



**Questions – NREL Work Effort:**

**Q1: Keith Miller (NJTPA): Did you see any other patterns (e.g., spatial) in the penetration rates? I ask because I am concerned that probe data may be missing certain populations. Perhaps this is not as important when you're looking at just overall counts, but it might be.**

A: Stan Young (NREL): Most of the patterns we have assessed are with respect to road class (as shared) or prevailing volume. We are interested in whether there is a relationship with respect to density and urban/rural development in general, but have not assessed these spatial attributes at present.

**Q2: Michael Iacono (MNDOT): Is a 1% penetration rate sufficient for local roads? With an average hourly volume of 39 vehicles per hour and 1% penetration, you're getting an average of around 10 vehicles per day.**

A: Stan Young (NREL): 1% penetration on extremely low volume roads ( 39 vehicles per hour) may be adequate to inform that it is extremely low volume road (less than 1000 VPD for example), but nothing more.

**Q3: Harun Rashid (NVTA): Will there be an attempt to identify vehicle classes - as basic as percentage of freight traffics on freeways?**

A: Stan Young (NREL): UMD looked at this for Florida, as the data source has data attributes that correlated to vehicle type. The volume estimates from NREL work has not done this, as the base data source from TomTom has no data attributes that correlate to vehicle type.

A: Kaveh Sadabadi (UMD CATT): We did this with Florida – we had classification counts throughout the state, so we trained our model to estimate hourly freight volume and the initial results were quite promising, especially on higher functional road classes and for heavier trucks.

**Q4: Skip Yeakel (Volvo): The data collection and analysis effort is interesting but--in and of itself--it DOES nothing to relieve the congestion that plagues all but every major metro area of the U.S. What does the speaker or any of his colleagues propose to DO about changing the congested status quo? If the answer is the obvious--building more lanes, etc.--would raising the fuel tax be a top priority to do so? Are there any other (e.g. ITS) means by which the speaker or his colleagues might suggest to pursue?**

A: Stan Young (NREL): Volume measures across the network will fully inform of the congestion – but as Skip said, it does nothing in and of itself to remedy. A complete volume picture can aid in re-routing, detours, planning for road maintenance etc. At the capital planning level it can more accurately locate priorities for road expansion, signal retiming, or more accurately model the anticipated results of actions.

**Q5: Michael Iacono (MNDOT): Can you explain why the EMFR seems to be increasing with the probe penetration rate? This seems a bit counterintuitive. Does it have anything to do with the sample locations?**



**Question and Answer Summary**

A: Stan Young (NREL): The accuracy is greatest at the mean probe penetration rates (the lowest error was at the bottom of the U-shaped curve), and then gets worse with lower rates and with higher rates. Accuracy will be greatest if the probe penetration is consistent. The mean penetration rate for this data set was approximately 10%, then I would expect minimum error to be on roads with about 10% penetration rate. If the penetration rate was consistently higher, than errors would go down. Note that a very minor portions of roadways in North Carolina had penetration rates of less than 10%.

**Q6: Andrew Ludasi (NJDOT): How is truck volume (and type, SU & Tractor-Trailers) being estimated, if at all?**

A: Stan Young (NREL): This was not approached, but if you speak to Kaveh Sadabadi, they looked at truck volume estimates in Florida back in Phase I.

A: Kaveh Sadabadi (UMD CATT): Florida DOT provided by class counts at all their continuous count stations. We aggregated the counts to heavy and medium weight categories and used that in training our model. Summary results were presented in this webinar. Model showed good performance for heavy trucks on higher functional class roads. For medium weight category and on lower functional class road results are still good but we believe there is room for improvement.

**Questions – UMD CATT Work Effort:**

**Q7: Nathan Webster: When you train the models, is there some benefit to looking at recent time series of probe speeds, and not just the instantaneous speed?**

A: Zach Vander Laan (UMD CATT): The model incorporates features such as hour of day and day of week to try to capture temporal patterns for probe speeds and other input data. Additionally, we have experimented with other model architectures that explicitly consider the time series of probe speeds (and other input variables) prior to the target time interval. In the past this approach didn't appreciably improve the model accuracy, but this is still an ongoing area of research.

**Q8: Harun Rashid (NVTA): In the D.C. metro area, there is a network of toll lanes on major freeways, do you see ML and AI to distinguish traffic volumes between tolled and GP lanes?**

A: Kaveh Sadabadi (UMD CATT): That's potentially doable. Typically tolled lanes have higher speeds and smaller number of lanes compared to GP lanes. These factors (i.e., number of lanes, and speeds) are currently used as input to the model. So, I am cautiously optimistic that the current model can produce good estimates of traffic volumes on tolled and GP lanes. However, we may need actual count data from tolled lane facilities to expose the model to more scenarios like this in training. Also, we can use archived toll amounts (dollar values) as an additional feature in model training. So, the answer is yes. We may just need more relevant data on toll lane operations to improve the current traffic count estimates.

**Q9: Stan Young (NREL): Kaveh - for the AADT, which road classes are those?**



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### **Question and Answer Summary**

A: Kaveh Sadabadi (UMD CATT): All road classes in Maryland.

**Q10: Keith Miller (NJTPA): Is your "phase 1" and "phase 2" the same as NREL's? It looks like they're different locations.**

A: Kaveh Sadabadi (UMD CATT): The overall approach is the same but targeting different locations because the vendor is different, and data opportunities are different. In Phase I, we focused on different locations and geographies (MD, FL, NH, CO) with data from different vendors. In Phase II, in one case (Harrisburg, PA) both UMD and NREL are working on the same location and time period, but with different vendors. Harrisburg will be the first geographic location where results from both vendors and both approaches will be directly compared.

**Q11: Michael Iacono (MNDOT): Has there been any attempt to compare the volume predictions from probe data for lower functional class roads with more conventional volume estimation techniques, such as short counts?**

A: Kaveh Sadabadi (UMD CATT): Yes – That is something we're planning to do for Harrisburg because we have access to short term counts. We're going to use it to help validate results on lower count roads.

A: Stan Young (NREL): All this research that we're calling Phase I and Phase II was inspired and funded with operations concerns in mind. Now we're pivoting to planning/AADT efforts. Both NREL and UMD efforts are looking from that point of view. Our fundamental message is 24/7 365 volumes. We want to bring more representative metrics and measures to the planning world. We already have AADT in Florida and Maryland, and partial results in Colorado. We're going back and looking at how would we appropriately structure the framework to give operations hourly and sub-hourly data as well as planning-level estimates. We want to examine how these relate with short-term counts or estimates from short-term counts – that's one of the questions we want to answer with FHWA's pooled fund study.