



Department  
for Transport

# An Introduction to the Use of Portable Vehicular Signals

This guidance has been withdrawn with immediate effect. Current  
guidance is available from the Association of Road Traffic Safety  
Management at <https://artsm.org.uk/sales/>



Updated version  
for 2016, now includes  
supporting Traffic Advisory  
Leaflets 2/11 and 3/11 and

This booklet is for people with specific responsibility for portable vehicular signals at street works and road works. Sites with alternate one-way vehicular flows are referred to as 'shuttle' working.

For current information about traffic control at street works and road works, including health and safety issues, you, or your supervisor, should refer to Chapter 8 of the Traffic Signs Manual and to Safety at Street Works and Road Works: A Code of Practice.\* For convenience, in this booklet these will be referred to as 'Chapter 8' and 'the Code of Practice' respectively.

\*Text in blue ink shows matters that may need to be referred to your supervisor.



Department  
for Transport

# **An Introduction to the Use of Portable Vehicular Signals**

London: TSO

Department for Transport  
Great Minster House  
33 Horseferry Road  
London SW1P 4DR  
Web site [www.gov.uk/dft](http://www.gov.uk/dft)

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## Introduction

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This booklet does not cover portable pedestrian crossing facilities. See Traffic Advisory Leaflet 3/11: *Signal-controlled pedestrian facilities at portable signals* for advice on the use of these facilities. The leaflet is available from the Department's website at [www.gov.uk/government/publications/signal-controlled-pedestrian-facilities-at-portable-traffic-signals](http://www.gov.uk/government/publications/signal-controlled-pedestrian-facilities-at-portable-traffic-signals)

**You, or your supervisor, will need to discuss the placing of portable traffic signals with the traffic authority.** Permission in writing will be required, and express approval to the placing of the signals at a particular site may be needed. If the permission/express approval gives positions for signal heads etc., it is important that the layout follows those instructions. Lack of permission/approval and/or incorrect layout may make the site unlawful. **You, or your supervisor, should check if in doubt.**

If the works are close to or are likely to affect level crossings, permanent signal-controlled junctions and controlled crossings (including Zebras), the traffic authority must be involved before you proceed. In the case of level crossings, the railway authority must also be involved at an early stage.

## The system

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Signal heads: the Code of Practice says that consideration should be given to providing two signal heads on each approach. However, whether one or two signal heads are used, for safe operation, the approaching driver must be able to see at least one signal on the approach and one whilst waiting at the WAIT HERE sign (see 'Setting up the equipment'). Signal heads must be either: compliant to the European Specification EN 12368, or of a type approved to TR 2206, or the TR 0102 amendment to BS 505. The information may be on the signal head, otherwise check with the supplier.

Portable signal controllers are linked to the signal heads and detectors by either:

- cables: which will need protecting where they cross the carriageway, and are vulnerable to problems from turning or accelerating/braking vehicles (see page 13), or
- radio control: care needs to be taken to ensure that other sources of radio transmission and obstructions do not interfere with the radio link.

Energy sources include: diesel or Liquefied Petroleum Gas (LPG) generator, battery or mains electrical supply through a suitable transformer.

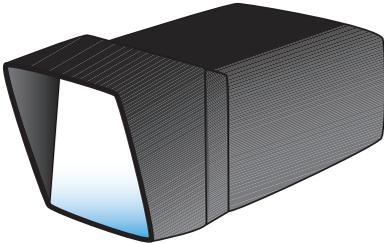
The above factors, taking into account any environmental considerations, may influence your choice of system. [You, or your supervisor, should check with the manufacturer if in any doubt about the above details.](#)

## What to do first

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The portable signal controller and detector equipment must be of a type approved on behalf of the Secretary of State for Transport. Specifications are issued by the Highways Agency.

Look on the controller for a label\* for the specification reference. Most equipment will be approved against MCE 0111, TR 0111, or the current TR 2502. Equipment to MCE 0111 and TR 0111 has the same initial set-up (see pages 15 and 16), whereas that to TR 2502 is different. This booklet gives advice on both initial set-up sequences. For ease of reference, the sequence of **MCE 0111 and TR 0111** will be highlighted in pink and that of **TR 2502** in yellow. In addition, there is one controller approved to an interim specification 027-008-024. References to 027-008-024 have been made separately.



Look on the detector housing for a label\* stating which specification applies. Equipment is approved against MCE 0114 (C), TR 2147, or the current TR 2504. The detector housing may be fixed to the top of the signal head; others are fitted below the head.

If the relevant controller/detection specification information is not on a label, it may be on information in the controller housing. **However, if the specification information is not available, you or your supervisor should check with the traffic authority that it is approved.**

\*Note: There is no longer a requirement for the label to bear a crown emblem.

## Vehicle Actuation (VA) operation

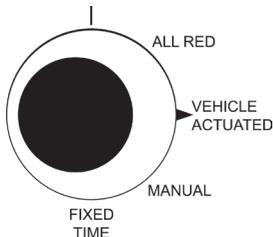
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Signal control should always be vehicle actuated (VA) unless agreed otherwise, in writing, by the traffic authority. You will find that modes other than VA are provided on the controller, but these should only be used to relieve short-term difficulties.

VA reduces delay to vehicles by ensuring that the green time is adjusted automatically. The relevant traffic authority may, however, instruct you to use another control mode, either for the duration of the works, or for specific times of the day.

The selection may be by rotary switch, similar to that shown below, or by menu display and keypad.

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All Red – holds signals on red to all approaches.

Manual (MAN) – should be used to stop traffic if the shuttle lane has to be occupied for short periods (e.g. for unloading).

Fixed time (FT) – may be used while awaiting the arrival of the engineer if the equipment needs attention. On some controllers there is no fixed time mode.

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## Vehicle Actuation (VA)

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On VA, if there are no approaching vehicles, the signals will revert to red in both directions. The first vehicle to arrive will register a demand for the signals to change on that approach. See ‘Nudge circuit’ on page 14.

