2022 ITS Washington Annual Conference

Trajectory Based Signal Performance Measures: What are they? And how can they help agencies improve performance and reduce emissions?

Gary Carlin, PE, PTP, Dir. Business Development

INRIX

Our Mission: Enabling Intelligent Mobility

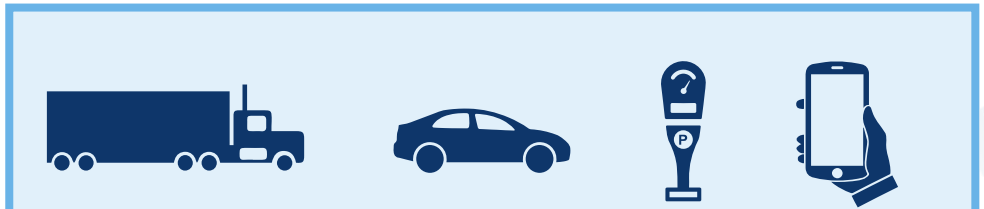
Providing Mission Critical Software for Mobility Intelligence

Mobility-Intelligence Platform

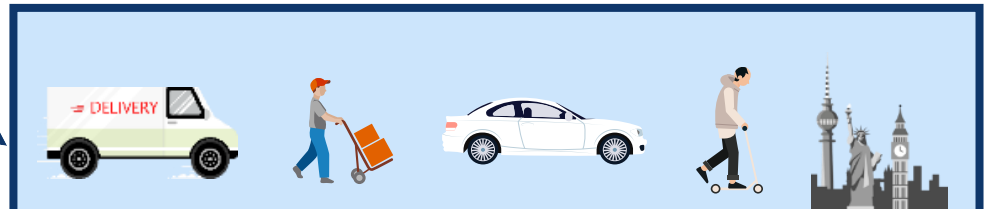
15+ Yrs. Of Proprietary Historical Data	**130M+** Daily API Calls	**470+** Data API's	**36 PBs** Data in INRIX Data Lake
300M+ Vehicles & Devices	**2T+** Kilometers of Vehicle Trip Data	**23M+** Data Points Per Minute	**33B+** Data Points Per Day

Software-As-A-Service

12+ SaaS Analytics Applications	**145+** Service Countries	**1,000+** Active Revenue Generating Customers (1)
400+ Public Sector Customers	**250+** Patents Issued Over Past 15 Years	**400,000+** Average Monthly Interactions



Transforming location-based data...



...into mission-critical solutions

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Intelligent Mobility Starts at the Intersection

Signal timing impacts everything from urban congestion to air pollution to safety

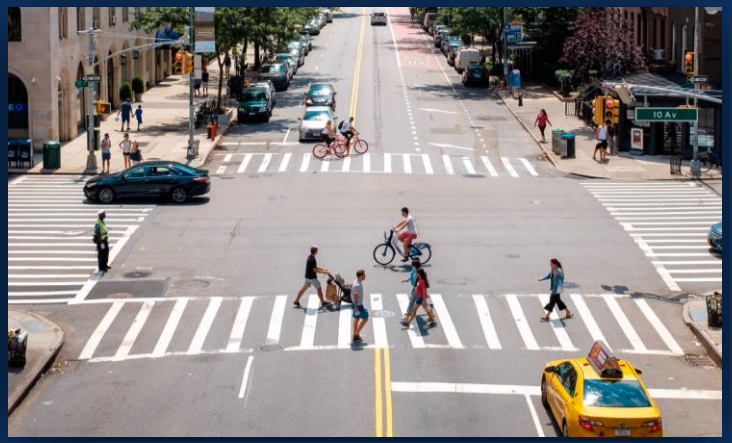
CONGESTION

10% of the travel time of an average trip is typically spent waiting at traffic signals*

POLLUTION

More than **28 Million** metric tons of CO_2 are emitted into the atmosphere each year due to signal delay*

SAFETY



About **3,300** people lose their lives each year at signalized intersections**

*Source: INRIX U.S. Signals Scorecard, April 2022 update

**Source: Federal Highway Administration, About intersection safety

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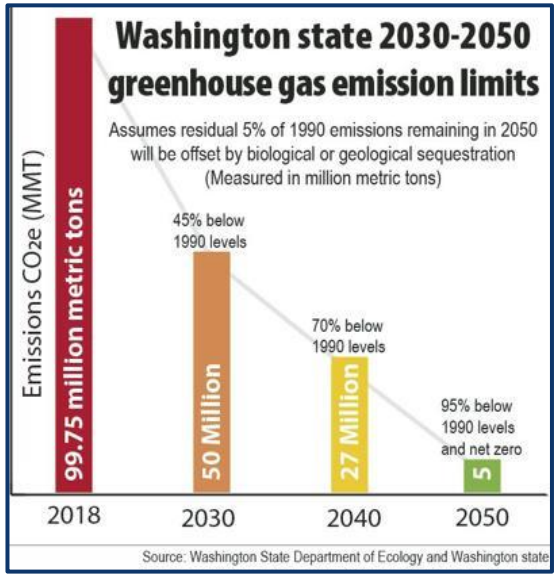
The Push for Carbon Reduction/Net Zero

How do we get there?

- Federal Carbon Reduction Program ($6.5B over 5 years; WA-$21.1M/year)
- New Fuel Sources (water, wind, solar, etc.)
- Zero Emission Vehicles…

BUT

- Can the Grid/Infrastructure Handle Expanded EV Fleet?
- Per new ATRI study:
  - "…an all-electric U.S. vehicle fleet would ***use more than 40 percent***." of country's present electricity generation
  - "…electrification of the U.S. vehicle fleet ***would require 6.3 to 34.9 years of current global production***." of battery materials.



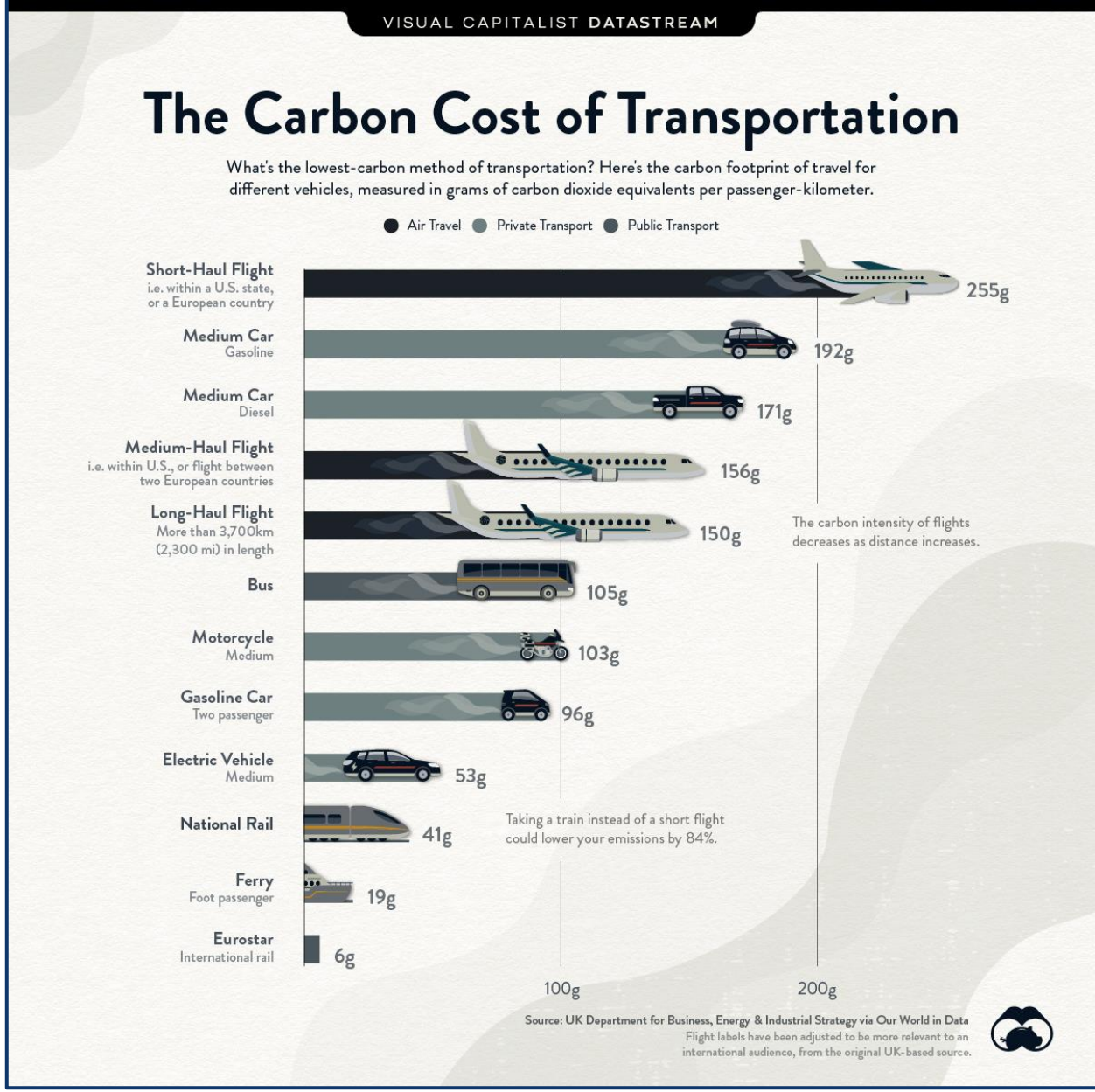
"Less than 1% of the 250 million cars, SUVs and light-duty trucks on the road in the United States are electric.", Reuters, 2/7/22

ATRI Study Link: https://truckingresearch.org/2022/12/06/charging-infrastructure-challenges-for-the-u-s-electric-vehicle-fleet/

Typical Sources of Emissions

- Greenhouse Gas Emissions by Transportation Sector
  - 40% Cars
  - 34% Trucks
  - 11% Air
  - 11% Marine
  - 4% Railways

Source:
https://transportgeography.org/contents/chapter4/transportation-and-environment/greenhouse-gas-emissions-transportation/



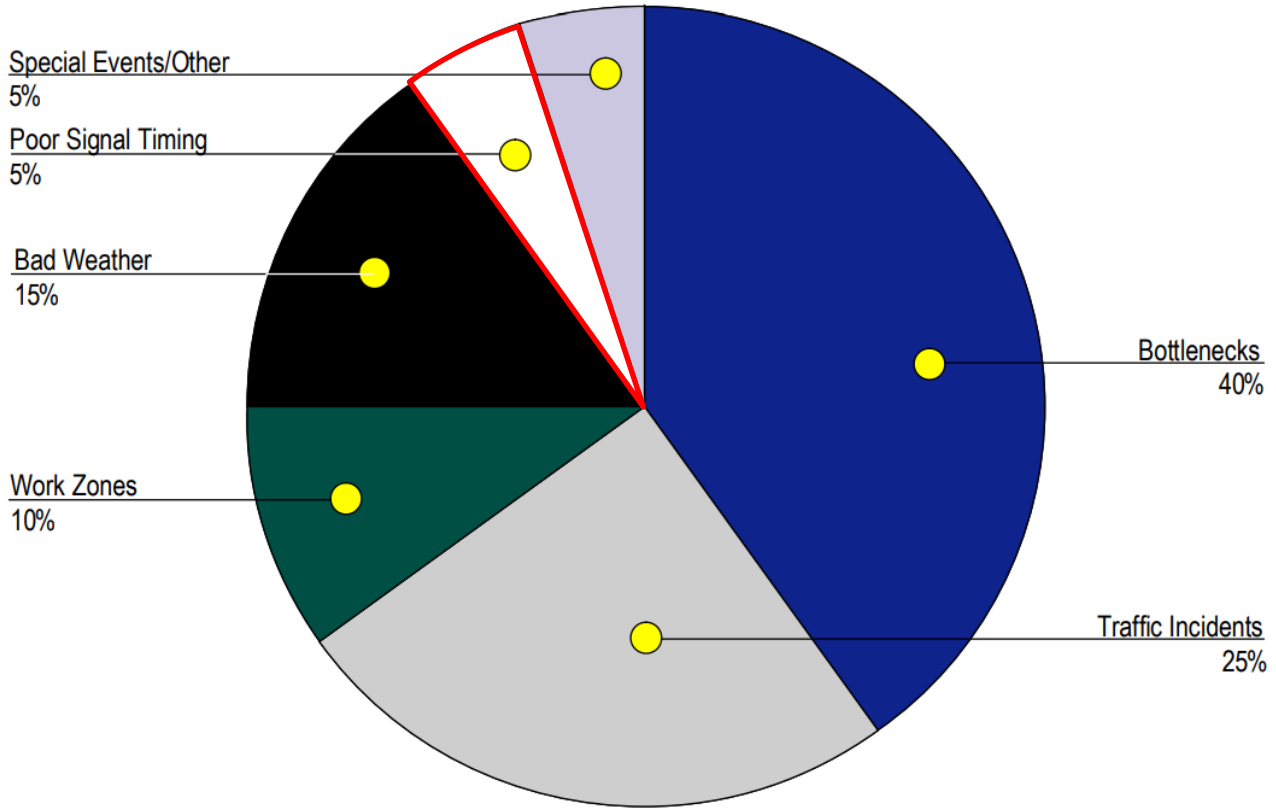
Source: https://www.visualcapitalist.com/comparing-the-carbon-footprint-of-transportation-options/

Signal Timing: How big is this opportunity?

