



University of Nevada, Reno

# TRANSPORTATION SERVICE

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## Signal Re-timing of South Carson Street

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CATER

# CATER and UNR Transportation Program

- Transportation Engineering Program at UNR started in 2004
- CATER was established in 2010
- Two tenured faculty, two post-doctors, plus 11 graduate research assistants
- Two nationally and internationally recognized research areas: **Traffic Signal Control** and **LiDAR Applications**



# Student Awards

- International/National level
  - ITE Best Student Paper (twice)
  - ITS America Student Paper Competition 1<sup>st</sup> Place
- Regional Level
  - ITE District 6: Best Student Paper (5 times)
  - Van Wagoner Award
  - ITE Intermountain Section
  - Las Vegas Fall Conference



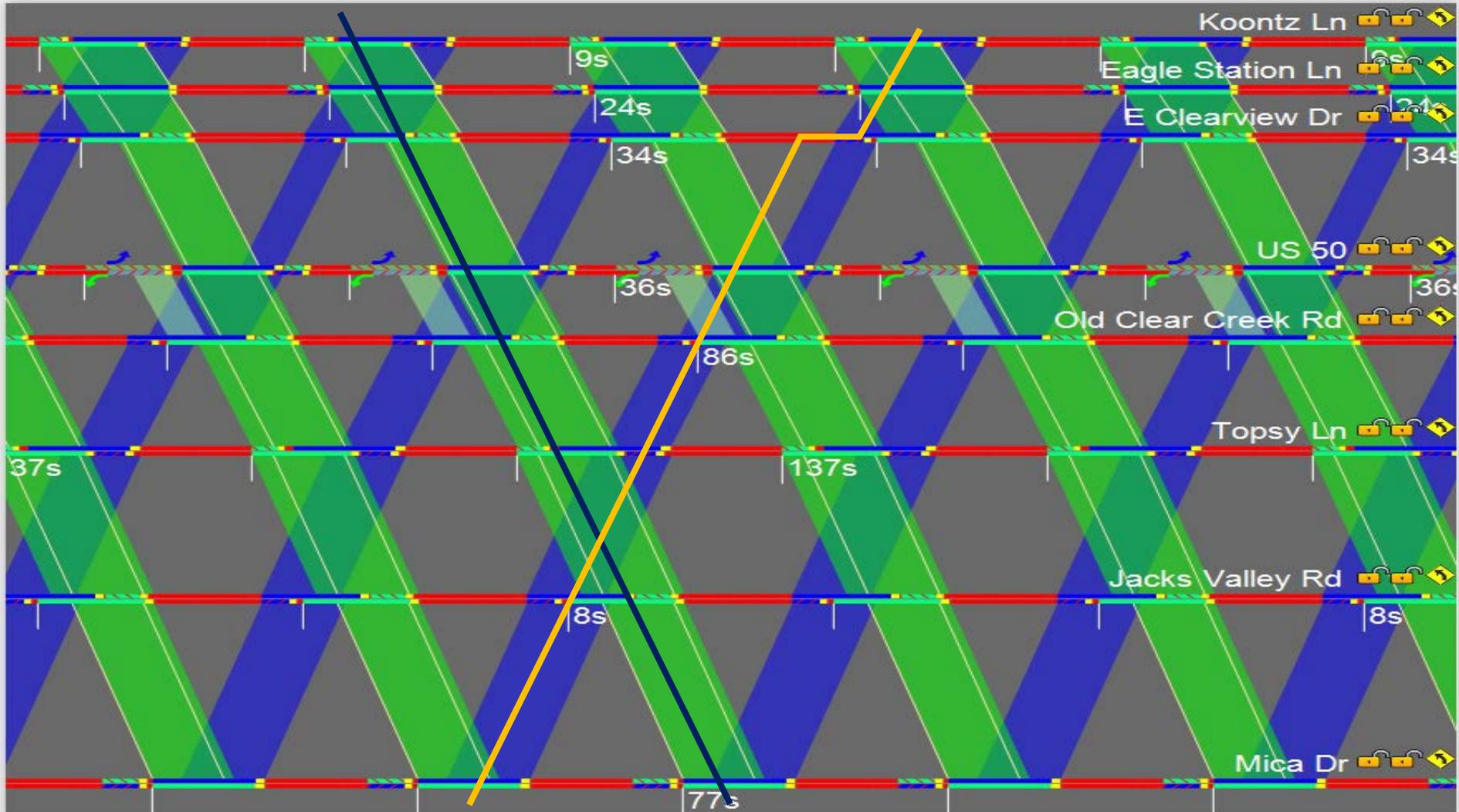


## South Carson Street

- ❖ Last re-timing was done in 2017
- ❖ Received many citizen complaints
- ❖ City staff performed significant fine-tuning on the original timing parameters
- ❖ A new contract was issued to UNR-CATER in 2019

# TranSync

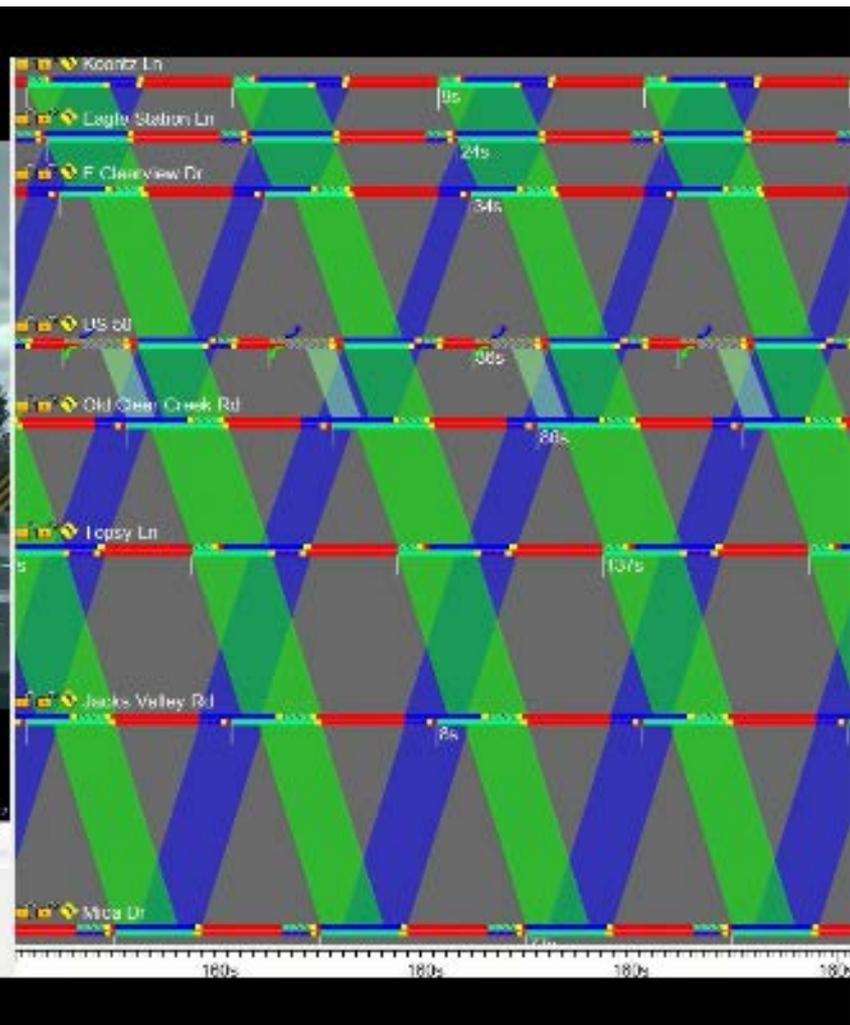
## Time-space Diagram





Maple Creek Rd (160ND) 09/20/2019 10:19:22 AM 26482 Miles

Towing Name: 160 ND    GPS Data: Corson S (160ND) (ND-0019-09-18 10:20:22 gpx)  
 Record Time: 10:20:22 AM    Travel Time: 0m 0s    Average Speed: 58.2 mph  
 Distance Traveled: 0.1    No. of Stops: 0    Instant Speed: 58.2 mph

