

Puffin Pedestrian Crossing

February 2001

Introduction

This advisory leaflet introduces the Puffin crossing. It describes both the operation of the crossing, and how it is intended to be integrated into existing traffic control systems. For advice on the assessment, design and installation, potential users should refer to Local Transport Note 1/95, Local Transport Note 2/95, Local Transport Note 1/98.

Background

The PUFFIN (Pedestrian User-Friendly INtelligent) crossing is a new type of signal controlled facility. It can be installed at most pedestrian crossing sites, either to replace existing pelican crossings, or as a new pedestrian crossing. The pedestrian pushbutton, signals and detectors can also be used to provide pedestrian facilities at signal controlled junctions.

Pedestrian detection is used to automatically vary the length of the pedestrian period, giving pedestrians the time they need to cross. The system should also remove the irritation some drivers feel when stopped needlessly at existing crossings when there are no pedestrians waiting to cross.

By replacing the flashing amber period with a steady red signal to vehicular traffic, the Puffin gives pedestrians (particularly older and disabled people) a greater sense of protection compared with a pelican crossing. The pedestrian signals are normally mounted on the primary pole on the approach to the crossing and are positioned to allow them to watch approaching traffic, while keeping the signal in their field of view. This is particularly helpful for visually impaired people using crossings who cannot clearly discern signals mounted across the road.



How the Puffin Works

The new system uses pedestrian detectors, both for the crossing zone (on-crossing detectors) and for the waiting area on the footway (kerbside detectors). Pedestrian signals positioned on the near side of the road replace those on the far side. The light sequences are also modified. The flashing amber and the flashing green man periods of the pelican are not used, nor is the 'blackout' period in the pedestrian phases at signal controlled junctions.

Basic Operating Strategy

Calling the Pedestrian Stage

In the absence of a pedestrian pushing a button, vehicles will normally be shown a green signal. It may be desirable for both vehicular and pedestrian signals to 'rest on red', particularly during quieter periods, in the absence of a demand from the push button or vehicle detectors. This allows the signals to change quickly for pedestrians or vehicles on a "first-come-first- served" basis. The technique also

allows normal audible and tactile signal operation.

On receiving a pedestrian demand from a push-button the controller also checks the output of the kerbside presence detector. If pedestrian presence is detected, the pedestrian stage is requested and the 'call confirmation' light illuminated.

If the output of the kerbside presence detector disappears (e.g. if a pedestrian crosses the road outside the pedestrian phase) and it is not re-established within a pre-set period, the call for the pedestrian stage is cancelled. If the output of the kerbside detector is maintained, the pedestrian stage will appear following the termination of the green to vehicles and the normal 'intergreen' time (period between the end of the vehicle stage and the start of the pedestrian stage) (see the Operation Diagram).

The pedestrian push-button can register a demand whenever the red man signal is illuminated and the call confirmation symbol is NOT illuminated



Composite pedestrian nearside signal and typical detector arrangement

The Pedestrian Stage

The 'green walking figure' symbol is displayed at the start of the pedestrian period: an audible and/or tactile signal, where fitted, will also operate during this period. Pedestrians who start to cross during the green man period, within the lines of studs, will be monitored by the on-crossing detectors and given sufficient time to cross the carriageway.



Alternative nearside signal arrangement showing pedestrian green signal and a pushbutton

After the green walking man symbol is extinguished, the pedestrian precedence period continues and is extended by the on-crossing detectors until the crossing is clear. During this time a red signal continues to be shown to drivers. The red standing man symbol is illuminated immediately the pedestrian green man signal extinguishes, as a warning to pedestrians arriving at the crossing in this period not to start to cross. Pedestrians not already on the crossing when the 'red standing man' signal appears should not start to cross, because they may require more than the remaining time available. The maximum allowed crossing time (the clearance time) is pre-set for each site. If this time is reached then an additional period, up to 3 sec, is added before changing the vehicle signals. When the crossing is clear, or when the maximum clearance time and the extended all-red period expires, vehicles are given a red/amber then green signal (see the Operation Diagram).

The Vehicle Precedence Period

During the period when the vehicular green signal is displayed, any pedestrian demand to cross will be stored by the signal controller. The signals will not change during the pre-set minimum vehicle green period. After the minimum green period, detected vehicles will continue to hold the vehicle precedence period up to the expiry of the pre-set maximum vehicle green period. This is known as a 'forced change'. The maximum vehicle green period can be timed either from the receipt of a demand or with the start of the minimum green (known as the pre-timed maximum). This allows a wide range of variations in setting relative vehicle/pedestrian precedence.

Consideration should always be given to reducing pedestrian waiting time. If there are no detected vehicles, and there is a stored

pedestrian demand, the signals will immediately proceed to the pedestrian stage. This is known as a 'gap change'. Throughout the pedestrian stage the traffic signals rest on a red.

