

Connected Vehicles

Arash Olia,
Ph.D. Candidate

Baher Abdulhai, Ph.D., P.Eng.
Professor, Dept of Civil Engineering

Saiedeh N. Razavi, Ph.D.
Assistant Professor, McMaster University



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING
Transportation Research Institute

What is Connected Vehicles?

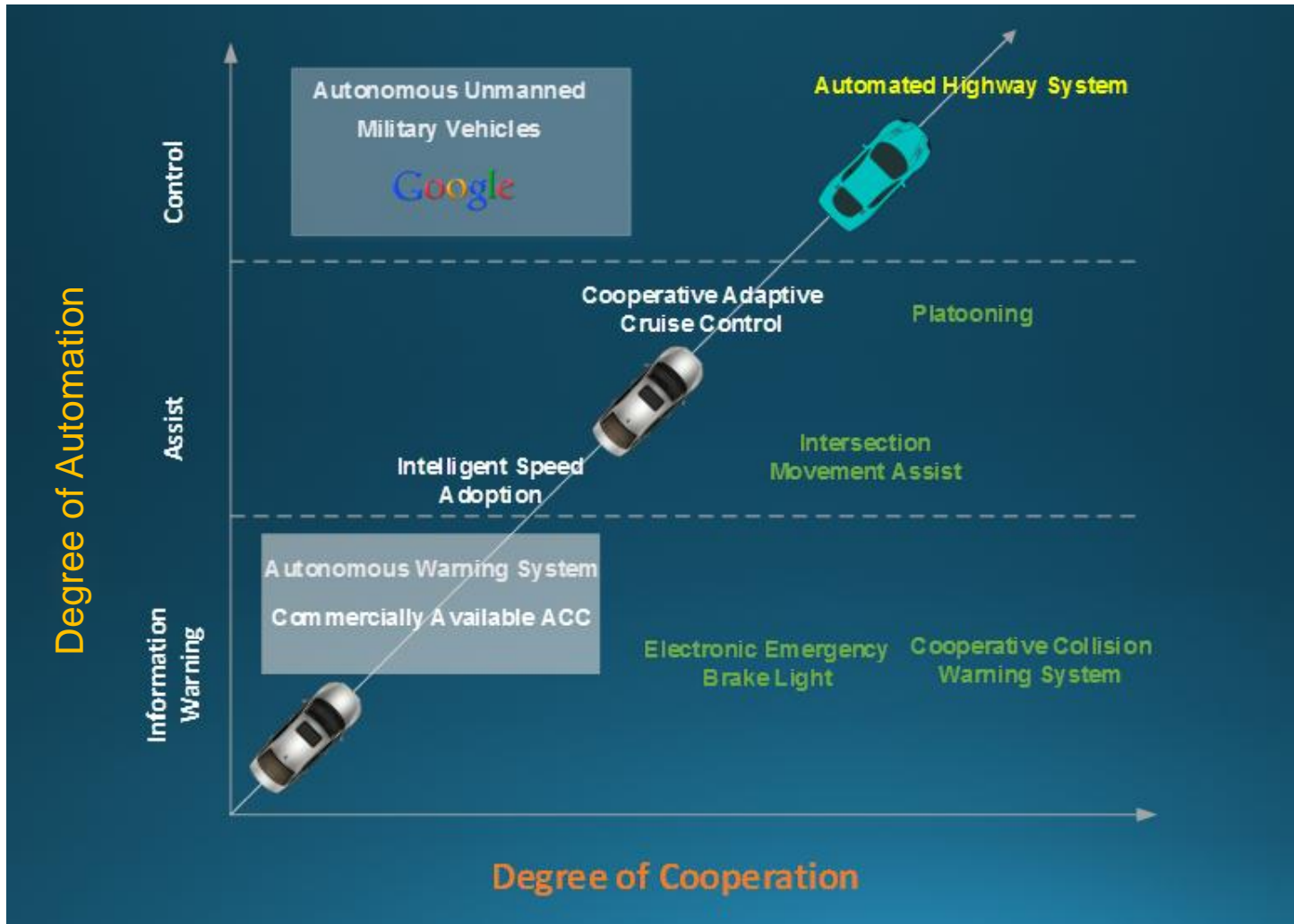


Connected Vehicles?

