DECISION TOOL FOR INTERSECTIONS ALONG CORRIDORS TO REDUCE TRAFFIC-RELATED IMPACTS

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Post-Doc Research (identifying main topic, future activities and plan)

Functionally interdependent intersections in series along corridors are implemented to fulfill several performance goals regarding traffic operation and safety. However, these traffic facilities are restricted to the land use availability. Moreover, the design of corridor involves the balancing of several competing objectives such as environmental and noise-related aspects. Little is known about the different impacts that a given intersection control has on motor vehicles, cyclists, motorcycles or pedestrians.

The fundamental goal of this post-doctoral project is to develop a new-based decision supporting tool for evaluate corridor-specific economic, environmental, safety, capacity and noise impacts for use by transportation stakeholders for long-range corridor planning strategies. The work plan involves four main tasks: 1) Introducing a conceptual methodology to assess transportation-related externalities according to the corridor-specific geometric, operational and driving habits, and adjusted to local vulnerability conditions (i.e., population negatively affected by environmental stressors provoked by road traffic); 2) Developing robust empirical models to express corridor characteristics and transportation-related externalities such as traffic congestion, emissions, noise, safety or costs; 3) Modeling corridor-specific operations under various operational and design scenarios; and 4) Developing an integrated support tool for selecting intersections along corridors based on different transportation stakeholder's needs.

Vehicle dynamic along with traffic, cyclist and pedestrian flow data will be collected from real-world case studies with conventional single and multi-lane roundabouts, turbo-roundabouts and signalized intersections. These data will be obtained and processed using innovative methods for better understanding future traffic trends, and will include infrared sensors, precise point positioning, smartphones and Bluetooth sensors. Concurrently, a portable emission measurement system will be used to measure exhaust emissions from gasoline, diesel and hybrid passenger vehicles and light commercial vehicles. Crash data will be also recorded at the selected studied locations.

A microscopic platform of traffic, emissions and safety will be calibrated and validated using the collected data and numerical models to assess equitable and realistic scenarios. These scenarios will include new vehicle technology developments such as the electric vehicles and connected and automated vehicles (CAV's), as well as the design of innovate intersection layouts.

The main deliverable of this project will be a flexible tool to provide proper intersection control strategies located in urban or rural corridors that will quickly inform state and local transportation agencies, decision makers and planners about safety, emissions, noise or traffic congestion levels. This tool will also quantify the benefits for different road users individually.

KEYWORDS: Corridors, Intersections, Traffic-related impacts, Modelling, Decision-Support.

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