

Stan Caldwell, Executive Director



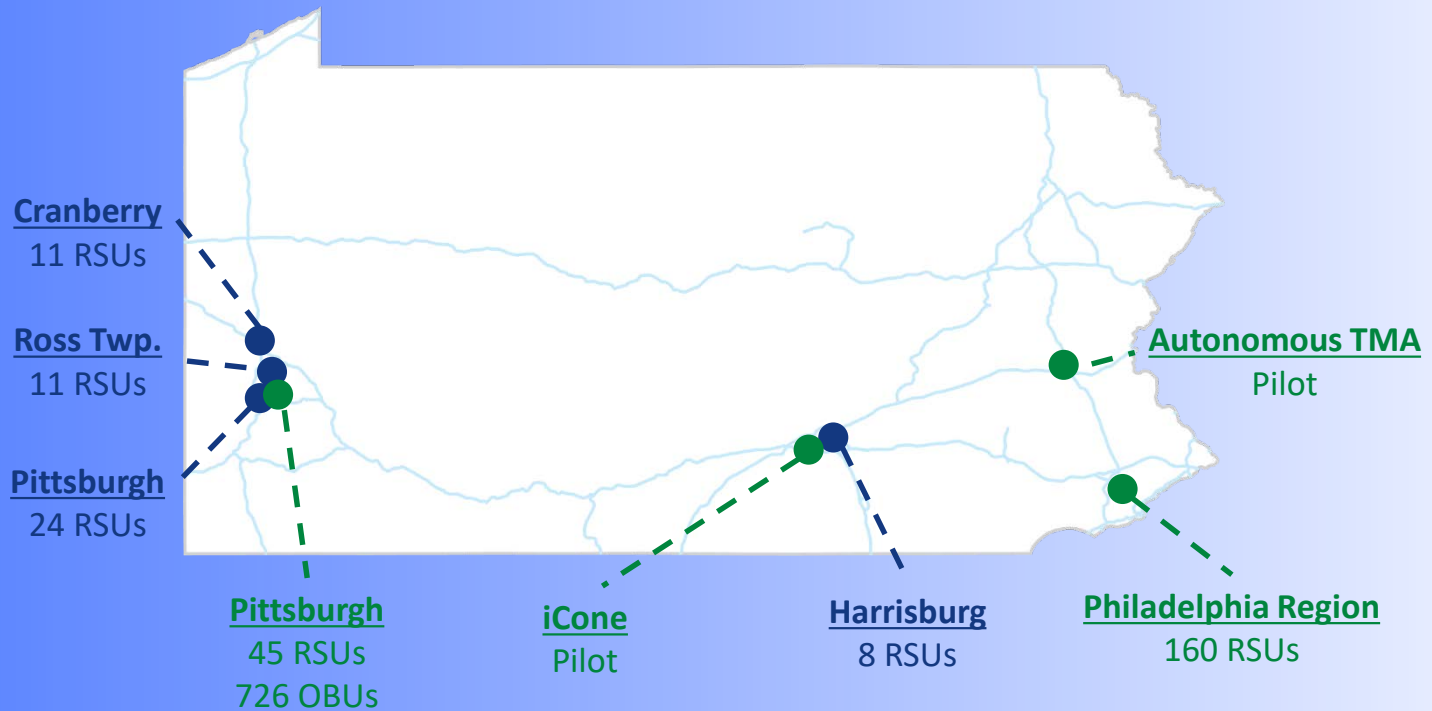
# History of the Pittsburgh CV Test Bed

- Initiated in 2012 with the First Surtrac Deployment (now 24 DSRC)
- 2014 Cranberry DSRC deployment for Shuster/Schoch AV Demo
- 2014 Signed Affiliated Test Bed Agreement with US DOT for CV
- 2016 Supported the Harrisburg Rapid CV Deployment
- Partnered with the City of Pittsburgh on the US DOT Smart City Challenge and Subsequent ATCMTD Grant to Develop the Smart Spines
- Developed the OPERA Wireless City Plan