Cooperative vs. Autonomous Automated Vehicles

Automation Connectivity/ Communication Latency	Full Automation	
	Cooperative	Autonomous
Low Latency	<ul style="list-style-type: none">- V2V platooning- Intersection Collision Avoidance	<ul style="list-style-type: none">- Self-driving
High Latency	<ul style="list-style-type: none">- Sharing congestion and routing information	<ul style="list-style-type: none">- Self-driving

Progression Towards Automation



Why Connected Vehicles



Congestion



Collision

Emissions



Research Steps

Congestion Avoidance

- Quantifying The Mobility, Safety And Environmental Benefits Of V2v And V2i Information Sharing For Congestion Avoidance

Automated Driving

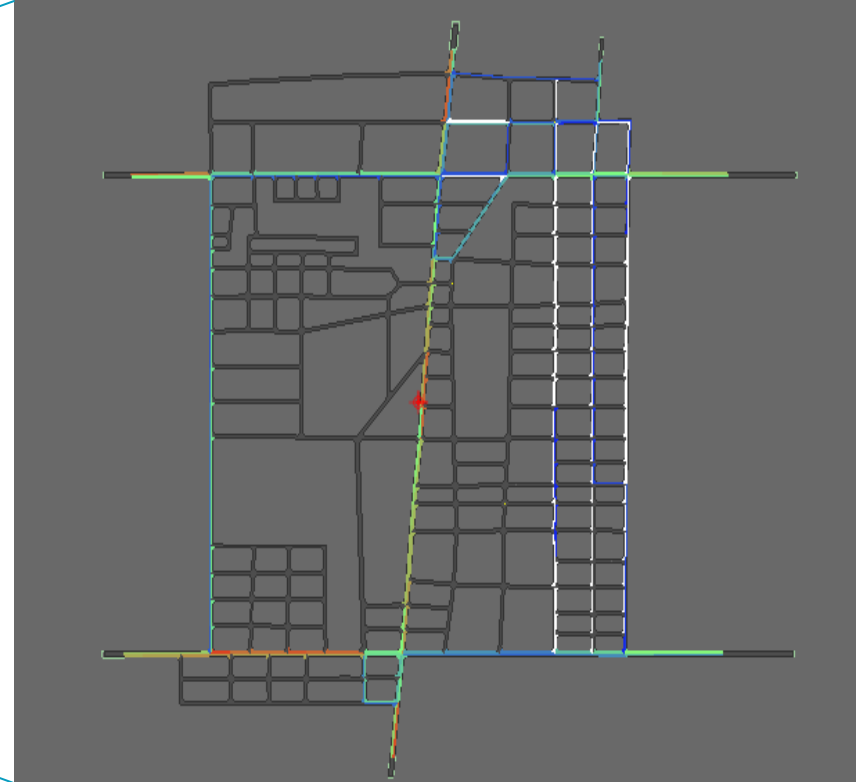
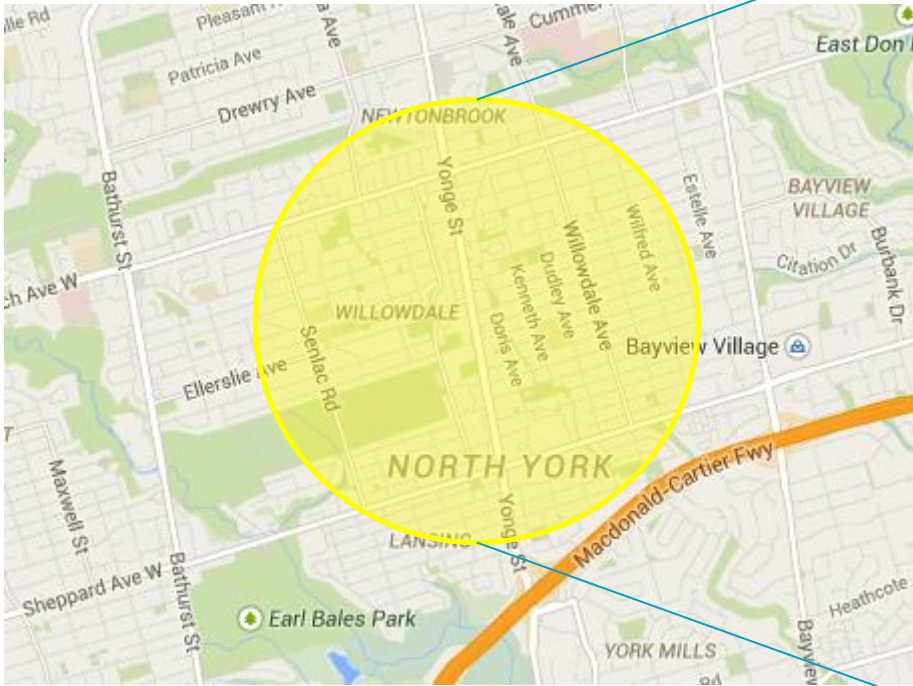
- Traffic-Flow Characteristics of Cooperative vs. Autonomous Automated Vehicles