Following vehicles will extend the time that the green light is shown. The duration of the green will vary between the minimum green period (7 or 12 seconds) and the maximum green period (settable on the controller). The signals will change either when the last vehicle has passed, or after the maximum time the green signal has been set for.

## How does it work?

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Each signal is provided with a vehicle-detector unit. These units normally use microwave technology and are often referred to as an ‘MVD’ (Microwave Vehicle Detector). Other technology can be used, but the unit must be approved (see page 3).

The MVD can detect most moving motor vehicles, including larger motorcycles, up to 40 metres away, but with smaller motorcycles and cycles the distance is 25 metres — provided they are travelling towards the MVD at speeds greater than 10 mph and the detector is correctly aligned (see next page). Some detectors may be able to work outside these limits.

An indicator is illuminated when a vehicle is detected and the ‘detect’ message is sent from the MVD to the controller.

## What you need to do

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Use only equipment of a type approved (a legal requirement) – see page 3.

All equipment on site can have problems, particularly from accidental and vandal damage. Maintenance contact information is therefore essential and should be readily available – for example, prominently displayed on the equipment.

Test the equipment before setting up – see pages 14 to 16.

Set up the signing and equipment correctly – see pages 11 to 16.

Use the 'VA' setting on the controller.

Align the MVDs carefully at each end of the site – see page 14. Remember, MVDs cannot see around corners, parked vehicles, plant or materials! Neither can they work properly if they are: pointing at the sky – or over a hedge, not facing oncoming traffic, or damaged by being roughly treated, for example thrown onto the back of a lorry.

Use the correct All-Red and Maximum Green settings (see pages 7 to 10).

If there is a photocell fitted, ensure it is not going to be overshadowed by, say, a tree canopy.

## Adjusting the timers

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Look at the selection switches, or menu display/keypad, for the All-Red and Maximum Green timers for each approach. This should make it clear whether to measure the distance between:

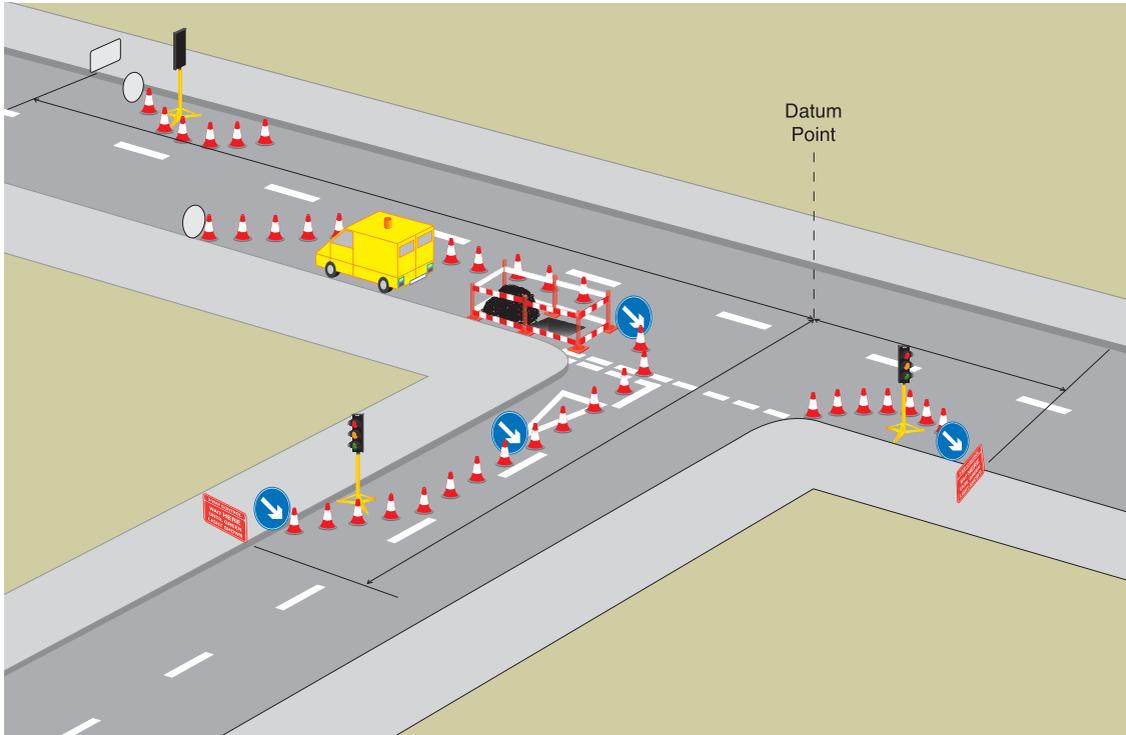
- the two 'WAIT HERE' signs – at sites with more than two approaches, the longest distance to the other 'WAIT HERE' signs is used for that approach – or
- the 'WAIT HERE' sign and the 'datum' point. The datum point can be half way along the shuttle working length, or a point in the centre of the junction (see page 8).

It is important to watch the vehicular flow at intervals and adjust the controller settings if necessary. As the flow changes during the day and day-to-day, it is necessary to carry out this check several times daily.

The following tables cover distances up to 300 metres between 'WAIT HERE' signs. If the longest distance is above 300 metres, ask for advice from the relevant traffic authority before proceeding.

NOTE: Some authorities will need to be informed if the distance is over 200 metres. [You, or your supervisor, should check if in doubt.](#)

## Datum point



**Datum point** (Note: The Chapter 8 triangular warning signs, guarding on the footway and possible secondary signals have been omitted for clarity.)

## Adjusting the red timers

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Measure the distance between 'WAIT HERE' signs, or the 'WAIT HERE' sign and datum point, (see page 7), and use the table below:

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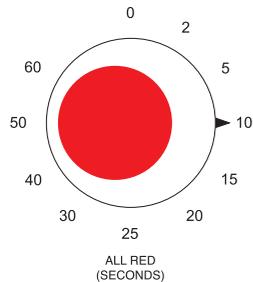
Distance (metres)	0	50	100	150	200	250	300
All-Red time (seconds)	5	10	15	20	25	30	

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NOTE: On some controllers the All-Red switch may be marked in metres and the equipment converts to seconds automatically.

