Albuquerque Automated Traffic Signal Performance Measures

ITE Joint Western and Texas District Meeting
June 26, 2018

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Christopher Sobie, MS, EIT

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Albuquerque Overview

- Population: 890,000
- 8 Bridge Crossings
- 640 Traffic Signals
  - 264 ATSPM Ready
  - 65 Ready – Copper Comms
  - 291 Not High Res Controllers
- 100+ Miles of Fiber

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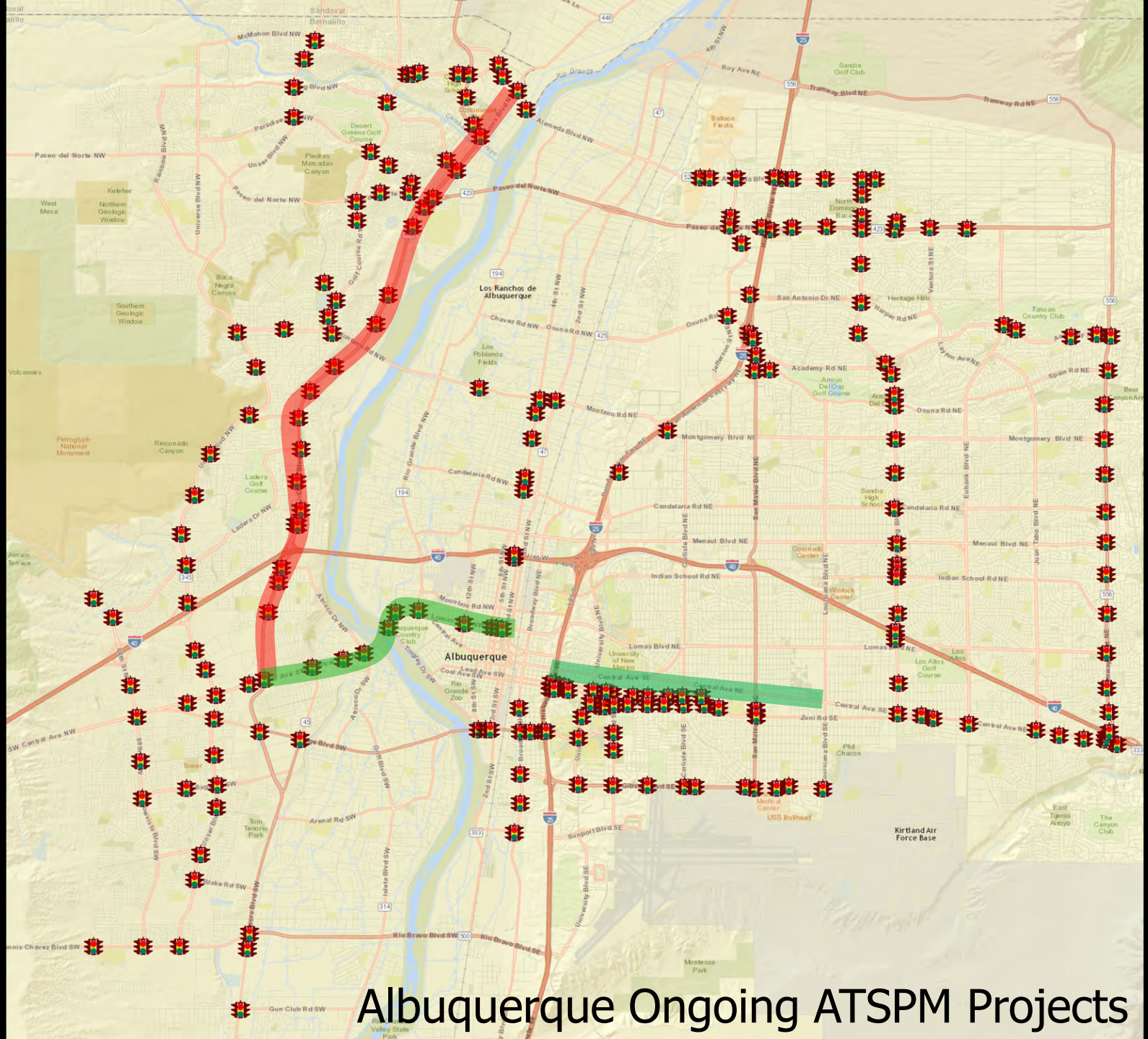
Motivation for ATSPM in ABQ

- State-based model to identify and deploy proven but underutilized innovations to:
  - Shorten project delivery process
  - Enhance roadway safety
  - Reduce congestion
  - Improve environmental sustainability
- EDC Rounds: two year cycles
- 4 Rounds, 46 Innovations



Albuquerque Ongoing ATSPM Projects

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Value at Any Level

Version #	2
).19.2.204_2017_05_31_1545.dat	
Intersection #	10.19.2.204
IP Address:	10.19.2.204
MAC Address:	00:04:81:02:8b:ba
Controller Data Log Beginning:	5/31/17 3:45 PM

Time	EventType	Parameter	TimeAsDecimal	EventText	ParameterText	EventGroup
7:01:29 AM	90	8	7.02472	PedDetector On	DET Channel # (1- 16)	Detector
7:01:29 AM	90	8	7.02472	PedDetector On	DET Channel # (1- 16)	Detector
7:01:51 AM	90	8	7.03083	PedDetector On	DET Channel # (1- 16)	Detector
7:01:52 AM	90	8	7.03111	PedDetector On	DET Channel # (1- 16)	Detector
7:02:52 AM	90	6	7.04778	PedDetector On	DET Channel # (1- 16)	Detector
7:02:52 AM	90	6	7.04778	PedDetector On	DET Channel # (1- 16)	Detector
7:02:53 AM	90	6	7.04806	PedDetector On	DET Channel # (1- 16)	Detector
7:02:53 AM	90	6	7.04806	PedDetector On	DET Channel # (1- 16)	Detector
7:02:53 AM	90	6	7.04806	PedDetector On	DET Channel # (1- 16)	Detector
7:02:53 AM	90	6	7.04806	PedDetector On	DET Channel # (1- 16)	Detector
7:03:29 AM	90	6	7.05806	PedDetector On	DET Channel # (1- 16)	Detector
7:03:29 AM	90	6	7.05806	PedDetector On	DET Channel # (1- 16)	Detector
7:03:35 AM	90	8	7.05972	PedDetector On	DET Channel # (1- 16)	Detector
7:04:03 AM	90	6	7.06750	PedDetector On	DET Channel # (1- 16)	Detector
7:04:04 AM	90	6	7.06778	PedDetector On	DET Channel # (1- 16)	Detector
7:04:19 AM	90	6	7.07194	PedDetector On	DET Channel # (1- 16)	Detector
7:04:20 AM	90	6	7.07222	PedDetector On	DET Channel # (1- 16)	Detector
7:04:20 AM	90	6	7.07222	PedDetector On	DET Channel # (1- 16)	Detector
7:06:44 AM	90	8	7.11222	PedDetector On	DET Channel # (1- 16)	Detector

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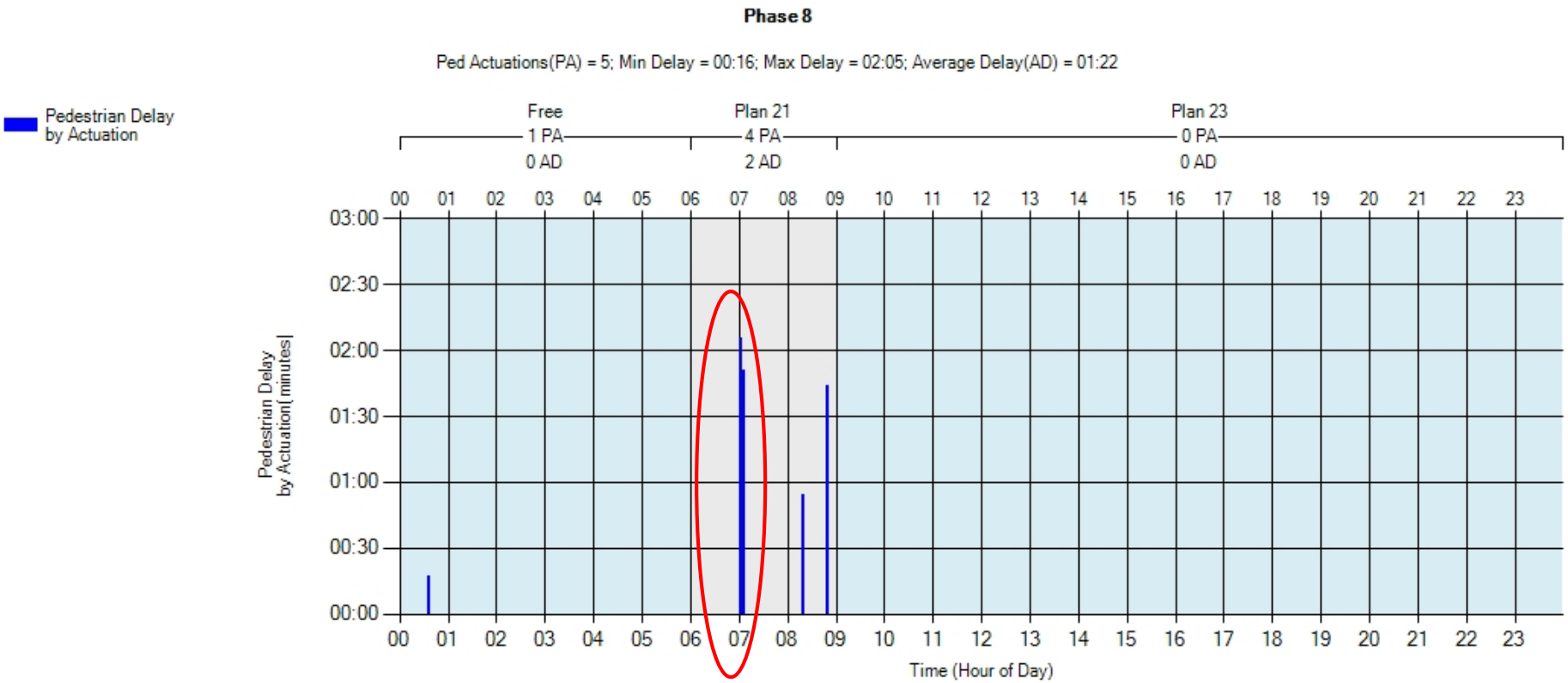
8	Timestamp	Event Typ	Paramet	Event Description
186	06/09/2017 7:01:28.7	45	8	Pedestrian Call Registered
312	06/09/2017 7:02:52.0	45	6	Pedestrian Call Registered
475	06/09/2017 7:03:34.6	21	8	Pedestrian Begin Walk
478	06/09/2017 7:03:34.8	45	8	Pedestrian Call Registered
648	06/09/2017 7:04:50.1	21	6	Pedestrian Begin Walk
913	06/09/2017 7:06:44.3	45	8	Pedestrian Call Registered
1137	06/09/2017 7:08:35.2	21	8	Pedestrian Begin Walk



