

# The safe use of vehicles on construction sites

A guide for clients, designers, contractors, managers and workers involved with construction transport



**This is a free-to-download, web-friendly version of HSG144 (Second edition, published 2009). This version has been adapted for online use from HSE's current printed version.**

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Every year in the construction industry, people are killed or injured as a result of being struck by moving plant. Accidents occur throughout the construction process, from groundworks to finishing works. Managers, workers, site visitors and the public can all be at risk if construction vehicle activities are not properly managed and controlled.

This book gives practical guidance on how to prevent vehicle accidents on construction sites. It provides information on planning and managing vehicle operations; selecting and maintaining vehicles; and safe driving and working practices. It will be useful to clients, designers, employers, managers, the self-employed, employees, safety representatives and plant hirers.

This second edition has been updated to reflect the Construction (Design and Management) Regulations 2007. Information has also been added about telehandler visibility and delivery lorries and goods vehicles.

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# Preface

Every year people are killed or injured by vehicles on construction sites. This book provides practical guidance on how to prevent these accidents by avoiding hazards and controlling the risks arising from the use of vehicles in construction work. This second edition has been revised in light of the Construction (Design and Management) Regulations 2007. It provides information on:

- planning and managing vehicle operations on construction sites;
- selecting and maintaining vehicles; and
- safe driving and working practices.

The key message of this guidance is:

***Construction vehicle accidents can be prevented by the effective management of transport operations throughout the construction process.***

This book is directed at all those who can influence construction vehicle operations, including clients, designers, employers, managers, the self-employed, employees, safety representatives and plant hirers. It supplements general guidance on workplace transport issues given in *Workplace transport safety: An employers' guide* HSG136.<sup>1</sup>

This book forms part of the Health and Safety Executive's (HSE's) specific guidance for the construction sector, which aims to help all those involved in construction to identify the main causes of accidents and ill health, and explains how to eliminate hazards and control risks.

# Introduction

1 Each year within the construction industry, approximately ten people die as a result of being struck by moving plant. In addition, there are hundreds of preventable accidents and injuries. This not only affects the lives of workers but can also result in material damage. Accidents occur throughout the construction process from groundworks to finishing works. Managers, workers, visitors to sites and members of the public can all be at risk if construction vehicle activities are not properly managed and controlled. This book considers methods of eliminating hazards and controlling risks that arise from the use of vehicles in the construction industry, including cars, vans, lorries, low-loaders, earth-moving machinery, tractors and lift trucks (this is not an exhaustive list).

2 This book is concerned with workplace transport during the construction process. It does not cover rail transport, non-powered transport, lifting equipment or pedestrian-controlled plant, or construction activities on the public highway, road transport, tunnelling, public transport, and works involving water transport. It does not cover the responsibilities for ensuring safe traffic routes after construction is complete and the facility is in use.

3 This book is divided into four main sections:

- safe workplaces;
- safe vehicles;
- safe driving and work practices; and
- managing construction transport.

4 Much of the occupational health and safety law relating to construction transport operations is qualified by the term 'so far as is reasonably practicable'; the same qualification applies to most of the guidance given in this book. The precautions required in a specific situation will depend on the extent and nature of the particular risks involved. High-risk situations require higher standards of precautions than low-risk situations. The examples of hazard elimination and risk control given do not cover every possible situation and may not be relevant to all sites, but indicate good practice.

5 The majority of construction transport accidents result from the inadequate segregation of pedestrians and vehicles. This can usually be avoided by careful planning, particularly at the design stage, and by controlling vehicle operations during construction work. Inadequate planning and control is the root cause of many construction vehicle accidents which often involve:

- vehicles or their loads striking people, particularly when reversing;
- vehicles striking services and obstructions;
- manufacturers' instructions for safe use being disregarded;
- inadequate training of drivers and signallers; and
- unsafe loading and transportation of materials on vehicles.

6 Successful management of construction vehicle activities is based on the provision and maintenance of safe workplaces, safe vehicles, safe drivers and safe work practices. Risk assessment is an essential part of effective health and safety management and involves five stages:

- identify the hazards;
- decide who might be harmed and how;
- evaluate the risks and decide on precautions;
- record the findings and implement them; and
- review the risk assessment and update if necessary.

### **Relevant law**

7 A legal framework for the management of construction transport risks is contained in the following legislation (summarised in Table 9 in Appendix 2):

- Health and Safety at Work etc Act 1974 (HSW Act);<sup>2</sup>
- Management of Health and Safety at Work Regulations 1999 (the Management Regulations);<sup>3</sup>
- Construction (Design and Management) Regulations 2007 (CDM);<sup>4</sup>
- Work at Height Regulations 2005;<sup>5</sup>
- Supply of Machinery (Safety) Regulations 1992;<sup>6</sup> and
- Provision and Use of Work Equipment Regulations 1998 (PUWER).<sup>7</sup>

# Safe workplaces

## Planning for safety

8 Planning a safe site should begin before the construction phase. There are specific duties placed on all of those involved within the construction process, including clients, designers, CDM co-ordinators and contractors. The section 'Managing construction transport' deals with these roles in more detail.

9 This section gives guidance on how to establish a safe workplace for vehicle operations. The overall message is simple – safe workplaces are achieved by separating pedestrians and vehicles and providing hazard-free traffic routes.

## Pedestrian and vehicle separation

### Regulation 36 of CDM requires that:

*Every construction site shall be organised in such a way that, so far as is reasonably practicable, pedestrians and vehicles can move safely.*

10 Principal contractors should ensure that pedestrians and vehicles are adequately separated by establishing:

- pedestrian-only areas from which vehicles are completely excluded;
- safe designated pedestrian routes to work locations;
- vehicle-only areas, especially where space is limited or traffic is heavy; and
- safe vehicle routes around the site.

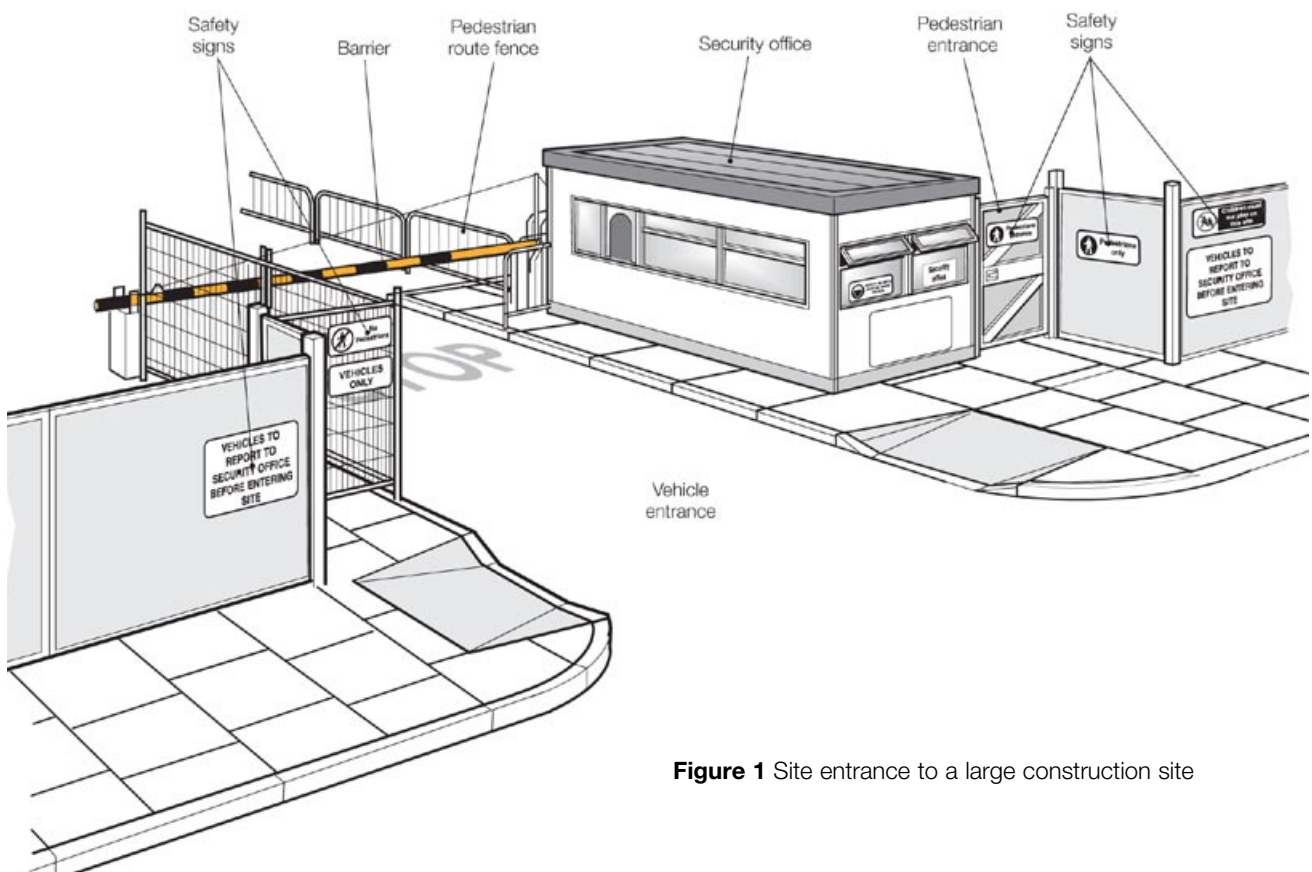
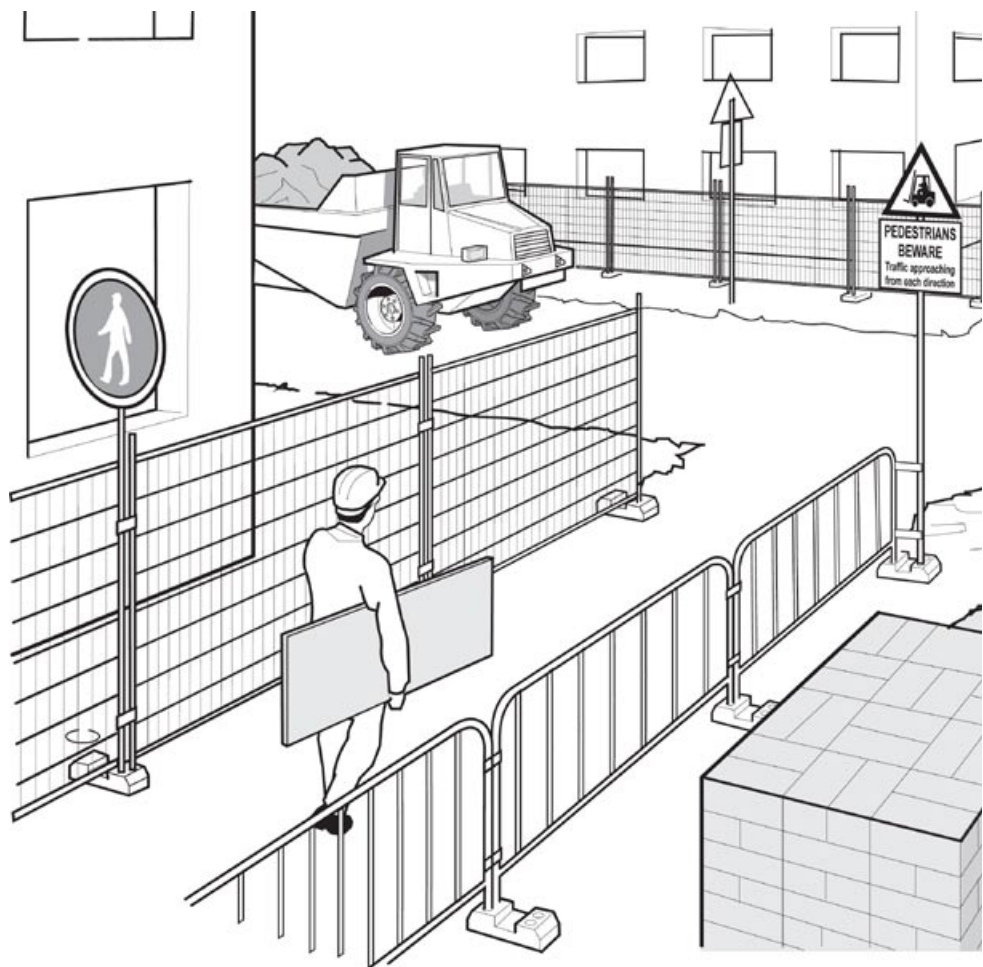