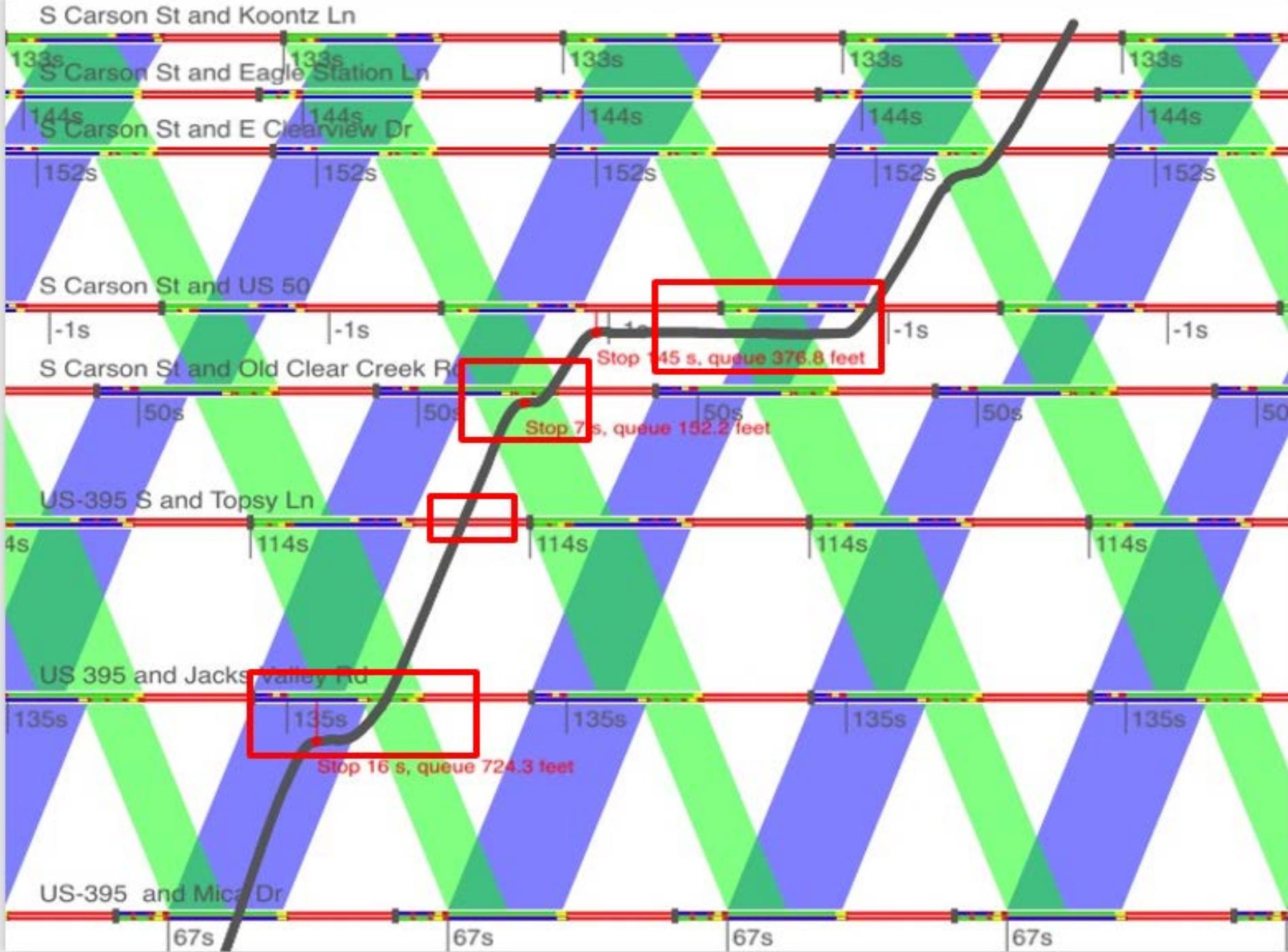


# Issues and Challenges

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- **Frequent signal transitions caused by emergency vehicles**
- **Short period traffic flow surges causing overflow at bottleneck intersections**
- **Wide intersections to accommodate pedestrian crossings**
- **Major crossing street traffic flow (I-580)**
- **Traffic incidents**







