

Integration of Traffic and Emissions Data: Exposure to Ultrafine Particles for Non-Auto Urban Travelers

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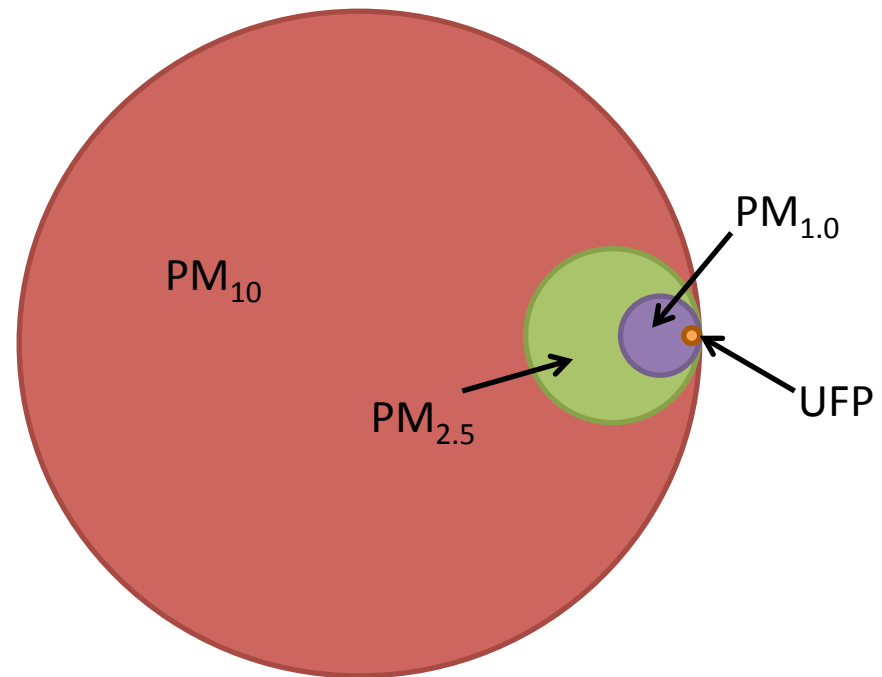
Overview

- Ultrafine Particles (UFP) & Exposures
- Experiments
 - Cycle track
 - Noise barrier
- Conclusions & Future Directions



Particulate Matter

- PM_{10} $d < 10.0 \mu m$
- $PM_{2.5}$ $d < 2.5 \mu m$
- $PM_{1.0}$ $d < 1.0 \mu m$
- UFP $d < 0.1 \mu m$



Particle Deposition in the Lungs

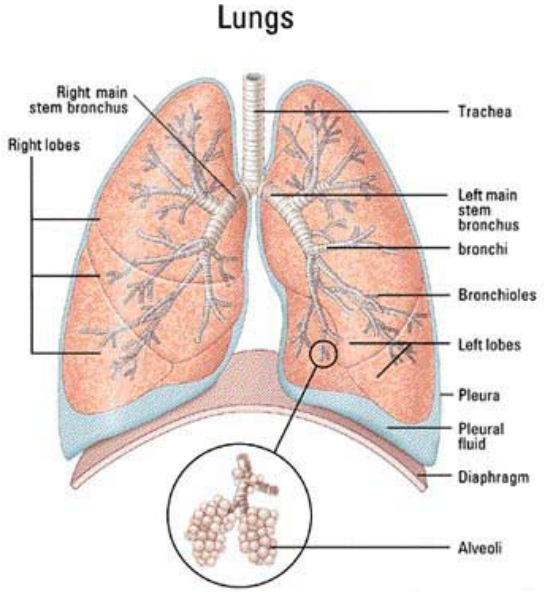
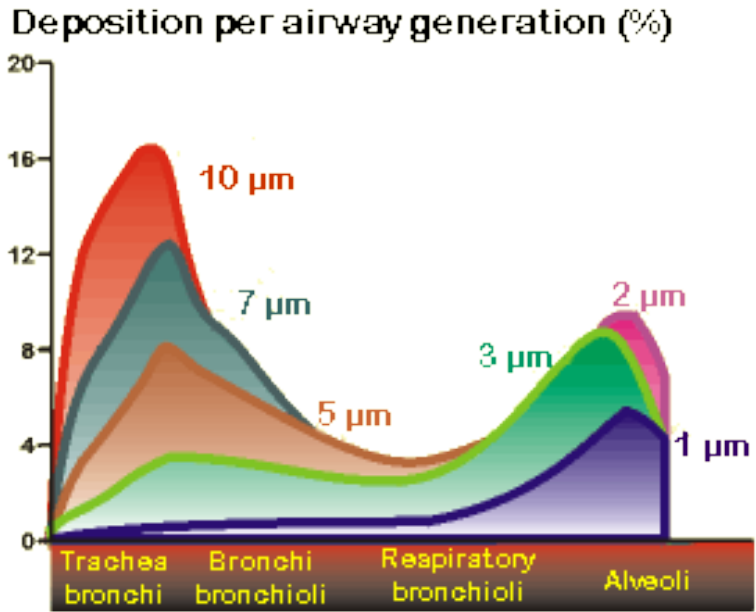