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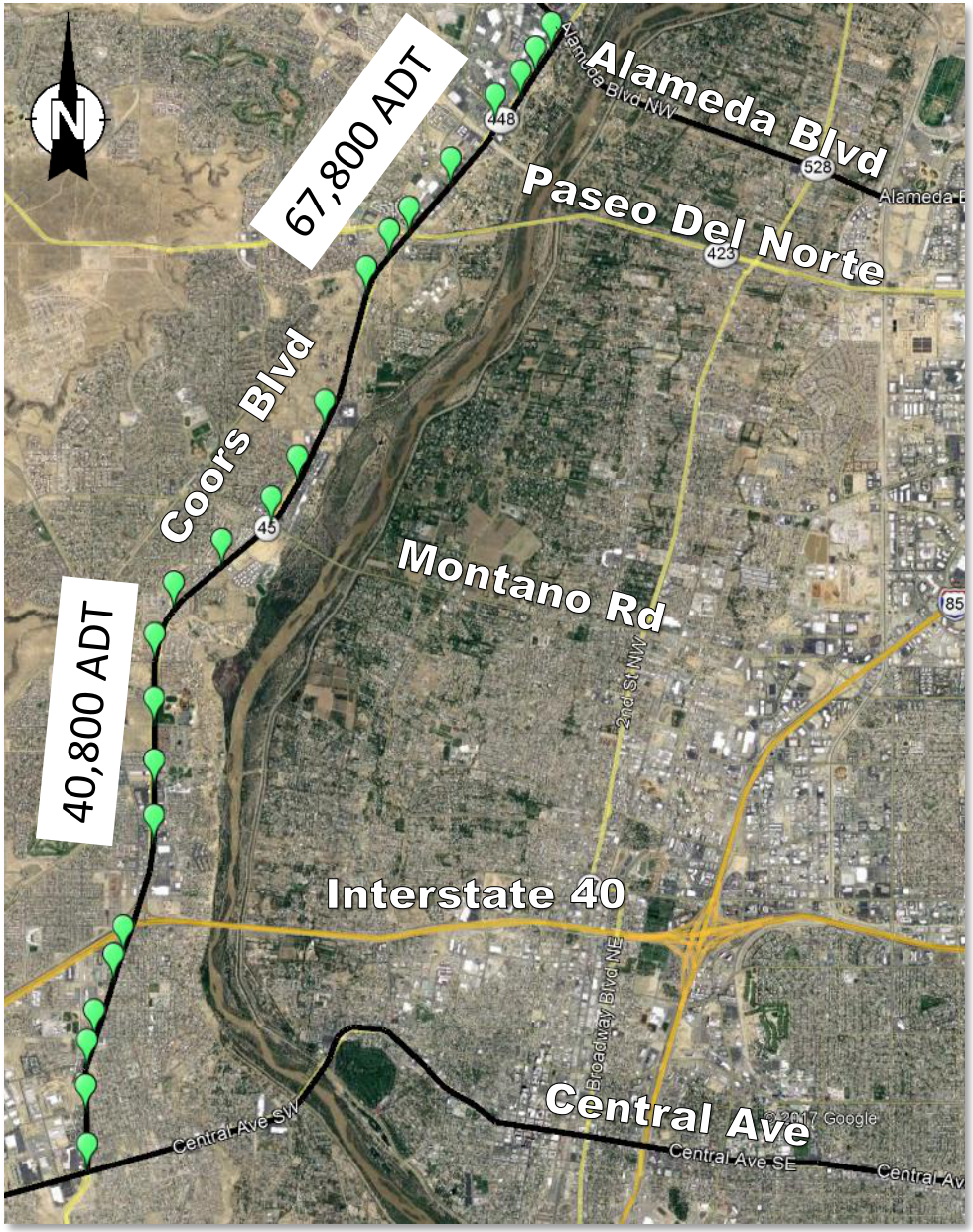

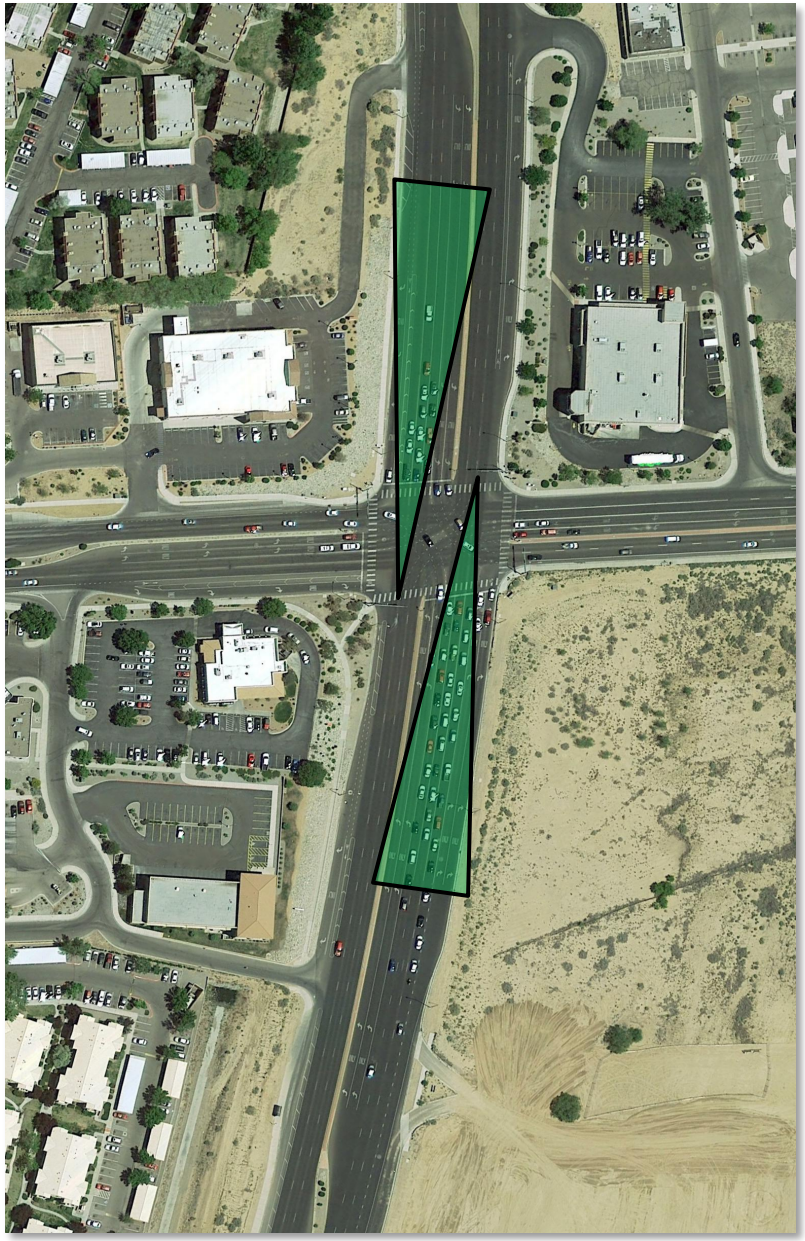

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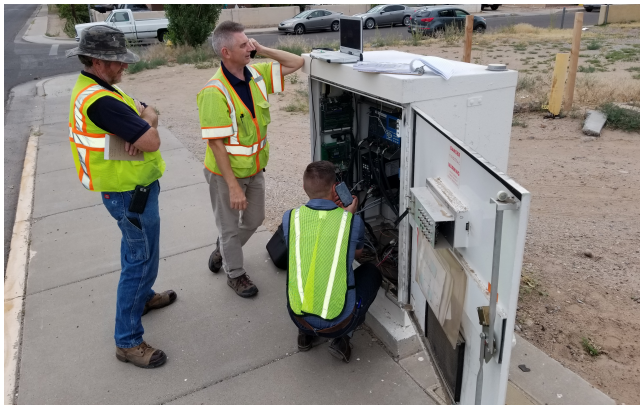
Coors Boulevard Project Goals

- Measure and Analyze Traffic Conditions
- Proactively Optimize Traffic
  - Reduce Delay Across the Corridor
  - Reduce Travel Time
- Implement Maintenance and Performance Alerts



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Coors Boulevard Upgrades

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Coors Boulevard Schedule Update

- Schedule
  - June 2017
    - Detection Installed
  - August 2017
    - ATSPM Server
  - September 2017
    - Existing Condition Data Collection
  - October 2017 – Present
    - Active ATSPM Management
  - April 2018
    - 6 Month Project Status Report

