The Eastern Transportation Coalition

Transportation Data Marketplace

TDM Validation Technical Advisory Committee Meeting

April 12, 2022

Welcome to the Meeting!

- VIDEO - You are welcome to turn on your camera by pressing the camera icon in the bottom left corner of your screen

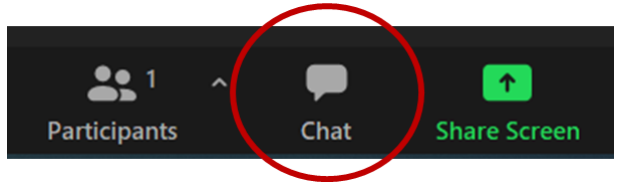
- AUDIO - Please select **ONE** of the following audio options:
    1. **Computer: Use your computer speakers and microphone by clicking the "Join Audio button at the bottom left of the screen (Preferred method of audio)**
    2. **Phone:** Call into the meeting by dialing the phone number based on your location (provided in the confirmation email) and enter the Meeting ID at the prompt

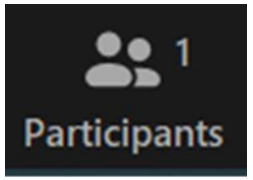
- **This web meeting is being recorded for internal use.**
- **Questions** with the audio or web? Please contact Esther via the Chat Box or email (ekleit@kmjinc.com)

Asking Questions

In the Chat Box

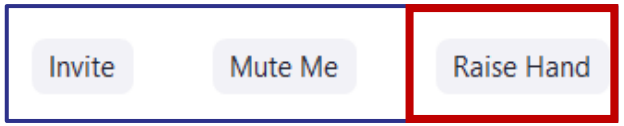
- You may pose your questions using the Chat Box. Click on the chat icon at the bottom of your screen
- The questions in the Chat Box will be monitored and answered at the end of each section.
- When responding to a message in the Chat Box, please indicate who you are referring to using the "@" symbol (ex. @John)





Verbally

- Please raise your hand *(click on the participants button at the bottom of the screen then scroll down to the bottom of the list of participants, and click on the "Raise Hand" button)*, and the host will call on you.



- Please give your name and agency before asking your question

- **Please mute yourself when you are done asking a question**

While you are not speaking….
Please confirm you are **MUTED**

Using your computer audio? Mute your computer mic

Using your phone? Mute your line

Thank
You!

Welcome and Introductions

Stan Young, PE, PhD
Chief Data Officer,
The Eastern Transportation Coalition

Zach Vander Laan,
Faculty Specialist
University of Maryland CATT

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CONNECTING FOR SOLUTIONS

Today's Agenda

1. Welcome and Overview of the TETC TDM Validation TAC
2. TAC Business - Priorities and Emphasis for FY 2022-23
3. Presentation of VPPII Validation Results
   - Georgia - Results on Urban Arterial in Downtown Atlanta
   - Pennsylvania - First Look at Tunnels and Construction Zones
4. Wrap Up and Next Steps

Welcome and Overview

Welcome and Overview

- Introductions - North to South
- What are you most looking forward to in 2022?

The Coalition Transportation Data Marketplace

The Coalition's Transportation Data Marketplace, uses our economies of scale to:

- Give members access to transportation data from market leading companies
- Provide multiple vendor offerings at **discounted prices**
- Establish strong agency focused data use agreements
- Validate, control and assess the quality of the data through a rigorous process guided by a Coalition Technical Advisory Committee
- Push the innovation envelope of turning data into actionable information

The Eastern Transportation Coalition's Transportation Data Marketplace has its origins in the Vehicle Probe Project (VPP) which began in 2008 with the primary goal of providing Coalition members with the ability to acquire reliable and real-time travel time & speed data for their entire roadway network without the need for sensors and other hardware. The Coalition's current effort, the **Transportation Data Marketplace**, is providing members the opportunity to select from a host of prequalified vendors to provide data in **six different categories** including Travel Time & Speed, Volume, Conflation, Waypoint, Origin-Destination, and Freight Data.

2008 Vehicle Probe Project

ONE vendor
Travel Time & Speed Only

2014 VPPII Marketplace

THREE vendors
Travel Time & Speed Only

2022 Transportation Data Marketplace

6 Dataset Types – 13 vendors:

- ❑ **Travel Time & Speed Data**
- ❑ **Volumes Estimates**
- ❑ **Conflation Datasets**
- ❑ **Waypoint Data**
- ❑ **O-D Data**
- ❑ **Freight Data**

Data Sharing:

- The data is still subjected to rigorous validation for reliability under the guidance of TETC Technical Advisory Committee.
- Transportation data procured through the TDM, regardless of vendor, is available to each of the participating agencies providing a truly shared effort.
- Governed by a Data Use Agreement, sharing critical data with cities, counties, MPOs and adjoining member states is enabled.
- Participating member agencies are also able to share access to the data with local planning organizations and consultants/contractors working for the agency.

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tetcoalition.org

For questions regarding the Traffic Data Marketplace or to obtain more information, please contact Denise Markow, TSMO Director at the Eastern Transportation Coalition (dmarkow@tetcoalition.org).

Growth over the Years

In 2008, the marketplace began by providing data on approximately 1500 centerline miles of freeway and 1000 centerline miles of non-freeway roadways.

As of June 2020, the marketplace had grown so that it reported on over 11,000 freeway centerline miles and over 98,000 non-freeway centerline miles.

