Volume & Turning Movements Project

Steering Committee Meeting #2

October 13, 2016

Introductions

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Other Project Contacts

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Steering Committee Coordinator: Joanna Reagle (KMJ Consulting), 610-228-0760 or jreagle@kmjinc.com

Attendees

Agency	Representative	Agency	Representative
Colorado DOT	Erik Sabina	South Carolina DOT	Michael Dennis
DVRPC	Jesse Buerk, Zoe Neaderland	Virginia DOT	Mena Lockwood, Mike Fontaine (VTRC)
FHWA	Chandra Bondize, Jimmy Chu, Tianjia Tang	USDOT	Ed Strocko
Georgia DOT	Tom McQueen, John Hibbard	HERE	Joe Guthridge, Terri Johnson
Maryland SHA	Nicole Katsikides, Glenn McLaughlin	TTI	Shawn Turner
MassDOT	Ginna Reeder	NREL	Stan Young
MWCOG	Daivamani Sivasailam, Marco Trigueros	I-95 Corridor Coalition	Trish Hendren, Denise Markow, Marygrace Parker, Patty Reich
NJTPA	Sutapa Bhattacharjee	UMD CATT	Kaveh Sadabadi, Kathy Frankle
PennDOT	Scott Benedict	I-95 Corridor Coalition (support)	Joanna Reagle
Port Authority of NY & NJ	Steve Brown, Jennifer Bates		

Please confirm that your line is muted

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Thank you!

Agenda

- Project overview/objectives
- Spotlight presentation – Shawn Turner, TTI
- Project deliverables & timeline – UPDATES
- Feedback from Steering Committee
- Next meeting/webinar

Project Overview

- Initiated in 2013 as an **I-95 Corridor Coalition MCOMP** proposal
  - Foresaw that probe data will ultimately drive many of the operations and planning business processes.
- Goal of project
  - **Accelerate the timeframe** to achieve viable **volume and turning movement data** through **probe data**
- The Project Team (I-95 Corridor Coalition, UMD and NREL) recognizes that the success of this project is critical to **broader national initiatives** which require quality data to operate and model the transportation system with the goal to optimize for **safety, mobility, and energy efficiency**.
- Hypothesis: Information in existing probe data can be used to infer volume thresholds

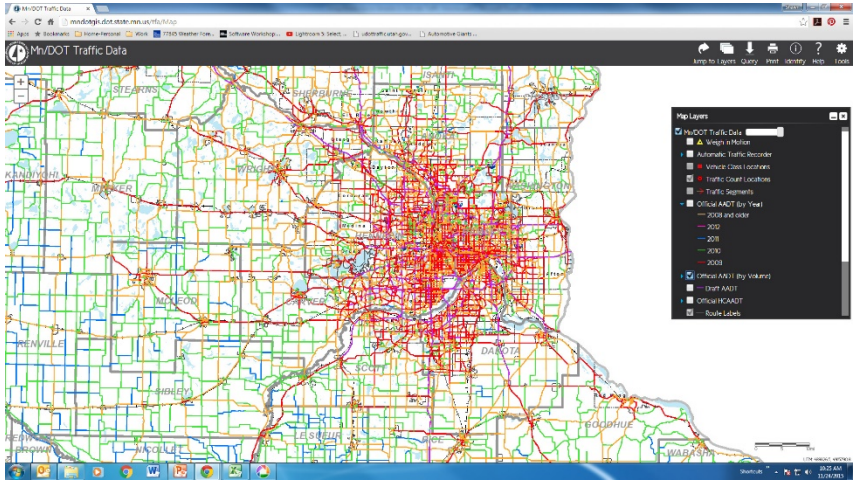
Project Background

- Network wide **volume and turning movement data** remains key **missing dimensions** for operational awareness and assessing transportation system performance.
- Highway Performance Monitoring System (HPMS) data is currently state-of-the-practice in providing volume data
  - Annual Average Daily Traffic (AADT)
  - 2-3 year lag in reporting
  - Disaggregated into hourly volumes – TAMTI methodology
- Turning movement data is only available in special studies

- NEED 24x7x365 VOLUME (or DENSITY) ESTIMATE ACROSS THE NETWORK

Project Objectives

- Define a practical and logistical framework for the delivery of probe-based volume and turning movement data.
- Understand, document, and share data requirement needs for a variety of DOT applications requiring such data.
- Create a calibration and validation testbed to assist vendors' initial development efforts.
- Provide representative data products, and set appropriate expectation for data fidelity, form, granularity, and usability.
- Anticipating the need for an ongoing calibration network, estimate resources needed to maintain/operate a national calibration/validation testbed.