# V2I Deployments

CURRENT

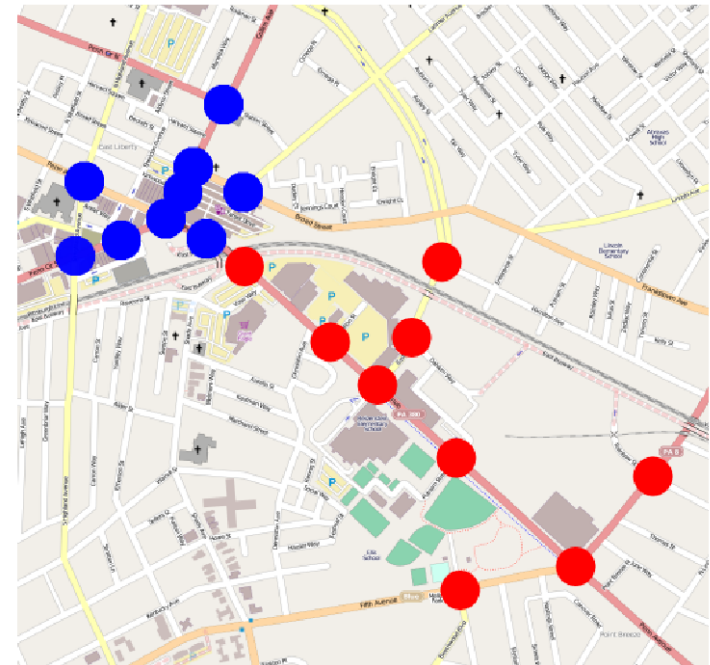
PLANNED



# Results of 2nd Phase Deployment

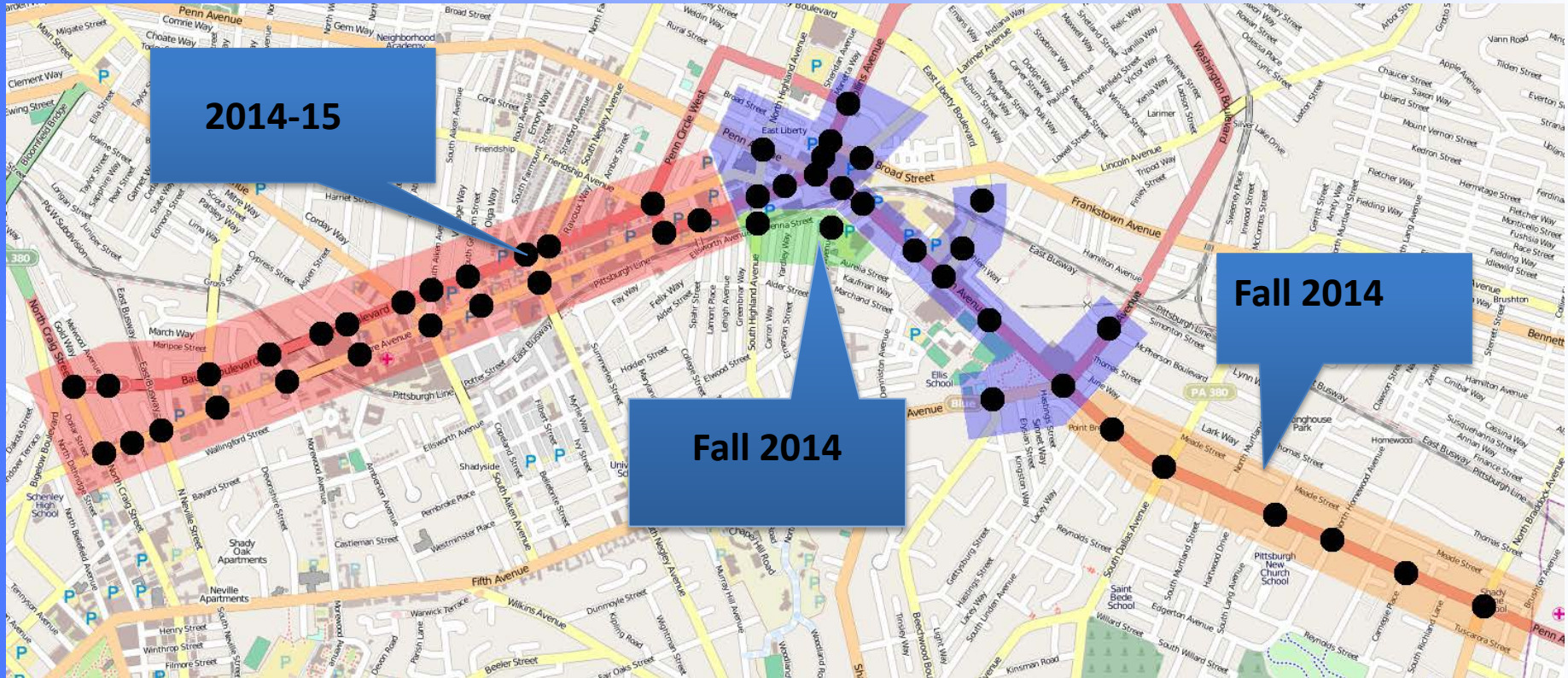
## Bakery Square Expansion (Nov 2013)