Centerline Miles of Roadway

- 2008 – 1500 freeway miles, 1000 non-freeway miles
- 2011 – 2484 freeway miles, 4580 non-freeway miles
- 2013 – 7000 freeway miles, 27,000 non-freeway miles
- 2015 – 9386 freeway miles, 34159 non-freeway miles
- 2019 – 10,400 freeway, 86,540 non-freeway miles across 10 states
- 2020 – 11,790 freeway, 98,614 non-freeway miles across 11 states

Growth in Data – as of 2020

- 8 Billion measurements every single day
- Estimated over 35 trillion speed measurements since the project began

TDM - Building on the past

2008

- ❑ Established the first and largest multi-jurisdictional (East Coast Wide) Traffic Monitoring System sourced with Industry data
- ❑ Moved from Level of Service (A through F) to **travel time and reliability**
- ❑ Data Licensing Provisions (One buys, All share) that became industry standard
- ❑ Standards based procurement
  - Established accuracy, latency, availability standards for probe-based traffic data
  - Developed validation methodology and program – remains industry gold standard

2014

- ❑ Established **multi-vendor marketplace**
- ❑ Speed/travel-time standards extended to signalized roadways
- ❑ Allowed for **ancillary products**

Validation Program - 2022 Forward

Validation Program to focus on new data items / vendors in the TDM

Under the direction of Validation Technical Advisory Committee (TAC)

- ❑ Representatives from participating states
- ❑ Type, Frequency, Method and Location adjusted to concerns
- ❑ Periodic reporting or results
- ❑ Coalition will carry out program
- ❑ Better align members concerns with validation program
- ❑ No longer a ‘static’ process – shaped based on TDM needs

Conflict Resolution - <u>NEW</u>

- ❑ Vendors issues escalated through Coalition
- ❑ Coalition to mediate for acceptable solution (see RFP)
- ❑ Committee recommends necessary action

Introducing the TAC Chair

Mike Fontaine, PE, PhD
Associate Director
Virginia Transportation Research Council
Virginia DOT

TAC Business

Priorities and Emphasis for FY 2022-23

TAC Business – Priorities & Emphasis

- Organization of the TAC
  - Similar to pooled fund study
  - All Member States can attend
  - States that contribute resource have voting power
  - Chairing the TAC, yearly… July through June

- Charge and Responsibilities of the TAC
  - Prioritize and allocate resources to validation efforts
  - Share/discuss quality/accuracy concerns of products/vendors
  - First level of dispute resolution

Validation Priorities in 2022/2023

- Emphasis Areas moving forward
  - Provide data clearinghouse across **all six offerings**
    - Detailed cross-comparisons, references, sample-data
  - **Volume** validation
    - Literature review / synthesis of volume quality
    - Develop approach, methodologies and measures
    - In partnership with state(s), establish initial validation, 'bake-off'
  - **Origin Destination** Data
    - Literature review / synthesis of OD quality
    - Develop comparative approach
  - **Other** – quarterly updates from TAC feedback

Concept of Volume Validation

Partner with Coalition State

- Leverage rich mixture of continuous counters and temporary counts
- Include some deployable units – targeting expected areas of volume fluctuation
- Provide vendors history of continuous count data for calibration
- Run for four weeks – compare results with reference counts, consistency, and any dynamic fluctuations

Quarterly Targets / Pace

Current Quarter Apr 2022 – Jun 2022	Next Quarter: Jul 2022 – Sep 2022	Next Quarter: Oct 2022 – Dec 2022	Next Quarter: Jan 2023 – Mar 2023
TAC Meeting – April 12	TAC Meeting – July 2022	TAC Meeting – Oct 2022	TAC Meeting – Jan 2022
TAC Overview	PA Travel Time Results	Volume test results	Travel Time Results?
GA Travel Time Results	Volume lit review	OD Lit review	OD test plan
TAC Organization	Volume test plan		
Discussion of Priorities	TDM data comparison		
Activities – to Jun 30	Activities – to Sep 30	Activities – to Dec 31	Activities – to Mar 31
Complete PA report	Initial volume test	Plan 2nd volume test	Initial OD test?
Test volume sensors	OD lit review	Traditional validation?	Plan second volume?
Volume lit review		OD test plan?	Other?
Volume test plan		Other?	
TDM data comparison			

Discussion and Feedback

- State Roll Call -

  Top 2-3 priorities

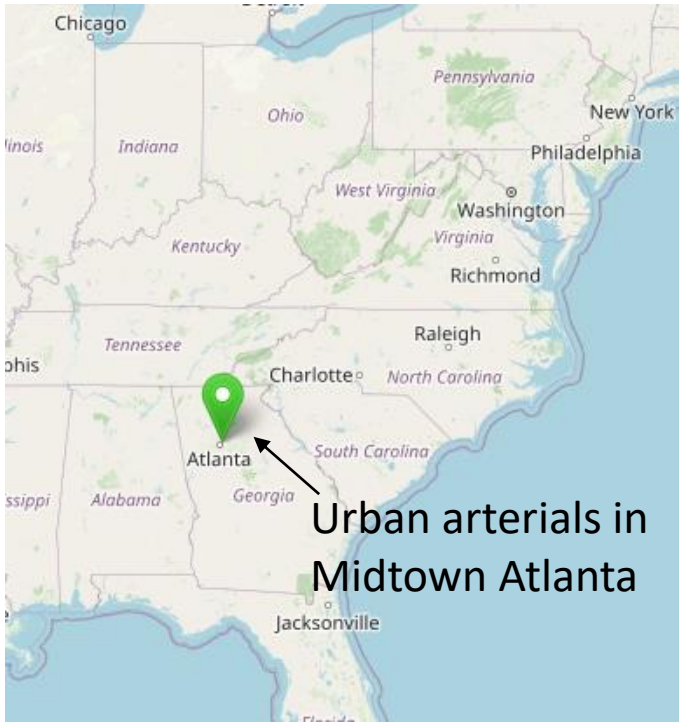
Presentation of VPPII Validation Results

