Transport for London
Street Management

# Behaviour at Cycle Advanced Stop Lines

## London Road Safety Unit
## Research Summary No 6

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## Overview

This study examined the behaviour of cyclists and other road users at 12 signalled junctions with Advanced Stop Line (ASL) facilities and 2 control sites in London. Video observation over 2 days at each site provided information on 6,041 cyclists.

At ASL sites, a larger proportion of cyclists (92%) were able to gain access to the front of traffic queues when stopped at traffic signals than at control sites (64%). At the same time the proportion of vehicles that encroached onto pedestrian crossings while waiting at signals was reduced. However, motorised vehicles encroached onto ASL reservoirs and feeder lanes, reducing their effectiveness.

Casualty and conflict analysis could not conclusively determine the safety effect of ASLs. Further research in this and other areas is recommended.

## Objectives

- To obtain information on how cyclists and other road users behave at junctions with and without Advanced Stop Lines with a variety of lane layouts;
- To assess safety at ASL sites using information about casualties before and after implementation, and instances of road user conflicts observed at these sites.

## Background

Originating in the Netherlands, Advanced Stop Lines are a facility designed to give priority to cyclists at signalled junctions. They provide a second stop line at traffic signals in advance of the normal stop line for vehicles. Between the two lines is an area (ASL reservoir) which is reserved for cyclists. Access to the reservoir is gained via a cycle feeder lane (in the carriageway or along the kerb) or by a gate (opening to the reservoir without feeder lane). Coloured surfacing is sometimes used to delineate the feeder and reservoir.

Little was known about how these facilities are used in London and their effect on safety. The London Road Safety Unit commissioned the Transport Research Laboratory (TRL) to study behaviour and safety at a selection of ASLs in London.



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## Method

- 14 sites were selected (12 with ASLs, 2 control sites without ASLs);
- Video data were collected between 7am and 6pm over two days at each site;
- Information on each cyclist was extracted from the videos including their use of the ASL and any conflict between cyclists and other vehicles;
- Information about other road users was extracted for every fifth traffic signal cycle;
- Casualty data from the Stats19 records were collated for each site studied and casualty rates before and after implementation of the ASL were compared;
- Information on traffic flows and speeds were sought from the relevant highway authority for each site.

**Site selection criteria** meant that only sites with at least 100 cyclists expected over 2 days were used. They comprised a mix of lane layouts and ASL design. Two had central ASL feeder lanes and a dedicated left turn lane. The sites represented a variety of lane widths and layouts and were drawn from central, inner and outer London. Despite efforts being made during site selection, there were no left turning movements at either of the control sites.

## Results

**Cyclist characteristics** for 6,041 cyclists were observed at the 14 sites as part of the study. Daily cycle flows varied between sites from 41 to 596 cyclists per day. Adult males made up 71% of the sample and adult females 27%. Over all sites, 62% of the cyclists were travelling during peak hours (i.e. 0700-1000 and 1600-1800).

### ASL kerbside feeder lanes lead to more cyclists approaching along the kerbside

Figure 1 shows the method of approach to the junction used by cyclists travelling amongst other traffic. Where a kerbside feeder lane was present, 87% of cyclists used it. Where none was present, 77% of cyclists approached along the kerb. At the two sites with a central feeder lane, 52% of cyclists used it while 26% still approached along the kerbside.

At the one ASL site with a single traffic lane and no feeder lane, 10% of cyclists approached on the footway (compared with an average of 1%). At sites with a separate left-turn traffic lane, weaving was a more common approach method than at other sites.

### More cyclists reach the front of the vehicle queue at ASL sites

Given that more cyclists approached on the nearside at ASL sites, there is potential for increased conflict with other left-turning vehicles. However, cyclists who have to stop at the junctions can position themselves ahead of other traffic.

At ASL sites 92% of cyclists reached the front of the traffic queue compared with only 64% at control sites. However, the feeder lane was blocked for an average of 11% of cyclists over all eight sites that had feeder lanes. Blockages increased the proportion of cyclists weaving on the approach to the junction from 1% to 13%.

At sites with a dedicated left turn lane and central feeder lane, 31% of cyclists waiting to travel straight on positioned themselves front left while 2% positioned themselves to the left of traffic.