Image: www.transplantcafe.com



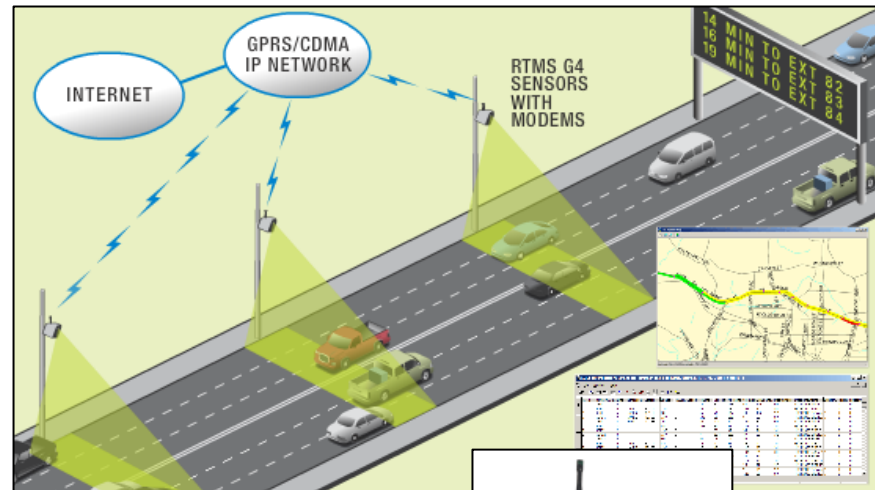
Instrumentation

Air Quality



Instrumentation

Traffic



Cycle Track



View of SW Broadway before cycle track



View of SW Broadway with cycle track



Equipment

Research vehicle in parallel parking space



Pttrak

- Drivers side – bike lane
- Pass. side – cycle track