Georgia & Pennsylvania

Presentation of VPPII Results

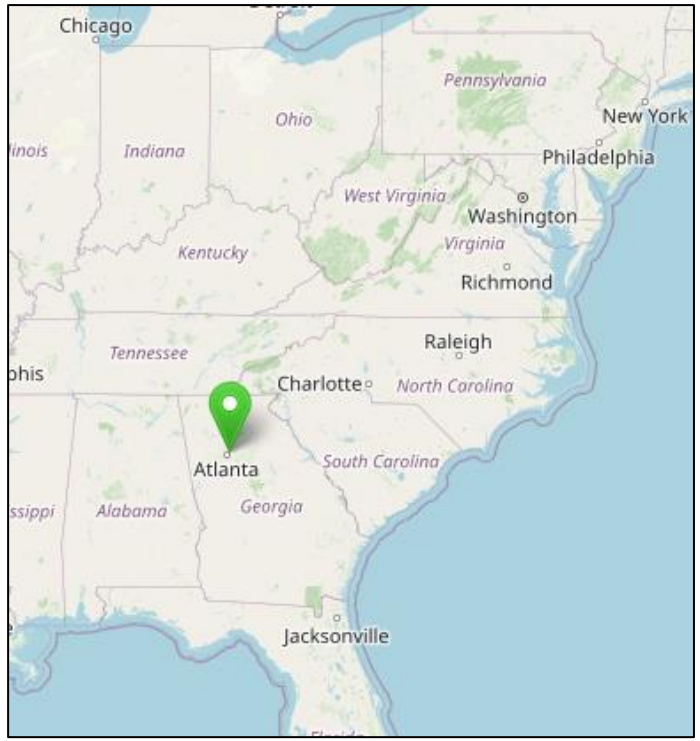
- All VPPII validation activities are focused on travel time & speed

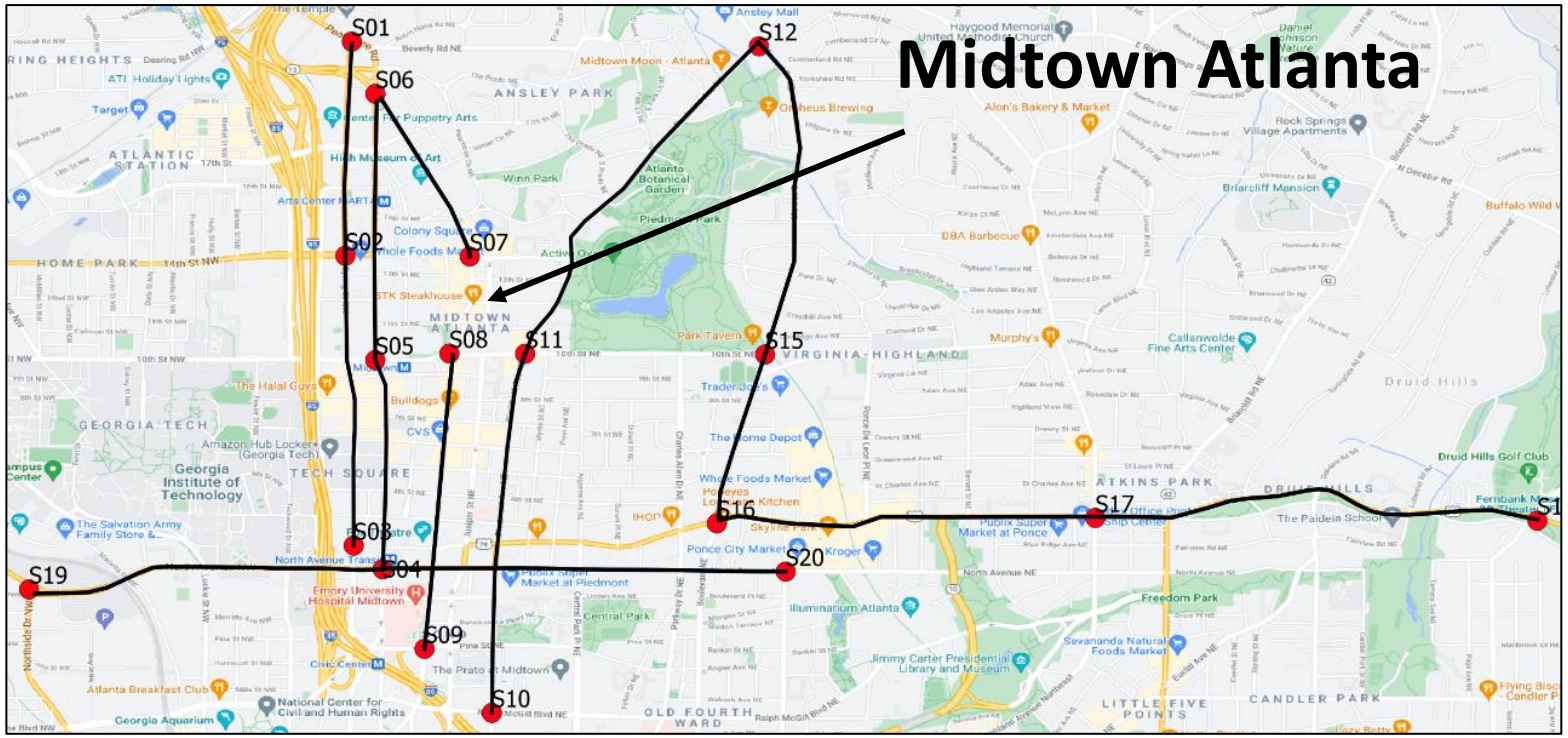
Georgia (Fall 2021)



Pennsylvania (Fall 2021)

GA - Study Area (Urban Arterials)





GA - Study Area Description

- Low speed, high signal density with many access points
- **Local, rather than through traffic differentiates these arterials from most previous studies**
- Previous arterial validation recommended three signals per mile or less

ES Table 1 - Arterial Corridor Description

Name	Signals / mile	AADT (bi-directional)	Speed Limit	Miles (directional)
Spring St NW	7.1	22.2k	35 mph	1.70
W Peachtree St NW	10.1	22.9k	35 mph	1.59
Peachtree St NE	10.1	16.0k	25 mph	3.17
Piedmont Ave NE	4.8	21.6k	35 mph	2.49
Monroe Dr NE	5.1	24.0k	30 mph	3.34
Ponce De Leon Ave NE	5.1	38.9k	35 mph	4.71
North Ave NW/NE	7.0	29.1k	35 mph	4.27

GA - General Observations

1. **Reference data was sparse** on many segments due to lack of through traffic.
   - Several segments had to be omitted (insufficient reference data density)
   - Validation segments were split into shorter subsegments. (accuracy vs density tradeoff)
   - **Scenario represents a corner case** beyond the 2014 intent of probe data

3.1.6.4	Accuracy requirements will be in effect for vehicle flows exceeding 500 VPH of through traffic for Major Arterials.	**HD/E**
3.1.6.5	Maximum data latency shall be less than or equal to eight (8) minutes.	HD/E

2. **Visual inspection of plots was more informative** than traditional error analysis

3. **Several data issues emerged** upon detailed inspection, related to congestion detection, latency/missing data in real-time feeds.