At ASL sites, only 3% of cyclists who stopped at the junction intending to proceed straight on positioned themselves on the left of traffic (as shown in figure 2) compared with 23% at control sites. In addition, 16% of cyclists

**Figure 1: Cyclists' methods of approach to the junctions by layout type**

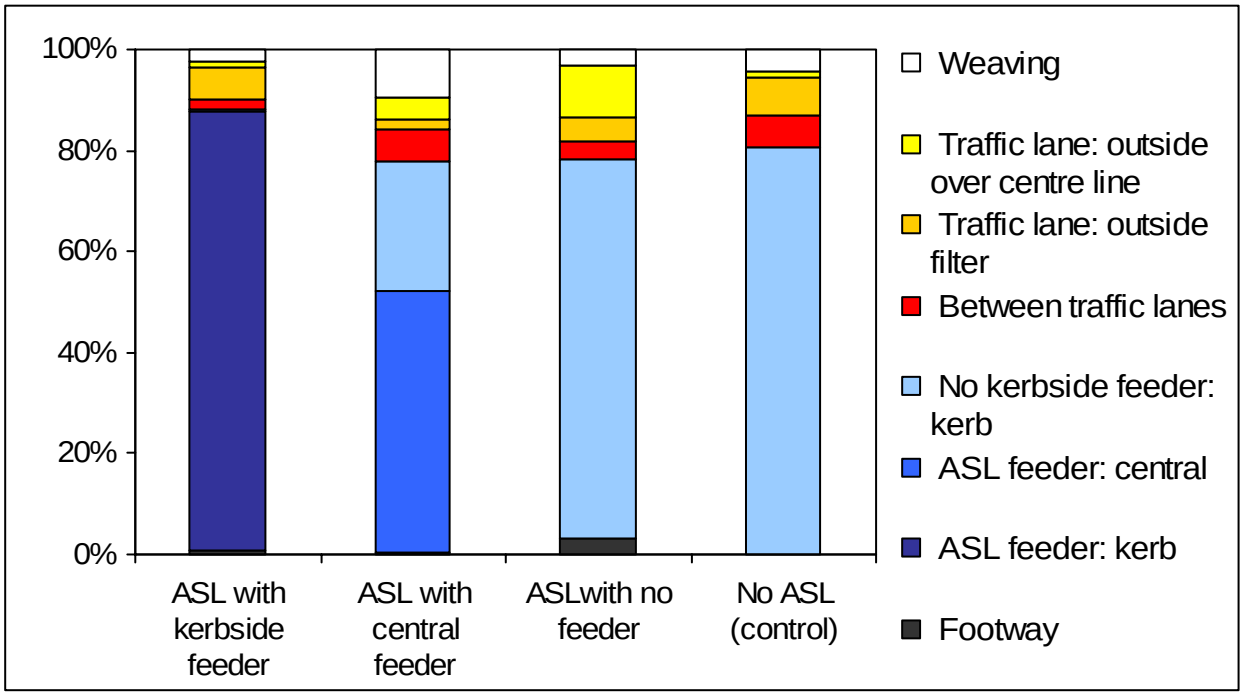
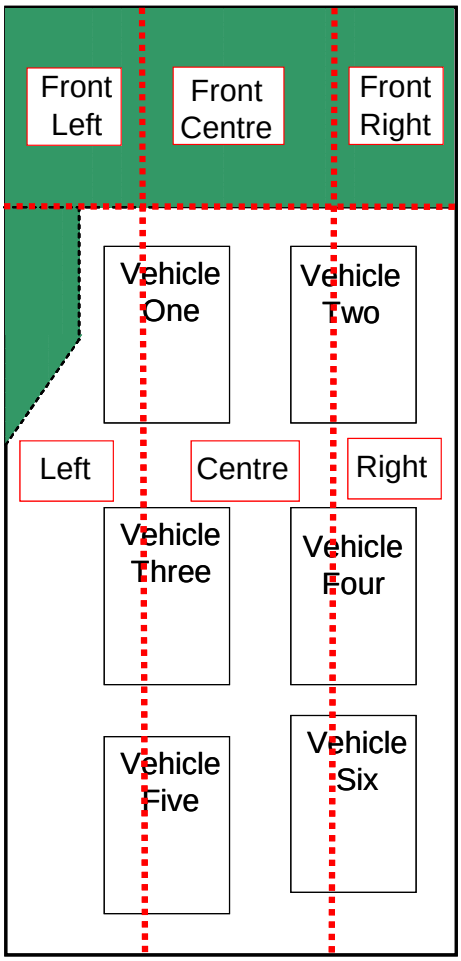



**Figure 2: Positioning of cyclists waiting at traffic signals**




waiting at ASL junctions who intended to travel straight on positioned themselves front centre while only 6% did at control sites.

