# Cloud-Based Intelligent Transit Signal Priority
# VTA ROUTE 77 PILOT

Tech Transfer Seminar: Operating Complete Streets
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# Why Trial Cloud-Based TSP?

- Looking for a solution with less infrastructural needs

- Take advantage of evolving/currently available technology
  - Use mobile device on transit vehicle (CAD/AVL)
  - Software is quicker to deploy
  - No new hardware installed at the traffic signal

- Change workforce/industry (Opened Source & Knowledge of Coding)

- Real-time insights and reporting

- Had willing partners to test it

# Who Was Involved?

- LYT.ai (formerly SinWaves)

- City of San Jose - Department of Transportation

- Santa Clara Valley Transportation Authority
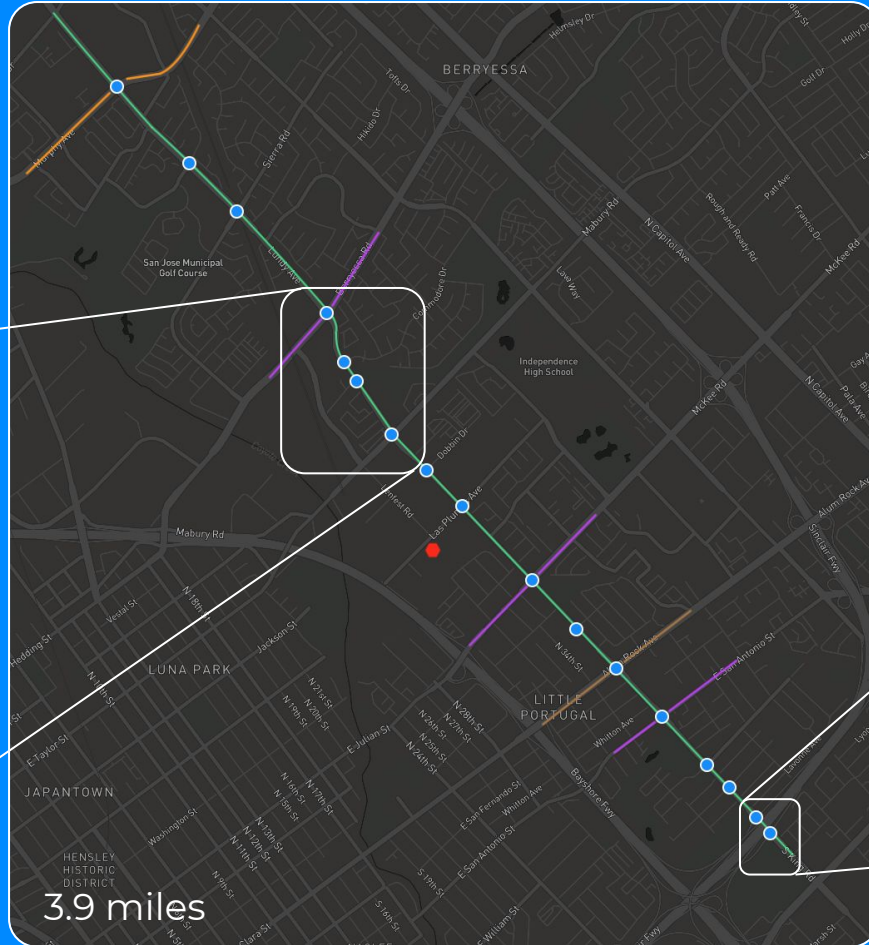
- National Science Foundation

# VTA Route 77

- Located in East San Jose

- Each end terminates at a major mall

- Route altered to service the new Berryessa Bart station

- 42 traffic signals on route
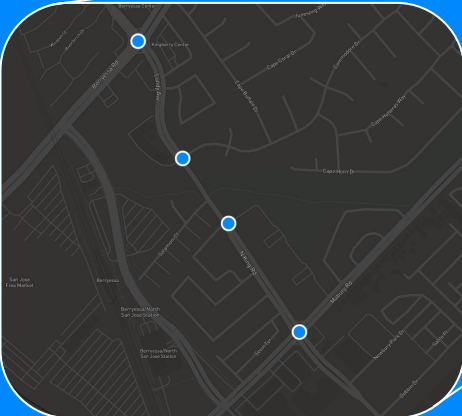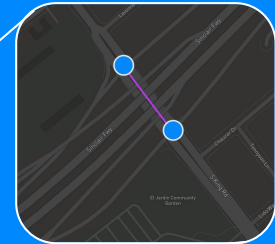
- 17 authorized by San Jose for priority