Figure 1 Site entrance to a large construction site

### **Pedestrian routes**

11 Establish pedestrian routes on site which provide safe pedestrian access to work areas. Pedestrian routes should be either located a safe distance away from areas of vehicle activity or provided with appropriate physical protection, such as substantial fencing and/or kerbs, to prevent pedestrians being struck by vehicles or their loads. Pedestrian routes should:

- be clearly separated from vehicle routes by fencing and/or a kerb, or other suitable means;
- be wide enough to safely accommodate the number of people likely to use them at peak times;
- allow easy access to work areas;
- be kept free from obstructions and tripping hazards;
- be clearly signed;
- ensure pedestrian safety where they cross main vehicle routes;
- provide pedestrians with a clear view of traffic movements at crossings and where gates used by pedestrians lead onto traffic routes; and
- have clearly marked, separate access for pedestrian use at loading bays and site gates used regularly by construction vehicles.



**Figure 2** Pedestrian walkway crossing a vehicle route

12 Chestnut paling, metal barriers or plastic fencing will be adequate to separate pedestrian routes that are a safe distance away from the edge of vehicle routes. Where vehicles are present for only short periods, and the work presents little risk

to pedestrians, satisfactory segregation can be achieved using traffic cones and warning tape or similar means to identify the working area from which pedestrians are prohibited.

13 At points where large numbers of pedestrians cross busy vehicle routes, eg near site welfare facilities, appropriate traffic control measures should be implemented, such as designated pedestrian crossing points and traffic control systems. Vehicle movements around the site can be restricted to specified times. Where people with disabilities may use site pedestrian routes, eg on occupied sites, special attention will need to be paid to ensure their safety by providing ramps for people in wheelchairs and tapping boards for the visually impaired.

14 In some circumstances it may not be reasonably practicable to achieve physical segregation between pedestrians and vehicles, eg during infrequent, short-duration, low-risk unloading operations. In such cases signallers and safe systems of work should be used to control vehicle and pedestrian movements. Systems of work should ensure that:

- drivers and signallers are in contact at all times;
- drivers and signallers understand the appropriate signals and site rules;
- the signaller controls the vehicle movements and gives clear warnings to pedestrians; and
- the signaller is in a safe place.

#### **Vehicle routes**

15 On site, establish vehicle routes which:

- are segregated from pedestrian routes;
- minimise the need for reversing operations with one-way systems and turning points;
- are adequate for the number, type and size of the largest vehicles that may use them;
- have firm surfaces, adequate drainage and safe profiles to allow safe vehicle movements;
- are kept clear of obstructions and other hazards;
- avoid steep gradients and tight bends where practicable;
- avoid hazards such as excavations, edges of structures, and fuel or chemical storage areas;
- have the minimum necessary number of junctions;
- are clearly signed with signposts and, where appropriate, road markings (eg on concrete or tarmac roads) showing the right of way etc;
- have speed limits and speed control measures specific to site conditions and the types of vehicles using the route, eg some lift trucks may be unsuitable for passing over road humps;
- keep site vehicles, delivery vehicles and private vehicles apart, where possible, by establishing private vehicle parking areas, specified delivery routes and storage areas.

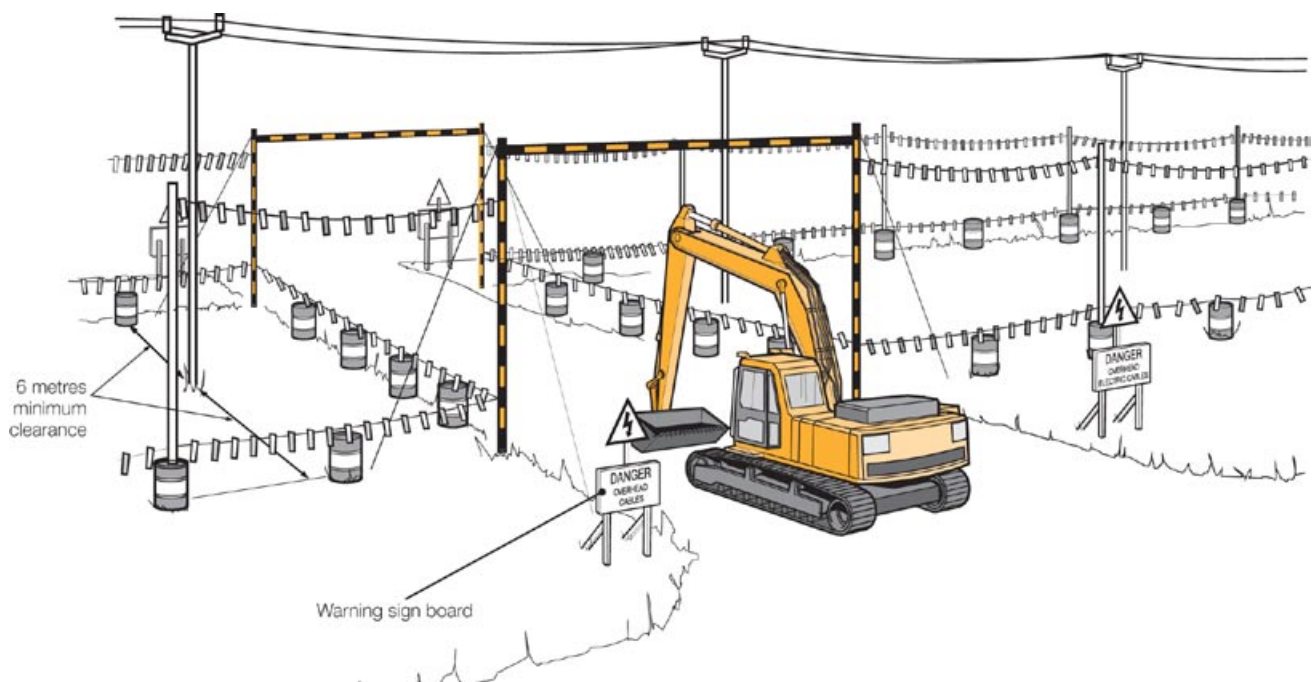
16 Primary vehicle routes should be established to handle the most common vehicle movements on site, eg deliveries and access to principal work areas. Primary vehicle routes should be located away from the main pedestrian routes, wherever possible. Where risks are high because of the number and nature of vehicle movements, control measures can include setting up different routes for different vehicle types and activities, eg for muck-away operations and materials delivery. Establish secondary vehicle routes to temporary work areas which ensure vehicle and pedestrian safety.



17 Where vehicle routes cannot avoid hazards to construction vehicle operations, measures should be taken to reduce and control the risks they present. Table 1 outlines examples of the control measures which can be applied to reduce the risks arising from common vehicle route hazards.

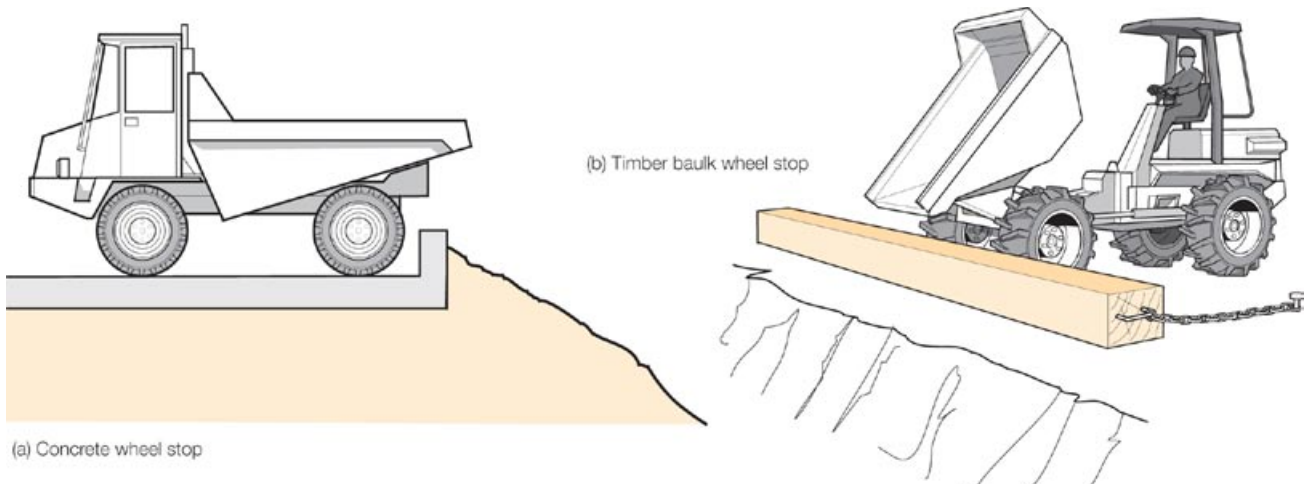
**Table 1** Control measures for establishing safe site vehicle routes

Common site vehicle route hazards	Control measures
Contaminated land and muddy sites	Establish primary routes which avoid hazardous areas and prevent vehicles becoming bogged down. Provide vehicle washdown facilities and road sweeping machines to maintain site transport routes (and the public highway) in a safe condition
Areas of restricted visibility, width, or weight limits	Prevent unsuitable vehicles using routes. Provide warning signs, visibility aids such as mirrors and suitable traffic control measures, eg traffic lights, passing points, or one-way systems
Temporary structures, liquefied petroleum gas (LPG) storage areas, areas of limited headroom, electric cables, pipelines etc	Provide physical protection and warning signs in all situations which have significant danger potential if struck by vehicles, eg safety barriers to protect LPG storage areas, and goalposts, bunting and barriers where there is a risk of overhead services and other hazards being struck by vehicles (see Figure 3)
Edges of roadways, excavations, pits, watercourses, spoil heaps etc	Provide physical barriers such as safety banks or stop blocks to restrain vehicles. Timber baulks and wheel stops should be fixed in position to avoid displacement (see Figure 4)



**Figure 3** Overhead cable protection on a vehicle traffic route

18 Signs should be provided to warn pedestrians and drivers of hazards, give instructions on safe work practices and indicate the correct routes to follow. Signs and road markings should be clear and follow the standard road traffic signs, and comply with the Health and Safety (Safety Signs and Signals) Regulations 1996.<sup>8</sup>



**Figure 4** Examples of vehicle restraints

### Loading and storage areas

19 Work on site should be planned to minimise vehicle movements, and to avoid unnecessary deliveries and the double handling of materials on site. The location of loading and storage areas needs to be carefully considered. Where there is little on-site storage space, off-site storage areas may be required for the temporary storage of materials. Loading and storage areas should:

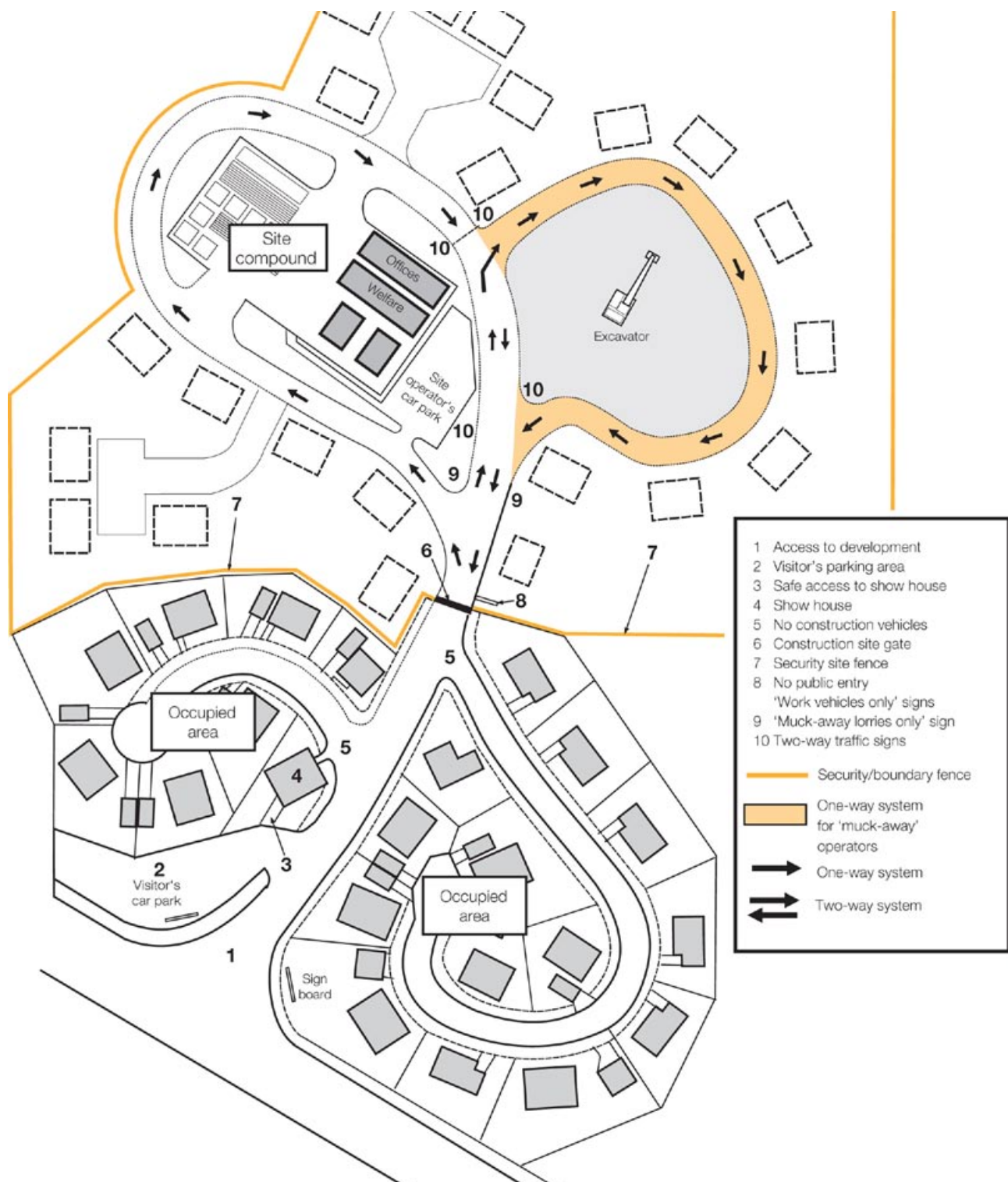
- be located away from pedestrian-only areas and main pedestrian routes;
- exclude pedestrians so far as reasonably practicable;
- have one-way systems and safe exit points;
- have sufficient room for vehicle movements; and
- have adequate fixed lighting, signs and appropriate visibility aids for drivers, eg convex mirrors positioned on corners.

### Public protection

**A young woman was killed when she was dragged from the upper deck of a bus by the bucket of an excavator which was loading a lorry at the side of the road. Both the contractor and the client (the local council) were successfully prosecuted.**

20 To prevent construction vehicle operations endangering the public, relevant precautions should be taken, depending on the nature of the site and work, including the provision of:

- suitable vehicles;
- appropriate pedestrian and vehicle traffic management systems;
- site fencing;
- signallers or security guards; and
- effective vehicle immobilisation systems and key custody procedures.



**Figure 5** Example of traffic routes on a housing development site (road markings omitted for clarity)

21 Where vehicles cross the public footway, measures need to be taken to protect members of the public and control their movement to ensure safety, eg by using barriers and a signaller. Drivers, particularly when working in public areas, should always remove the keys from the ignition when they park and leave their vehicles.

22 Where there are many pedestrians or vulnerable groups passing the site, eg close to schools, hospitals and major shopping centres, restrictions may have to be placed on traffic movements to and from site. Deliveries to site can be restricted to specific times to prevent congestion at peak times.

23 Site security measures should ensure unauthorised persons, especially children, do not have access to sites. *Protecting the public: Your next move*<sup>9</sup> provides specific guidance on the measures necessary to protect members of the public from construction activities.

**A 12-year-old boy was killed when a road roller he and his friends had started up on site at a weekend overturned onto him on a steep bank.**

24 Traffic routes on partially occupied housing sites require careful management to protect the public, particularly children, from construction vehicle operations (see Figure 5). The following measures can reduce the risks to the public on partially occupied sites:

- phase occupation of dwellings so that site traffic can be excluded from occupied areas;
- segregate public vehicle and pedestrian routes from site vehicle and site worker routes;
- provide safe places for public parking and safe access to show homes;
- provide relevant information for visitors on public safety; and
- update information to take account of any changes in traffic routes which may affect the visiting public and residents.

**Table 2** Summary of control measures to ensure safe site traffic routes

Description	Vehicle routes	Pedestrian routes
Site entrance and exit	Adequate sight lines, signs, maps, security and vehicle management procedures	Separate entrance point, signs, instructions
Parking areas	Separate site vehicle, delivery and worker parking areas. Provide temporary lorry parking/holding area by the site entrance to manage deliveries and allow vehicles to turn away from site if not allowed to enter site	Provide safe pedestrian routes from parking areas to offices, welfare facilities and workplaces  Provide clear signs and instructions to workers
Offices and welfare facilities	Locate offices and welfare facilities and other areas of frequent pedestrian activity away from primary site traffic routes  Provide signs and pedestrian and vehicle control measures where vehicle routes cross pedestrian routes	Provide safe pedestrian routes from parking areas to workplaces  Provide clear signs and instructions to pedestrians
Primary traffic routes	Primary traffic routes should allow the safe passage of site and delivery vehicles away from pedestrian routes  Establish one-way systems where possible	Establish primary pedestrian routes which provide safe access to work areas, away from main vehicle routes where reasonably practicable  Provide physical protection where pedestrians are at risk of being struck by vehicles or their loads  Establish crossing points and pedestrian control measures where necessary
Secondary traffic routes	Define safe routes for all vehicle operations on site	Provide protected pedestrian routes in areas where vehicles regularly pass
Storage areas and loading bays	Locate storage and loading areas away from areas of frequent pedestrian activity	Provide separate pedestrian access, clear signs and instructions to workers
Vehicle facilities	Locate vehicle washing areas, sheeting gantries and weighbridges off primary vehicle routes	Provide safe pedestrian access across vehicle routes to all places of work

### Information

25 All drivers and pedestrians entering a site need to be informed of any site transport hazards and relevant site rules, including the correct traffic routes to use. The amount and detail of information given needs to reflect the nature of site hazards. Information can be provided by:

- verbal instructions on arrival at site;
- site induction;
- issue of site maps to drivers;
- giving site-specific delivery instructions when ordering materials from suppliers; and

- displaying maps and site rules at site entrance points and elsewhere on site, eg in canteens and welfare facilities.

26 Any changes made to site traffic routes need to be communicated to site workers and visiting drivers. Workers and their safety representatives should be consulted on any changes which may significantly affect their health and safety. The information on transport management contained within the workplace transport plan will need to be updated as the project progresses and traffic routes and site rules change.

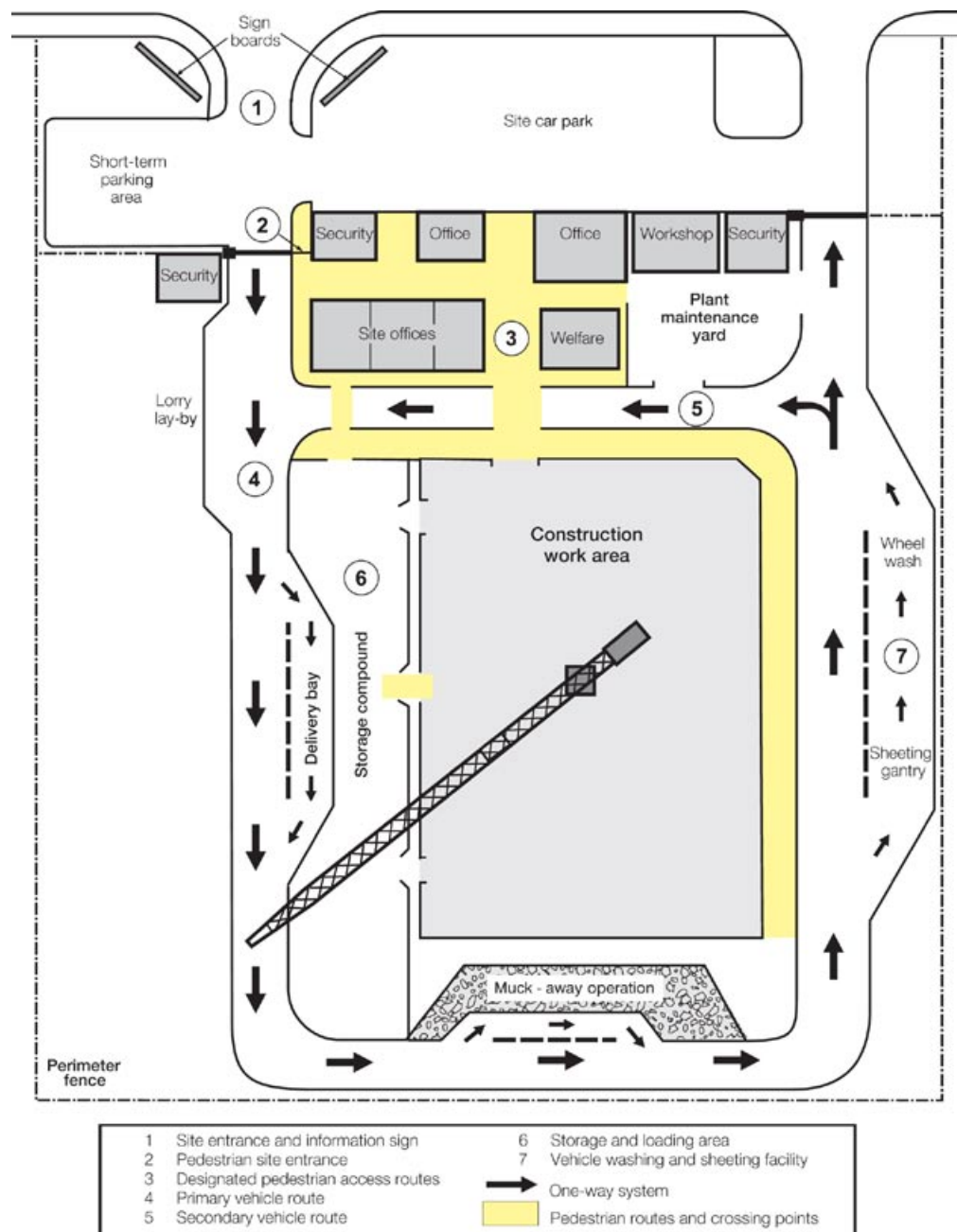


Figure 6 Example of site traffic route plan

# Safe vehicles

27 This section provides guidance on health and safety aspects of selecting and maintaining construction vehicles.

## Vehicle selection

28 The design of some vehicles presents hazards, such as restricted visibility and lack of driver protection from the effects of overturning, noise and vibration. Some old designs of site dumpers allowed the vehicle to be knocked easily into gear as the driver dismounted.

