



Chicane Schemes

Introduction

Traffic Advisory Leaflet 9/94 "Horizontal Deflections" reported on the results of track trials carried out by the Transport Research Laboratory (TRL) in 1994. Following the track trials, TRL on behalf of the Driver Information and Traffic Management Division of the Department of the Environment, Transport and the Regions, carried out a study (TRL Report 313) of chicane schemes installed by local highway authorities. The purpose of the study was to obtain further information to assist in the design of chicanes. This leaflet is a summary of the results of the study.



Background

The Highways (Traffic Calming) Regulations 1993 allow local highway authorities to construct a wide range of horizontal deflection features, including chicanes. Most design advice has been based on that developed in other European countries. The object of current research by the Department has been to ascertain whether the same design principles can apply in the UK, or whether they need to be modified.

Attitude surveys which have been conducted into traffic calming schemes seem to suggest that the public tend to dislike horizontal deflections more than they dislike road humps (see TRL Report 311). So care needs to be taken in designing these devices, to ensure maximum acceptability.

Chicane designs vary considerably. For the purposes of the study two broad categories were adopted:

(a) single lane working consisting of buildouts, staggered on alternate sides of the road, narrowing the road so that traffic from one direction has to give way to opposing traffic;

(b) two-way working, using buildouts to provide deflection, but with lanes separated by road markings, or a central island.

Although all the schemes studied for both categories involved two way roads, the design principles are relevant to streets which are one way.

Study results

49 chicane schemes, representing the most common chicane types, were selected, resulting in some 142 chicanes being studied.

As with the track trials (TA Leaflet 9/94), the critical dimensions used to describe chicanes were:

- **free view width (A)** - the width of the central gap between build outs on opposite sides;
- **lane width (B)** - the average width between the build out and the opposite kerb;
- **stagger length (L)** - the length between the start of the stagger on the offside, and end of the stagger on the nearside;
- **Path angle** - the angle through which the traffic lane is displaced (see Figure 1)