Route 77 Stops and Traffic Signals

San Jose

Bus Stops
Route 77
signalsroute77

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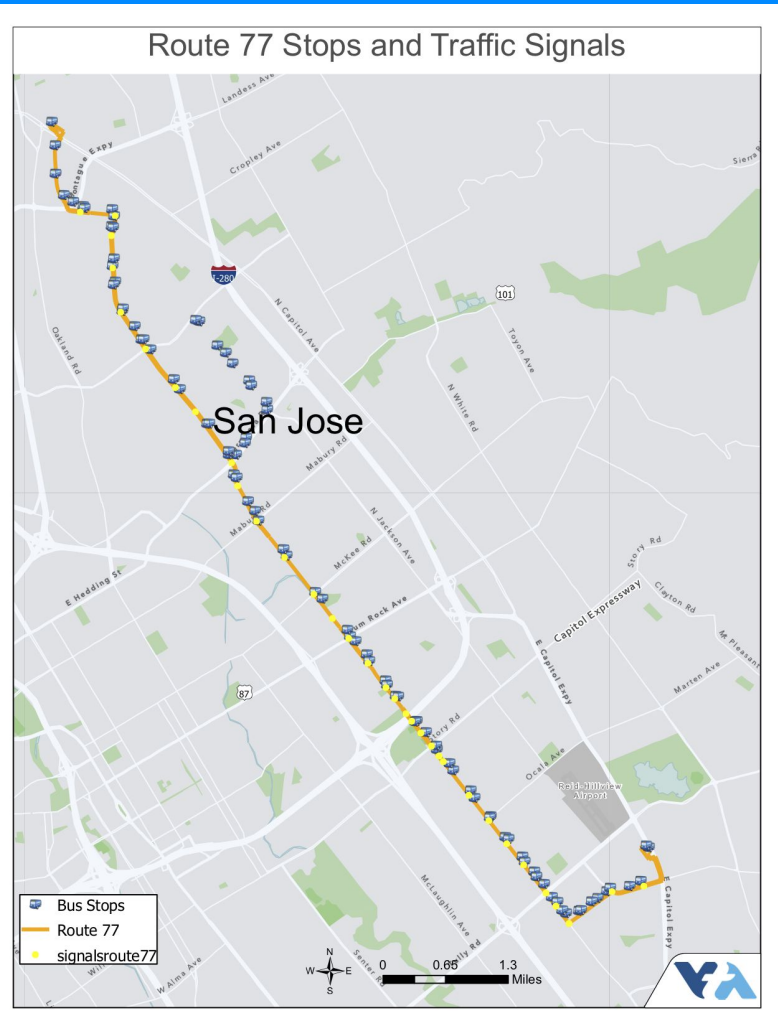
# The Pilot Section of Route 77



**Legend:**
- Route
- Traffic Signal
- BRT Lane
- Kadence
- Coordinated
- Fire Station

Double to Single Lane

Highway Overpass

3.9 miles

# Scope of the Pilot

- Send Command Through The Cloud to A Traffic Signal Controller in a Lab
  - Completed Fall 2018

- Define Performance Measures & Evaluation of Pilot
  - Completed March 2019

- Lab Simulated Corridor Testing
  - April Through June 2019

- Actual Field Testing
  - May through December 2019

- Final Evaluation of Pilot
  - January 2020

# Stakeholder Success Metrics

**VTA Metrics**
- Reduce the amount of travel time between bus stops
- Improve the average speed of the route

**City Metrics**

- Work over the existing communication network
- Not interfere with pre-existing traffic management systems