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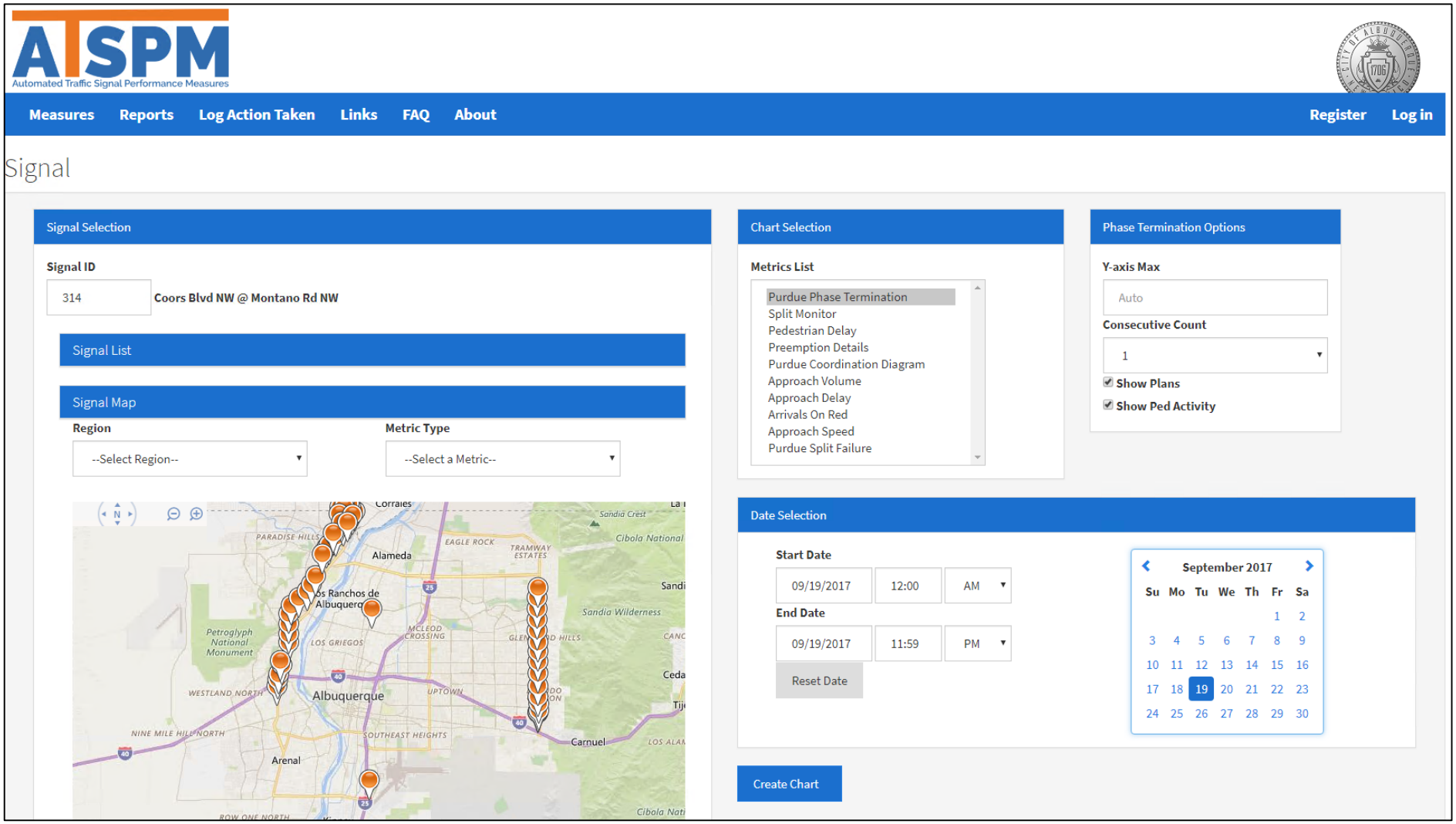
Coors Boulevard Metrics



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ATSPM Alerts for 9/25/2017 - Message (Plain Text)

FILE MESSAGE ESET ADOBE PDF

Delete Reply Reply All Forward | ASTPM To Manager Team Email | Move | Assign Policy Mark Unread Categorize Follow Up | Translate | Zoom

Delete Respond Quick Steps Move Tags Editing Zoom

Mon 9/25/2017 7:01 AM

ATSPM@cabq.gov

ATSPM Alerts for 9/25/2017

To Chris Sobie; Chris Sobie

--No new missing record errors were found on 9/22/2017:

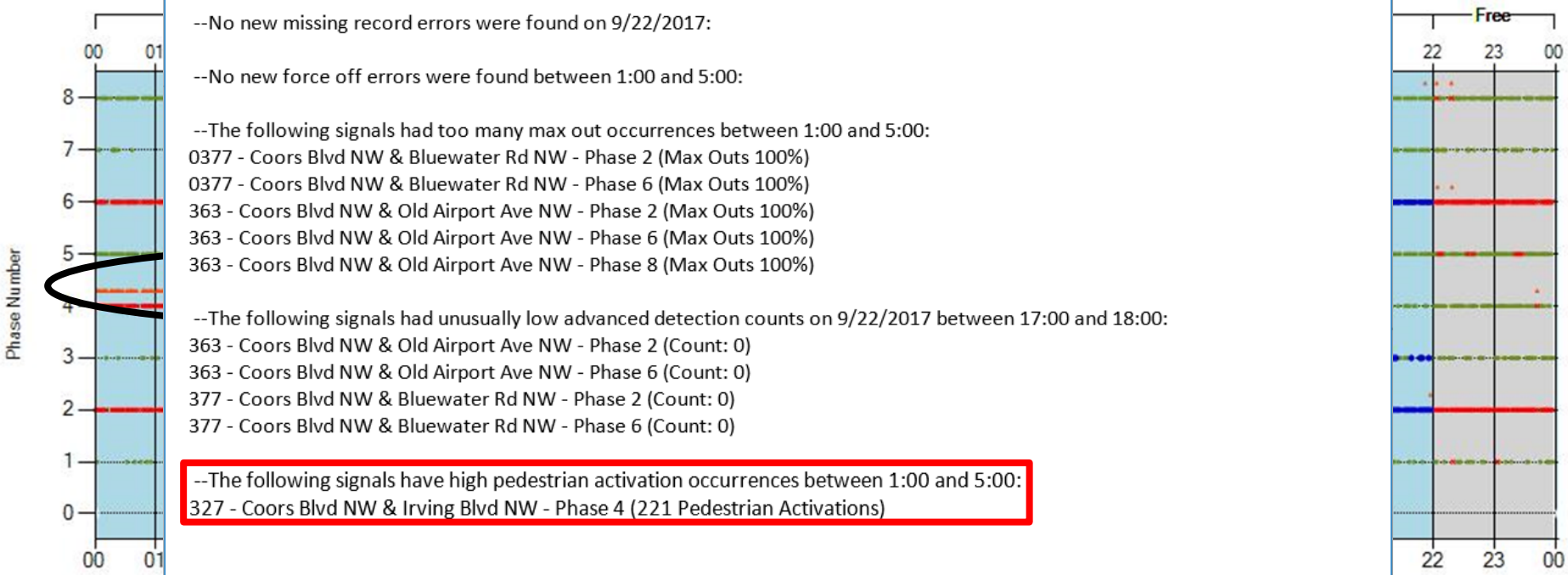
--No new force off errors were found between 1:00 and 5:00:

--The following signals had too many max out occurrences between 1:00 and 5:00:
0377 - Coors Blvd NW & Bluewater Rd NW - Phase 2 (Max Outs 100%)
0377 - Coors Blvd NW & Bluewater Rd NW - Phase 6 (Max Outs 100%)
363 - Coors Blvd NW & Old Airport Ave NW - Phase 2 (Max Outs 100%)
363 - Coors Blvd NW & Old Airport Ave NW - Phase 6 (Max Outs 100%)
363 - Coors Blvd NW & Old Airport Ave NW - Phase 8 (Max Outs 100%)

--The following signals had unusually low advanced detection counts on 9/22/2017 between 17:00 and 18:00:
363 - Coors Blvd NW & Old Airport Ave NW - Phase 2 (Count: 0)
363 - Coors Blvd NW & Old Airport Ave NW - Phase 6 (Count: 0)
377 - Coors Blvd NW & Bluewater Rd NW - Phase 2 (Count: 0)
377 - Coors Blvd NW & Bluewater Rd NW - Phase 6 (Count: 0)

--The following signals have high pedestrian activation occurrences between 1:00 and 5:00:
327 - Coors Blvd NW & Irving Blvd NW - Phase 4 (221 Pedestrian Activations)

Unable to log in to: SharePoint.



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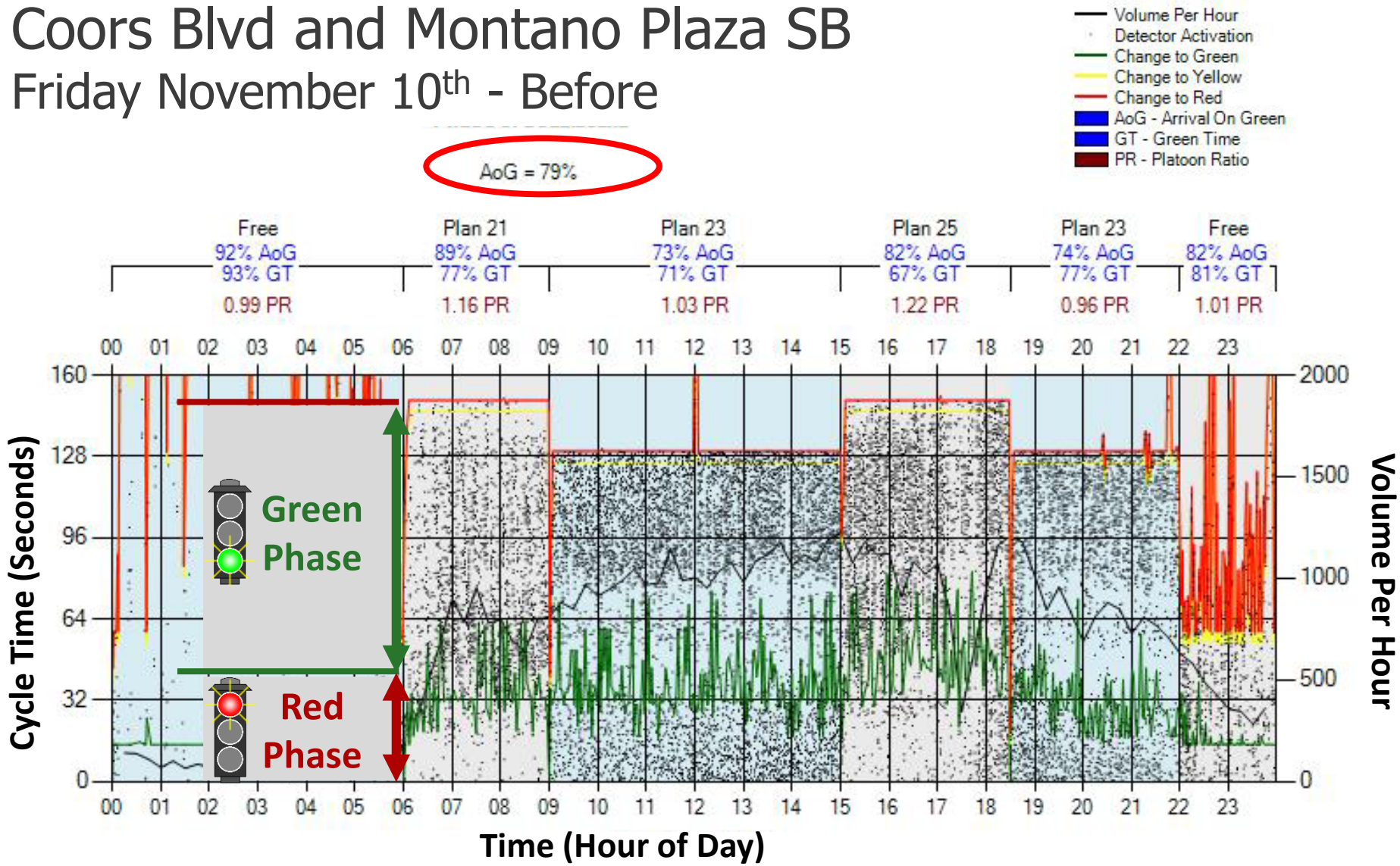
ATSPM Metrics - Coordination