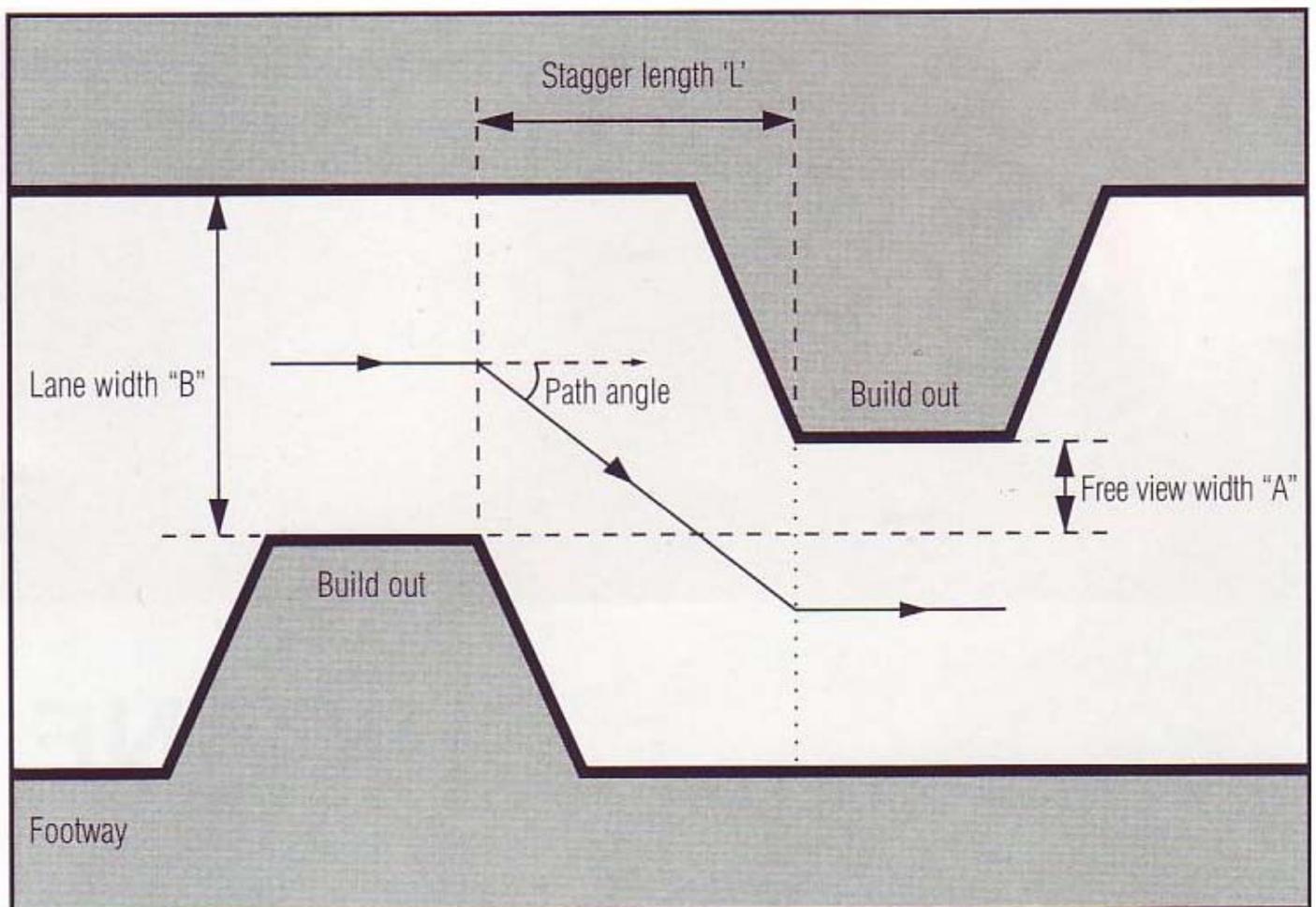


Figure 1

Path angles

The data collected from the study indicated that an increased path angle leads to a reduction in speed. In general path angles greater than 15° reduced mean speeds at the chicanes to less than 20 mph, whilst path angles of less than 10° allowed speeds of 25 mph or more. For 85th percentile speeds path angles of about 10° would allow speeds of over 30 mph, whereas path angles of 15° to 20° would result in speeds of between 20 mph to 25 mph.

Path angles were found to be greater at single lane working chicanes than at two-way working chicanes resulting in lower speeds at the single lane working sites.



Comparison with the results obtained from the track trials showed a similar relationship but speeds from the track trials were 3 mph to 4 mph higher. This was possibly due to the field of view being wider, and greater familiarisation by drivers of the track layouts.

Speeds at the chicane

Taking the data from all the sites studied, the overall reduction at the chicanes for both mean and 85th percentile speed was 12 mph. The average mean speed was found to be 23 mph and the 85th percentile speed 28 mph.

At single lane working chicanes, the average mean speed was 21 mph and the average 85th percentile speed was 26 mph. The average reduction in the 85th percentile speed was 14 mph. At one scheme which incorporated a speed cushion, the mean speed fell to 12 mph

At two-way working chicanes the average mean speed was 27 mph and the average 85th percentile speed was 31 mph. The average reduction in the 85th percentile speed was 11 mph.



Speeds between chicanes

Only a few local authorities had collected intermediate speed data, so a reliable speed/spacing relationship could not be compiled. The information available indicated a reduction in overall mean speeds to 29 mph, and 85th percentile speeds to 31 mph.

There appeared to be greater reductions in speeds between chicanes where single lane working schemes were used. Reductions for both mean and 85th percentile speeds of 12 mph were obtained, giving speeds of 23 mph and 27 mph respectively. At two way working schemes the reduction was 6 mph, with mean and 85th percentile speeds of 31 mph and 34 mph.

Accidents

Accident data were only available for 12 of the single lane working, and five of the two-way working chicane schemes. Accident frequencies were reduced at ten of the schemes, unchanged at four schemes, and increased at three schemes. The overall reduction in accident frequency was 54%. Accident severity was also reduced, from 28 ksi before to 6 ksi after, from 16 schemes.

Vehicle flows

"Before" and "after" flows were only available for some of the sites, so it was not possible to use the data to determine acceptable levels of flow for the various chicane designs. Danish advice for single lane working chicanes is not more than 3,000 vehicles per day. Elsewhere it has been suggested that the maximum vehicle flow for most types of chicane is 600 vehicles per peak hour. At the study sites the average daily flow for single lane working was 3,900 (coloured by two sites where flows exceeded 7000 vehicles). For two-way working the average daily flow was 7,300 (but again, two schemes had flows in excess of 10,000 vehicles).