# Before-After Performance Measures

		Previous (Before) Timings		New (After) Timings			
		Travel Time (minute)	Stops	Travel Time (minute)	Improved by	Stops	Reduced Stops
AM	NB	8.61	3.7	5.02	41.7%	0.8	2.9
	SB	6.12	2.6	4.53	26.0%	0.4	2.2
	Freeway	2.72	0.3	2.88	-5.9%	0.5	-0.2
MD	NB	6.27	2.8	4.89	22.0%	0.3	2.5
	SB	6.13	2.5	4.61	24.8%	0.5	2.0
	Freeway	2.61	0.1	2.96	-13.4%	0.15	-0.1
PM	NB	9.67	4.2	5.58	42.3%	1	3.2
	SB	12.85	5.6	7.51	41.6%	1.6	4.0
	Freeway	6.25	1.2	6.83	-9.3%	1.9	-0.7



# Benefit-Cost Estimates

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- Arterial AADT is about 36,000, and is about **20,000** during coordination between 6:00 a.m. and 8:00 p.m.
- Travel time savings are about 1.8 min/trip, 610 hrs/day, **180,000** hrs/year
- This translates into about **\$1.9** million in savings
- The benefit-cost (B/C) ratio (time savings alone) is about **80:1**
- Additional fuel savings and emission reduction

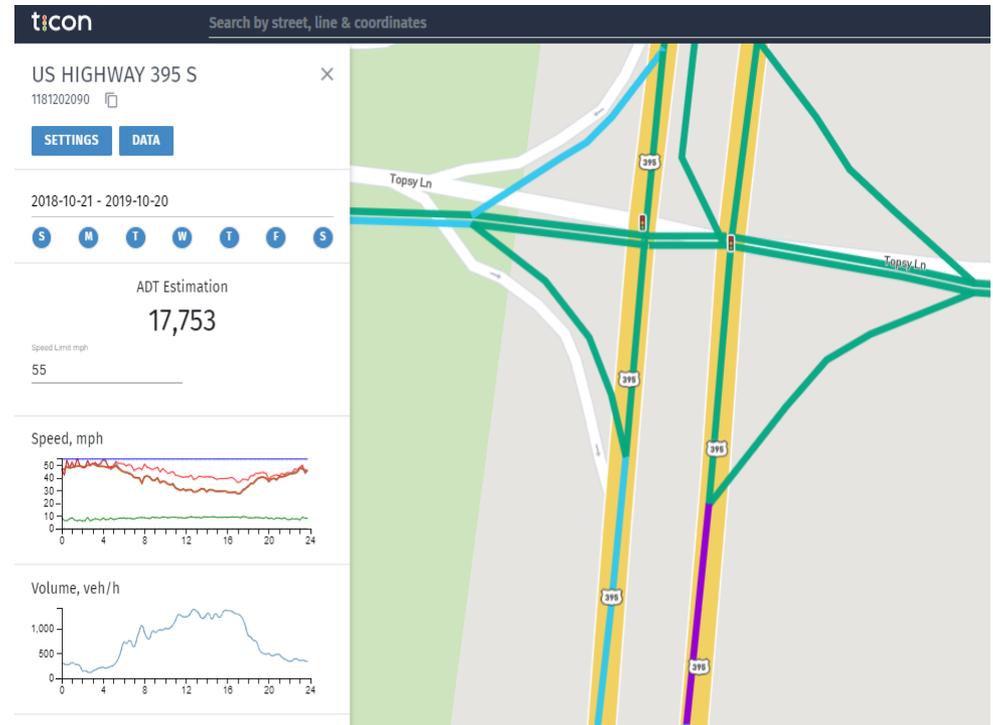
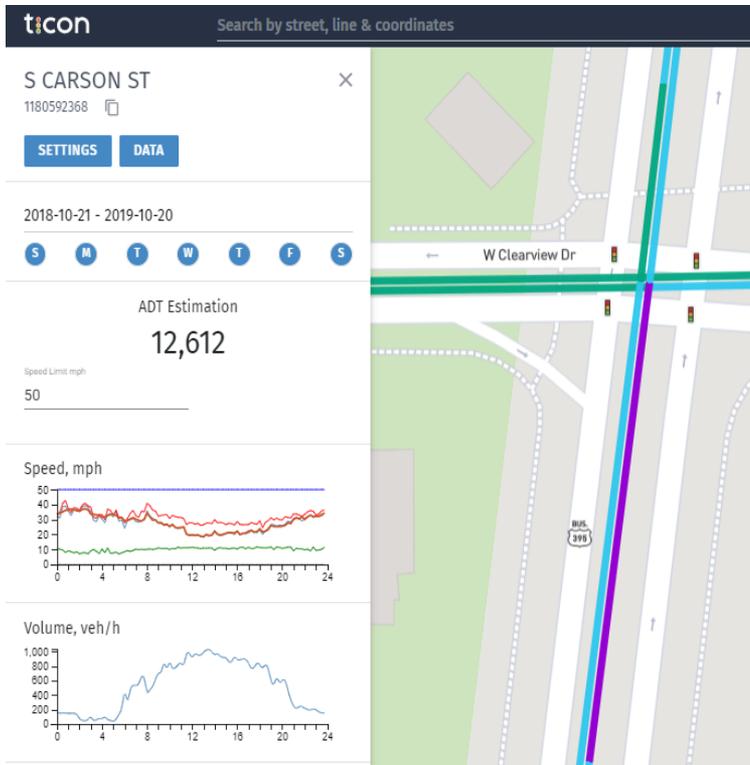


