Off-street trials of a Bus Stop Bypass

Background

As part of a major programme of off-street trials of innovative cycling infrastructure, Transport for London (TfL) commissioned TRL to investigate pedestrian crossing options with varying pedestrian and cycle flows, conducted at an off-street build facility at TRL. The trials were part of a wider programme of off-street trials of innovative cycling infrastructure commissioned by Transport for London (TfL) to provide evidence to inform the implementation of the Mayor's Vision for Cycling (GLA, 2013). A Bus Stop Bypass involves taking an on-carriageway cycle lane via a cycle track behind a bus stop. The purpose of this is to remove the need for cyclists to overtake a stationary bus thereby improving cyclist comfort and safety by reducing the collision risk for cyclists. A consequence of applying this concept is that pedestrians need to cross the cycle track to reach the bus stop for which a crossing point is provided.

Design

A Bus Stop Bypass takes a cycle lane which is usually adjacent to a kerb on the approach to a bus stop, and routes it behind the bus stop; removing the need for cyclists to pass a stopped bus on the main carriageway. After the bus stop the bypass either continues on to a cycle track or merges cyclists back into to the main carriageway. However, whilst removing potential interactions with other vehicles, this creates the possibility of interactions with pedestrians crossing to the bus stop. Therefore, the key focus on the tested designs were the crossing types, which were required to take in to account both able pedestrians and those with impairments. The four crossing types tested were:

- No Ramp/No Zebra: (at the level of the cycle track, uncontrolled crossing) the pedestrians cross the cycle track via a dropped kerb, and no pedestrian crossing was marked.
- No Ramp/Zebra: (at the level of the cycle track, controlled crossing) the pedestrians crossed the cycle track via a dropped kerb, and a Zebra pedestrian crossing was marked.
- Ramp/No Zebra: (at footway level, uncontrolled crossing) the pedestrians crossed the cycle track via a ramp at footway height, and no pedestrian crossing was marked.
- Ramp/Zebra: (at footway level, controlled crossing) the pedestrians crossed the cycle track via a ramp at footway height, and a pedestrian crossing was marked.

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Aims of research and key findings

The research had four key aims:

Identify the pedestrian capacity of the Bus Stop Island: defined as the number of people who can be accommodated on the island

The trial determined a basic formula for determining the maximum capacity of the bus stop island, and found that when pedestrian numbers reached 85% of this, pedestrians decided not to wait on the Bus Stop Island, but to wait elsewhere instead. This formula can be utilised by planners to design Islands with sufficient capacity for the number of pedestrians expected at any given time.

Determine the levels / thresholds of occupancy that queuing seemed to break down

This found that that new pedestrians joining queues waiting at the bus stop began to join anywhere on the Island when there was between 33 to 47 pedestrians in the queue.

Identify how the interaction between pedestrians and cyclists can be safely managed

The Bus Stop Bypass introduces a situation of potential direct conflict between pedestrians and cyclists, with pedestrians crossing in front of approaching cyclists to reach the Bus Stop Island. Safety of the four designs tested was based upon direct observations of interaction rates between cyclists and pedestrians, and their understanding (and agreement) of priorities. These have resulted in the following conclusions based upon the behaviours observed in the trials:

- A Zebra crossing reduced the probability of interactions between cyclists and pedestrians. It had the greatest agreement amongst participants regarding priorities both at the crossing and elsewhere. It had the highest scoring for perceived safety. Furthermore, participants with impaired sight found it easier to locate.
- Dropped kerbs were generally preferred at the Zebra crossing except with high pedestrian flows, and both pedestrians and cyclists felt safer. Although, people with impaired mobility, including wheelchair users, preferred the Ramp/Zebra crossing. In addition, a ramp generally increased interaction rates, although slightly decreased the number of serious interactions; i.e. a near, or very near, miss. This conflicting evidence on interactions means no overall conclusion can be reached with respect to safety. However, if the pedestrian flow was at least 40% of a large cycle flow then numbers of interactions were reduced

Identify the features of the bus stop island layout that are attractive to cyclists and that encourage them to use the bypass cycle track

The key findings were that the Bus Stop Bypass appeared to be attractive to participant cyclists; it appeared to have advantages for participant cyclists' perceived safety, compared with using the main carriageway; it was perceived to be safer by cyclists, but cyclist journey times were generally lower without a Zebra crossing, particularly under high cyclist flows.

Further Information

TfL - Better Junctions for Cyclists www.tfl.gov.uk/betterjunctions
TRL - Safer Cycling Innovations www.trl.co.uk/cyclinginnovationtrials/