

A Research and Coordination Network of CAV Testbeds for Human-Center Technologies and Equitable Mobility in the Pacific Northwest

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Center Name: Pacific Northwest Transportation Consortium (PacTrans)

Research Priority: Improving the Mobility of People and Goods

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Project Partners: City of Seattle, City of Moscow

Research Project Funding: \$195,000 federal; \$195,000 non-federal match

Project Start and End Date: 8/16/2023 – 8/15/2025

Project Description: In the last two decades or so, new versions of connected and automated vehicles (CAVs) have emerged and are under rapid developments. The field testing of CAVs, however, is still quite limited to this day, mainly for individual vehicles by the industry sector. There is a critical research gap to understand how CAVs interact with human driven vehicle (HDVs) and the connected transportation infrastructure for safer vehicle control, and for the efficiency, sustainability, and equity of the entire transportation system. This requires open CAV testbeds. While CAV testbeds have been built in different parts of the country in the last 5-10 years (e.g., the M-City), they are hard to access / use physically and also costly for many university researchers. In our Pacific Northwest region, despite various plans to build CAV testbeds at several partnering universities, a properly instrumented and working CAV testbed does not exist yet. This severely limits CAV-related research and deployment in the region, for which researchers have to rely on traffic simulation and/or driver simulators, or second-hand data from other testbeds. More importantly, the diverse geography, landscape, population, and economies lead to diverse mobility needs in our region, calling for testbeds with various focuses to address specific local needs of agencies, researchers, and the public. It is thus imperative to build CAV testbeds with different focuses at partnering universities of PacTrans to develop human-centered technologies/methods and for diverse and equitable mobility in the Pacific Northwest.

Problem statement: We propose to establish a research and coordination network of CAV testbeds in Federal Region 10 as a synergistic effort to facilitate and coordinate the building of CAV testbeds at partnering universities to address the diverse mobility needs in our region. This will help us understand local needs to build CAV testbeds, review current practices in the region, select proper CAV testbed sites, recommend focuses of each testbed, and provide general guideline and share resources to build the testbeds and to best use them.

The benefits of the proposed research for CAV testbeds are three-fold. *Researchers* can coordinate efforts and share resources, which help reduce costs and speed up the process of building their CAV testbeds. *Agencies* can provide their input, at an earlier stage, regarding where and what types of CAV testbeds to build, ensuring that the planned testbeds are helpful for them to address diverse mobility challenges and develop appropriate CAV related policies/regulations now and in the future. *The public* will get to know CAVs and how they work in the real world, helping promote public acceptance and accelerate CAV deployment.

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US DOT Priorities: the proposed research, by focusing on the opportunities of emerging CAVs and CAV testbeds can bring to address the diverse regional mobility challenges in both rural and urban areas, contributes to *Transformation* and *Equity* goals of USDOT. The methods to engaging communities and guidelines to build CAV testbeds and share resources in the region will produce transformative research and results.

Outputs: the proposed research and coordination network will produce an inventory of existing CAV testbed plans and facilities in the region, recommend CAV testbed sites and their focuses, and develop guideline on how to build the testbeds. A pilot urban CAV testbed that contains only one intersection will be built in the Seattle area.

Outcomes/Impacts: the research results will help build CAV testbeds in the region that will boost CAV research and agencies' understanding of CAV technologies. The testbeds will help develop human-centered technologies, address the diverse mobility needs and equity issues in the region, facilitate agencies to develop appropriate CAV related policies / regulation, and improve public acceptance of CAVs.

Final Research Report: *will provide upon completion of the project*