- Sidewalk



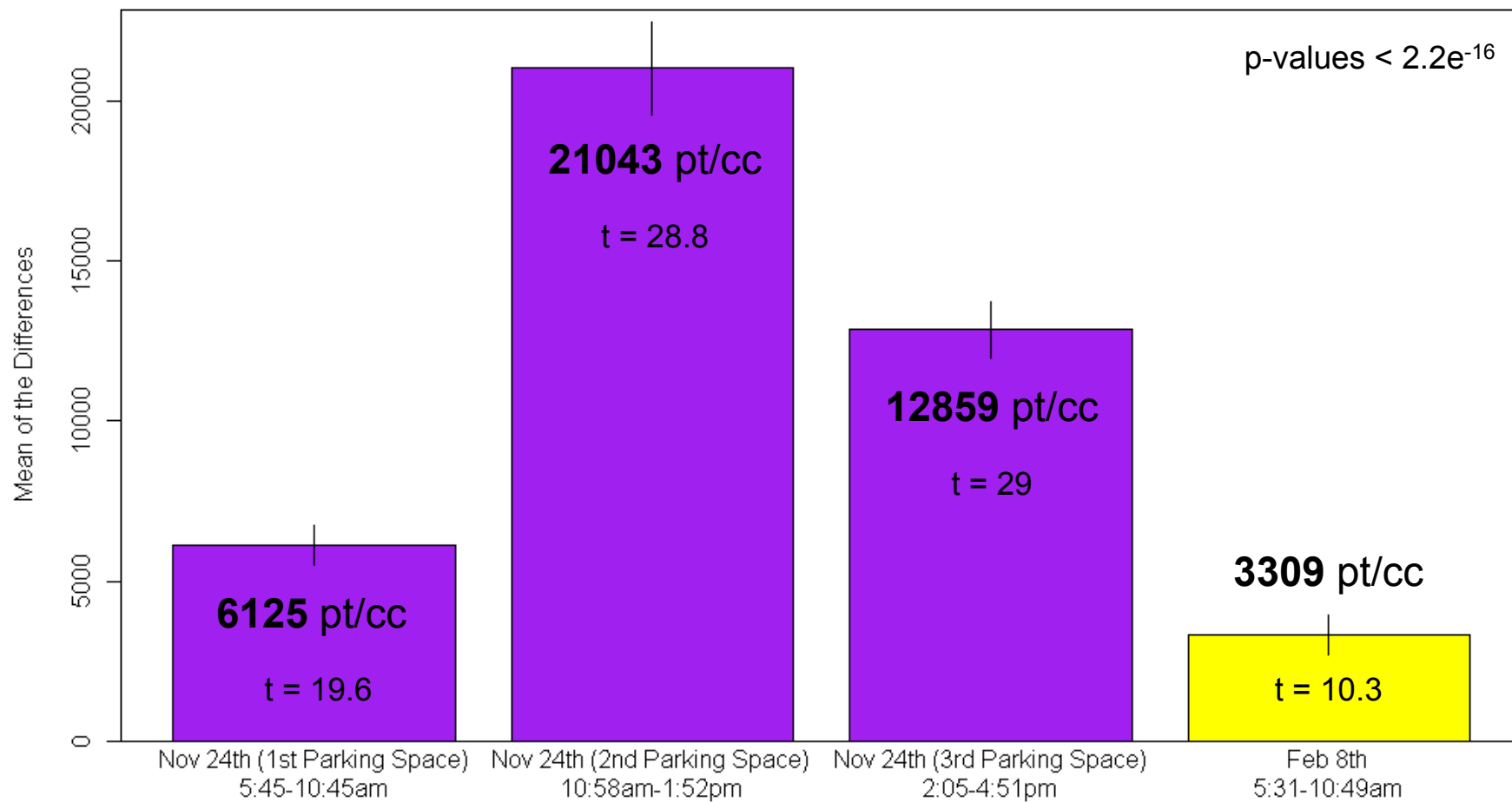
Anemometer



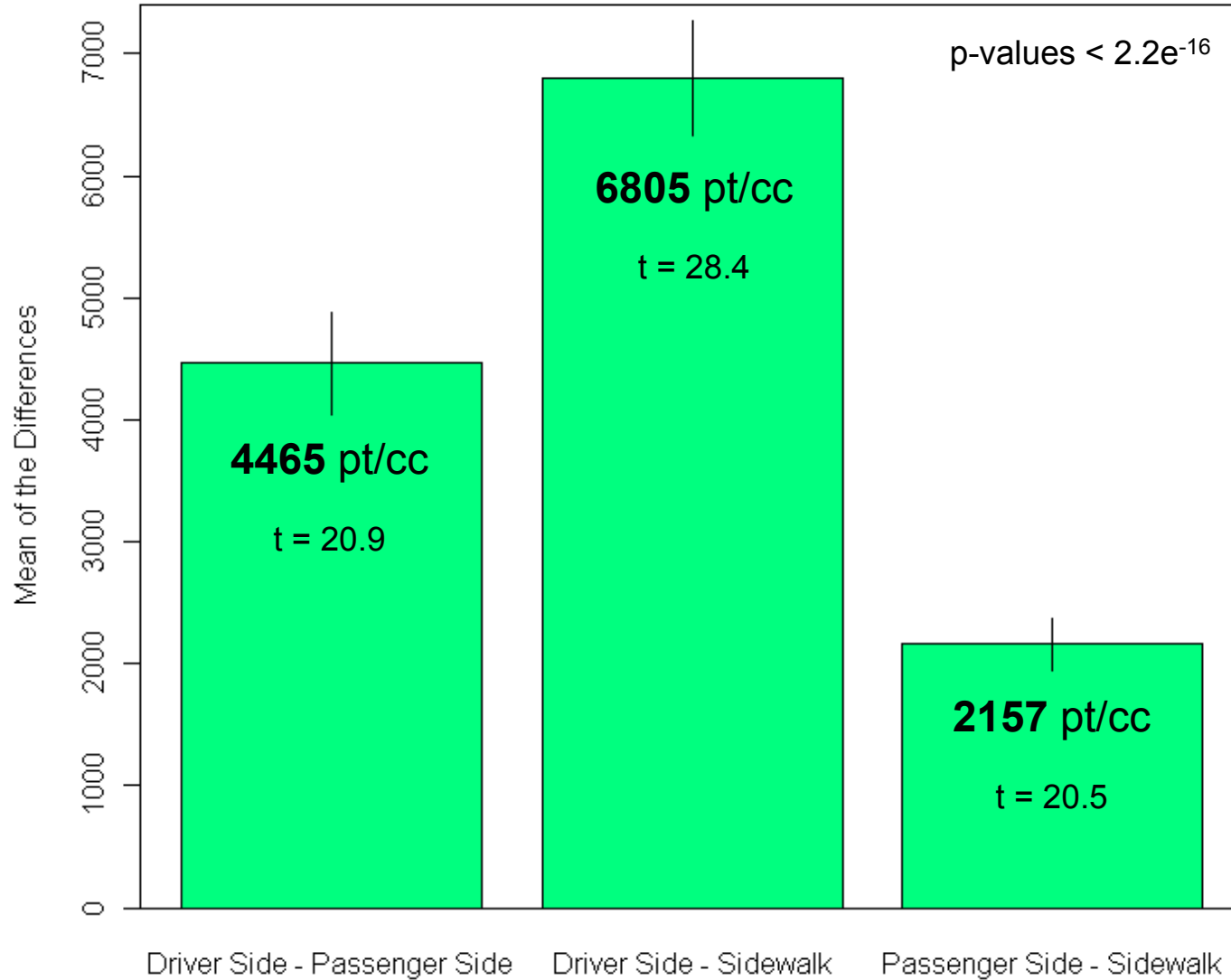
Traffic tubes



Exposure Concentrations Significantly Greater on Driver Side vs. Passenger Side

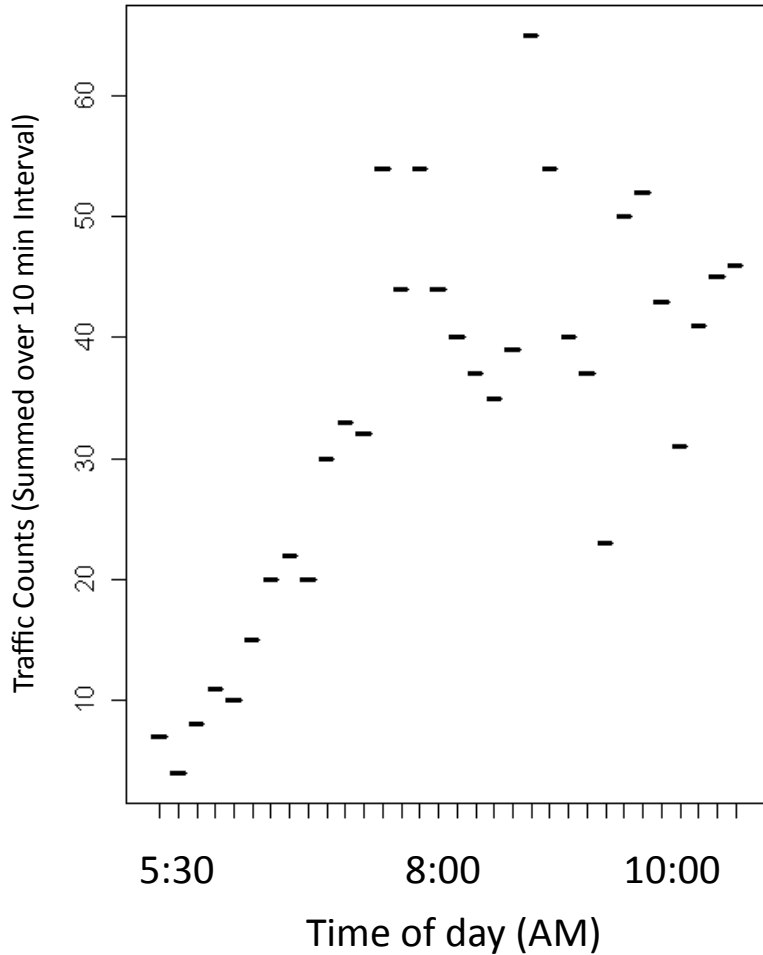


Exposure Concentrations Significantly Greater as PTrak is Located Closest to Traffic June 7, 2010