Infrastructure Optimization

- Optimizing Numbers and Locations of Freeway Roadside Equipment (RSE) in Connected Vehicle Environment for ITS application



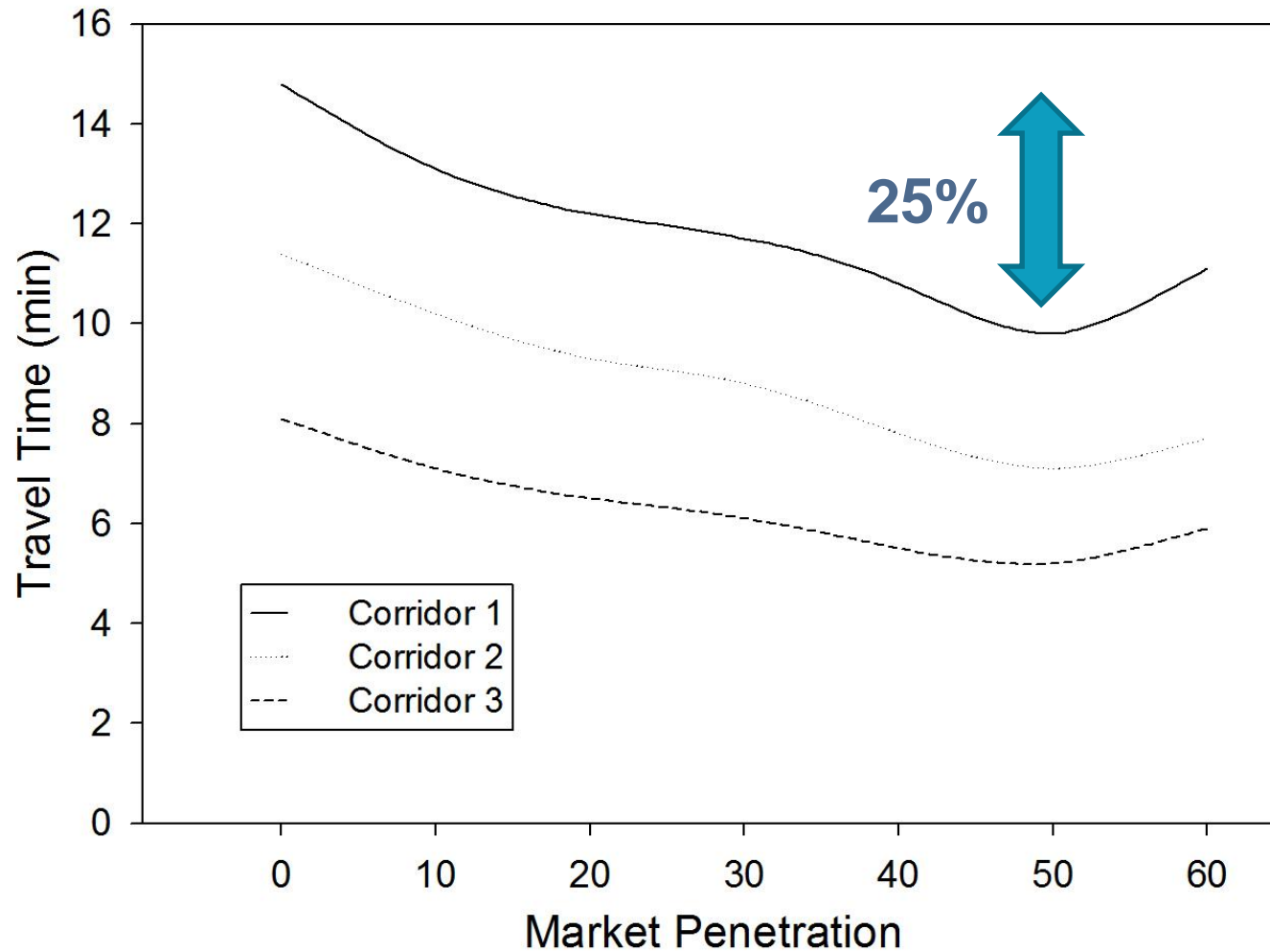
Step 1, Quantifying Routing Benefits of Connected Vehicles