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Method of selection  
and values may differ



If the site is on a steep gradient, you may need to increase the indicated All-Red value for the uphill direction incrementally until vehicles clear safely.

If there are large numbers of slow-moving vehicles that have difficulty in clearing the works before the lights have changed, increase indicated values of the relevant All-Red settings incrementally until vehicles clear safely.

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## Adjusting the Maximum Green settings

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Measure the distance between 'WAIT HERE' signs, or the 'WAIT HERE' sign and datum point, (see page 7), and use the table below:

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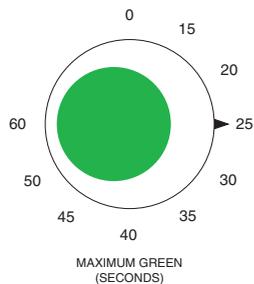
Distance (metres)	30	75	135	195	300
Green time (seconds)	35	40	45	50	

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NOTE: On some controllers the Maximum Green switch may be marked in metres, and the equipment converts to seconds automatically.

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Method of selection  
and values may differ



Set the Maximum Green times to the appropriate settings.

If substantial queues begin to form and vehicles take more than one green period to get through the site, then adjust the setting incrementally. For each new setting allow a few green periods to assess the difference. It is normal to increase the setting but, if this increases the queue, reduce the setting, again allowing time to assess the result.

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## Setting up – general signing

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Check that full Chapter 8 signing is provided and checked regularly. Log any problems and remedial action taken. Make sure you are familiar with recommendations on the stability of signs and the need for standby 'STOP'/'GO' signs.

If possible, avoid placing signs and/or signals on the footway.

For additional advice on signing, including that for works on or near footways, see Chapter 8 and the Code of Practice.

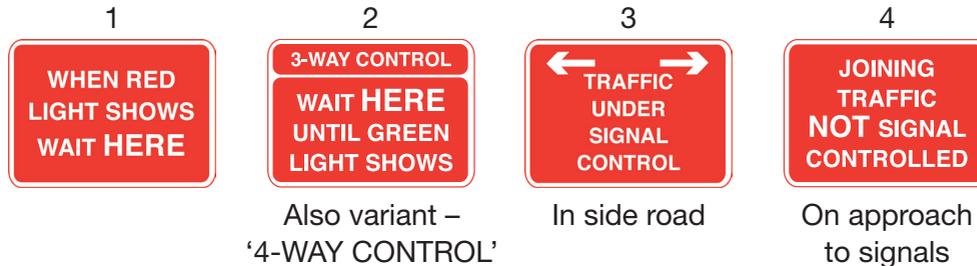
Care should be taken to allow sufficient room for vehicles to pass between the end of the works and vehicles waiting at the signal. If the signal head is not within the coned-off area, protect it with traffic cones. See the Code of Practice for detail on lead-in and exit tapers.

## Setting up – ‘WAIT HERE’ signs

Position the signals where needed. For clear visibility of the signal and reliable detector operation, there must not be any obstructions between the signals and vehicles up to 70 metres away.

‘WAIT HERE’<sup>1</sup> signs should be placed before the signal head. If there is a side road controlled by portable signals use the ‘3-WAY CONTROL’<sup>2</sup> sign.

If there are uncontrolled side roads joining works under signal controlled shuttle working, use the two signs<sup>3,4</sup> in addition to the ‘WAIT HERE’ signs.



## Setting up – ‘RAMP’ signs

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Many portable signals are radio controlled, but some are connected by cable. If the signals are on the near side of the road, cables may have to cross the shuttle lane. Cables crossing a road, should not be placed where vehicles are turning, or accelerating/ decelerating.

Where vehicles have to pass over the cable, use a cable crossing protector. These are designed to prevent damage to the cable and to allow vehicles, particularly those with two wheels, to cross safely.

‘RAMP’ and ‘RAMP AHEAD’ signs must be used, and it may be necessary to weight the cable crossing protector at each end to prevent lifting or twisting.

It should not be necessary for cables to cross the footway.



## Setting up the MVDs

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The MVDs work best if they are mounted on signals on the near side of the road.

A vehicle approaching the MVD, within the range given on page 5, should be detected. The indicator will be illuminated on the MVD (see page 5). If this does not happen, check the alignment and readjust as necessary. If the indicator still does not illuminate when the next vehicle approaches, call out the service engineer.

If the indicator stays on regardless of approaching vehicles, the MVD probably needs replacing – call the service engineer.

Specifications MCE 0114(C), TR 2147 and TR 2504 require that, if a detector has not registered a demand for 2.5 minutes, the detector generates a demand via its 'nudge circuit'. This will mean that at quiet times the signals will change at least every two and a half minutes.

## Initial set-up of the equipment

	<b>MCE 0111, TR 0111</b>	<b>TR 2502</b>
1	Point signals away from the road so they cannot be seen by drivers.	Align the signals and MVDs – see pages 5, 6, 12 to 14.
2	Connect the signal heads and power supply to the controller.	Connect the signal heads and power supply to the controller.
3	Set the controller to 'MANUAL'.	Set the 'All-Red' controls – see pages 7 to 9.
4	Set the 'All-Red' controls – see pages 7 to 9.	Set the 'Maximum Green' controls – see pages 7, 8 and 10.
5	Set the 'Maximum Green' controls – see pages 7, 8 and 10.	Set the controller to Vehicle Actuated (VA).
6	Switch on signal heads and go to page 16.	Switch on signal heads. On some controllers this may be achieved by selecting VA. Go to page 16.

Controllers to 027-008-024 – consult the instructions for the equipment.

## What happens next?

<b>MCE 0111, TR 0111</b>	<b>TR 2502</b>
<p>Signals start by showing red.</p> <p>It is recommended that, when it is safe to do so – working on one approach at a time, turn the signal heads to face oncoming vehicles. Ensure the MVDs are also aligned to face the vehicles.</p> <p>Switch to Vehicle Actuated (VA). The signals to one approach will change – red/amber, green. Other approaches will stay red until the end of the first approach green. The signals will then cycle in the normal fashion.</p> <p>Check the timings and the operation of the MVDs.</p>	<p>The sequence will start by closing down each approach in sequence through amber, then red. On the last approach, the signals will show green.</p> <p>The signals will then cycle in the normal fashion.</p> <p>Check the timings and the operation of the MVDs.</p>

Controllers to 027-008-024 – consult the instructions for the equipment.