Using Mobile Device Samples to Estimate Traffic Volumes in MN

Shawn Turner, P.E.

Texas A&M Transportation Institute

I-95 Corridor Coalition Webinar ~ October 13, 2016

Project Motivation

- In 2015:
  - 90% own cell phone
  - 68% own smart phone
- Mobile devices already used to estimate traffic speeds and trip patterns
- Can mobile devices be used to accurately estimate traffic **COUNTS**?

Task 1 – Feasibility & Approach

1. Independent Evaluator

- Evaluate commercial product: TRAFFIC COUNTS
- Most feasible when companies compete on existing viable products
- TTI provides “Seal of Approval” and methods for ongoing quality assurance

2. Development Partner

- Develop analytics to turn probe samples into TRAFFIC COUNTS
- Most feasible when no companies offer viable product
- MnDOT maintains control of analytics, but also must buy probe data

Independent Evaluator vs. Development Partner

Criteria to Consider

- Companies have existing viable products?
- Means to ensure ongoing quality of traffic counts?
- Implementable and sustainable business model
  - DOT buys raw GPS probe data for one use?
  - Company buys GPS probe data for multiple apps (travel time, origin-destination, traffic counts, etc.)

TTI as Independent Evaluator

- Multiple companies interested
  - **HERE**
  - INRIX
  - **StreetLight Data**
  - Airsage/Citilab Streetlytics
- Recommend to proceed as evaluator

Overall Evaluation Structure

- MnDOT counts serve as benchmark
- Compare to count estimates from providers
- Fair, level playing field for all providers
  - Evaluation procedures agreed to in advance
- Several tiers of evaluation
  - Corresponds to count granularity

Reverse Engineering

- Lots of MnDOT count data publicly available
- Prevent or mitigate reverse engineering (like applying growth factors to historical counts)
- Identify non-public sites or higher granularity that is not public

Granularity of comparisons

- ADT most common, but publicly available
- MADW daily volumes
- MADW hourly volumes

Comparison Sites

Location Category	Low Traffic	Medium Traffic	High Traffic
Urban with “GPS Canyons”	5	5	10
Urban, Typical Grid	5	5	10
Urban, Interchanges or closely-spaced roadways	5	5	10
Rural, major roads	5	5	10
Rural, minor roads	5	5	10
Subtotal	25	25	50

Other Evaluation Factors

- Roadway coverage
  - Urban vs. rural
  - Lower functional classes
- Level of integration effort
- Request turnaround time

Next Steps

- Finalize agreements with participating providers
- Identify specific comparison locations with MnDOT
  - Non-public locations and non-public granular data

Opinion Page

- High demand for traffic info on private side
  - Granular, 1-stop shopping for national businesses
  - Bundled with demographics, trip O/D
- Not if, but when
- Monitor accuracy for different use cases
  - Planning vs. operations
  - Major roads/highway vs. lower functional classes

Volume & Turning Movement Application Survey

- Thanks for your comments and suggestions to improve survey
- Link sent via email to Steering Committee (on 9/26 & 10/4)
    - http://tinyurl.com/zozbnvm
- Sample responses: How would you use Volume Data
    - Special Events – Can alternative routes handle the volume
    - Emergency planning applications
    - Model development