# Ticon Data

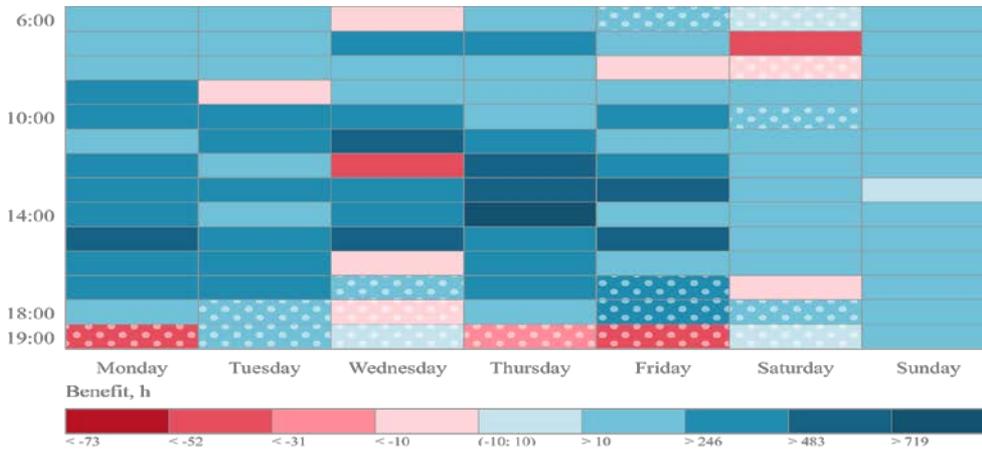


- North of I-580 (AADT 25,000)

- South of I-580 (AADT from 32,500 to 36,500)



