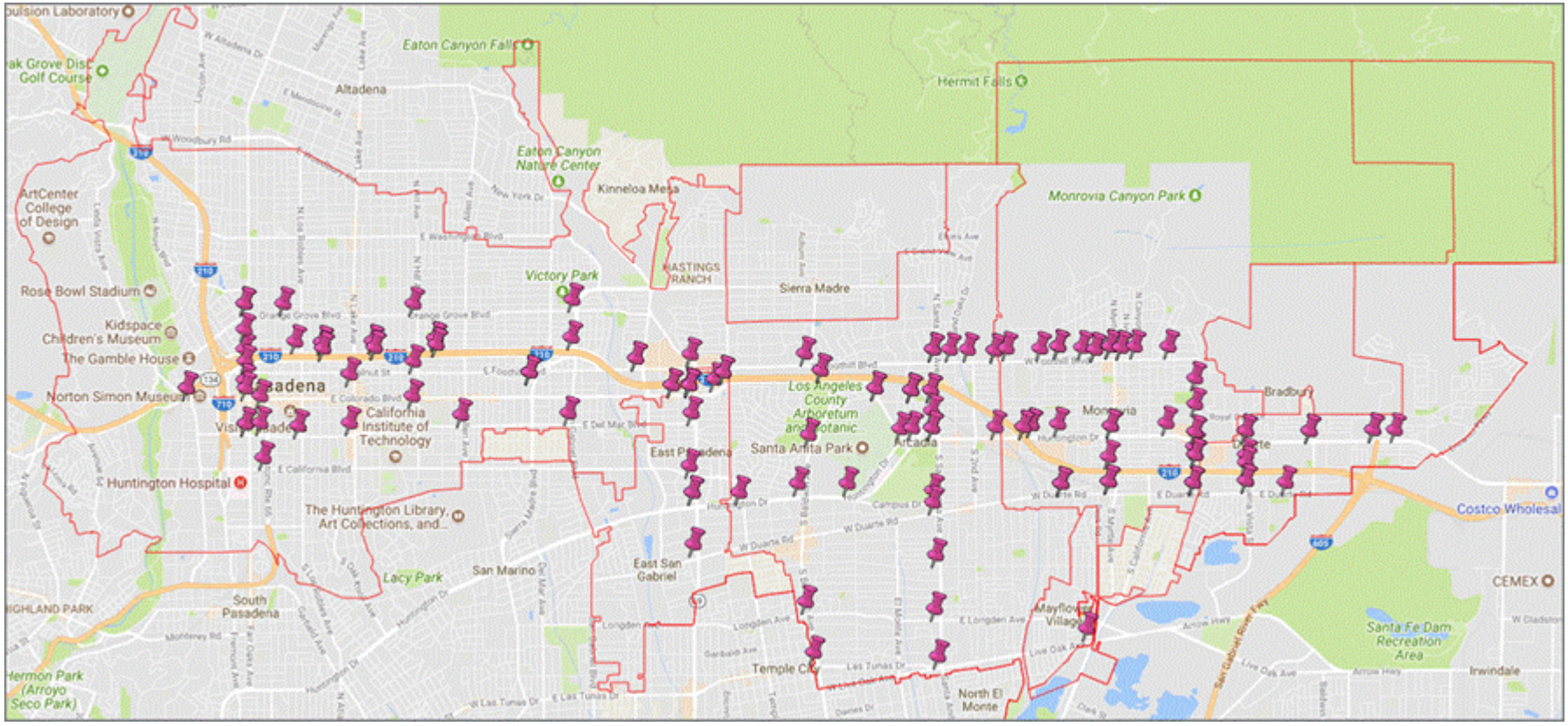
- Assist Caltrans D7 to manage and coordinate the execution of the 9 arterial ITS improvement projects

#	Package Description	Contract #	Contract Status
1	Bluetooth – Iteris Velocity	07A4470	Awarded, in Progress
2	Bluetooth – BlueToad	07A4477	Awarded, in Progress
3	New Controller Cabinets	07A4603	TBD
4	Communication Upgrades	07A4479	Awarded, in Progress
5	Firmware/Timing Plan Updates/Controller Upgrades	07A4480	Awarded, in Progress
6	Video Detection System	07A4481	Awarded, in Progress
7	Data Communication Module and Video Detection Software Upgrade	07A4601	TBD
8	Advanced Traveler Information Systems	N/A	Divided to 3 packages - 2 being reviewed by DPAC - 1 being handled by Caltrans
9	Environmental Stations with Air Quality Sensors and Open Data Systems	07A4388	Awarded, in Progress

Project Area

#	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	07A4601	√	√	√	√	√	√
8	Advanced Traveler Information Systems	N/A	√	√	√	√	√	√
9	Environmental Stations with Air Quality Sensors and Open Data Systems (ODS)	07A4388	√					

Project Area (cont.)

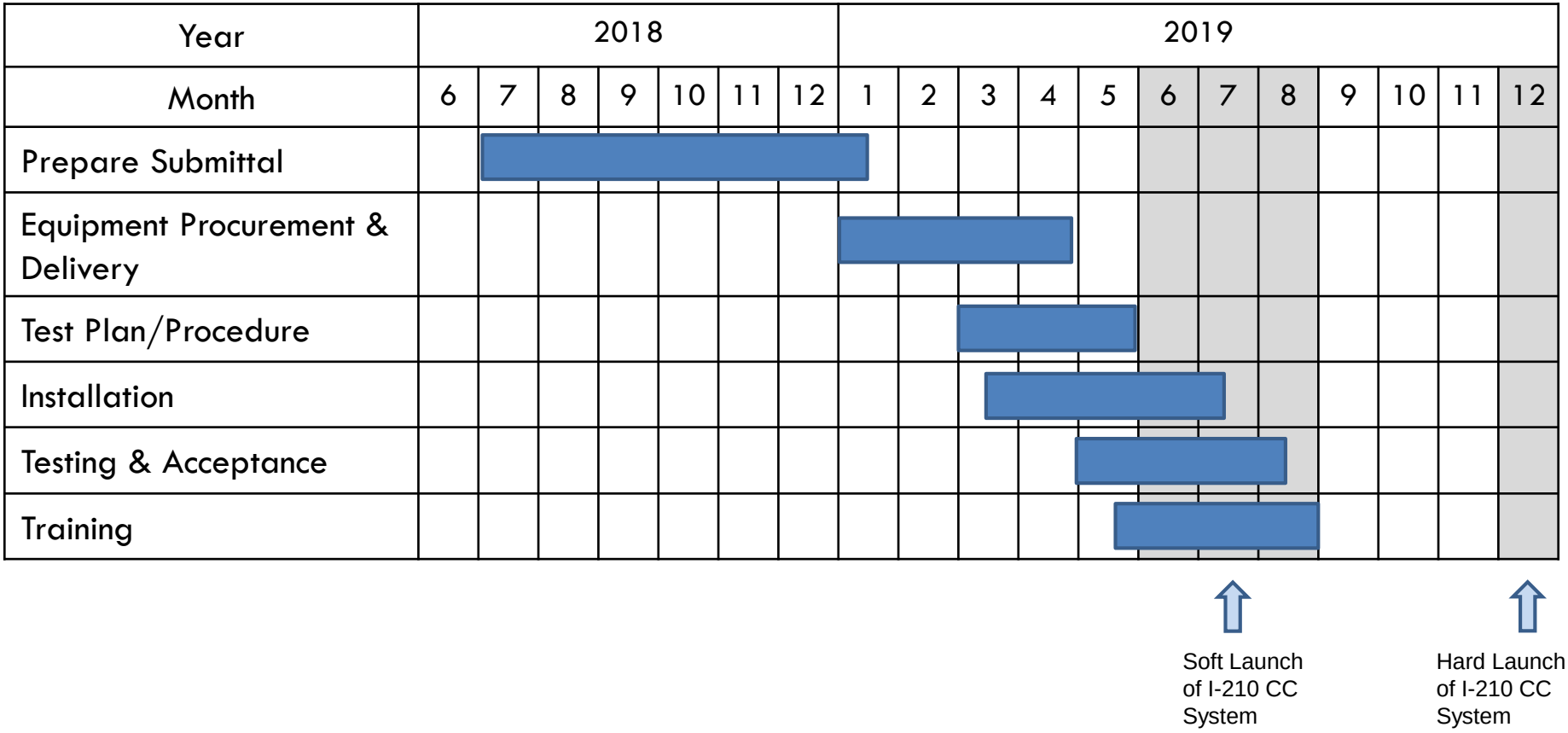


UPDATE ON

PACKAGES 1-9

March 12, 2019

Target Timeline



Update on 9 Packages

Pkg. #	Package Name	Contract #	Project Status
1	Bluetooth – Iteris Velocity	07A4470 PTM	• NTP: 7/10/2018 • Kick-off Meeting: 7/30/2018 • Submittal Approved: 8/16/2018 • Equipment ready, Permit Ready, Testing Plan Approved • Installation QC checklist being prepared • Installation & Testing being scheduled • Expected to be completed: May 2019 (90%)

2	Bluetooth – BlueToad	07A4477 DBX	• NTP: 7/10/2018
			• Kick-off Meeting: 7/30/2018; Submittal Approved: 10/12/2018
			• Configuration :
			  • Configuration done for all BlueTOAD Spectra Units
			  • Configuring VM Server for LA County
			  • Need to confirm physical server to be procured for Pasadena
			• Pasadena: need network security related hardware/software (firewall, etc.)
			• Acceptance Test Plan being revised
			• Installation QC checklist being prepared
			• Installation & Testing for LA County to be scheduled
			• Expected to be completed: June 2019 (90%)

Update on 9 Packages (cont.)

Pkg. #	Package Name	Contract #	Project Status
3	New Controller Cabinets	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 Mar 15, 2019 • being reviewed by DPAC for further consideration • Expected to be awarded: TBD • Expected to be completed: TBD

4	Communication Upgrades	07A4479 Kanaan Construction	• NTP: 7/13/2018
			• Kick-off Meeting: 7/30/2018
			• Revised Submittal reviewed by Stakeholders
			• Most of equipment procured
			  • LA County: requested to updating to GB switches
			  • Duarte to provide spec of Myers BBS battery backup system for us to verify if cabinet to be procured is big enough
			• Expected to be completed: July 2019 (80%)

Update on 9 Packages (cont.)

Pkg. #	Package Name	Contract #	Project Status

5	Firmware/Timing Plan Updates/Controller Upgrades	07A4480 CPE, Inc	• NTP: 7/17/2018
			• Kick-off Meeting: 7/30/2018
			• Submittal Reviewed and Required Equipment changed per Stakeholder Comment
			• Contractor has been given revised requirements on the controller configuration from all 3 jurisdictions
			• Contractor is
			  • coordinating with supplier (McCain) to estimate price change
			  • Coordinating with LA County regarding installing LACO-4E traffic controller software in existing controller
			• Expected to be completed: Jun 2019 (80%)

Update on 9 Packages (cont.)

Pkg. #	Package Name	Contract #	Project Status

6	Video Detection System	07A4481 Traffic Loops Crackfilling, Inc	• NTP: 7/10/2018
			• Kick-off Meeting: 7/30/2018
			• 10/9/2018: Conducted Site Survey
			• 10/18/18: Submittal approved
			• Installation: 12 out of 22 locations completed
			  • Several location experienced issues after turn-on
			  • Requested contractor to QC installation
			  • Site investigation in Duarte & Pasadena on 4/30/2019
			• Testing Plan – to be submitted
			• Expected to be completed: June 2019 (90%)

7	Data Communication Module and Video Detection Software Upgrade	07A4601	• Disqualified: Bids came above the SB limit (314k). • Originally cancelled by DPAC; being reviewed by DPAC for further consideration • Expected to be awarded: TBD • Expected to be completed: TBD

Update on 9 Packages (cont.)

Pkg. #	Package Name	Contract #	Project Status

8	Advanced Traveler Information Systems	N/A	• Divided to 3 packages:
			  • DMS Procurement – being reviewed by DPAC
			  • Static Sign Procurement - being handled by Caltrans Maintenance Group
			  • Integration -– being reviewed by DPAC
			• Expected to be awarded: TBD
			• Expected to be completed: TBD

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 • CPP coordinated with Caltrans & Parsons to get test data in TMDD format from D7 ATMS Test Server to feed Open Data System; • 11/30/18: Coordination among CPP, PATH, Caltrans. PATH provided architecture diagrams, sample data set; Working with Caltrans on network connection • 2/12/19: Face-to-face meeting in Berkeley conducted; PATH to provide specification documents • Expected to be completed: Aug 2019 (90%)

Next Steps

- Package 1: schedule installation and testing
- Package 2: Testing plan to be distributed to stakeholders for review and approval; need server & security requirement from Pasadena; Schedule installation and testing
- Package 3: Track the status
- Package 4: Follow up with stakeholders on RFIs; complete procurement
- Package 5: Follow up on price change and revised submittal
- Package 6: Support site investigation and installation quality control; Testing plan to be distributed to stakeholders for review and approval;
- Package 7: Track the status
- Package 8: Track the status
- Package 9: Support coordination

Thank You and Questions?

SIGNAL PLANS FOR USE DURING INCIDENT RESPONSE

Outline

Outline

- Goals for this presentation
- Taxonomy of route segments
- Process for control plan generation
- Examples for illustration
- Connection of control plans to DSS rules
- Next steps