**Transit Signal Priority' Most Important Metric**
- Repeatedly provide green lights to buses

# Why LYT?



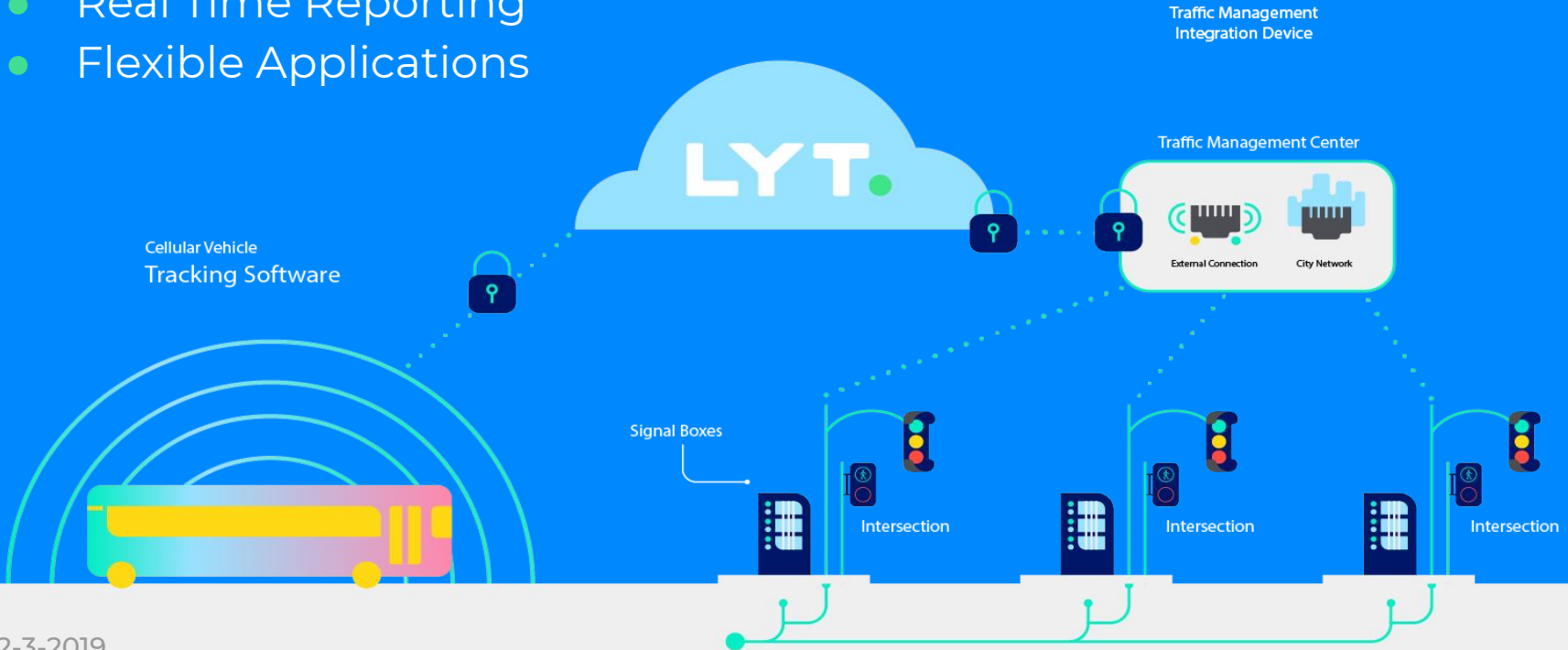Real-Time Artificial Intelligence **+** Cloud Infrastructure **+** Pre-existing Infrastructure **=** **LYT.speed**, an always-learning, smarter TSP

# What Makes LYT Different?

- Cloud Based & 100% Software Defined
- Continuously Learning
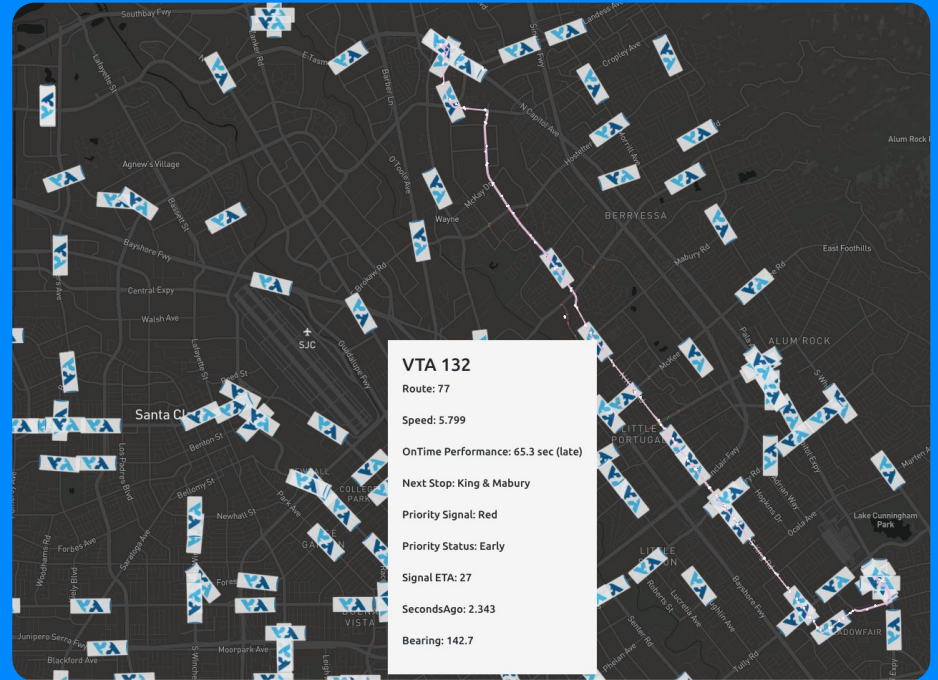- Real Time Reporting
- Flexible Applications