Coors Blvd and Montano Plaza SB

Friday November 10th - Before



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ATSPM Metrics – Offset Improvement

Purdue Link Pivot Analysis

Report Options

Route

1. Coors Blvd south of I-40

Signals

Cycle Length

90

Start Date

09/12/2017

End Date

09/14/2017

Start Time

8:00 AM

End Time

9:00 AM

Advanced

Run Report

Adjustments

Link	Signal	Location	Link Delta	Edit Link Delta	Offset(+ to Offset)	Existing Offset	New Offset
1	377	Coors Blvd NW Bluewater Rd NW	57	57	3	0	3
2	378	Coors Blvd NW Los Volcanes Rd NW	43	43	36	0	36
3	379	Coors Blvd NW Fortuna Rd NW	82	82	83	0	83
4	381	Coors Blvd NW Hanover Rd NW	1	1	1	0	1
5	383	Coors Blvd NW Iliff Rd NW	0	0	0	0	0

Approach Link Comparison

Link	Approaches		Upstream AOG			Downstream AOG			Total Link AOG			Delta	AOG Chart
	Upstream	Downstream	Existing	Predicted	Change	Existing	Predicted	Change	Existing	Predicted	Change		
1	377 Southbound	378 Northbound	1133	1289		1137	1142		**2270**	**2431**		57	PCD Options
	Coors Blvd NW Bluewater Rd NW	Coors Blvd NW Los Volcanes Rd NW	55%	63%		82%	83%		**66%**	**71%**			
2	378 Southbound	379 Northbound	1191	1960		872	701		**2063**	**2661**		43	PCD Options
	Coors Blvd NW Los Volcanes Rd NW	Coors Blvd NW Fortuna Rd NW	52%	85%		69%	56%		**58%**	**75%**			

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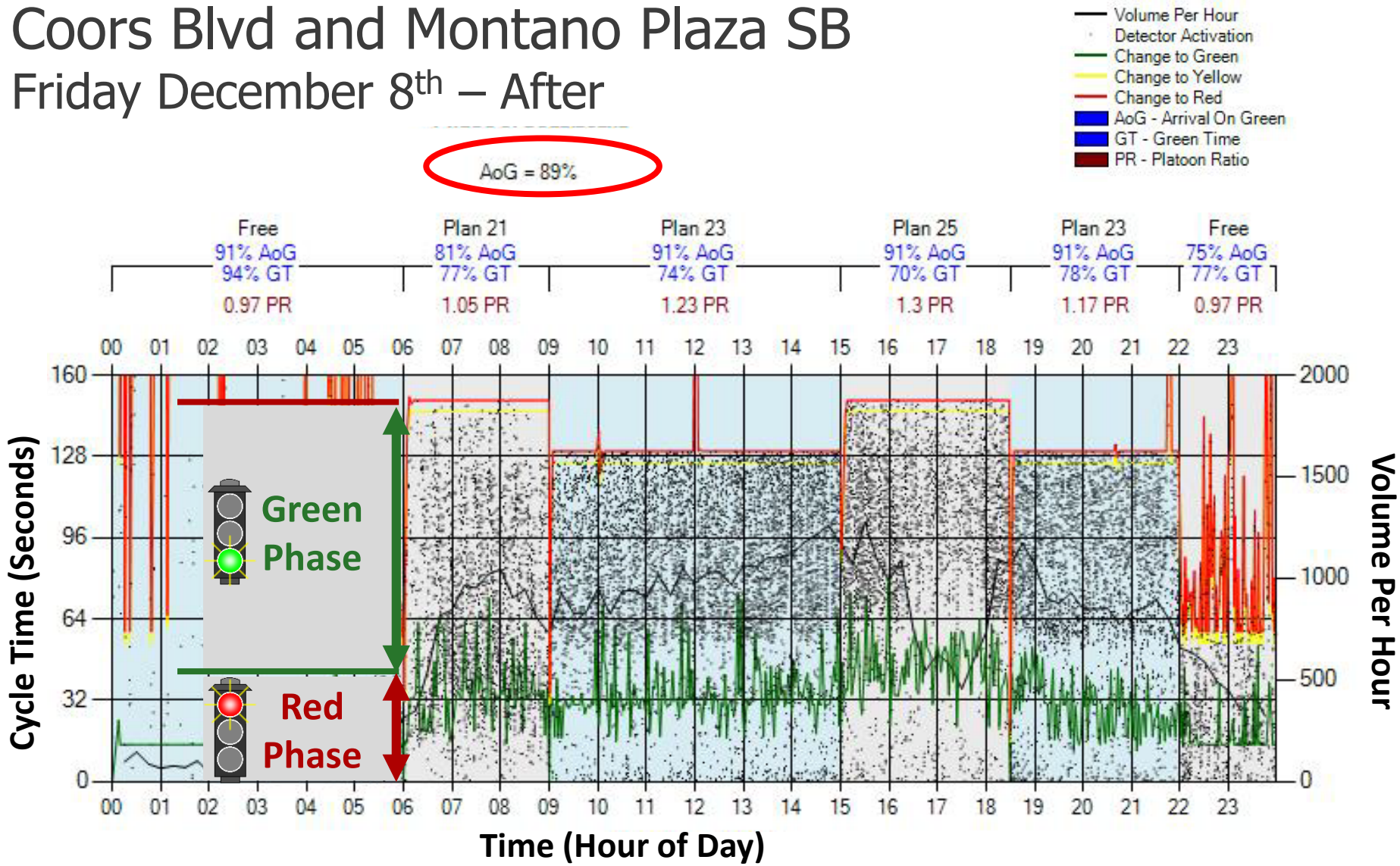
ATSPM Metrics - Coordination

Coors Blvd and Montano Plaza SB

Friday December 8th – After



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Average Delay per Vehicle Analysis

Scenario		Before (October 2017)		After (February 2018)		Summary	
		Average Volume per day During Peak Hours (veh)	Average Delay per Vehicle During Peak Hours (sec/veh)	Average Volume per day During Peak Hours (veh)	Average Delay per Vehicle During Peak Hours (sec/veh)	Change in Average Volume per Day During Peak Hours	Change in Average Delay per Vehicle During Peak Hours
Total		7,973	22	10,076	15	26%	-31%
AM	NB	794	12	986	9	24%	-31%
	SB	733	9	938	6	28%	-33%
MD	NB	1,515	10	1,941	7	28%	-33%
	SB	1,464	8	1,902	6	30%	-31%
PM	NB	1,850	15	2,252	9	22%	-43%
	SB	1,617	10	2,057	9	27%	-11%

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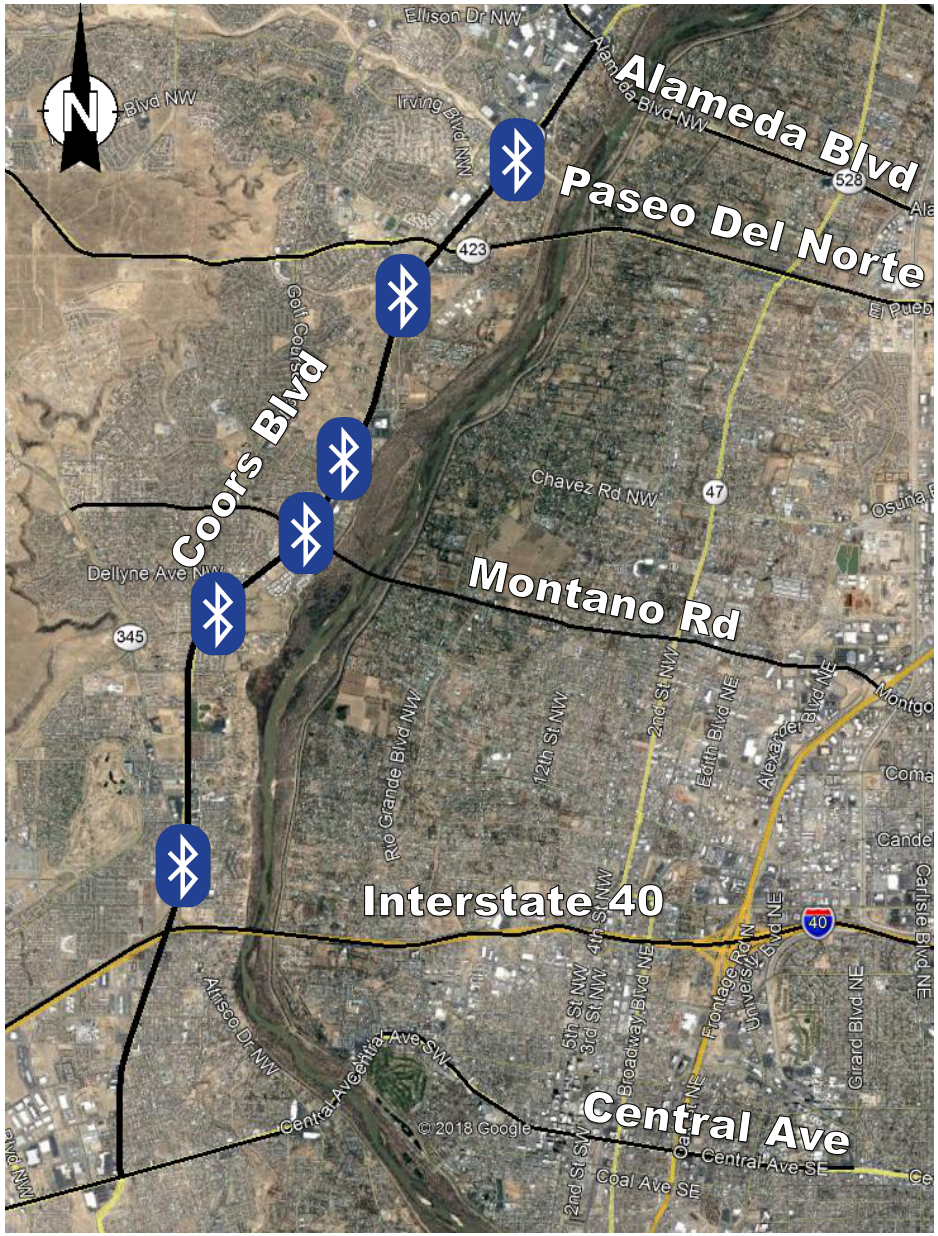
Travel Time Analysis