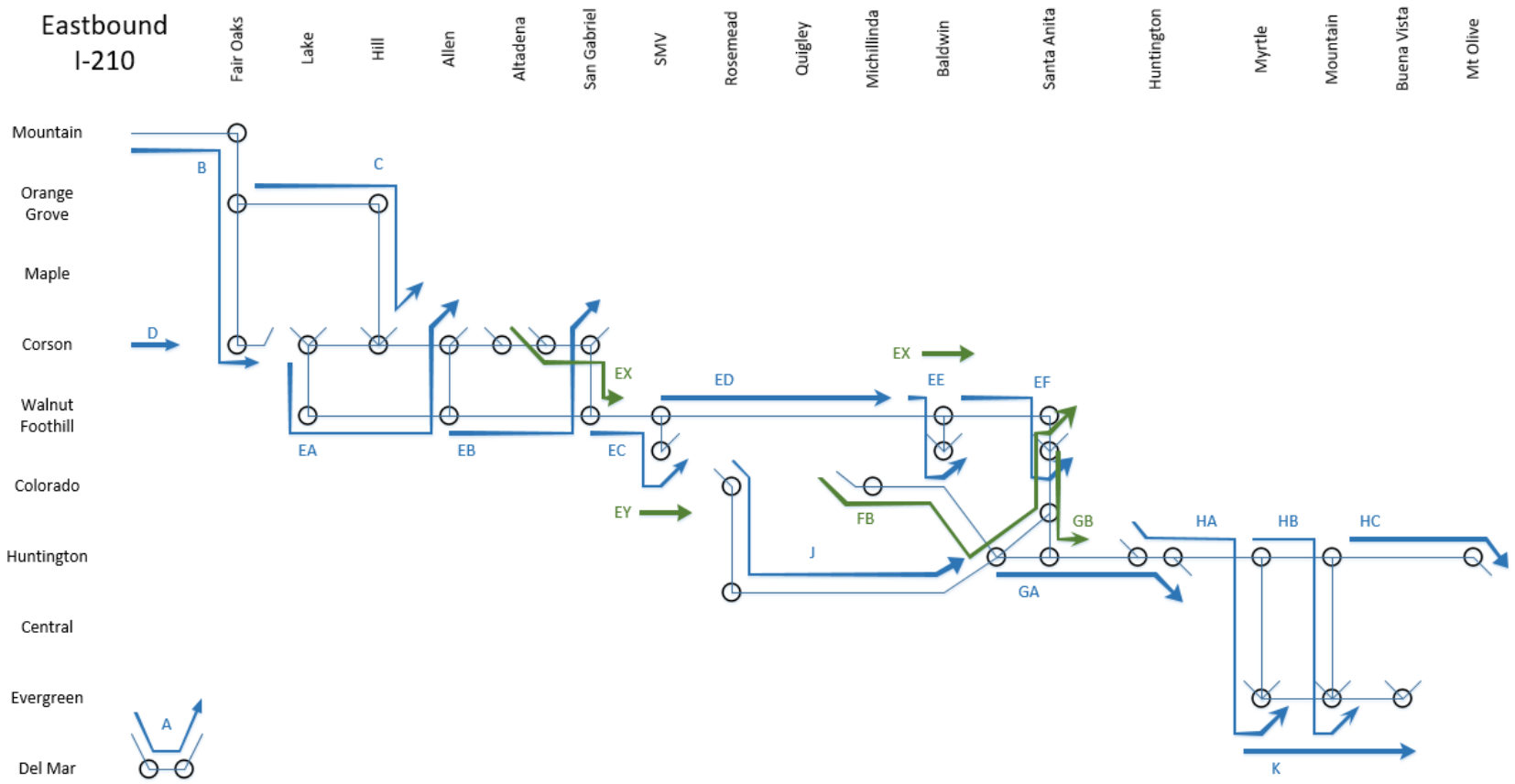
Goals

Goals for this presentation

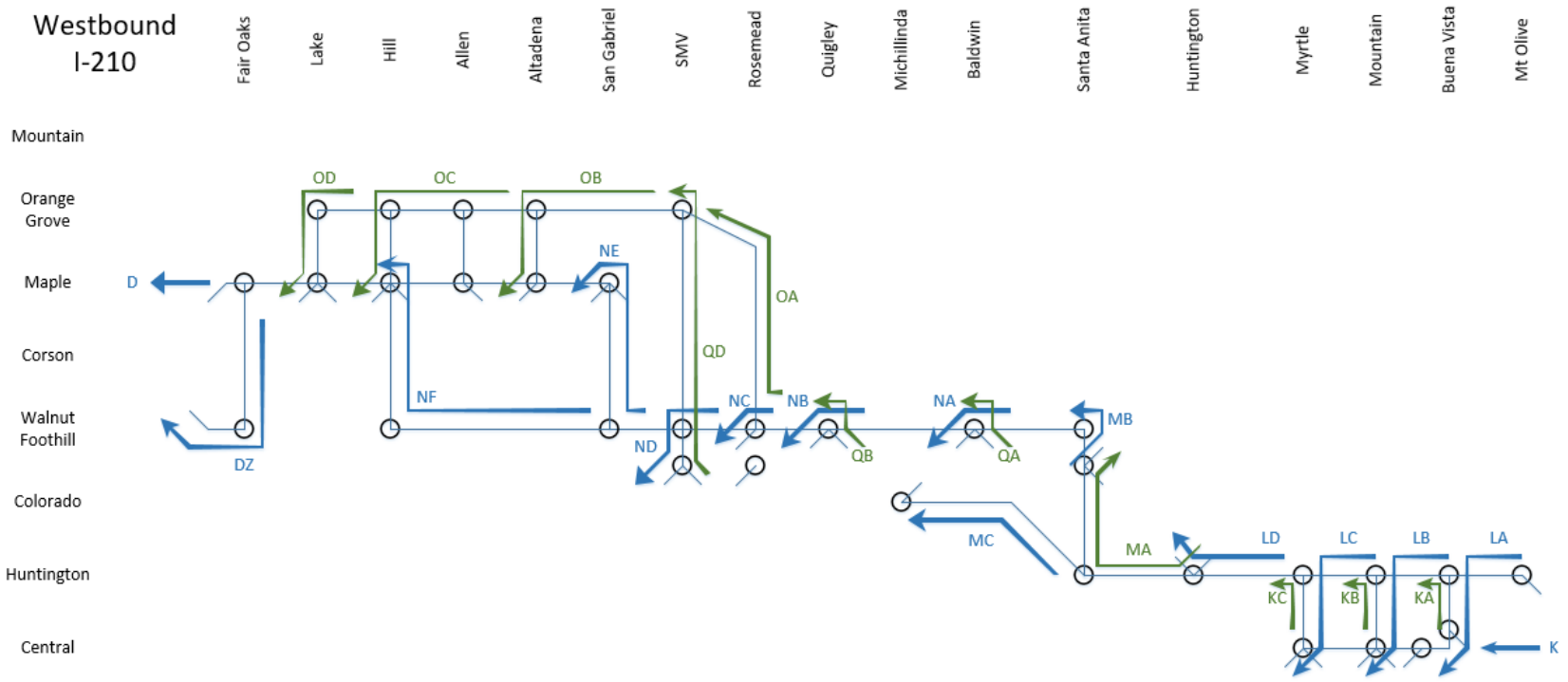
- **Communicate the process for control plan generation**
- **Identify and manage risks**
- **Schedule future meetings with stakeholders**

Taxonomy of route segments

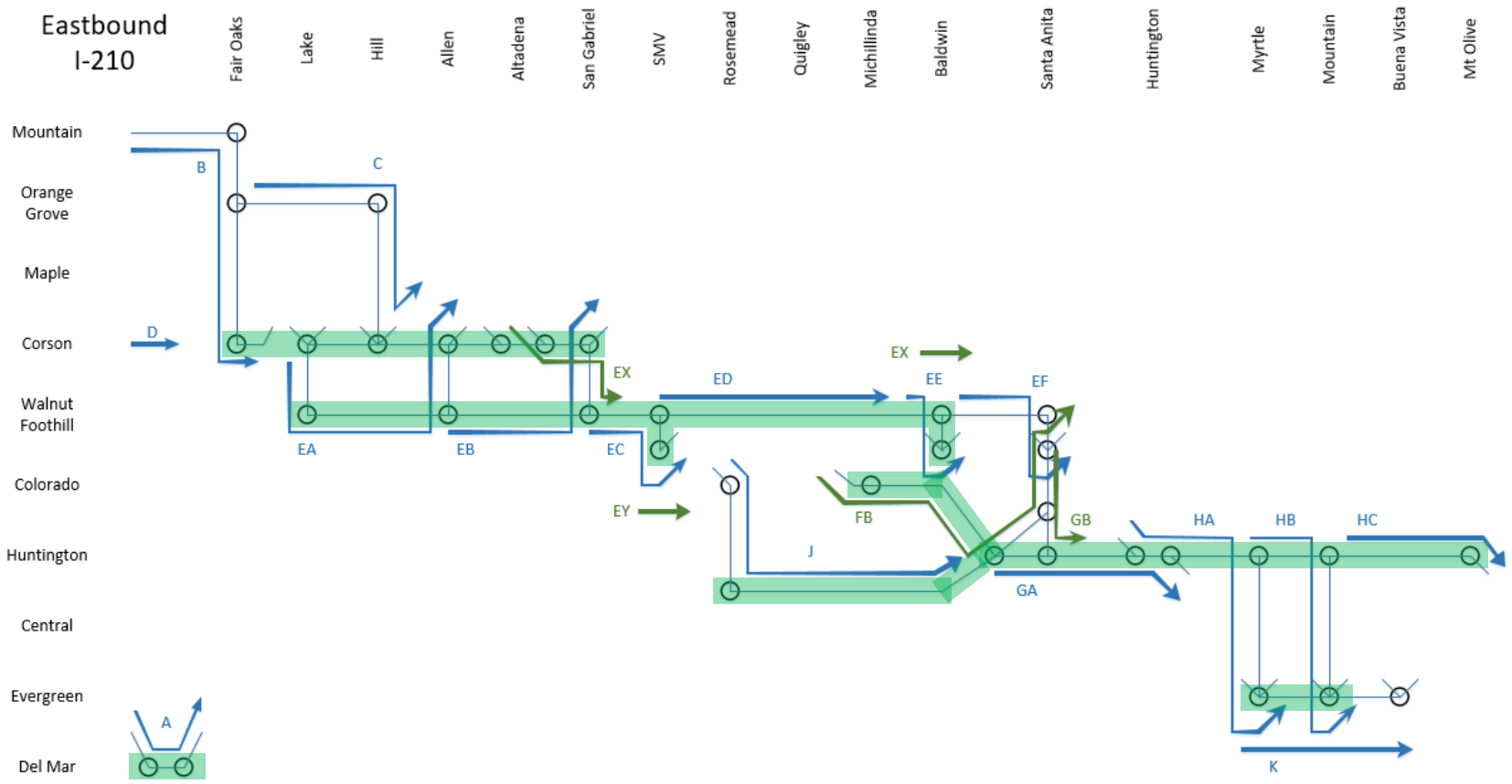
Route Schematic (Eastbound)



Route Schematic (Westbound)



Finalized plans (Eastbound)



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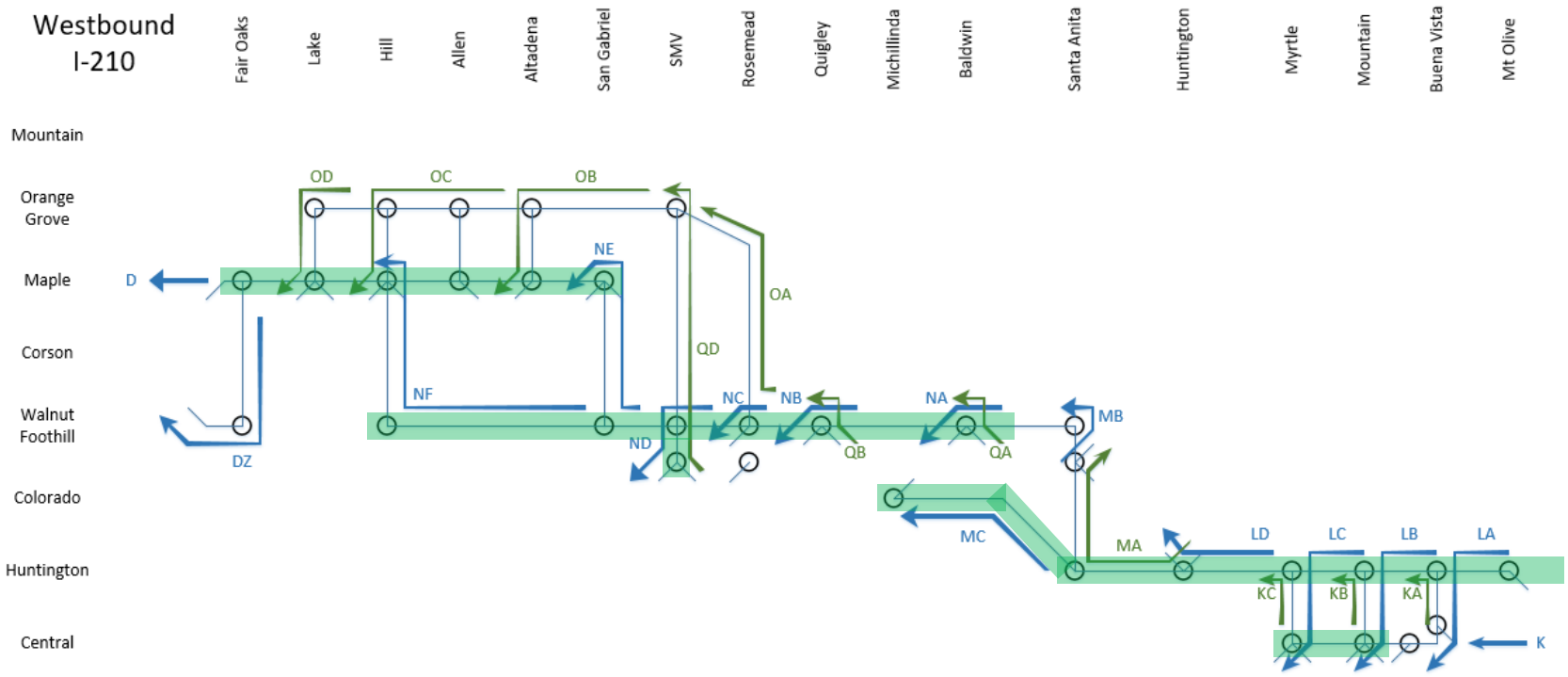
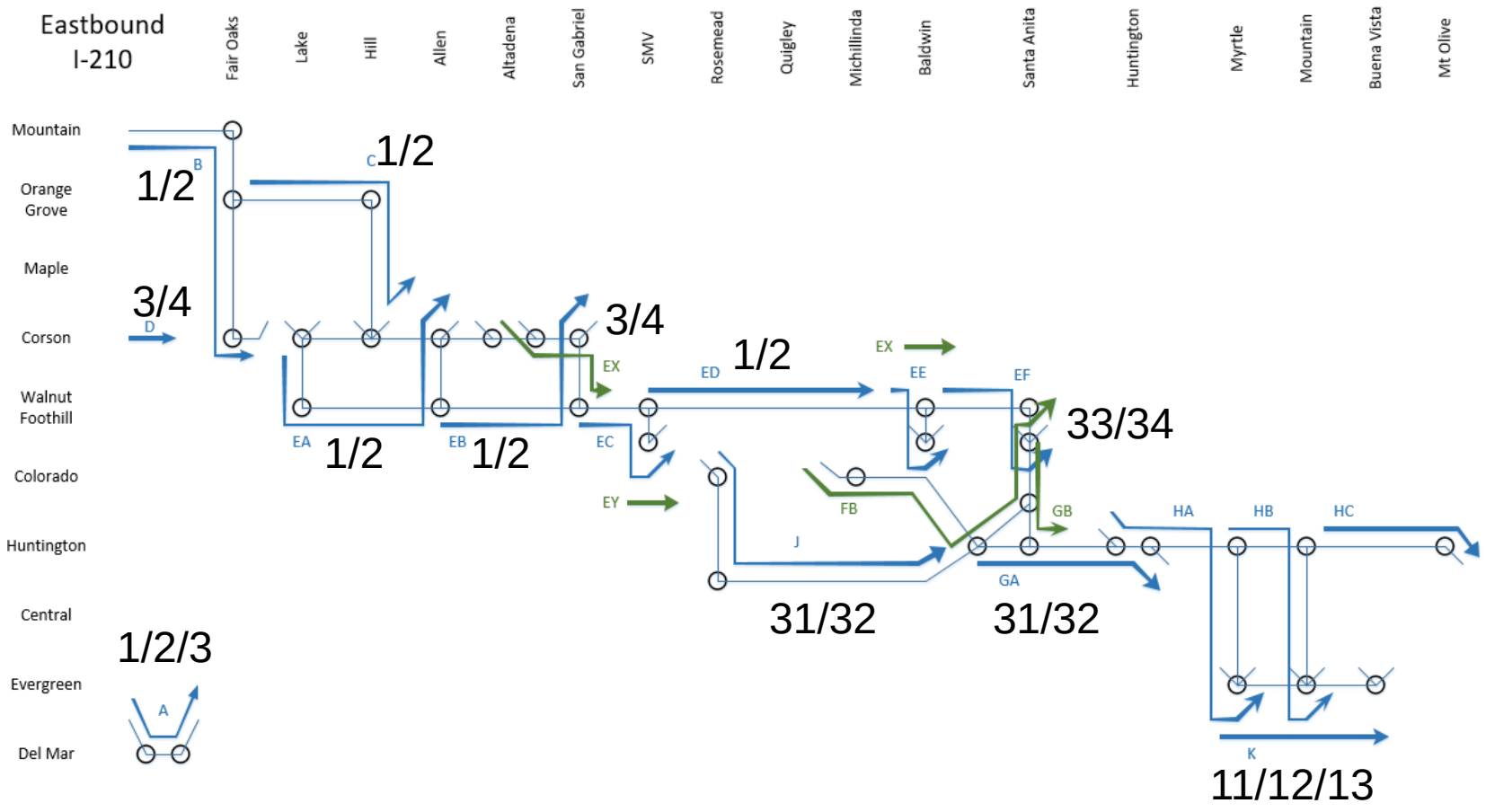


Coordination Plan/Pattern (Eastbound)



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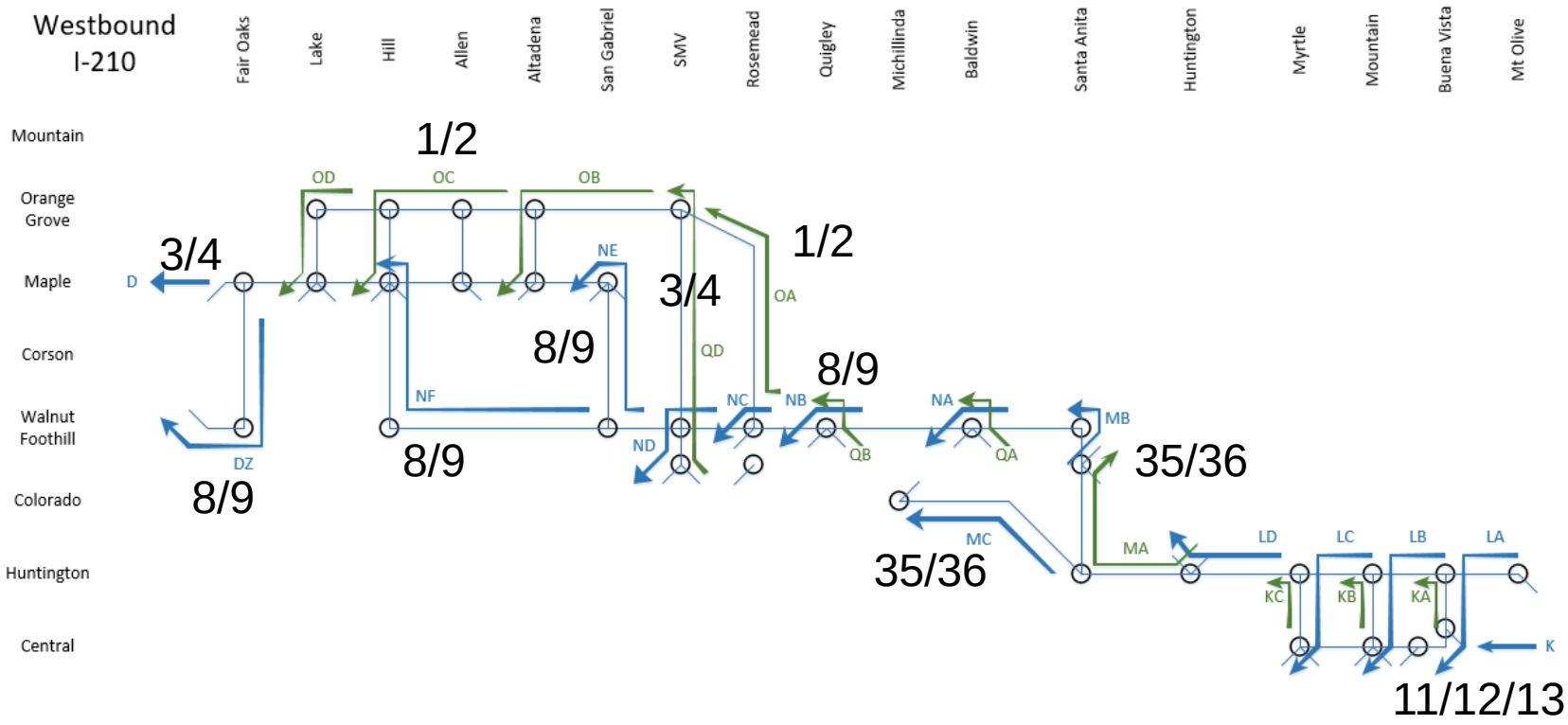