On a road where the 85th-percentile speed exceeds 35mph, the all-red period, following the vehicular stopping amber, should be fixed at 3 seconds. For other roads the all-red period will normally be 1 second for a gap change and 1, 2 or 3 seconds for a forced change.

Operation with Other Control Strategies

Stand-alone crossings on Single Carriageway Roads

On single carriageways, wherever possible, crossings should be designed to allow pedestrians to cross in one movement. However, where the carriageway is wider than 11 metres, the installation of a staggered crossing, operating as two separate crossings, should be considered.

Vehicular traffic and nearside signal in the pedestrian field of view



At some sites a single straight crossing with a central island may be feasible. Additional pedestrian on-crossing detectors may be required at some sites to ensure that pedestrians continue to be detected over the whole crossing area. The pedestrian demand unit should be installed on both sides of any central refuge island, to enable pedestrians waiting in this area to register a demand. The use of one or more kerbside detectors within this area is also recommended.

On a one-way street, the pedestrian demand unit should be positioned on the vehicular approach side.

OPERATIONAL DIAGRAM FOR PUFFIN CONTROL

VEHICLES



PEDESTRIANS



References

LTN 2/95	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9
TR 0141C	6.3.1	6.3.2	6.3.2	6.3.3	6.3.4(a)	6.3.4(a)	6.3.4(a)	6.3.4(a)	6.3.4(b)

To minimise confusion, pedestrian signals in a central refuge area (but no others) should be configured to show a 'black-out' during the pedestrian clearance period (not shown on the Operation Diagram). If any of the push-buttons in this area are pressed during the clearance period, the demand to cross should be registered and the call confirmation indicator and the red man should be illuminated. After the clearance period, the pedestrian signals in the central refuge area should revert to a red signal, regardless of any demands being entered.

Dual Carriageway Roads

On dual carriageways, Puffins are normally operated as two separate crossings with the usual stagger arrangement. Where the centre refuge is very narrow or where a straight crossing is desirable, the arrangement described in the previous section should be considered. It is recommended that where an additional push-button is necessary, for instance because a crossing is particularly wide, careful consideration be given to its position relative to the waiting area. The above-ground kerbside detector zone profile and its suitability for particular site requirements should be taken into consideration. Additional detector(s) may be required to provide a fuller coverage. The highway authority should discuss any special requirements with the equipment supplier.

Typical dual Puffin facility



Stand-alone Crossings in Urban Traffic Control (UTC)/ Split Cycle and Offset Optimisation Technique (SCOOT©) schemes and Local Linking schemes

To realise the maximum potential efficiency of the Puffin strategy, it is recommended that where a Puffin is located more than about 100 metres from a SCOOT©/UTC signalled controlled junction, it should be operated as an isolated crossing with vehicle actuation, unless there is a good reason to include it.

The vehicle detectors will search out convenient gaps in arriving platoons when a pedestrian stage is requested.

To ensure the pedestrian stage does not commence just before the arrival of the main platoon, the 'hold vehicle' (PV) signal may be sent to the controller up to 10 seconds before the estimated time of arrival at the stop line.

If the Puffin is located closer than 100 metres from a SCOOT©/UTC signal controlled junction, it may be operated as either a separate stage in the controller sequence or with an inhibiting link to the Puffin. Compared with a pelican, Puffin should work better within the SCOOT©/UTC control logic environment, because of the ability of the on-crossing detectors to inform the signal controller precisely when to end the pedestrian stage.

Isolated Signal Controlled Junctions with a Full Pedestrian Stage

The pedestrian control strategy is similar to that described in the section 'Basic Signal Strategy'. Because 'Puffin' is defined by the Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997, it cannot apply in a legal sense to a pedestrian facility at a junction that uses nearside pedestrian signals.

The sequence for the pedestrian signals is consistent with a stand-alone Puffin crossing. The pedestrian stage consists of a fixed green walking man 'invitation to cross' period, followed by a variable clearance period (red man) controlled by the pedestrian 'on-crossing' detectors. At the termination of this period, the vehicular traffic stage commences with the normal red/amber signal to vehicular traffic.

The vehicular signal display is identical to that used at a signalled junction without a pedestrian facility.

Isolated Signal Controlled Junctions using 'Parallel' Pedestrian Stages

In 'parallel' operation pedestrians are permitted to cross a carriageway, under signal control, while non-conflicting vehicular traffic can flow elsewhere in the junction.

The operation differs from the 'full' pedestrian stage described in the previous section, in that the 'green walking man' signal is normally shown for the full length of the associated traffic green

period. The following extension to the pedestrian crossing period is variable (the clearance period), being extended by pedestrian 'on-crossing' detectors if there are pedestrians still in transit at the end of the traffic stage. If there are no pedestrians on the crossing, this period is short.

The vehicular signal display is identical to that at current signalled junctions having parallel pedestrian stages.

Operation at Signal Controlled Junctions Under SCOOT®/UTC

It is recommended that the pedestrian stage operates through pedestrian demand in a similar manner to that described for isolated junction control. The control strategy will normally allot the maximum period, and maximum intergreen (period between the end of the pedestrian stage and the start of the vehicular stage), to the pedestrian stage. If the pedestrians clear the crossing early, any unused time will be added to the following vehicular stage.