National Contribution to Congestion (2004)

- 2004 - FHWA has produced the composite estimate of congestion by source based on modeled data

- Estimated 5% of all congestion is a result of poor signal timing

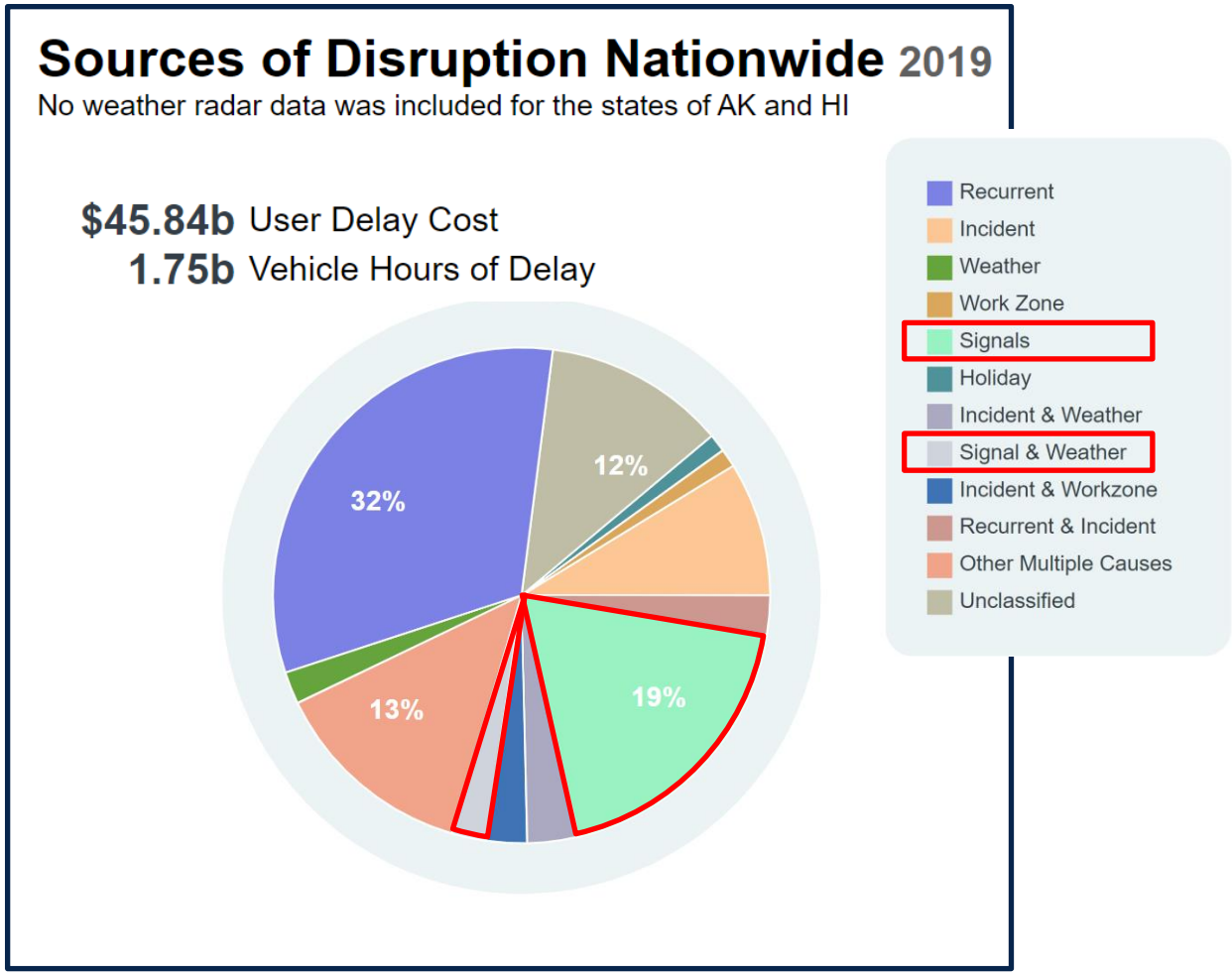


Source: https://ops.fhwa.dot.gov/congestion_report/congestion_report_05.pdf

How big is this opportunity? (Revisited)

Transportation Disruption and Disaster Statistics (TDADS)

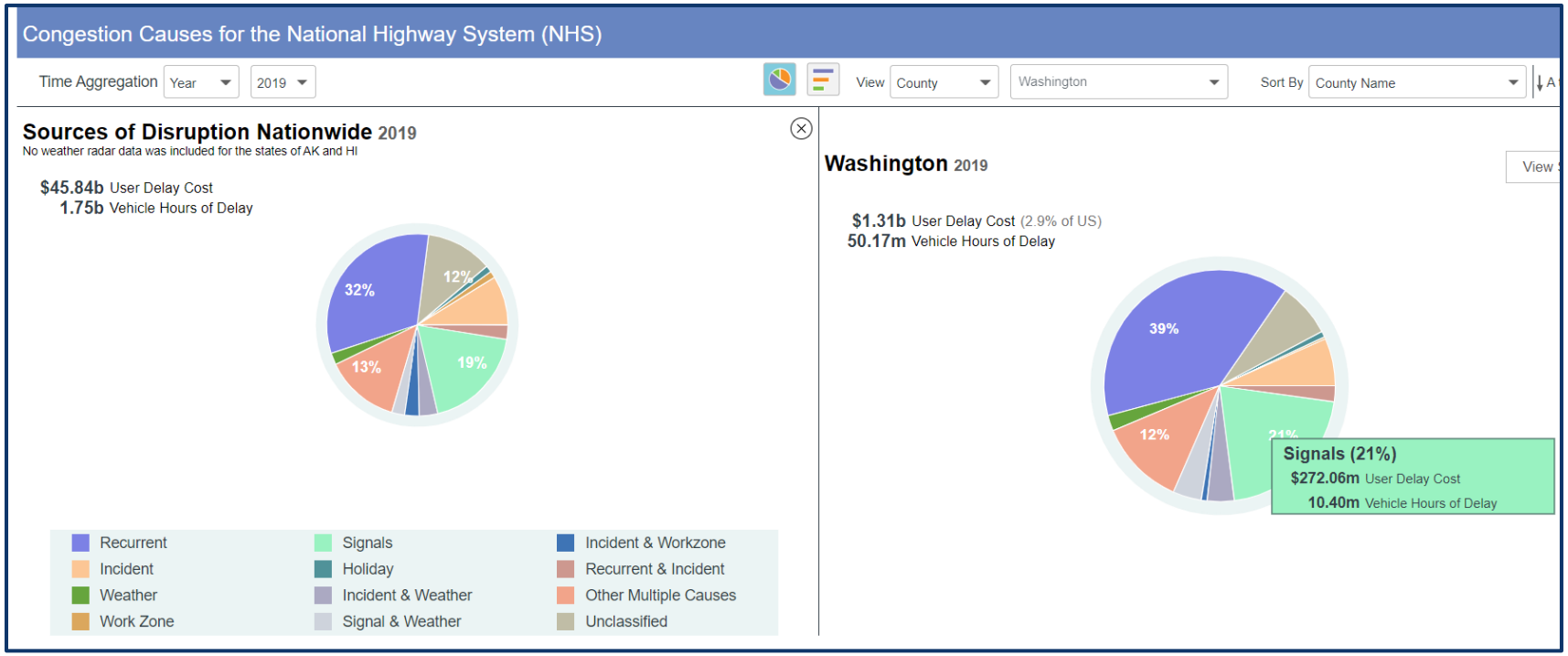
- 2019 – CATT Lab and I-95 Corridor Coalition are revisiting the Congestion Pie Chart using measured Data
- Measurements revealed the cause of congestion as a result of signalized intersections may have been understated.
- Based on National Highway System
- Potentially 350 million vehicle hours of delay due to traffic signals

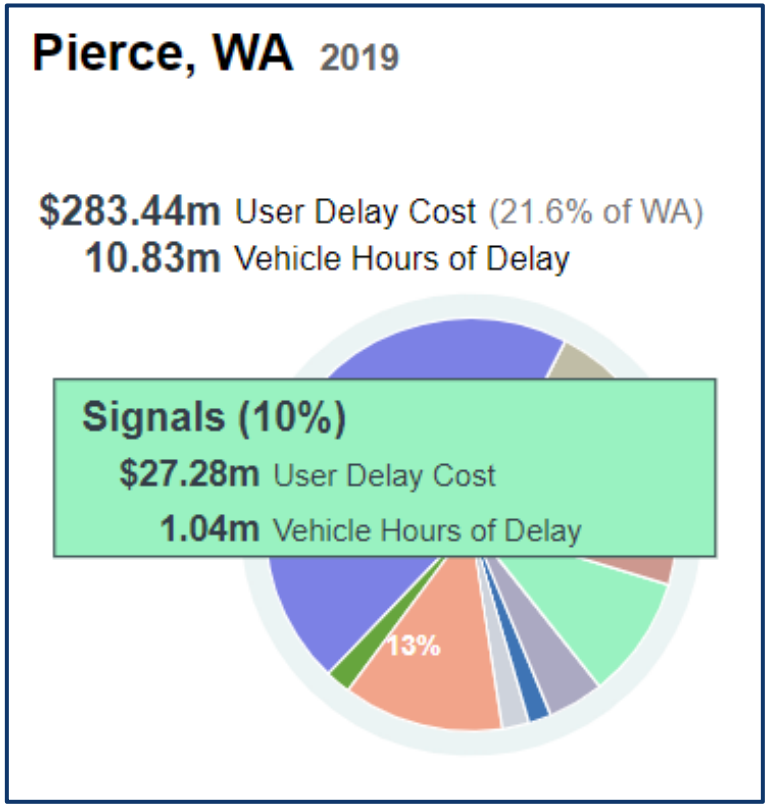


Source: CATT LAB TDAS

Pierce County, WA Example

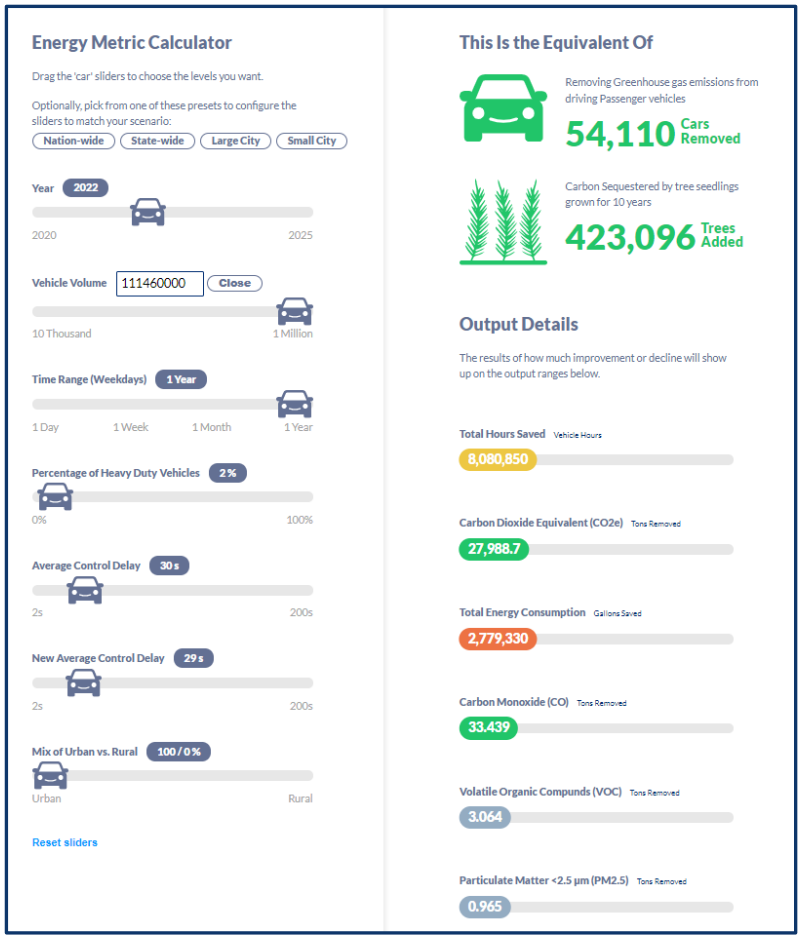
NHS Roadways Only





The Washington State Opportunity/Cost of Not Doing Anything…

Improve Signals by 1 Second



Degrade Signals by 1 Second

Net Annual Change
(between the two options)