29 Choosing the right vehicle for the job is an essential part of effective vehicle management. The vehicle selected needs to be capable of performing its designated tasks safely. The following are important factors to consider:

- stability under all foreseeable operating conditions;
- safe access to and from the cab and other working locations on the vehicle;
- effective braking systems;
- adequate visibility for the driver all around the vehicle;
- headlights, a horn, windscreen wipers and warning devices, eg reversing alarms;
- physical guards to protect dangerous parts such as power take-off shafts, chain drives, trapping points and exposed exhaust pipes;
- protection for the driver from work hazards, eg working at height and falling from the vehicle, falling objects and the effects of the vehicle overturning; and
- protection for the driver from the weather, noise, vibration, noxious fumes and dusts.

30 Manufacturers' specifications need to be considered when choosing vehicles for construction and civil engineering work. In particular, load and stability limits need to be taken into account when choosing vehicles for use on uneven and sloping ground. Some vehicles, especially those involved in lifting operations (such as some lift trucks and telescopic handlers) require flat, compacted surfaces to operate safely.

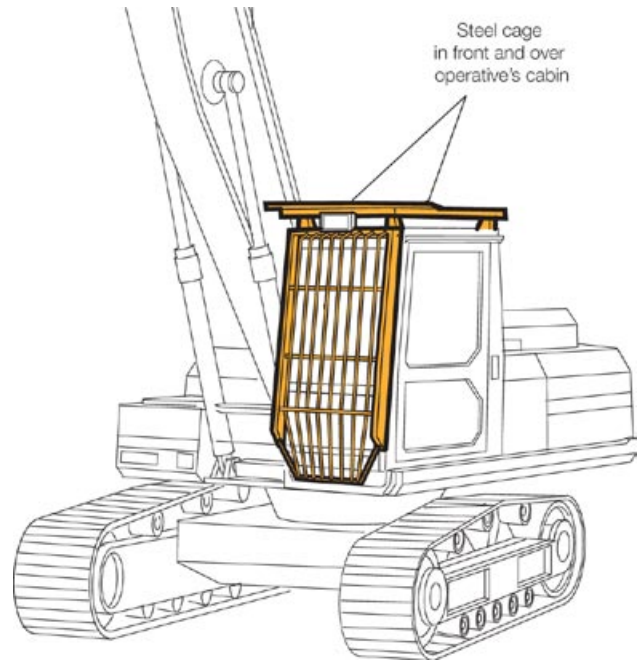
31 Effective braking systems, including parking brakes, are essential for the safe use of vehicles. Parking brakes should be fitted on trailers over 0.75 t maximum gross capacity. Where parking brakes are not fitted, trailer wheels need to be chained or locked to prevent movement when the trailer is parked. Wheel chocks should be used to prevent unintended vehicle and trailer movements when parked on sloping ground. Trailers with maximum gross weights between 0.75 t and 3.5 t should have at least an overrun brake (ie an inertia brake), while trailers over 3.5 t should be fitted with braking systems linked to the towing unit.

32 Where the risk of vehicles overturning is significant, eg dumpers used on sloping ground, vehicles should be fitted with roll-over protective structures (ROPS) (see Figure 7). Where there is a significant risk of falling materials endangering the driver, eg excavators used in demolition work, vehicles should be fitted with falling-object protective structures (FOPS) (see Figure 8).

33 Adequate visibility for the driver is a key factor in the safe use of vehicles on site. Adequate visibility from the driving position is judged on the basis of risk and the state-of-the-art technology. Visibility aids such as closed-circuit television (CCTV) and convex mirrors should be fitted to vehicles to overcome significant blind spots along the sides and at the rear of large vehicles, particularly where pedestrians are at risk (see Figures 9 and 10).



**Figure 7** Site dumper with ROPS

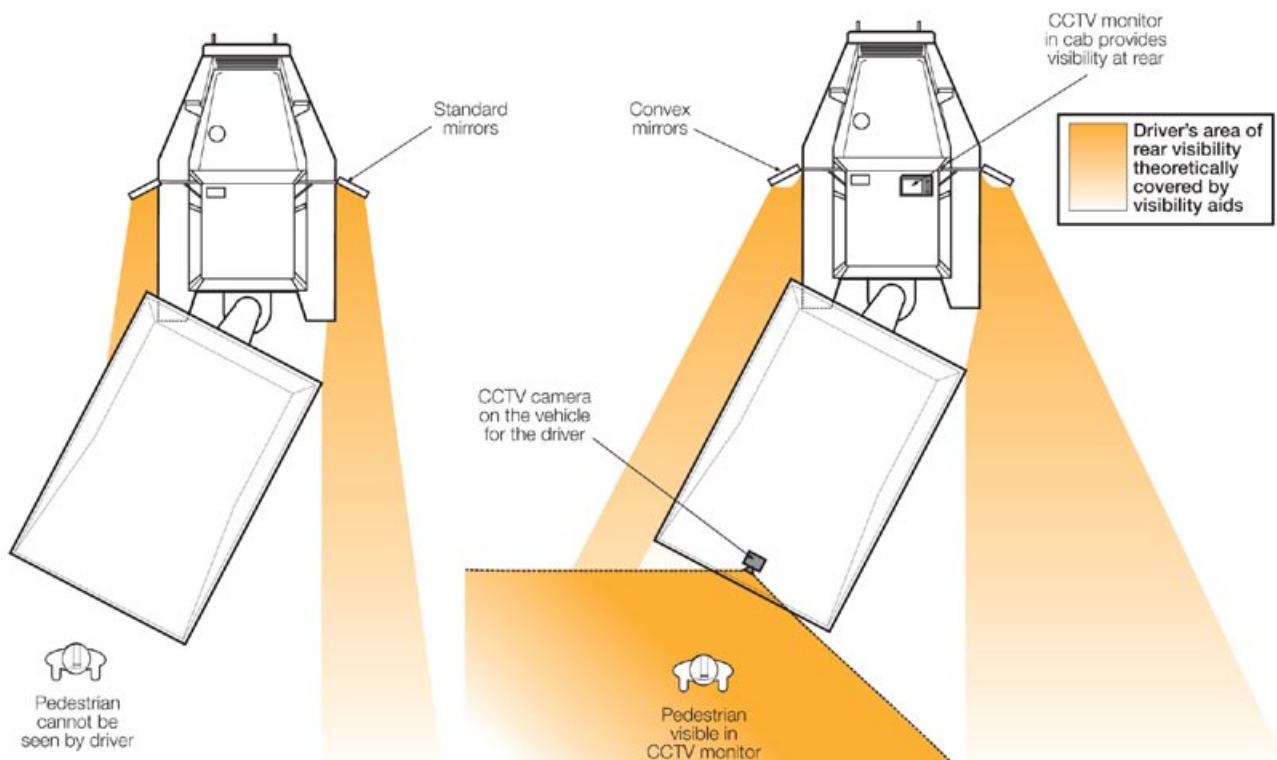


**Figure 8** A 360° excavator with FOPS



**Figure 9** Photo montage of large dumper truck fitted with CCTV and mirrors to improve visibility from the driving position





**Figure 10** Plan view of visibility alongside and at rear of a large articulated vehicle

### Vehicle inspection and maintenance

34 Construction vehicles work in harsh environments and require effective maintenance regimes to avoid them developing defects. A programme of daily visual checks, regular inspections and servicing schedules should be established according to the manufacturer's instructions and the risks associated with the use of each vehicle.

**A worker was crushed to death by a vehicle which ran away down a slope because the parking brake failed.**

35 Plant hire companies need to provide information with all plant and equipment they supply to enable it to be used and maintained safely. Contractual arrangements between user and hirer should set out who is responsible for maintenance and inspection during the hire period and these should be made clear to all parties.

36 Vehicles should have a maintenance log to help manage and record vehicle maintenance operations. Employers should establish procedures designed to encourage drivers to report defects or problems, and ensure that problems with vehicles are put right. Planned inspection and maintenance needs to follow manufacturer's instructions and include, where appropriate:

- braking systems;
- seat belts;
- tyres, including condition and pressures;
- steering;
- convex mirrors, CCTV and other visibility aids;
- lights and indicators;
- safety devices such as interlocks;
- warning signals;

- windscreen washers and wipers;
- firefighting equipment;
- condition of cab protection devices, eg ROPS and FOPS;
- functional checks on the vehicle, including controls and starting systems;
- correct location of guards and panels on the vehicle; and
- other accessories, such as quick couplers and (if applicable) their locating pins, are correctly fitted and in place.

## Safe driving and work practices

37 This section gives advice on safe work practices. It contains guidance on managing the risks arising from the use of vehicles, including reversing, loading and vehicle signalling. It briefly covers safe work practices relating to specific types of construction vehicles, but in all cases the manufacturer's guidance on safe use should be followed.

38 The main duty to manage transport risks on site rests with the principal contractor. However, subcontractors, drivers and signallers all need to follow safe working practices. All employers need to carefully select, train and supervise drivers and signallers, and monitor working practices.

### Reversing

***A site supervisor was killed by a reversing lorry as he stooped down at the edge of a roadway. No turning area was provided on site so lorries had to reverse long distances down the primary site vehicle route. The lorry did not have any devices to overcome visibility blind spots from the driving position, nor was a signaller used to guide the driver, nor was a reversing alarm fitted.***

39 Vehicle reversing operations cause a third of all fatal transport accidents in the construction industry, producing an average of five deaths and 20 major injuries per year. The most effective way of managing the risks from reversing is to avoid the need for reversing manoeuvres by providing one-way systems, turning areas and drive-through loading and unloading areas.

40 When planning and controlling site vehicle operations, the hierarchy of control measures for reversing operations, detailed in Table 3, should be followed. Vehicles required to reverse on site should provide adequate visibility around the vehicle for the driver to ensure safety. Safe systems of work need to be devised and followed for all reversing operations, particularly when signallers are used to control third-party risks or assist in the accurate positioning of the vehicle. Warning systems offer the lowest level of protection in the hierarchy and, if they are the only precaution used, are only appropriate for low-risk situations.