If there are no pedestrian demands on any cycle, the control strategy should allot the spare time to an alternative stage.

Puffin Crossing Signal Control Using MOVA

Standard Vehicle Actuation (VA) control with Puffin differs from MOVA in that MOVA tends not only to find more suitable gaps in the arriving traffic in which to change the signals, but also can be made more responsive to pedestrian demands by increasing the weighting assigned to the pedestrian stage. The controller requirements are specified in TR0141 Issue C specification, with an additional UTC interface to allow MOVA to control the signals. Special conditioning can allow the pedestrian stage to be called only when both the push-button is pressed and one or more of the kerbside detectors are occupied.

The controller settings should conform to the advice given in LTNs 1/95 and 2/95. Installation of MOVA as a substitute for traditional VA and Speed Discrimination Equipment (SDE) control on roads with 85th percentile speeds above 35mph would require different, but probably no more expensive, vehicle detection. The main extra cost is the provision of MOVA, either as an add-on to the normal signal controller or in an integrated form. Reference should be made to MCH 1542 for guidance on the installation of MOVA.

Facilities for Disabled Pedestrians

Audible and/or tactile signals of the type provided at pelican crossing can be used with Puffin equipment. The mounting of signals on the near side should assist visually impaired pedestrians. For more information, reference should be made to Traffic Advisory Leaflets TAL 4/91 and TAL 5/91.

Legal Requirements

The Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997 came into force on 15 December 1997. They prescribed Puffin crossings for the first time. Puffin crossings may be installed at stand-alone sites without requiring consent from the Secretary of State, providing they use Statutory Type Approved Equipment.

Revised Traffic Signs Regulations and General Directions are planned for 2001 and it is hoped that they will include Puffin-type nearside pedestrian signals for use at junctions.

Traffic signs that are not prescribed in Regulations require site specific authorisation. Fully type-approved equipment must be used at all installations as detailed in TRG0500. Fuller information is available from the Highways Agency.

Potential Benefits

SAFETY

- The red signal to vehicular traffic during pedestrian crossing periods should remove the sense of harassment experienced by some pedestrians from impatient drivers during the pelican flashing green/amber period.
- Fewer unnecessary changes should reduce shunt-type vehicle accidents.
- No 'blackout' periods at junctions and flashing green man at pelicans should remove sources of pedestrian confusion, and result in greater consistency throughout the country.
- The wider use of pedestrian stages at signal controlled junctions should increase pedestrian convenience and reduce pedestrian/vehicle conflicts.

FOR DRIVERS

- Overall vehicle delays may be reduced at junctions with pedestrian stages.
- Fewer unnecessary stops at stand-alone crossings when pedestrians have already crossed.
- Establishing a standard traffic signal sequence should remove possible ambiguity of meaning, particularly for foreign drivers.

FOR PEDESTRIANS

- Increased convenience, particularly to disabled and older people, of having the pedestrian period adjustable to their own walking speed.
- Waiting pedestrians should be able to see the approaching vehicles and signals simultaneously.
- The signals and operation will be common at junctions, mid-block crossings and other crossings with the nearside signal facility.
- Near side signal should help reduce problems from sun-phantom and wash-out effects compared with the existing far side signals.
- Scope for deployment of alternative vehicle strategies to reduce pedestrian waiting time.
- Benefits for visually impaired pedestrians.
- Location of push-button box consistent from site to site.
- Audible and/or tactile signals can be provided for visually impaired pedestrians.
- All crossings provided with gently sloping ramps to assist wheel chair users and people with prams and pushchairs.

References

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

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

Local Transport Note 1/98 - The Installation of Traffic Signals and Associated Equipment.

Traffic Advisory Leaflet 4/91 - Audible and Tactile Signals at Pelican Crossings.

Traffic Advisory Leaflet 5/91 - Audible and Tactile Signals at Signalled Controlled Junctions.

The Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997.

The Traffic Signs Regulations and General Directions 1994.

TRG0500 - Statutory approval of equipment for the control of vehicular and pedestrian traffic on roads. (Published by the Highways Agency).

Design Manual for Roads and Bridges, Section 1, TD 35/91- All Purpose Trunk Roads MOVA System of Traffic Control at Signals.

TR0141, Specification for Microprocessor Based Traffic Signal Controllers (Published by the Highways Agency).

MCH1542 - Installation Guide for MOVA (Published by the Highways Agency).

Guidance on the use of tactile paving 1999.

Enquiries

The Department of the Environment, Transport and the Regions
Traffic Management and Tolls Division
Zone 3/21 Great Minster House
76 Marsham Street
London SW1P 4DR
Tel: 020 7944 2974

The Highways Agency
QS TSS (TCSL) Division
Tollgate House
Houlton Street
Bristol BS2 9DJ

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