- 6 Bluetooth Readers
- 5.5 Mile Segment
- 13 Signals
- 18,900 vpd During Coordinated Hours
- Before: October 2017
- After: April 2018



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Travel Time Analysis

Peak Period	Direction	Average TT Before (min/veh vehicle)	Average TT After (min/veh vehicle)	Net Average TT Change Per User
AM Peak 7:30 AM - 8:30 AM	NB	0:09:43	0:09:43	0:00:00
	SB	0:10:19	0:09:26	-0:00:53
MD Peak 11:00 AM - 1:00 PM	NB	0:09:37	0:09:41	0:00:04
	SB	0:10:21	0:09:27	-0:00:54
PM Peak 4:30 PM - 6:30 PM	NB	0:09:55	0:10:05	0:00:11
	SB	0:10:29	0:09:39	-0:00:50
			Net Change	-0:02:22
			Average Change	-0:00:24

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Cost Analysis

User and Non-User Benefit Analysis for Highways (AASHTO "Red Book")

Transportation Mode and Trip Purpose	Recommended Percent of Wage / Compensation (AASHTO Value)	Albuquerque Average Wages / Compensation (www.bls.gov)	Average Vehicle Occupancy (AASHTO Value)	Value of Time per Hour (wage x percentage x occupancy)
Auto Drive Alone / Commute	50%	$22.08	1.50	$16.56

Average AWDT 2014 from MRCOG Data	49,000
Average Growth Rate 2010-2014 from MRCOG Data	7.77%
Forecasted 2017 AWDT ($F=P(1+i)^n$)	60,000
Percent of Vehicles Traveling between Quail Rd and Irving Blvd from Bluetooth Travel Time Readers	35%
Percent of Vehicles Traveling on Coors Blvd during Coordinated Hours from ATSPM Volume Metric	90%
Calculated Volume for Bluetooth Travel Time Analysis (=2017 AWDT x Volume During Coordination on Segment)	18,900

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Cost Analysis (Continued)

Average Travel Time Saved (seconds)	0:00:24
Vehicles During Coordinated Hours (AWDT)	18,900
Total Travel Time Saved per Day During Coordinated Hours (Hours)	126
Total Cost Savings Per Day During Coordinated Hours	$2,087
Total Cost Savings Per Year During Coordinated Hours Irving to Quail	$751,170
Total Cost Savings Per Signal Per Year (Coors Blvd)	$57,782
Total Cost Savings for 23 Signals on Coors Blvd Per Year	$1,328,986

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Weekend Coordination Plan

- Operates PM Timing Plan on the Weekends
- Link Pivot Analysis for Saturdays in January 2018
- Quail to Coors Bypass

Upstream Arrivals on Green			Downstream Arrivals on Green			Total Link Arrivals on Green		
Existing	Predicted	Actual	Existing	Predicted	Actual	Existing	Predicted	Actual
10,613	11,244	12,048	11,518	11,479	11,652	22,131	22,723	23,700
71%	75%	77%	71%	71%	71%	71%	73%	74%

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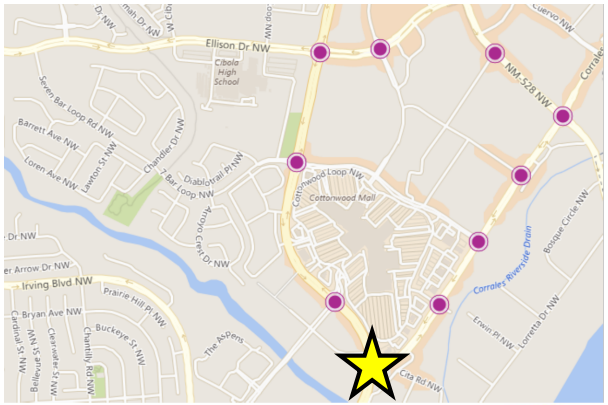
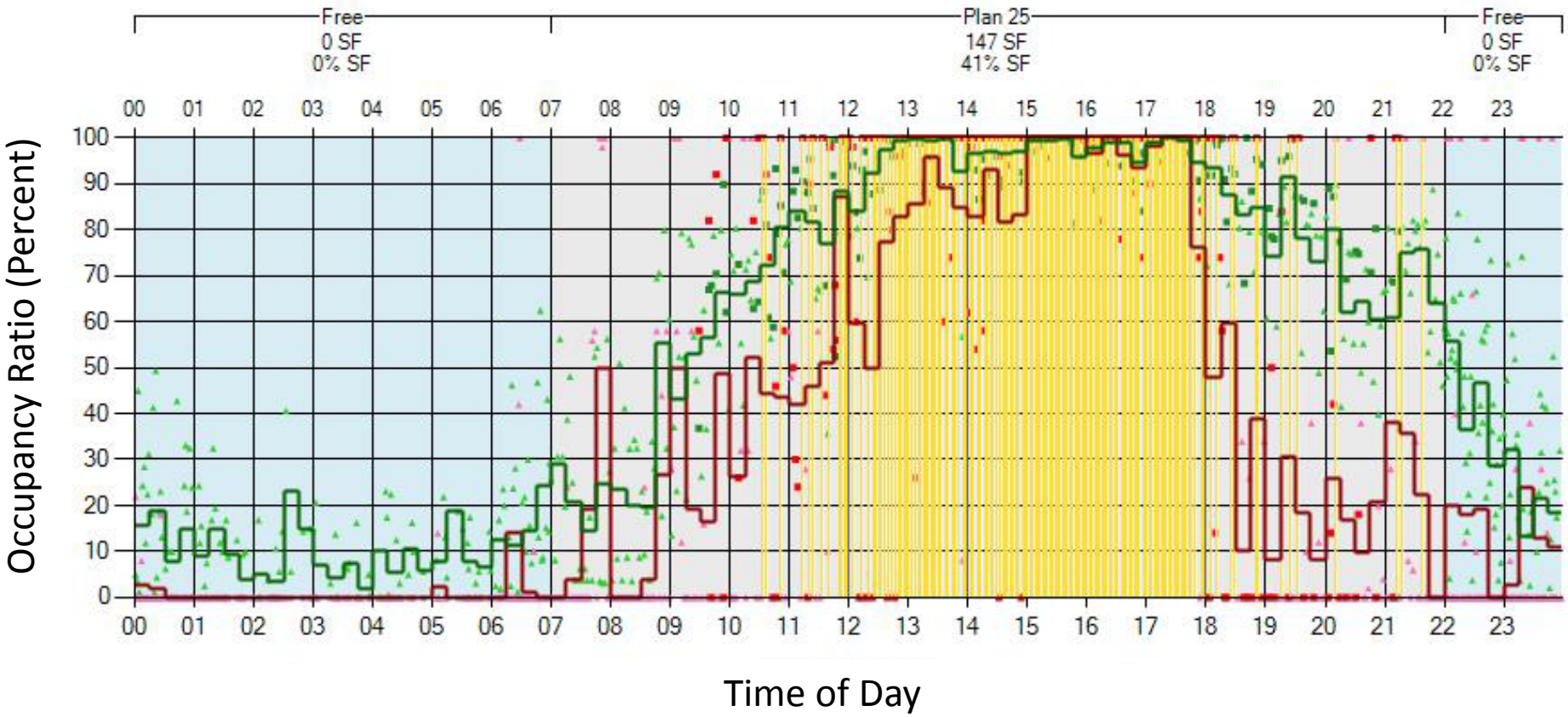
Coors Blvd and Coors Bypass
Saturday December 9th - Before



Protected Phase 8: Westbound Left

Total Split Failures = 147



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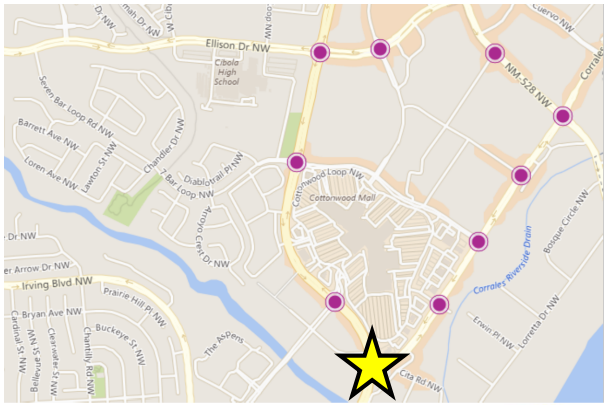
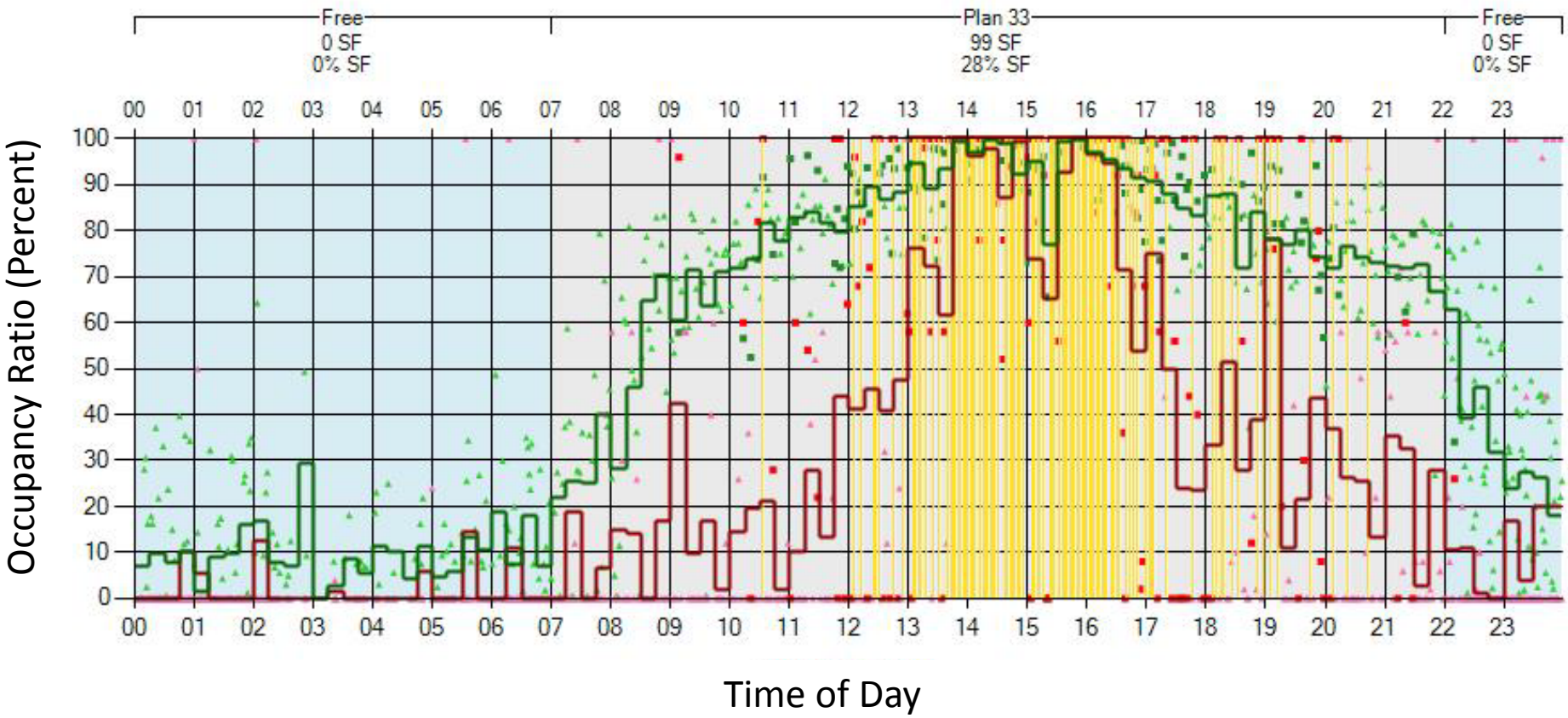
Coors Blvd and Coors Bypass
Saturday December 23rd - After