## Trouble-shooting guide

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<b>Problem</b>	<b>Possible cause</b>	<b>Remedy</b>
Very long vehicular queues	Maximum Green setting needs adjusting	See page 10
	Faulty detector (MVD)	Call service engineer*
	Too many vehicles	Discuss with relevant traffic authority urgently
Green period always same length	Maximum Green setting needs adjusting	See page 10
	Faulty detector (MVD)	Call service engineer*
	Low vehicular density	No action required
Vehicles still in shuttle lane at start of next green	Vehicles entering shuttle lane after start of red	If frequent, report facts to the police
	All-Red too short	Increase setting
	Obstruction in carriageway	Clear obstruction

\* The signals may need to be controlled by using MANUAL or FIXED TIME, depending on the severity of the problem.

## Trouble-shooting guide (continued)

Problem	Possible cause	Remedy
Long gap between last vehicle clearing shuttle lane and start of next green	All-Red setting too long	Decrease setting
	Detector fault – working fixed time	Call service engineer
Signals do not remain on red in absence of vehicles	Detector fault – working fixed time	Call service engineer
	Switched to Fixed Time	Switch to VA
	‘Misaligned detectors	Re-align detectors
	*‘Nudge circuit’ operating	No action
Signals do not change after one stream has stopped, even though vehicles are waiting	Faulty detector (MVD)	Call service engineer, work signals MANUALLY or FT until engineer arrives.

\* See page 14 for nudge circuit.

# **Traffic Advisory Leaflet 2/11**

April 2011 (as revised December 2015)

# Portable Traffic Signals for the Control of Vehicular Traffic

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## Introduction

This leaflet provides advice on the use of portable traffic signals at road and street works. Detailed advice is already given on the design and use of these, primarily in:

- An Introduction to the Use of Portable Vehicular Signals ('the Pink Book')<sup>1</sup>
- Safety at Street Works and Road Works – A Code of Practice ('the Red Book')<sup>2</sup>
- Traffic Signs Manual Chapter 8 ('Chapter 8')<sup>3</sup>

This leaflet is designed to complement these documents by providing a summary of the main requirements. It does not cover portable signal- controlled pedestrian facilities. For advice on these, please see Traffic Advisory Leaflet 3/11: *Signal- controlled pedestrian facilities at portable traffic signals*<sup>4</sup>.

Portable traffic signals might be required as a consequence of road works, or street works. They should not be confused with temporary traffic light signals, which are permanent signals mounted in a temporary fashion.

### *Road works and street works*

For the purposes of this leaflet, road works are any works carried out primarily to improve or maintain the highway, such as resurfacing of the road.

Street works are any works carried out by statutory undertakers to place or maintain apparatus such as water mains or electricity cables ('undertaker' is defined in the New Roads and Street Works Act 1991<sup>5</sup>). To simplify this leaflet both road works and street works will be referred to from this point as road works. This leaflet only considers circumstances in which works are carried out by statutory undertakers or permitted by the traffic authority.

Portable traffic signals are most often used at shuttle working sites, i.e. sites where the width of the road is restricted so that traffic can only pass in one direction at a time.

## Legal Considerations

### *Powers to place portable traffic signals*

Anyone proposing to use portable traffic signals must obtain written approval from the traffic authority before using them<sup>6,7</sup>. For certain types of sites, such as where a junction is included in the working length, the traffic authority should, in addition, be consulted when planning the works.

How this is done will depend on the nature of the works and the systems used by the traffic authority. Whatever system is in place, early engagement with the traffic authority can help resolve potential problems before they arise. Portable traffic signals can have a significant impact on traffic flows which can raise network management issues for traffic authorities. If portable signals are needed to help manage an emergency situation, for example a burst water main or other urgent repairs, a statutory undertaker can place them without prior written approval. However, they should notify the authority as soon as it is practicable to do so<sup>8</sup>.

Portable signals must comply with the relevant legislation<sup>8</sup> and various components used in connection with them must be type-approved.

**Local highway and traffic authorities are responsible for ensuring that any equipment placed on their road networks is safe and complies with relevant legislation.**

### *Type Approval*

Direction 56 of TSRGD<sup>8</sup> requires control equipment to be of a type approved in writing by the Secretary of State. Type approval is carried out to the relevant specification; the process is administered by the Highways Agency. Performance specifications are available from the Highways Agency site at this link [www.tssplansregistry.org](http://www.tssplansregistry.org).

**It is for the traffic authority to ensure that any equipment placed on their network has been type approved in accordance with TSRGD direction 56<sup>8</sup>.**

### **Layout Considerations**

Generally, on single carriageway roads, if the width of the road works still allows 6.75m of carriageway, two-way traffic can operate satisfactorily. Chapter 8<sup>3</sup> has details relating to bus routes and considerations for cyclists. Widths of 5m can be used on two-way roads for short duration works if heavy or wide vehicles do not normally use the road. Specific information on carriageway widths for cyclists at road works can be found in *Traffic Advisory Leaflet 17/99: Cyclists at Road Works*<sup>9</sup>.

Portable vehicle signals can be mounted at lower heights than permanent ones. This can make them less visible, and prone to being obscured by vehicles. Queues, high sided vehicles (especially buses) and the geometry of the approach must be taken into account when considering the placing and mounting height of the signal heads. TD 50/04: *The Geometric Layout of Signal-controlled Junctions and Signalised Roundabouts*<sup>10</sup> contains advice on visibility and stopping sight distances.

See the Pink Book<sup>1</sup> and Chapter 83 for detailed advice on site layouts.

### *Length of controlled area*

In general, a long working area (working length) will result in long all-red settings and consequently longer queues. It is recommended that the minimum length necessary is used, with a maximum of 300m. Some traffic authorities have a lower maximum and the working length should be discussed at an early stage.