- Hours Saved: 16M Hours
- CO^2 Saved: 56K Tons
- Gas Saved: 5.6M Barrels
- CO Saved: 66M tons

Assumptions: 5,573 signals with avg. ADT = 20,000

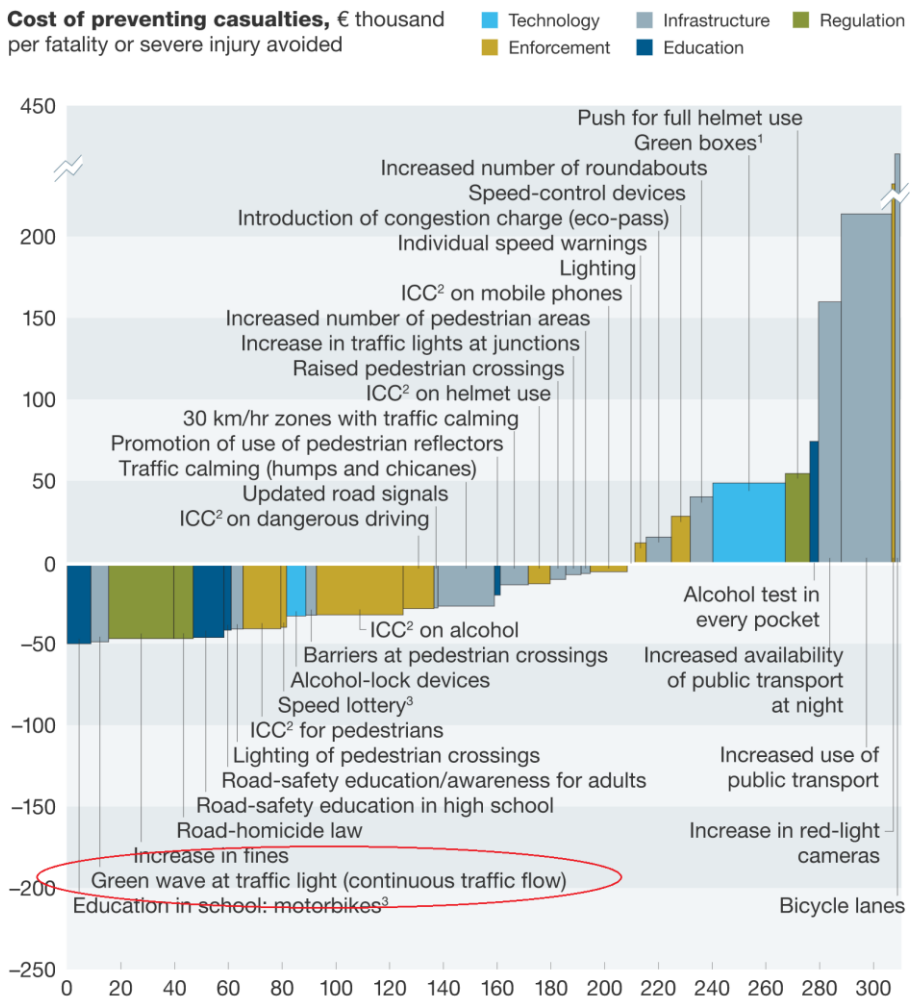
INRIX Green Calculator: https://inrix.com/green-calculator/

Traffic Signals Use Case: Benefits of Good Signal Timing

- Signal optimization is one of best ways to improve safety.
  - >10% reduction crash for front end
  - >50% reduction of rear-end
  - 18% reduction in vehicle-to-pedestrian crashes

Vehicle and pedestrian safety impacts of signal timing optimization in a dense urban street network

Arash M. Roshandeh [a], Zongzhi Li [b] ✉, Shengrui Zhang [c], Herbert S. Levinson [d], Xi Lu [b]



Slide Source: "Improving the State of Practice for all Signals" – presented at the 2022 ITS CA Annual Meeting, Eric Raamot, Chief Technology Officer, Econolite

Probe Based SPMs Advantages: Scalability & Cost Effectiveness

Validation of using Probe Data for Signal Operations

- Crowd-source data is currently at 3-8% penetration rate.
- Offset optimization possible with even <1% penetration rate
- "Detector-Free Signal Offset Optimization with Limited Connected Vehicle Market Penetration: Proof-of-Concept Study", 2016 – Day, Bullock:
  - *"The results show that over a 3-h window, successful offline optimization can be achieved with a CV* ***penetration rate as low as 1%****. Layering multiple days of data might allow offline optimization with penetration rates as low as 0.1%."*
  - *"In corridors with a high penetration rate of connected mobile devices, some private-sector probe data services may be on the cusp of providing the necessary data to facilitate detector-free optimization."*
- Crowd-source data can be normalized via existent detectors.

Not an "either or" Solution

How Long Do We Have to Collect Data to Draw a Meaningful Conclusion?

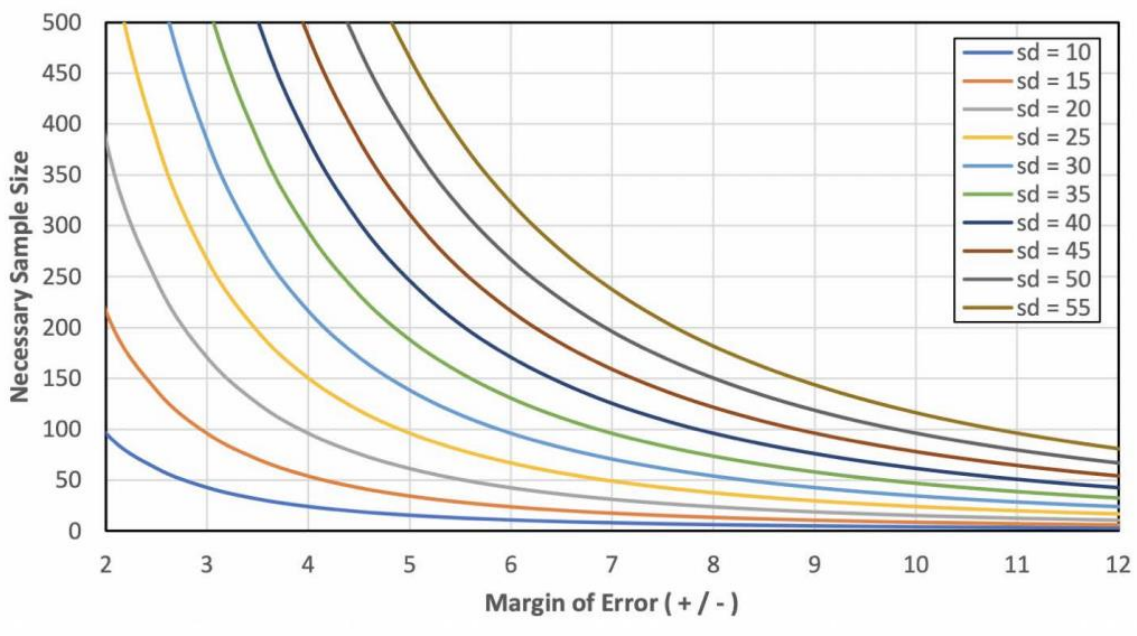


Figure 12. Sample size necessary for certain margins of error given the standard

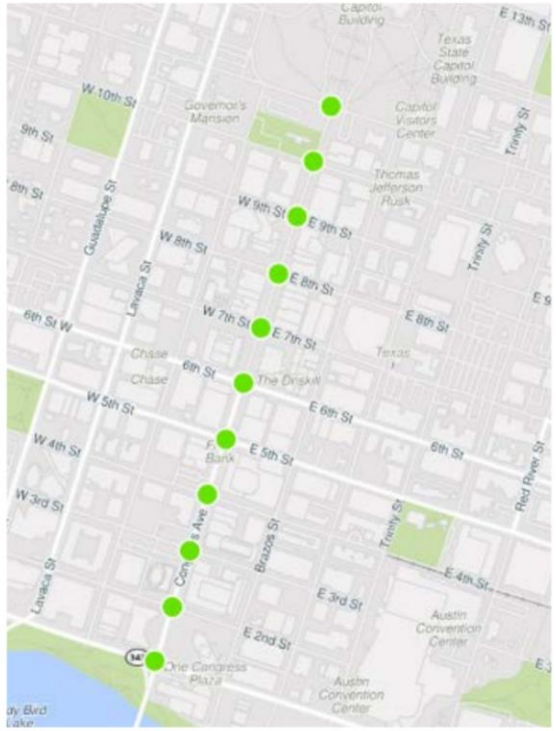


Figure 12. 11 intersections on Congress Avenue in Downtown Austin, TX

Intersection (1 day)	Westbound			Northbound			Eastbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Congress Avenue & West Cesar Chavez Street	24	44	10	10	34	10	8	68		0	48	9
Congress Avenue & West 2nd Street	0	0	0	5	40	5	0	0	0	0	56	0
Congress Avenue & East 3rd Street	0	0	0	0	37	0	0	0	0	0	54	0
Congress Avenue & East 4th Street	0	0	0	0	32	0	0	5	0	0	44	0
West 5th Street & Congress Avenue					32	6	5	58	7	0	42	
Congress Avenue & West 6th Street	13	44	5	10	30						31	0
Congress Avenue & East 7th Street					25	10	0	32	0	6	32	
Congress Avenue & West 8th Street	9	13	0	0	22						29	0
Congress Avenue & East 9th Street					22	0	0	0	0	0	25	
Congress Avenue & West 10th Street	11	8	0	0	19						14	0
West 11th Street & Congress Avenue	6	20		10		10		21	8			

Table 1. PM Peak Observed Counts on Congress Avenue (1 day – April 7, 2021)

Intersection (1 week)	Westbound			Northbound			Eastbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Congress Avenue & West Cesar Chavez Street	108	242	23	48	197	77	39	308		24	216	36
Congress Avenue & West 2nd Street	12	11	9	17	208	27	9	14	7	10	240	8
Congress Avenue & East 3rd Street	5	8	0	7	202	22	5	16	11	5	235	14
Congress Avenue & East 4th Street	13	0	8	0	189	17	10	17	14	5	210	5
West 5th Street & Congress Avenue					179	38	41	233	26	12	195	
Congress Avenue & West 6th Street	55	232	23	60	163						148	20
Congress Avenue & East 7th Street					119	64	10	153	15	34	154	
Congress Avenue & West 8th Street	54	59	8	19	105						137	6
Congress Avenue & East 9th Street					94	14	9	15	28	8	107	
Congress Avenue & West 10th Street	33	36	0	15	90						67	0
West 11th Street & Congress Avenue	30	81		35		59		78	31			

Table 2. PM Peak Observed Counts on Congress Avenue (1 week – April 5 - 9, 2021)

Intersection (1 month)	Westbound			Northbound			Eastbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Congress Avenue & West Cesar Chavez Street	457	1123	115	236	837	358	144	1392		113	840	176
Congress Avenue & West 2nd Street	57	53	56	59	910	99	38	100	49	46	929	48
Congress Avenue & East 3rd Street	14	18	10	31	885	94	33	80	43	34	934	44
Congress Avenue & East 4th Street	51	20	27	42	833	70	34	69	61	17	821	58
West 5th Street & Congress Avenue					788	146	157	1102	170	66	734	
Congress Avenue & West 6th Street	226	1079	123	287	680						574	84
Congress Avenue & East 7th Street					470	313	37	624	79	119	560	
Congress Avenue & West 8th Street	207	251	34	50	441						479	14
Congress Avenue & East 9th Street					407	57	32	79	100	40	383	
Congress Avenue & West 10th Street	142	146	9	48	394						228	7
West 11th Street & Congress Avenue	130	319		169		250		337	90			

Table 3. PM Peak Observed Counts on Congress Avenue (1 month – April 2021)

King Co., WA: 2,261 Signals, average daily crossings/intersection = 294

Opportunities for Detector-Free Signal Offset Optimization with Limited Connected Vehicle Market Penetration: A Proof-of-Concept Study

Christopher M. Day and Darcy M. Bullock

Paper No. 16-0112

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INRIX Signal Analytics Calibration with ATSPMs

