

Traffic Advisory Leaflet 4/97 March 1997



Rising bollards

Summary

Rising Bollards are a relatively recent development and, whilst doubts have been expressed as to the legality of their use, they can be effective when used to enforce Traffic Regulation Orders (TROs) that are time related or restrict access to particular classes of traffic.

Other applications include controlling the entry of small numbers of vehicles into otherwise pedestrianised areas, and ensuring that bus gates are not used by other road users.

The purpose of the leaflet is to describe the circumstances and the manner in which rising bollards can properly be used.



Legal Position

Bollards and other obstructions under sections 92 (outside London) and 94 (London) of the Road Traffic Regulation Act 1984 (RTRA) may include obstructions of any description whatsoever. These may be either fixed or moveable and may be placed so as to prevent the passage of vehicles at all times or at certain times only. It follows from this that rising bollards are lawful as movable obstructions if they prevent the passage of vehicles where this is prohibited by a traffic order. In Scotland, section 28 of the Roads (Scotland) Act 1984 applies.

The Highways Act 1980, section 66(2) enables fixed bollards to be erected on the edge of a footway for the protection of pedestrians. This could include protecting the footway from pavement parking so as to safeguard pedestrians.

Authorisation and Equipment Approval

In some existing installations there are "indicators" telling road users that the bollards are fully lowered and therefore permitted traffic may proceed. No such indicators are prescribed in the Traffic Signs Regulations and General Directions 1994 and, if they are to be placed, they must be authorised by the Secretary of State under section 64 of the RTRA.

Authorisation will only be given to indicators, variable message signs or other information or related control devices if they are of a type approved by the Secretary of State. A properly conducted risk assessment should assist in gaining equipment approval.

Planning considerations

Rising bollards may initially appear to be a low cost solution to a problem. However, the whole life installation, maintenance and operating costs must be considered in assessing the true financial and operational benefits. If, for example, the bollards are to be raised and lowered only once per day, then a manually operated gate might be a better solution.

Automatic operation raises a number of technical and safety issues, some of which are outlined in this leaflet. If rising bollards are being considered, then it is recommended that a detailed risk assessment for the proposed scheme is completed at an early stage.

Visibility

Road users, whether authorised to use the system or not, should be made aware of the presence of bollards. To improve visibility, it is recommended that light coloured retroreflective stripes are applied to the bollards.

Positioning

Rising bollards should not normally be sited close to or at signalled junctions or pedestrian crossings.

Access

Careful consideration should be given to the number and positioning of rising bollards at entrances to controlled areas. The treatment of exits will also need careful consideration to ensure they cannot be used as unofficial entrances.

Provision will be needed for access by emergency service vehicles. This may be achieved by the use of a special key or a smart card.

Management

It is useful to adopt a comprehensive management scheme for bollard systems. Queries and complaints from road users can thus be readily responded to and arrangements made to deal with faults and routine maintenance issues. Good quality scheme management should help to quickly identify any modifications required to the equipment or its operating sequence.

Non Compliance

Any system is liable to be abused. For example, where exits from a restricted area are uncontrolled, some drivers may try to use them as entrances. Bollards will not restrict the passage of bicycles or motorcycles.

Signing

In general, signing in advance of rising bollards will be required. The times at which the bollards will operate should be shown and/or the classes of vehicles permitted access.

Traffic Signals

Two-aspect vehicular traffic signals are not prescribed for use on public roads. Threeaspect vehicular signals should only be used in accordance with TSRGD or the pedestrian crossing regulations. Established practices of traffic control using traffic signals do not control separate vehicles; streams of vehicles are controlled with drivers able to see the signals from a significant distance. Rising bollards are normally used to control individual vehicles in that they are raised each time a vehicle has passed over them. The requirement, therefore, is for short range signalling and the standard form of traffic signals should not be used with rising bollards.



Indicators

Unless drivers have a clear view of the bollards, an indication should be given to drivers that the bollards have fully retracted.

Systems with indicators or variable message signs will require equipment approval. Figure 1 illustrates an example of a form of design the Department would consider authorising in appropriate cases.

The indicators should be aimed towards the waiting driver and not at on-coming traffic.

Figure 1: Example of bollard signage



Safety Considerations

Consideration should be given to the effects of the installation on all road users, not just those in four wheeled vehicles. Three wheeled vehicles, motorcycles and vehicles with trailers, for example, may not be sensed by the vehicle detectors used with automatic bollard systems. It will almost certainly be necessary to provide alternative means of access for some classes of road users or vehicles.