<b>% Improv.</b>	<b>Travel Time</b>	<b># of Stops</b>	<b>Wait Time</b>	<b>Emissions</b>
AM rush	17.02%	33.81%	32.76%	16.21%
Mid Day	21.35%	37.23%	38.09%	17.62%
PM rush	28.61%	44.87%	46.40%	24.77%
Overall	24.07%	40.39%	41.54%	20.67%



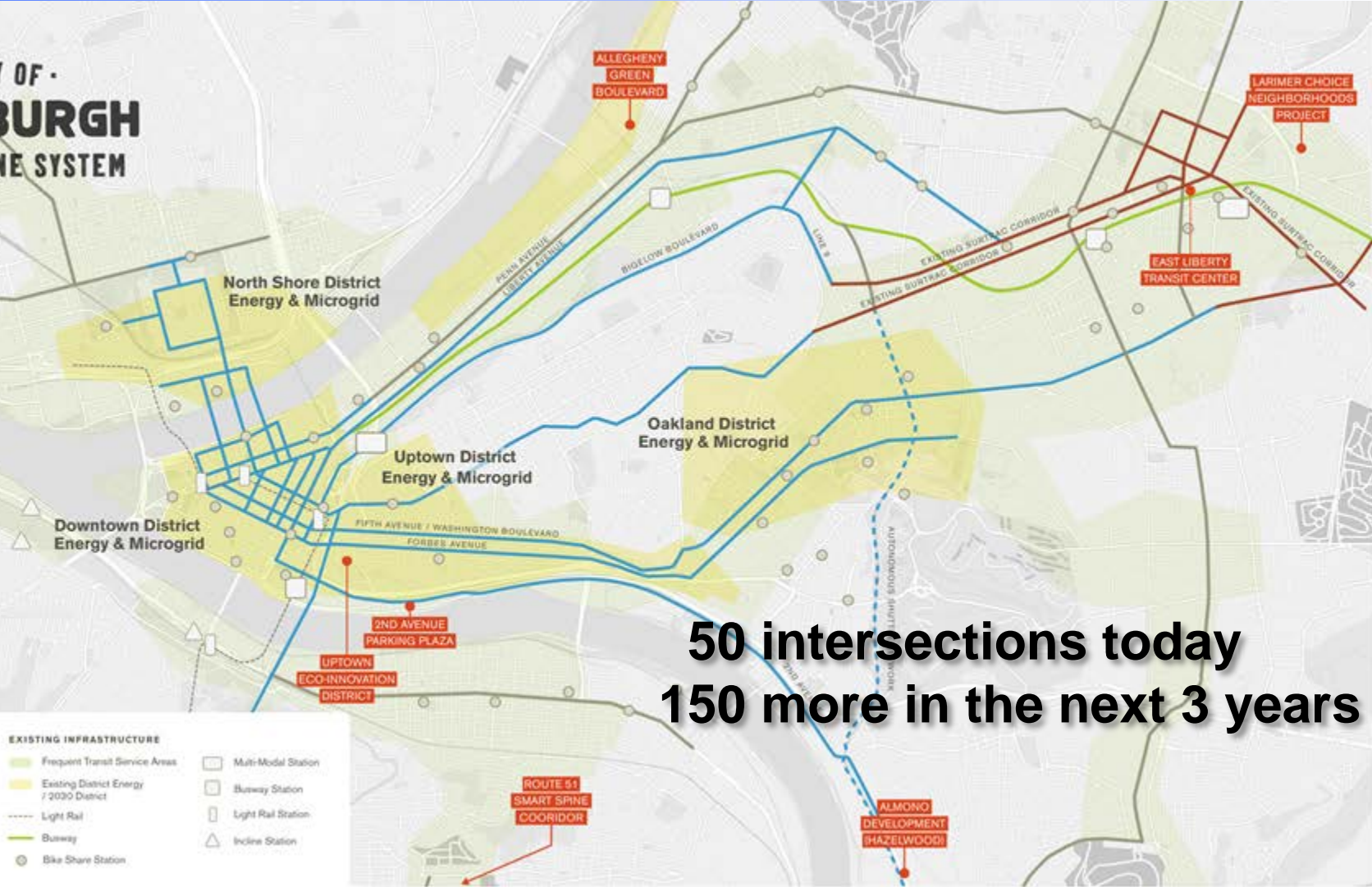
# Surtrac Adaptive Signal Control Expansion

(49 intersections)





**CITY OF  
PITTSBURGH  
SMART SPINE SYSTEM**



**50 intersections today  
150 more in the next 3 years**

PROPOSED INFRASTRUCTURE	EXISTING INFRASTRUCTURE	STATION TYPES
— Proposed Smart Spines	■ Frequent Transit Service Areas	□ Multi-Modal Station
- - - Future Smart Spines	■ Existing District Energy / 2030 District	□ Busway Station
— Existing Smart Spines	- - - Light Rail	□ Light Rail Station
	— Busway	△ Incline Station
	● Bike Share Station	