- Deadline – October 28, 2016

Vendor Participation

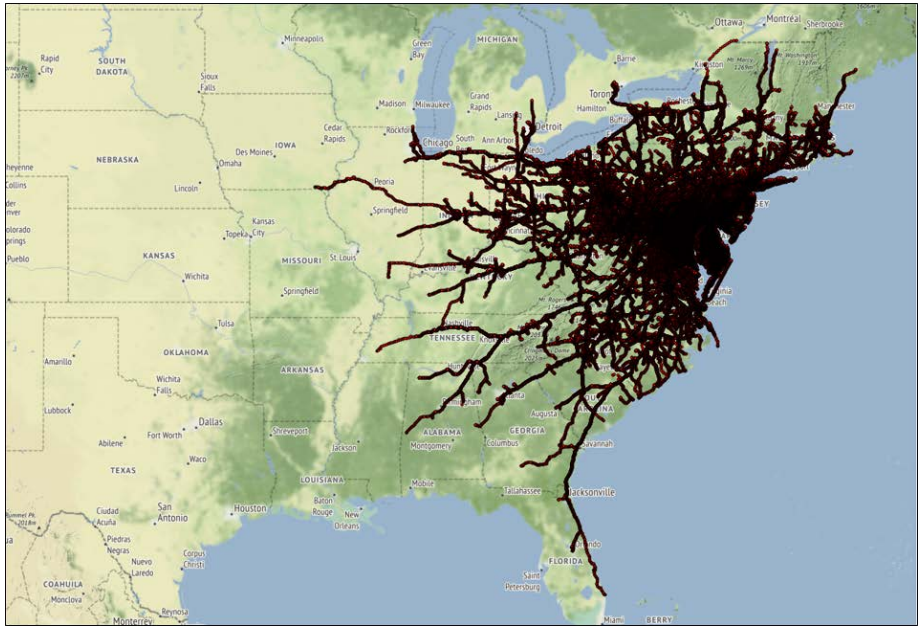
- All VPP vendors are progressing toward agreements to enable participation – no one has crossed the finish line, but getting close.
  - HERE
  - INRIX
  - TomTom
- Progress in last quarter
  - All three moving forward - agreements being finalized
  - All three are participating, but in different methods

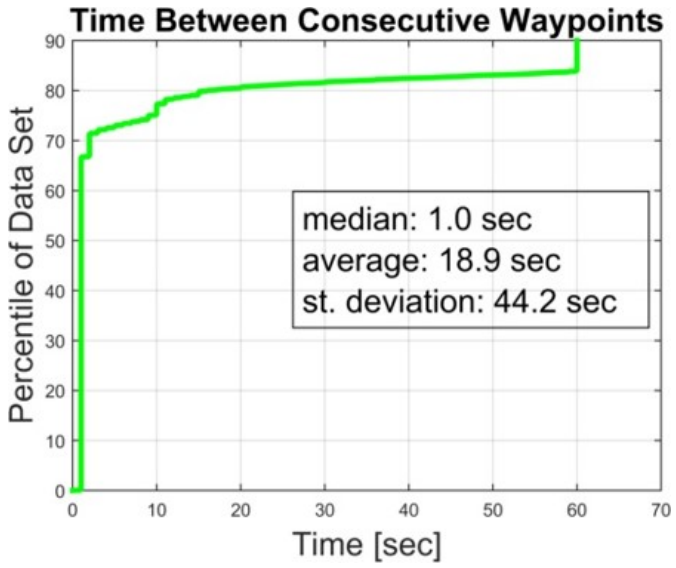
Test Bed Initialization

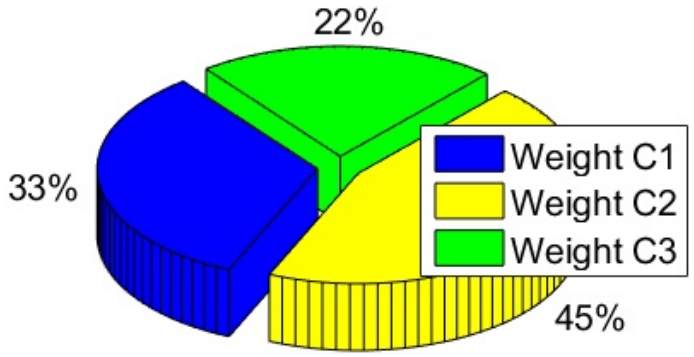
- Test-bed - functional by end of 2016, refined in 2017
  - Progress last quarter
    - Several volunteers from steering committee
    - Moving forward with sample analysis / test bed from Maryland
  - Initialization of Testbed with Maryland SHA data
  - INRIX Trip Data Set purchased by Maryland SHA enables early analysis
    - Data sets span for February, June, July and October of 2015
    - Representative of high resolution data to support volume and turning estimates
    - Anticipate analyzing data against Maryland permanent count stations
    - Learn challenges, process, and if initial estimates are 'within the ballpark'

INRIX Trip Data

- 4 months of data during 2015 (February, June, July, August)
  - 20 million trips, which include 1.4 billion waypoints
  - 112 GB of data
- Waypoint location/spacing and three vehicle types (C1<14,000 lb, C3>26,000 lb.)