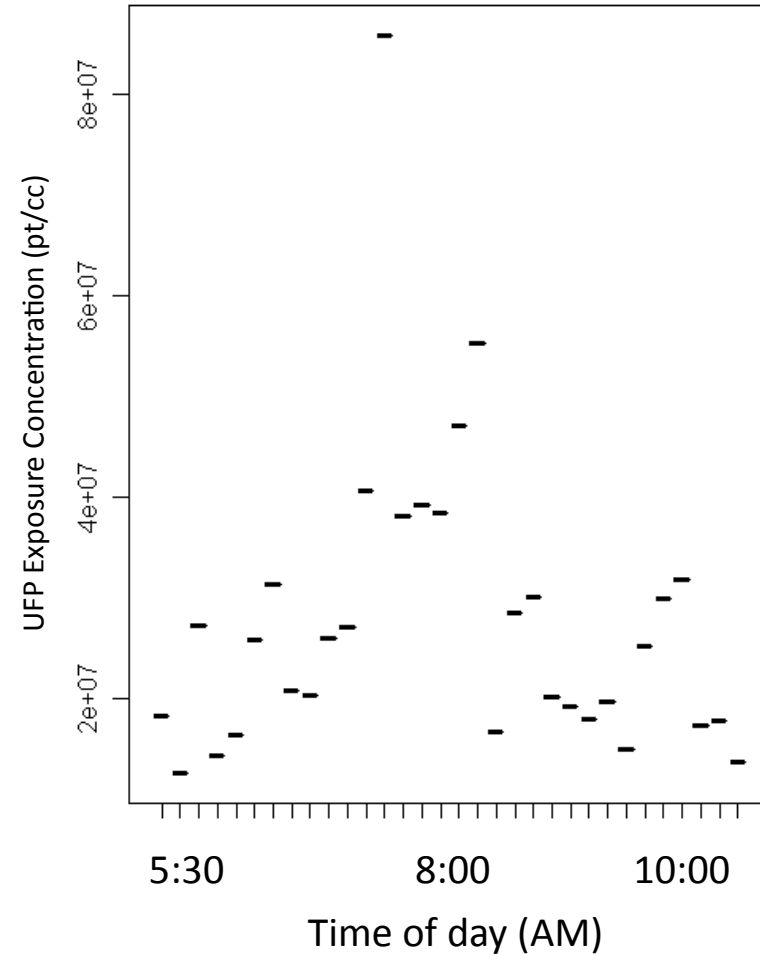


Is there a relationship?

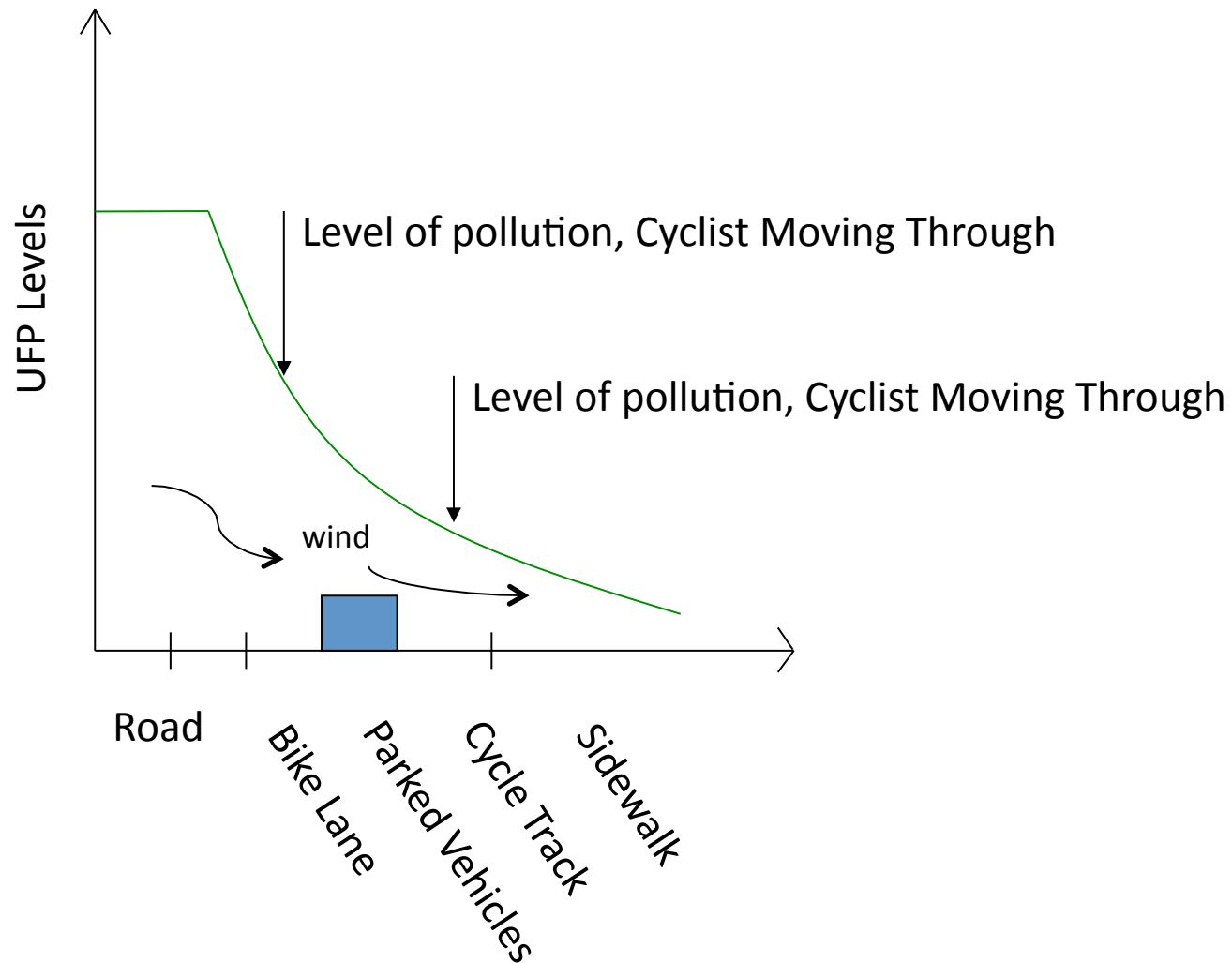
Traffic Counts Over Time



UFP Concentration Over Time



Dispersion Concept



Cycle Track Conclusions



VS.