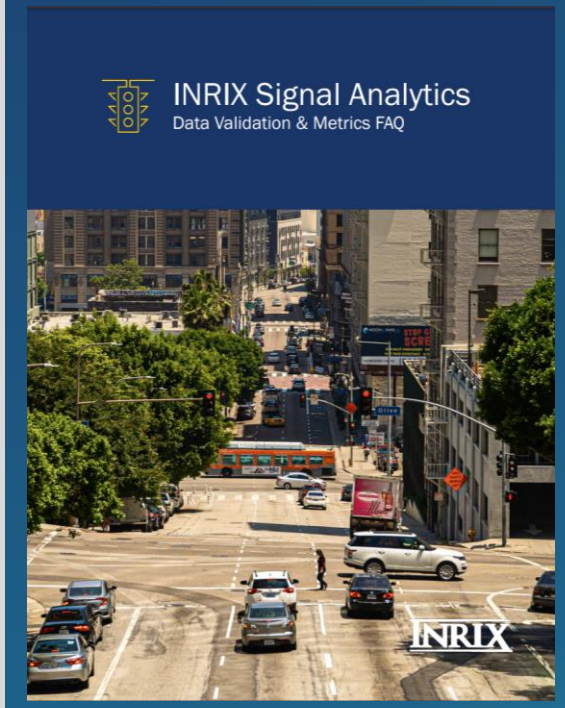
Calibration Metrics

Inbound Length

Outbound Length

Stop Speed

Stop Duration



Stop Speed Calibration

Figure 5. POG by approach and time of day with logic statements

Figure 5a. 4100 S @ 2700 W

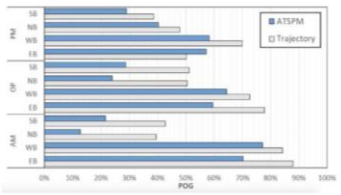


Figure 5b. Early logic

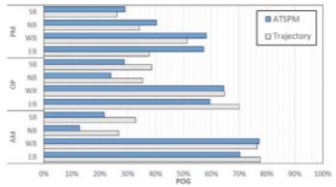


Figure 5c. Later logic

Trajectory POG vs. Controller/Sensor POG

Figure 6. POG comparison on a single approach using a PCD

Figure 6a. 3500 S @ 3200 W

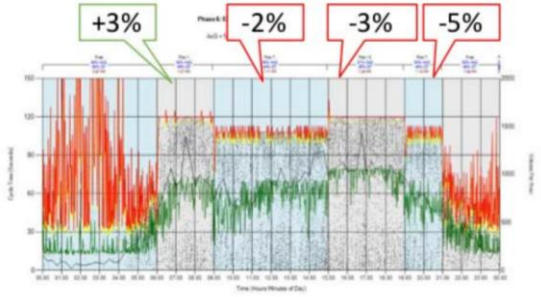


Figure 6b. Purdue Coordination Diagram

Trajectory Split Fail vs. Controller/Sensor Split Fail

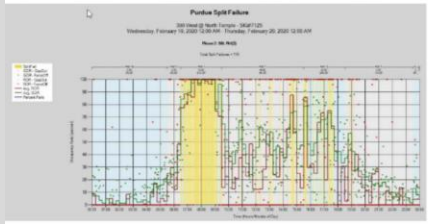


Figure 10a. Purdue split failure diagram (pre-covid)

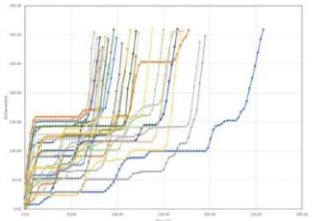


Figure 10b. Corresponding trajectory data (>1 stop)

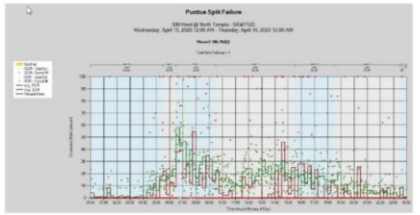


Figure 10c. Purdue split failure diagram (during-covid)

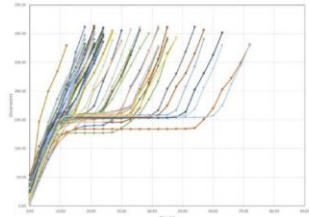


Figure 10d. Corresponding trajectory data (>0 stops)

Signal Analytics The Fundamentals

High Frequency Waypoint Data

The Data: 3 to 5 second frequency CV GPS points snapped to OSM using the INRIX trips engine

The Metrics: CV GPS points are used to determine the travel time of a vehicle moving through an intersection.
Other vehicle attributes include turning movement, vehicle stop, approach speed, or vehicle split failure
3 to 5 second frequency CV GPS points snapped to OSM using the INRIX trips engine

The Tools: Aggregate the metrics by intersection. Report summary metrics over various time periods

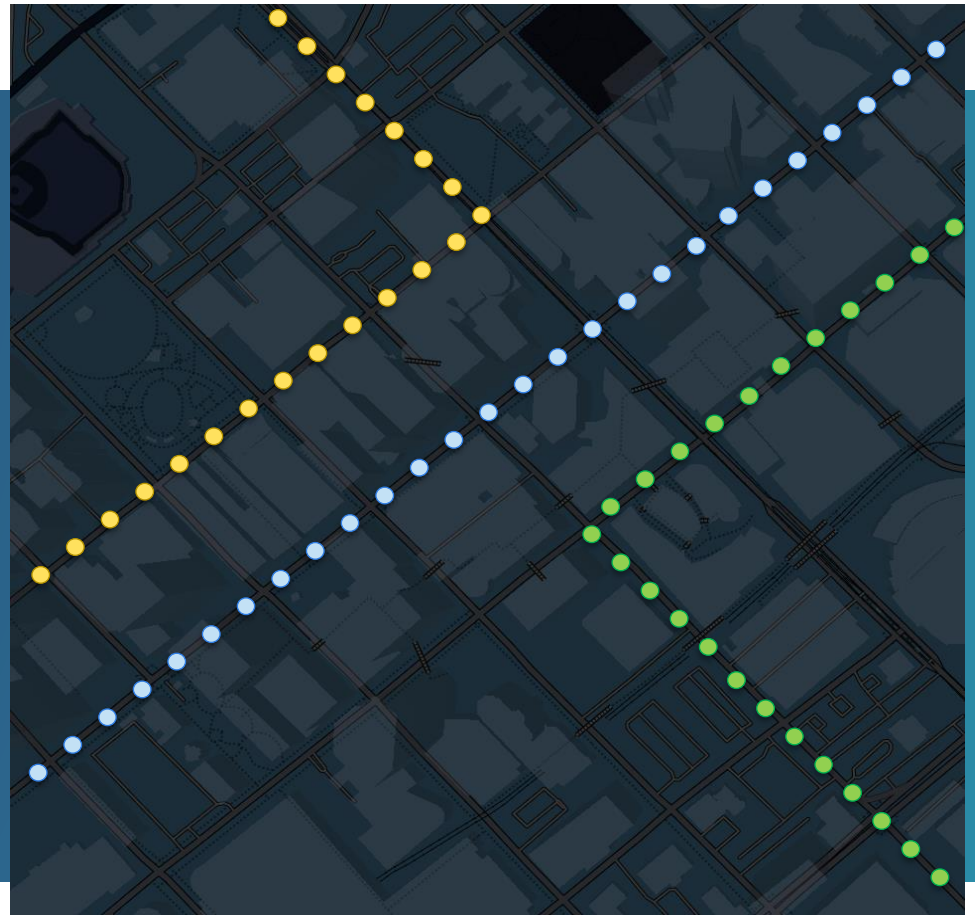
Data Directly from Vehicles

High Frequency Waypoint Data

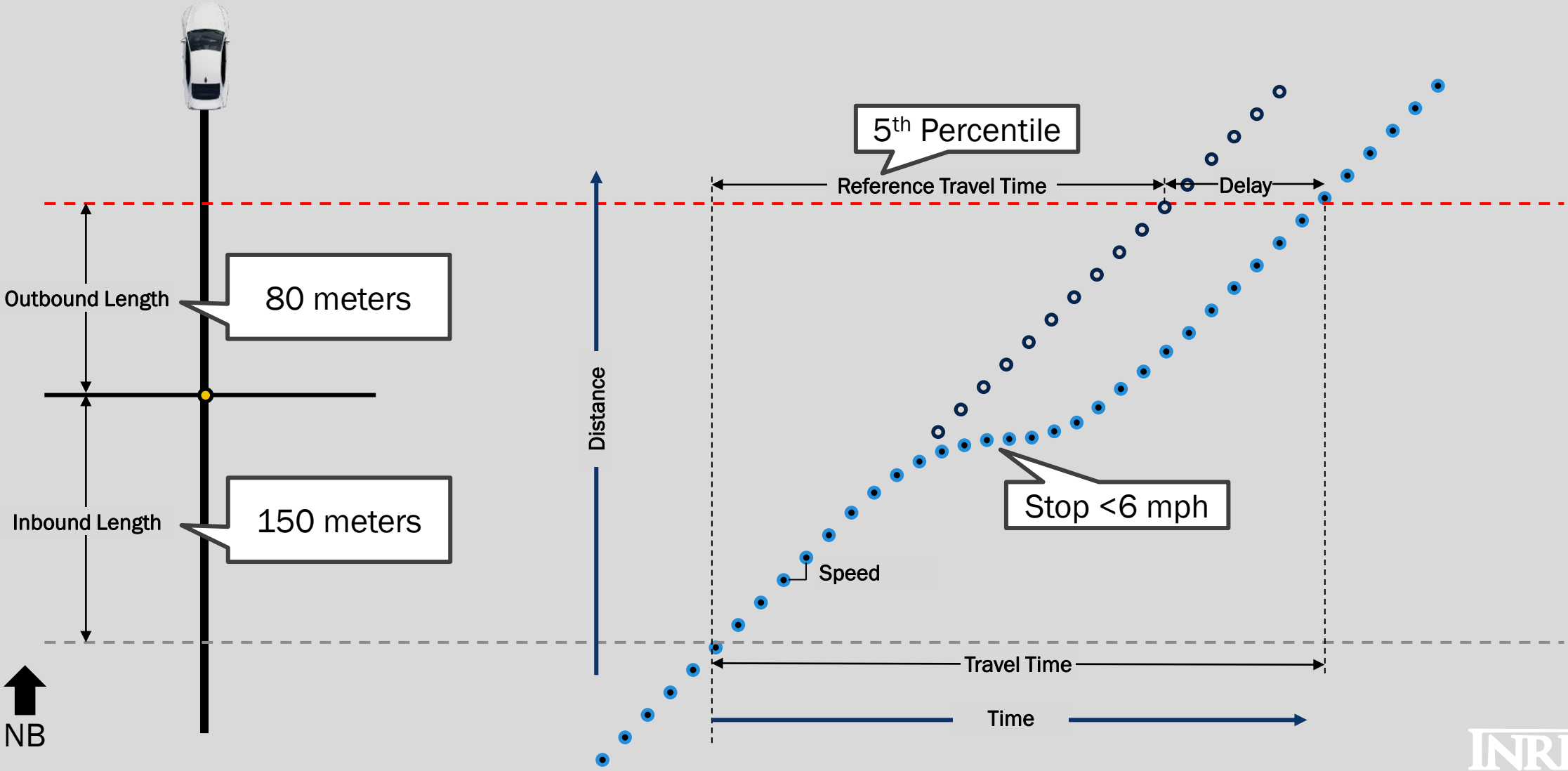
Connected Vehicle Data
Data collected from GPS devices built into the vehicle

High Frequency Waypoints
Waypoints collected every 3 to 5 seconds are used

No Infrastructure Required
No connection to detectors or the signal cabinet is required