<p><b>1 Eliminate need to reverse</b></p>	<p>Implement one-way systems around site and in loading and unloading areas</p> <p>Provide designated turning areas</p>
<p><b>2 Reduce reversing operations</b></p>	<p>Reduce the number of vehicle movements as far as possible</p> <p>Instruct drivers not to reverse, unless absolutely necessary</p>
<p><b>3 Segregate vehicles and pedestrians</b></p>	<p>Design vehicle reversing areas which:</p> <ul style="list-style-type: none"> <li>■ allow adequate space for vehicles to manoeuvre safely</li> <li>■ exclude pedestrians; and</li> <li>■ are clearly signed to have physical stops or buffers to warn drivers that they have reached the limit of the safe reversing area</li> </ul>
<p><b>4 Ensure safe systems of work are followed</b></p>	<p>Fit CCTV, convex mirrors, Fresnel lens etc to overcome restrictions to visibility from the driver's seat, particularly at the sides and rear of vehicles</p> <p>Fit radar proximity devices to vehicles to indicate to drivers when there are objects near the vehicle</p> <p>Ensure everyone on site understands site rules on vehicle safety</p> <p>Drivers and signallers need to be in constant communication during reversing operations</p> <p>Signallers should not be put at risk from vehicle movements, eg by standing directly behind reversing vehicles</p> <p>Ensure all vehicles on site are fitted with appropriate warning devices</p>
<p><b>5 Provide warnings when vehicles are reversing</b></p>	<p>Ensure reversing warning lights and alarms are in good working order and instruct workers to keep clear of moving vehicles</p>

**Table 3** Hierarchy of control measures for reversing operations

### Loading of vehicles

41 Load and unload vehicles at level ground, in areas away from passing traffic, pedestrians and overhead hazards, eg bridges, pipelines or electrical cables. Loads need to be:

- of suitable height and width for the vehicle and road conditions on site;
- secured to prevent movement;
- evenly loaded and distributed to keep the centre of gravity as low as possible and to prevent stresses on vehicle structures;
- positioned on vehicles and transported so that they do not adversely affect vehicle stability; and
- checked to ensure they will not fall uncontrollably when restraints are removed during unloading.

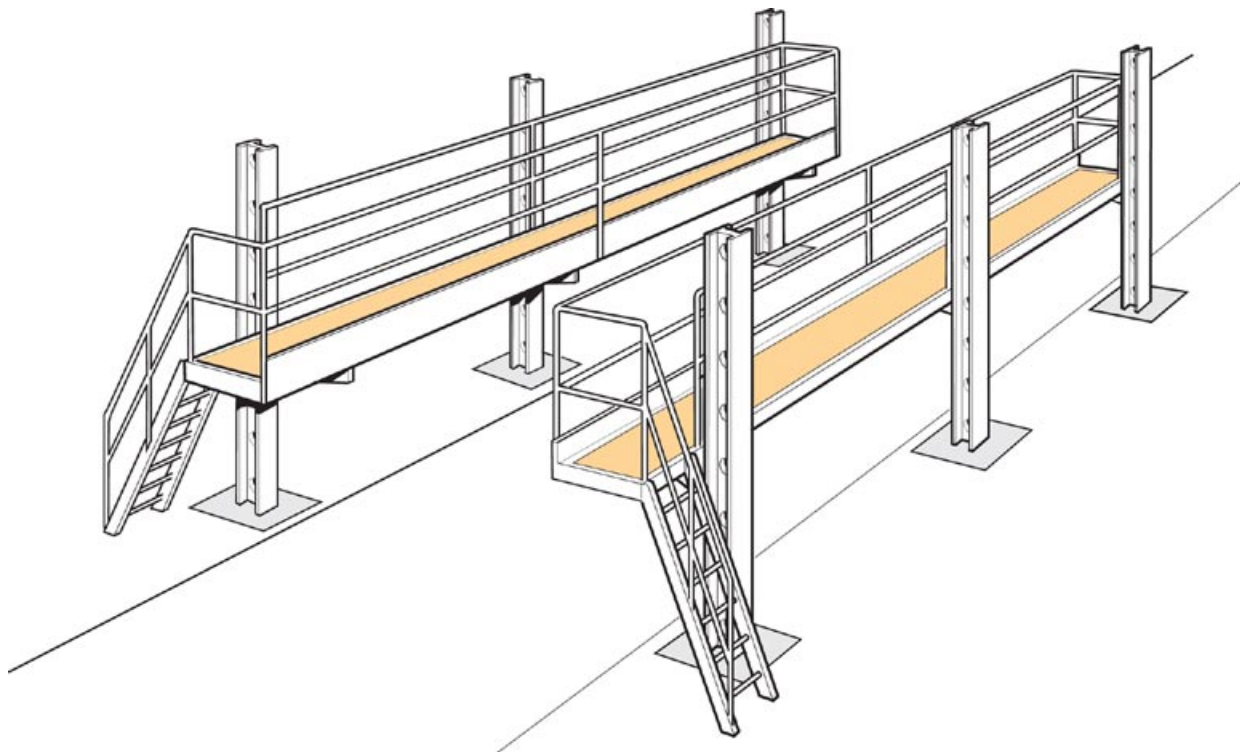
42 No vehicle should be loaded beyond its safe working capacity. Loads which project out from the body of the vehicle should be indicated by a warning flag or sign.

43 Gantries which fit closely to the vehicle can provide safe means of access for workers during the manual sheeting of wagons. They are particularly appropriate for regular sheeting operations on similar vehicles.

44 The precautions necessary for managing the risks presented by hazardous loads when transported by road need to be followed on site and supplemented as necessary in relation to site risks, eg lorries carrying LPG cylinders should not be parked near scaffolds where there is a risk of falling objects striking them. Site rules should require visiting drivers to inform site management of any hazardous loads on their vehicles. Appropriate fire precautions need to be instituted for loads which contain substances with specific fire hazards, eg fuels and solvents. Information about the hazards of dangerous loads and necessary precautions in the event of an accident should be issued to all site drivers.

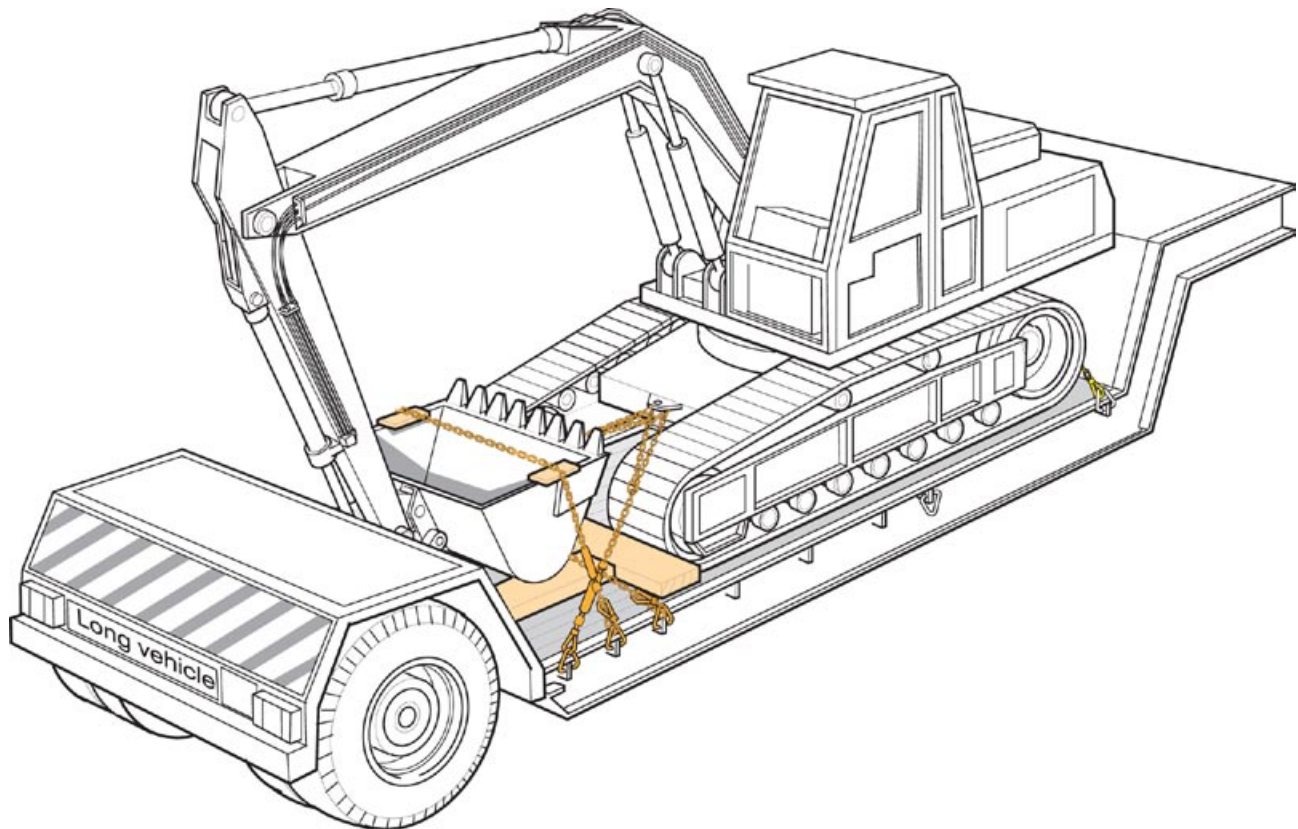
45 Where vehicles are transported on site on low-loaders, they should be:

- dismantled so far as possible to keep them within the dimensions of the carrying vehicle;
- emptied of fuel, so far as possible;
- relieved of hydraulic pressure by moving all control levers through all positions, twice, before transportation; and
- secured and restrained to prevent movement (see Figure 12), with their parking brake applied and wheels and rollers chocked. Moveable assemblies, such as jibs, dismantled parts and ancillary equipment, need to be secured following the manufacturer's recommendations.



**Figure 11** Sheeting gantry providing safe access for sheeting vehicles

46 Loading and offloading areas should be of sufficient size to allow vehicles to move, without striking obstructions or causing hazards to others. Access ramps used for getting vehicles on and off low-loaders should be of adequate strength and size.



**Figure 12** Excavator  
secured for transportation

### Drivers

**Following an accident in which an untrained and inexperienced driver was killed when the dumper he was driving overturned, a company was fined £150 000.**

47 Many accidents are the result of untrained or inexperienced workers driving construction vehicles. Employers need to ensure that all drivers are competent to perform the work they are given.

48 Driver competence may be judged on the basis of experience, recognised training and testing of knowledge and ability. Certificates of training from recognised training schemes help demonstrate competence. Driver training records should be kept up to date.

**HSE investigations showed that in one-third of accidents involving site dumpers the drivers had little experience and no training. Less than half of their employers had made checks on driver competence.**

49 The following points need to be considered when selecting people to drive construction vehicles:

- drivers should be competent in the safe operation of the vehicles and their daily maintenance checks;
- training certificates should be checked for validity;
- training alone is not competence and you should ensure that the operator has enough experience on the class of the machine to operate it safely, and enough time to familiarise themselves with a new machine, if appropriate;

- caution should be exercised with drivers who may be unfamiliar with the hazards of construction sites, including trainees and new staff; and
- no one unfit to drive through the influence of alcohol or drugs should be permitted to drive any vehicle.

**A site worker was killed when he tried to drive an excavator. The worker had no experience of operating the excavator. He lost control of the vehicle and it overturned on a slope into an excavation. Proper supervision and training could have saved his life.**

50 Drivers should ensure that they are familiar with the use of all the additional attachments on the machinery that they are operating, such as lifting points and quick hitches on excavators, as these may vary.