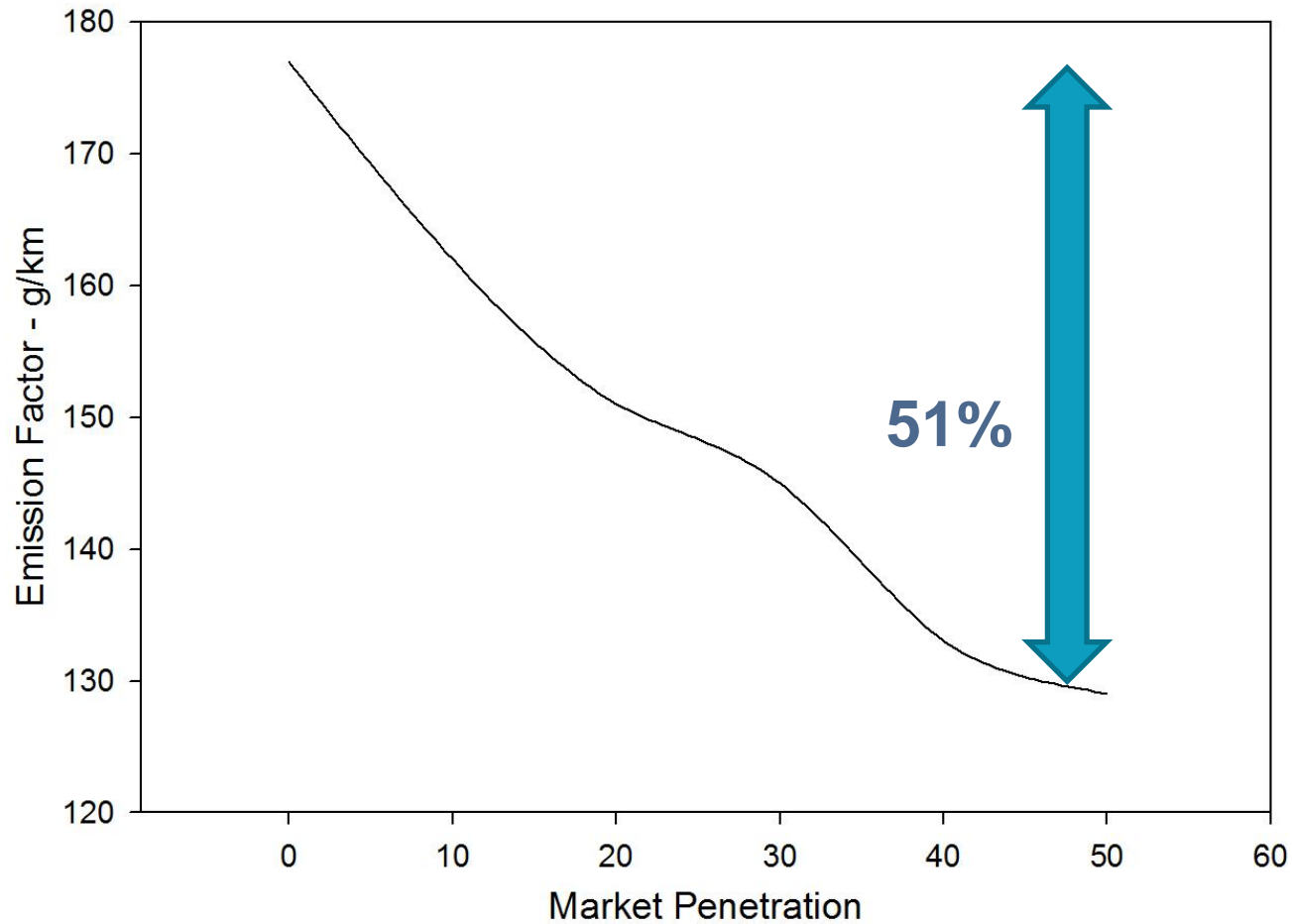
Mobility, Safety and Environmental