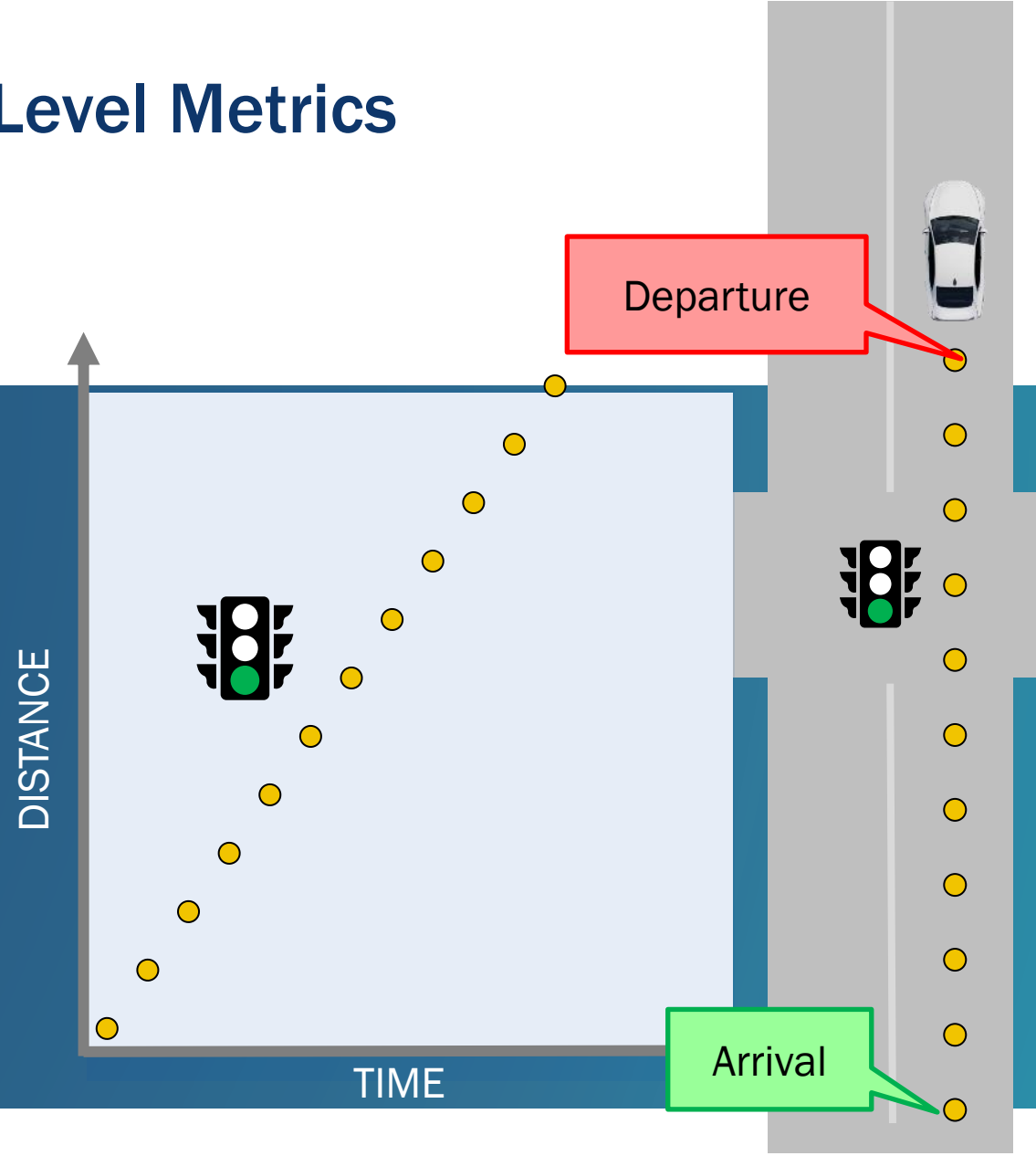
Developing the Metrics



Intersection, Approach and Movement Level Metrics

Signal Performance Metrics

- Travel Time
- Approach Speed
- Control Delay
- Level of Service
- Turn Ratios
- Vehicle Counts
- Split Failures
- Stops / AOG



Scheduled_Intersection_Performance_Reports_Austin_2021-12-03_to_2021-12-04 2021-12-03 **Time Range Display** 24 Hours **Map Display** LOS Values | Avg. Control Delay/Vehicle

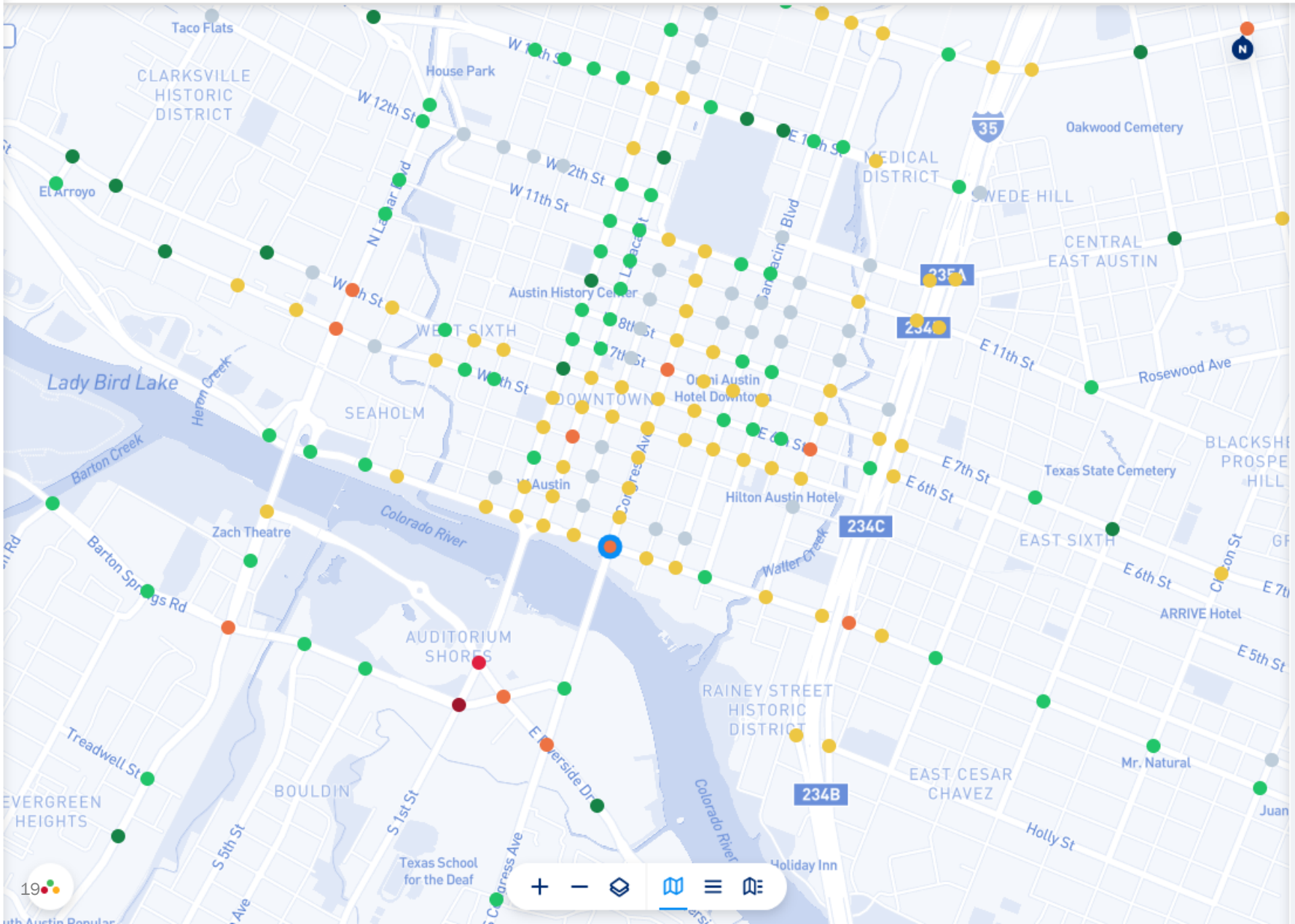
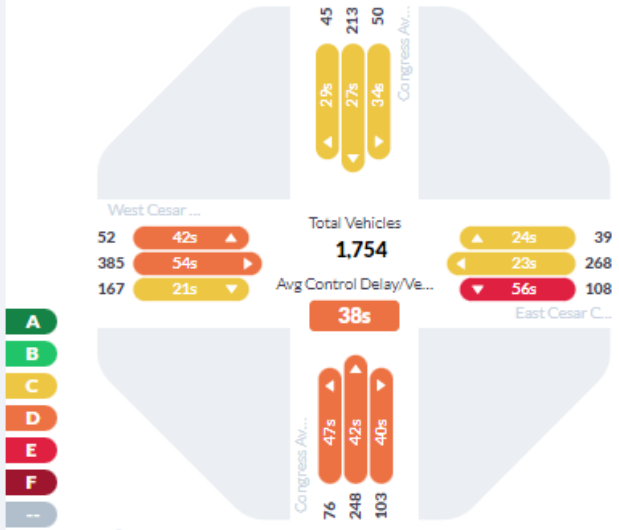


Diagram List Approaches **Movements**

Congress Avenue



A
B
C
D
E
F
--

Metric Avg Control Delay/Vehic...

○ Scaled ◉ Observed

Time Range Display 09/30/2022 24 Hours | Map Display LOS Values | Avg. Control Delay/Vehicle

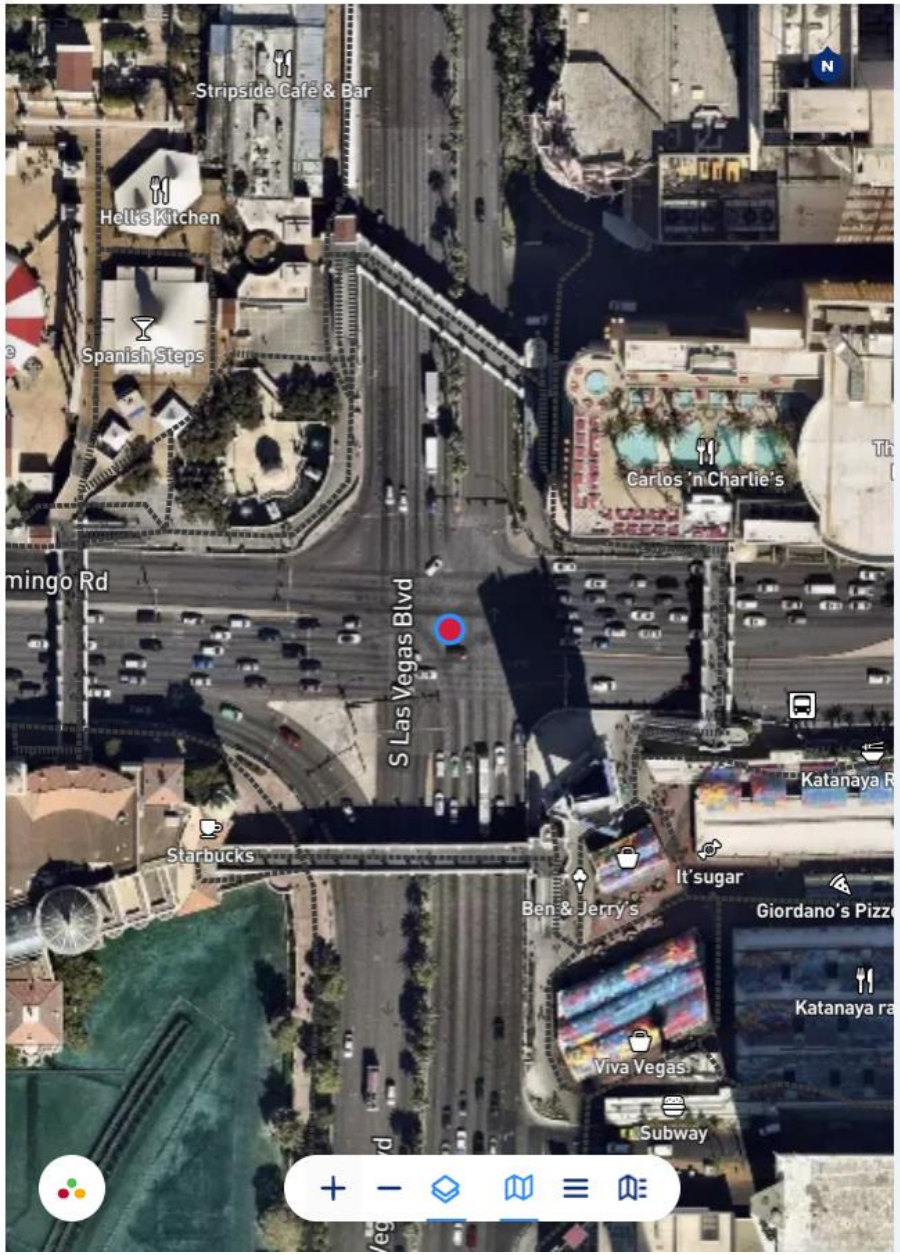
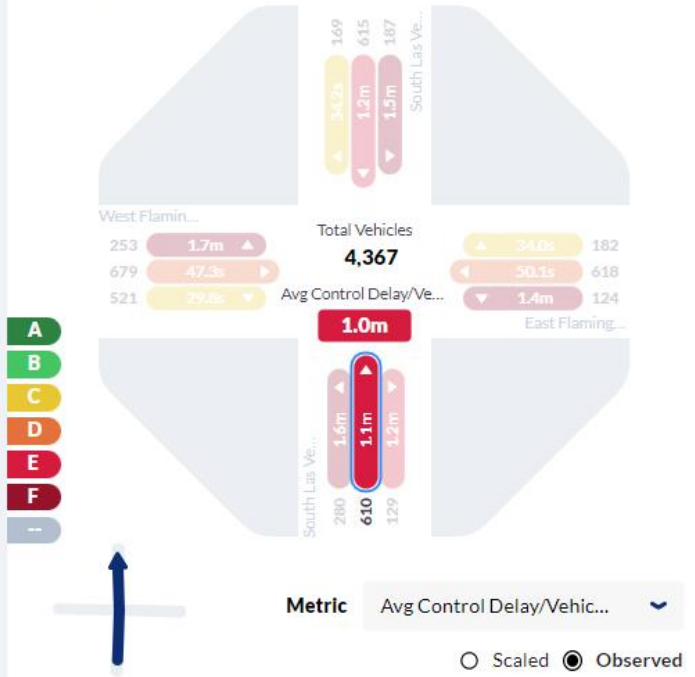


Diagram | List | Approaches | Movements

South Las Vegas Boulevard & East Flamingo Ro...