# Before-After Comparison



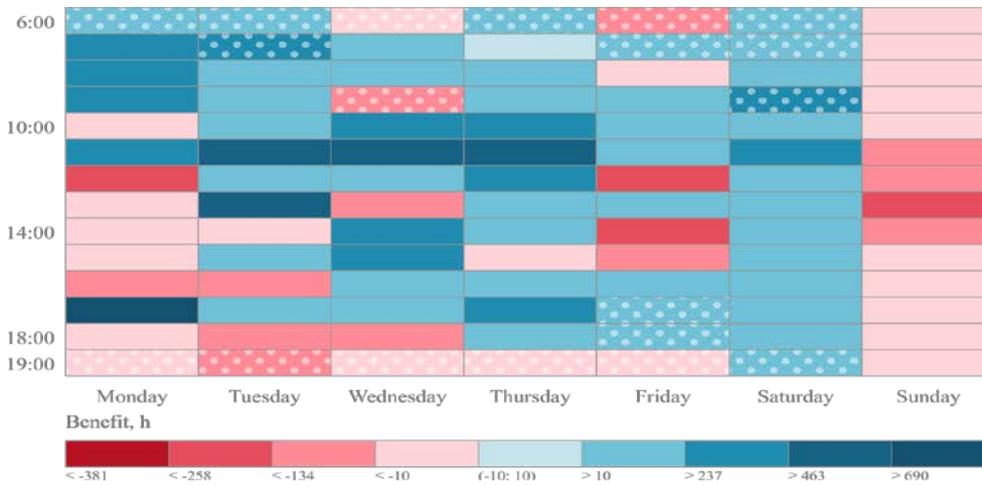
**Statistics:**

Maximal hourly gain	719.05 h
Maximal hourly loss	72.95 h
Average daily gain	186.72 h
Average gain for AM peak	237.66 h
Average gain for PM peak	230.32 h

Average Cumulative TD Before	892.99 h
Average Cumulative TD After	706.27 h

**\*187 hrs saving/day**

Northbound



**Statistics:**

Maximal hourly gain	689.86 h
Maximal hourly loss	381.32 h
Average daily gain	64.96 h
Average gain for AM peak	148.36 h
Average gain for PM peak	46.30 h

Average Cumulative TD Before	1103.21 h
Average Cumulative TD After	1038.26 h

**\*65 hrs saving/day**

Southbound



# Benefit



## One month based

Northbound	186.72 h/day
Southbound	64.96 h/day
Both directions	251.68 h/day
Yearly savings	91,863.20 h/year
Rel. delay decrease	5.86 %

This translates into about \$1,0M



# Vehicle Trajectories



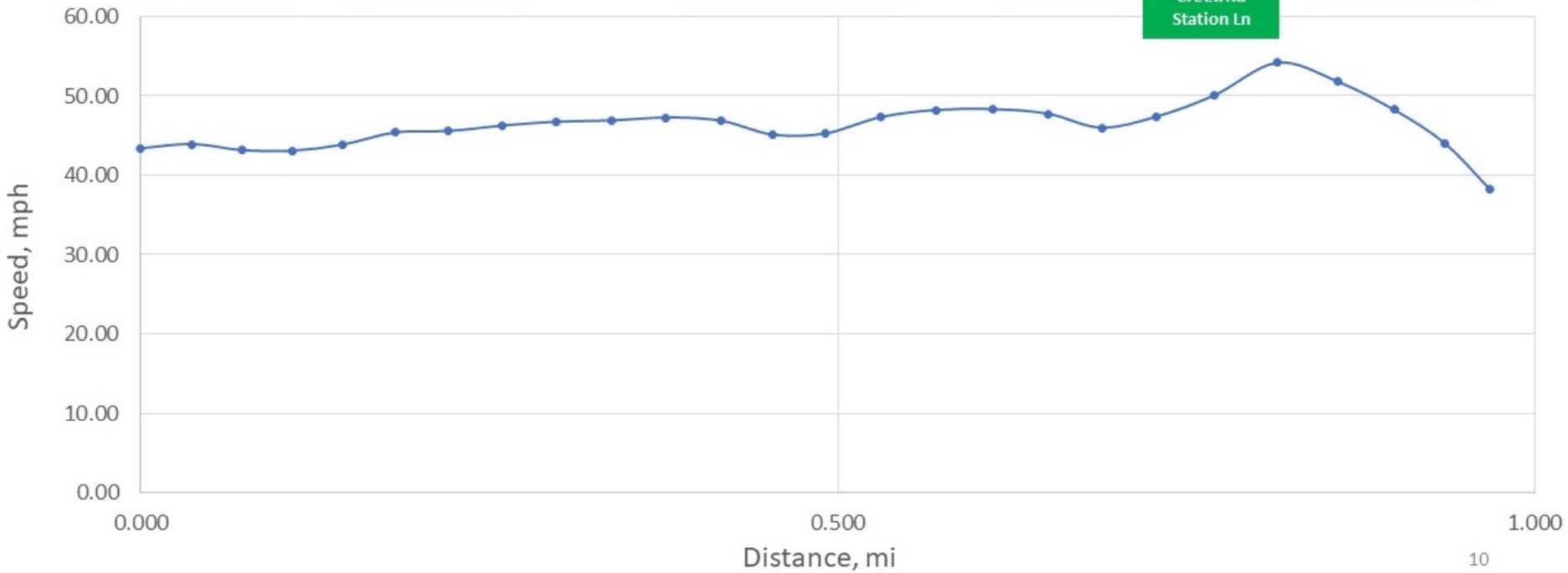
2019-08-15  
18:24:53

IntVIN: 1GKS2CKJGR

Average speed 46.35 mph

2019-08-15  
18:26:50

Koontz Ln Eagle Station Ln W Clearview Dr I 580 Old Clear Creek Rd Station Ln Warehouse Dr