Protected Phase 8: Westbound Left

Total Split Failures = 99



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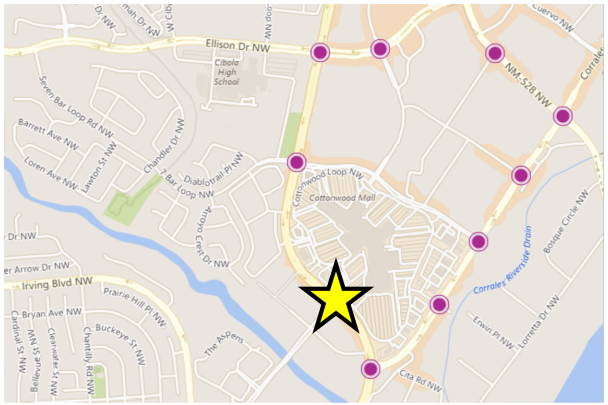
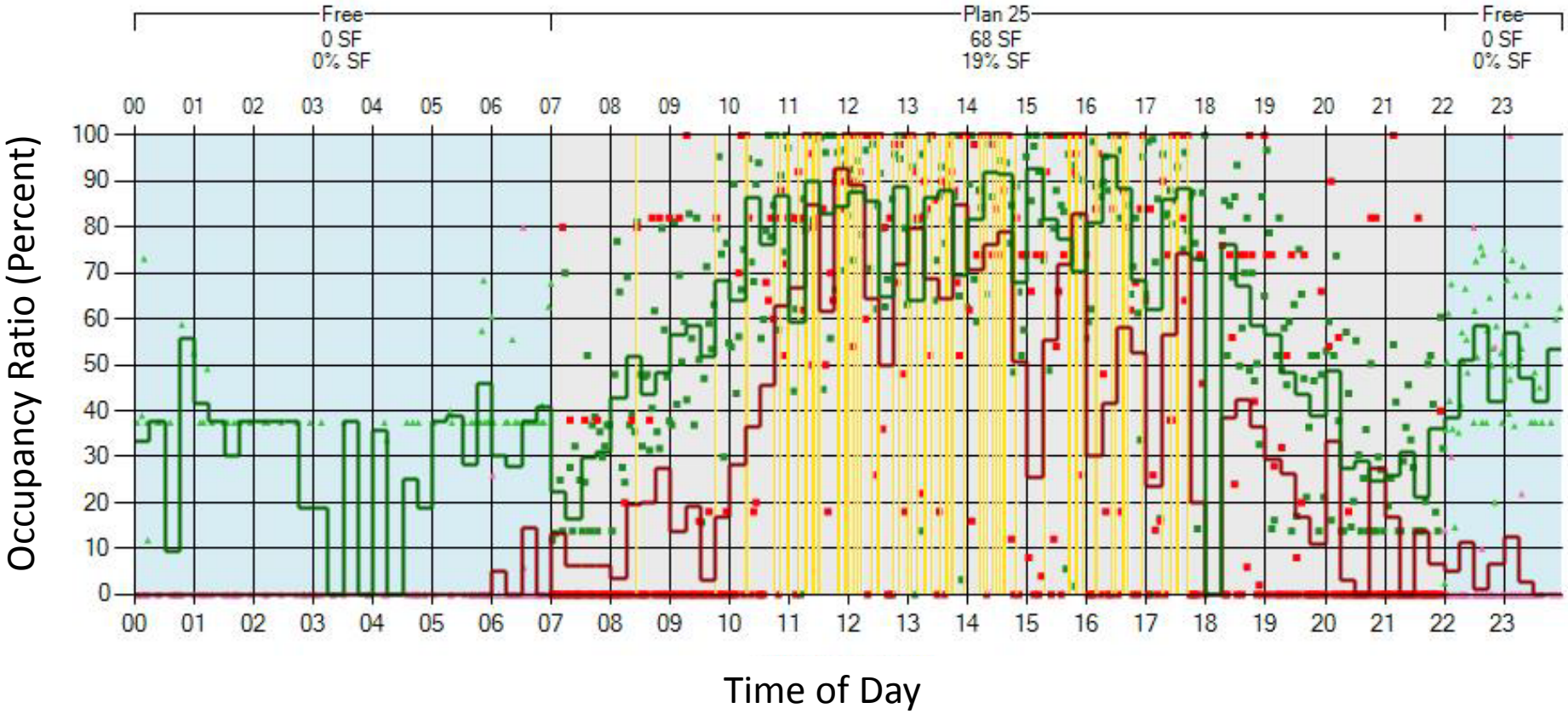
Coors Bypass and Eagle Ranch
Saturday December 9th - Before



Protected Phase 7: Northeast Left

Total Split Failures = 68



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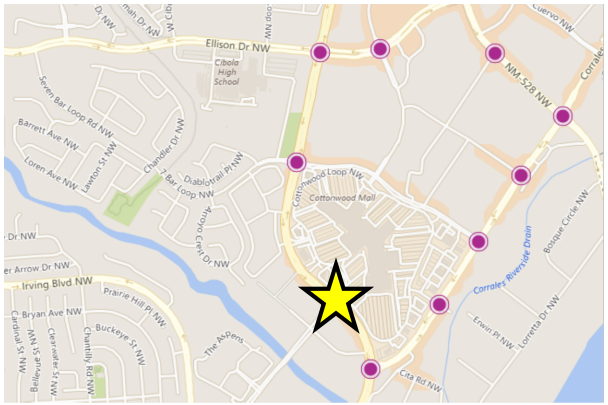
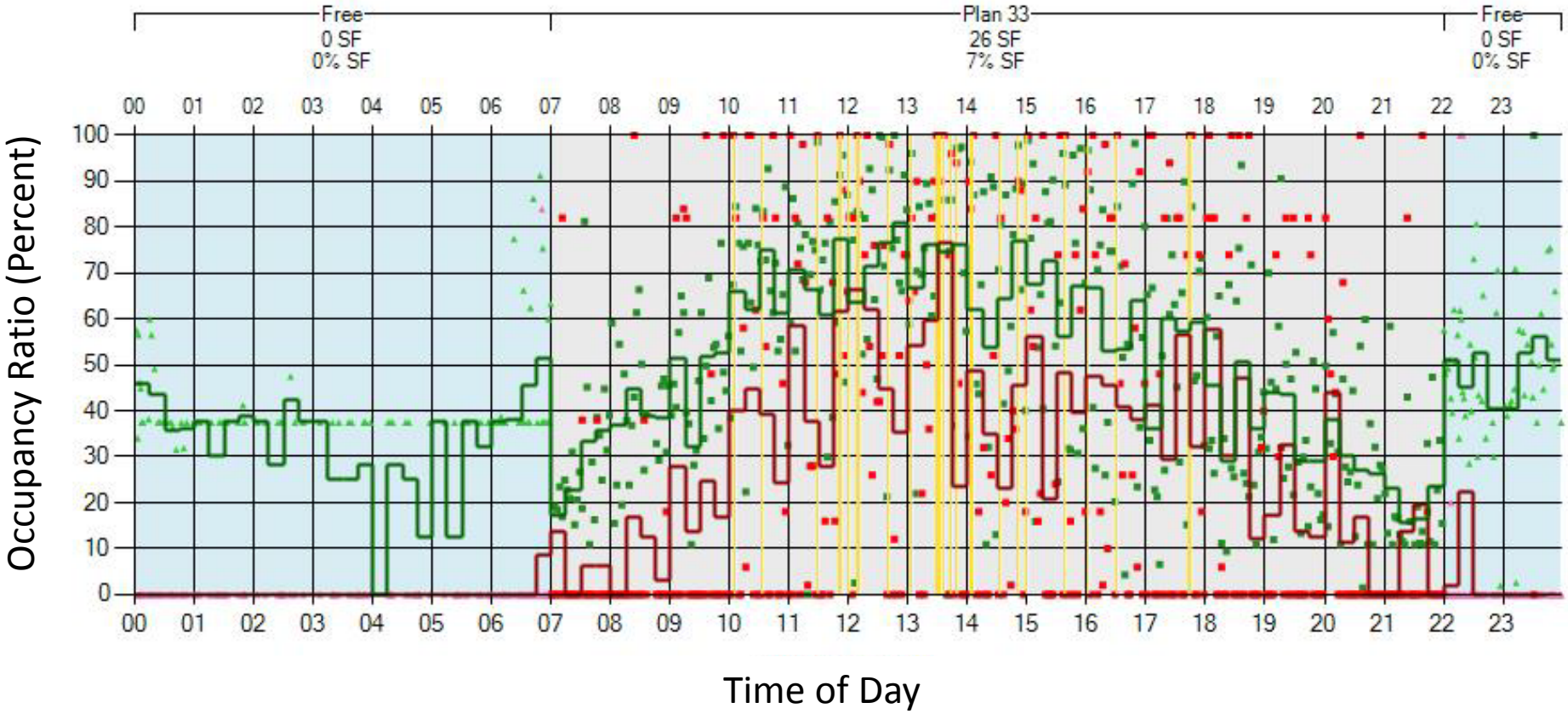
Coors Bypass and Eagle Ranch
Saturday December 23rd - After