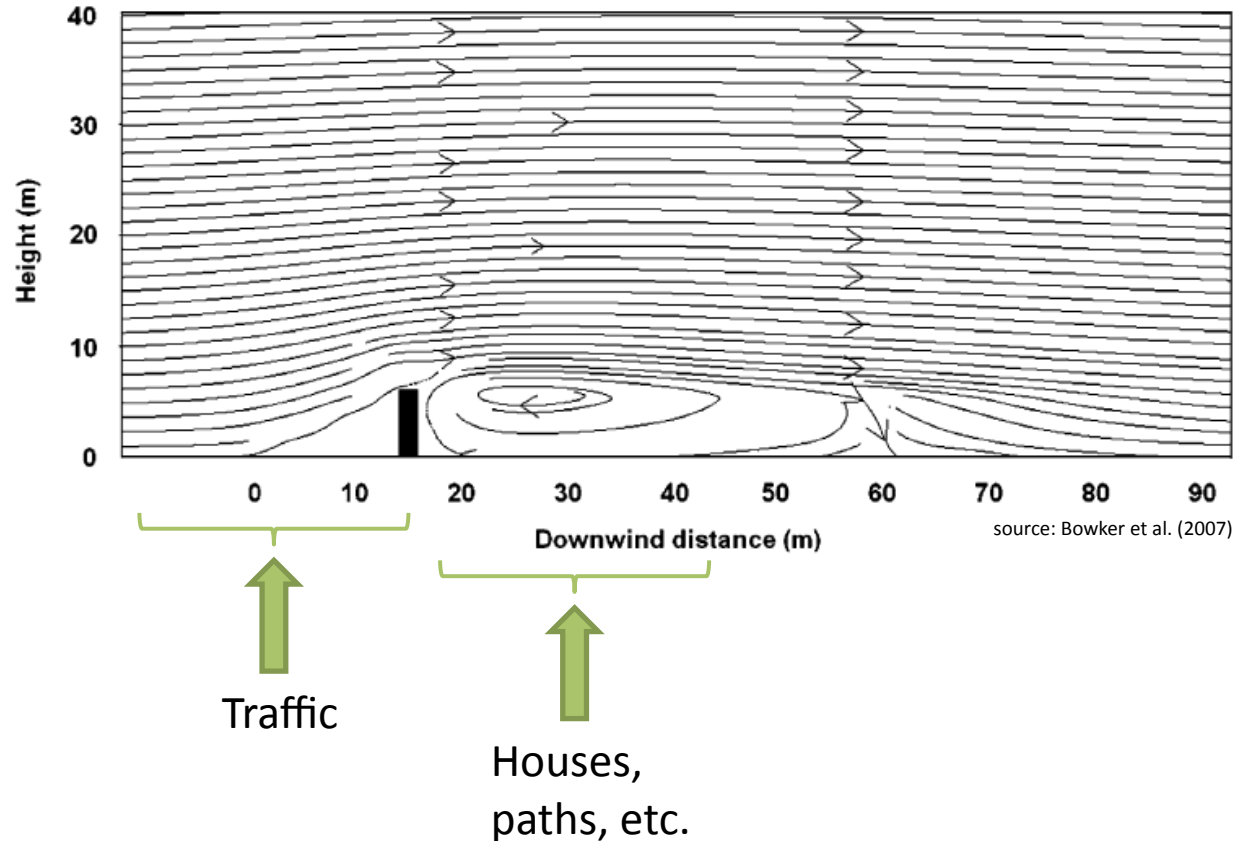
Cycle track has potential to lower exposures for cyclists