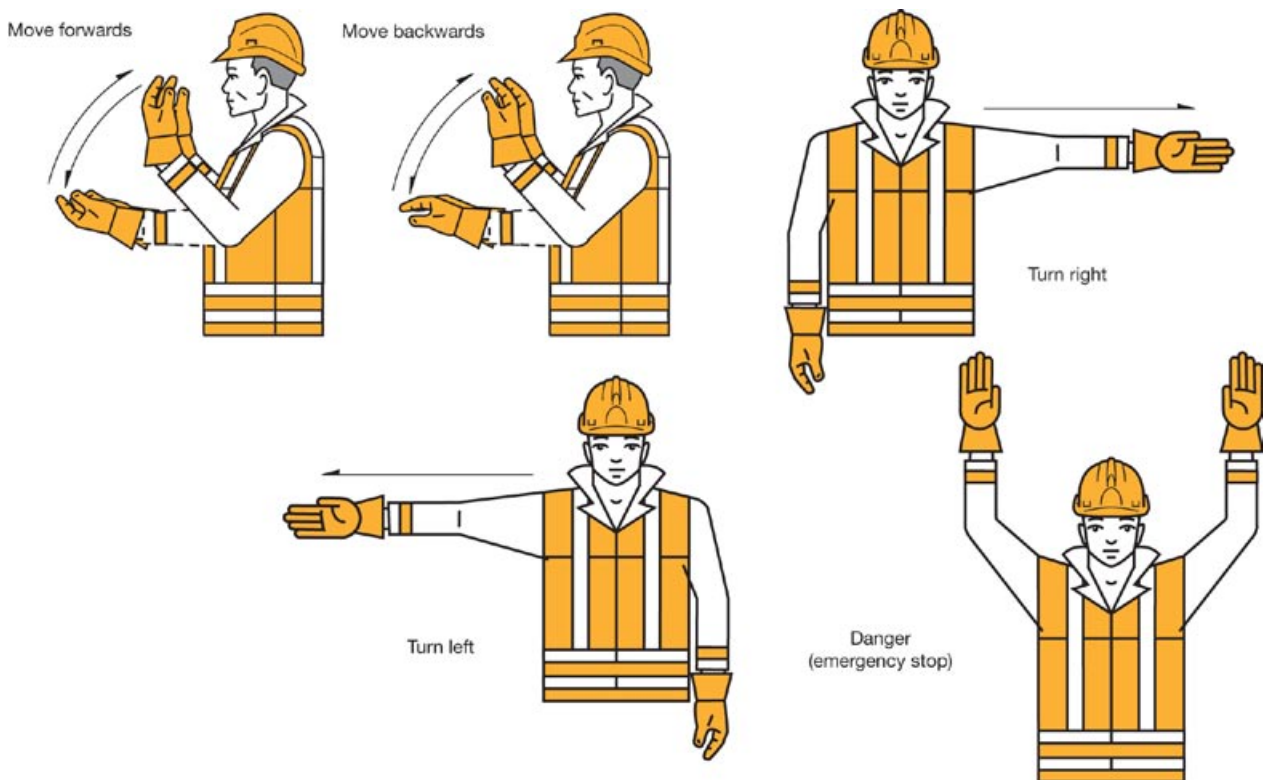
51 Drivers should be aware of their own responsibilities and avoid taking risks and short cuts. A summary of driver safe work practices is contained in Table 4.

**Table 4** Drivers' safe work practices checklist

- Only operate vehicles if you are competent and authorised to drive them
- Do not drive when your abilities are impaired by ill health, poor vision, prescribed or illegal drugs, or alcohol
- Make sure you fully understand the operating procedures of the vehicles you control and all of the accessories you are using
- Know the site emergency procedures
- Understand the system of signals used on site
- Visiting drivers: seek appropriate authority to enter the site and operate vehicles
- Know the safe operating limitations of your vehicle, particularly relating to safe maximum loads and gradients
- Carry out daily checks on your vehicles and report all defects immediately to supervisors
- Follow site procedures and comply with all site rules
- Do not drive at excessive speeds
- Follow established site traffic routes
- Ensure that windows and mirrors are kept clean and clear
- Keep the vehicle tidy and free from items which may hinder the operation of vehicle controls
- Do not allow passengers to ride on vehicles unless safe seating is provided
- Park vehicles on flat ground wherever possible, with the engine switched off, the handbrake and trailer brake applied, and where necessary use wheel chocks
- Do not reverse without checking behind the vehicle for pedestrians, vehicles or obstructions
- Where visibility from the driving position is restricted, use visibility aids or a signaller. Stop if you lose sight of the signaller or the visibility aid becomes defective
- Do not remain on vehicles during loading operations, unless the driver's position is adequately protected
- Ensure loads are safe to transport
- Do not attempt to get on or off moving vehicles
- Do not make adjustments with the engine running and guards removed
- Do not smoke during refuelling operations

## Signallers

52 Signallers used to direct pedestrian and vehicle movements need to be competent in the methods used to ensure their own and other people's safety (see Figure 13). Safe systems of work need to be provided to prevent signallers being struck by vehicles. The provision of refuges, observation positions, control rooms, radio communications and CCTV systems can help remove signallers from areas of vehicle movement. Signallers should be authorised by site management and easily distinguished on site by the use of colour-coded helmets, clearly labelled high-visibility jackets etc. A checklist of safe work practices for signallers is provided in Table 5.



**Figure 13** Signals to drivers

**Table 5** Signallers' safe work practices checklist

- Ensure you know and understand relevant safety procedures and correct signalling systems
- Ensure drivers understand the correct signalling systems
- Signal instructions clearly
- Ensure you are visible to the driver and the driver is visible to you; if not, stop the vehicle moving
- Stand in a safe location at all times
- Warn pedestrians and make sure they are kept away from vehicle operations
- Wear appropriate protective equipment, including high-visibility clothing
- Report work hazards to supervisors
- Make sure you can get to and from your work location safely
- Do not ride on the vehicle you are directing unless you are in a designated safe position
- Do not direct vehicles if your ability is affected by alcohol or drugs

### Safe working practices for specific vehicles

53 Paragraphs 54–66 provide brief details of safe work practices for several types of common construction vehicles. Before using any vehicle for the first time, drivers should refer to the manufacturer’s instructions for safe use.

#### Site dumpers

**A worker was crushed against a wall by a runaway dumper. The dumper driver left the engine running and knocked the gear lever as he got off, causing the dumper to run away.**

54 Site dumpers are involved in many fatal and major accidents in the construction industry resulting from:

- using site dumpers on gradients beyond their safe working capacity; overturning is one of the most common accidents on site;
- inexperienced and untrained drivers operating site dumpers;
- inadequate maintenance of braking systems;
- carrying passengers in unsafe positions; and
- failing to provide stop blocks at the edges of excavations and spoil heaps (see Figure 14).



**Figure 14** Small site dumper fallen into excavation due to lack of wheel stops

**A security guard was killed when crushed between a dumper and another vehicle. The dumper driver had left the engine running and knocked it into gear as he got off, causing it to lurch forward.**

55 The precautions necessary to ensure the safe use of site dumpers are contained in Table 6.



**Table 6** Safe use of site dumpers checklist

- Do not drive on gradients in excess of those safe for the dumper (see manufacturer's instructions)
- Allow only competent people to drive site dumpers
- Provide wheel stops at the edges of excavations, pits, spoil heaps etc to prevent site dumpers falling when tipping. The blocks provided need to be positioned a sufficient distance away from any unsupported edges and slopes to prevent the weight of the vehicle causing collapse
- Provide purpose-built platforms for regularly transported items, eg large drums
- Implement safe systems of work at all times and monitor their effectiveness
- Do not operate the site dumper's controls unless seated on the driving seat
- Do not carry passengers unless purpose-built seats are provided
- Manoeuvre carefully on sloping ground
- Drive at appropriate speeds for site conditions
- Load on flat ground with brakes applied
- Get off the dumper when it is being loaded
- Ensure loads are distributed evenly and do not let them obscure your vision
- Securely fix loads which may cause danger if they move
- Stop the vehicle, take it out of gear and apply the parking brake before tipping loads
- Do not drive around with the skip in the vertical discharge position
- Use the appropriate towing pins (not bent pieces of reinforcement bar)
- Do not leave the engine running when you leave the vehicle
- Be aware of the differences in performance of site dumpers when loaded and unloaded, particularly speed, braking, and stability on slopes
- Be aware of the different handling and braking characteristics of the vehicle in wet or icy conditions
- Do not alter tyre pressures outside the manufacturer's specifications
- When using a starting handle ensure:
  - neutral gear is selected and the handbrake is firmly applied, and the area is clear of obstructions
  - the starting-handle is the correct type and in good condition with a handle grip which rotates freely
  - your thumb is kept on top of the grip of the handle to prevent injury in case of kickback

***Lift trucks and telescopic handlers***

56 Materials handling vehicles are at risk of overturning when:

- overloaded;
- working on sloping, uneven or unstable ground;
- driving with raised loads; and
- driving at excessive speed around corners.

57 Telehandler visibility to the rear may present a significant hazard. This may be remedied by fitting additional visibility aids. Similarly, when in operation with the boom raised and other configurations, there may be a significant 'blind spot' to the front right-hand side of the vehicle. Both of these hazards should be identified within a risk assessment and suitable control measures should be put in place.

58 These types of vehicle normally require prepared, flat, graded surfaces to operate safely. Even rough-terrain lift trucks have strict operational limits which need to be observed. Contractors should limit the use of these machines to competent drivers in safe environments.

### Excavators

**A ground worker was killed while standing in the blind spot of a reversing excavator.**

59 Excavators are involved in many accidents. They commonly occur when excavators slew around, reverse and move around site. To prevent such accidents:

- excavators should be equipped with adequate visibility aids to ensure drivers can see areas where people may be at risk from the operation of the machine;
- people should be kept away from the areas of excavator operation by the provision of suitable barriers;
- a signaller should be provided and in a safe position to direct the excavator's operation and any pedestrian movements; and
- a clearance of over 0.5 m needs to be maintained between any part of the machine, particularly the ballast weight, and the nearest obstruction.

60 Accidents commonly occur during reversing and digging operations. If pedestrians are liable to approach temporary work areas, bunting or fencing or other appropriate means need to be used to create and maintain a pedestrian exclusion area. Plan work to include the appropriate use of competent signallers to control third-party risks and to help the driver to accurately position the machine. At sites where space is limited, eg the loading of muck-away vehicles near the public highway, sufficient room and appropriate traffic management systems should be provided to allow excavators to operate safely.

61 To prevent excavators overturning on sloping ground, create level work areas and carefully control the swing of the bucket downhill. All earth-moving vehicles should be parked with their buckets, blades etc lowered to the ground.

### Tipper lorries and lorry loaders

62 Rear-tipping lorries can overturn during tipping operations. On unmade or uneven ground, tipper-trucks of Stability Category A or equivalent should be used. To prevent overturning:

- always tip on firm level ground;
- never tip on a slope;
- never tip during high winds;
- ensure the load is evenly distributed in the body of the truck;
- for articulated vehicles, ensure that the tractor is in line with the trailer body;
- ensure a competent signaller is on hand to supervise tipping operations;
- tip the load gradually so that it is discharged in a controlled manner; and
- watch out for loads sticking, which could cause instability during tipping.

63 Visibility from the driving position during reversing operations can be improved by fitting visibility aids such as convex mirrors and CCTV. Warning devices, eg alarms and lights, should operate when lorries and lorry loaders are reversing.

