Impact of Bike Traffic on the Christchurch Multimodal Transport System

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The performance of urban transportation networks is central to economic productivity, quality of life, and sustainable development. Sustainable transport is a key priority for New Zealand as it works towards reducing CO^2 emissions and creating resilient, liveable cities. Promoting active transport modes, such as cycling, is central to this transition, with national and local governments investing heavily in infrastructure to encourage a shift from private vehicles. Christchurch has committed over 60 km of separated cycleways, supported by $177.3 million in funding from the New Zealand Transport Agency for 2024–2034, highlighting its strong focus on sustainable transport.

Despite this progress, current traffic simulation models for New Zealand do not adequately capture the effects of cycling. This study develops the first detailed microscopic traffic model of cycle lanes in Christchurch, New Zealand, offering new insights into how active modes influence traffic dynamics, congestion, and overall network performance. Microscopic traffic modelling offers a highly detailed overview into the performance of a network and is especially useful for investigating traffic signal coordination and intersection operations.

This study updates the Christchurch microscopic model in Aimsun simulation environment to reflect the current network. The methodology involves incorporating updated road geometry, intersection layouts, signal control plans, and cycle lanes sourced from OpenStreetMap and validated against aerial imagery. Demand data is taken from Christchurch City Council's macroscopic SATURN model to ensure consistency between models.

Simulations were conducted under two scenarios: (1) a base bimodal network, and (2) a multimodal network including cycling. Key performance indicators such as total travel time, delay, and traffic density will be compared across scenarios. It is anticipated that results will demonstrate how active modes influence existing traffic conditions.

The study will deliver valuable insight into how cycling infrastructure affects network performance, supporting Christchurch's long-term goal of transitioning to a sustainable and resilient multimodal transport system.