Report Issue



A B C D E F --

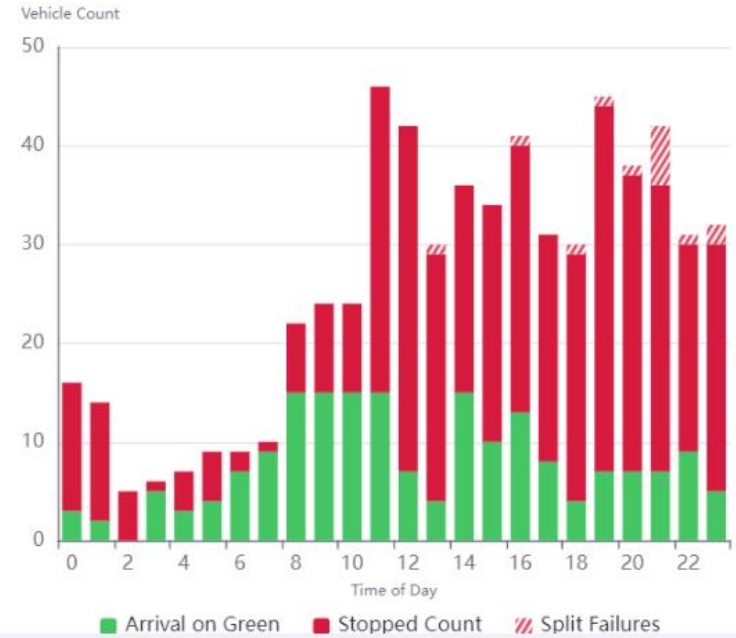
Metric Avg Control Delay/Vehic...

Scaled Observed

Count Stats | Time Stats | Trajectory Plot

Percent on Green	30.98 %	vs	4wk Average	30.32 %	Change + 2.17%
Split Failures	14	vs	4wk Average	29	Change - 15
Vehicle Count	610	vs	4wk Average	685	Change - 75
Stopped Count	421	vs	4wk Average	478	Change - 57

Resolution: Hourly



Time Range Display 09/30/2022 24 Hours | Map Display LOS Values | Avg. Control Delay/Vehicle

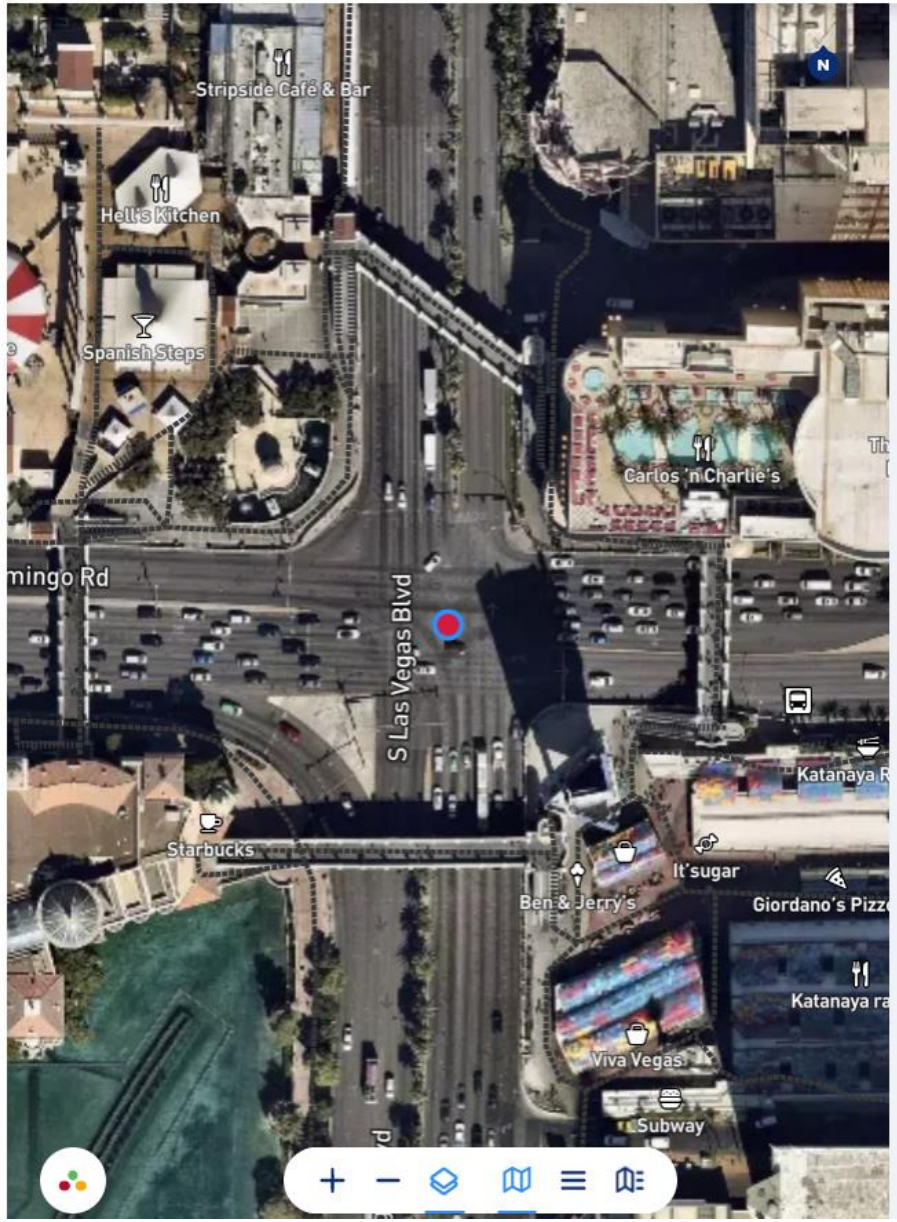
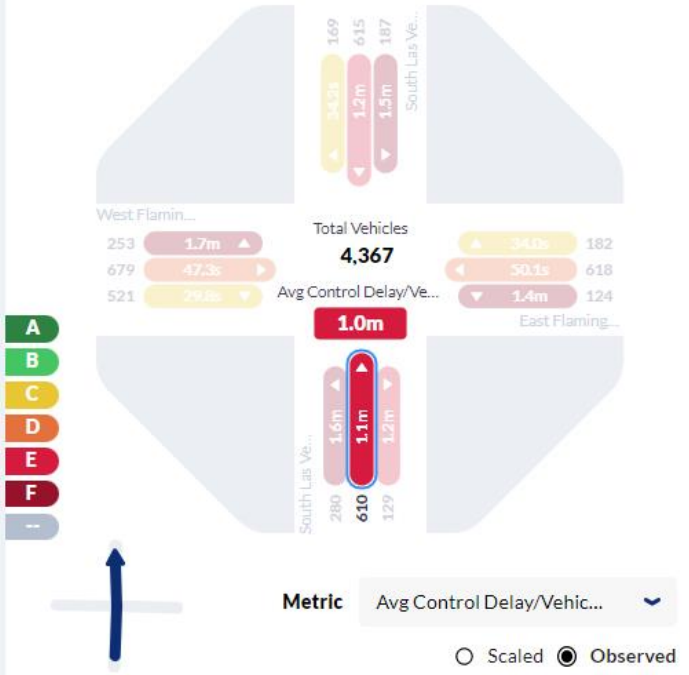


Diagram | List | Approaches | Movements

South Las Vegas Boulevard & East Flamingo Ro...

Report Issue

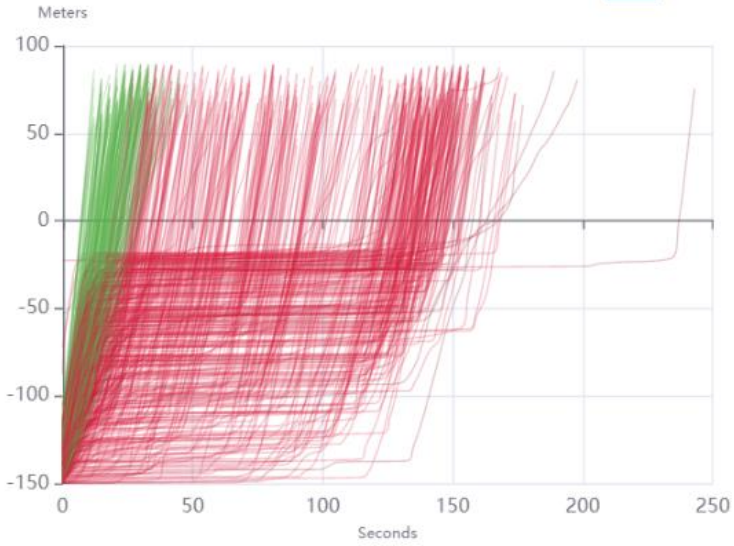


Metric Avg Control Delay/Vehic...

Scaled Observed

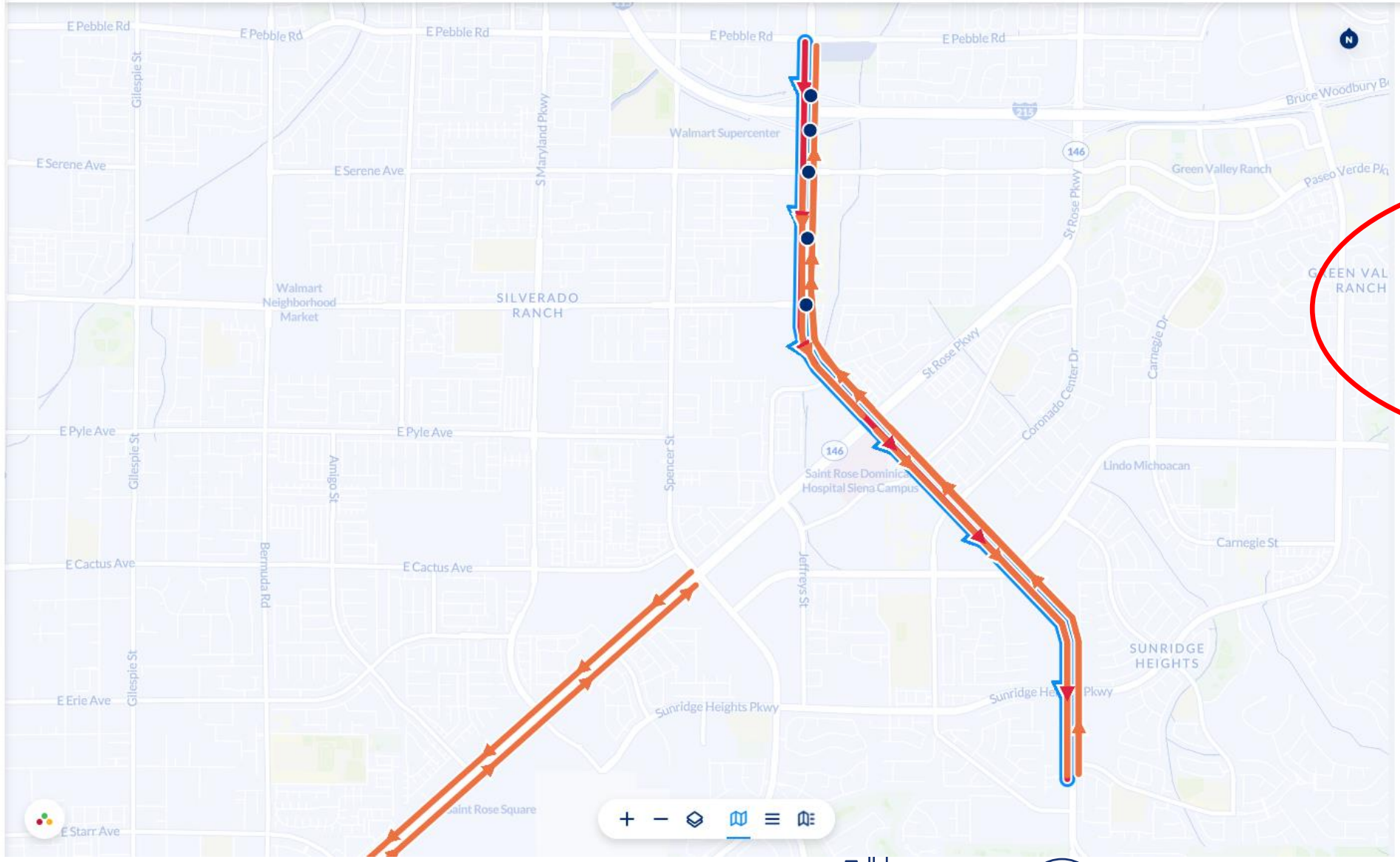
Count Stats | Time Stats | Trajectory Plot