Of the 13 schemes with "before" and "after" data, flows decreased at eight schemes, increased at 3 schemes, and did not change at 2 schemes.



Cost

There was considerable variability in the cost of the chicanes, because of the different types of construction, signing and lighting employed. The average cost of installing a single lane working chicane was £3,000, including signing and lighting. It was not possible to derive a figure for two-way working chicanes.

Chicane design

The study has generally shown that the design principles referred to in TA Leaflet 9/94 are still relevant.

Although the study showed a reduction in accidents overall, it is understood that at some

schemes elsewhere serious and fatal injury accidents have occurred.



The causes of such accidents have still to be investigated, but signing and illumination, and the location of the chicane, may be relevant. It may therefore be helpful to consider the following points, particularly where approach speeds may be relatively high:

- A speed reducing feature such as a roundabout or "T" junction should ideally be provided prior to the location of the first chicane.
- Reliance on signing alone may not be sufficient, unless it can be incorporated into a conspicuous gateway feature, with both vertical and horizontal elements.
- For the combination of a roundabout or gateway and chicane to be both safe and effective, they must be within a relative short distance of each other. Drivers have some disincentive to accelerate if they are aware of the chicane as they pass the gateway or roundabout. The chicane would need to be located about 40m to 80m from the roundabout or gateway. The more severe the chicane deflection, or the higher the approach speed, the closer the chicane would need to be to the gateway or roundabout.
- Illumination and signing of chicanes needs to be checked regularly, as poorly illuminated or poorly signed chicanes can become hazards during bad weather (including snow) or the hours of darkness.
- At single lane working chicanes, opposing drivers should have sufficient visibility to enable either of them to give way to the other without sudden braking.

Overrun areas

These may be used to give car drivers the impression of a restricted width carriageway, so encouraging lower vehicle speeds, but allowing additional manoeuvring room for larger vehicles such as buses. Care needs to be taken that the height of the overrun areas does not exceed that prescribed by the Highways (Traffic Calming) Regulations 1993, (see TA Leaflet 7/93 and TA Leaflet 12/93) and that these features will not create a noise nuisance.



Environmental issues

The appearance of the chicane is important, particularly in terms of being acceptable to the general public. Attention needs to be given to materials. Planting should be encouraged providing it does not obstruct sight lines. Chicanes are not generally the most appropriate places for pedestrians to cross, but where this cannot be avoided care must be taken that pedestrians, and particularly children, are not obscured by any planting or other features.



Cyclists

Investigations have shown (see Traffic Advisory Leaflet 1/97) that cyclists can be concerned when cycling through narrowings, such as chicanes. Where possible a cycle bypass around the chicane should be considered in accordance with the guidance given in TA Leaflet 1/97.

Motorcyclists

It is inappropriate for motor cyclists to use any cycle bypass facilities. Whilst the chicane needs to exert an effect on the speed of motorcyclists, care needs to be taken that the layout does not place them at risk. The chicane and the route through it should be clearly delineated, particularly any overrun areas incorporated in the design, both for day and night-time conditions.

As far as noise is concerned, chicanes will generate less vehicle body rattle than road humps. However, chicanes may encourage more stopping, starting, acceleration and braking noise, and at times these can create a nuisance.

Stop-start movements also may increase vehicle exhaust emissions, though they would have to be in very large numbers to have any real effect.

References

Traffic Advisory Leaflet 7/93 - Traffic Calming Regulations

Traffic Advisory Leaflet 12/93 - Overrun Areas

Traffic Advisory Leaflet 9/94 - Horizontal Deflections

Traffic Advisory Leaflet 1/97 - Cyclists at Road Narrowings

Highways Act 1980

Traffic Calming Act 1992

Highways (Traffic Calming) Regulations 1993
SI 1993 No 1849

Traffic signs Regulations and General Directions 1994, SI 1994 No 1519

TRL Project Report 102 - Horizontal deflection (chicane) trials at TRL

TRL Report 311 - Traffic Calming - Public Attitude Surveys: A Literature Review

TRL Report 313 - Traffic Calming - An Assessment of Selected on-road Chicane Schemes

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