Process

Generation of control plans

Overview of process

- Outreach meetings to establish routes in play and signal plan guidelines such as allowable cycle durations and max greens
- Signal design and optimization in Synchro to obtain offsets along each route for each family of cycle durations
- Aimsun entry of each allowable route and signal plan combination organized into policies (response plan elements) that can be invoked in simulation
- Testing in Aimsun to exercise signal plans and perform final adjustments to ensure smooth operation of response plan routes

Established stakeholder guidelines

- **Established routes in play**

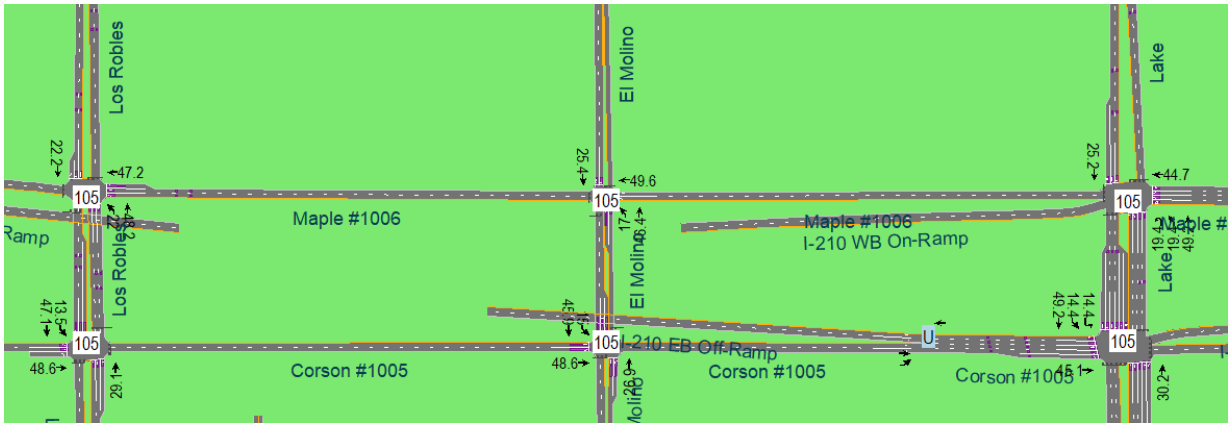
- **Agreed on signal plan guidelines**
  - Based all adjustments on existing AM or PM peak plans
  - Max cycle duration for Pasadena set at 135 sec, and 150 sec for the rest of the corridor
  - Allowable to adjust force offs, max greens, and offsets

Signal design and Synchro Optimization

- **Signal design to provide about 5% to 20% of additional green time to favored direction**

			Flush Plan			PM Diff			
Name	Updated Aimsun ID	Movement Focus	Coordination Direction	Offset	PM Cycle Length	EWL Diff	EWT Diff	NSL Diff	NST Diff
Corson St & Los Robles Ave	PA 157	EB T	NS	82	105	0.00	0.05	-0.02	-0.04
Corson St & El Molino Ave	PA 158	EB T	NS	0	105	0.00	0.07	-0.02	-0.05
Corson St & Lake Ave	PA 612	EB T	NS	17	105	0.00	0.05	-0.01	-0.05
Corson St & Los Robles Ave	PA 157	EB T	NS	2	120	0.00	0.12	-0.04	-0.08
Corson St & El Molino Ave	PA 158	EB T	NS	35	120	0.00	0.13	-0.04	-0.09
Corson St & Lake Ave	PA 612	EB T	NS	45	120	0.00	0.12	-0.03	-0.09
Corson St & Los Robles Ave	PA 157	EB T	NS	4	135	0.00	0.16	-0.05	-0.11
Corson St & El Molino Ave	PA 158	EB T	NS	39	135	0.00	0.18	-0.06	-0.12
Corson St & Lake Ave	PA 612	EB T	NS	44	135	0.00	0.17	-0.05	-0.12

- **Synchro optimization of offsets**



Aimsun routes, signals and policies

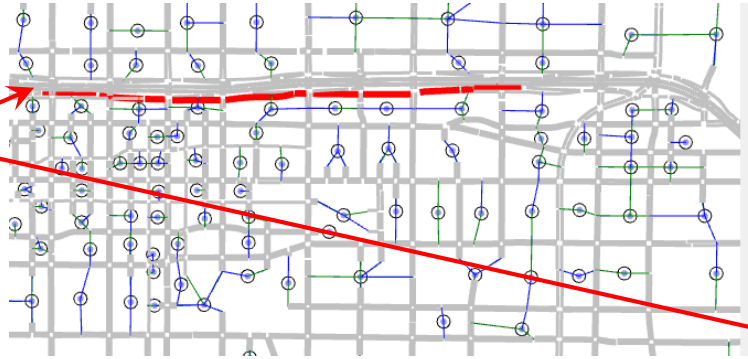
- **Aimsun policies (response plan elements) coded to contain a set of signal plans that can be deployed in combination**

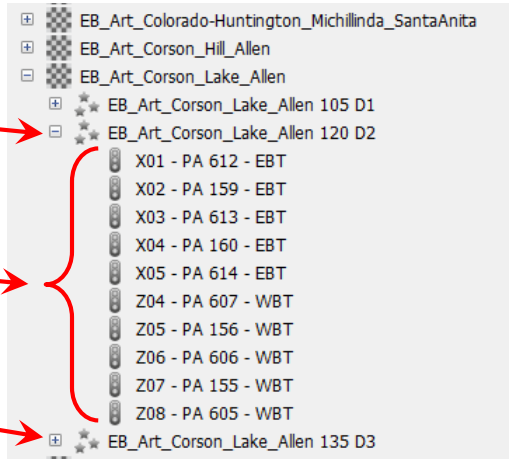
Set of Signal Plans with cycle length of 120 sec

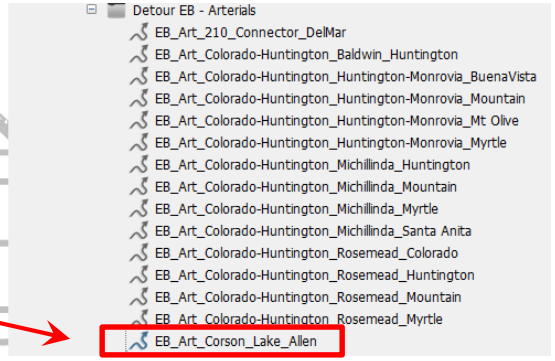
Signal Plans

Set of Signal Plans with cycle length of 135 sec

Route

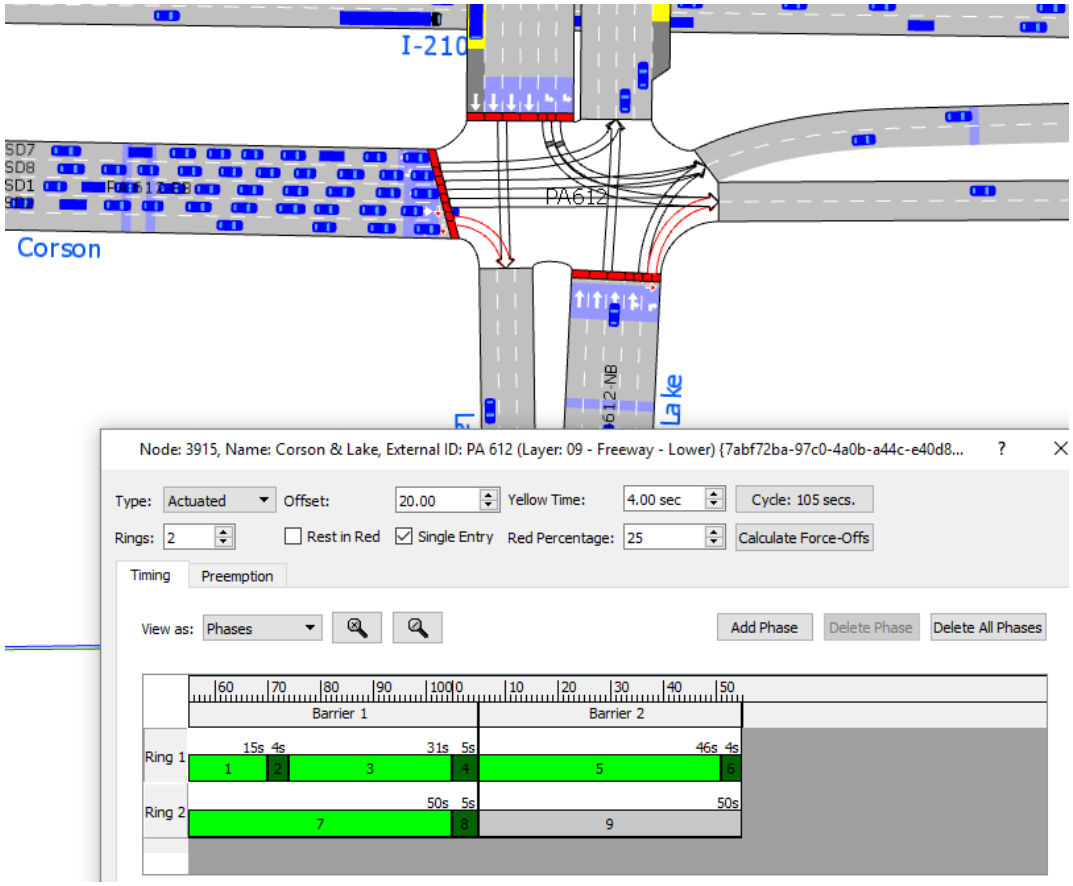






Aimsun testing of response plans

- **Simulation in Aimsun**
- **Checking for smooth progression**
- **Adjusting timing to eliminate excessive queues**



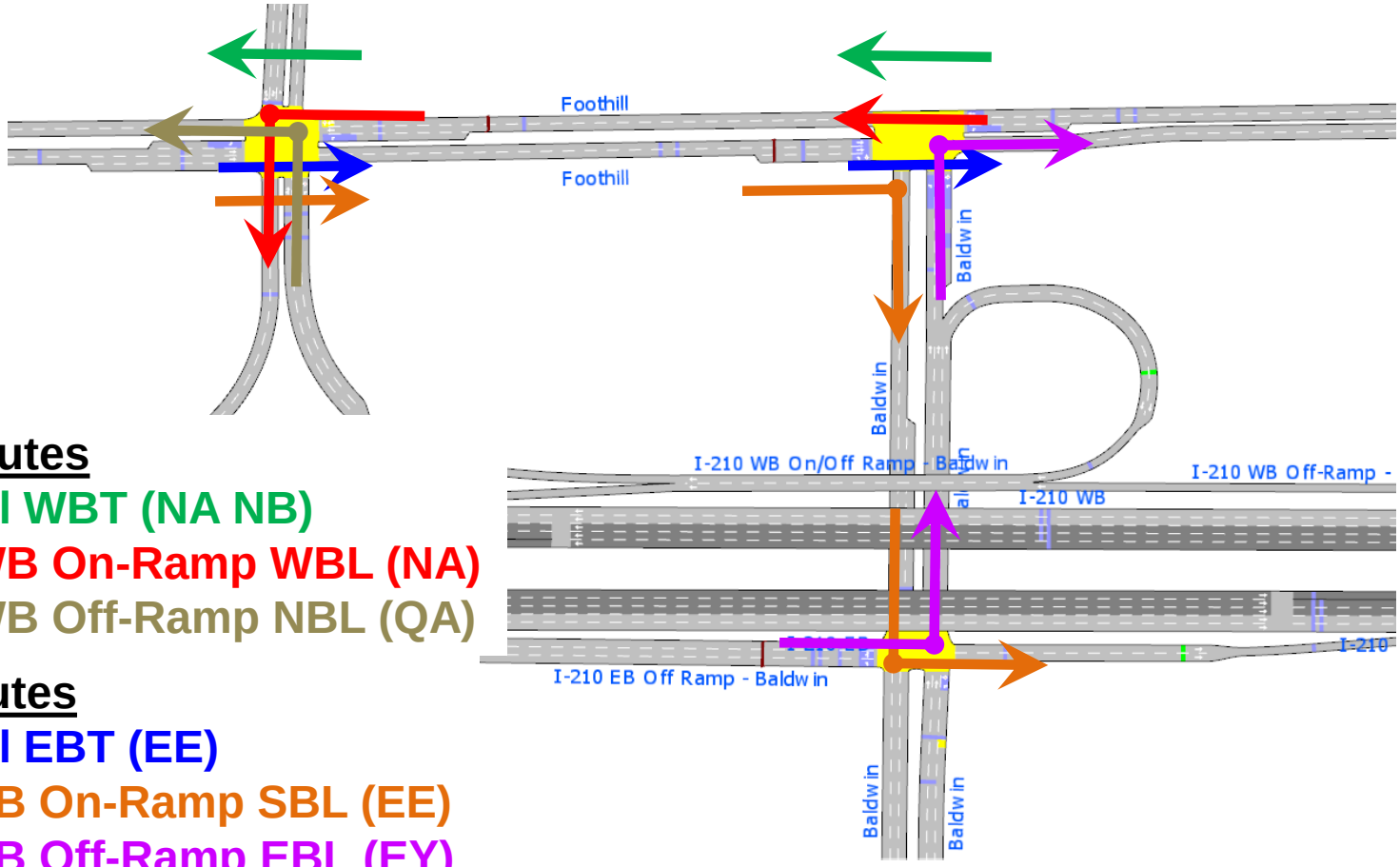
What matters?

- **Key points in a response plan**
  - Ability to deploy a signal plan to favor high-demand movements
  - Ensuring that left turns on non-favored directions have a place to go
  - After the incident, prevent aggressive ramp-metering so that excess arterial vehicle accumulation can enter the freeway
- **Risks**
  - Managing software interface differences across multiple jurisdictions
  - Possibilities for human introduced error in communication of control plans
  - Communication to ensure that control plans in Aimsun, DSS spreadsheets, and field elements are in synch

Example outcome #1

Arcadia: Foothill @ Baldwin

Map of Possible Movements



WB Routes

Foothill WBT (NA NB)

I-210 WB On-Ramp WBL (NA)

I-210 WB Off-Ramp NBL (QA)

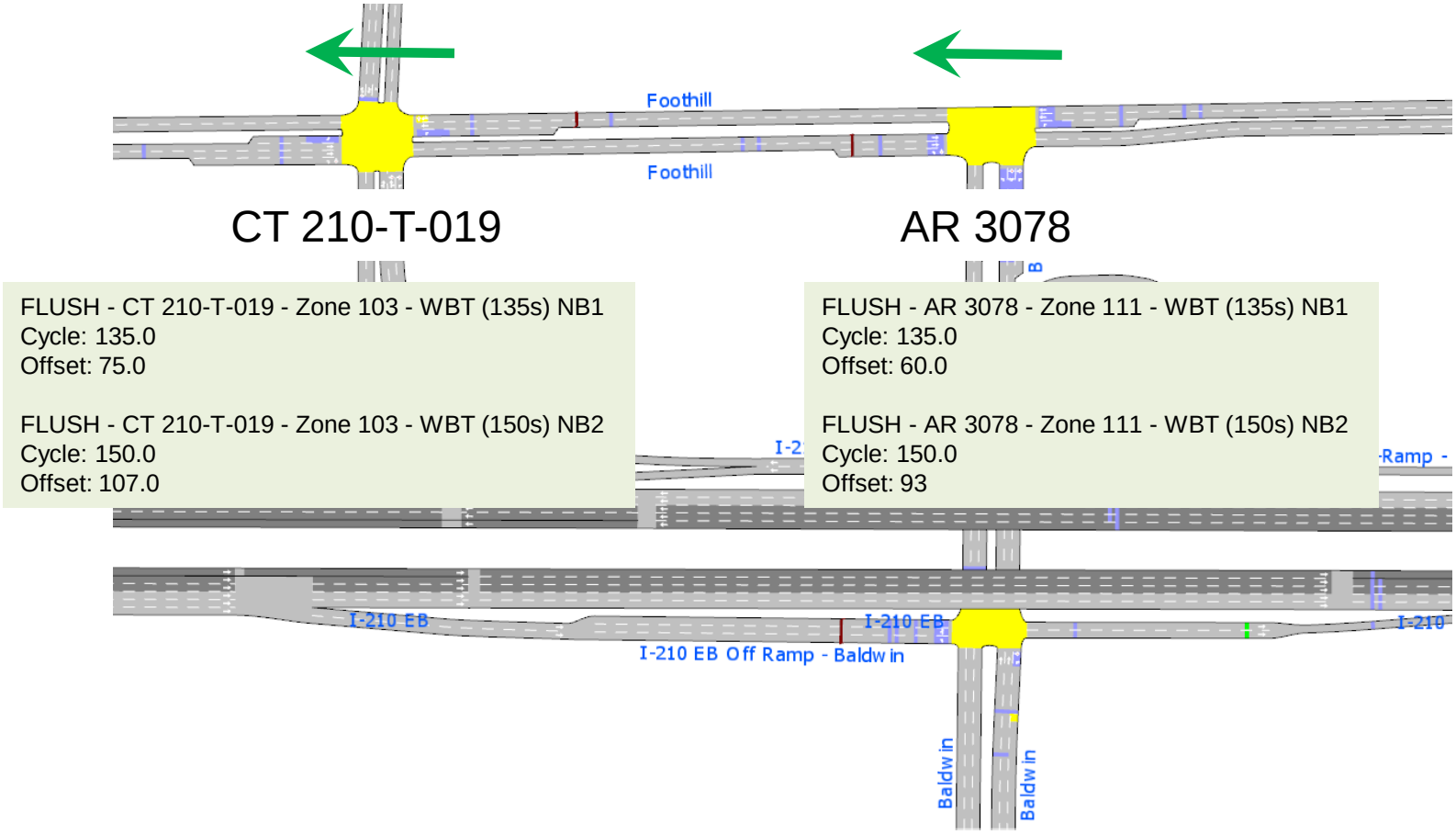
EB Routes

Foothill EBT (EE)