# Vehicle Trajectories

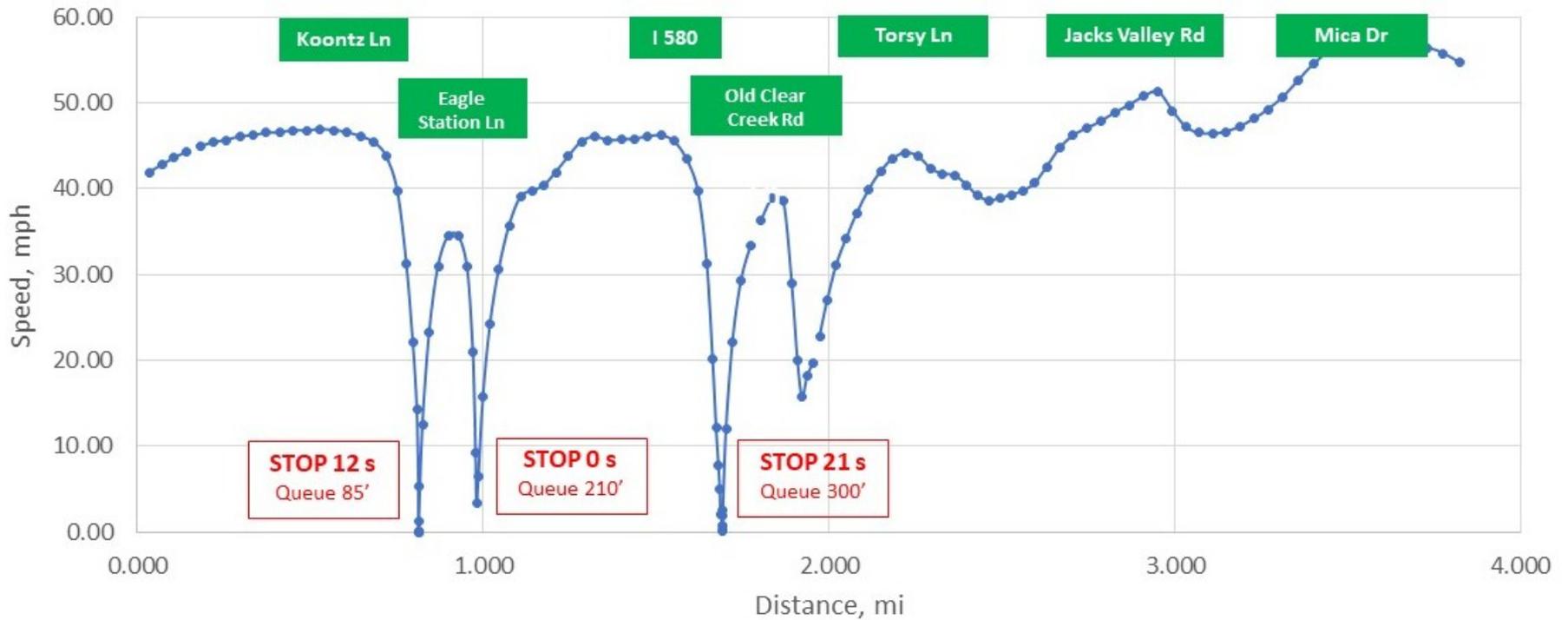


2019-08-17  
15:55:43

IntVIN: 2GNFLFE3G6

Average speed 35.54 mph

2019-08-17  
16:02:10



# Summary

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- The new timing showed major reductions in stops and delays.
- According to Ticon data, the delay savings alone can translate into about **\$1** million per year in user costs.
- Major issues and challenges include frequent disruptions from emergency vehicles and accommodation of pedestrians at large intersections.
- Other strategies, e.g., adaptive signal control?



