UNIVERSITY TRANSPORTATION CENTER

RESEARCH BRIEF

PROJECT TITLE: **Dynamic Metering in Connected Urban Street Networks: Improving Mobility**

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INSTITUTION: WASHINGTON STATE UNIVERSITY

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Background

Connected vehicles, the internet of things, and smart infrastructure technologies facilitate the exchange of real-time, highly granular information between individual users in transportation networks, system operators, and the supporting infrastructure through communication standards. Harnessing this emergent ubiquitous connectivity and its resulting data stream opens unexplored possibilities to improve mobility in urban street networks. Traffic metering is among effective traffic control methods that can greatly benefit from connected and autonomous vehicle technologies.

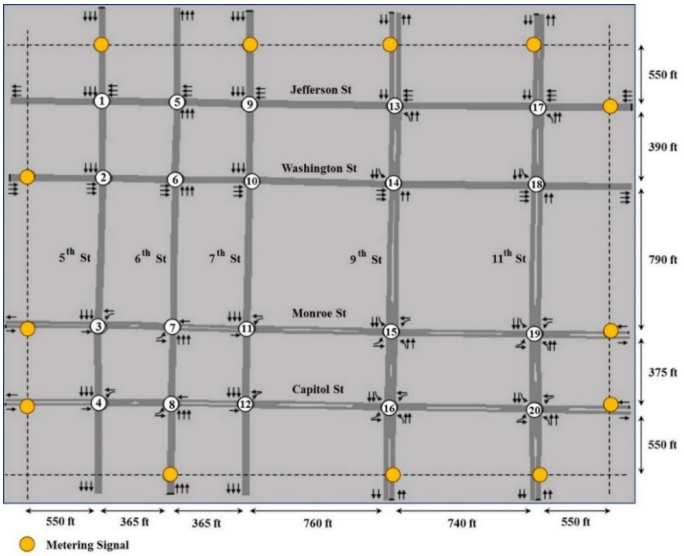
Metering traffic on on-ramps can improve traffic operations on freeway facilities by maintaining traffic state in undersaturated flow conditions and avoiding capacity loss at the expense of delaying vehicles entering the freeway from on-ramps. The same concept offers great potential to improve traffic operations by regulating/limiting the flow of vehicles into congested areas of urban street networks. In congested conditions, queue spillovers and gridlocks reduce the capacity of urban street networks to process vehicles and consequently increase the total travel time. Research shows that there is an optimal accumulation level of vehicles inside a network that maximizes the network throughput. The goal of traffic metering is to maintain network accumulation at this optimal level.

Research Project

The goal of this project is to improve mobility by developing a dynamic traffic metering methodology in connected urban street networks. The methodology aims at metering an optimal portion of incoming traffic at the boarders or inside the network to increase system-level mobility by avoiding long queues, queue spillovers, and gridlocks.

This study will generate the first network level formulation for dynamic optimization of metering rates in urban street networks. It will also incorporate connected vehicle information in the mathematical model and the proposed solution algorithm.

The project directly addresses the system-wide efficiency focus area by developing system-wide methods to improve mobility in urban street networks. In addition, the project directly addresses data-driven solutions in transportation networks as well as technologies to connected users and infrastructure systems as it fuses connected vehicle and point detector (e.g., loop detector) data and integrates them in mathematical models to optimize metering rates.



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