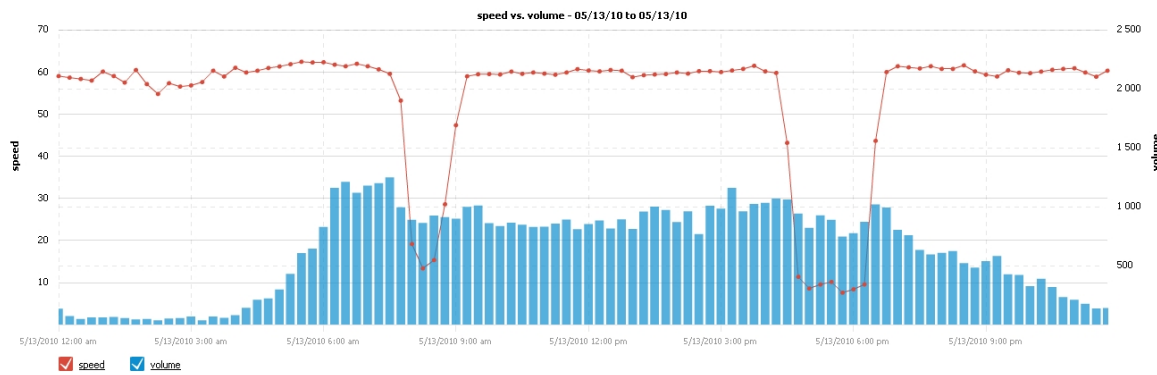
Roadway Noise Barrier

Bicycle facility: multi-use paths along freeways

- Investigate barrier effect on adjacent paths



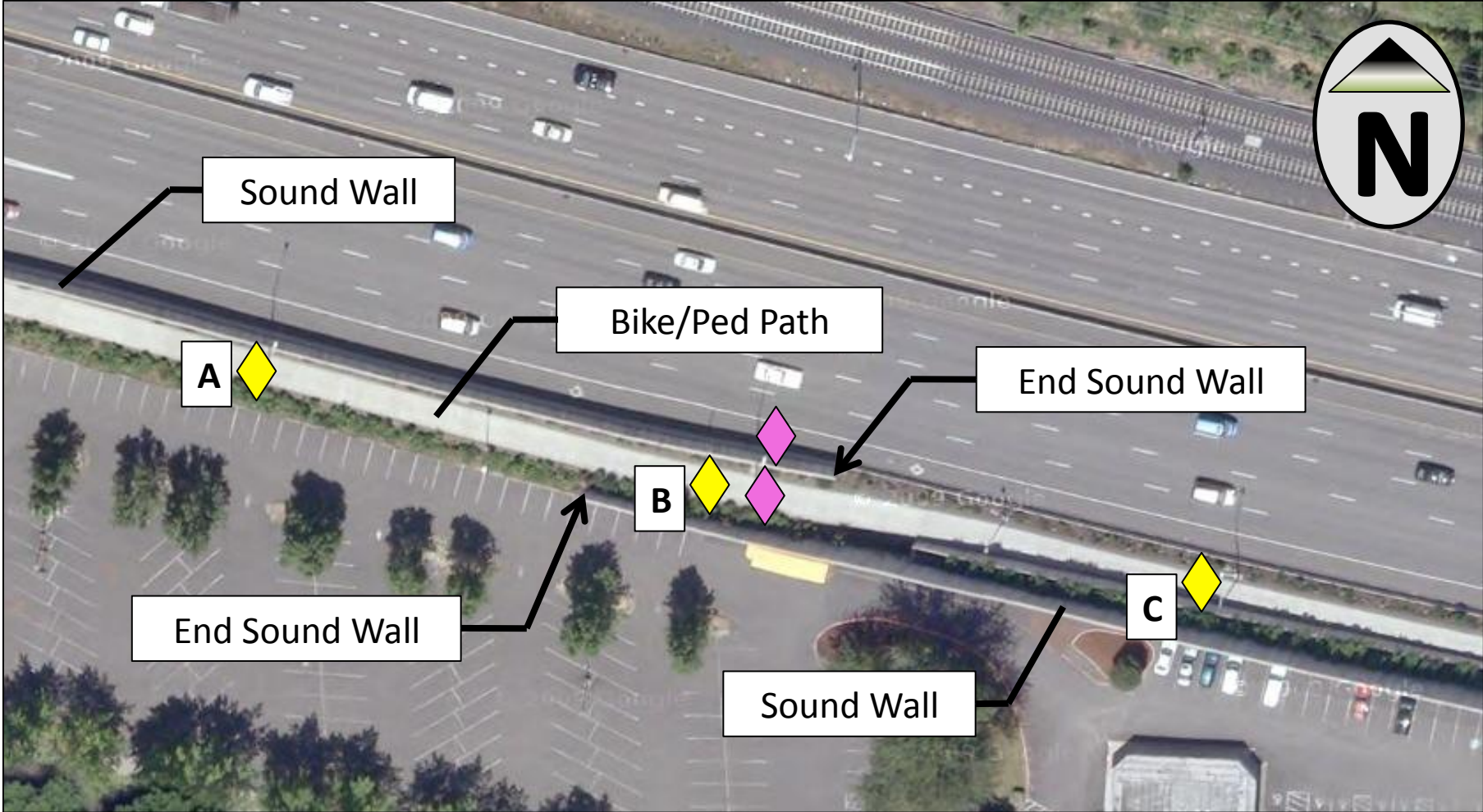
Equipment



Study Location 1

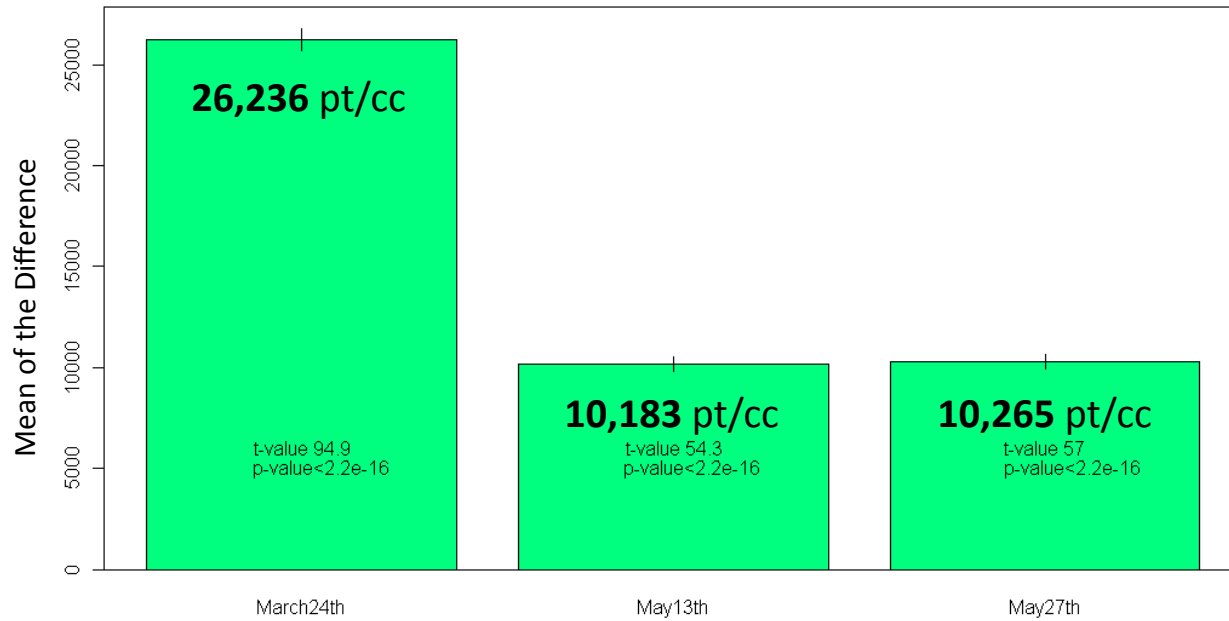
US 26

◆ Ptrak, Study Design A
◆ Ptrak, Study Design B



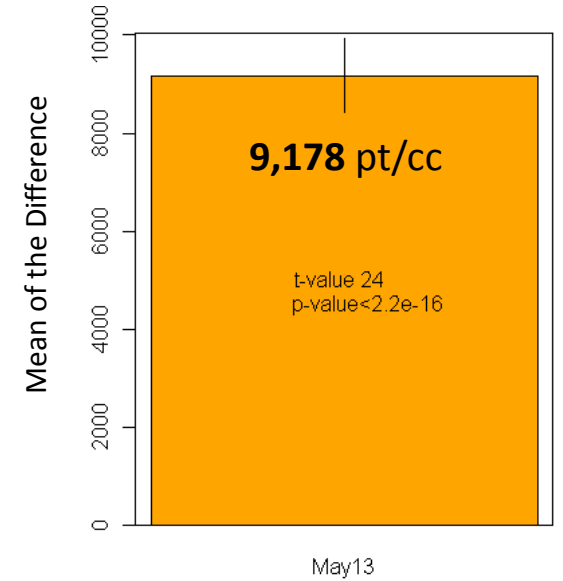
◆ **Ptrak, Study Design A**

Ptrak "C" compared to Ptrak "A"