## ASLs create a buffer between pedestrians and other road users

When stopped at a junction without an ASL reservoir, a larger proportion of cyclists positioned themselves in the pedestrian crossing. At control sites 54% of cyclists waited beyond the stop line in the pedestrian crossing compared with 40% at ASL sites where 38% used the ASL reservoir.

## Other road users encroach onto space reserved for cyclists

The study examined the degree to which other road users encroached onto ASL reservoirs and feeder lanes.

While using an ASL, 36% of cyclists experienced encroachment into the ASL reservoir by motorised vehicles. Over all ASL sites, 55% of vehicles encroaching were cars or taxis and 30% were motorcycles.

Different types of vehicles encroached the ASL to different degrees: 68% of car drivers that encroached covered less than half the reservoir while 64% of motorcyclists (64%) covered the whole length of the reservoir.

The proportion of vehicles stopping past the stop line at control sites was 26% compared with 13% of vehicles stopping over the second stop line at ASL sites. This again suggests that ASLs provide a buffer to pedestrians by reducing the incidence of motorised traffic stopping in the pedestrian crossing area.

**ASL feeder lanes** were encroached on by car, taxi and light goods vehicle drivers more often than other road users.

Although the two sites with distinctly coloured feeder lanes had the lowest levels of encroachment, no statistically significant relationship was determined between colour and encroachment.

All road users demonstrate high levels of red light violation

At ASL sites the proportion of cyclists who chose to violate a red signal was 17% compared with 13% at control sites. However the propensity to do this varied widely between 3% and 36% at different sites and is likely to have been influenced by site specific characteristics.

Just over half of the red light violations observed (55%) occurred during peak hours. Men committed 80% of the violations and women 20% as might be expected given that men made up 71% of the sample. However, over the whole sample 20% of male cyclists and 12% of female pedal cyclists were observed violating a red signal.

Observation of other road user behaviour indicated that, over all sites, while 48% of violations were committed by pedal cyclists, 31% were committed by cars and taxis. These proportions varied widely between sites.

**Road user conflicts** between cyclists and other road users were identified from video data and rated on a scale of severity from 1 to 5 (with “serious conflicts” defined as those categorised as 3 or above).

Over all sites during the times surveyed, 72 conflicts were recorded. This represented 1.2% of all cyclists observed. The proportion of cyclists involved in a conflict varied between sites (0%-9%). The average proportion was 1.3% at ASL sites and 0.6% at control sites.

**Cyclist casualty rates** were determined before and after implementation dates for five sites.

Over those five sites, the annual average cyclist casualty rate had risen from 1.42 in the before period to 1.66 in the after period but there was wide variation between sites. In the context of rising cyclist numbers across London, it was not possible to draw any conclusions about the effect of ASLs on cyclist safety.

## Conclusions

This study demonstrates that ASL facilities can be successfully employed at virtually any type of junction layout. They are well used by cyclists and effective in providing priority to cyclists who have stopped at the traffic signals by allowing them to position themselves in front of motorised vehicles.

However, obstructed feeder cycle lanes, which may be obstructed by parked vehicles, could endanger cyclists when manoeuvring around them into the main traffic lane. Road users should be discouraged from encroaching onto ASL feeder lanes or reservoirs.

Sites with a left-turn only lane will always introduce a potential hazard for cyclists. This may be exacerbated by the provision of kerbside feeder lanes which

seems to encourage cyclists to approach on the nearside.

Poorly marked ASL facilities may be less effective.

## Next steps

Further research would be useful on the following topics:

- Comparison of casualty rates before and after implementation of ASLs at a larger sample of sites across London;
- Conflicts between cyclists and left-turning vehicles at sites with and without a feeder lane;
- The level of motorists' understanding of the purpose and regulations regarding ASLs;
- The factors affecting levels of red light violation by cyclists and other road users;
- The effect of coloured surfacing at ASL facilities on levels of encroachment and obstruction.

## Selected references

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