

## Can extended marked crossings improve the safety of crossing cyclists and pedestrians?

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### Background

Crossing a road at an unprotected crossing is one of the most risky manoeuvres for vulnerable road users (VRU) in traffic. Busy roads with large volumes of traffic can form a major barrier, physically and psychologically dividing the urban landscape. Crossing these roads can be challenging for VRU. Researchers and practitioners are looking for effective ways to improve safety of crossing pedestrians and cyclists. Given the limited public budgets, minor infrastructural changes that can be implemented quickly and at low cost are potentially interesting quick wins. Therefore, the Flemish Roads and Traffic Agency set up a trial design of 'extended crossings', that has the aim to improve the safety of crossing pedestrians and cyclists. An extended crossing is a zebra crossing that is extended in the upstream direction so that the stripes have a length of 8m instead of 3m at traditional crossings. At the same time, a physical barrier ensures that the VRU can only cross at the rear 3m of the crossing. The idea is that this will create an extra buffer to create an extra safety margin for the crossing VRU, and will make the crossing more conspicuous and commanding to approaching vehicles, hence improving yielding behaviour and reducing (near-)crashes.

### Aim

The aim of this study is to empirically assess the road safety effects of the conversion of classic crossings to extended crossings. The safety effects on crossing cyclists (who do not have the right-of-way at these crossings) and pedestrians (who have the right-of-way) are both analysed. For the purpose of this conference/paper, the emphasis will be put on the results related to cyclists.

### Method

The extended crossings are implemented at two crossings in urban areas on dual carriageways with two lanes in each direction. The selected locations have a speed limit of 50km/h and high volumes of motorized traffic as well as high volumes of crossing pedestrians and cyclists. This paper presents the results of an empirical before-and-after evaluation study using surrogate measures of safety; more specifically advanced video analyses of traffic conflicts (near-crashes) and a systematic behavioural observation of interactions between crossing VRU and motorized traffic.

The characteristics of the interactions between a crossing road user and a motor vehicle are coded using a predefined codebook. The codebook includes information such as the yielding process (is there a priority violation, and do road users behave in a defensive or a more assertive way), types of road users involved, in which traffic lane the motor vehicle is positioned, whether there is a sight obstruction caused by traffic in the other lane, etc. All interactions from one full day are coded in the codebook.

Potential conflicts are pre-selected from the videos and accurately and objectively measured using T-Analyst, a semi-automated video analysis tool that allows an accurate and objective measurement of the severity of the interaction. The severity of the potential conflicts is assessed using the minimal Time-to-Collision (TTCmin) and Post Encroachment Time (PET) indicators. Three days of videos for each crossing are analysed to identify serious conflicts.

### Expected results

The analyses of the video footage of the after-period are still ongoing. The final results are expected in March. The analyses from the before period show high numbers of interactions (1500-2500 interactions per crossing) as well as serious conflicts (10-25 serious conflicts per crossing over the course of three days). The analyses show generally poor yielding behaviour; we observe many cyclists who do not yield to approaching motor vehicles, but also that many pedestrians are not yielded to by motor vehicle drivers. Many serious conflicts happen in the second lane (from the point of view of the crossing VRU), and in most of these conflicts, a sight obstruction played a role.

The relatively high numbers of interactions and conflicts will allow a robust assessment of the measure. The preliminary results seem to suggest that the number of serious conflicts is lower in the after period, which would suggest that extended crossings could indeed improve safety for crossing vulnerable road users.