I-210 EB On-Ramp SBL (EE)

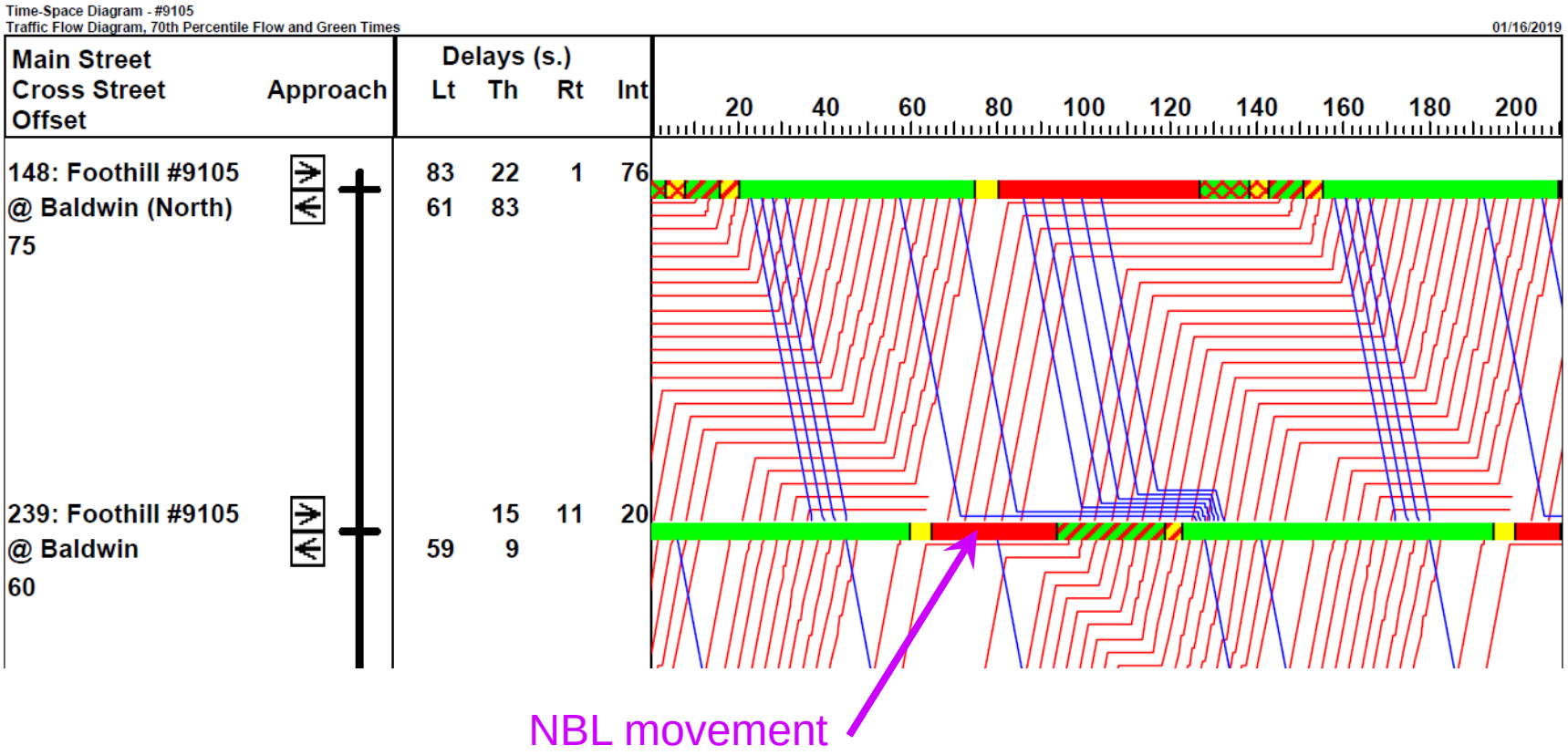
I-210 EB Off-Ramp EBL (EY)

Foothill WBT (NA NB)



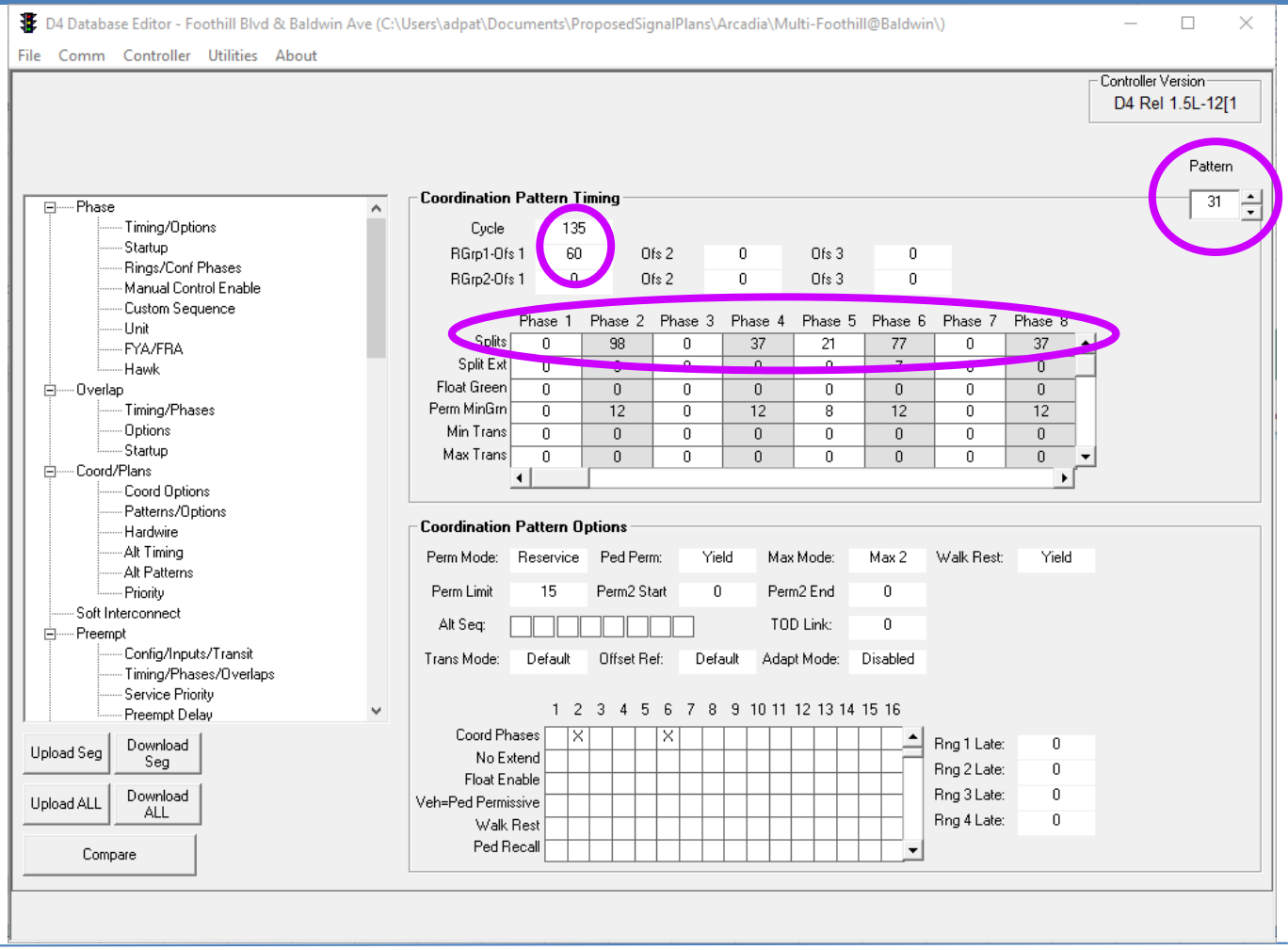
Foothill WBT (NA NB)

- **Offsets chosen to support NBL movement**



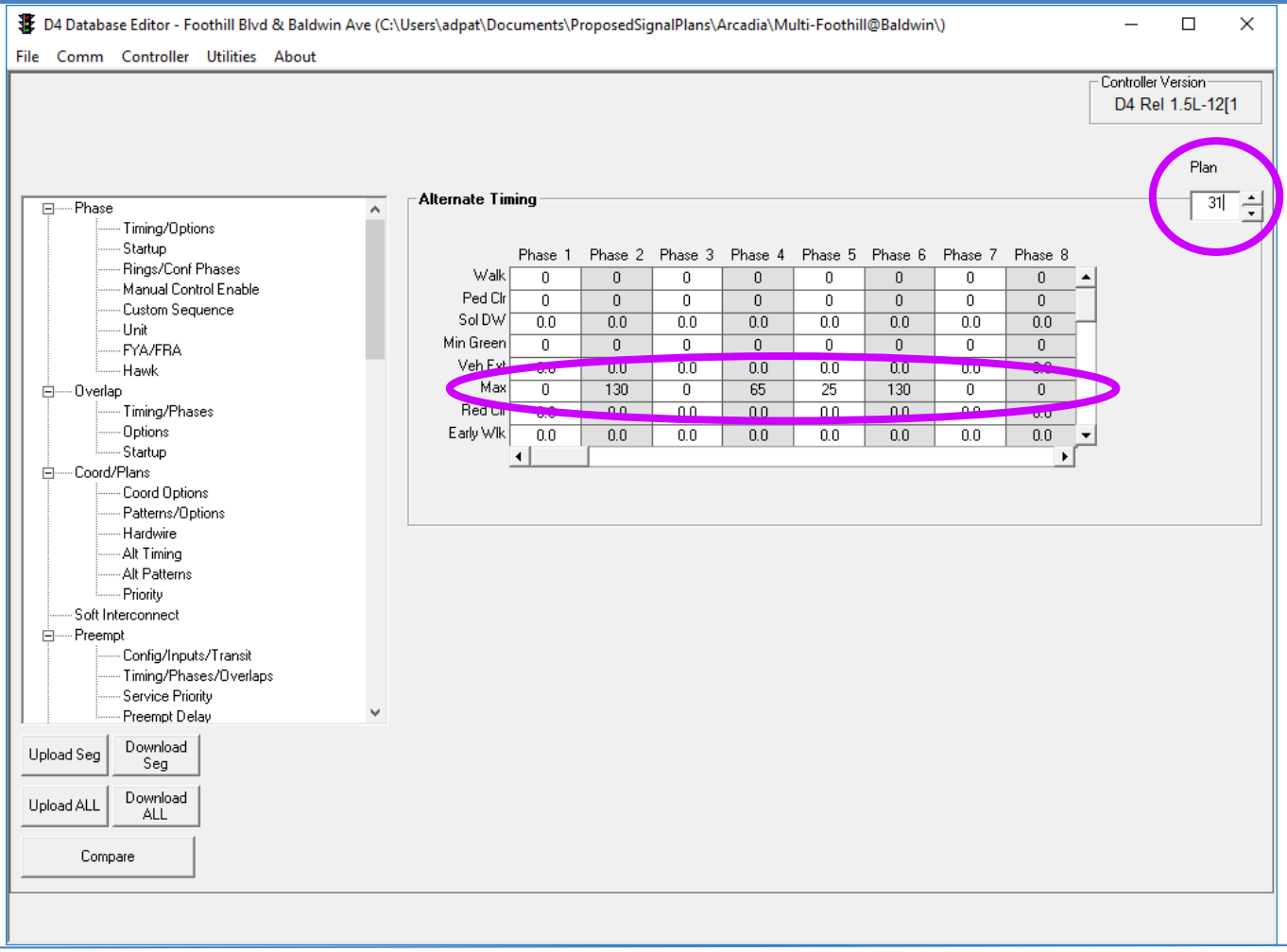
Foothill WBT (NA NB)

- **D4 Database Editor: Pattern 31**
- **Cycle 135 s**
- **Offset 60 s**



Foothill WBT (NA NB)

- **D4 Database Editor: Pattern 31**
- **Max greens specific to Pattern 31 in "Alternate Timing"**



HTML representation

- **Plans 31 and 32 for Foothill @ Baldwin**

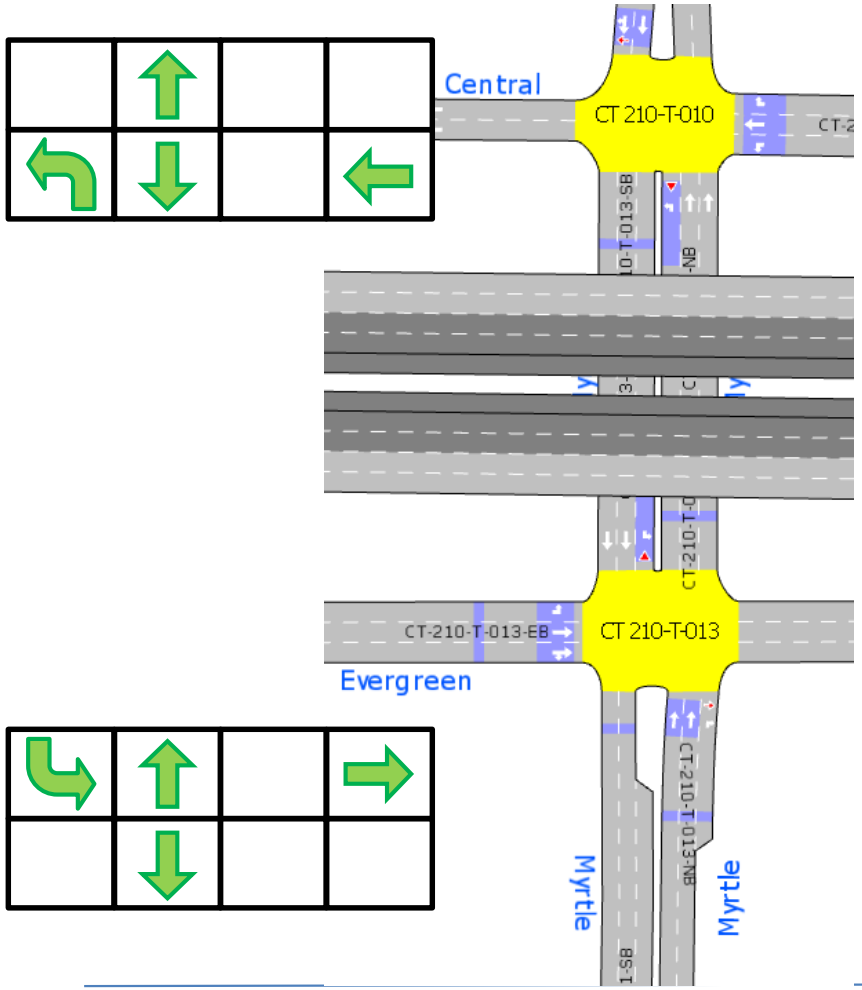
FLUSH - AR 3078 - Zone 111 - WBT (135s) NB1			Plan: 31		Cycle: 135.0		Offset: 60.0	
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	WBT	98.0	93.0	10.0	130.0	120.0	0.0	Coord
1	EBR NBL NBR	37.0	32.0	4.0	65.0	61.0	37.0	No
2	WBL NBR	21.0	18.0	4.0	30.0	26.0	60.0	No
2	EBR EBT	77.0	72.0	10.0	130.0	120.0	0.0	Coord