The possibility of a device rising under a wheelchair or pushchair should be taken into account. The risks could be mitigated to some extent by providing suitable alternative access adjacent to the bollards, and by using a coarse road surface to divert pedestrians away from the bollard installation.

Whilst most applications will be to enable the passage of one vehicle at a time, there will be instances where two or more vehicles attempt to pass through in close succession. The system should ensure that bollards cannot rise beneath a vehicle because of the danger this would create. It is better to risk a certain amount of violation by "tailgating" vehicles, rather that put road users at risk.

Any system, however well designed, will fail to operate correctly on occasions. The system should fail to a safe state, ideally with the bollards retracted. In the event if an accident the emergency services may need to override the control system and retract the bollards.

Installations used on one way roads are relatively straightforward; the safety considerations become much more complex when there is two way traffic.



All current systems use some form of vehicle detection. There are various types of detector technology that can be used. The advantages and disadvantages of each type and technology of detector must be considered. Loops, for example, may not detect some types of vehicles so an alternative detection system may be needed.

Within the range of possible configurations, it is unlikely that all road vehicles could be detected in all instances. This needs to be considered during the risk assessment, together the effects of detector or other system component failures.

For a system not in continuous use, one of the most critical stages will be the 'start up' phase

when the bollards are first raised. The most effective way of minimising the risk to a pedestrian, a parked vehicle or other obstruction is to have an operator present to initiate the sequence. If a fully automatic method is proposed there are a number of safety issues which will need to be addressed, the main ones being covered in this leaflet.

Risk Assessment

When considering whether to install a system including rising bollards, it is important that a risk assessment is carried out.

The designer should consider the benefits of the proposed scheme (accident reductions, quality of life, etc) against the possibility of malfunction and any associated risk or consequences.

The authority responsible for the road will need to work closely with all relevant parties to ensure the performance requirements for the system are met. For instance, if the components of a system are purchased from several suppliers the local authority may need to take overall responsibility for the risk assessment. The authority should also identify and assess the consequences of system failure within a risk assessment framework.

Normal safety audit procedures should be followed before completing the commissioning of rising bollard systems.



Risk Issues

Many of the issues to be considered will be specific to individual installations, so it is not possible to produce a comprehensive "checklist". However, the following items will need to be considered at most sites:

- The Traffic Regulation Order to be used and the specific wording
- The fixed signing to be used
- Classes of vehicles permitted and those capable of passing between bollards
- The physical layout
- The activating mechanism
- The design of the bollards
- The warning signs/indicators
- The control system including vehicle sensors
- Failure modes
- Equipment monitoring
- Emergency vehicle access
- Health and safety legislation
- Equipment approval
- Maintenance/reliability

Failure Modes

One of the key elements of a risk assessment will be the analysis of the various failure modes.

The local authority, together with the supplier, will need to ensure that the defined failure modes for a scheme can be enacted under all circumstances, including failure of the main power source. This will require internal monitoring of the system, which may also need to be backed up by remote reporting and interrogation.

The requirement that the internal monitoring should work properly under all circumstances is probably the most difficult issue to address. At the very least there must be a fail safe way of detecting a fault. If a fault is detected, then the system should react in a pre-determined and safe way.

Monitoring

Operational

When the system is in operation its use will need to be monitored. The system design should be such that permitted drivers find it easy to use but abuse by unauthorised drivers is negligible. Observation of the site in operation will show whether there are still potential hazards for pedestrians, particularly those who are disabled, and two wheeled road users. The key to an effective system will be credibility. In order for this to be sustained, there should be operational monitoring of each scheme. The monitoring should be such that an assessment can be made as to whether the objectives of the scheme are being met. Problems encountered by road users should be gauged and checks made to establish whether new patterns of behaviour are being created which might undermine the effectiveness of the scheme.

Equipment

An urgent visit to site by maintenance staff may be required in the event of system failure, particularly if the bollards fail in a fully or partially raised state. This might be the case were a bollard to be struck by a passing vehicle. Rapid response can probably be facilitated most effectively by using a remote monitoring system. In this way, faults can be reported to a control centre and remedial action initiated.



References

Highways Act 1980 The Traffic Signs Regulations and General Directions 1994 (SI 1994/1519) Road Traffic Regulation Act 1984 The Roads (Scotland) Act 1984

Equipment specifications and approval

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