

Development of a decision-making tool for the implementation of pop-up bike lanes

Master's Thesis of Mohand Baraya

Mentoring:

M.Sc. Georgios Grigoropoulos
Dr. rer. nat. Andreas Keler
M.Sc. Patrick Malcolm



Vissim model for after pop-up bike lane implementation

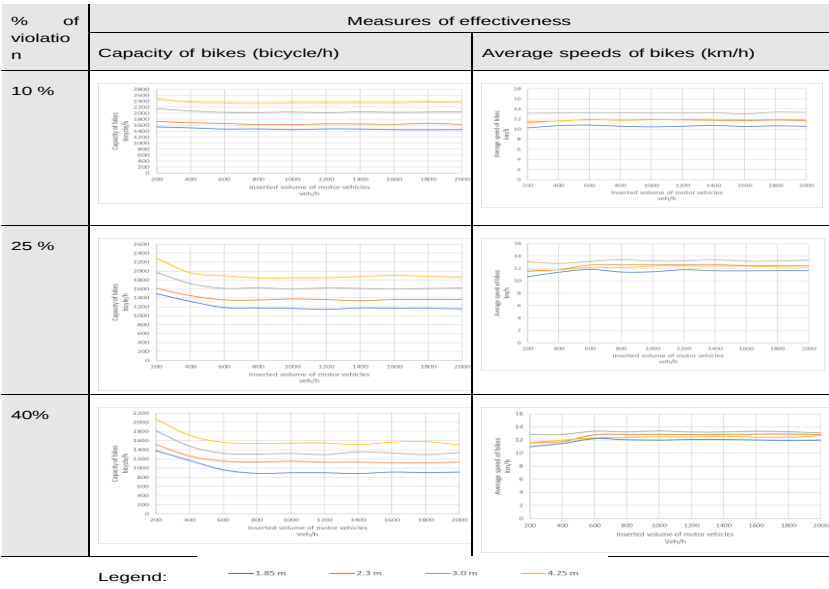
Vissim model for before pop-up bike lane implementation

For the analysis

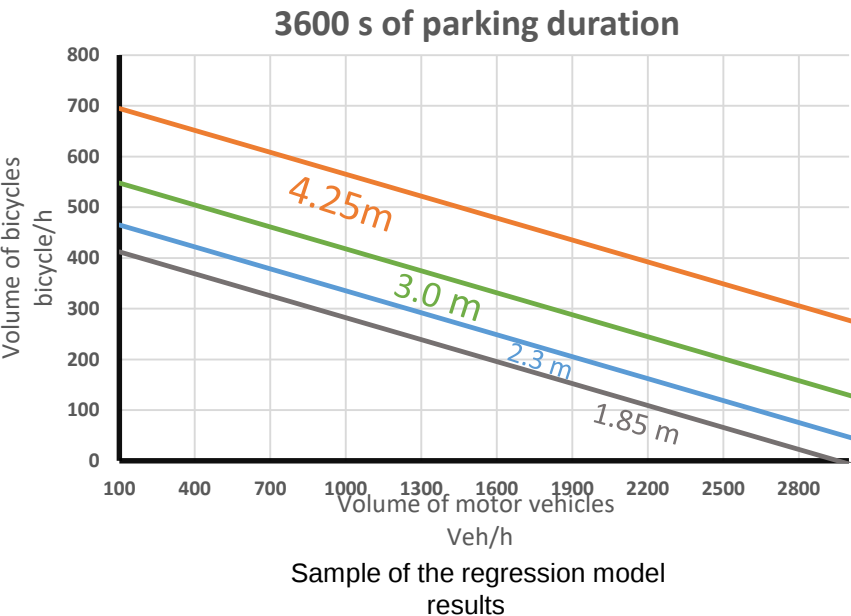
Different methodologies for varying the volumes of bikes and motor vehicles were applied to extract various traffic efficiency and safety data, such as the capacity of motor vehicles and bicycles, average speeds of both road users, average delay time per bicycle in queues formed at bottleneck location of delivery trucks parking on the pop-up bike lane, and the volume of bicycles that had to use the motor vehicles lane to overtake delivery trucks. These data were analyzed and compared to understand how different infrastructure types and scenarios would affect the traffic efficiency and safety of road users.

In this thesis

The implementation of pop-up bike lanes was evaluated and analyzed through the development of microsimulation models using PTV Vissim software and a user-friendly interface designed using Microsoft Excel to help automate the process of evaluating different volume variations of motor vehicles and bicycles in all the microsimulation models. Thus, a comprehensive understanding of the impacts of the implementation of pop-up bike lanes on traffic efficiency and safety of a road section was achieved.



Sample of the evaluation results



Decision-making tool

A multiple linear regression model was developed for selecting a suitable pop-up bike lane width; thus, it can be used along with the developed microsimulation models and excel sheets as a decision-making tool for the pop-up bike lane implementation. This decision-making tool aims to help the decision-makers to take a decision by visualizing the impacts of the implementation of pop-up bike lanes on road sections under different infrastructure configurations and variations of inflows of vehicular and bicycle traffic.