### *Level crossings and other barrier-controlled sites*

If the planned works are on an approach to a level crossing, or any installation controlled by barriers, such as a moveable bridge, the authority responsible for that site must be informed of the works<sup>11</sup>. See Traffic Advisory Leaflet 1/08: *Wig-wag Signals*<sup>12</sup> for contact details.

Under no circumstances should portable traffic signals be used where queuing vehicles may block back across a level crossing, either preventing a barrier being used, or preventing drivers being able to exit the section between stop lines/ give way markings.

### *Existing signal-controlled junctions & pedestrian crossings*

If an existing permanent signal installation is to be taken out of service, arrangements should be made to switch off the equipment, erect suitable signs, such as TSRGD diagram no.7019<sup>8</sup>, and cover any signal heads/ beacons to prevent misinterpretation. The traffic authority's permission must be sought to switch off permanent traffic signals.



Diagram 7019

Pedestrian facilities that are taken out of service are a particular problem. The nature of the works might mean that pedestrians will have to use a different route, which will need signing. Consideration should be given to providing an alternative facility on the new desire line.

### *Uncontrolled facilities for pedestrians*

If pedestrians have to cross the length of road being worked on, the road works will normally mean that the volume and speed of vehicles through the working area will be reduced and uni-directional at any one time. One option is to extend the distance between the end of works and the WAIT HERE sign to TSRGD diagram no. 7011<sup>8</sup>. Pedestrians can then cross within the controlled section. If this method is used, the all-red would be adjusted to the setting in the Pink Book, based on the distance between WAIT HERE signs but can be set marginally higher by, say, one incremental setting. However, if the setting is too high, unnecessarily increasing delays, it could bring the signals into disrepute. If there is a particular peak of pedestrian activity, for example at school times, manual control could be used to allow the all-red setting to be held during periods of high pedestrian use. In these circumstances, the crossing point should be visible to the operator at all times.

If this form of pedestrian crossing provision is being used, it is essential that there is good intervisibility between vehicle drivers and pedestrians. If site conditions permit, the footway should be ramped down to the carriageway - see the Red Book<sup>2</sup> for details.

### *Side roads within a working length controlled by portable traffic signals*

The decision to control any side roads with signals will depend mainly on the visibility from the side road to the main road signal approaches. If this is poor then signal control is likely to be needed. The nature of the side road will also be a factor but even drivers exiting a minor cul-de-sac will have difficulties if they cannot see vehicles entering the working length.

Drivers entering the works from an unsignalled side road or access need to be made aware that the main road is under signal control.

## Equipment

The decision on what type of equipment to use will depend on many factors, including method of setting up, choice of power supply, method of communication between controller and signal head, and cost.

### *Vehicle Actuation (VA)*

All equipment used on public roads must be capable of working in Vehicle Actuated (VA) mode. These signals use detectors to monitor traffic flows and use this information to adjust the length of the signal green time to reduce delays.

VA mode should always be used unless there is a specific reason, such as using the manual mode on a short-term basis to move plant into, or out of, the controlled area. Use of VA will help to reduce unnecessary delays.

If the signals are to be operated under manual control at any time, both ends of the working area should be clearly visible to the operator at all times.

Vehicle detectors (Microwave Vehicle Detectors, or MVDs) used at portable traffic signals must have received type approval from the Highways Agency. To be able to work in the VA mode it is essential that the MVDs are set up as detailed in the Pink Book<sup>1</sup>.

### *Method of setting up*

The method used will depend on what type of equipment is chosen - more information is given in the Pink Book<sup>1</sup>. The manufacturer's instructions should also be referred to. On some installations the choice can make a difference to the efficiency of operation, especially during off-peak periods.

### *Power supply*

Power supply types include: diesel or Liquefied Petroleum Gas (LPG) generator, battery or mains electrical supply through a suitable transformer.

Clearly some will be noisier than others and some will have a greater carbon footprint than others. If it is decided to connect to a mains supply, arrangements will need to be made in advance. All temporary electrical works must comply with BS7671<sup>13</sup>.

### *Method of communication*

There are two basic types available: cable- and radio-linked.

In a cable-linked system, the cables will normally be required to cross the carriageway at some point. If so, cable crossing protectors should be used to protect them from physical damage and to reduce trip hazards. Cables are particularly vulnerable at a vertical change of direction, such as a kerb face. Cable crossing points should avoid areas where vehicles are likely to be turning, braking or accelerating.

Cable routes should avoid areas where there is pedestrian traffic. If this is unavoidable the cable route, as a minimum, should be covered with a ramp suitable for wheelchair use. See the Red Book<sup>2</sup> for details.

If cables cross a carriageway, signs to TSRGD diagrams 7013 and 7010.1<sup>8</sup> (varied to “RAMP AHEAD”) should be used.



Diagram 7013



Diagram 7010.1

For longer term installations it might be appropriate to cut slots in the road surface so that the cables can be buried temporarily.

Radio-linked systems avoid the use of cables, but care needs to be taken to ensure that other sources of radio transmission and obstructions do not interfere with the radio link.

### *Signal heads*

The minimum requirement<sup>8</sup> is for one signal head on each approach.

For safe operation drivers must be able to see at least one signal on approach, and one while waiting at the ‘WAIT HERE’ sign.

## *Settings*

Initial timings should be optimised according to the advice given in the Pink Book or the manufacturer's instructions. Optimising the timings can be time-consuming, but is important as incorrect timings can lead to delays, frustration and even accidents.

The equipment may have a selector for VA, Fixed Time (FT) or Manual. Some controllers only have a selector for VA or Manual. The equipment should normally be operated in the VA mode unless there is a very good reason to select FT or Manual. If the traffic authority agrees that FT or Manual operation is essential, a record of the decision should be kept.

The operation of the controller should be checked regularly, at least daily. If portable traffic signals are on site but not in use, the signal heads and associated signs should be turned away from oncoming vehicles, or covered. A sign warning of portable traffic signals when none exist is frustrating for drivers and brings road works signs/ signals into disrepute.