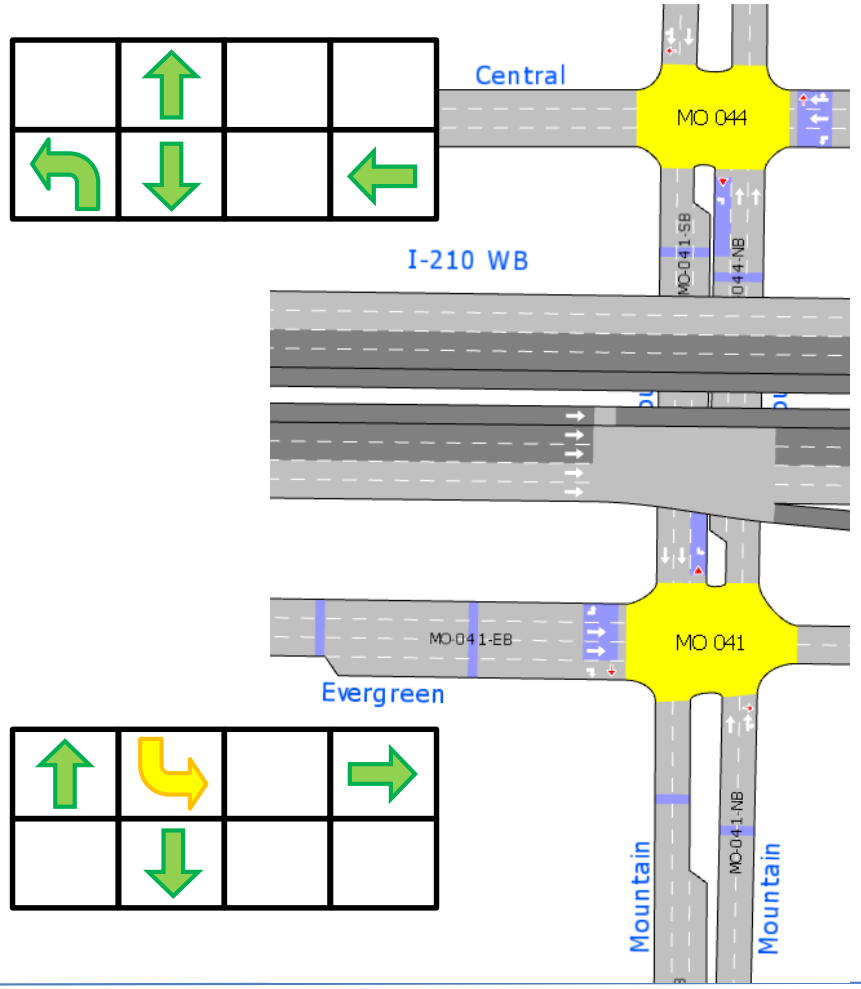
FLUSH - AR 3078 - Zone 111 - WBT (150s) NB2			Plan: 32		Cycle: 150.0		Offset: 93.0	
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	WBT	113.0	108.0	10.0	130.0	120.0	0.0	Coord
1	EBR NBL NBR	37.0	32.0	4.0	65.0	61.0	37.0	No
2	WBL NBR	21.0	18.0	4.0	30.0	26.0	60.0	No
2	EBR EBT	92.0	87.0	10.0	130.0	120.0	0.0	Coord

Example outcome #2

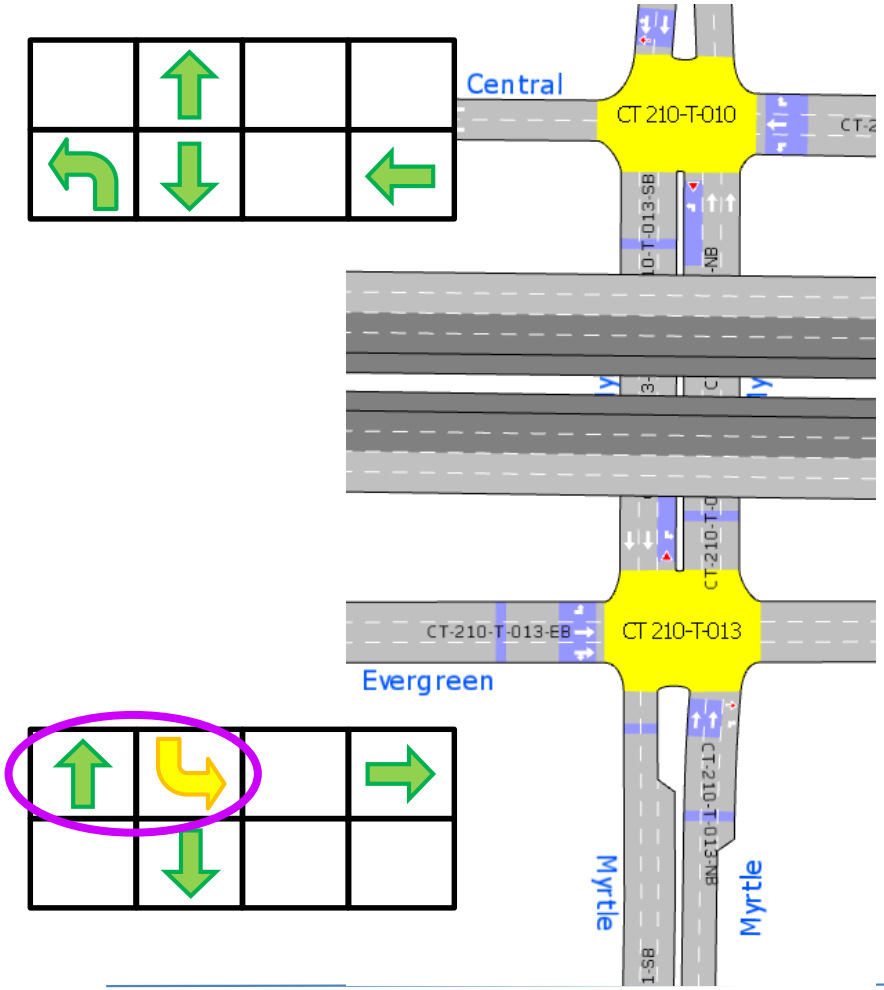
Caltrans: Myrtle @ Evergreen

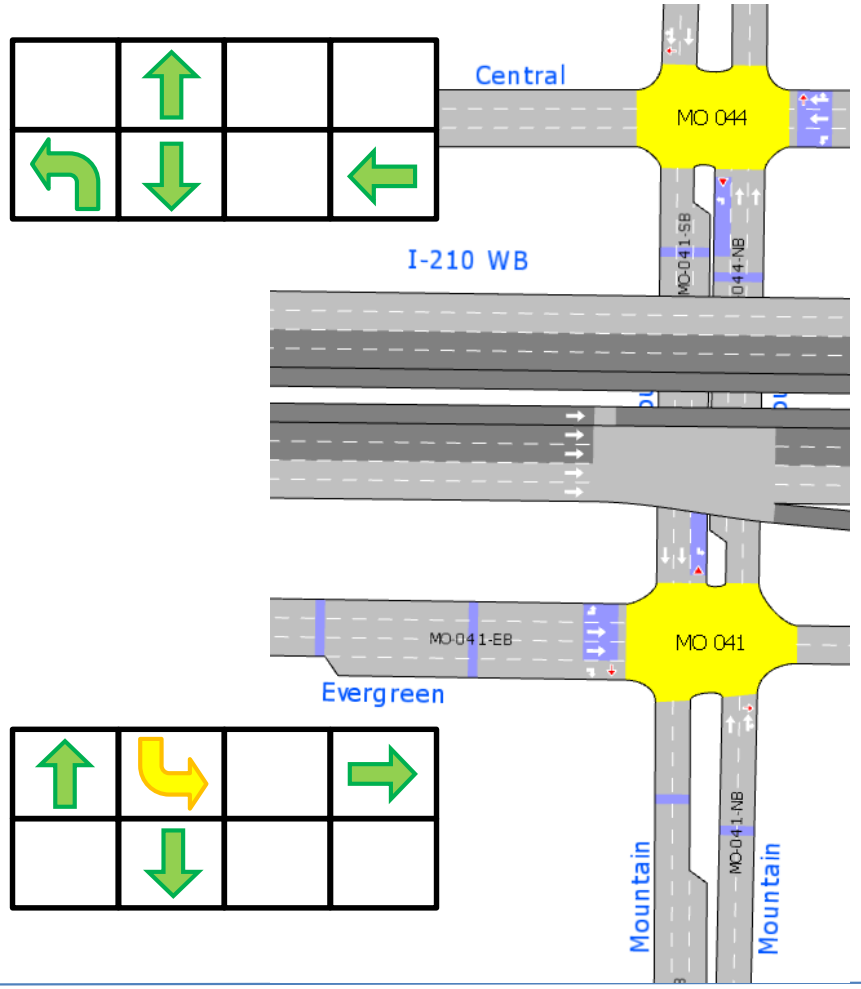
Current Phasing at Myrtle and Mountain



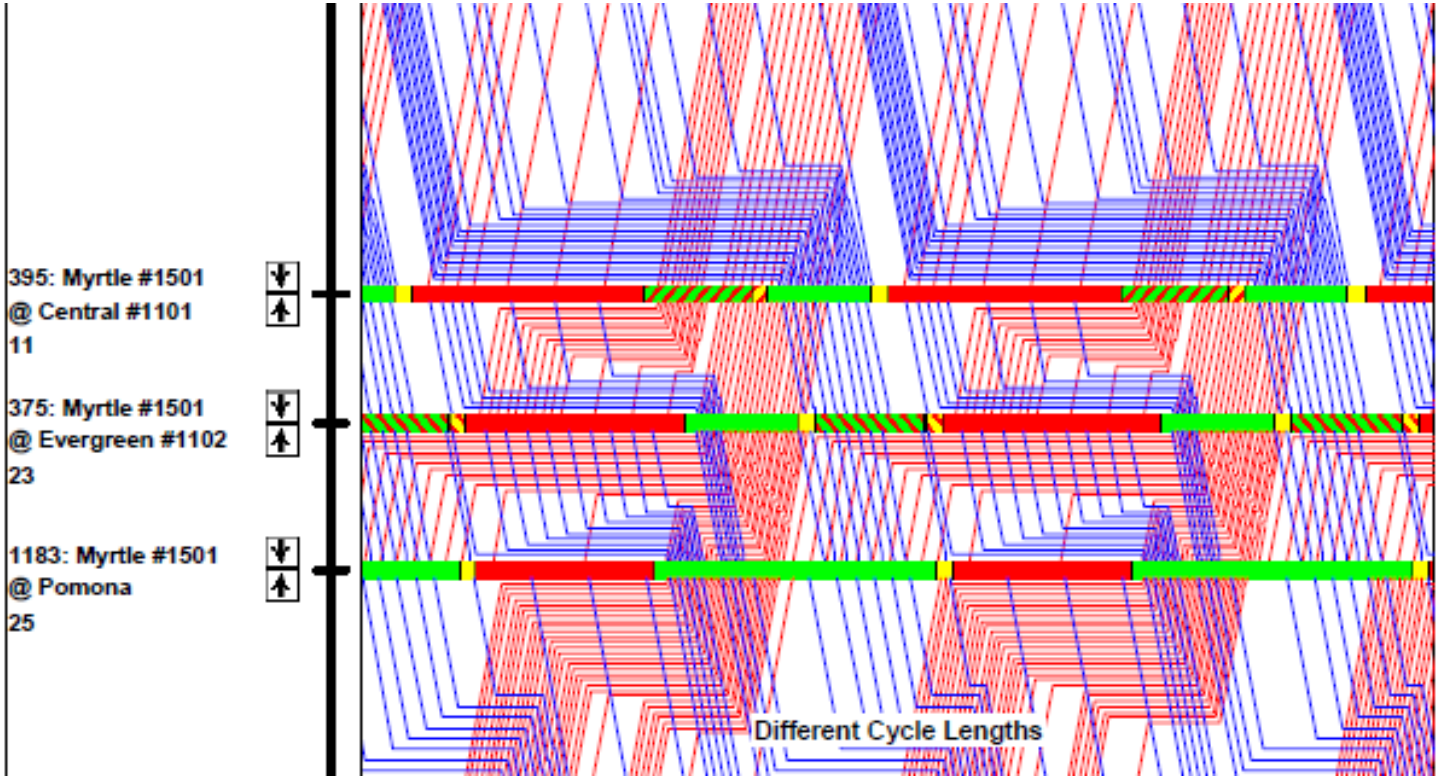


Proposed change





Lagging left at Myrtle and Evergreen



Myrtle @ Evergreen

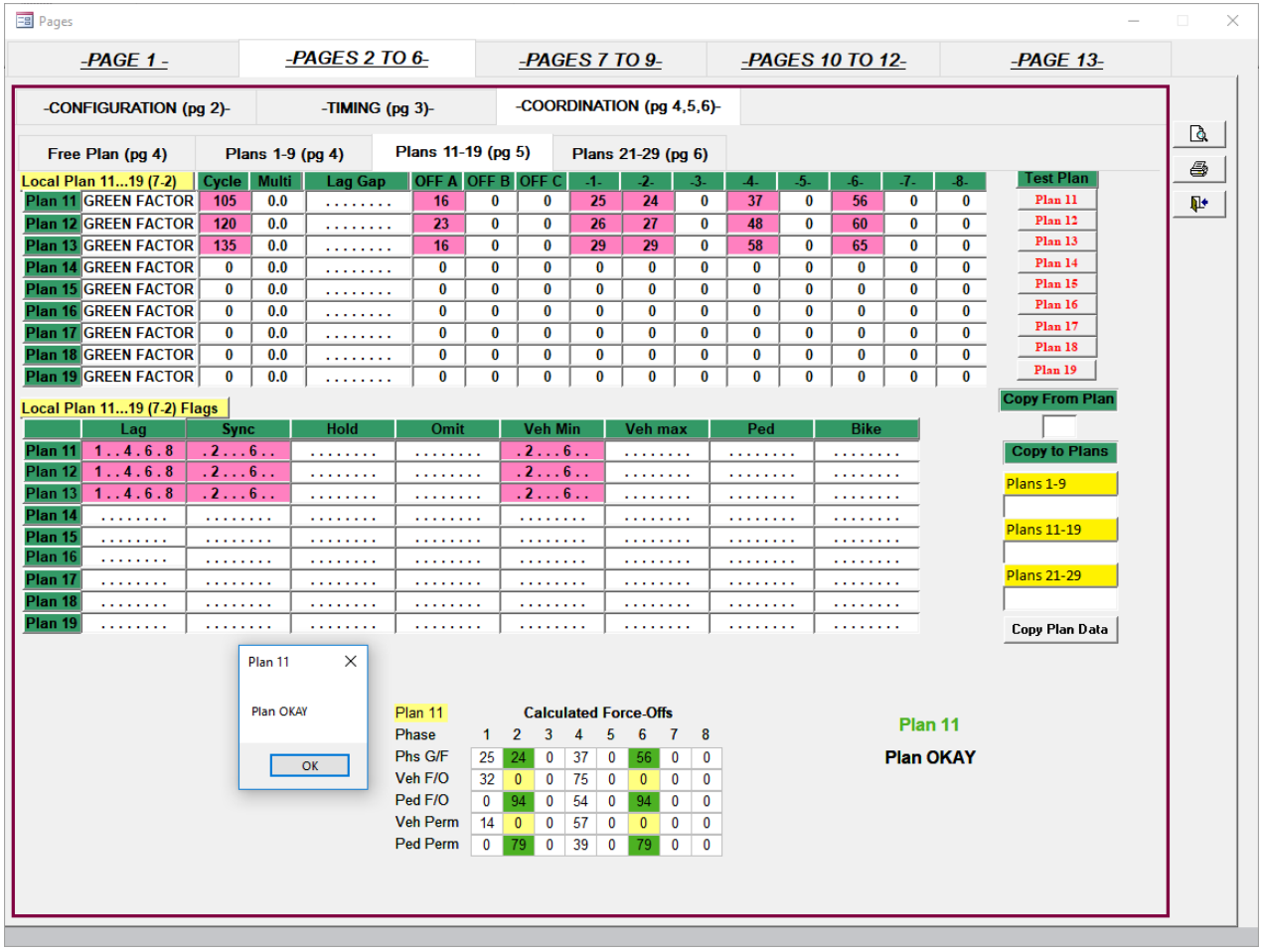
California Department of Transportation, Caltrans

Location: LA 210 EB RAMPS @ MYRTLE AVE. / EVERGREEN AVE. TSCP 2.21

PHASE TIMING

Phase (2-2)	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-
--- Walk 1 ---	0	7	0	7	0	7	0	10
Flash Don't Walk	0	12	0	21	0	12	0	10
Minimum Green	10	10	10	10	10	10	10	10
Det Limit	0	0	10	0	10	0	10	10
Max Initial	0	20	10	0	10	20	10	10
Max Green 1	25	40	50	30	50	40	50	50
Max Green 2	50	50	50	50	50	50	50	50
Max Green 3	35	70	50	70	50	70	50	50
Extension	4.5	3.0	5.0	3.0	5.0	3.0	5.0	5.0
Maximum Gap	4.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0
Minimum Gap	4.5	2.0	5.0	3.0	5.0	2.0	5.0	5.0
Add Per Vehicle	0.0	2.0	1.0	0.0	1.0	2.0	1.0	1.0
Reduce Gap By	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0
Reduce Every	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0
Yellow	4.1	4.4	5.0	4.1	5.0	4.4	5.0	5.0
All-Red	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Myrtle @ Evergreen