Protected Phase 7: Northeast Left

Total Split Failures = 26



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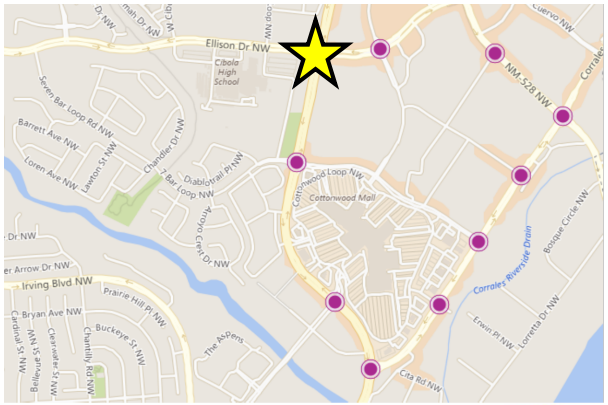
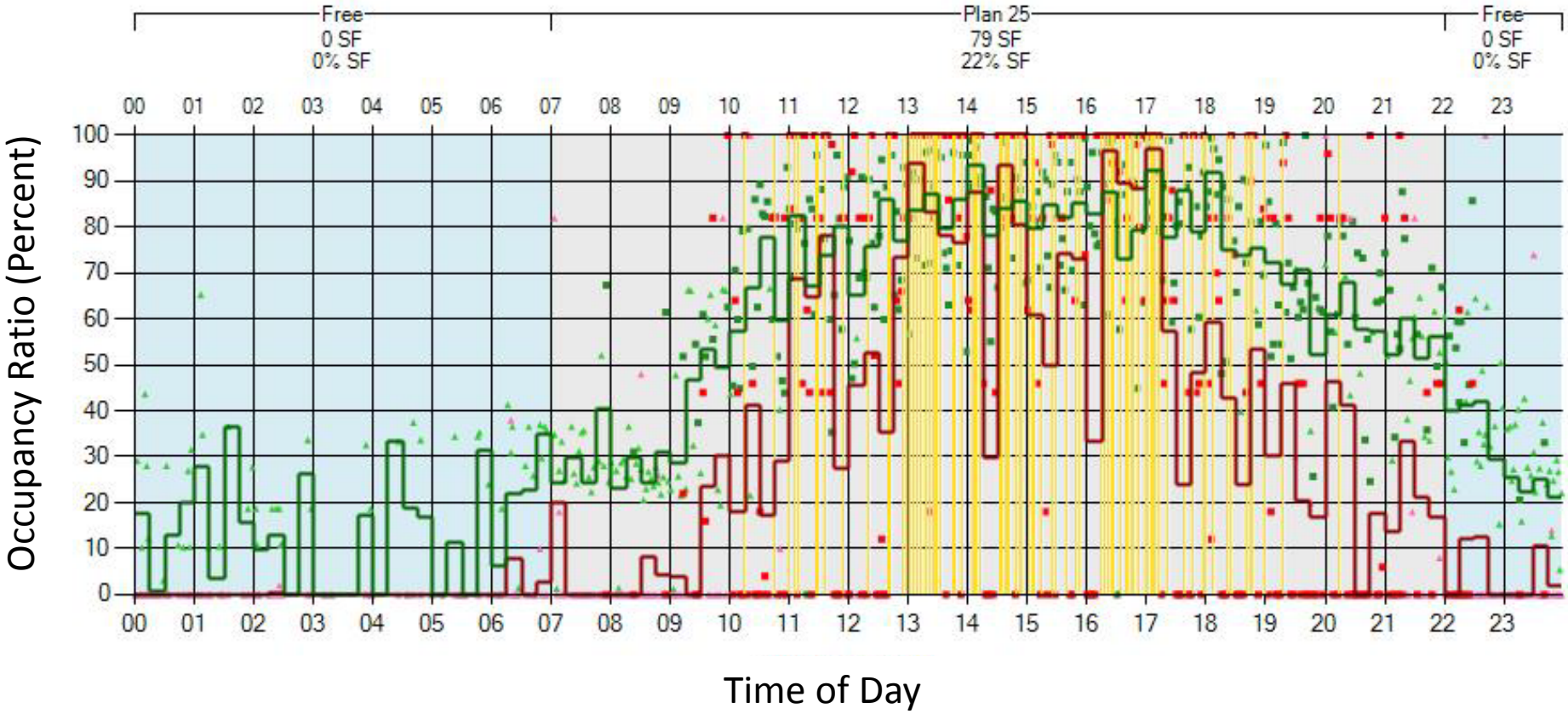
Coors Bypass and Ellison Dr
Saturday December 9th - Before



Protected Phase 1: Westbound Left

Total Split Failures = 79



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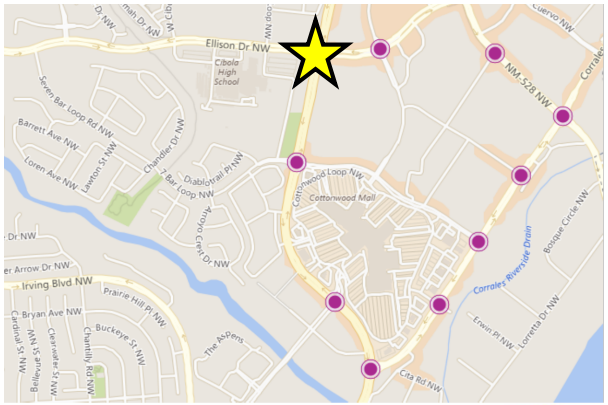
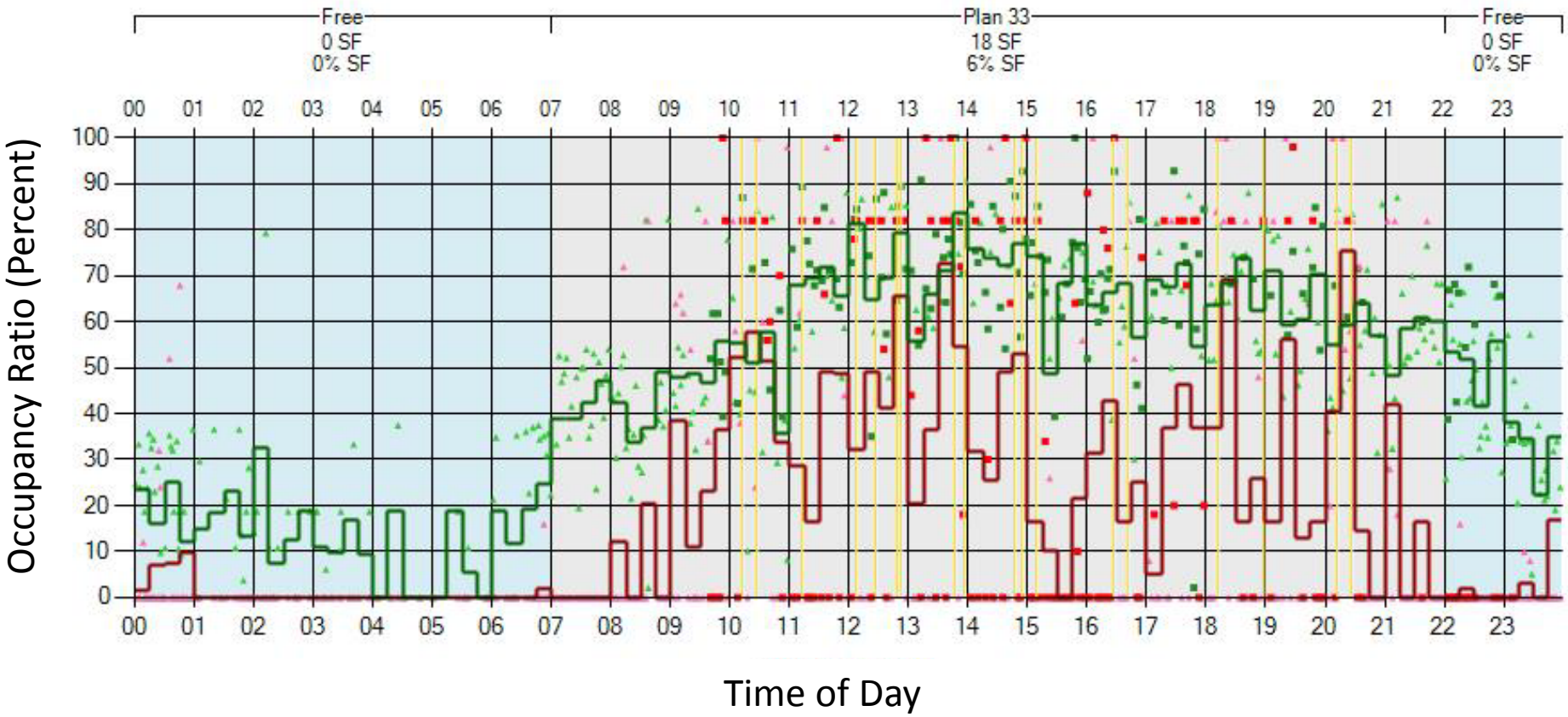
Coors Bypass and Ellison Dr
Saturday December 23rd - After



Protected Phase 1: Westbound Left

Total Split Failures = 18



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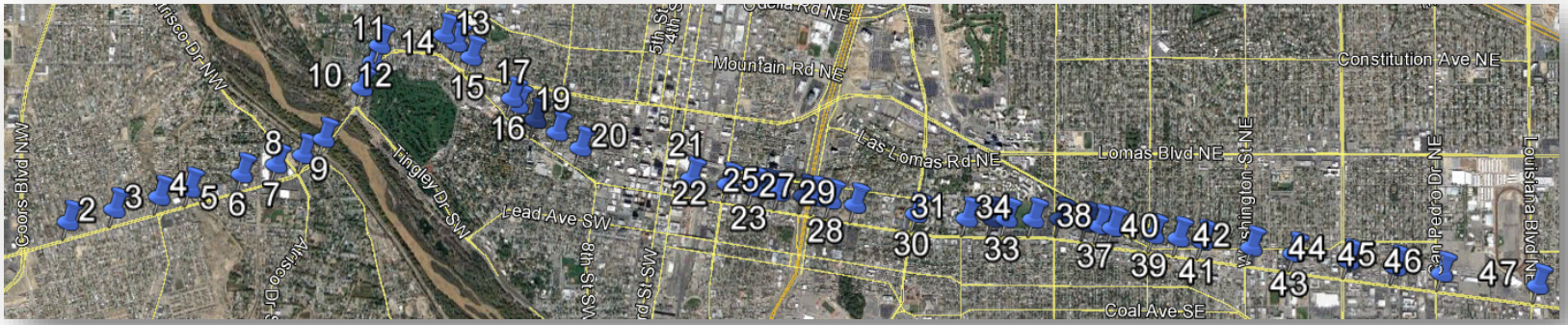
ART ATSPM