Through Count	189	vs	4wk Average 206	Change - 8.36%
Stopped Count	421	vs	4wk Average 478	Change - 12.00%
Split Failures	14	vs	4wk Average 29	Change - 51.70%



No Stop | Single Stop | Split Failure

Time Range Display 10/03/2022 TO 10/09/2022, Weekdays, 24 Hours Map Display Travel Time Values



Count Stats | Time Stats

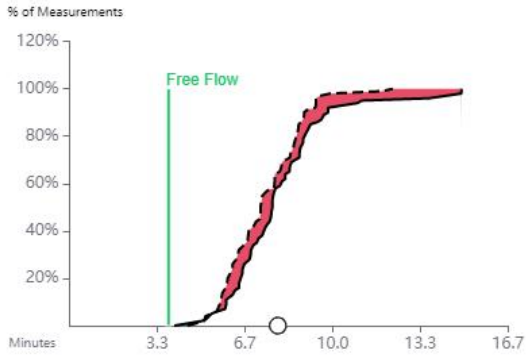
Eastern: Pebble to Sunridge Heights (SB)

Length: 2.78 mi
Free-flow: 3.7m

Metrics for Selected Time Period

		4wk Average	Change	
Average Trav...	7.9m	7.5m	25.3s	+5.62%
Travel Time I...	2.15x	1.98x	0.17x	+8.33%
Planning Tim...	3.65x	3.01x	0.64x	+21.30%

Metric: Travel Time CDF | TT Over Time



Selected Time Period 4wk Average Mean

Download Data

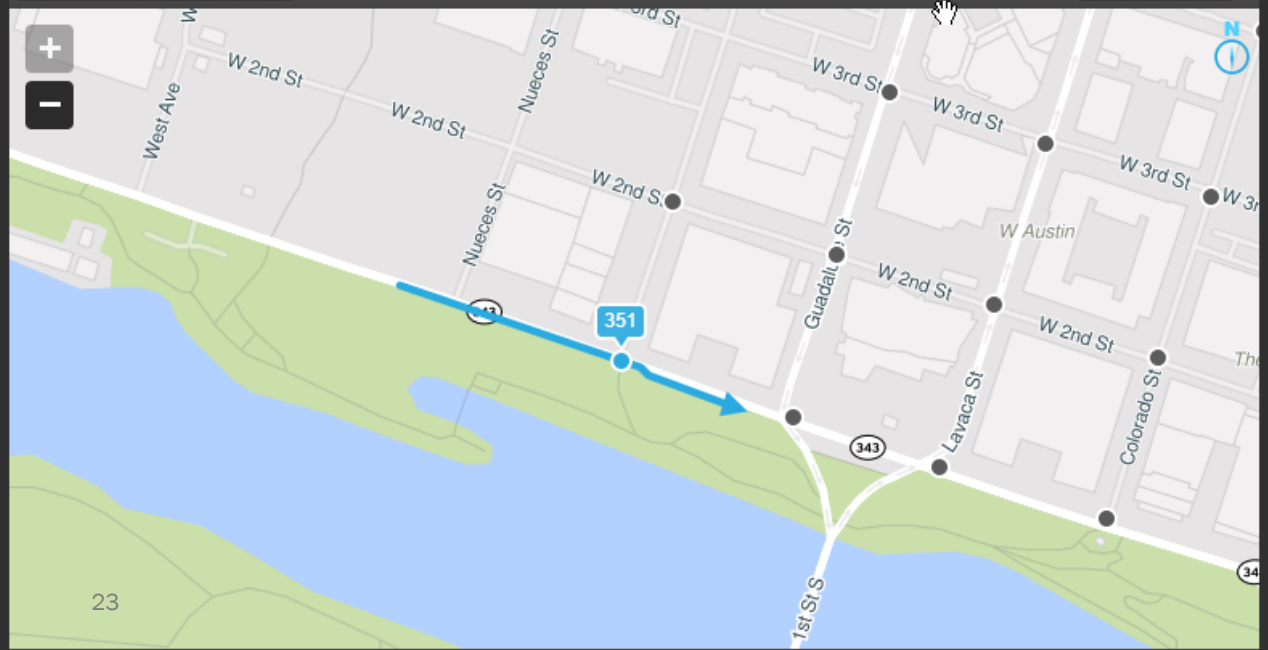
Intersection Analysis

Ranked intersection movements for 90 intersections from November 01, 2021 through November 30, 2021 (Every Monday, Tuesday, Wednesday, and Thursday) from 6 AM to 10 AM

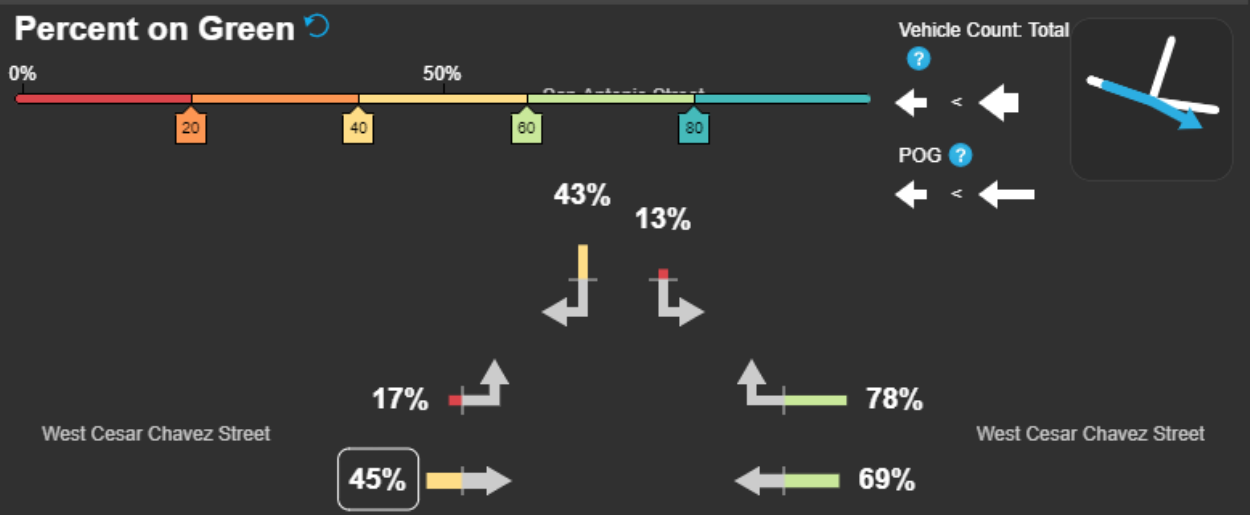
Filter | Display Options

Rank	Intersection	Approach	Movement	Vehicle Count: T...	Vehicle Count: S...	POG	Split Failure: ...	Travel Time: Avg...	Travel Time: Ma...	Approach Speed...	Control Delay: A...	Control Delay: M...
1	San Antonio Street & West Cesar Chavez Street	Eastbound	Through	2879	1589	45%	113	49	367	27	34	352
2	East Cesar Chavez Street & North Interstate 35	Eastbound	Through	1115	488	56%	20	45	196	27	28	179
3	East 5th Street & Brazos Street	Northbound	Through	83	51	39%	17	50	105	23	29	84
4	South 1st Street & West Cesar Chavez Street	Westbound	Through	1160	606	48%	14	51	301	24	39	289
5	Congress Avenue & East Cesar Chavez Street	Westbound	Through	905	214	76%	11	37	354	25	21	338
6	Brazos Street & East 7th Street	Eastbound	Through	538	156	71%	11	34	332	25	17	315
7	Colorado Street & West Cesar Chavez Street	Westbound	Through	1202	512	57%	10	52	362	24	37	347
8	West 4th Street & Guadalupe Street	Westbound	Left	55	37	33%	10	68	132	20	47	111
9	East 2nd Street & San Jacinto Boulevard	Southbound	Through	133	88	34%	8	58	269	22	34	245
10	West 5th Street & Rio Grande Street	Northbound	Through	27	23	15%	8	109	294	21	83	268
11	Congress Avenue & East Cesar Chavez Street	Eastbound	Through	1440	776	46%	7	43	136	27	31	124
12	South 1st Street & West Cesar Chavez Street	Eastbound	Left	509	332	35%	7	58	246	32	40	228

Map | San Antonio Street & West Cesar Chavez Street | Display Options



Intersection Breakdown | San Antonio Street & West Cesar Chavez Street | Display Options



Use Case: RTCSNV, Adaptive Signal System Evaluation

Adaptive Systems & How Performance Measures Can Help

September 27, 2022

John R. Peñuelas, Jr., P.E. (NV)

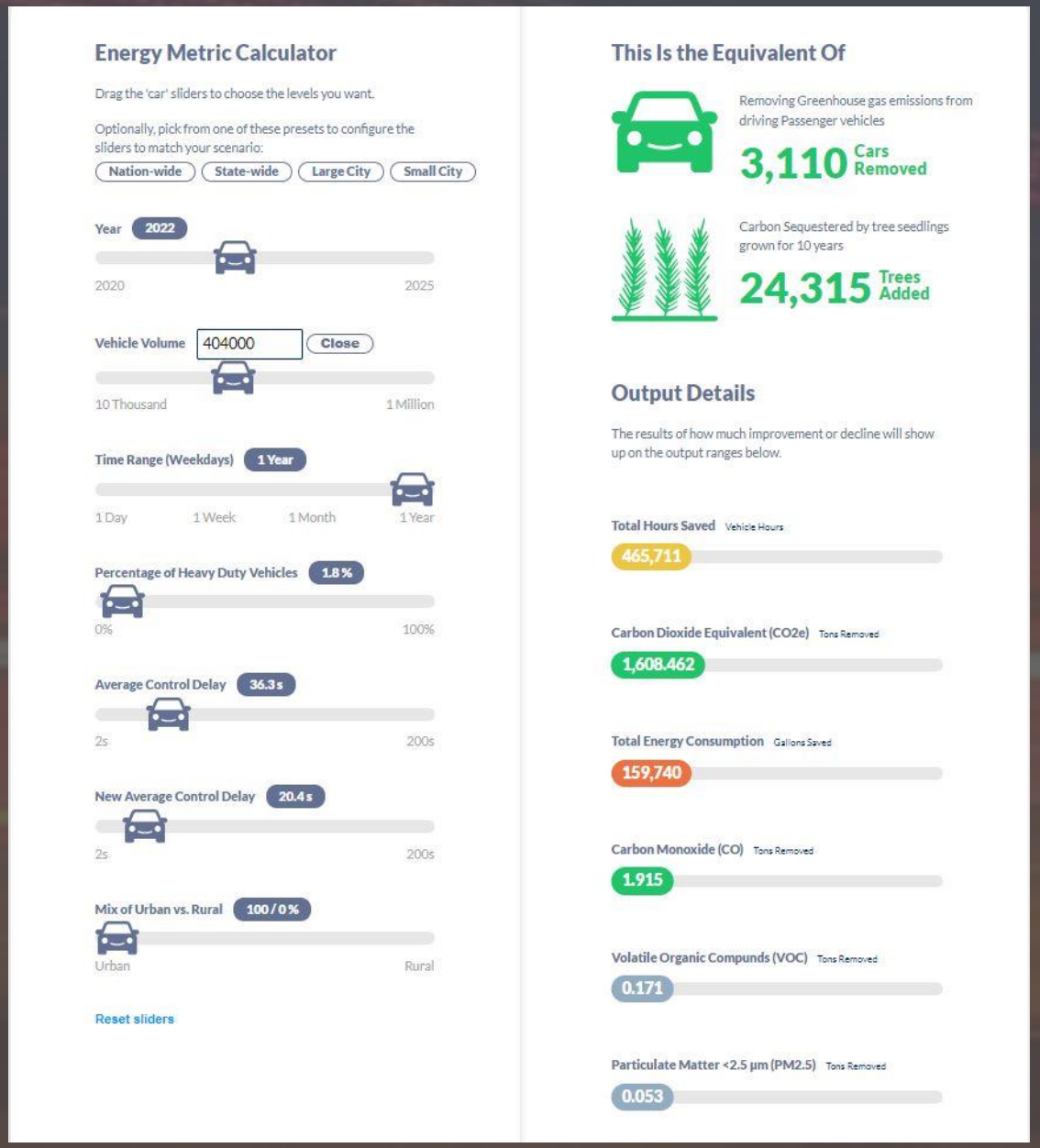
Director of Engineering Services

Regional Transportation Commission of Southern Nevada

Weighted Vehicle Delay

Vehicle Delay (sec)				
Intersection	ASC	TBC	Delta	Estimated Avg Daily Intersection Volume
Pebble	29.3	36.5	7.2	42,788
Serene	33.7	34.8	1.1	73,605
Silverado Ranch	22.8	25.2	2.4	68,789
St Rose	32.3	32.9	0.6	97,974
Horizon Ridge	38.7	41.4	2.7	62,226
Sunridge Heights	33.2	35.5	2.3	58,407
		Total	16.3	403,788