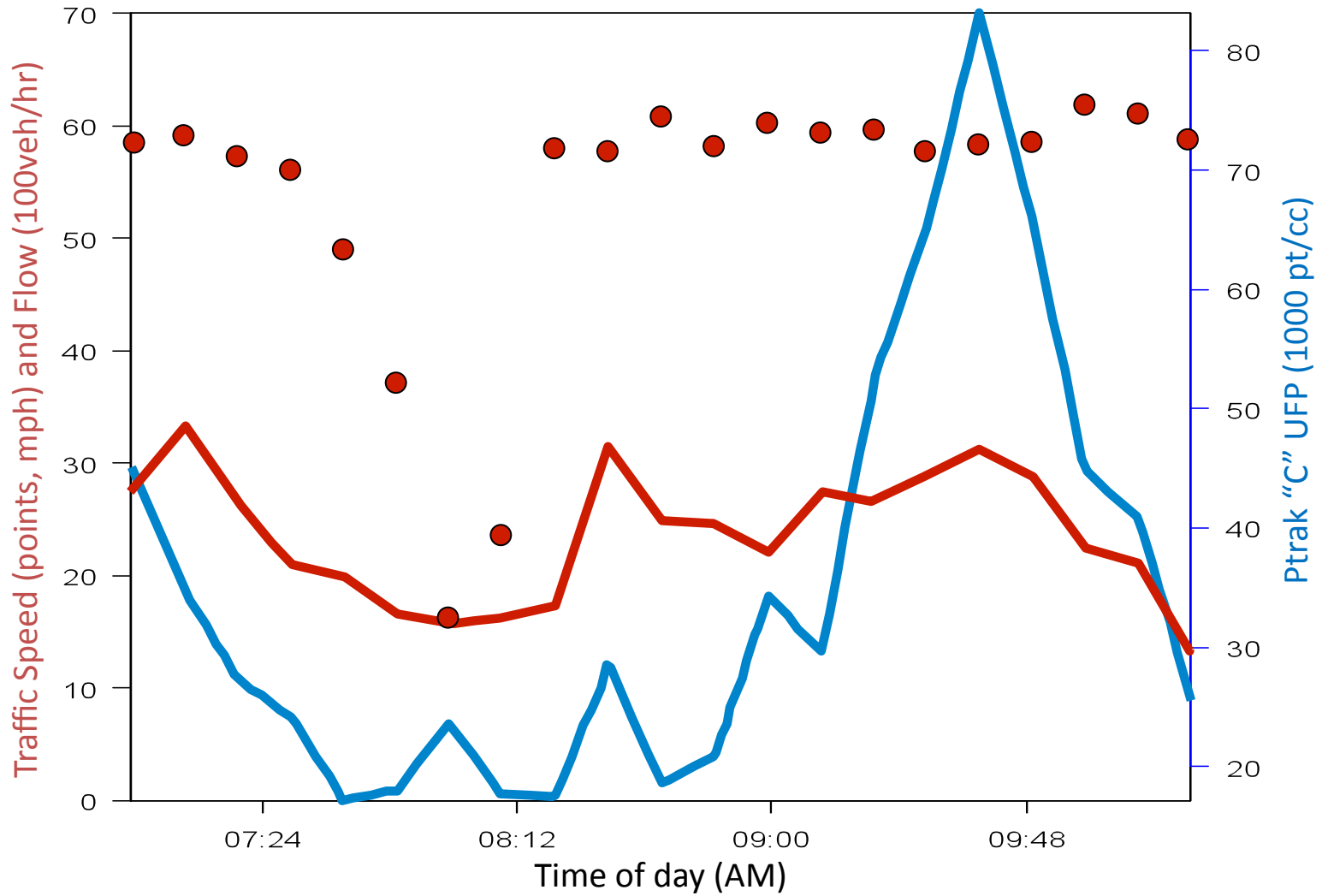


◆ **Ptrak, Study Design B**

Front compared to Behind



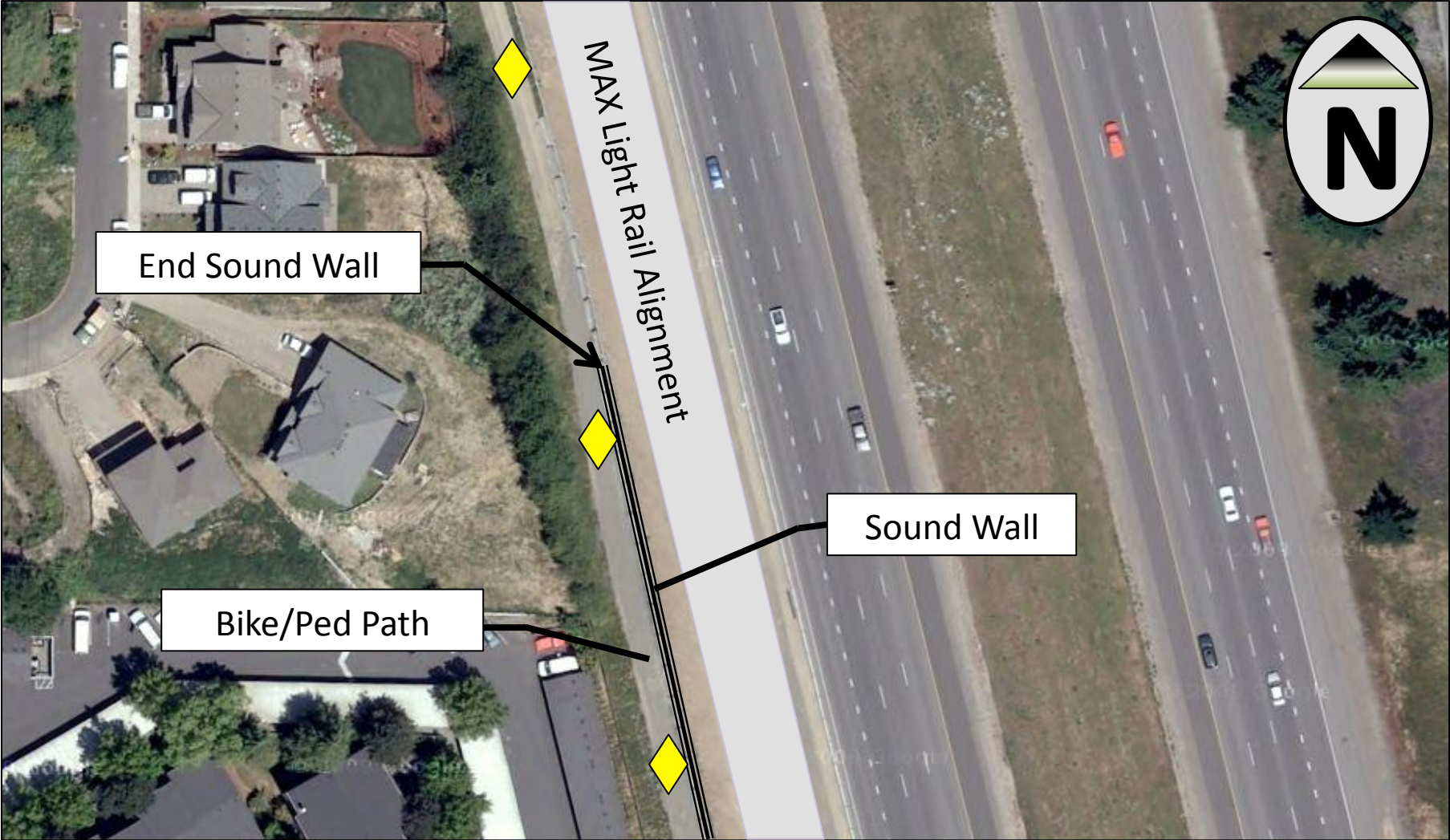
10-min Aggregation, Traffic Characteristics and UFP Concentration