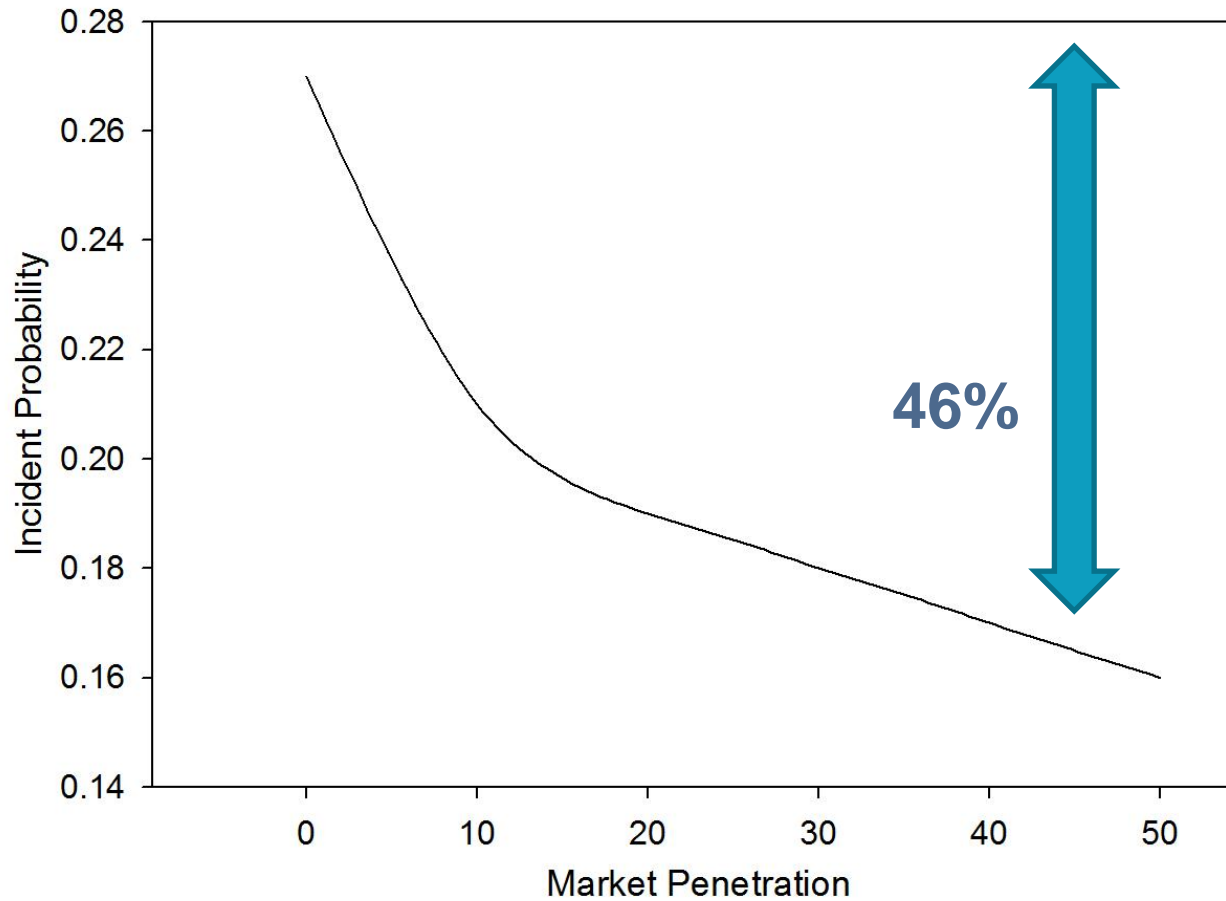
Impact on mobility



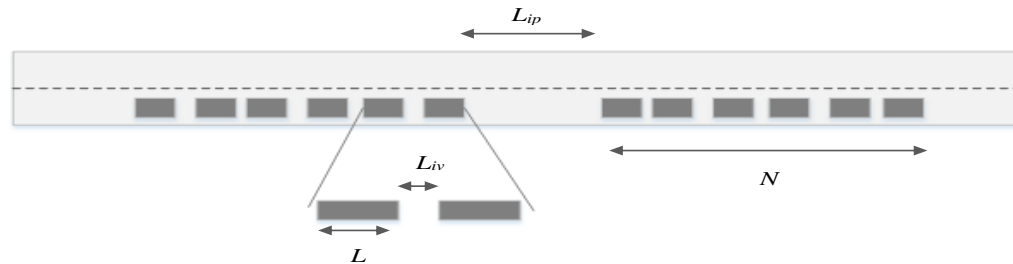