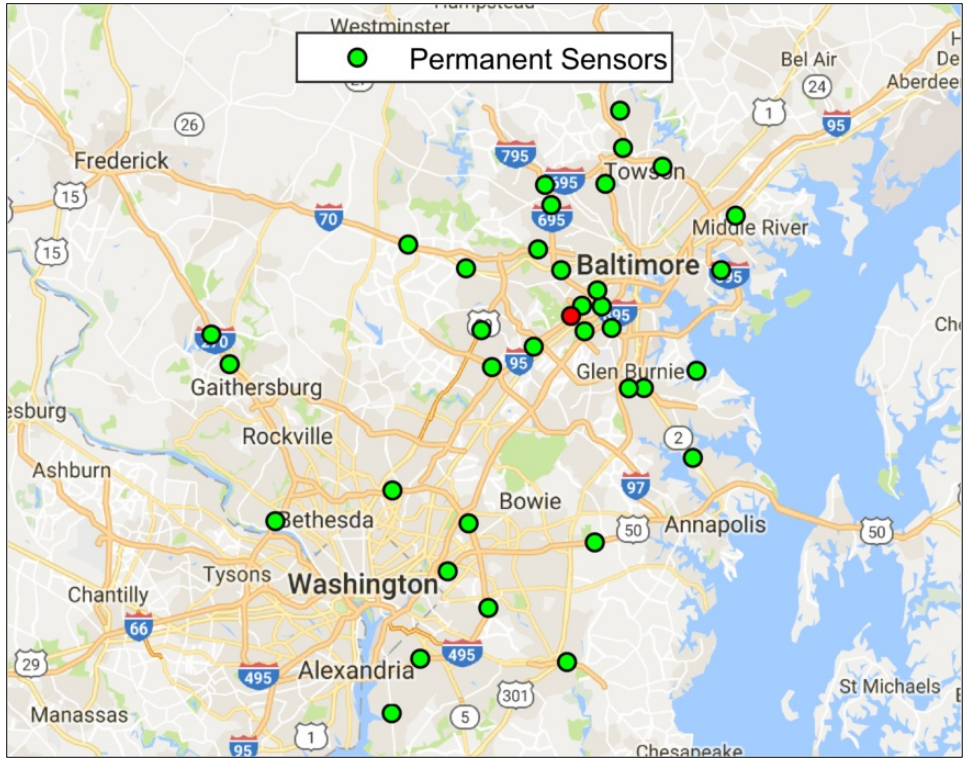






ATR Data

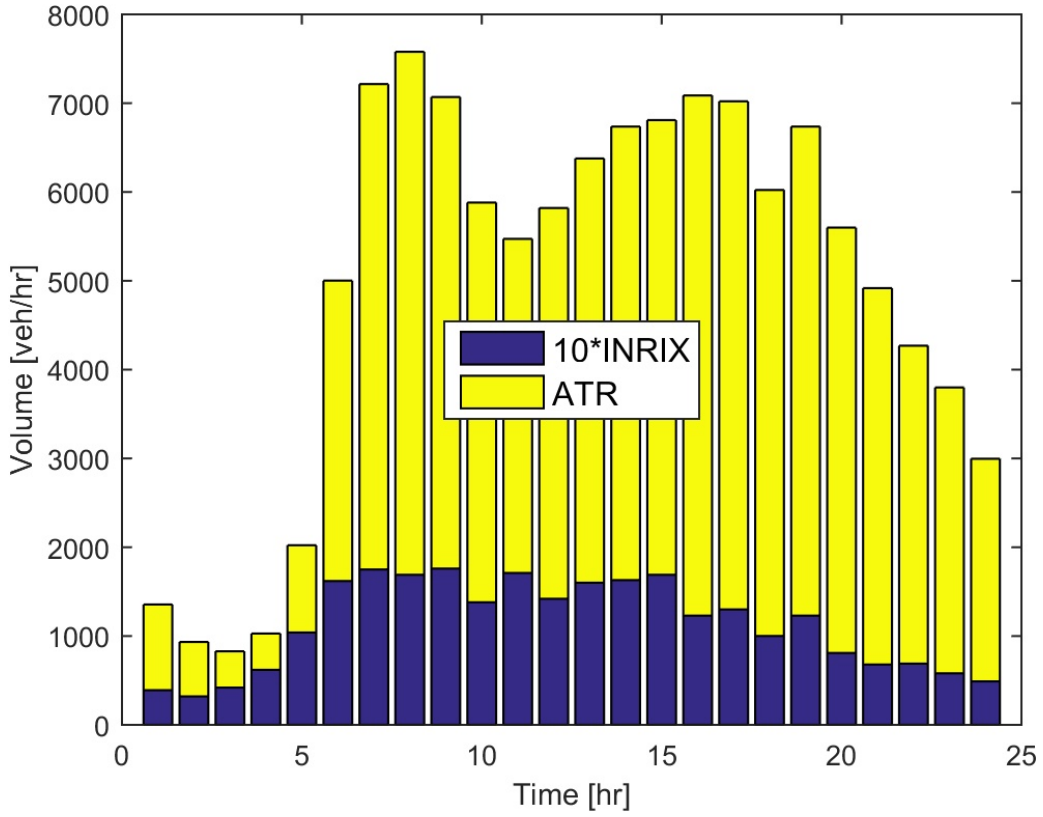
- 15-min volumes from 37 permanent sensors across MD
- Volumes are broken down for 14 vehicle classes



