

## USE OF CRASH CUSHIONS

### 1. INTRODUCTION

#### General

1.1 There has over recent years been a number of suggestions for the use of crash cushions to help reduce the severity of injuries where vehicles impact fixed obstructions on the highway. A number of systems are now available that are designed to cope with a range of impact speeds.

#### Scope

1.2 This interim advice note discusses the options available and provides advice on the provision of crash cushions on the existing network, in new construction and as temporary installations during maintenance works on trunk roads in England.

#### Implementation

1.3 This interim advice note provides guidance for situations where the installation of crash cushions are proposed and should be followed where approval for the use crash cushions is requested.

### 2. USE OF CRASH CUSHIONS

#### General

2.1 Crash cushions are designed to absorb the energy of a vehicle which would otherwise impact an obstruction head-on. Some systems also redirect severe angle impacts away from the obstruction in a similar manner to safety fences and barriers. Crash cushions have been designed to cope with a range of impact speeds from 30mph up to 70 mph. Designs vary from plastic and steel cylinders some of which are sand filled to more complicated honeycomb structures. With the plastic and steel cylinder types damaged cylinders can be replaced after an accident, whereas other types may have to be totally replaced.

2.2 In the USA crash cushions are used quite widely. However conditions on the USA road network, the legislative climate and design criteria differ to those in the UK. In European countries, crash cushions are currently used in selected locations, as is advocated in this interim advice note.

#### Existing Roads

2.3 The general presumption should be that crash cushions are not provided on existing trunk roads except where special features or circumstances warrant their installation and the future expenditure on maintenance. Where a case is to be made for including crash cushions the accident statistics for the site should be considered together with options for reducing the number or severity of accidents by other means. For example 250m of safety fencing can be installed to protect vehicles from impacting obstructions for the cost of one typical crash cushion.

2.4 Depending on the particular situation the majority of the following criteria should be met before approval is requested for deploying crash cushions on existing roads.

- a) History of above average numbers (for such road type) of serious accidents at the particular location involving vehicles impacting an obstruction(s)
- b) High traffic speeds (minimum 50 mph)
- c) Large numbers of weaving movements
- d) Close proximity of traffic to the potential hazard such as no hard shoulder provision on motorways
- e) Hazard has high value to the operation of the network or potential for causing severe disruption if damaged
- f) Sub-standard geometry (narrow lanes, greatly reduced radii etc.)
- g) The deployment is economically justified
- h) Combination of hazards

### **New Roads/Improvement Schemes**

2.5 The advice in the DMRB on the provision of safety fences and barriers to protect structures and other obstructions should enable designers to avoid situations that could be regarded as hazardous if impacted by a vehicle. Consequently, the expectation is that there is no justification for the general use of crash cushions on new or improved roads.

2.6 Notwithstanding the above there may be isolated circumstances where crash cushions are the only way that impact protection for vehicle occupants can be provided. This is only likely to arise where departures from layout standards are necessary because of landtake considerations. Even in these situations it may be better to monitor the road in operation before the installation of crash cushions is proposed.

2.7 The provision of crash cushions is not a justification for adopting lower design standards.

### **Maintenance**

2.8 The expense of crash cushions and the time taken to install them, particularly those with bolted down securing arrangements are such that they should not normally be included as part of any traffic management design in the contract documents.

2.9 Crash cushions may however be proposed by the contractor and in such instances the proposals must be backed up by an analysis of the benefits taking into account the risk both to the workforce and the travelling public. Approval to their use will still be required as a departure from standards.

2.10 Where the works or the crash cushions will be in position for less than 28 days any benefits to the travelling public are likely to be outweighed by the additional risks to the workforce carrying out the installation and the increased risk and delays to the travelling public during the period of installation. In such cases crash cushions should not be considered unless there are overriding reasons.

## **3. SPECIFICATION**

3.1 A performance specification for crash cushions is available based on the draft of prEN 1317-3 Road Restraint Systems - Part 3: Crash Cushions - Performance classes,

impact test acceptance criteria and test methods. This European standard is scheduled to be voted upon during 1998. It is anticipated that it will not specify the situations in which crash cushions should be deployed; this will be at the discretion of the individual member state. Compliance with this specification as appropriate for the road classification must be demonstrated before a particular product/system can be installed on the trunk road network. Copies of prEN 1371-3 can be obtained from the Customer Services Department of the British Standards Institution.

#### **4. APPROVAL FOR USE**

4.1 The provision of crash cushions is a departure from standards and formal approval is required before they can be used. An application for a departure from standards should be accompanied by full details of the layout, proposed system and evidence of compliance with prEN 1317-3. The details must be accompanied by an economic justification for the provision.

4.2 All installations of crash cushions should be monitored over a three year period from installation and the results reported to the Highways Agency [Safety Team, QS TSE] to provide information on their performance.