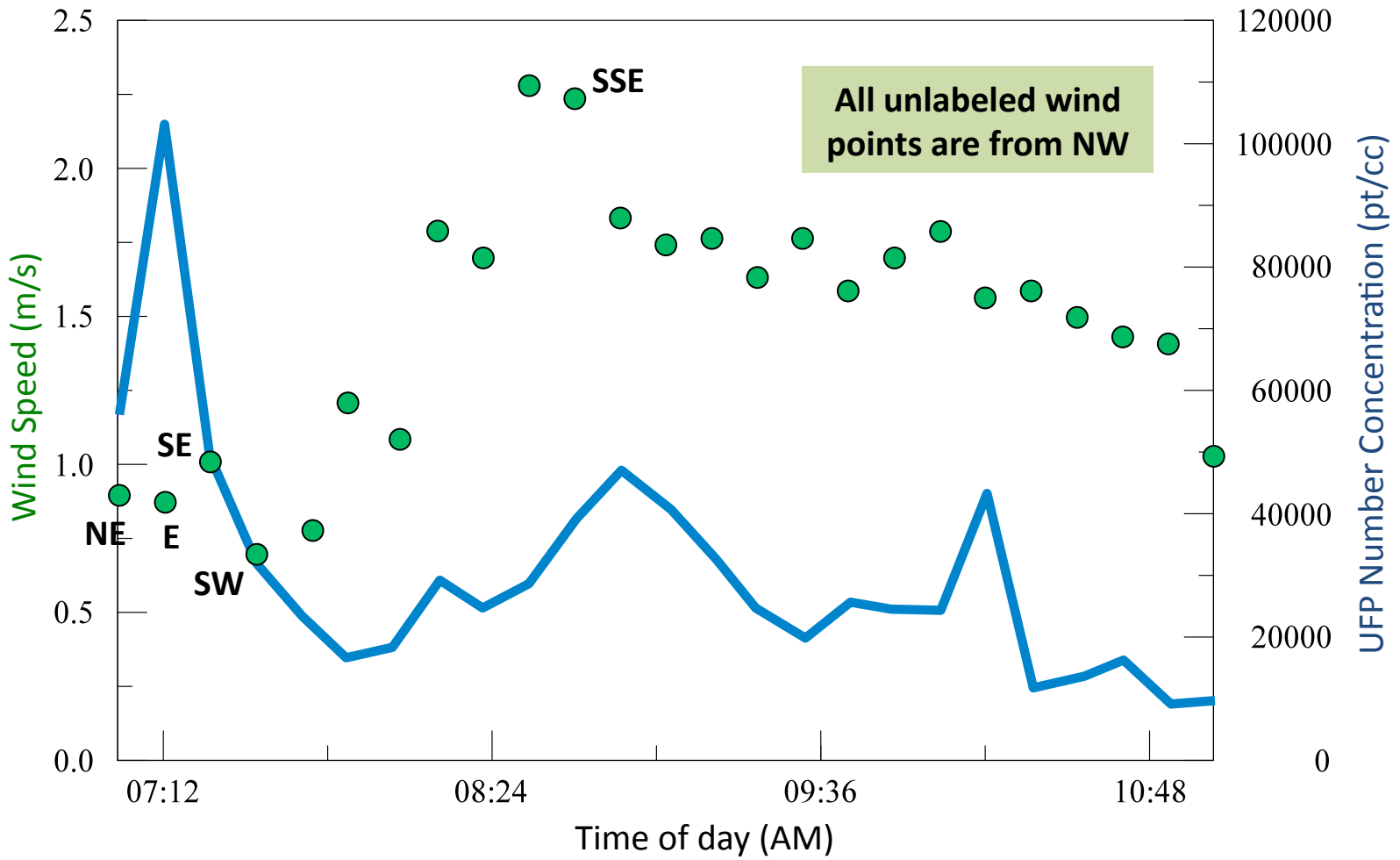
Study Location 2

I-205

◆ Ptrak



10-min Aggregation, Wind Speed & Direction, UFP Concentration



Noise Barrier Conclusions

- “Wall effect”
 - Source variability (traffic)
 - Dispersion variability (wind)
- Complex pollution/traffic relationships
- Future work
 - Movements perpendicular to noise barriers



Acknowledgements



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Questions?