GA - Findings

- **All vendors met expected average accuracy levels** (AASE and SEB)
  - Not a 'high hurdle' to clear with sparse nature of the reference data & slow speeds
  - Slowdown analysis reflected general ability to effectively reflect congestion

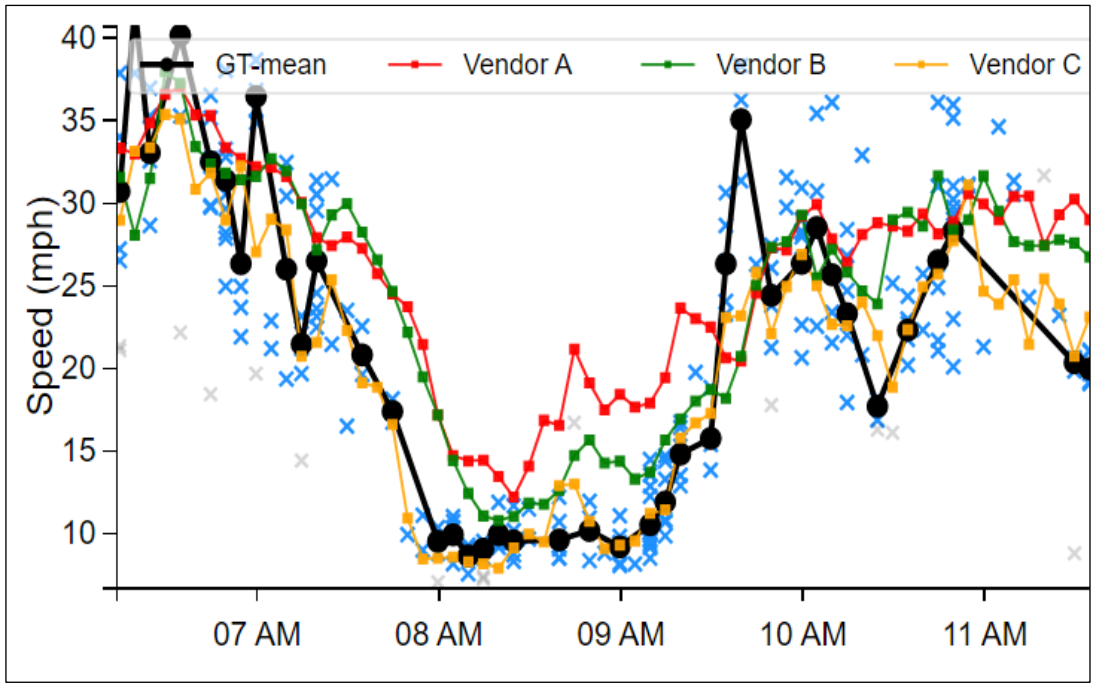
- **Urban arterials expose limitations to validation methodology & quality specifications**
  - Bluetooth only captures through traffic – lots of local access
  - Specs need attention (wide confidence bands, slowdown definitions)

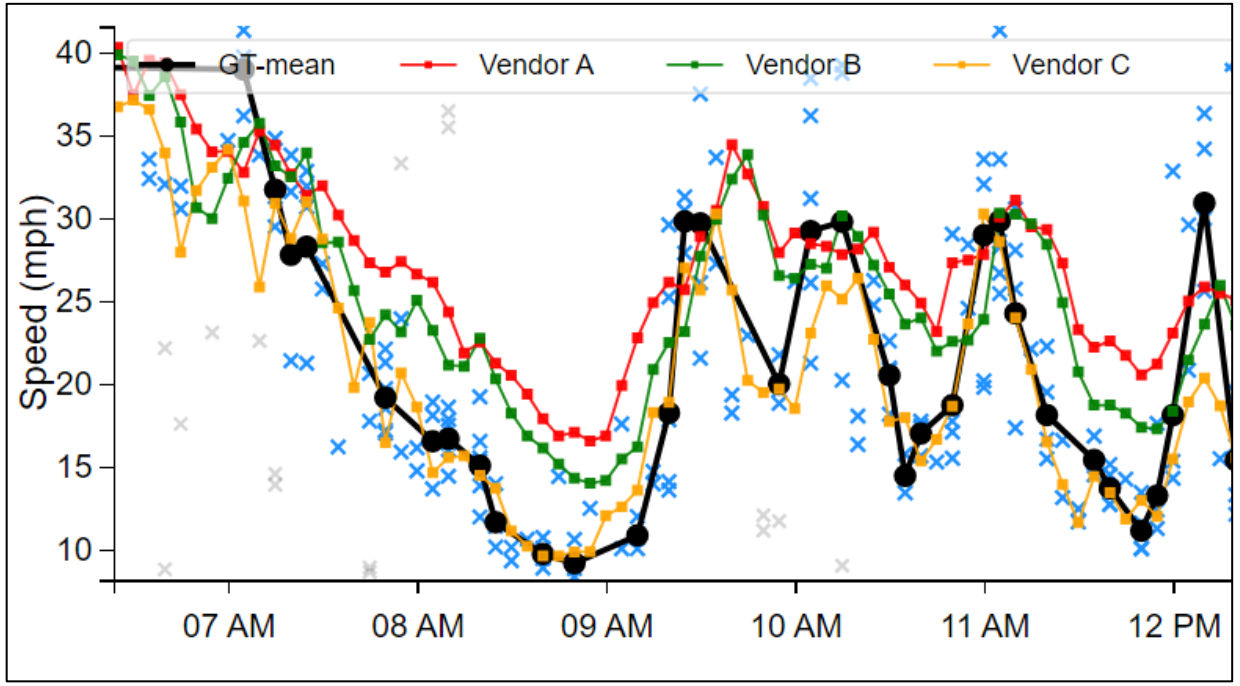
- **One vendor had many instances of missing data in various locations and time periods**
  - Misreported road closure events
  - Random API network / timeout issues during real-time recording