- A sensor on I-95 is selected for initial analysis (red dot)
- Comparison with INRIX data is performed at hourly and daily levels
- Corresponding penetration rates are computed

INRIX vs. ATR

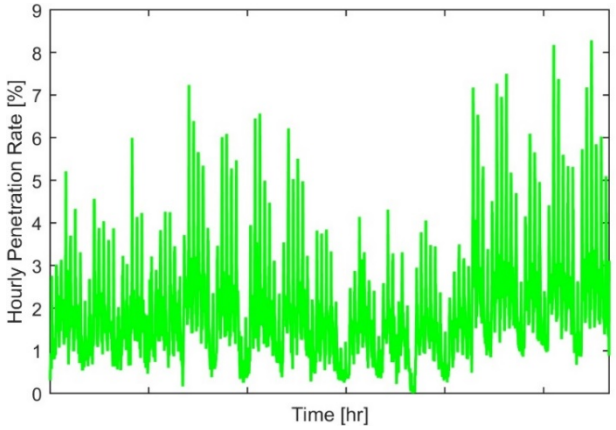
- Vehicle counts for October 30, 2015 (all vehicle types)
- Direction: South

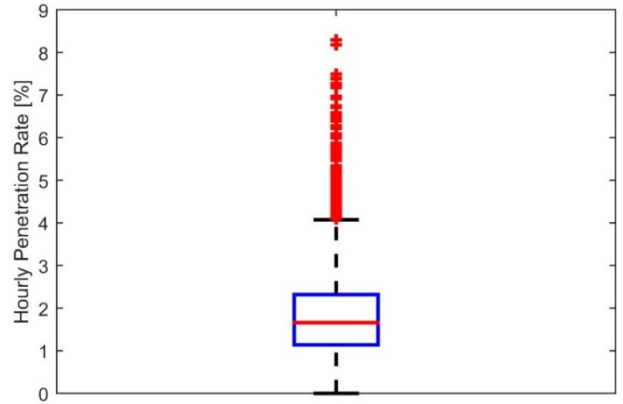


- INRIX counts are scaled by the factor of 10 for visibility
- Median hourly penetration rate for this particular day is 2.42%
- Penetration rate for this day is 2.28%
- Similar comparison is conducted for all 4 months of INRIX data

INRIX vs. ATR

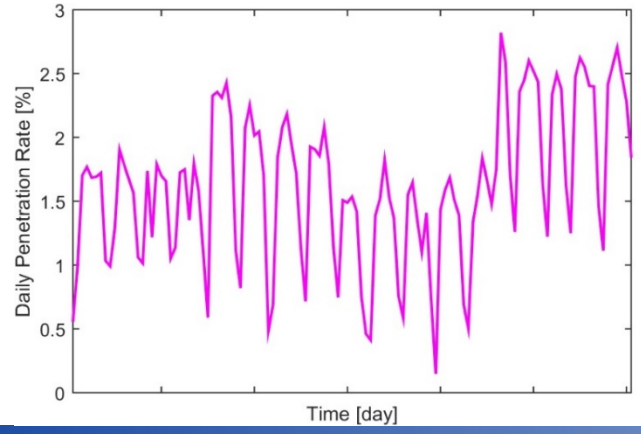
- Penetration rates for each hour within a 4 month period

