



Effectiveness of Speed Indicator Devices on reducing vehicle speeds in London

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Overview

Speed Indicator Devices (SIDs) are increasingly used in London and the UK. However, little research has been undertaken on their effectiveness on reducing vehicle speeds and improving road safety. The London Road Safety Unit commissioned the Transport Research Laboratory (TRL) to study the effectiveness of SIDs on reducing vehicle speeds in London¹.

This research measured vehicle speeds before the installation of the SID, during their operation and after their removal.

Overall, at the 10 study sites, it was found that speeds reduced by 1.4mph while a SID was operational for at least two weeks. The reduction in speeds extended 200 metres downstream of the sign. When SIDs were removed, speeds returned to the speeds recorded before the SIDs were operational.

The research findings show that a SID rotation programme can contribute and be part of a speed management programme to improve road safety in London.

Background

Vehicle speeds are an important factor in the frequency and severity of collisions. SIDs are temporary signs that detect an approaching vehicle's speed at a distance of 100 metres and can in some cases display the speed and also a happy / sad face if the vehicle is under / over the speed limit (Figure 1). SIDs were set not to display speeds over a certain point. The display and operation of a SID is different to Vehicle Activated Signs (VAS) which have been found to reduce vehicle speeds and collisions².



Figure 1: A Speed Indicator Device (SID)



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Research objectives

1. To measure vehicle speeds and to assess the effectiveness of SIDs.
2. To assess the contribution SIDs can make in improving road safety in London.
3. To identify and document good practice of operating SIDs in London.

Methods

Sites were selected for inclusion in the study if they passed several inclusion and exclusion criteria. These criteria included a record of speed related collisions, appropriate road length and geometry, no other speed management features and a 30mph speed limit.

Speed data were collected at one pilot site and ten study sites using Automatic Traffic Counter tubes. The period for which speed data were recorded differed between sites. Overall, speed data were collected to allow the analysis of speeds a week before SID installation, during SID operation and for two weeks after the SIDs were removed.

In the collection of the speed data several days of data were lost at some sites because of equipment failure and vandalism. Some SID batteries failed prematurely and SIDs were therefore inactive for some periods of the study. Data issues were resolved by excluding data and analysis undertaken as planned.

Using free flowing speed data all research questions were answered by comparing mean speeds to the mean speeds of the before period. The mean speeds at a loop 200 metres upstream of the SID were used to control for any background changes in vehicle speeds during the study.

The analysis allowed for the assessment of the effectiveness of SIDs on mean speeds.

Results

1. SID effectiveness on reducing mean speeds in London

SIDs were effective at reducing mean speeds in London.

At the ten study sites mean vehicle speeds before the installation of the SIDs ranged from 28.4mph to 35.4mph. When the SIDs were operational, mean speeds reduced by between 0.6mph and 2.6mph. The overall effect was a 1.4mph reduction in mean speeds. All changes in speeds were statistically significant. Therefore, the probability of no changes is less than 5%.

SIDs were effective at reducing the proportion of vehicles exceeding the speed limit.

The proportion of vehicles exceeding the speed limit at higher speeds was significantly reduced when the SIDs were operational. Table 1 shows that before the SIDs were present, 18.8% of vehicles were travelling at 36mph or higher. This is the speed that the Association of Chief Police Officers suggest that speed limit enforcement should start at. During the period of SID operation, 13.1% of vehicles were travelling at or exceeding 36mph. When the SIDs were removed, the proportion of vehicle's exceeding 36mph increased. The proportion of vehicle's exceeding one and a half times the speed limit (45mph) reduced while SIDs were operational and increased once they were removed.

Table 1: Proportion of vehicles exceeding speed limit

	Vehicles travelling at or exceeding:		
	30mph	36mph	45mph
Before	56.5%	18.8%	2.0%
During	45.4% *	13.1% *	1.5% *
After	56.0% *	17.7% *	1.8% *

* Change is statistically significant at the 5% level from the before period

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The proportion of vehicle's exceeding one and a half times the speed limit (45mph) reduced while SIDs were operational and increased once they were removed.

The reduction in mean speeds continued for a short distance downstream of the SID.

Table 2 shows that mean speeds returned to the before mean speed between 200 and 400 metres downstream of the SID.