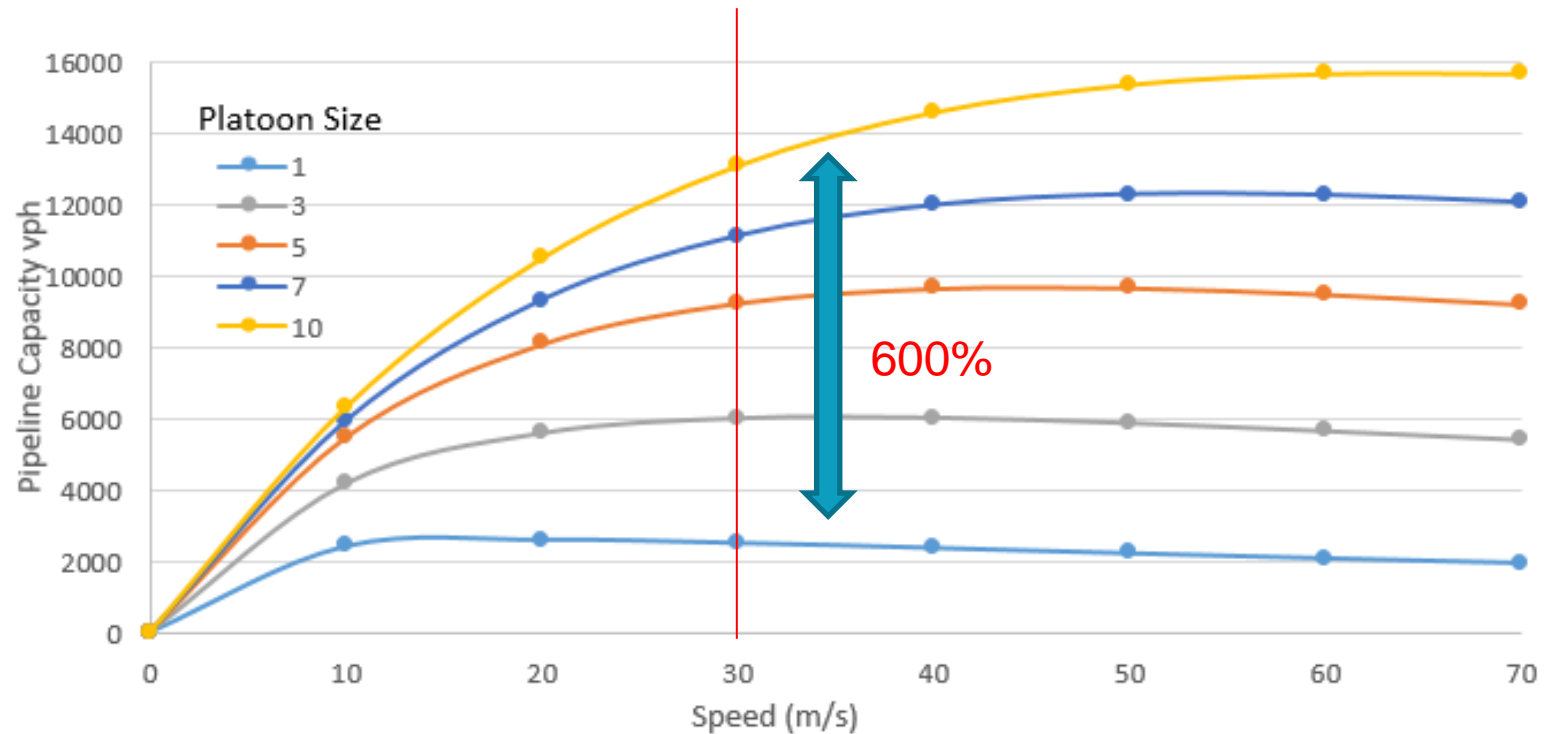
Impact on Emissions