  *****This is the only vendor providing confirmed real-time data*****

GA - Findings (Slowdowns)

- **Key differences in how the vendor data feeds respond to congestion events.**

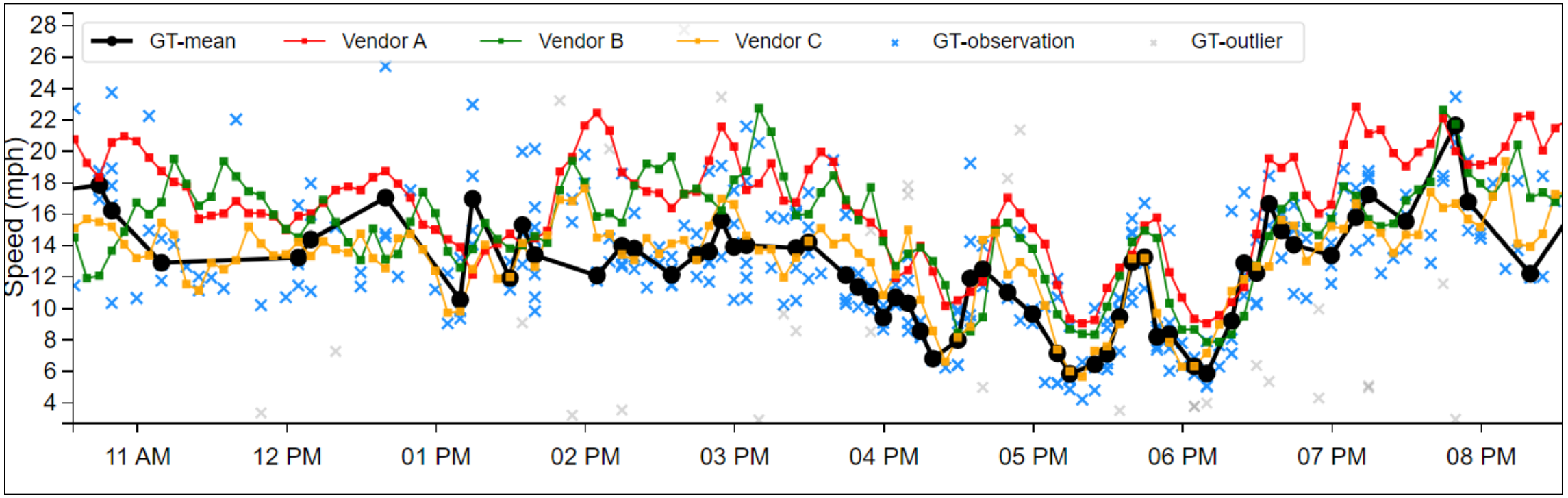




Vendor A and Vendor B exhibit latency, as common in some real-time systems. Vendor C has no latency, and in some cases pre-emptively identifies changes in speed before the reference data.

GA - Findings (Optimistic/Pessimistic)

- **When traffic speeds were bimodal or distributed over a wide range of values, data vendors differed in whether they favored "optimistic" or "pessimistic" values**



