Department for Transport

Traffic Advisory Leaflet 4/98
April 1998

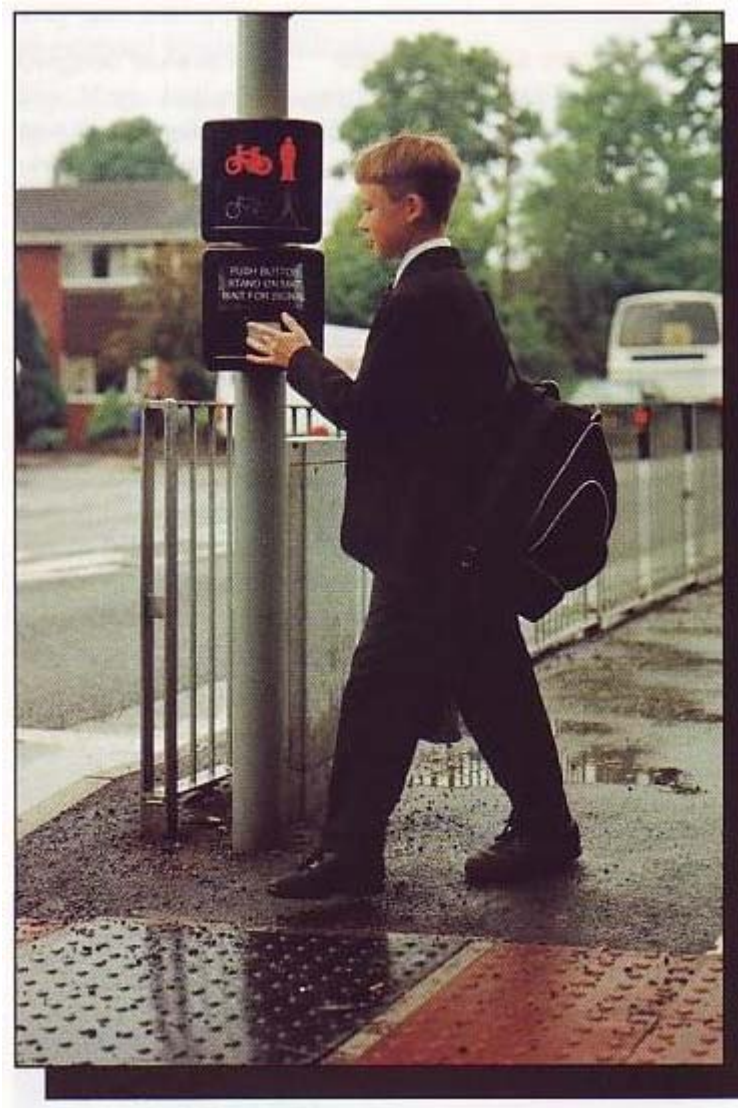
Toucan Crossing development

Introduction

This leaflet provides a summary of the results of trials carried out into the use of prototype nearside signals at Toucan Crossings (see TRL Report 331).

It also offers advice on the authorisation and approval of Toucan Crossing equipment.

Since the initial trials at 13 sites in England, Scotland and Wales in 1992, over 200 Toucan Crossings have been installed. All these crossings have been based on the use of the far-side three aspect signals, with push-buttons in each corner of the crossing (TA Leaflet 10/93). A number have also incorporated on-crossing detection to extend the "black-out" period and thus enable a longer crossing time for cyclists and pedestrians when required.



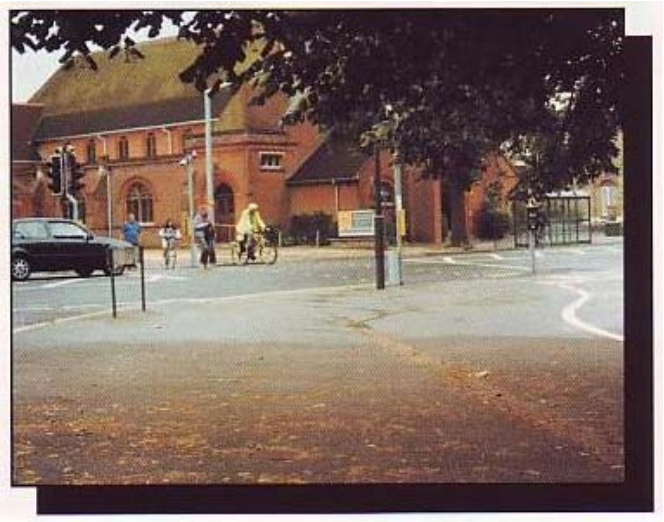
Puffin crossing

The PUFFIN Pedestrian User- Friendly INtelligent) Crossing, which is for pedestrians only, has nearside aspects (rather than far-side), kerbside detection and on-crossing detection (see also Network Management Advisory Leaflet March 1993). It is intended that the PUFFIN Crossing will eventually replace the Pelican Crossing. It is now prescribed within the Zebra, Pelican and Puffin Pedestrian Crossing Regulations and General Directions 1997.