**Traffic Management Integration Device**

**Traffic Management Center**

**Cellular Vehicle Tracking Software**

External Connection

City Network

**Signal Boxes**

Intersection

Intersection

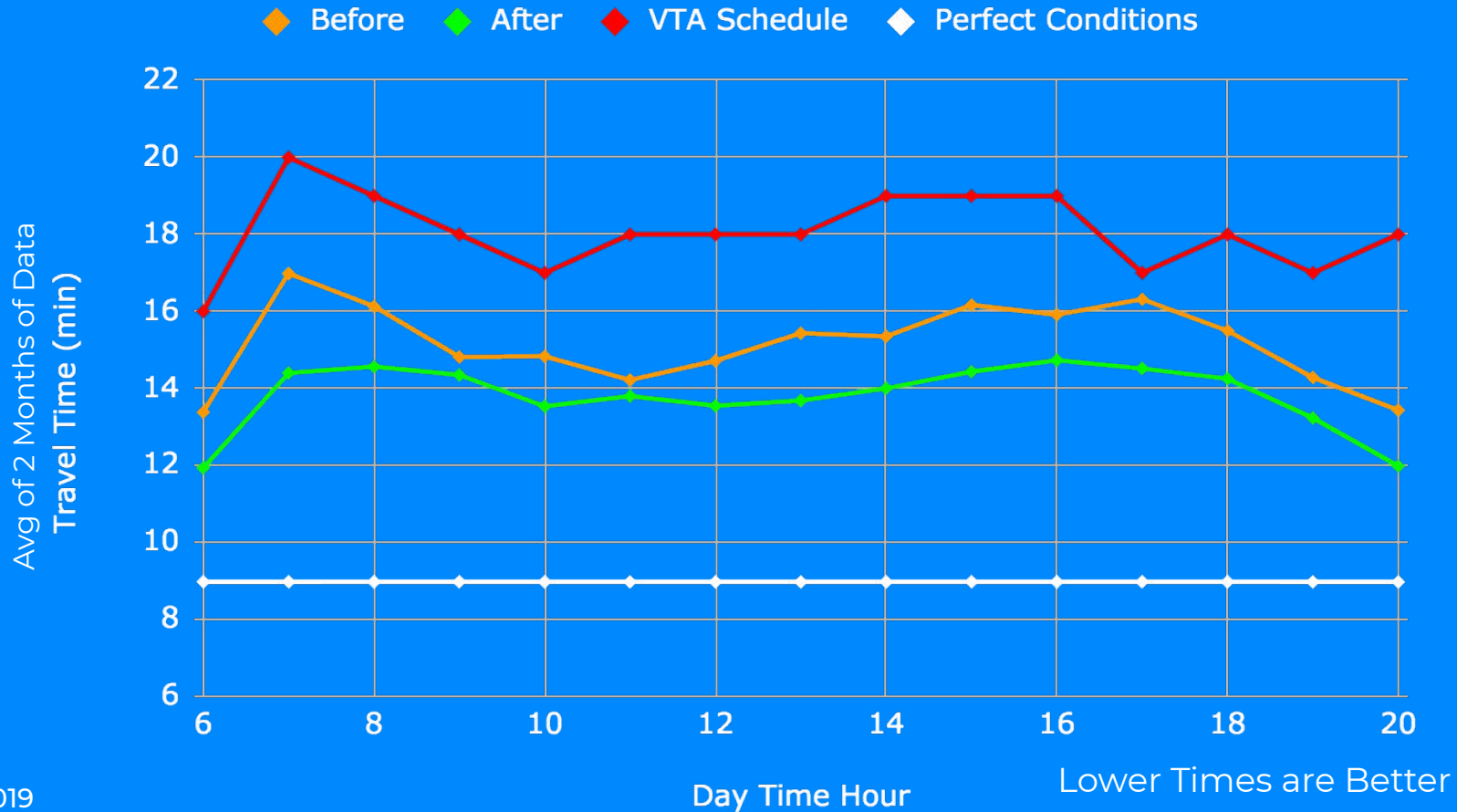Intersection

# Cloud-Based Connections

During the pilot:

- **277** unique buses service this route, none with priority hardware.

- Hardware cost to upgrade buses ≈ **$1,385,000**.  (excluding installation & maintenance).