Table 2: Difference in mean speeds during SID operation to before mean speeds

	Distance downstream		
	At SID	200m	400m
Change (mph)	-1.4 *	-0.2 *	0.6 *

* Difference statistically significant at the 5% level from the before period

SIDs were effective at reducing mean speeds for the first two weeks of their operation.

Table 3 shows that when the SIDs were present, speeds were reduced for the first two weeks of operation. There was a 'novelty' effect at some sites where reductions were greater in the first week of operation compared to the second week.

Table 3: Difference in mean speeds during and after SID operation to before mean speeds

	During week			After week	
	1	2	3	1	2
Change (mph)	-1.5 *	-1.5 *	-	0.0	0.1 *

Note: Not enough data for change to be calculated in during week 3

* Statistically significant at the 5% level from the before speed

The study was unable to conclude whether the SID had an effect in the third week of operation. At the one site mean speeds increased (a reduction compared to the before mean speed of -1.6mph in week 2 to a reduction of -1.0mph in week three). At the other site, mean speeds remained at the same level compared to the second week (-2.5mph). In the first and second week after the SID was

removed, speeds returned to the mean speed recorded in the before period.

During the study, several SIDs were non-operational because of failed batteries. The effect on speeds when a SID was present but not displaying speeds to approaching vehicle's was a 0.5mph reduction compared to the before mean speed.

SID effectiveness varied between sites with different characteristics.

Table 4 shows that the effect of SIDs on speeds varied between sites with different characteristics. The small number of sites means any differences should be interpreted with caution. Mean speeds reduced more at residential sites compared to sites where the land use was a mixture of residential and commercial activities. Mean speeds reduced more at sites with a low daily vehicle flow compared to sites with a high vehicle flow.

Table 4: Road characteristics and reduction in mean speeds at SID sites

Site characteristic	Difference to before mean
Residential	-1.5 *
Commercial / residential	-1.2 *
On road parking	-0.9 *
No on road parking	-1.7 *
Low flow road (less than 7000 vehicles per day)	-2.1 *
High flow road (more than 7000 vehicles per day)	-1.2 *

Note: Some road characteristics were only present at one site

2. Estimated collision reductions from SIDs

SIDs could reduce collisions by 5.6%.

The relationship between speed and collision frequency is well documented and potential collision reductions from lower speeds can be estimated³. Overall, it is estimated that a reduction in mean

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speeds of 1.4mph by an active SID would reduce collisions by 5.6%. The effect on reducing collisions is applicable for the period a SID is operational, for a section of road downstream of a SID and for the two to three weeks that the SID reduces speeds for.

3. Case study for good practice: Royal Borough of Kingston-Upon-Thames SID rotation policy

An efficient method of operating SIDs is to design a programme of rotating SIDs around several sites.

The Royal Borough of Kingston-upon-Thames through their use of SIDs since 2003 and have amassed a large amount of knowledge and experience in operating a SID rotation programme.

The policy of rotating 13 SIDs around 90 sites is based on a body of data and evidence that shows SID effectiveness reduces over time. The monitoring of vehicle speeds at SID locations showed that vehicle speeds began to increase after two to three weeks despite the SID still being present⁴.

SID locations have backing plates and a permanent power supply fitted. The 13 temporary SIDs are rotated around the SID locations. SIDs remain at a site for three weeks before being moved to the next scheduled site by two staff members in one day. This is a cost effective and efficient way of using SIDs.

Conclusions

Overall, the research found:

- 1) SIDs were effective in reducing speeds on 30mph roads in London.
- 2) SIDs were effective at reducing speeds 200 metres downstream of the sign.
- 3) SIDs were effective in the first two weeks of operation.

- 4) The likely effect on road safety of SIDs is an estimated reduction in collisions of 5.6% for the first two weeks of operation at site.

There is no residual effect after a SID is removed. The effect on vehicle speeds reduces over time so SIDs should be moved after two to three weeks of operation.

Therefore, the research findings show that a SID rotation programme can contribute and be part of a speed management programme to improve road safety in London.

Selected References

1. **Walter LK and Knowles J, (2008).** Effectiveness of Speed Indicator Devices on reducing vehicle speeds in London TRL report 314
2. **Winnett MA and Wheeler AH, (2002).** Vehicle activated signs – a large scale evaluation. TRL report 548
3. **Taylor MC, Lynam DA and Baruya A, (2000).** The effects of drivers' speed on the frequency of road accident TRL report 421.
4. **Poulter D and McKenna F, (2005).** Long-term SID report. University of Reading

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