Because of advantages offered by the PUFFIN Crossings approach, the use of

similar prototype equipment at Toucan Crossings was investigated.

The Transport Research Laboratory was commissioned by the Driver Information and Traffic Management Division (DITM) of the Department of the Environment, Transport and the Regions (DETR). The task was to develop a nearside signal aspect for the Toucan. Trials of crossings incorporating this, and other prototype equipment being used at PUFFIN Crossings, were undertaken.

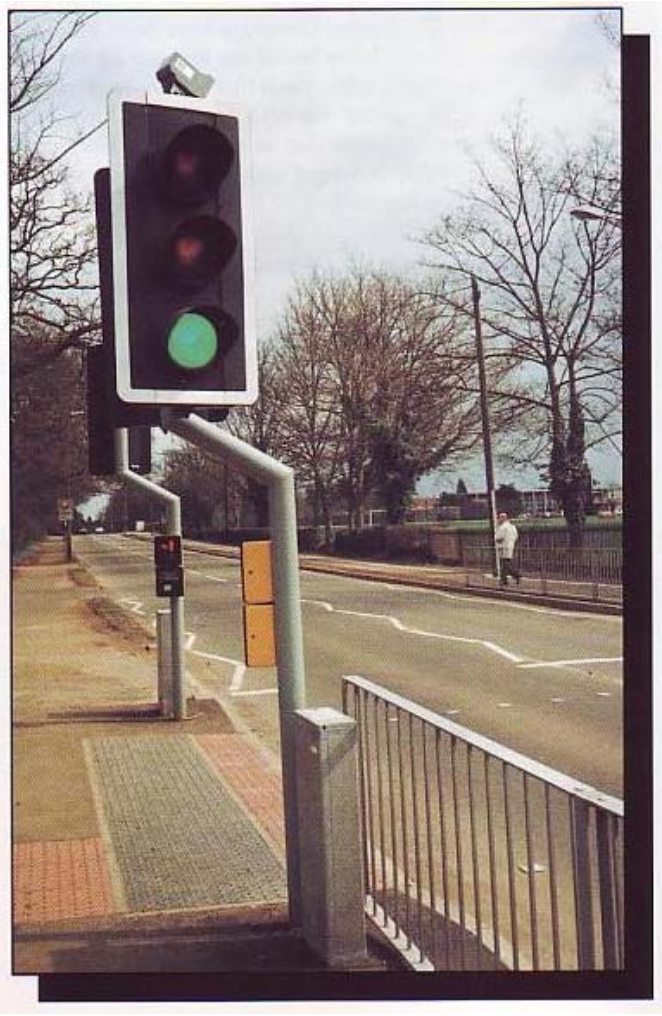


Toucan nearside signal aspects

Aspects were designed with a curved face incorporating green/red cycle and pedestrian symbols. The curved face was chosen, as it was felt that this might improve the visibility to approaching pedestrians and cyclists. However, from some angles only the cycle symbol or the pedestrian symbol could be viewed, but not both. The signals together with the push button unit were to be located on either side of each crossing approach. The push button was constructed as a separate unit to be located immediately below the signal unit. The push-button itself was much larger than that used for far-side Toucan Crossings, and illuminated when pressed. No advantage was found in mounting the push button unit with a gap between it and the signal unit. Future regulations will permit the push button and nearside aspects to be assembled as one complete, or two separate, units. The push button unit was mounted so that the centre of the push button was 1.06m above the adjacent footway, to ensure reasonable access to wheel-chair users and children.

On-crossing detection

Micro-wave detectors were used at three of the sites, and a infra-red detector at Southampton.