INRIX Green Signals Calculator



Annualized “Green” Statistics

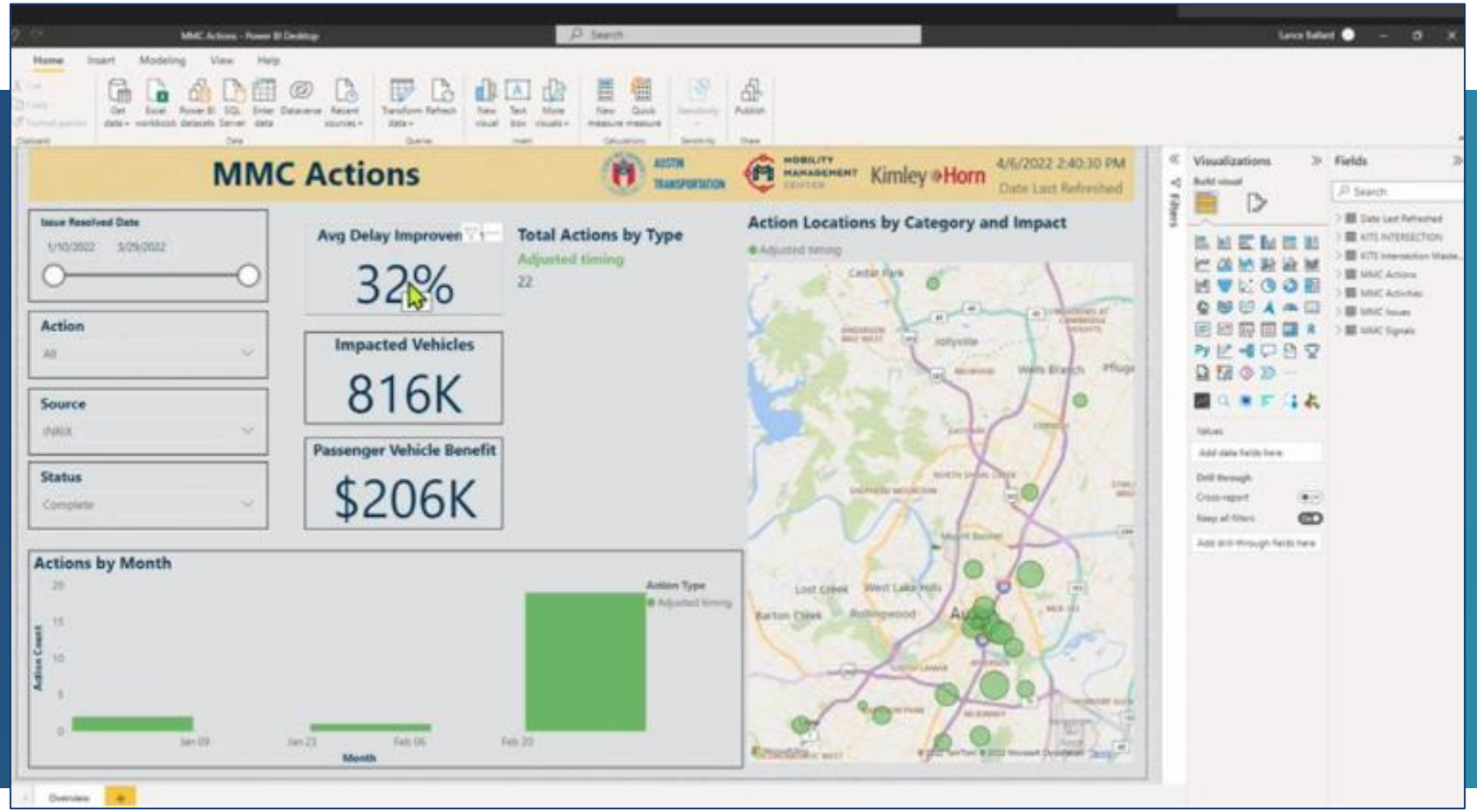
- 3,110 Vehicles Removed
- 24,315 Trees Added
- 465,711 Hours Saved
- 1,608 Tons of CO2e Removed
- 159,740 Gallons Saved
- $10.3 M Total Savings (Time/Fuel)
- 32 Days to Recover Cost of Project

Use Case: City of Austin Summary Program Benefits

Cost Benefit – 22 Intersections

Approximately 90 Days:

- Avg Delay Improvement = 32%
- # Vehicles 816k
- Cost benefit ~$206k



Use Case– Washington County – Active Signal Management

Leveraged Daily Emails to Investigate Recurring Issues

Intersections: Top 5 Control Delay Issues — 2021-12-06 — 24 Hrs

	Worsened Control Delay (Total)	4-wk Avg	2021-12-06	Change	
1	Southwest Tualatin Sherwood Road & Southwest Martinazzi Avenue	357.6h C	530.1h D	+172.5h	+48%
2	Southwest Tualatin Sherwood Road	502.3h C	611.1h C	+108.8h	+22%
3	Southwest Walker Road & Southwest 158th Avenue	369.3h C	431h D	+61.8h	+17%
4	Southwest Tualatin Sherwood Road & Southwest Boones Ferry Road	557.4h D	613.9h D	+56.5h	+10%
5	East Main Street & Southeast Cornelius Pass Road	540.9h C	594.4h C	+53.6h	+10%

Intersections: Top 5 Control Delay Issues — 2021-12-07 — 24 Hrs

	Worsened Control Delay (Total)	4-wk Avg	2021-12-07	Change	
1	Southwest Tualatin Sherwood Road & Southwest Martinazzi Avenue	406.8h C	575h D	+168.1h	+41%
2	Southwest Tualatin Sherwood Road & Southwest Boones Ferry Road	641.6h D	747.2h D	+105.6h	+16%
3	Southwest Hall Boulevard & Southwest Scholls Ferry Road	546h D	629.1h D	+83.1h	+15%
4	Southwest Tualatin Sherwood Road	538.3h C	590.8h C	+52.5h	+10%
5	Southwest Oleson Road	293.1h C	343.8h C	+50.7h	+17%

Intersections: Top 5 Control Delay Issues — 2021-12-08 — 24 Hrs

	Worsened Control Delay (Total)	4-wk Avg	2021-12-08	Change	
1	Southwest Tualatin Sherwood Road & Southwest Martinazzi Avenue	441.5h C	608.2h D	+166.7h	+38%
2	Southwest Tualatin Sherwood Road	502.6h C	594.7h C	+92.2h	+18%
3	Southwest 170th Avenue	395.5h C	456.5h C	+60.9h	+15%
4	Southwest Hall Boulevard & Southwest Scholls Ferry Road	581.4h D	634.7h D	+53.3h	+9%
5	East Main Street & Southeast Brookwood Avenue	335.7h C	382.8h C	+47h	+14%

Intersections: Top 5 Control Delay Issues — 2021-12-09 — 24 Hrs

	Worsened Control Delay (Total)	4-wk Avg	2021-12-09	Change	
1	Southwest Tualatin Sherwood Road & Southwest Martinazzi Avenue	319.4h C	551.2h D	+231.9h	
2	Southwest Tualatin Sherwood Road	483.3h C	633.6h C	+150.4h	
3	Southwest Tualatin Sherwood Road & Southwest Boones Ferry Road	586h D	707.1h D	+121.1h	
4	Southwest Walker Road & Southwest Murray Boulevard	455.7h C	562.3h D	+106.5h	
5	Southwest Tualatin She				

Intersections: Top 5 Contro

	Worsened Control Delay (Total
1	Southwest Tualatin Sh Southwest Martinazzi
2	Southwest Tualatin Sh Southwest Boones Fer
3	Southwest Tualatin Sh
4	Southwest Barnes Roa Crest Drive
5	Southwest Walker Roa Boulevard

Intersections: Top 5 Contro

	Worsened Control Delay (Total
1	Tualatin Sherwood Roa
2	Tualatin Sherwood Roa
3	Tualatin Sherwood-Nyl FredMeyers
4	Murray Blvd & Jenkins
5	Cornell Rd & Brookwoo

From: Mark Player <Mark_Player@co.washington.or.us>
Sent: Thursday, December 16, 2021 1:03 PM
To: Shaun Quayle <Shaun_Quayle@co.washington.or.us>
Subject: Re: Trying to understand 48% delay jump at Martinazzi-TSR

The comm was down at Nyberg @ Fred Meyer. I'm sure that wasn't helping things. I was able to get the comm back up. It should be good now. Not sure about Martinazzi though.

Mark

Sent from my iPhone

On Dec 16, 2021, at 9:26 AM, Shaun Quayle <Shaun_Quayle@co.washington.or.us> wrote:

Hi Kevin,

Can you have someone swing by TSR/Martinazzi and Nyberg/Cabelas to check on detector health?

John, Matt, Mike, I took a quick look at the reported 48% jump in delay at Martinazzi/TSR, which is orders of magnitude larger than our other Countywide sample of Inrix Signals IQ locations.
Attached is a word document comparing TSR/Martinazzi this Monday to the previous four Mondays. There is an obvious jump in delay after Thanksgiving, particularly for EB through traffic. This maybe reflecting increased turning traffic demand to/from Nyberg Woods shopping center and Fred Meyer. SCATS adaptive is likely having to allocate more green time to this turning/side-street shopping/retail traffic, which is taking time from the mainline through traffic on Nyberg - Tualatin-Sherwood Road.

Use Case– Washington County – Active Signal Management

Leveraged Daily Emails to Investigate Recurring Issues

Intersections: Top 5 Control Delay Issues		2022-01-08	24 Hrs		
Worsened Control Delay (Total)		4-wk Avg	2022-01-08	Change	
1	Scholls Ferry Rd & 125th - North Dakota St	197.8h B	298.4h C	+100.6h	+51%
2	Scholls Ferry Rd & Murray Blvd	388.2h C	462h D	+73.7h	+19%
3	Cornell Rd & 25th Ave	240.8h B	312.5h C	+71.7h	+30%
4	Tualatin Sherwood Road & Boones Ferry Road	309.3h C	377.4h C	+68.2h	+22%
5	Scholls Ferry Road & Nimbus Avenue	103.6h A	157.5h B	+53.9h	+52%

Intersections: Top 5 Control Delay Issues		2022-01-09	24 Hrs		
Worsened Control Delay (Total)		4-wk Avg	2022-01-09	Change	
1	Scholls Ferry Rd & 125th - North Dakota St	161.6h B	256.8h C	+95.2h	+59%
2	Tualatin Sherwood Road & Boones Ferry Road	222.8h C	263.5h C	+40.9h	+18%
3	Baseline Rd & 185th Ave	304.4h C	332.7h C	+28.3h	+9%
4	Scholls Ferry Road & 121st Avenue	125.3h B	146.4h B	+21h	+17%
5	Scholls Ferry Road & Roy Rogers Road	94.6h B	115.2h B	+20.6h	+22%

From: Mark Leavitt <mleavitt@beavertonoregon.gov>
Sent: Thursday, January 13, 2022 12:27 PM
To: Shaun Quayle <Shaun_Quayle@co.washington.or.us>
Subject: [EXTERNAL] RE: Ped button stuck on Murray-Allen

Shaun,

Scholls @ 125th we discovered a hung up Loop card. It was reset. Now Murray @ Allen we didn't find any issues. No calls on the controller and the DC isolator card had no recall, and no button was stuck. Are you still seeing any issues there?

INRIX SIGNAL ANALYTICS

Thank you! Questions.

Gary Carlin, Director Public Sector Services

Gary.carlin@inrix.com

inrix.com/signals/

Continuously monitor every movement in your network without investing in equipment

Identify performance issues without ever leaving your desk

Take proactive actions based on deep analysis and reliable performance trends

Make cities more livable with better traffic flow, improved air quality, and safer intersections

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