

## Pedestrian Occupancy (Draft) Good Practice Guide

### Introduction

Kerbside pedestrian occupancy detection, with variable 'Invitation to Cross' times, is now being rolled out across Cambridge, following successful trials.

This paper proposes best practice in implementation, specifically using the AGD 645 Kerbside Occupancy Detector, although the principles could be extended to any form of pedestrian occupancy detection.

### Considerations

Where kerbside pedestrian occupancy detection is being considered, there are a range of factors to consider. These include:

- Restrictions and practical constraints
- Configuration and timings of the crossing
- Application at Junctions and on islands
- Whether kerbside-cancellation is to be used
- The definition of area and occupancy

### Restrictions and Practical Constraints

Kerbside detection was only introduced and recommended for use with nearside 'Puffin' and 'Toucan' style crossings. Although kerbside occupancy detection could potentially be applied to farside crossings, great care and assessment should be taken to ensure the same guidance is relevant.

If kerbside occupancy detection is to be retrofitted to an existing site, practical considerations need to be taken into consideration, such as:

- Are there suitable poles in appropriate locations?
- Are there sufficient spare cores for the detector, or can more be provided?

### Configuration and Timings

Only phase green times should be altered as a result of occupancy detection. Generally, this will be by extending the pedestrian phase green (or a dummy phase in the same stage), up to a maximum.

### TOUCAN TIMINGS

Period	Signal to Vehicle	Signal to pedestrian	Duration
1	GREEN	RED	7 - 30
2	AMBER	RED	3
3	RED	RED	1 GAP / 2 FORCE
4	RED	GREEN	5 - 12
5	RED	RED	3
6	RED	RED	0 - 4
7	RED	RED	0
8	RED	RED	0
9	RED	RED	2

Table 1. Example timings from a design drawing

The pedestrian phase minimum should be calculated as normal for the Highway Authority, following guidance as set out in Local Transport Notes and Traffic Advisory Leaflets.

The pedestrian (or dummy) phase should have a maximum timer applied. A typical phase maximum of 12 seconds has been found to work well. This may be varied by two seconds either up or down, based on engineering judgment and considering the pedestrian flow, region cycle time and any other site specific factors.

PEDESTRIAN PHASE MAXIMUM TIME	12S ± 2s
PEDESTRIAN PHASE EXTENSION	0.5s

Table 2. Pedestrian Extension and Maximum Timings

The second output of the AGD 645 is only triggered when occupancy is either medium or high. This should be wired as a detector and configured to extend the pedestrian green or dummy phase, with a 0.5 second extension.

As the phase green will only end when occupancy drops or a maximum is reached, there is normally no need at mid-block pedestrian crossings to differentiate between medium and high density.

### DETECTOR FUNCTIONS

DETECTOR LABEL	PHASE(S) DEMANDED	PHASE(S) EXTENDED	ALL RED EXTENDED
A_MVD1	-	A (0.5)	-
B_MVD1	-	B (0.5)	-
C_PB1	C	-	-
C_PB2	C	-	-
C_KS1_OP1	-	-	-
C_KS1_OP2	-	C(0.5)	-
C_KS2_OP1	-	-	-
C_KS2_OP2	-	C(0.5)	-
C_ON1	-	-	C (2)
C_ON2	-	-	C (2)

If all kerbside inputs becomes inactive while a demand for phase C is present, cancel the demand.

Table 3. Example detector function table from a design drawing

The intergreen following the pedestrian green should remain as normally calculated and extended by on-crossing detection where appropriate.

### Junctions and Crossings with Islands

In some cases, particularly at junctions, it may be appropriate to introduce alternative, shorter vehicle maximums. These can be triggered from the same detector (the second output).

At junctions with exceptionally high pedestrian flows, where it is necessary to implement further measures (such as alternative stages) only at the busiest times, this can be done by triggering when both the first and second output from the detector are active.

At staggered crossings, it may be appropriate to trigger ‘feed-through demands’, or to hold both crossings at green to pedestrians at the same time. This is best achieved in most cases by sensing the occupancy on the footways, before the island becomes overcrowded. While occupancy detection on the island itself may be worthwhile, it is likely to be more difficult to achieve effective, well targeted interventions.

### Kerbside Cancellation

Where kerbsides are normally used to cancel the pedestrian demand in the absence of a detected presence, the kerbside pedestrian occupancy detector can provide the same functionality. Instead of relying on a single output, to cancel a demand using an AGD 645 occupancy detector, the demand should be cancelled only when both outputs are not active.

Normal practice on the use of kerbside detection, such as guidance found in the Puffin Good Practice Guide, should be followed. This must include latching the demand if a kerbside input is not present when the demand is entered, but this must consider both inputs on each unit.

Where kerbside cancellation is not necessary, on many pedestrian crossings the first output will not be required.

### Occupancy Area and Definition

If kerbside-cancellation is being used, the area over which occupancy is being measured will be dictated by the need to sense any pedestrian waiting between the poles and over the normal waiting area. As occupancy may vary over this area, the average occupancy will be low and the threshold for occupancy within the detector may need to be set correspondingly low.

Where kerbside cancellation is not being used, the detection zone should be set up to measure the area where pedestrians most often wait when the site is busy. This is likely to be at the back of the footway and may extend behind one or more push buttons, outside the width of the crossing.

If the detection area is targeted at a relatively small area, where occupancy is likely to be measured as high at busy times, the thresholds may be set higher.

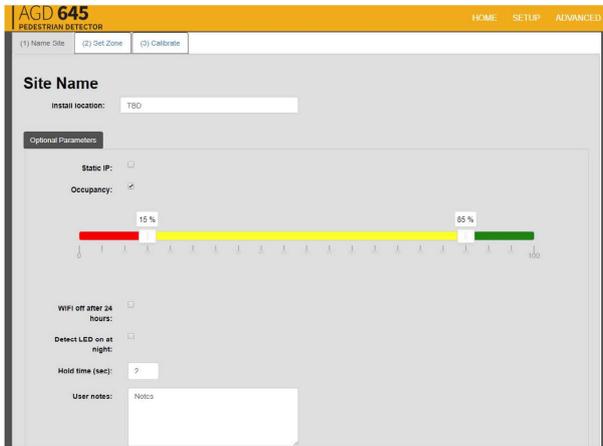


Figure 1. Example of thresholds being set on AGD645

If the phase green time is being extended simply based on output 2, as described in the paragraphs above, the threshold value for high occupancy is not important and does not need to be considered.

The actual zone size and thresholds are subject to site conditions and the engineer's judgement and must be done carefully. As a rule of thumb though, larger detection zones will require a lower

occupancy threshold, while smaller, targeted zones will require a higher occupancy threshold.

Small, targeted zones however may be vulnerable to sudden changes in occupancy. If this is found to be the case, or if the detection zone is configured away from the crossing area, a longer detector extension may be required.

#### Detector Fault Monitoring

Inputs from occupancy detectors should normally fail inactive, to avoid unnecessary delay at quiet times. Where the detectors are being used for kerbside-cancellation, the detector failing inactive should result in all pedestrian demands becoming latched anyway.

As the minimum invitation to cross is no shorter than standard, there is no safety benefit of failing the detectors active, and unnecessary delay may encourage drivers to ignore the red signal.

It may be necessary to monitor both inputs (if both are used) and force them both to fail inactive, if either develops a fault.

#### Further Information

Technical information about the AGD 645 can be downloaded from the AGD website at

[www.agd-systems.com](http://www.agd-systems.com).