With **LYT.speed**,

- Instant priority to all 277 buses without any hardware.
- Flexible, individually customizable TSP
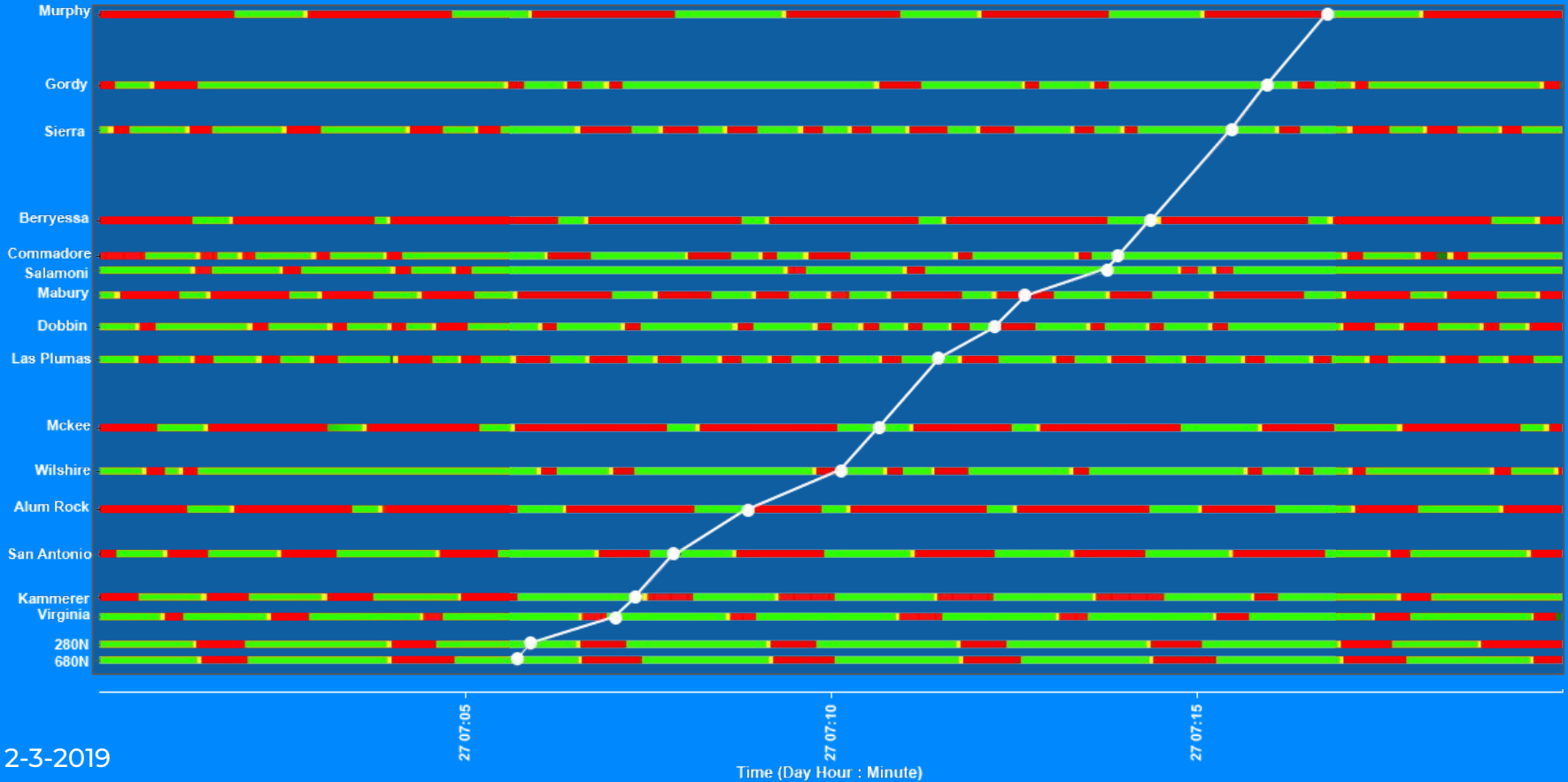- Cross-jurisdiction ready.

**VTA 132**

Route: 77

Speed: 5.799

OnTime Performance: 65.3 sec (late)