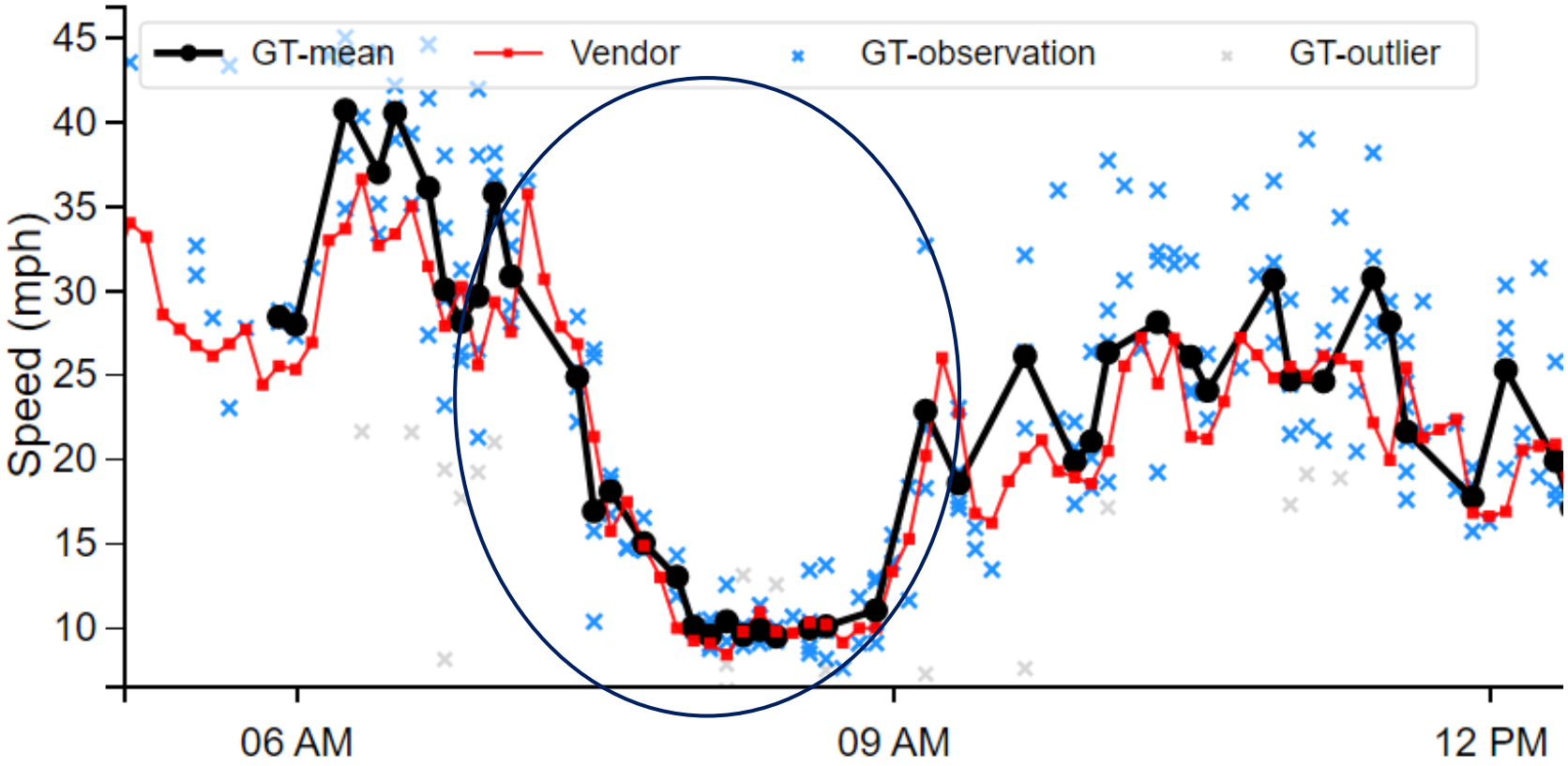
GA - Slowdown Analysis

- **Classification criteria stretched to its limits in this evaluation** (keep in mind)
  - Slowdown analysis was initially conceived to evaluate vendors on high-speed, high-volume arterials
  - Attempted to apply scoring criteria as published, but low-speed, highly signalized roads proved challenging
- **Noticeable difference in slowdown analysis results across vendors. But….**
  - All vendors registered noticeable speed drops for each event, even when classified as "Fail to Capture"
  - There are differences in data delivery and segmentation that may play a role

Vendor	Slowdowns	Fully Captured	Partially Captured	Failed to Capture
A*	13	5	4	4
B	13	7	6	0
C	13	13	0	0

* Vendor A was the only vendor whose data was confirmed to be recorded in real time.