Kerbside detection

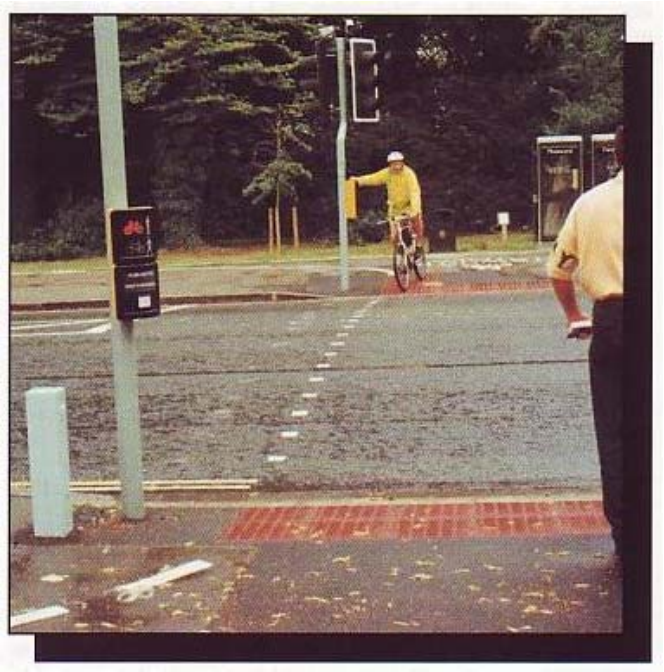
The purpose of the kerbside detector is to detect the presence of pedestrians/cyclists in the wait area. The kerbside detector works in conjunction with the push-button. When the push-button is pressed the detection checks that there are pedestrians/cyclists waiting to cross, before processing the crossing demand. This enables the crossing demand to be cancelled if pedestrians/cyclists cross between gaps in the traffic before vehicles are signalled to stop. Three detector prototypes existed at the time of the trial, two being surface mat detectors (fibre optic sensors, or piezo-electric sensors) and one above-ground (infra red).

For the infra-red above-ground detectors, used at Cambridge and Southampton, the specification required a "must detect" area

extending 1.5m back from the carriageway edge across the full crossing width. In reality the equipment could only provide a "must detect" area of 1m in depth.

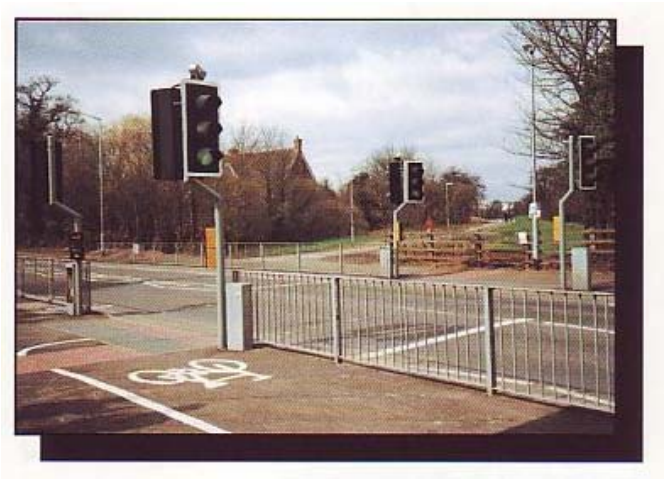
The detection mat using fibre optic sensors was used at the Warwick site. It had a depth of 0.8m and extended for the full width of the crossing, and was positioned 0.4m from the back of the kerb line.

The mat with the piezo-electric sensors was used at Nottingham. It was 1.2m deep, and extended across the full width of crossing, but was butted up to the kerb line.



Induction loops

Early forms of cycle-only signal crossings had incorporated inductance loops, rather than push buttons. However, the majority of Toucan Crossings have been installed with push buttons only. There may be some advantage in having both push buttons and loops and it was felt that this should be investigated as part of the trial. The loops needed to be compatible with the kerb-side detector, and allow sufficient time for a cyclist detected by the loops to reach the kerbside detection area. It was also essential that the loops were uni-directional, so that cyclists leaving the crossing did not register a demand.



Trial assessment

If equipment is not type approved, trial assessment approval needs to be obtained from TSS Division of the Highways Agency. This was secured for the signal aspects, on-crossing detectors, push-button units, kerbside detectors and signal controllers.

Trial sites

DITM, through TRL, paid for the signal aspects and contributed towards the cost of the other equipment and installation. The local highway authority covered the remainder of the costs, and arranged and supervised installation. Four crossings were installed, at suitable sites in separate local authority areas.

The local authorities involved in the trials, the sites where the crossings were installed, and the details of ancillary equipment used are listed in Table 1.