Next Stop: King & Mabury

Priority Signal: Red

Priority Status: Early

Signal ETA: 27

SecondsAgo: 2.343

Bearing: 142.7

# Performance Measure: Travel Time Comparison

Legend: Before — After — VTA Schedule — Perfect Conditions

Y-axis: Avg of 2 Months of Data Travel Time (min)
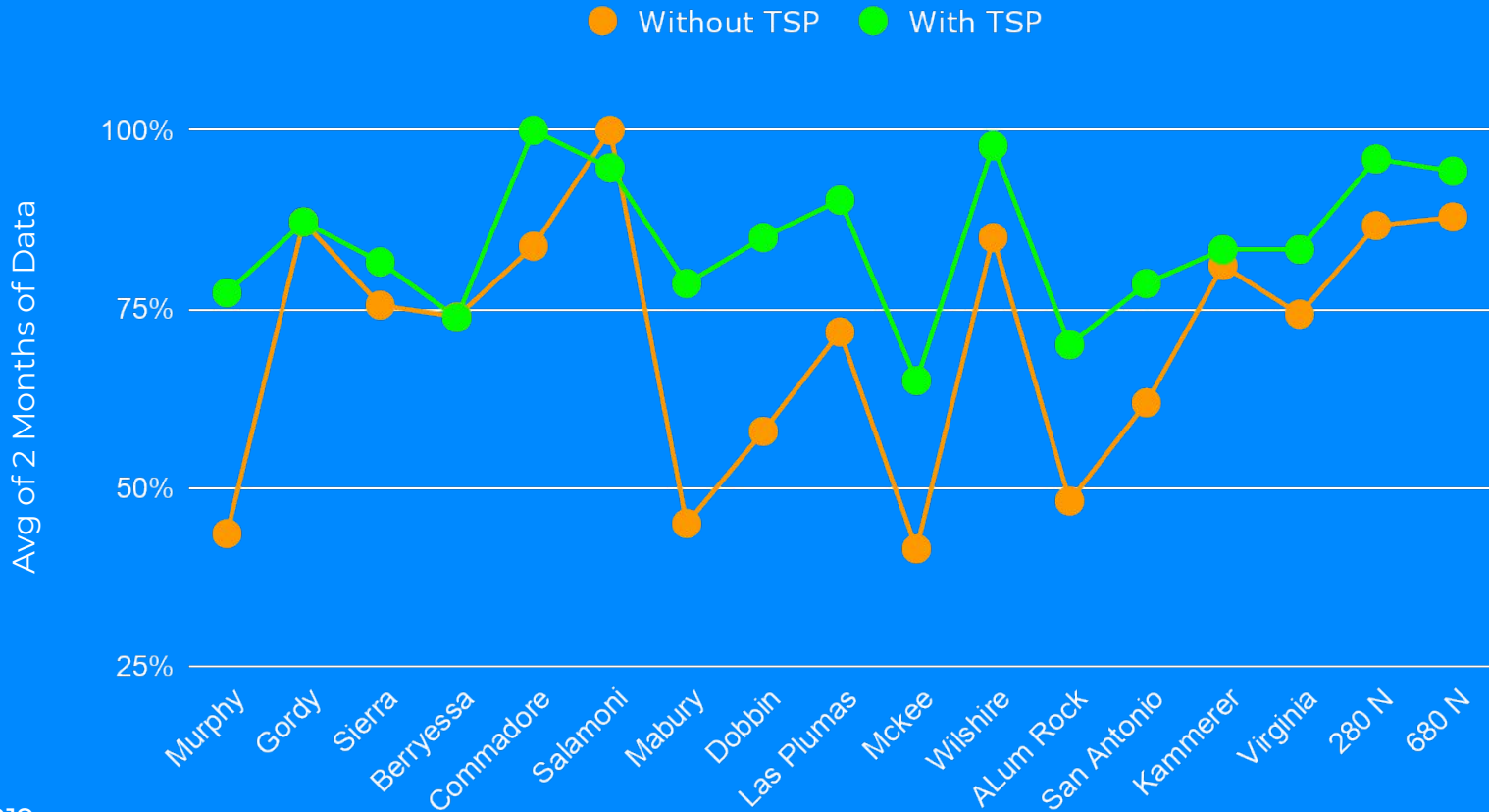X-axis: Day Time Hour