All signs and signals should be removed as soon as the works are complete.

## *Traffic Signs*

For advice on signing at road works sites see Chapter 8<sup>3</sup>. Stability of sign frames and signal equipment should be ensured by the use of suitable ballast - details can be found in Chapter 8<sup>3</sup>.

Diversion routes and/or inforamatory signing involving either changes to existing signs or the provision of dedicated signs, can be very effective in reducing through traffic and minimising delays. The police and relevant traffic authority, including those responsible in any adjacent authorities if the works are near a boundary, should be consulted.

## Bus Stops

If there are bus stops on the approaches to, or in, the working length they will generally need to be moved to a temporary position. The traffic authority and bus operators should be consulted.

## Training

Portable traffic signals that have been poorly set up can lead to frustration, a greater risk of accidents, additional costs in fuel and time and increased pollution. It is essential that those responsible on site have had the necessary training. Many authorities require National Highways Sector Scheme (NHSS)<sup>14</sup> training for their contractor's staff. There are a number of organisations that have training programmes leading to the appropriate Sector 12 certification - more information is available from the United Kingdom Accreditation Service (UKAS).

## Maintenance

Access to the signal control panel must be limited to prevent unauthorised changes to timings. Information on maintenance arrangements and contact telephone numbers for the contractor or the signal hire company should be available at all times. It may be helpful to print fault reporting information on the signal equipment, to enable fault reporting by the general public.

Switching signals to Fixed Time (FT) is a temporary expedient and not a solution for faulty VA. If equipment cannot be repaired, a replacement should be provided. Permanent use of FT is not acceptable.

On site, the following should be checked at least daily:

- safety/stability of signals and lamp integrity;
- cables, for security and damage;
- signal heads and detectors for correct alignment;
- timings, to ensure correct VA operation; and
- power supply, to ensure continuous operation until at least the next maintenance inspection visit.

Signal head lenses should be cleaned regularly. The interval will depend on the site condition but should be not less than once per week.

Where signal dimming facilities are provided, the light sensor should be cleaned regularly. A build up of dust and dirt will affect its operation, possibly causing the signals to dim during daylight and become less visible to drivers.

### **Temporary Traffic Signals**

In some circumstances, a temporary facility may be more suitable than a portable one. Temporary facilities use permanent equipment mounted in a temporary fashion, most commonly using standard poles in concrete filled barrels, although specially designed temporary equipment and mounting systems are available.

The decision on what type of facility to provide is for the traffic authority. Many temporary installations will need careful design and the traffic authority signal control designers should be consulted at an early stage.

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## Contact details

### *Department for Transport*

Traffic Division  
3/27 Great Minster House  
33 Horseferry Road  
London SW1P 4DR

### *British Standards Institution*

Customer Services  
389 Chiswick High Road  
London W4 4AL  
Tel. 0208 996 9001

### *Highways Agency*

Network Services  
Zone 2/17 Temple Quay House  
2 The Square  
Temple Quay  
Bristol BS1 6HA  
Tel. 0117 373 8782

### *TSO*

PO Box 29  
Norwich NR3 1GN  
Tel. 0870 600 5522  
[www.tsoshop.co.uk](http://www.tsoshop.co.uk)

### *UKAS*

21-47 High Street  
Feltham  
Middlesex TW13 4UN  
Tel: 020 8917 8421

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# **Traffic Advisory Leaflet 3/11**

June 2011 (as revised December 2015)

# Signal-controlled Pedestrian Facilities at Portable Traffic Signals

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## Introduction

This leaflet is intended to provide advice to those who may be involved in or considering providing portable pedestrian crossing facilities, whether stand-alone or at road works. The Traffic Signs Regulations and General Directions<sup>1</sup> 2002 (TSRGD) were amended in 2011 to allow the use of pedestrian facilities with portable traffic signals.

Traffic Advisory Leaflet 2/11: Portable traffic signals for the control of vehicular traffic<sup>2</sup> provides advice on the use of portable traffic signals to control vehicular traffic only. Much of that advice is relevant to portable pedestrian facilities, and TAL 2/11<sup>2</sup> should be read in conjunction with this leaflet.

Other advice is given in:

- An Introduction to the Use of Portable Vehicular Signals ('the Pink Book')<sup>3</sup>,
- Safety at Street Works and Road Works – A Code of Practice ('the Red Book')<sup>4</sup>,
- Traffic Signs Manual Chapter 8 ('Chapter 8')<sup>5</sup>.

The advice in this leaflet also supersedes that given in paragraph 1, page 1 of the Pink Book<sup>3</sup>.

For the purposes of this leaflet, road works are any works carried out primarily to improve or maintain the highway, such as resurfacing of the road. Street works are any works carried out by statutory undertakers to place or maintain apparatus such as water mains or electricity cables ('undertaker'

is defined in the New Roads and Street Works Act 1991<sup>6</sup>). To simplify this leaflet, both road and street works will be referred to as road works. This leaflet only considers circumstances in which works are carried out by statutory undertakers, or permitted by the traffic authority.

## Legal Considerations

### *Powers to place pedestrian facilities with portable traffic signals*

Anyone intending to use portable traffic signals incorporating pedestrian crossing facilities must obtain written approval from the traffic authority before using them.

How this is done will depend on the nature of the works and the systems used by the traffic authority. Whatever system is in place, early engagement with the traffic authority can help resolve potential problems before they arise. Portable traffic signals can have a significant impact on traffic flows, which can raise network management issues for traffic authorities. If the planned works are on an approach to a level crossing, or any installation controlled by barriers, such as a moveable bridge, the authority responsible for that site must be informed of the works<sup>7</sup>. See Traffic Advisory Leaflet 1/08: Wig-wag Signals<sup>8</sup> for contact details.

Portable traffic signals must comply with the relevant legislation<sup>1</sup> and various components used in connection with them must be type-approved.