Table 1 - Location of trial nearside Toucan Crossings

Authority	Location	Installation date	Equipment
Southampton City Council	The Avenue, near junction with Northlands Road, Southampton	July 1996 Converted from a far-side Toucan Crossing	Above ground infra-red kerbside detectors Infra-red on-crossing detectors
Cambridgeshire County Council	Maids Causeway near the junction with Fair Street, Cambridge	April 1996. Converted from a parallel crossing	Above ground infra-red kerbside detectors Micro-wave on-crossing detectors Induction loops to detect approaching cyclists
Warwickshire County Council	Myton Road near the junction with Myton Gardens, Warwick	March 1996 New crossing	Fibre optic kerbside surface detectors Micro-wave on-crossing detectors Inductance loops to detect approaching cyclists
Nottinghamshire County Council	Gregory Street/Lenton Lane, Nottingham	October 1996. New crossing	Piezo-electric kerbside surface detectors Micro-wave on-crossing detectors Inductance loops to detect approaching cyclists

Equipment performance

The prototype nature of the equipment, including the signal aspects, push button unit and kerb-side detectors, resulted in some faults occurring. Whilst these were a nuisance, they did not hinder assessment of the nearside aspect Toucan Crossings.

Attitude surveys

Views from both pedestrians and cyclists on the use and operation of the new style Toucan Crossings were obtained by attitude surveys carried out at the sites in Warwick and Cambridge.

The following is a summary of these results (TRL Report 277 contains the full results).

Some 237 interviews were carried out, more or less equally divided between pedestrians and cyclists. Nine of those interviewed had disabilities.

83% of the interviewees said they could see the illuminated symbols clearly on the approach, and 90% said they could see them clearly when alongside them. Those who experienced difficulty attributed it to problems of reflection, or the position of the units relative to the kerb.

95% stated that the push buttons were at the right height, and 8 out of 10 cyclists found them easy to press whilst remaining on their cycles. 75% of those interviewed agreed that push buttons on each side of the approach were necessary. However, in Cambridge two-thirds believed that there should be separate units for pedestrians and cyclists.(The Cambridge site had previously been a parallel crossing. Additionally the layout of the site meant that generally pedestrians and cyclists approached and left the crossing following different paths, so in effect they had separate pushbuttons.) Overall 80% of users found it acceptable for pedestrians and cyclists to

share the crossing. Most stated they experienced no problem. However, 12% of cyclists compared to 4% of pedestrians mentioned the need for a segregated approach.

Early in the trials all sites experienced the push buttons frequently jamming. Despite this, about 70% of respondents made positive remarks about the push buttons. In Cambridge the larger units and buttons were found to be easier to use.12% of users disliked the push-buttons because they were at the wrong height or angle, were not functioning properly, or had insufficient illumination.

Almost half interviewed said they had no problem with the fact that there was no far-side signal. However, in Cambridge where there had previously been a far-side side signal, more people felt that one was needed.

93% of those using the crossing said they felt safe. No differences were found between pedestrians and cyclists, pedestrians with a mobility handicap or those of different age.

Video survey

A video survey was undertaken to understand the behaviour of pedestrians and cyclists in the kerbside detection area. Only one side of each crossing was filmed.

Button-pushing behaviour

All the sites except Southampton had inductance loops for detecting cyclists on the approaches. Some 45% of all users pushed the button at the Southampton site, whilst overall only 25 % did so.

More pedestrians (32%) pushed the button than cyclists(19%)again reflecting the fact that the majority of the sites had inductance loops for detecting cyclists.

Kerb-side detection area

Of the total 514 users observed, 55% of pedestrians and 65% of cyclists were correctly positioned in the detection area. The Nottingham site had the highest number of users waiting correctly (90%),but also had the largest detection area (4.8m^2)

Overall 30% of those waiting did so outside the detection area. At Warwick 35% of pedestrians and 43% of cyclists moved forward out of the detection area and waited on the single line of tactile blocks between the detection pad and the kerb. At Southampton 56% of the pedestrians waiting had pushed the button and then stepped back.

Trial conclusions

Both pedestrians and cyclists found no difficulty in using the nearside aspect Toucan Crossings, either in terms of the equipment being used or the shared nature of the crossing.

Careful design and location of the kerbside detection area is needed so that as far as possible pedestrians/cyclists waiting do not step outside this area. From the trials it is clear that the "must detect" area should have a depth of at least 1.5m,and be located so that detection can occur up to the back of the kerb line.

The pedestrian/cycle aspects were clearly visible, although whether having the curved face added or detracted to this was not established. However, site observation indicated that the orientation and location of the signal aspect was important. At the Nottingham site the orientation and location was such that children stepping forward after having pushed the button could not clearly see the signal. The orientation was in part a response to concern that approaching vehicle drivers should not be able to see the pedestrian/cycle aspects. With signal aspects on each corner of the crossing it is possible to orientate the right hand aspect so that it is at right angles to the kerb-line, facing away from nearside oncoming drivers. The left hand aspect can be orientated so that it is parallel to the kerb line, which enables approaching pedestrians/cyclists from both directions to see this aspect, whilst approaching drivers cannot. It is possible that the curved face has some advantage when used mounted parallel to the kerb-line.