Lower Times are Better

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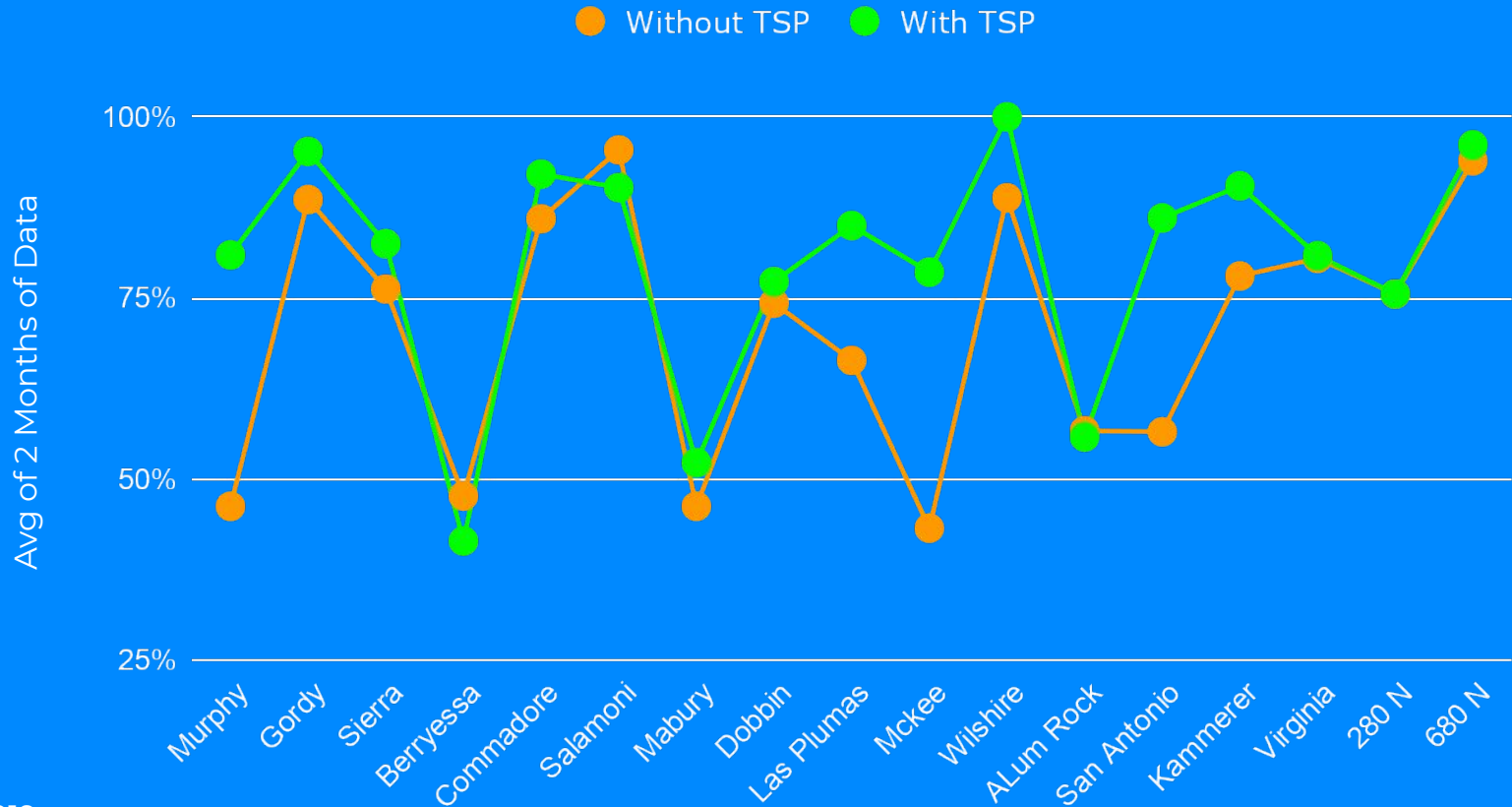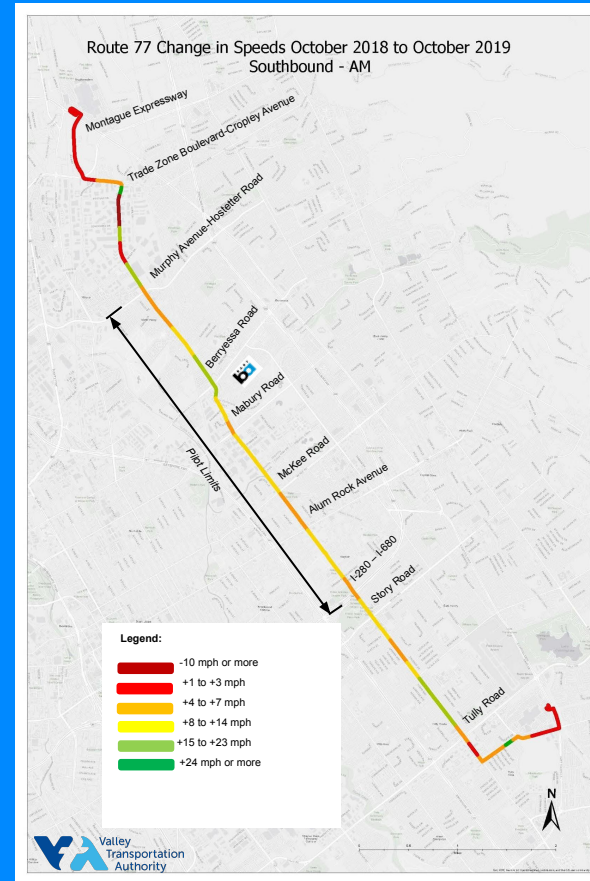# Performance Measure: Disruption to Traffic?
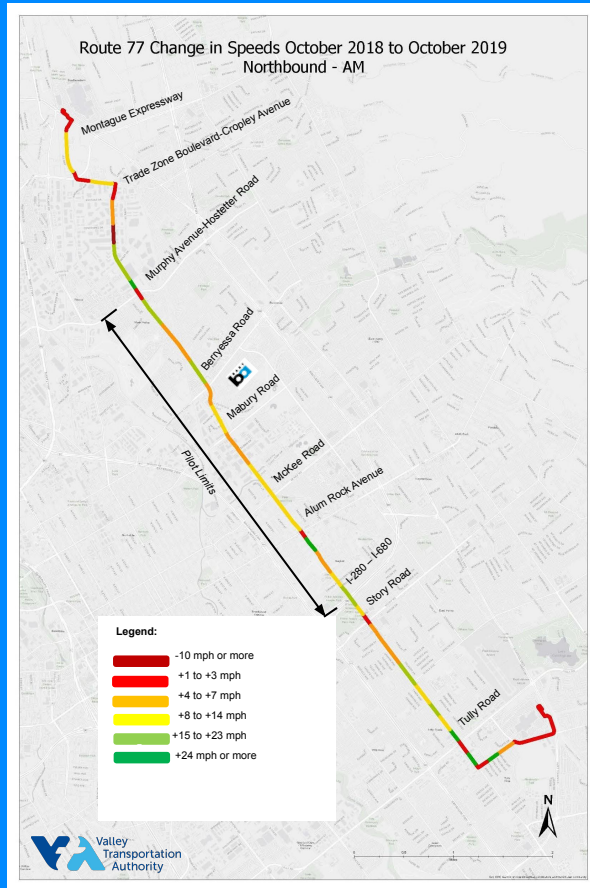