- Build upon the ART System Upgrades
- Installation of Advanced Radar Detection
- Complimentary to Transit Signal Priority (TSP)
  - Provide **additional data** to implementation designers
  - Active ATSPMs management
  - Develop TSP ATSPM statistics



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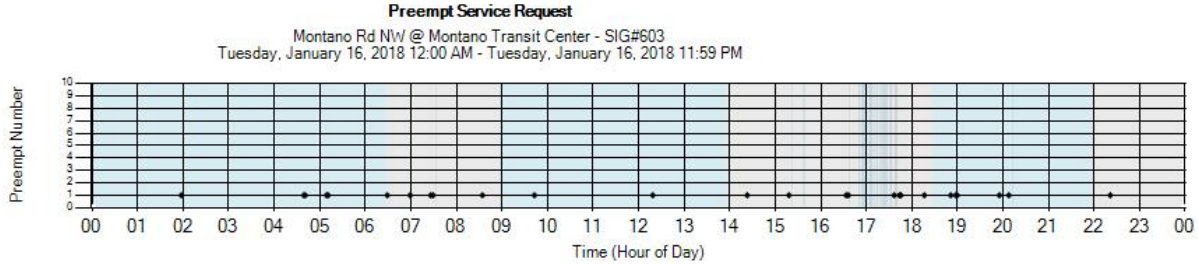
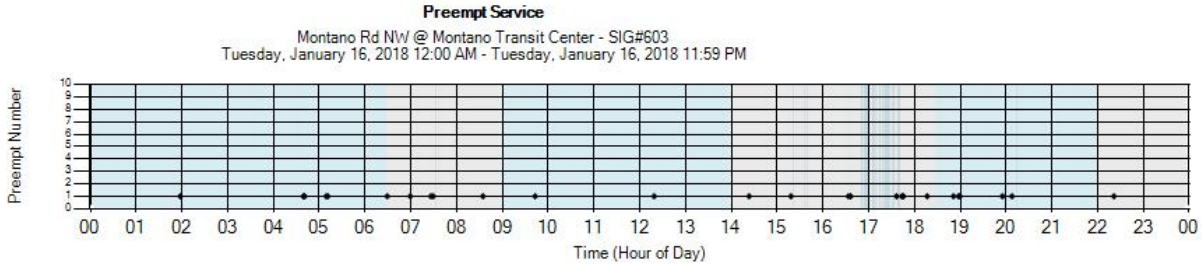
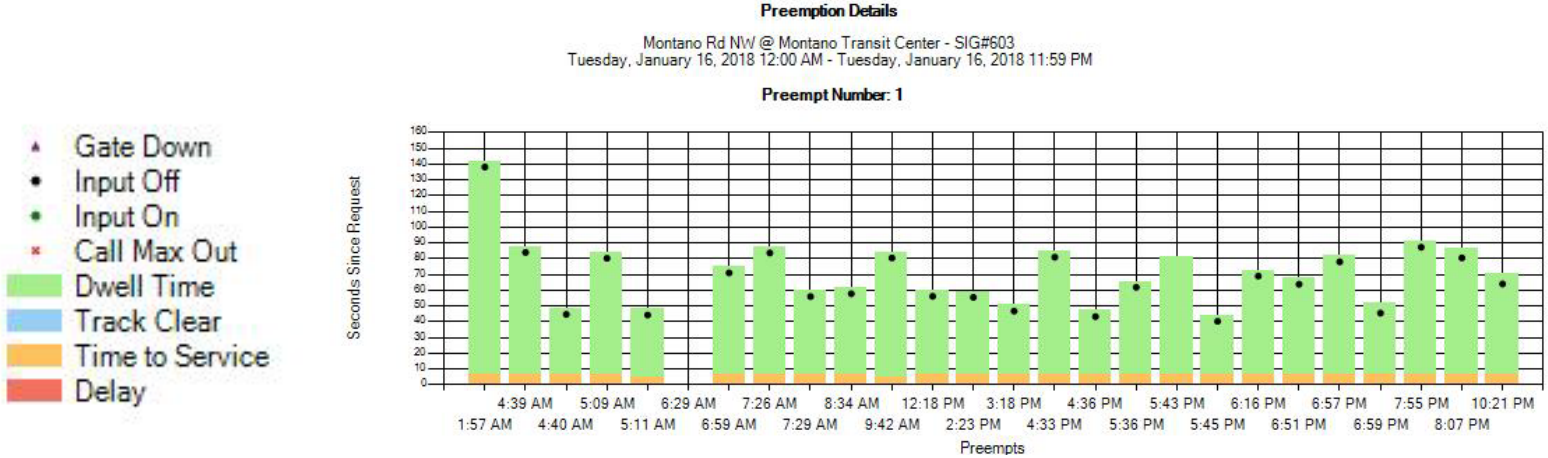
ART ATSPM Metrics

- Preempt Request



- Preempt Service





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TSP Metrics – Data Logger

Event Code	Event Description	Parameter	Description Parameter Description
112	TSP Check In	TSP #(1-10)	Set when request for priority is received.
113	TSP Adjustment to Early Green	TSP #(1-10)	Set when controller is adjusting active cycle to accommodate early service to TSP phases.
114	TSP Adjustment to Extend Green	TSP #(1-10)	Set when controller is adjusting active cycle to accommodate extended service to TSP phases.
115	TSP Check Out	TSP #(1-10)	Set when request for priority is retracted.

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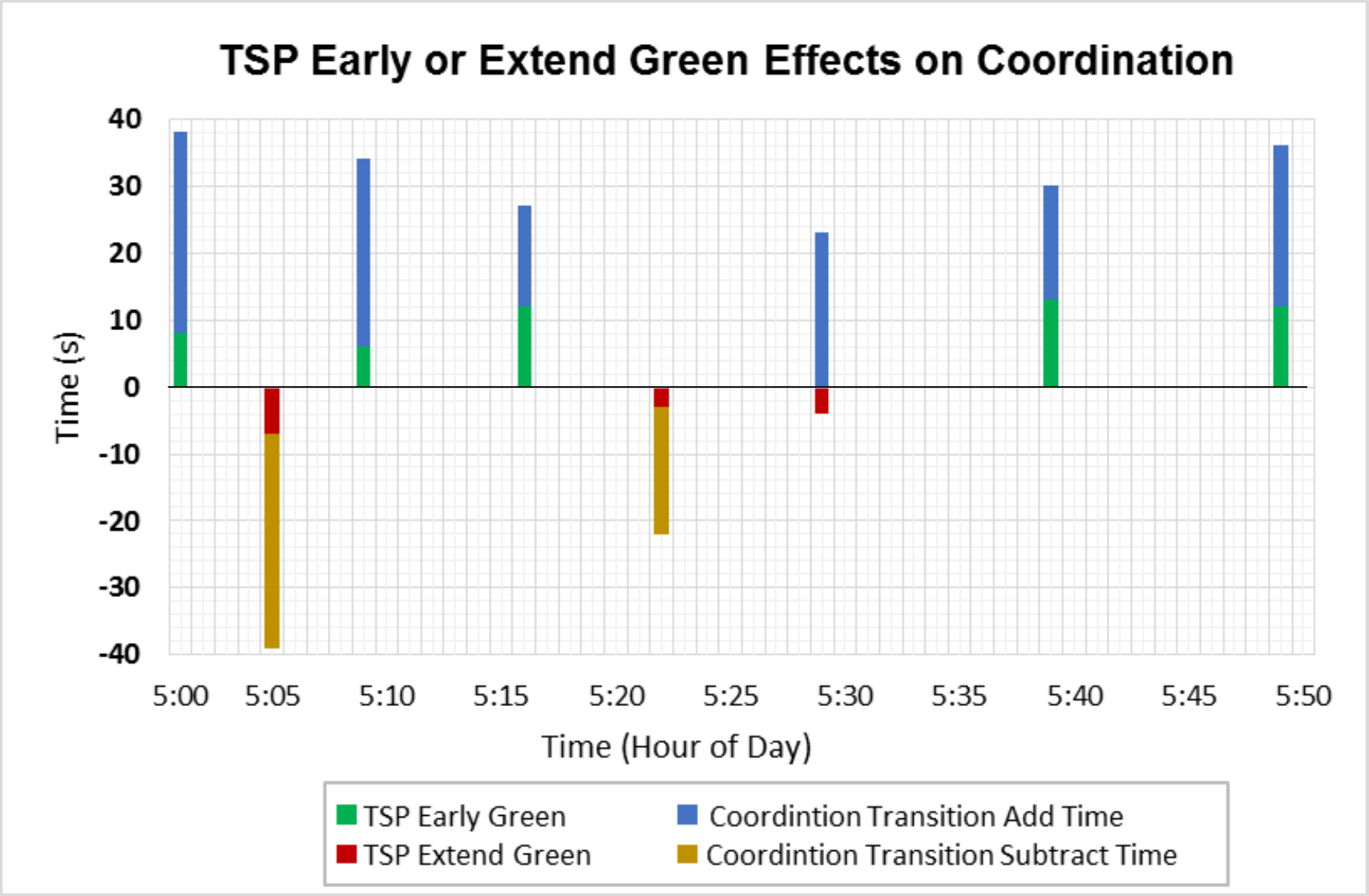
ART ATSPM Metrics - TSP



ATSPM Benefits

- Increased Safety
  - Proactive operations and maintenance practices
- Targeted Maintenance
  - Provide actionable information, significant agency cost savings
- Improved Operations
  - Active monitoring of signalized intersection performance

ATSPMs provide affordable and sustainable system improvements by leveraging existing resources more effectively

Thank you!

Chris Sobie, EI

csobie@lee-eng.com

Special Thanks to
Mark Taylor & UDOT
marktaylor@Utah.gov

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