64 During maintenance operations under tipper-lorry bodies or cabs, proprietary props designed to withstand the lowering forces should be used to secure them in the raised position and prevent their collapse.

65 Lorry loaders should be operated on firm, level ground with their stabilisers fully extended and the parking brake applied when loading and offloading.

On soft or uneven surfaces, suitable packing should be used under stabiliser feet to spread the load and prevent movement, in accordance with the manufacturer's instructions.

66 Lorry drivers should only stay in their cabs during loading operations if it is safe for them to do so, eg when loose pea gravel is being loaded, rather than when demolition debris is being loaded. The safety of tipper-lorry cabs is increased when there is an extension of the tipper body over the cab.

#### **Delivery lorries and goods vehicles**

67 A large proportion of accidents that occur on construction sites involve the delivery of plant and material to site. Statistics show that the most common causes of accidents involving goods vehicles are:

- being struck by a moving vehicle;
- falling from vehicles while getting in and out of the truck or during loading/unloading operations; and
- materials falling from vehicles during the unloading process, due to load movement during transit to site.

68 To control the risks caused by these hazards, the following steps should be taken:

- the site should be designed and laid out, so far as is reasonably practicable, to ensure that people and vehicles cannot come into contact with each other through physical segregation. Physical segregation involves using barriers to keep pedestrians away from manoeuvring vehicles;
- adequate means of access and egress to the vehicle should be provided. This is not only important for the driver getting in and out of the cab but also to anyone accessing the vehicle bed to load/unload goods;
- refuse to accept uneven loads or loads that have moved significantly: competent logistics operators will only send appropriately strapped loads.

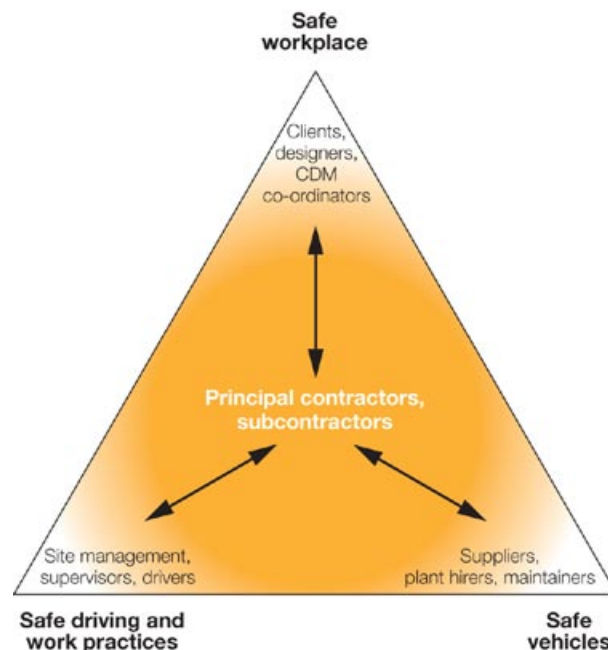
## **Managing construction transport**

69 This section examines different dutyholders' roles in managing construction vehicle safety using the framework of the Construction (Design and Management) Regulations 2007 (CDM).<sup>4</sup>

70 The earlier in the life of a project that health and safety issues are considered, the greater the potential for accident prevention. *Successful health and safety management*<sup>10</sup> details the principal requirements for effective health and safety management which include setting policy, organising staff, planning and setting standards, measuring performance and learning from experience. Key elements of successful health and safety management include:

- senior management's commitment;
- clear objectives;
- competent and trained personnel;
- effective work planning, including risk assessment;
- positive implementation in the workplace; and
- checking and reviewing performance.

71 Figure 15 indicates how those involved with construction projects can influence site transport safety. The role of the principal contractor and subcontractors is central but all others can contribute to the provision and maintenance of safe workplaces, safe vehicles, safe driving and safe work practices.



**Figure 15** Responsibilities for ensuring site vehicle operations

### Clients

72 Clients need to ensure that those they appoint are competent to manage transport-related risks. Clients should consider, in particular, candidates':

- previous experience and understanding of logistics, such as booking time slots for deliveries, off-site waiting areas where appropriate etc and past performance in this area;
- health and safety management systems; and
- systems for assessing the competence of their appointees.

73 CDM requires the client to provide relevant health and safety information with the pre-construction information. Where the project is notifiable, the client should provide the CDM co-ordinator with this information. Transport-related information could include:

- the extent of site occupation by those not involved in construction work;
- anticipated vehicle and pedestrian traffic movements, including deliveries;
- speed, height, width and parking restrictions;
- requirements for safe public and emergency vehicle access;
- exclusion zones, routes, crossings, traffic calming measures and designated car parks;
- restrictions on working times or temporary diversions during peak traffic hours;
- location of gas and electricity services, adjacent railways etc; and
- hazardous ground features, eg contaminated landfill areas, burial grounds, underground streams, surface watercourses etc.

## Designers

74 Designers need to examine, assess and reduce the risks associated with their designs. Considering the following measures at the design stage can assist safe site vehicle operations:

- allowing space around structures and site boundaries for safe traffic movement;
- designing one-way systems and drive-through areas to reduce the need for reversing;
- removing hazardous gradients and embankments;
- specifying suitable profiles, surfaces and traffic management for site roads, and the early installation of permanent roads with safe site access to and from the public highway;
- considering how site traffic routes can avoid hazards such as overhead electricity lines, railway lines etc and how routes need to change as work progresses on site;
- indicating the maximum loading limits of floors used by vehicles, particularly during construction, demolition and refurbishment;
- relocating or protecting vulnerable services such as gas pipes and electricity cables; and
- passing on information on any features of the design presenting significant transport risks to other project team members as necessary, including significant risks during future construction work or maintenance.

75 Designers responsibilities extend beyond the construction phase of the project. They also need to consider health and safety aspects for the users of the workplace in accordance with the Workplace (Health, Safety and Welfare) Regulations 1992.

***Designers of a large inner-city office block designed the ground floor slab to accommodate site traffic operations, including deliveries and muck-away operations. Benefits from this design included safe vehicle operations, improved site productivity and the prevention of local traffic congestion.***

## CDM co-ordinators

76 CDM co-ordinators should ensure project designs take account of the issues in paragraphs 73 and 74, and that there is pre-construction information on specific transport risks. Pre-construction information may also include such things as:

- the need for crash decks for works over railways;
- phasing works to minimise risk to the public; and
- local or statutory authority restrictions, eg in relation to access on and off the public highway.

## Principal contractors

77 Principal contractors should ensure the safe management of pedestrian and vehicle movements on site. Key tasks for principal contractors include:

- provide relevant information from the construction phase plan to contractors to allow them to adequately plan their work and identify safe systems of work and prepare method statements;
- planning, managing and monitoring transport activities including establishing site rules and giving reasonable directions to contractors;

- implementing systems of work which ensure that pedestrians and vehicles are kept apart as far as possible;
- ensuring subcontractors make adequate provision for the selection and supervision of drivers and general vehicle safety;
- making specific reference to vehicle safety in the construction phase plan, including traffic and pedestrian routes, vehicle access and site rules;
- setting standards for driver competence, vehicle safety and maintenance, and maintaining a site register of authorised drivers;
- ensuring co-ordination and co-operation between contractors;
- co-ordinating the views of safety representatives and workers;
- ensuring all workers receive site induction training covering safe traffic routes and site rules for operating vehicles;
- establishing safety monitoring procedures for the use of vehicles on site, eg checking vehicle maintenance, key custody and permit-to-work systems, drivers' work practices and the use of high-visibility clothing; and
- reviewing the health and safety performance of everyone on site.

**A principal contractor put into place site traffic management systems which set standards for all vehicles entering site, established one-way traffic routes, and required the production of adequate risk assessments, method statements and proof of employee competence, before any work was allowed to start. The accident rate for the project was significantly less than the construction industry average.**

78 Compliance with site rules needs to be monitored and positive action taken when they are breached. Appropriate disciplinary action may be necessary against contractors and individuals who ignore them.

### Contractors

79 Contractors should assess and minimise the transport risks associated with their work, institute safe systems of work, and follow the site rules, and the guidance applicable to them in paragraph 77.

**Remember:**

Construction vehicles can kill!  
Construction vehicle accidents are preventable by effective management.

80 To prevent death and injury ensure that you have:

- a safe workplace;
- safe vehicles; and
- safe driving and work practices.

# Appendix 1 Construction vehicle accident statistics

1 Struck-by accidents involving construction vehicles between 2003/04 and 2007/08 resulted in 47 deaths and 361 major injuries. Every year, construction vehicles striking workers and members of the public cause, on average:

- ten deaths; and
- around 150 injuries.

2 Construction transport accidents occur throughout the industry, including during loading and unloading operations, material movements, groundworks and roadworks. Roadworks account for the largest portion of struck-by accidents in construction followed by groundworks and loading operations (see Table 7).

3 The most common types of accident involve manoeuvring vehicles on site, especially with telehandlers, dumpers, excavators and goods vehicles. These four types of vehicle account for, on average, eight deaths and over 100 accidents every year.

**Table 7** Construction vehicle accidents by activity

Activity	Totals 2003/04–2007/08(p)		
	Fatal	Major	Over 3 day
Groundworks	5	39	38
Loading and unloading	3	35	37
Road construction works	12	84	91
Plant hire	5	38	24
Movement of materials	2	8	12
Finishing works	1	33	27

**Remember:**

Construction vehicle accidents are preventable. Prevention requires effective planning, organisation, control, monitoring and review of vehicle operations.

**Table 8** Construction vehicle accidents by type of vehicle

Type of vehicle	Totals 2003/04–2007/08(p)		
	Fatal	Major	Over 3 day
Small site dumpers and dumper trucks	9	77	45
Excavators	9	63	52
Road-making vehicles	1	6	14
Goods vehicles	6	68	86
Lift trucks	12	110	94
Private vehicles	10	37	68

(p) = provisional

### Costs of accidents

4 In addition to the personal distress caused by accidents, the cost of accidents includes material damage, plant damage, building damage, legal costs, fines, emergency supply costs, production delays, investigation time, clerical costs etc.

**In a study of a supermarket construction project, most of the costs incurred as a result of accidents were not recoverable. The ratio of insured to uninsured costs incurred by the main contractor was 1:11. On this project, even the costs of minor vehicle accidents, eg where vehicles hit or ran over property, and where lift trucks dropped their loads, cost the contractor over £3000 during the course of the project. The total cost of all accidents on this project was equivalent to 8% of the tender price.**

5 As well as the human and material losses produced, accidents can lead to low morale and reduced opportunities for tendering for work.



## Appendix 2 Legislation and the safe use of vehicles in construction

**Table 9** Principal legal requirements applicable to the safe use of vehicles in the construction industry

1 Table 9 gives details of the principal legal requirements applicable to the safe use of vehicles in the construction industry.