Impact on Safety

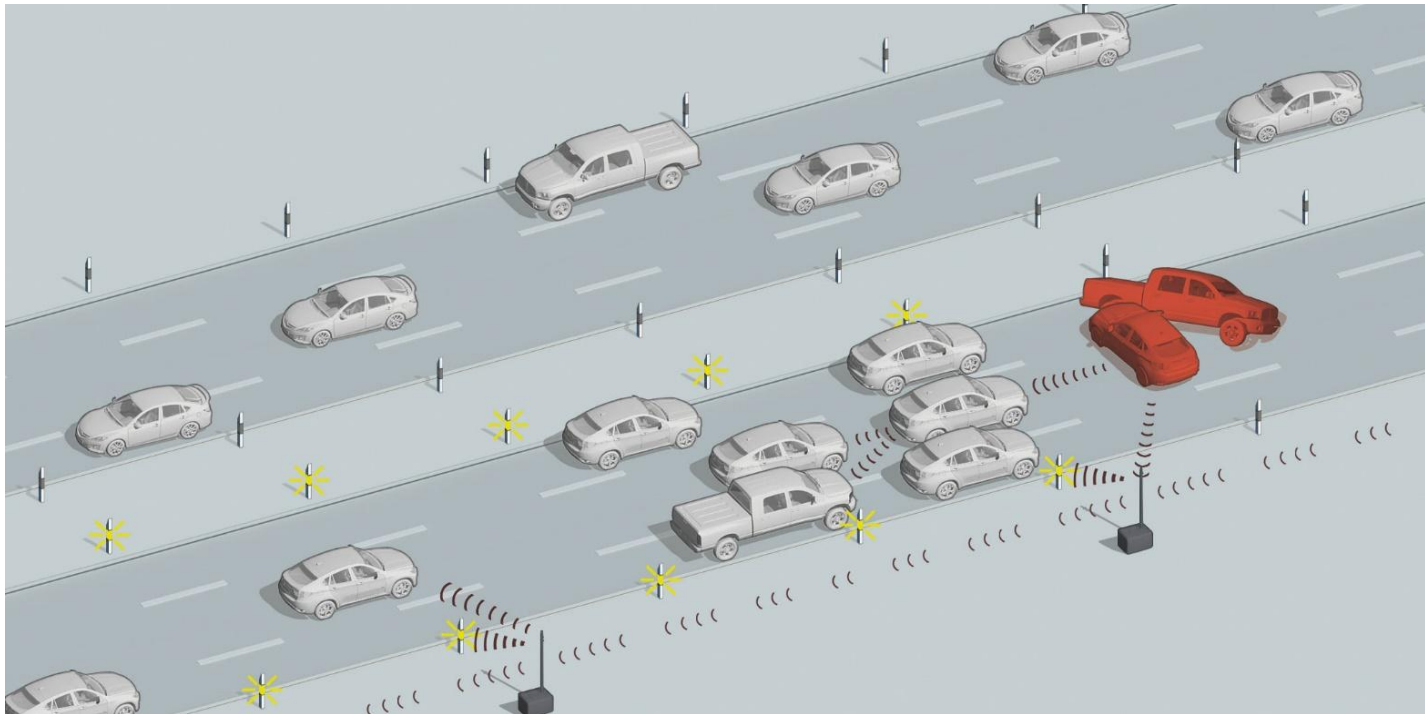


Step 2, Impacts of Cooperative Driving



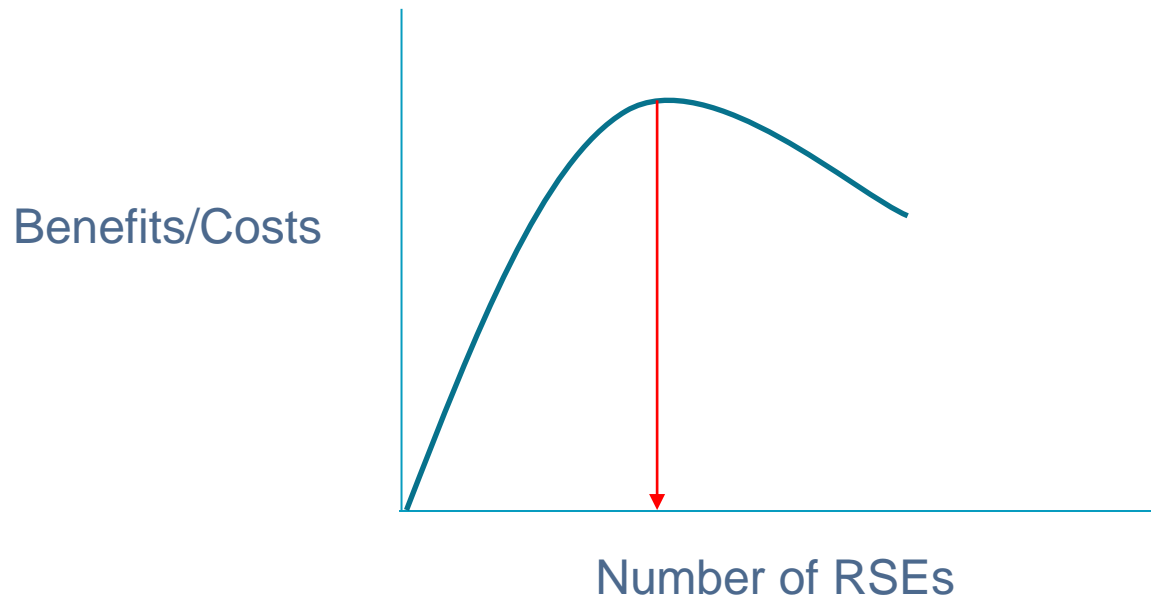
Next Steps (Step 3)

- Optimizing Location of Infrastructure



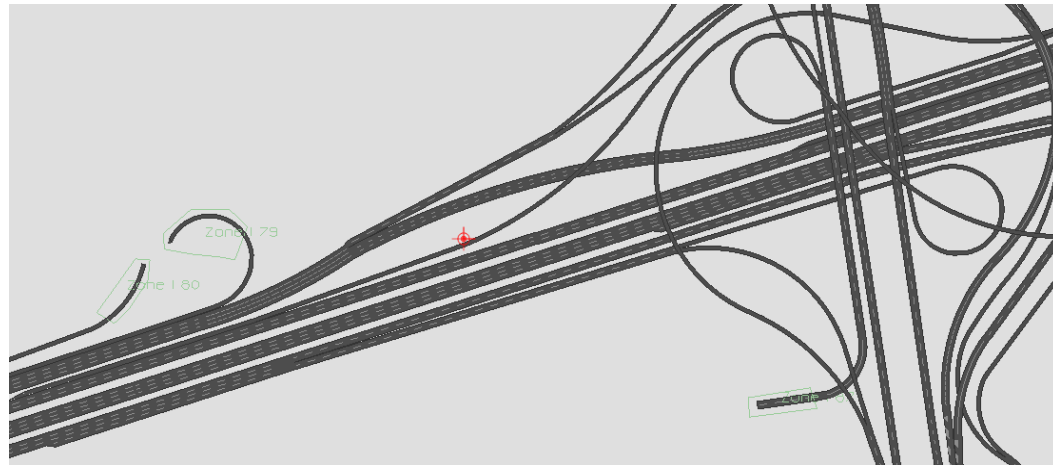