Fully Captured Example

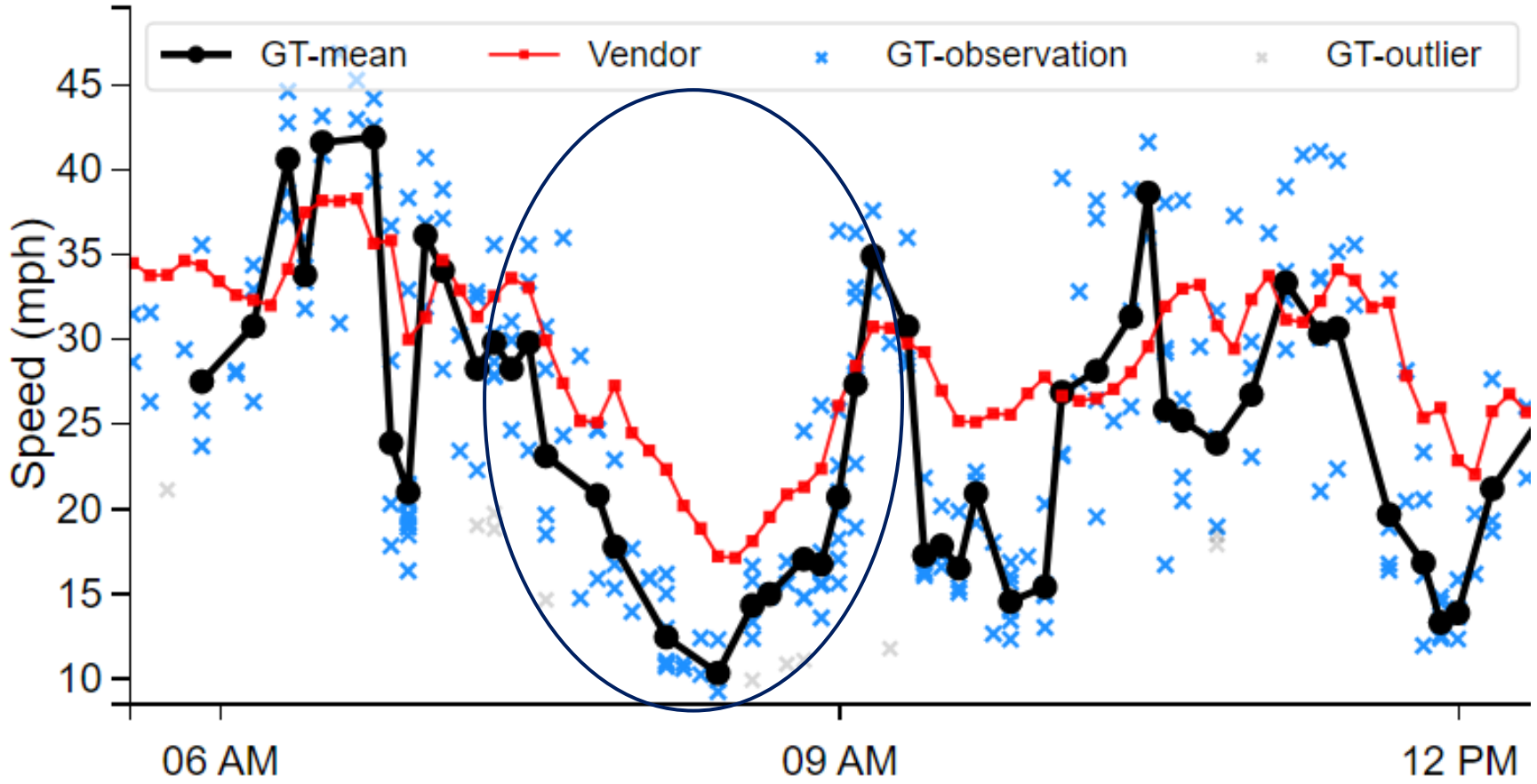


Fully Captured

Δ magnitude < 20% ✓

Δ duration < 20% ✓

Partially Captured Example

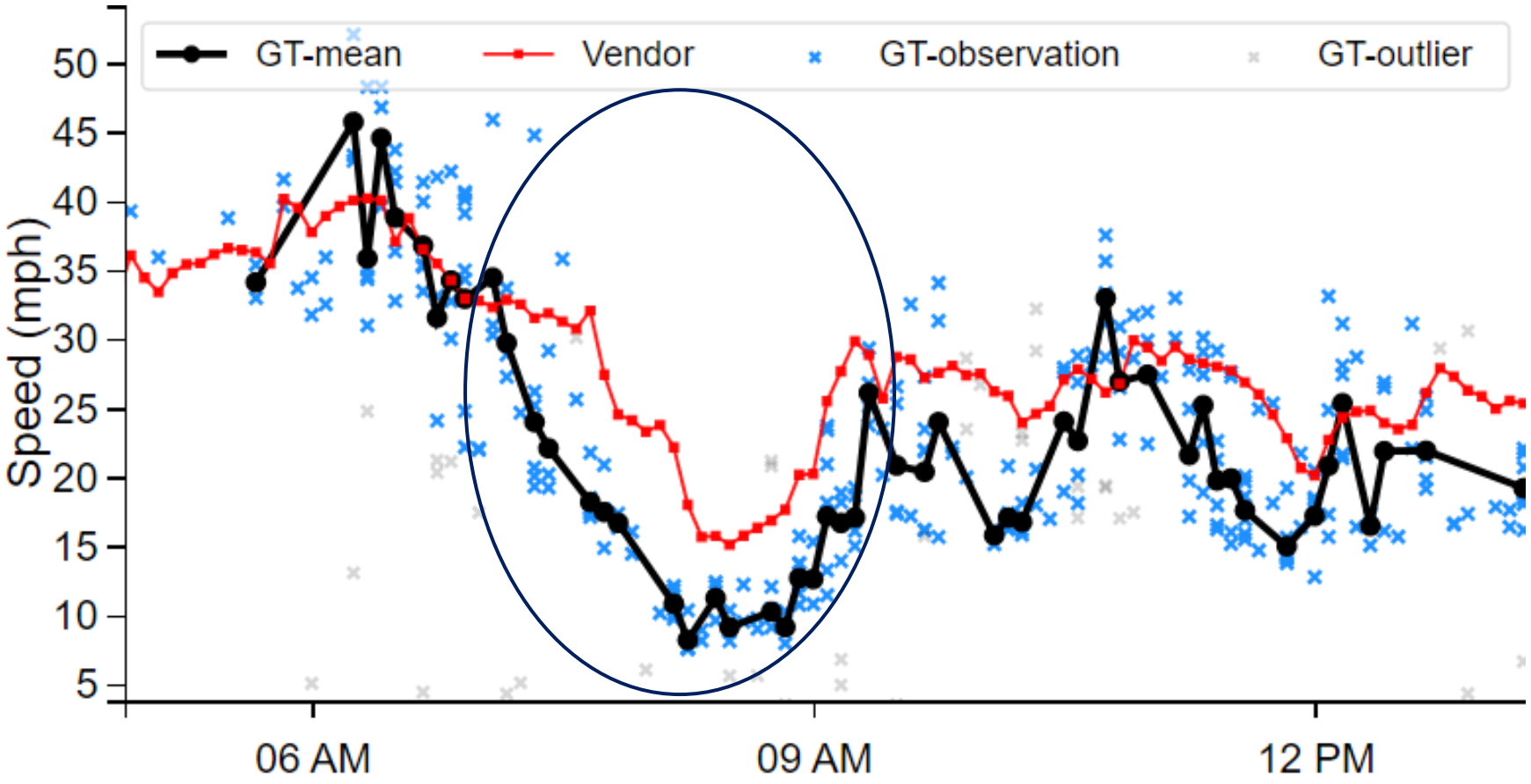


Partially Captured

Δ magnitude < 20% ✗

Δ duration < 20% ✓

Failed to Capture Example



Failed to Capture

Δ magnitude < 20% ❌

Δ duration < 20% ❌

- Captures trend of slowdown despite FTC classification
- FTC classifications in this study were far better than in previous years

GA - Recommendations

- **Appropriate expectation, specifications, and testing methods are needed for urban arterials.**
  - Plan to engage TAC with these ideas

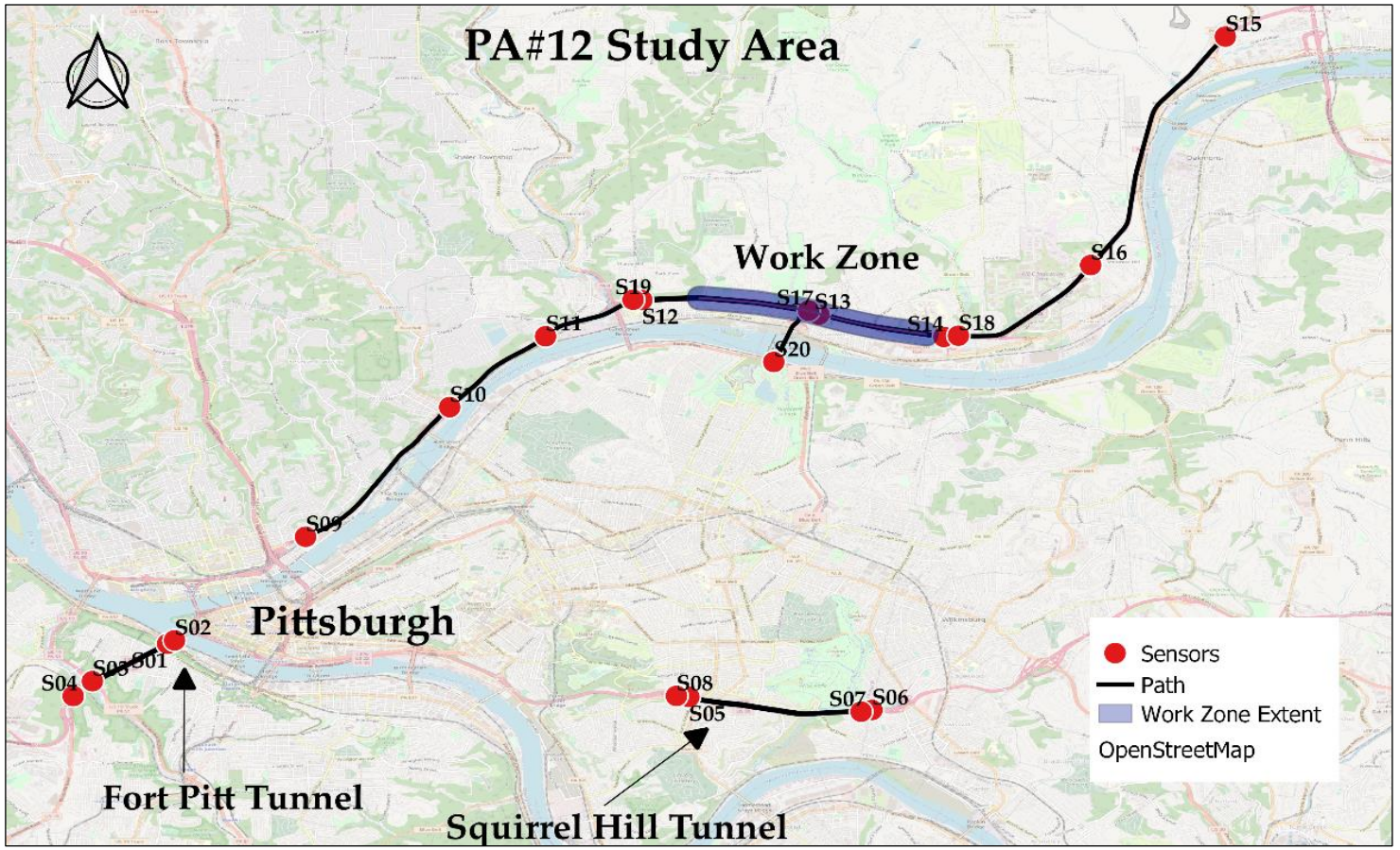
- **Recommended modifications to testing:**
  - Develop specifications in specific to travel time (not speed) to reflect these slower facilities
  - Invest in re-identification sensors that can capture a higher percentage of traffic
  - Concentrate on roadways / periods with known traffic disruptions (quality over quantity)