Route 77 North Bound

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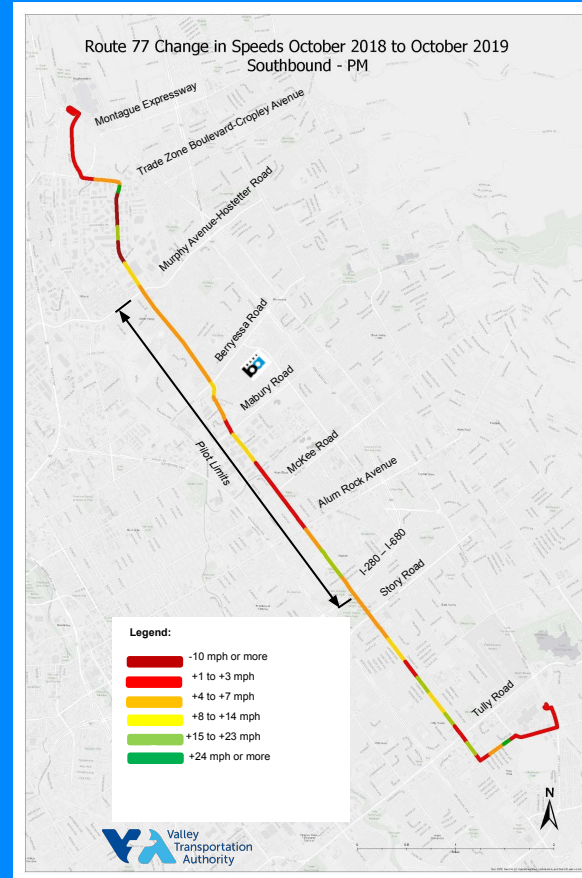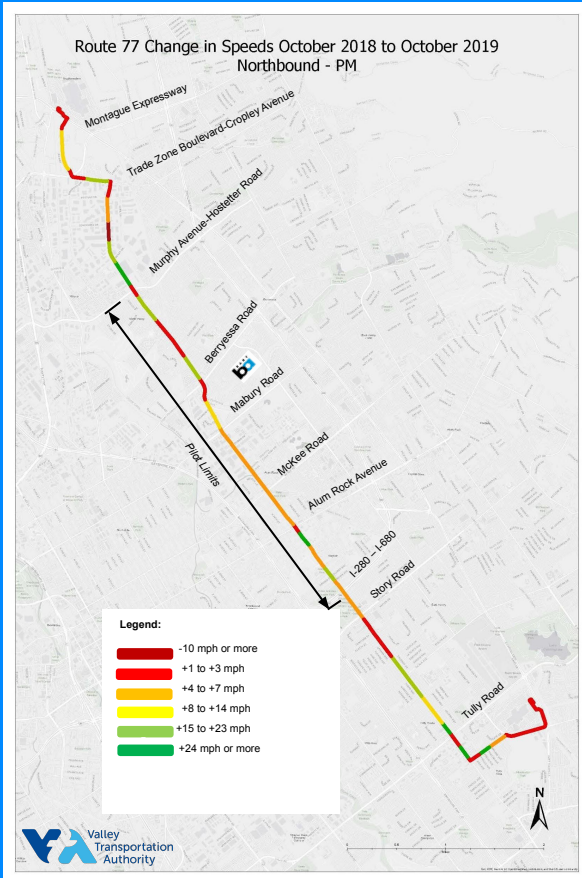Performance Measure: Percent Difference In Southbound Green Probably

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# Performance Measure: Percent Difference In Northbound Green Probably

# VTA's Independent Evaluation



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# VTA's Independent Evaluation



Route 77 Change in Speeds October 2018 to October 2019
Northbound - PM



Route 77 Change in Speeds October 2018 to October 2019
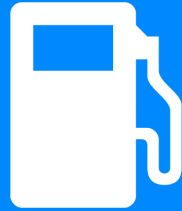Southbound - PM

**Key Findings:**
- Increased speeds
- 15% to 20% on time performance increase

# Conclusions: Potential Benefits Derived from Pilot

**20%**

**Shorter Travel Times**

**14%**

**Fuel Savings**

**12%**

**Reduction in Emissions**

**1**

**Piece of Hardware**