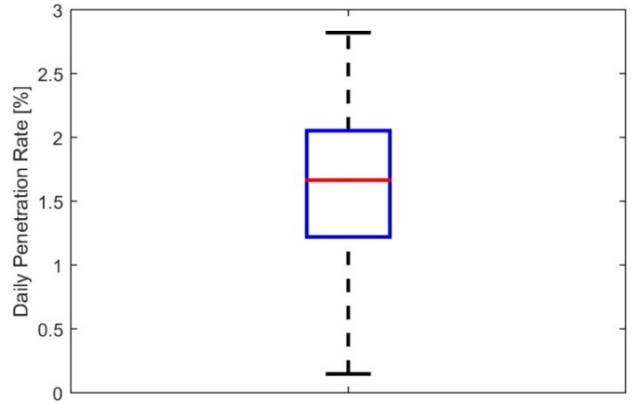




Median hourly penetration rate: 1.66%

- Penetration rate for each day within a 4 month period

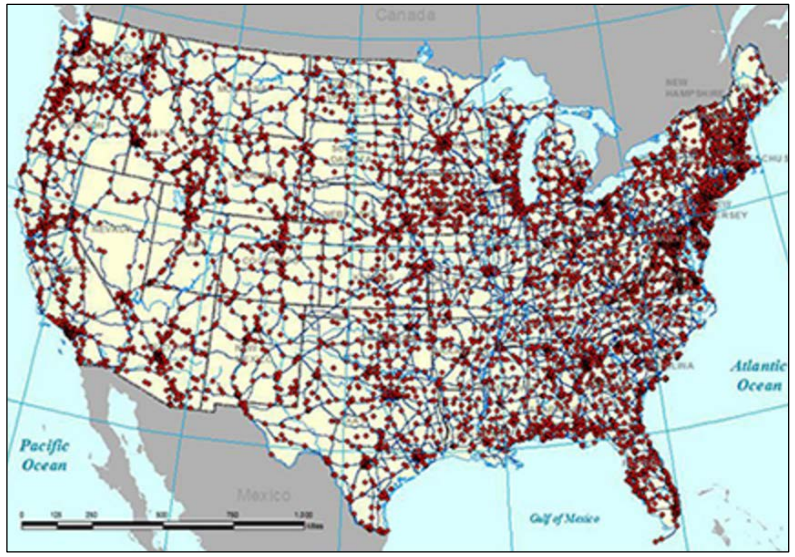




Median daily penetration rate: 1.67%

Next Steps

- Immediate objectives
  - Extend analysis to other sensors in MD
  - Break down the analysis for different vehicle classes
  - Apply machine learning for predictive analytics
- Long term objectives
  - Scale the developed methodology to the whole country



Traffic monitoring stations in the US as of 2015 (source: FHWA)

Project Timeline/Deliverables

- Phase 1: Proof of concept (Q1 2017)
  - Milestone: Vendors under contract – end of Q4 2016
    - Now end of Q4 2016 (with initial analysis data set, not as time critical)
  - Milestone: Survey, compiled feedback
    - Survey distributed in Sept 2016
    - Deadline Oct 28, 2016, results summarized one month later
  - Milestone: Test bed – functional by end of Q4 2016, refined in 2017
    - Initial functionality in Q3 2016 (Maryland)
    - Additional state(s) by end of Q4 2016
  - Milestone: Specifications & validation/calibration methodology – Q1 2017
    - Initiated after completion of Maryland trip data analysis and compiled survey responses

Steering Committee Participation and Feedback

- Complete and recruit others to complete the survey
- Proactive in populating test bed data (November time frame)
  - Count data in 15 minute intervals (minimum) with vehicle class
- Comments on initial MD Analysis
  - Insights, suggested direction, balance of light-duty / heavy-duty

Questions

Wrap Up

- Closing remarks
- Next meeting/webinar
  - Thursday, January 26, 2017
  - 1:30p.m. - 3:00p.m. (EST)
  - Agenda
    - Survey Results
    - Analysis of Maryland Data

Thank You!

For Questions, please contact:

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