HTML representation

- **Plan 11 for Myrtle @ Evergreen**

FLUSH - CT 210-T-013 - Zone 067 - EBT (105s) K1			Plan: 11		Cycle: 105.0		Offset: 16.0	
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	NBT NBR	31.0	26.0	10.0	70.0	60.0	0.0	Coord
1	SBL	31.0	26.0	7.0	35.0	28.0	31.0	No
1	EBL EBT EBR	43.0	38.0	10.0	70.0	60.0	74.0	No
2	SBT	62.0	57.0	10.0	70.0	60.0	31.0	Min

Example outcome #3

Pasadena: Lake

Map of Possible Movements

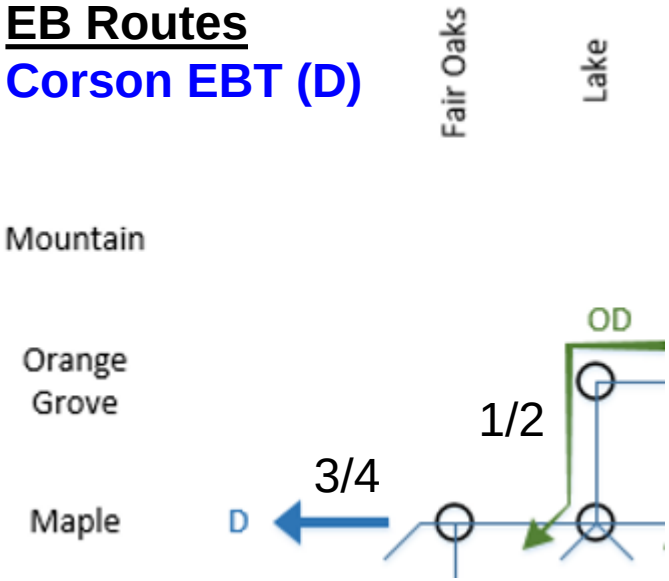
WB Routes

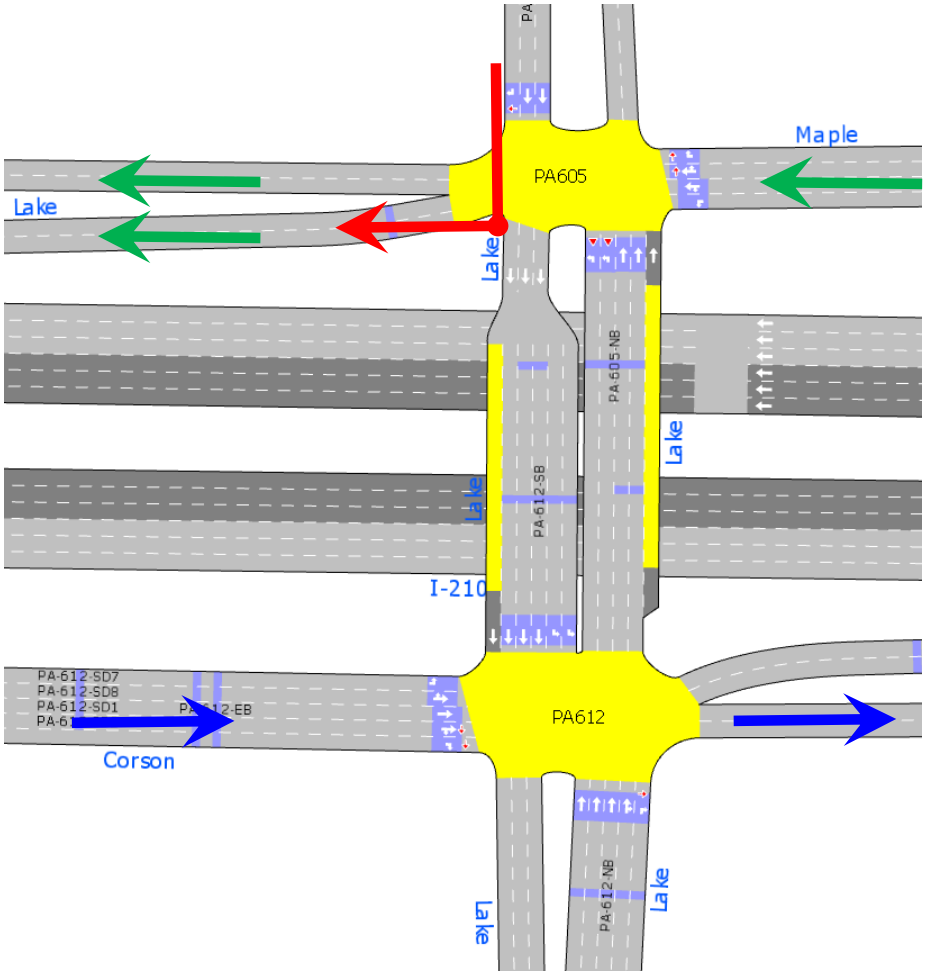
Maple WBT (D)

I-210 WB On-Ramp SBR (OD)

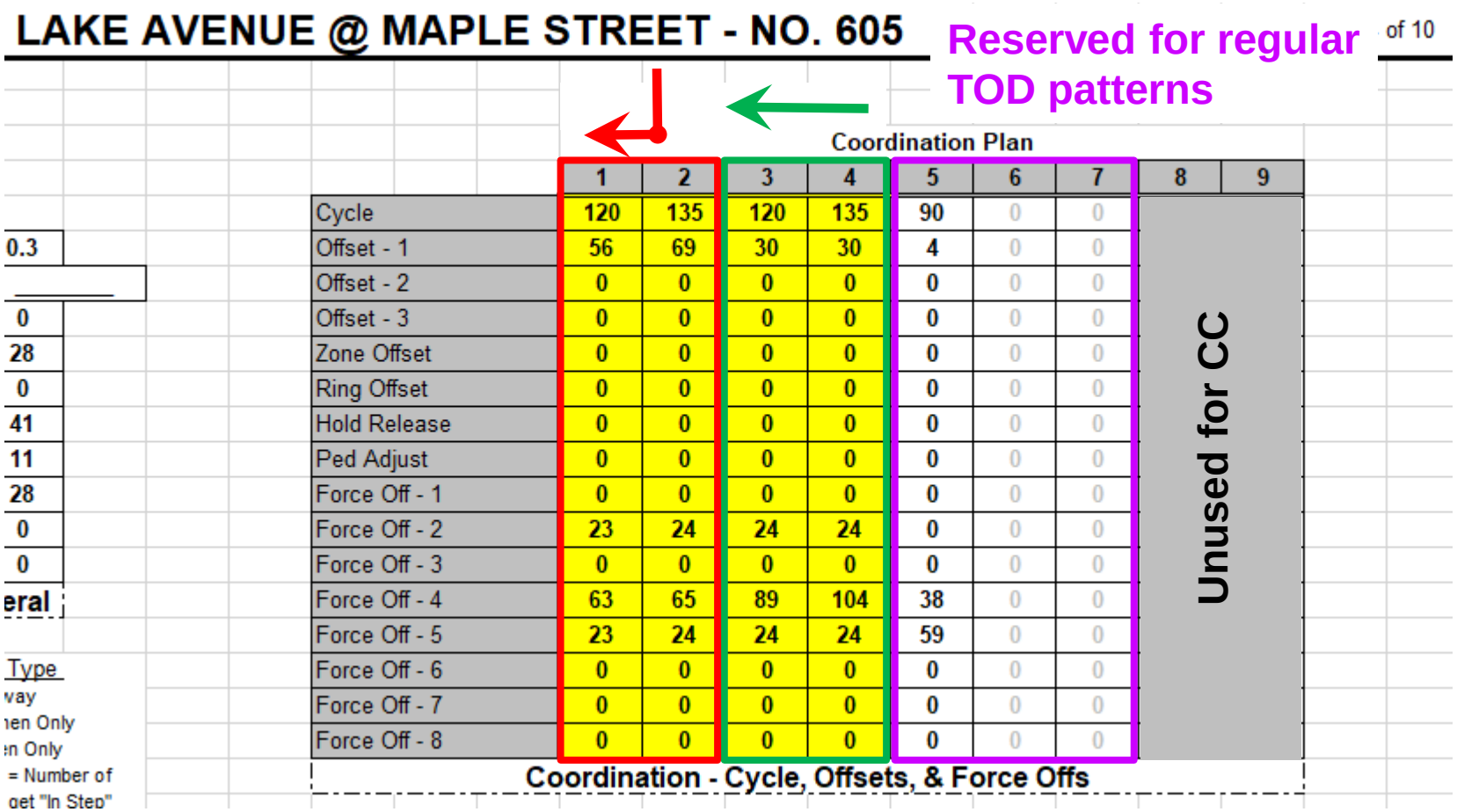
EB Routes

Corson EBT (D)





Lake @ Maple



LAKE AVENUE @ MAPLE STREET - NO. 605

of 10

Reserved for regular TOD patterns

Coordination Plan

	1	2	3	4	5	6	7	8	9
Cycle	120	135	120	135	90	0	0	Unused for CC	
Offset - 1	56	69	30	30	4	0	0		
Offset - 2	0	0	0	0	0	0	0		
Offset - 3	0	0	0	0	0	0	0		
Zone Offset	0	0	0	0	0	0	0		
Ring Offset	0	0	0	0	0	0	0		
Hold Release	0	0	0	0	0	0	0		
Ped Adjust	0	0	0	0	0	0	0		
Force Off - 1	0	0	0	0	0	0	0		
Force Off - 2	23	24	24	24	0	0	0		
Force Off - 3	0	0	0	0	0	0	0		
Force Off - 4	63	65	89	104	38	0	0		
Force Off - 5	23	24	24	24	59	0	0		
Force Off - 6	0	0	0	0	0	0	0		
Force Off - 7	0	0	0	0	0	0	0		
Force Off - 8	0	0	0	0	0	0	0		

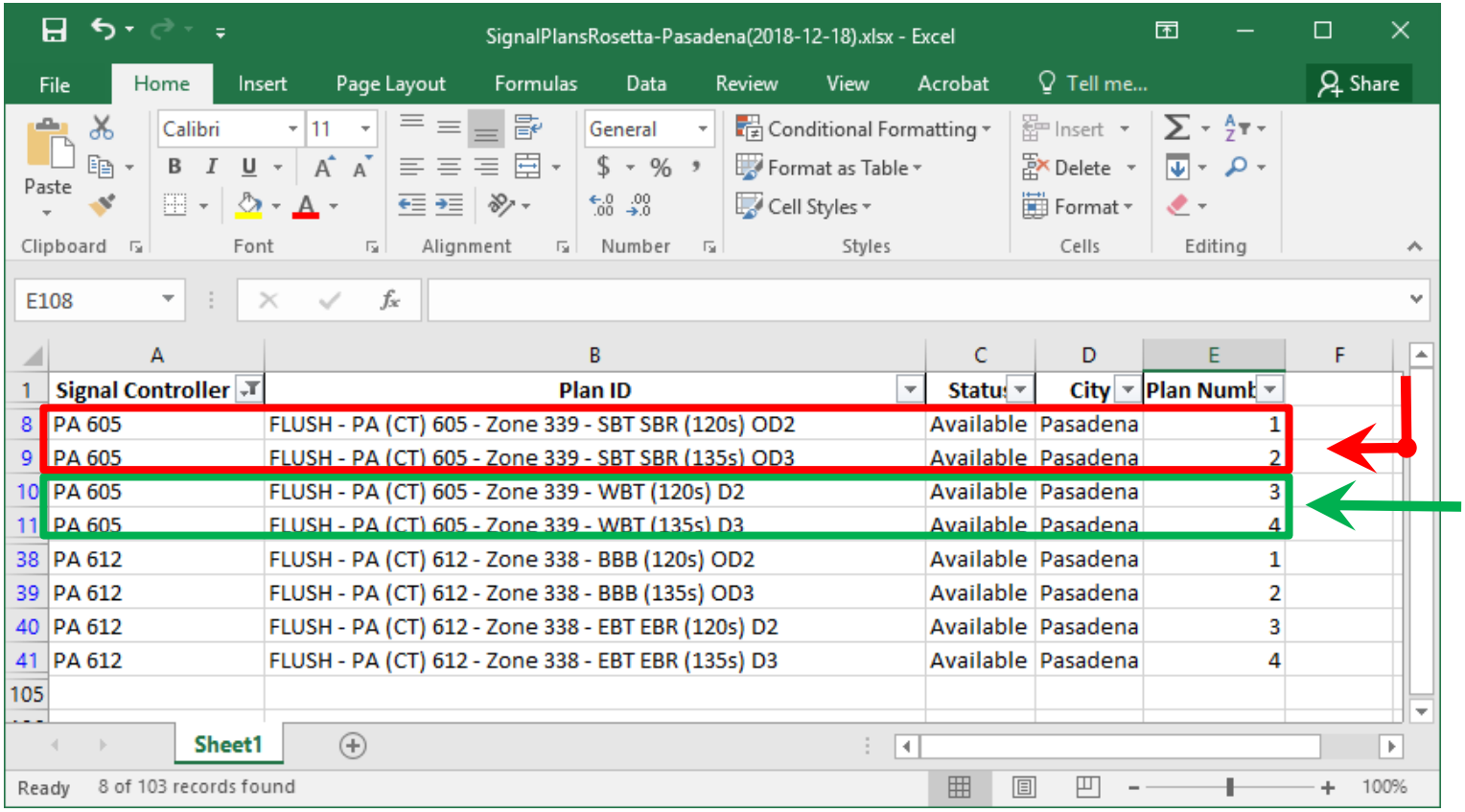
Coordination - Cycle, Offsets, & Force Offs

0.3
0
28
0
41
11
28
0
0
eral

Type
way
ien Only
en Only
= Number of
get "In Step"

Lake @ Maple

- **Rosetta Stone Spreadsheet**



	A	B	C	D	E	F
1	Signal Controller	Plan ID	Statu	City	Plan Numb	
8	PA 605	FLUSH - PA (CT) 605 - Zone 339 - SBT SBR (120s) OD2	Available	Pasadena	1	
9	PA 605	FLUSH - PA (CT) 605 - Zone 339 - SBT SBR (135s) OD3	Available	Pasadena	2	
10	PA 605	FLUSH - PA (CT) 605 - Zone 339 - WBT (120s) D2	Available	Pasadena	3	
11	PA 605	FLUSH - PA (CT) 605 - Zone 339 - WBT (135s) D3	Available	Pasadena	4	
38	PA 612	FLUSH - PA (CT) 612 - Zone 338 - BBB (120s) OD2	Available	Pasadena	1	
39	PA 612	FLUSH - PA (CT) 612 - Zone 338 - BBB (135s) OD3	Available	Pasadena	2	
40	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (120s) D2	Available	Pasadena	3	
41	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (135s) D3	Available	Pasadena	4	
105						

Lake @ Maple

LAKE AVENUE @ MAPLE STREET - NO. 605

Reserved for regular TOD patterns

of 10

Coordination Plan

		1	2	3	4	5	6	7	8	9
	Cycle	120	135	120	135	90	0	0		
0.3	Offset - 1	56	69	30	30	4	0	0		

FLUSH - PA (CT) 605 - Zone 339 - SBT SBR (120s) OD2 **Plan: 1** **Cycle: 120.0** **Offset: 56.0**

Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBT SBH SBR	57.0	52.0	6.0	90.0	84.0	0.0	Coord
1	NBH NBL	23.0	18.0	6.0	25.0	19.0	23.0	No
1	WBH WBL WBR WBT	40.0	35.0	10.0	75.0	65.0	63.0	No
2	NBT	80.0	75.0	6.0	90.0	84.0	23.0	Coord

FLUSH - PA (CT) 605 - Zone 339 - SBT SBR (135s) OD3 **Plan: 2** **Cycle: 135.0** **Offset: 69.0**

Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBT SBH SBR	70.0	65.0	6.0	90.0	84.0	0.0	Coord
1	NBH NBL	24.0	19.0	6.0	25.0	19.0	24.0	No
1	WBH WBL WBR WBT	41.0	36.0	10.0	75.0	65.0	65.0	No
2	NBT	94.0	89.0	6.0	90.0	84.0	24.0	Coord

Lake @ Maple

LAKE AVENUE @ MAPLE STREET - NO. 605

Reserved for regular TOD patterns

Coordination Plan

		1	2	3	4	5	6	7	8	9
	Cycle	120	135	120	135	90	0	0		
0.3	Offset - 1	56	69	30	30	4	0	0		

FLUSH - PA (CT) 605 - Zone 339 - WBT (120s) D2 — **Plan: 3** — **Cycle: 120.0** — **Offset: 30.0**

Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBT SBH SBR	31.0	26.0	6.0	90.0	84.0	0.0	Coord
1	NBH NBL	24.0	19.0	6.0	25.0	19.0	24.0	No
1	WBH WBL WBR WBT	65.0	60.0	10.0	75.0	65.0	89.0	Min
2	NBT	55.0	50.0	6.0	90.0	84.0	24.0	Coord

FLUSH - PA (CT) 605 - Zone 339 - WBT (135s) D3 — **Plan: 4** — **Cycle: 135.0** — **Offset: 30.0**