# LED Neighborhood Streetlight Replacement



**High Pressure Sodium**

Los Angeles' Hoover Street before ... Credit: Los Angeles Bureau of Street Lighting

**LED**

... and after the conversion to LED street lighting. Credit: Los Angeles Bureau of Street Lighting

# Pittsburgh Demonstration

9-4-14



**33 miles along Route 19 in multi-lane, dense traffic with lights and two interstate highways**



# Connected and Autonomous Vehicles 2040 Vision



# Autonomous Vehicles



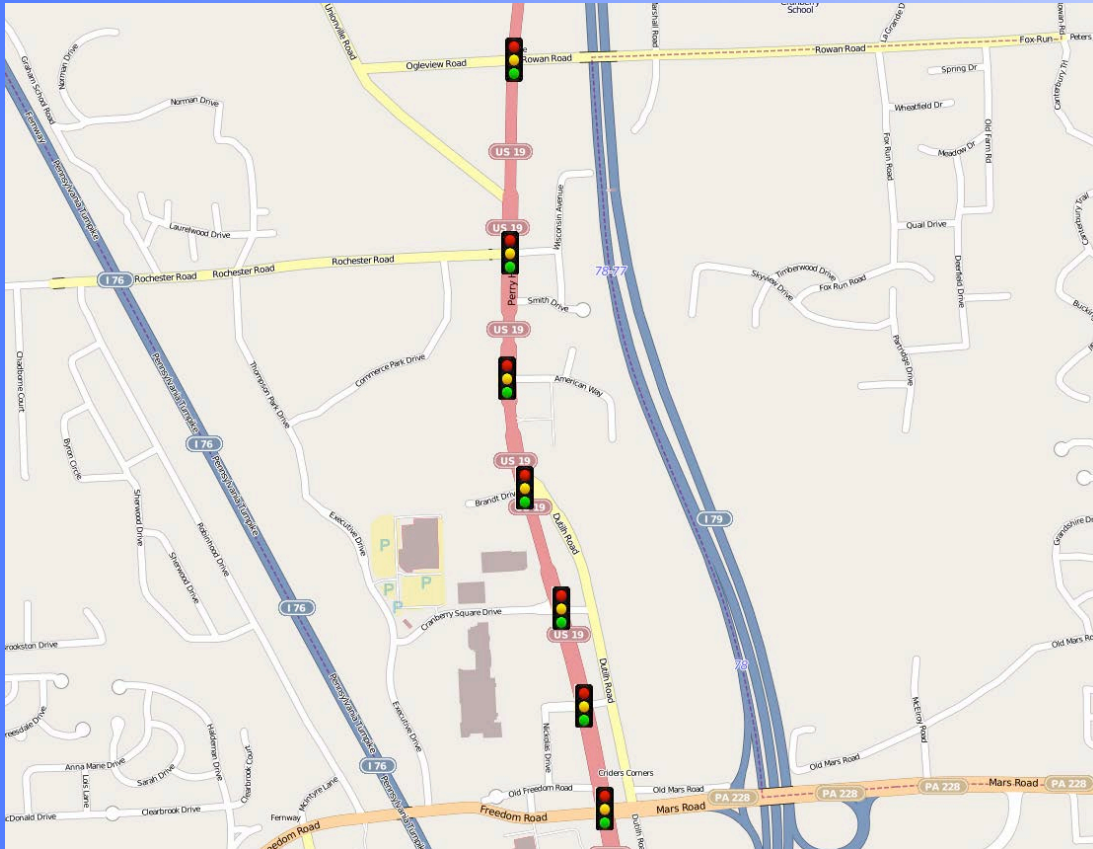
2007 GM Lab

2012 GM Lab



Carnegie Mellon

# V2I Infrastructure near Pittsburgh



## Cranberry Township, PA

- Located 20 miles north of Pittsburgh, PA
- 1.8 mile stretch along Rt. 19 corridor
- 11 intersections are instrumented



# Uber Cars: September 15, 2016 Post Gazette Photo





# AVs in Pennsylvania



Carnegie Mellon University



DELPHI

ARGO AI



Royal TRUCK & EQUIPMENT, INC.

2016 Pittsburgh Designation by  
US DOT as an AV Proving Ground

What's Next?



# OPERA

Open Pittsburgh wirEless Research Accelerator





# Smart Belt Coalition



## Attributes:

4 Distinct Seasons

Urban & Rural Roadways

Multi-jurisdictions

## Priorities:

Freight

Work Zones

Traffic Incident Mgmt.