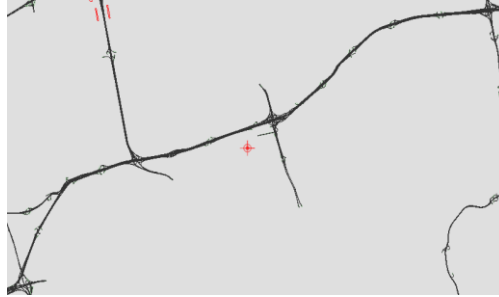
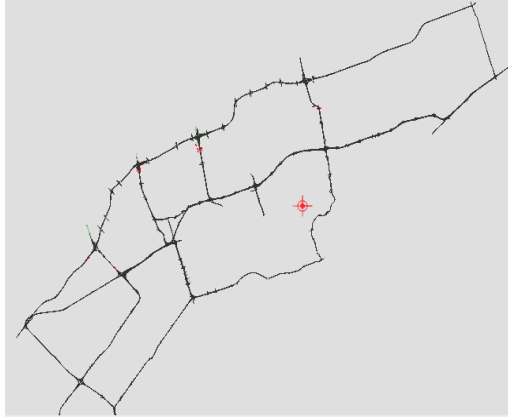
Optimization Location of RSEs

- Target : Realize Mobility, Safety and Environments Benefits
- Without Excessive Deployment of RSEs



Simulation Testbed

Toronto 400 series Highways



Thank You!