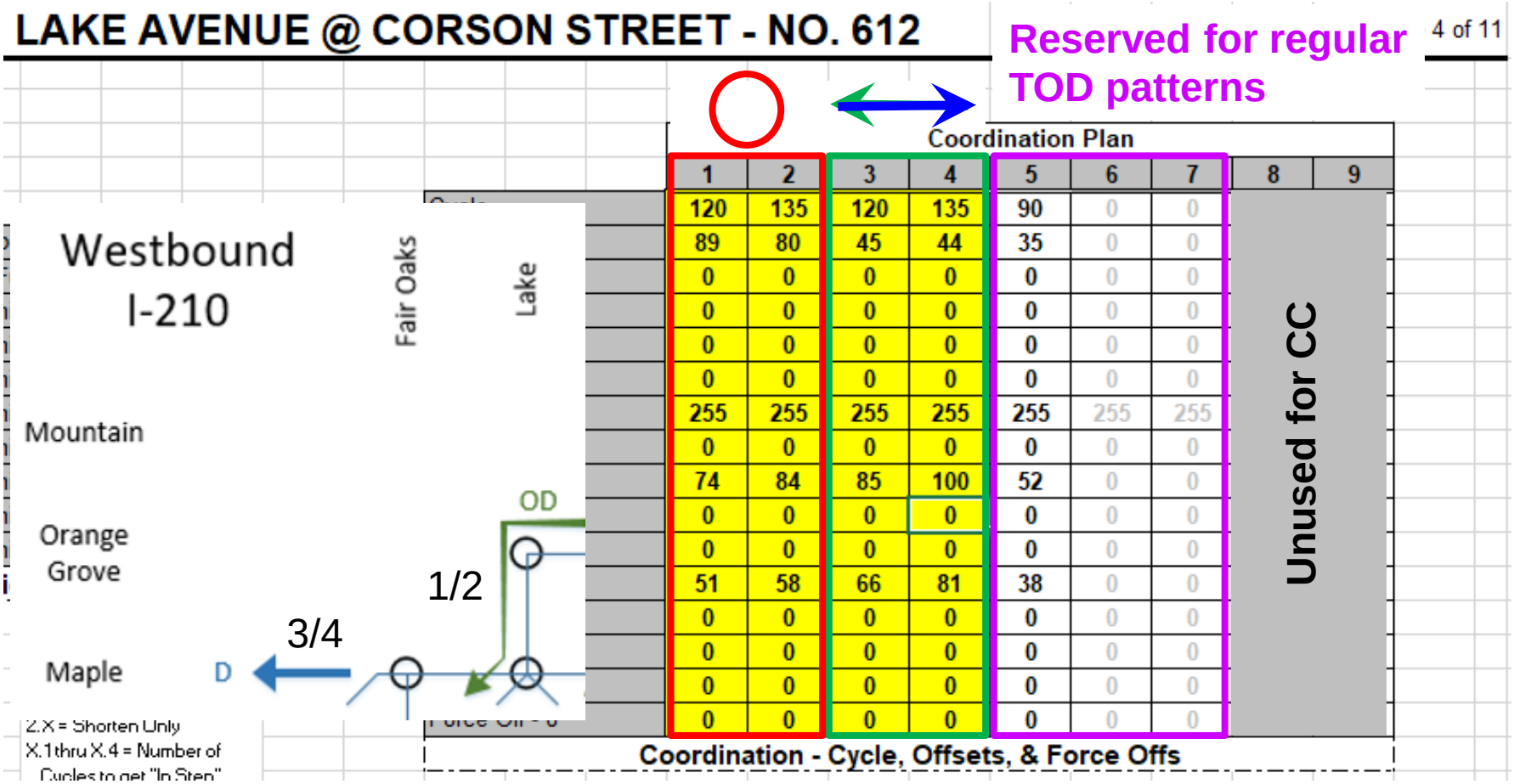
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBT SBH SBR	31.0	26.0	6.0	90.0	84.0	0.0	Coord
1	NBH NBL	24.0	19.0	6.0	25.0	19.0	24.0	No
1	WBH WBL WBR WBT	80.0	75.0	10.0	75.0	65.0	104.0	Min
2	NBT	55.0	50.0	6.0	90.0	84.0	24.0	Coord

Lake @ Maple

- **Max Greens coded in Max 2**

		Phase							
		1	2	3	4	5	6	7	8
Basic Phase Timing	Min Green	0	6	0	10	6	6	0	0
	Extension	0.0	5.0	0.0	4.0	2.5	4.0	0.0	0.0
	Max	0	60	0	40	15	60	0	0
	Max 2	0	90	0	75	25	90	0	0
	Cond Serve Check	0	0	0	0	0	0	0	0

Lake @ Corson -- off-route intersection

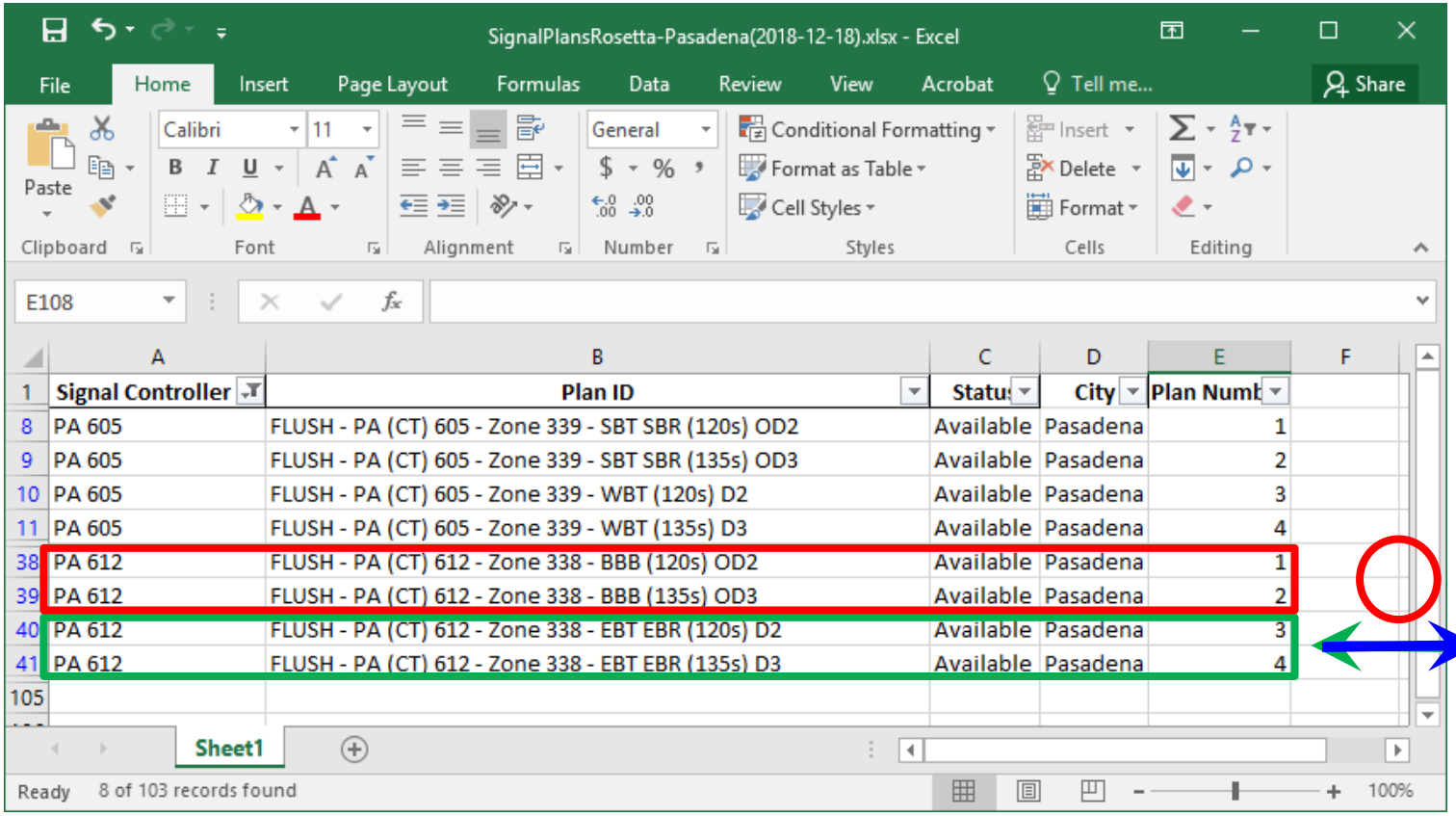


1	2	3	4	5	6	7	8	9
120	135	120	135	90	0	0		
89	80	45	44	35	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		
255	255	255	255	255	255	255		
0	0	0	0	0	0	0		
74	84	85	100	52	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		
51	58	66	81	38	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		
0	0	0	0	0	0	0		

Z.X = Shorten Only
X.1 thru X.4 = Number of Cycles to get "In Step"

Lake @ Corson

- **Rosetta Stone Spreadsheet**



	A	B	C	D	E
1	Signal Controller	Plan ID	Statu	City	Plan Numb
8	PA 605	FLUSH - PA (CT) 605 - Zone 339 - SBT SBR (120s) OD2	Available	Pasadena	1
9	PA 605	FLUSH - PA (CT) 605 - Zone 339 - SBT SBR (135s) OD3	Available	Pasadena	2
10	PA 605	FLUSH - PA (CT) 605 - Zone 339 - WBT (120s) D2	Available	Pasadena	3
11	PA 605	FLUSH - PA (CT) 605 - Zone 339 - WBT (135s) D3	Available	Pasadena	4
38	PA 612	FLUSH - PA (CT) 612 - Zone 338 - BBB (120s) OD2	Available	Pasadena	1
39	PA 612	FLUSH - PA (CT) 612 - Zone 338 - BBB (135s) OD3	Available	Pasadena	2
40	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (120s) D2	Available	Pasadena	3
41	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (135s) D3	Available	Pasadena	4
105					

Lake @ Corson

LAKE AVENUE @ CORSON STREET - NO. 612

Reserved for regular TOD patterns

Coordination Plan

	1	2	3	4	5	6	7	8	9
Cycle	120	135	120	135	90	0	0		
Offset - 1	89	80	45	44	35	0	0		

0.3

FLUSH - PA (CT) 612 - Zone 3?8 - BBB (120s) OD2 — **Plan: 1** — **Cycle: 120.0** — **Offset: 89.0**

Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBL SBH	23.0	19.0	8.0	25.0	17.0	74.0	No
1	NBR NBT NBH	47.0	42.0	8.0	75.0	67.0	0.0	Coord
1	EBL EBH EBR EBT	50.0	46.0	10.0	80.0	70.0	51.0	No
2	SBT	70.0	65.0	8.0	75.0	67.0	0.0	Coord

FLUSH - PA (CT) 612 - Zone 3?8 - BBB (135s) OD3 — **Plan: 2** — **Cycle: 135.0** — **Offset: 80.0**

Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBL SBH	26.0	22.0	8.0	25.0	17.0	84.0	No
1	NBR NBT NBH	52.0	47.0	8.0	75.0	67.0	0.0	Coord
1	EBL EBH EBR EBT	57.0	53.0	10.0	80.0	70.0	58.0	No
2	SBT	78.0	73.0	8.0	75.0	67.0	0.0	Coord

Lake @ Corson

LAKE AVENUE @ CORSON STREET - NO. 612

Reserved for regular TOD patterns

Coordination Plan

	1	2	3	4	5	6	7	8	9
Cycle	120	135	120	135	90	0	0		
Offset - 1	89	80	45	44	35	0	0		

0.3

FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (120s) D2 — **Plan: 3** — **Cycle: 120.0** — **Offset: 45.0**

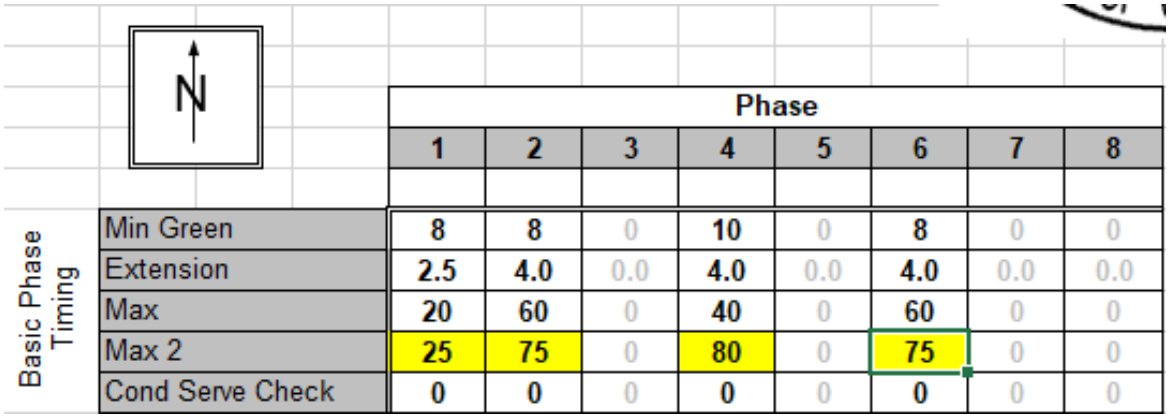
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBL SBH	19.0	15.0	8.0	25.0	17.0	85.0	No
1	NBR NBT NBH	36.0	31.0	8.0	75.0	67.0	0.0	Coord
1	EBL EBH EBR EBT	65.0	61.0	10.0	80.0	70.0	66.0	Min
2	SBT	55.0	50.0	8.0	75.0	67.0	0.0	Coord

FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (135s) D3 — **Plan: 4** — **Cycle: 135.0** — **Offset: 44.0**

Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	SBL SBH	19.0	15.0	8.0	25.0	17.0	100.0	No
1	NBR NBT NBH	36.0	31.0	8.0	75.0	67.0	0.0	Coord
1	EBL EBH EBR EBT	80.0	76.0	10.0	80.0	70.0	81.0	Min
2	SBT	55.0	50.0	8.0	75.0	67.0	0.0	Coord

Lake @ Corson

- **Max Greens coded in Max 2**

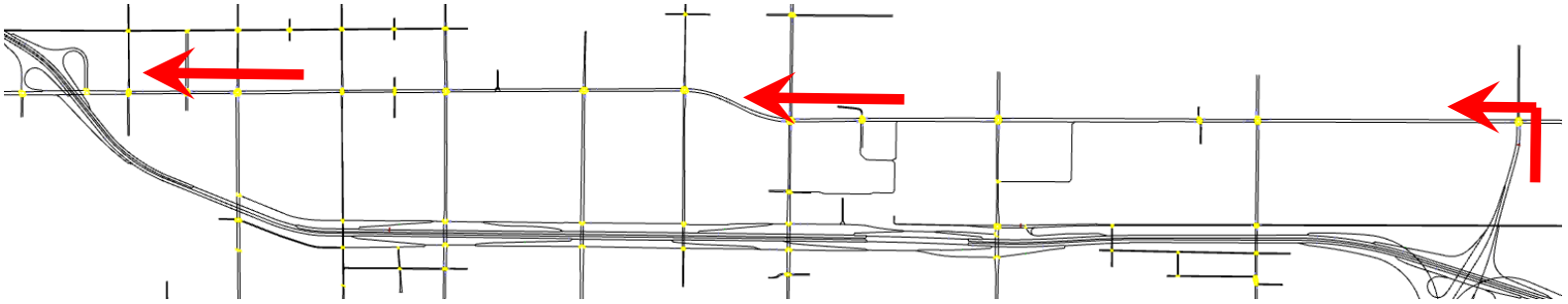


Basic Phase Timing	Phase							
	1	2	3	4	5	6	7	8
Min Green	8	8	0	10	0	8	0	0
Extension	2.5	4.0	0.0	4.0	0.0	4.0	0.0	0.0
Max	20	60	0	40	0	60	0	0
Max 2	25	75	0	80	0	75	0	0
Cond Serve Check	0	0	0	0	0	0	0	0

Example outcome #4

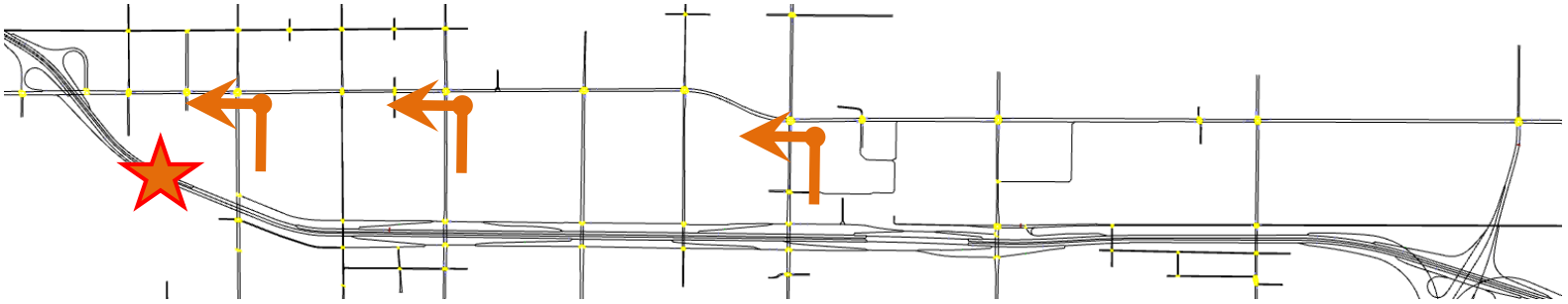
Huntington WB through Monrovia and Duarte