Inductance loops may offer some value to cyclists, depending on the arrangement of the cycle approach. However, no particular disadvantages have emerged at those sites where inductance loops were not used.

Although the trials have confirmed the acceptability of nearside Toucan Signals, the standard of the prototype equipment is not sufficient to enable any further nearside Toucan Crossing signal arrangements to be authorised at present. However, this situation is expected to change rapidly as a result of development of the PUFFIN Crossing signals. It is hoped that by 1999 more nearside Toucan signals could be installed. Further advice on the layout of nearside signal Toucan Crossings will be given at that time.

Current authorisation and approval requirements

Toucan Crossings are not presently prescribed by regulations and therefore signs authorisation as set out in Traffic Advisory Leaflet 10/93 is still required. A push button is required in each corner, and an unsegregated cycle track shared by pedestrians and cyclists should be provided immediately adjacent to the crossing. If segregation is required (though evidence from all the trials undertaken have not shown this to be necessary) then it should be achieved by either a level difference or a raised white line to diagram 1049.1 (Traffic Signs Regulations and General Directions 1994). Drawings accompanying the submission should clearly indicate which method of segregation is being used. With segregated approaches, care needs to be taken that the location of the push buttons is convenient for both pedestrians and cyclists, and does not obstruct their movements.

Tactile surfaces should be laid on the footway adjacent to the crossing for its full width. If a segregated crossing approach is adopted, then it may be possible to limit the tactile surface to the pedestrian side. However, if there is any likelihood that blind or partially sighted people might stray into the cycle approach then the tactile surface should be extended across the full width.

Zig-zag lines may be used at Toucan Crossings provided that the local police understand that they are not enforceable and agree to their use. A letter from them agreeing to the use of zig-zag lines should accompany the application.

Vehicle detection, including speed assessment/discrimination, needs to be provided in accordance with Local Transport Note 1/95 and Local Transport Note 2/95.

Trial assessment approval is required for the pedestrian/cycle aspects, the push button, on-crossing detection (and in the case of nearside crossings, kerbside detection) and the controller. It should be noted that, as from 31 March 1999,Toucan Crossing controllers will need to conform to Specification TR 0141C, or will need to be specially type-approved. Information on trial assessment and type approval procedures may be obtained from Traffic Systems and Signing (TSS) Division, Highways Agency, Tollgate House, Bristol, BS2 9DJ

The present far-side signals consist of nominal 300mmdiameter red and green pedestrian aspects and a nominal200mm diameter green cycle symbol. It is proposed that200mm pedestrian aspects will be prescribed in the future. Provided such aspects can be given signs authorisation and trial assessment approval, they may be used in the interim period before new regulations are made.

Future authorisation and approvals

It is expected that signs for Toucan Crossings, including both nearside and far-side signals, and zig-zag lines will be included in the Traffic Signs Regulations and General Directions which it is hoped to introduce within the next year. That change would make it unnecessary to seek signs authorisation, and zig-zag lines would be enforceable.

Trial assessment is expected to be needed for some time. Specifications for the equipment required at a Toucan Crossing are either prepared or in the process of being prepared. However, there is still a need for manufacturers to produce equipment that meets these specifications, and to have it type approved. It will be probably be well into 1999before this is achieved. Once such equipment is available, the emphasis would be towards encouraging the use of nearside signals for Toucan Crossings.

Kerb-side detection should generally be installed at all isolated nearside signal Toucan Crossings though there maybe occasions (such as where there is a frequent demand by cyclists/pedestrians) when this may not be

necessary. At Toucan Crossings incorporated into junction signals, it will be an option whether kerbside detectors should be installed or not.

On-crossing detection will be a necessary requirement with nearside signals, and is advisable for far-side signals.

Acknowledgements

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References

Traffic Advisory Leaflet 10/93 - Toucans

TRL Report 277 - Pedestrians' and Cyclists' Attitudes to Toucan Crossings.

TRL Report 331 - Toucan Crossing Equipment: Trials of Nearside Equipment

Traffic Signs Regulations and General Directions 1994

Zebra, Pelican and Puffin Pedestrian Crossing Regulations and General Directions 1997

Network Management Advisory Leaflet, March 1993, The Use of Puffin Pedestrian Crossings

TR 0141C Microprocessor based Traffic Signal Controller - TSS Division, Highways Agency

Local Transport Note 1/95 - The Assessment of Pedestrian Crossings

Local Transport Note 2/95 - The Design of Pedestrian Crossings