- **Develop a standard vendor data delivery mechanism that ensures validation is on real-time (as opposed to archive) data feeds.**

PA - Study Area (Tunnels & Work Zones)

Dates: October 26 – Nov 6, 2021

Corridor	Lanes	AADT	Speed Limit
I-376 (Tunnels)	2-4	95.8k	50-55 mph
PA-28 (Work zone)	1-4	54.0k	45-55 mph



PA - Preliminary Observations

1. **Dense reference data - able to characterize traffic conditions with high fidelity**
   - High volume roadways without many access points – minimal lost through traffic
   - ~ 5% penetration rate

2. **Both tunnel and work zone scenarios contained non-trivial traffic conditions**
   - Recurring and non-recurring congestion associated with busy urban freeways
   - Work zone traffic patterns may deviate from historical patterns

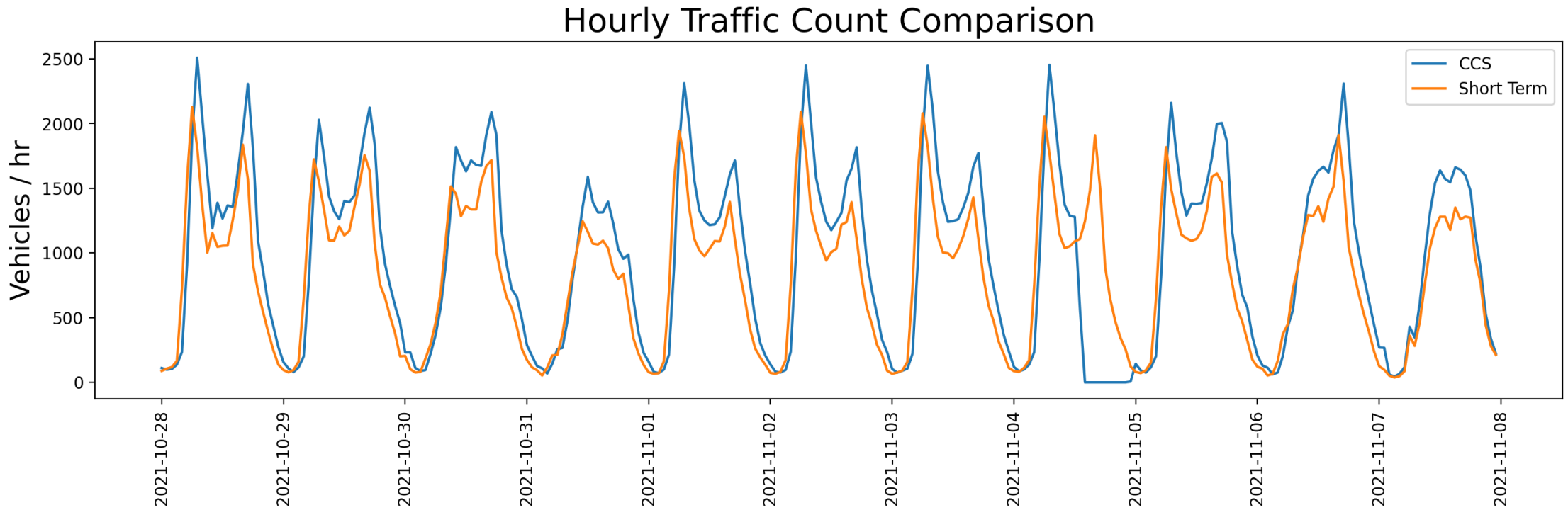
3. **Traditional error measures work well for this study area**
   - Traditional analysis was designed for freeway facilities and speeds
   - Not an edge case, but challenging mainstream

Preliminary analysis shows high accuracy by all 3 vendors – also volume checks

4. **Visual inspection also useful for understanding traffic patterns and evaluating performance**
   - e.g., did vendors capture progression of congestion across segments?

PA – Count Data Collection

- First attempt at measuring traffic counts -- placed sensor near Continuous Count Station
- Ability to capture traffic counts will be essential to future Volume validation activities



Next Steps

Proposed Deliverables – Next TAC

- Next TAC meeting - July 2022
- Agenda
  - **Final VPPII Validation - PA**
  - Product/Vendor briefing material
  - Volume accuracy literature review
  - Results of initial volume accuracy runs
  - Prep activities for State specific volume test
- Update on targets and priorities – TAC feedback
  - Budget update on resource, target activity alignment
  - Next quarter targets

Wrap Up

QUESTIONS?

Thank You!

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