<p><b>Health and Safety at Work etc Act 1974</b></p>	<p>The HSW Act requires:</p> <ul style="list-style-type: none"> <li>■ employers and self-employed workers to ensure they provide and maintain workplaces, equipment and systems of work that are, so far as is reasonably practicable, safe to workers and the public;</li> <li>■ designers and suppliers to ensure their products may be used safely;</li> <li>■ employees to take care of their own and others' health and safety.</li> </ul>
<p><b>Management of Health and Safety at Work Regulations 1999</b></p>	<p>The Management Regulations require employers and self-employed workers to:</p> <ul style="list-style-type: none"> <li>■ identify the measures they need to take by carrying out risk assessments;</li> <li>■ institute safety management systems;</li> <li>■ appoint competent persons to assist in health and safety management;</li> <li>■ ensure co-ordination and co-operation;</li> <li>■ formulate emergency procedures;</li> <li>■ provide information and relevant training to employees.</li> </ul>
<p><b>Construction (Design and Management) Regulations 2007</b></p>	<p>CDM applies to all stages of a construction project and places duties upon clients, designers and contractors. The Regulations aim to ensure:</p> <ul style="list-style-type: none"> <li>■ selection of competent appointees and provision of adequate resources;</li> <li>■ reduction of risk at the design and planning stages of a project;</li> <li>■ effective management of health and safety throughout the project.</li> </ul> <p>CDM contains two specific regulations (regulations 36 and 37) that are aimed at ensuring the safe use of vehicles on construction sites:</p> <ul style="list-style-type: none"> <li>■ sites need to be organised so that pedestrians and vehicles can move around safely;</li> <li>■ all vehicles should be loaded, unloaded, operated and moved in a safe manner.</li> </ul>
<p><b>Work at Height Regulations 2005</b></p>	<p>The Work at Height Regulations apply to all work at height where there is a risk of a fall liable to cause personal injury. They place duties on employers, the self-employed, and any person who controls the work of others.</p>
<p><b>Supply of Machinery (Safety) Regulations 1992</b></p>	<p>The Supply of Machinery (Safety) Regulations place duties on manufacturers and suppliers to ensure the safety and integrity of their products and provide information to ensure their safe use.</p>
<p><b>Provision and Use of Work Equipment Regulations 1998</b></p>	<p>PUWER applies to the selection, use and maintenance of work equipment including vehicles.</p>

## Appendix 3 Risk assessment and safety management

1 Employers, self-employed workers and designers in the construction process need to ensure that they avoid hazards and combat foreseeable risks at source. The assessment of work-related risk is required by regulation 3 of the Management Regulations and regulation 17 of CDM. Guidance on risk assessment is contained in *Five steps to risk assessment*.<sup>11</sup>

2 Transport hazards and the risks they present need to be identified and assessed. Table 10 provides examples of the risk assessment process applied to site transport issues for different kinds of construction projects. Only one of the principal hazards associated with each example is assessed to illustrate the process of risk assessment.

**Table 10** Examples of the risk assessment process

Project	Major new build on greenfield site	Refurbishment of existing building	Housing development	Major road construction
Key hazard identified	Steep gradients	Restricted site access and room around site	Residents in early occupation of homes on site	Large vehicles reversing in confined areas
Significant risk and who may be harmed	Vehicles overturning – driver injury	Vehicles striking pedestrians	Vehicles striking residents, particularly children	Vehicles striking pedestrians and other vehicles
Elimination and control measures determined	Grade site before establishing site transport routes  Ban vehicle movements on slopes  Select appropriate vehicles for site conditions	Establish segregated vehicle and pedestrian routes around the site  Ensure floors can take weight of vehicles	Fence off construction areas from occupied areas  Control vehicle access and movements  Warn new occupants of risks	Segregate vehicle and pedestrian routes  Fit CCTV, convex mirrors, radar warning systems and/or other safety aids on vehicles
Record findings	Include findings and systems in site safety plan			
Monitor, review and revise as necessary	Audit measures, review effectiveness, make improvements			

3 Removing hazards and reducing and controlling risks are essential parts of effective health and safety management systems. Risk assessments should be conducted for all transport activities including:

- vehicle arrival and departure;
- loading and unloading;
- movement around site; and
- maintenance works.

**Table 11** Examples of measures to avoid common problems and control the risks associated with the use of vehicles in construction

4 Where specific hazards cannot be avoided, the risks they present should be minimised and controlled. Table 11 provides examples of measures to avoid common problems and control the risks associated with the use of vehicles in construction. Efforts need to be made to avoid significant hazards before reliance is placed on risk control measures. The measures selected to control risks should be appropriate to prevent transport accidents in each specific situation.

Common problems	Avoid	Control
Lack of vehicle and pedestrian separation	<p><i>Designers and traffic route planners:</i> Design separate traffic and pedestrian work areas and routes</p> <p><i>Principal contractors and contractors:</i> Plan work to minimise traffic movements. Exclude pedestrians from high-risk areas</p>	<p><i>Principal contractors and contractors:</i> Segregate pedestrian routes from vehicles, follow safe systems of work, instructions and training</p>
Reversing	<p><i>Designers and traffic route planners:</i> Design in one-way systems to avoid the need to reverse</p> <p><i>Principal contractors and contractors:</i> Avoid reversing as far as possible. Specify visibility standards for vehicles used on site. Select vehicles which by design have adequate visibility around the vehicle for the driver to ensure safety, or fit aids, eg CCTV and convex mirrors. Keep pedestrians away from reversing vehicles</p>	<p><i>Contractors:</i> Vehicles that reverse as part of their designated tasks should have adequate visibility around the vehicle for the driver to ensure safety. Fit effective visibility aids (such as CCTV, mirrors, Fresnel lens) to vehicles to overcome areas of restricted driver visibility, particularly at the rear of vehicles. Radar systems, ultrasonic, contact and proximity devices, and audio and visual warning devices can be used as part of safe systems of work. Keep pedestrians away from reversing vehicles</p>
Restricted traffic route visibility	<p><i>Designers and traffic route planners:</i> Design corners with clear sight lines or provide one-way traffic routes</p>	<p><i>Principal contractors:</i> Where appropriate, fit mirrors to areas of restricted vision to aid visibility on traffic routes. Follow safe systems of work, eg traffic control and speed restriction. Provide warning signs</p>
Edges and steep gradients	<p><i>Designers and traffic route planners:</i> Remove, or re-route traffic away from steep gradients and edges</p> <p><i>Principal contractors:</i> Reduce gradients by levelling traffic routes</p>	<p><i>Principal contractors and contractors:</i> Restrict vehicle use in hazardous areas to those vehicles designed to cope with the conditions. Install protection to edges, eg stop blocks and warning signs etc</p>
Obstructions and services	<p><i>Designers and traffic route planners:</i> Relocate services or re-route traffic away from them</p> <p><i>Principal contractors:</i> Prevent unsuitable vehicles entering site</p>	<p><i>Principal contractors:</i> Provide physical protection, eg goalposts and warning signs at overhead restrictions and services</p>
Unintended vehicle movement	<p><i>Contractors/plant hirers:</i> Select vehicles with appropriate braking systems. Ensure effective inspection and maintenance procedures are put in place</p>	<p><i>Contractors:</i> Instruct drivers to test brakes before operating vehicles. Park vehicles on flat ground whenever possible. Chock wheels of vehicles and trailers as necessary when parked on sloping ground</p>

Common problems	Avoid	Control
Noise and vibration	<p><i>Principal contractors:</i> Specify standards for vehicles used on site, where necessary</p> <p><i>Contractors:</i> Select vehicles with noise and vibration damping to relevant standards</p>	<p><i>Contractors:</i> Ensure vehicles are used within the limits of their design and are maintained safely</p>
Drivers lacking competence	<p><i>Principal contractors and contractors:</i> Only authorise competent persons to drive vehicles. Provide site induction training</p>	<p><i>Contractors:</i> Ensure driver competence; train and supervise drivers as necessary</p>

## References and further reading

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*Workplace transport safety: An overview* Leaflet INDG199(rev1) HSE Books 2005 (single copy free or priced packs of 5 ISBN 978 0 7176 2821 6)  
[www.hse.gov.uk/pubns/indg199.pdf](http://www.hse.gov.uk/pubns/indg199.pdf)

*Health and safety in construction* HSG150 (Third edition) HSE Books 2006  
ISBN 978 0 7176 6182 4

*Safety in working with lift trucks* HSG6 (Third edition) HSE Books 2000  
ISBN 978 0 7176 1781 4

*Control back-pain risks from whole-body vibration: Advice for employers on the Control of Vibration at Work Regulations 2005* Leaflet INDG242(rev1) HSE Books 2005 (single copy free or priced packs of 10 ISBN 978 0 7176 6119 0)  
[www.hse.gov.uk/pubns/indg242.pdf](http://www.hse.gov.uk/pubns/indg242.pdf)

*Power take-offs and power take-off drive shafts* Agricultural Safety Leaflet AS24(rev) HSE Books 1997 (single copy free) [www.hse.gov.uk/pubns/agindex.htm](http://www.hse.gov.uk/pubns/agindex.htm)

*Safety signs and signals. The Health and Safety (Safety Signs and Signals) Regulations 1996. Guidance on Regulations* L64 HSE Books 1996  
ISBN 978 0 7176 0870 6

*Safety of construction transport: A survey of standards and accidents associated with construction machinery* SIR58 HSE Books 2001 ISBN 978 0 7176 2135 4

*Code of Practice for the safe installation, application and operation of lorry loaders* Association of Lorry Loader Manufacturers and Importers 1999  
[www.allmitraining.co.uk](http://www.allmitraining.co.uk)

*Safety of loads on vehicles. Code of Practice* (Third edition) Department for Transport 2002 ISBN 978 0 11 552547 6 [www.dft.co.uk](http://www.dft.co.uk)

*Health and safety training: What you need to know* Leaflet INDG345 HSE Books 2001 (single copy free or priced packs of 15 ISBN 978 0 7176 2137 8) [www.hse.gov.uk/pubns/indg345.pdf](http://www.hse.gov.uk/pubns/indg345.pdf)

*Avoidance of danger from overhead electric powerlines* General Guidance Note GS6 (Third edition) HSE Books 1997 ISBN 978 0 7176 1348 9

### DVDs

*Safely does it 2* Construction Industry Training Board (CITB) 2005 978 1 85751 117 8 [www.cskills.org](http://www.cskills.org)

### Training courses

The following organisations can give advice on training courses:

Construction Industry Training Board (CITB) – ConstructionSkills  
Tel: 0870 417 7326 [www.cskills.org](http://www.cskills.org)

Engineering Construction Industry Training Board (ECITB)  
Blue Court  
Church Lane  
Kings Langley  
Herts  
WD4 8JP  
Tel: 01923 260000  
[www.ecitb.org.uk](http://www.ecitb.org.uk)

## Glossary

**CDM** Construction (Design and Management) Regulations 2007.

**CDM co-ordinator** the key project advisor to the client in respect of construction health and safety risk management matters.

**client** any person for whom a construction project is carried out.

**construction vehicle** ride-on powered vehicle used for transporting materials or people in the construction process.

**contractor** any person who carries on a trade or business carrying out or managing construction work.

**designer** any person who specifies design details within a construction project.

**FOPS** falling-object protective structure.

**hazard** anything that can cause harm, eg substance, machinery, method of work etc.

**HSW Act** Health and Safety at Work etc Act 1974.

**HSE** Health and Safety Executive.

**loading bay** an area specifically provided for loading/unloading; not a place where loading/unloading merely happens to occur.

**LPG** liquefied petroleum gas.

**Management Regulations** Management of Health and Safety at Work Regulations 1999.

**PUWER** Provision and Use of Work Equipment Regulations 1998.

**principal contractor** the main or managing contractor with overall day-to-day control of the construction phase of a project.

**risk** likelihood of a hazard causing harm and the nature and extent of the resulting harm.

**ROPS** roll-over protective structure.

**signaller** a person who directs traffic movements, commonly known as a banksman.

**traffic** pedestrian or vehicle movements around site.

**traffic route** routes providing access to, or exit from, any part of a construction site.

**transport** movement of people or materials from one place to another.

### Further information

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