**Local highway and traffic authorities are responsible for ensuring that any equipment placed on their road networks is safe and complies with relevant legislation.**

### *Type Approval*

Direction 56 of TSRGD1 requires control equipment to be of a type approved in writing by the Secretary of State. Type approval is carried out to the relevant specification; the process is administered by the Highways Agency. Performance specifications are available from the Highways Agency website at [www.tssplansregistry.org](http://www.tssplansregistry.org).

**It is for the traffic authority to ensure that any equipment placed on their network has been type approved in accordance with TSRGD direction 56<sup>1</sup>.**

### **Equipment and Layout Requirements**

When considering the layout of portable pedestrian facilities, **the safety of road users, particularly pedestrians, should be the foremost consideration**. This advice applies to both stand- alone facilities, and those provided as part of a road works site. A risk assessment should be carried out when deciding what type of facility to provide.

The minimum requirements for portable pedestrian facilities are:

- 1 signal to TSRGD diagram 3000.1<sup>1</sup> per approach (2 for stand-alone facilities)
- 1 signal to TSRGD diagram 4002.1<sup>1</sup> per side
- 1 push button per side
- 1 sign to TSRGD diagram 7011.2<sup>1</sup> per approach.

These are prescribed by the 2011 amendments to TSRGD<sup>1</sup>. Diagram 7011.2 is a new sign, prescribed for portable pedestrian crossings.

Audible and/or tactile signals can be used, but if so then a ramp from the footway to the carriageway should be provided.



### Diagram 7011.2

Portable vehicle signals can be mounted at lower heights than permanent ones. This can make them less visible, and prone to being obscured by vehicles. Queues, high sided vehicles (especially buses) and the geometry of the approach must be taken into account when considering the placing and mounting height of the signal heads. TD 50/04: The Geometric Layout of Signal-controlled Junctions and Signalised Roundabouts<sup>9</sup> and Local Transport Note 2/95<sup>10</sup> contain advice on visibility and stopping sight distances.

Particular care should be taken on approaches that have more than one lane. On multi-lane approaches, the risk of drivers in the outside lane being unable to see the signals should be assessed.

Signal assemblies, pedestrian signal heads and push buttons should be mounted so as to reduce, as far as possible, the risk of injury from tripods, trolleys, post blocks etc. They should be mounted at right angles to the kerb. Push buttons should be positioned so that they are readily accessible to anyone wishing to use the crossing.

Signal head assemblies, whether installed in the carriageway or on the footway, should be suitably coned-off and provided with suitable guarding to prevent them from becoming a hazard.

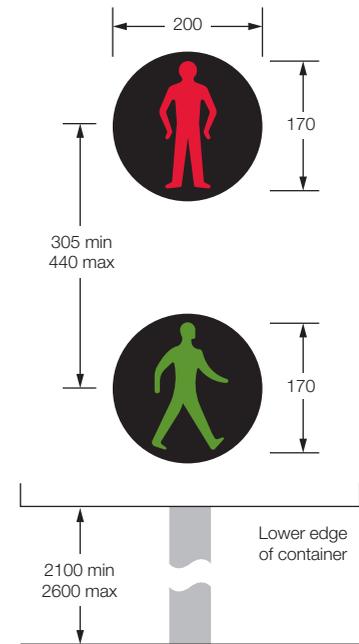
It is strongly recommended that two vehicle signal heads should be provided on each approach where pedestrian facilities are used. Drivers should be able to see at least one signal on approach and one while waiting at the 'WAIT HERE' sign. This is particularly important where pedestrian facilities are involved.

If the signals are to be operated under manual control at any time, the pedestrian crossing point should be clearly visible to the operator at all times.

### *Pedestrian facilities within portable signals at road works*

At road works, the addition of a pedestrian facility will substantially increase the signal cycle time leading to longer delays for vehicles. The cycle time will depend on the working length, crossing width, how often the pedestrian phase is called, and the signal staging. The risk of additional delays may mean incorporating other traffic management measures, such as alternative routes, to offset this.

Pedestrians are vulnerable road users, and include some who are particularly vulnerable. It is important that any signal-control provided is unambiguous to both pedestrians and drivers alike. The aim should be to achieve a similar standard of safety as at a permanent site.



**Diagram 4002.1**

At road works sites in residential areas, it is likely that the working length will include side roads (not always signal-controlled), commercial accesses and private driveways. Drivers entering the controlled section may therefore be unaware of the status of the signals at either end. Drivers normally join the vehicular flow travelling in the appropriate direction, however, when the pedestrian facility is showing a green figure there will be no vehicular flow and a driver from, say, a private driveway entering the working length could drive through the pedestrian crossing without passing a red vehicular signal.

In these circumstances, an additional signal and 'WAIT HERE' sign to TSRGD diagrams 7011<sup>1</sup> or 7011.2<sup>1</sup> may be required at the crossing point within the working length to reduce the risk to pedestrians.

Where additional signs and signals are used, care will be needed when setting the signal timings. Designers will need to ensure that, when given a red signal, traffic can clear the shuttle working length and is not 'trapped' at a red signal. This would be likely to prevent the opposing traffic moving through the working length, leading to heavy delays.

Ideally the pedestrian crossing should be towards one end of the shuttle working section with the distance between the vehicle signals there and the pedestrian crossing point no more than 10m. However, it is accepted that this is not always possible. When considering layouts, the risk of the crossing point and the vehicle signals becoming disconnected in road users' minds should be considered.

Where pedestrian facilities are provided, it may be more appropriate to consider 3-way or 4-way control for sites incorporating side roads.

Audible and/or tactile signals can be used, but if so then a ramp from the footway to the carriageway should be provided. Guidance on the use of audible signals is given in Local Transport Note 2/95<sup>10</sup>. However, the possibility for confusion with other warning sounds such as plant reversing indicators, should be borne in mind. Banksmen supervising reversing vehicles should be mindful of this.

### *Stand-alone facilities*

These are facilities provided to allow pedestrians to cross the road, not to control vehicle movements. For example, they may be provided:

- where an existing permanent crossing has had to be closed for upgrade works
- near road works sites where it is impractical to incorporate a pedestrian facility into the portable signals
- at large public events, such as a music festival, where there is a need for a crossing for a relatively short time.