Huntington WB Plans

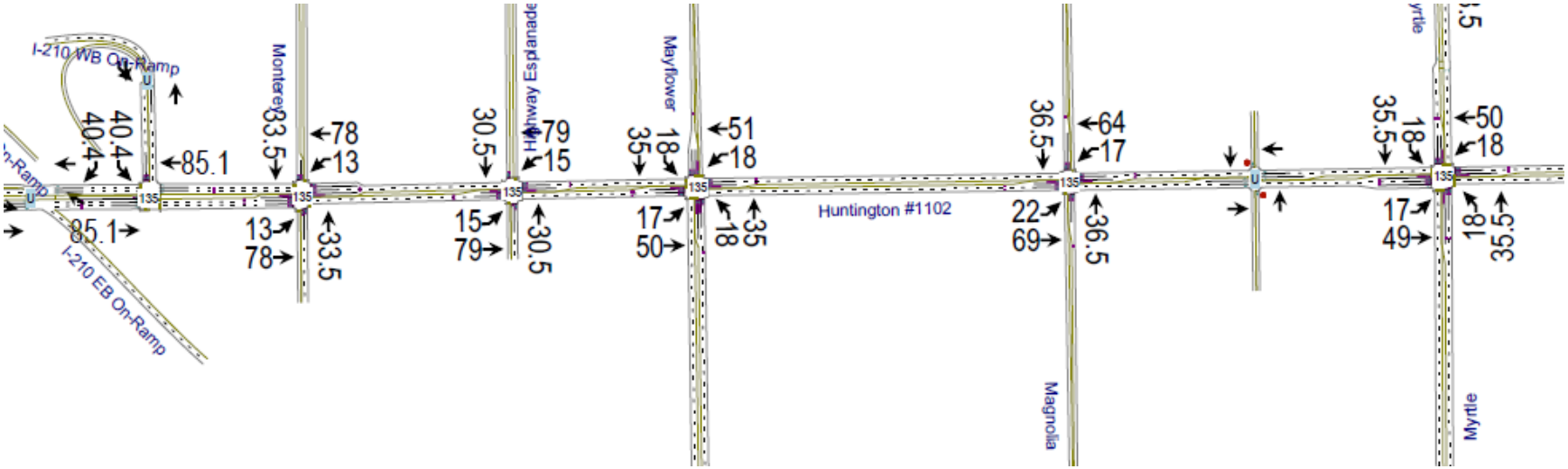


Huntington WB Plans

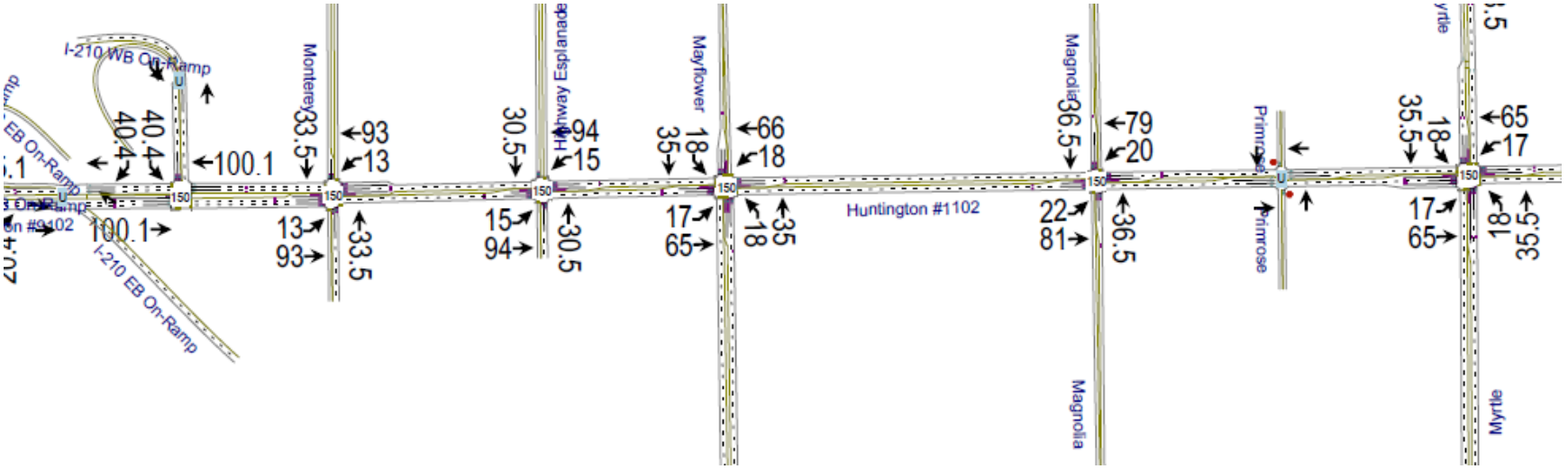
- **High demand for NBL movements at Mayflower, Myrtle, and Mountain**



Max Greens (135 s Cycle)



Max Greens (150 s Cycle)



Huntington @ Monterey (WBT)

- **Plans provided in HTML format**

FLUSH - MO 5083 - Zone 082 - WBT (135s) LD1			Plan: X		Cycle: 135.0		Offset: 10.0	
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	WBR WBT	82.0	78.0	10.0	130.0	120.0	119.0	Min
1	EBL EBU	16.0	12.0	4.0	25.0	21.0	0.0	No
1	SBL SBT SBR	37.0	33.0	4.0	30.0	26.0	37.0	No
2	WBL WBU	16.0	13.0	4.0	25.0	21.0	54.0	No
2	EBR EBT	82.0	78.0	10.0	130.0	120.0	0.0	Coord
2	NBL NBT NBR	37.0	33.0	4.0	30.0	26.0	37.0	No

FLUSH - MO 5083 - Zone 082 - WBT (150s) LD2			Plan: X		Cycle: 150.0		Offset: 109.0	
Ring	Movements	Split	Green				Force-off	Recall Mode
			Duration	Min	Max	Max-Min		
1	WBR WBT	97.0	93.0	10.0	130.0	120.0	134.0	Min
1	EBL EBU	16.0	12.0	4.0	25.0	21.0	0.0	No
1	SBL SBT SBR	37.0	33.0	4.0	33.0	29.0	37.0	No
2	WBL WBU	16.0	13.0	4.0	25.0	21.0	54.0	No
2	EBR EBT	97.0	93.0	10.0	130.0	120.0	0.0	Coord
2	NBL NBT NBR	37.0	33.0	4.0	33.0	29.0	37.0	No

Connection with DSS rules

Aimsun routes, signals and policies

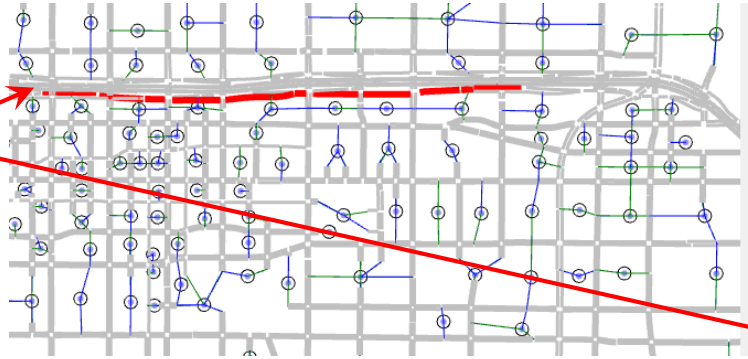
- **Aimsun policies (response plan elements) coded to contain a set of signal plans that can be deployed in combination**

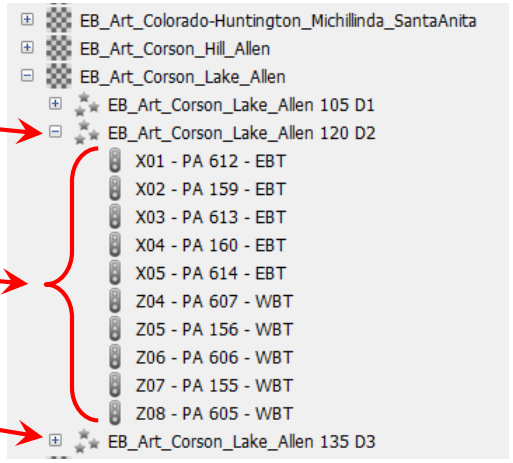
Set of Signal Plans with cycle length of 120 sec

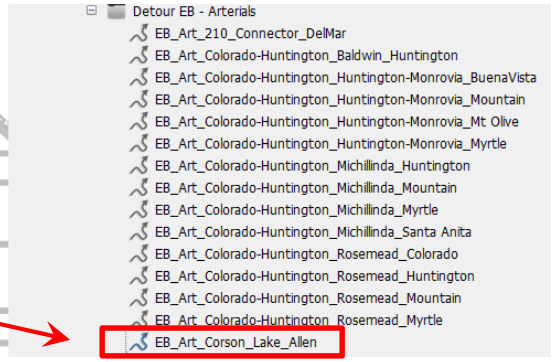
Signal Plans

Set of Signal Plans with cycle length of 135 sec

Route







DSS Rules – Summary of structure

Car Route Strategies	
Column	Definition
Route Name	Name of route in system
Signal Strategy A	Policy name from the Aimsun object
Signal Strategy B	Policy name from the Aimsun object
Ramp Meter Strategy A	Ramp meter overrides
Ramp Meter Strategy B	Ramp meter overrides
Wayfinding Strategy	Signage

Signal Strategies	
Column	Definition
Signal Strategy Name	Policy name from the Aimsun object
Signal Controller ID	Unique intersection identifier
Timing Plan	Human readable plan name including the favored movement

Signal Plans	
Column	Definition
Signal Controller ID	Unique intersection identifier
Plan ID	Human readable plan name including the favored movement
Target Plan ID	Coordination plan/pattern to be invoked in field element

DSS Rules – Example Spreadsheets

CarRouteStrategies.xlsx - Excel

	Route Name	Signal Strategy A	Signal Strategy I	Ramp Meter Strategy A	Ramp Met
13	EB_Art_Corson_Lake_Allen	EB_Art_Corson_Lake_Allen 120 D2	None	EBAllen-GreenBall	None
14	EB_Art_Corson_Lake_Allen	EB_Art_Corson_Lake_Allen 135 D3	None	EBAllen-GreenBall	None
15	EB_Art_Corson_Lake_Allen	EB_Art_Corson_Lake_Allen 105 D1	None	EBAllen-GreenBall	None

SignalStrategiesA.xlsx - Excel

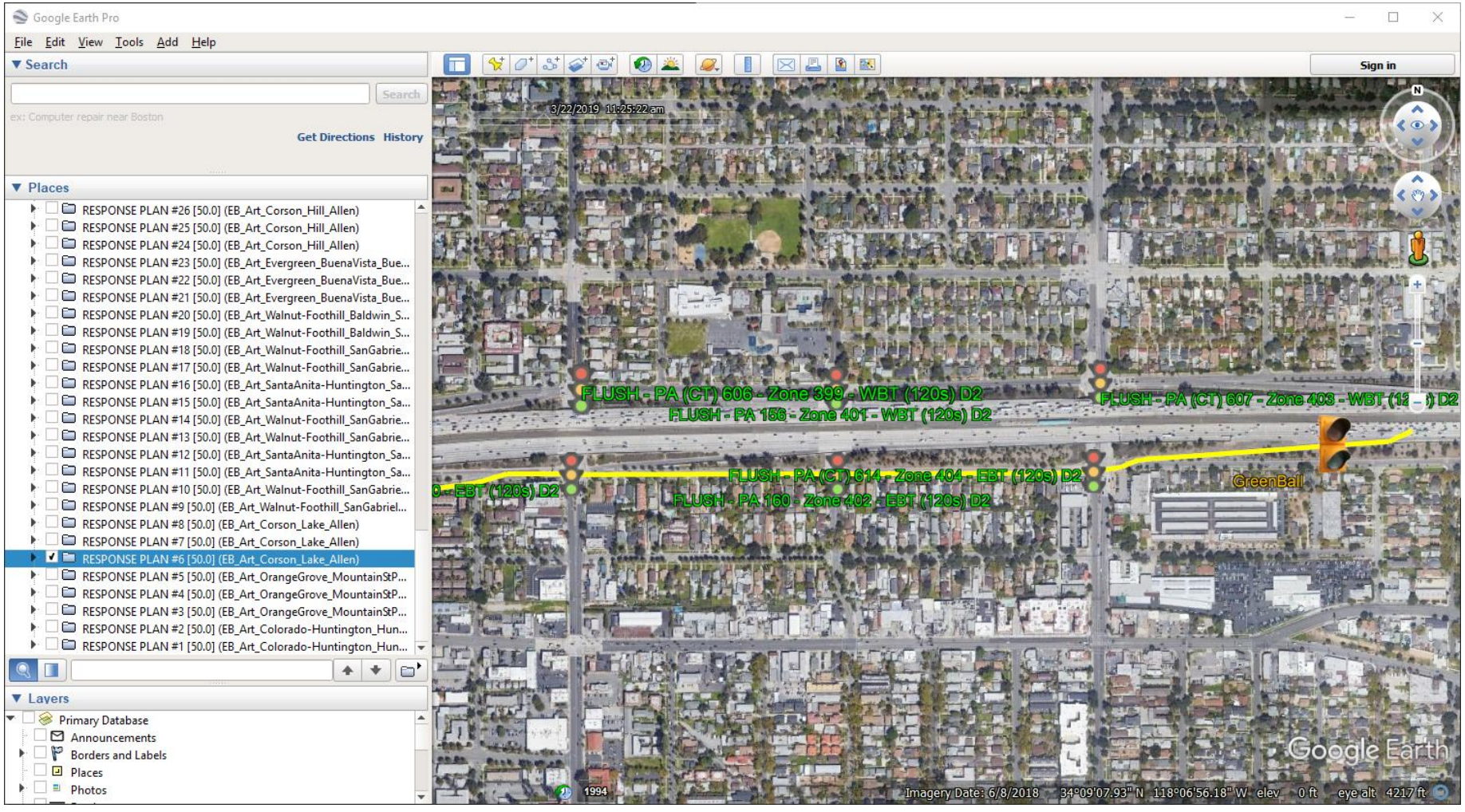
	Signal Strategy Name	Signal Controller ID	Timing Plan
714	EB_Art_Corson_Lake_Allen 120 D2	PA 607	FLUSH - PA (CT) 607 - Zone 403 - WBT (120s) D2
715	EB_Art_Corson_Lake_Allen 120 D2	PA 156	FLUSH - PA 156 - Zone 401 - WBT (120s) D2
716	EB_Art_Corson_Lake_Allen 120 D2	PA 606	FLUSH - PA (CT) 606 - Zone 399 - WBT (120s) D2
717	EB_Art_Corson_Lake_Allen 120 D2	PA 155	FLUSH - PA 155 - Zone 397 - WBT (120s) D2
718	EB_Art_Corson_Lake_Allen 120 D2	PA 605	FLUSH - PA (CT) 605 - Zone 339 - WBT (120s) D2
1149	EB_Art_Corson_Lake_Allen 120 D2	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (120s) D2
1150	EB_Art_Corson_Lake_Allen 120 D2	PA 159	FLUSH - PA 159 - Zone 398 - EBT (120s) D2
1151	EB_Art_Corson_Lake_Allen 120 D2	PA 613	FLUSH - PA (CT) 613 - Zone 400 - EBT (120s) D2
1152	EB_Art_Corson_Lake_Allen 120 D2	PA 160	FLUSH - PA 160 - Zone 402 - EBT (120s) D2
1153	EB_Art_Corson_Lake_Allen 120 D2	PA 614	FLUSH - PA (CT) 614 - Zone 404 - EBT (120s) D2

SignalPlans.xlsx - Excel

	Controller	Plan ID	Status
2316	PA 612	FLUSH - PA (CT) 612 - Zone 338 - BBB (120s) OD2	Available
2317	PA 612	FLUSH - PA (CT) 612 - Zone 338 - BBB (135s) OD3	Available
2318	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT (120s) NS	Available
2319	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (105s) D1	Available
2320	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (120s) D2	Available
2321	PA 612	FLUSH - PA (CT) 612 - Zone 338 - EBT EBR (135s) D3	Available
2322	PA 612	PA (CT) 612 - Zone 338 - P1	Available
2323	PA 612	PA (CT) 612 - Zone 338 - P14	Available

Google Earth Car Route Strategies

- **Among EB plans, 120-s Corson_Lake_Allen is #6 out of 95**



Next steps

Next steps

- **Finalize signal plan proposals (May)**
  - NS connections on Rosemead, Santa Anita, and Fair Oaks
  - Orange Grove routes
- **Stakeholder meetings for signal plan acceptance (June/July)**
- **Generate and review DSS spreadsheets, rules and decision-making parameters**

Thank You
and
Next Meeting
(Suggest Tuesday June 11th at Arcadia)