Regulatory requirements are given in Schedule 2 to the general directions in TSRGD<sup>1</sup> - this requires 2 vehicle signal heads per approach for stand-alone portable pedestrian facilities.

This type of facility is not a pelican or puffin crossing but operates with the same sequence as pedestrian facilities at junctions: red figure/ green figure/ black- out/ red figure. They are regulated by TSRGD<sup>1</sup> and the notification requirements of section 23 of the Road Traffic Regulation Act 1984<sup>11</sup> do not apply.

The provision of a stop line, studs and zig-zags is **optional** (but if zig-zags are to be used, a stop line and studs must also be used).

These markings are unlikely to be practical where a facility will be in place for only a few hours or days. However, where one will be in place for some time, or if it is considered that a more formal crossing place is necessary, say because of high pedestrian flows, these markings may be appropriate, depending on the individual site circumstances.

Decisions on what road markings to use at individual sites are for the local traffic authority (or statutory undertaker where section 65 of NRSWA applies).

### *Use on high-speed roads*

For the purposes of traffic signals a 'high-speed road' is one on which the 85<sup>th</sup> percentile approach speed is 35mph or above<sup>12</sup>.

Current advice<sup>12</sup> for permanent sites is that traffic signals should not be installed on roads where the 85<sup>th</sup> percentile speed is above 65 mph, and that where the 85<sup>th</sup> percentile speed is greater than 50 mph, serious consideration should be given to speed reduction measures before installing stand- alone crossings.

This applies equally to portable signals. **It is strongly recommended that portable pedestrian facilities should not be used on high-speed roads.**

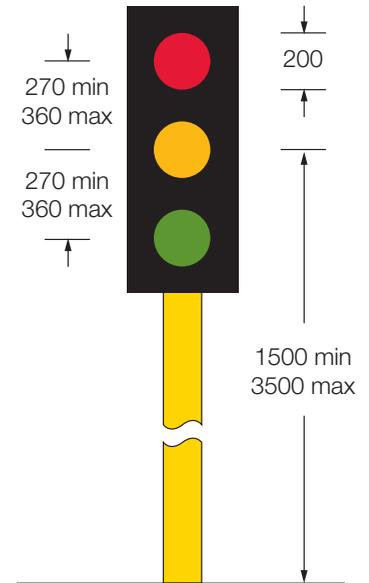


Diagram 3000.1

If portable signals are considered necessary on a high speed road, Speed Assessment/ Speed Discrimination equipment must be used in conjunction with the signals<sup>13</sup>, however the installation of the necessary loop detectors can be difficult with portable systems. It will usually be more practical, and safer, to use traffic management measures to bring vehicle speeds down.

### *Street lighting*

Where pedestrian facilities are provided, good uniform street lighting is essential so that pedestrians can be seen both waiting on the footway and crossing the carriageway. LTN 2/95<sup>10</sup> provides guidance on lighting at pedestrian crossings. Temporary lighting rigs can often produce harsh, bright light with high levels of glare and deep shadow. This can have a detrimental effect on drivers' ability to see pedestrians. Lighting should be provided for facilities on otherwise unlit roads, to ensure visibility of the crossing<sup>14,15</sup>.

### **Temporary Facilities**

In some circumstances, a temporary facility may be more suitable than a portable one. Temporary facilities generally use permanent equipment mounted in a temporary fashion, most commonly using poles in concrete-filled barrels, although specially designed temporary equipment and mounting systems are available.

The decision on what type of facility to provide is for the traffic authority.

### **Training**

Portable traffic signals that have been poorly set up can lead to frustration, a greater risk of accidents, additional costs in fuel and time and increased pollution. It is essential that those responsible on site have had the necessary training. Many authorities require National Highways Sector Scheme

(NHSS)<sup>15</sup> training for their contractor's staff. There are a number of organisations that have training programmes leading to the appropriate Sector 12 certification - more information is available from the United Kingdom Accreditation Service. Specialist knowledge is essential for the design of most schemes involving signal-controlled pedestrian facilities.

## Maintenance

Access to the signal controls must be limited<sup>12</sup> to prevent unauthorised changes to timings. Information on maintenance arrangements and contact telephone numbers for the contractor or the signal hire company should be available at all times. It may be helpful to print fault reporting information on the signal equipment to enable fault reporting by the general public.

Switching signals to Fixed Time (FT) is a temporary expedient and not a solution for faulty Vehicle Actuation (VA). If equipment cannot be repaired, a replacement should be provided. Fixed Time operation will bring in the pedestrian stage in every operational cycle, which could substantially increase delays to vehicular traffic. Permanent FT is not acceptable.

On site, the following should be checked at least daily:

- safety/stability of signals and lamp integrity;
- cables, for security and damage;
- signal heads and detectors for correct alignment;
- timings, to ensure correct VA operation; and
- power supply, to ensure continuous operation until at least the next maintenance inspection visit.

Signal head lenses should be cleaned regularly. The interval will depend on the site condition but should be not less than once per week.

Where signal dimming facilities are provided, the light sensor should be cleaned regularly. A build up of dust and dirt will affect its operation, possibly causing the signals to dim during daylight and become less visible to drivers.

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[www.ukas.com](http://www.ukas.com)

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## Contact details

### *Department for Transport*

Traffic Division  
3/27 Great Minster House  
33 Horseferry Road  
London SW1P 4DR

### *British Standards Institution*

Customer Services  
389 Chiswick High Road  
London W4 4AL  
Tel. 0208 996 9001

### *Highways Agency (HA)*

Network Services  
Zone 2/17 Temple Quay House  
2 The Square  
Temple Quay  
Bristol BS1 6HA  
Tel. 0117 373 8782

## *TSO*

PO Box 29  
Norwich NR3 1GN  
Tel. 0870 600 5522  
[www.tsoshop.co.uk](http://www.tsoshop.co.uk)

## *UKAS*

21-47 High Street  
Feltham  
Middlesex TW13 4UN  
Tel: 020 8917 8400

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Department for Transport  
Great Minster House  
33 Horseferry Road  
London SW1P 4DR

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