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PREFACE

Every year people are killed or injured by vehicles on construction sites. This booklet provides practical guidance on the prevention of these accidents by avoiding hazards and controlling the risks arising from the use of vehicles in construction work. It provides information on:

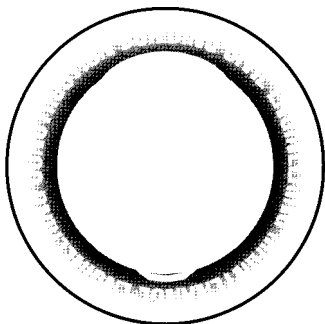
- (a) planning and managing vehicle operations on construction sites;
- (b) selecting and maintaining vehicles; and
- (c) safe driving and working practices.

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 booklet 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 Health and Safety Executive's (HSE's) *Workplace transport safety*.

This booklet forms part of 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. This series of construction guidance bears this logo.



INTRODUCTION

1 Each year construction industry vehicle accidents account for around 15 deaths, hundreds of injuries and much material damage (see Appendix 1). 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 booklet 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, but this is not an exhaustive list.

2 This booklet 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 booklet is divided into four main sections:

- (a) safe workplaces;
- (b) safe vehicles;
- (c) safe driving and work practices; and
- (d) 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 booklet. 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 and by controlling vehicle operations during construction work. Inadequate planning and control is the root cause of many construction vehicle accidents which often involve:

- (a) vehicles or their loads striking people, particularly when reversing;
- (b) vehicles striking services and obstructions;
- (c) manufacturers' instructions for safe use being disregarded;
- (d) inadequate training of drivers and signallers; and
- (e) 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 which involves five stages:

- (a) identify hazards;
- (b) decide who may be harmed and how;
- (c) evaluate the risks arising from the hazards and implement effective control measures for significant risks;
- (d) record the findings of the risk assessment; and
- (e) review the findings and revise if necessary.

RELEVANT LAW

7 A legal framework for the management of construction transport risks is contained in the following legislation (summarised in Table 1 of Appendix 2):

- (a) Health and Safety at Work etc Act 1974 (HSW Act);¹
- (b) Management of Health and Safety at Work Regulations 1992 (MHSW);³
- (c) Construction (Design and Management) Regulations 1994 (CDM);²
- (d) Construction (Health, Safety and Welfare) Regulations 1996 (CHSW);⁵
- (e) Supply of Machinery (Safety) Regulations 1992 (as amended) (SM(S));⁶
- (f) Provision and Use of Work Equipment Regulations 1998 (PUWER).⁷

1: SAFE WORKPLACES

8 This section gives guidance on how to establish safe workplaces for vehicle operations. The overall message is simple - safe workplaces are achieved by ensuring the separation of pedestrians and vehicles and the provision of hazard-free traffic routes.

PEDESTRIAN AND VEHICLE SEPARATION

Regulation 15 of CHSW 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 and without risks to health.

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

- (a) pedestrian-only areas from which vehicles are completely excluded;
- (b) safe designated pedestrian routes to work locations;

- (c) vehicle-only areas, especially where space is limited or traffic is heavy; and
- (d) safe vehicle routes around the site.

Pedestrian routes

10 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:

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

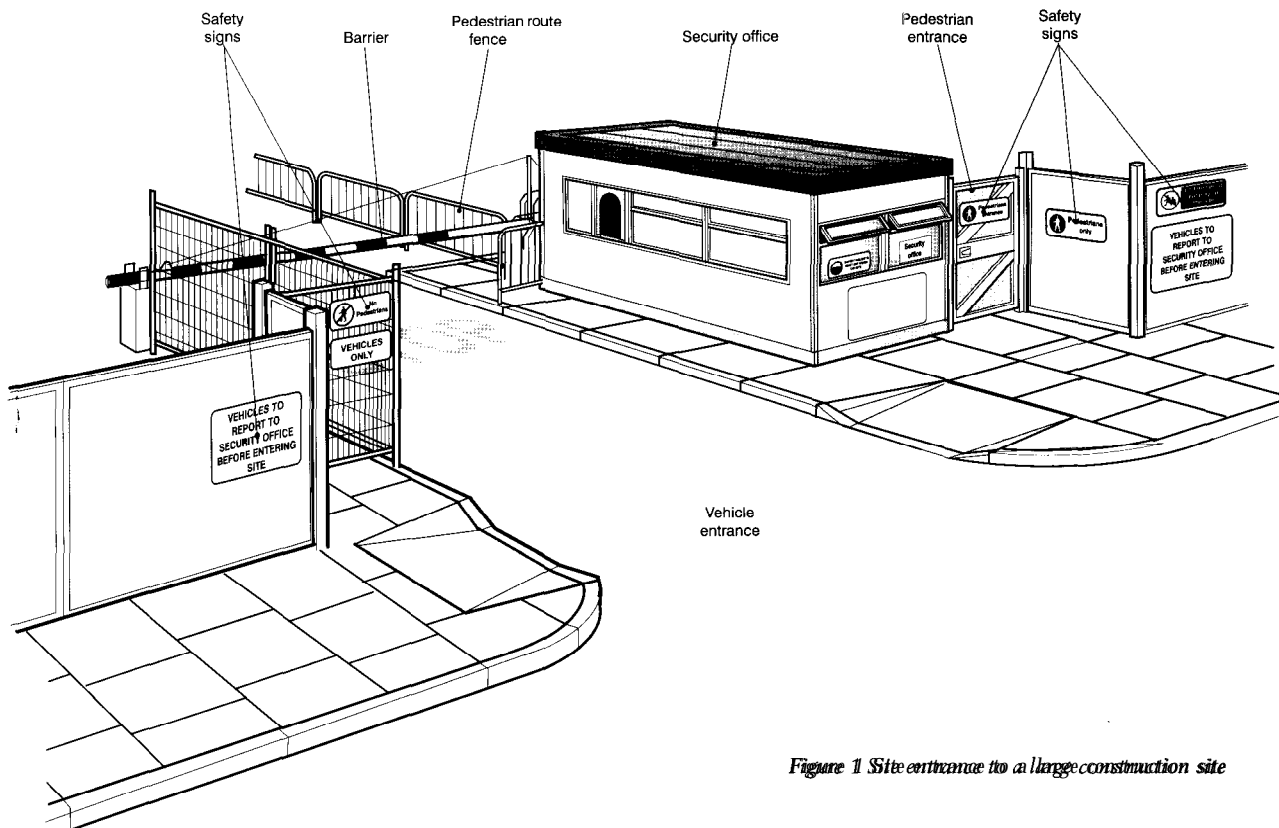


Figure 1 Site entrance to a large construction site

11 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.

12 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, for example on occupied sites, special attention will need to be paid to ensure their safety by the provision of

ramps for people in wheelchairs and tapping boards for the visually impaired.

13 In some circumstances it may not be reasonably practicable to achieve physical segregation between pedestrians and vehicles, for example 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:

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

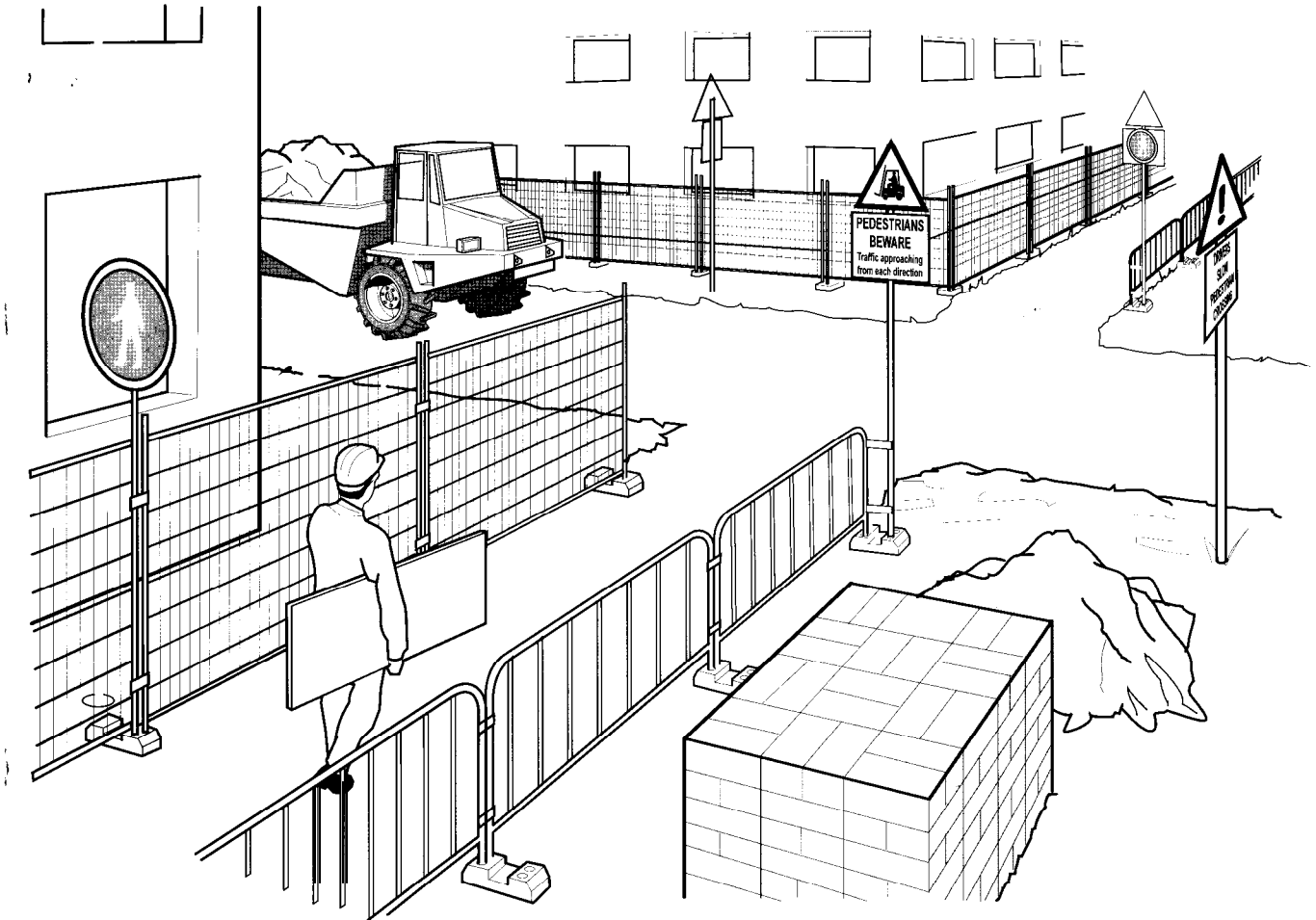


Figure 2 Pedestrian walkway crossing vehicle route

14 On site, establish vehicle routes which:

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

15 Primary vehicle routes should be established to handle the most common vehicle movements on site, for example 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.

16 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

<i>Common site vehicle route hazards</i>	<i>Control measures</i>
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, 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
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

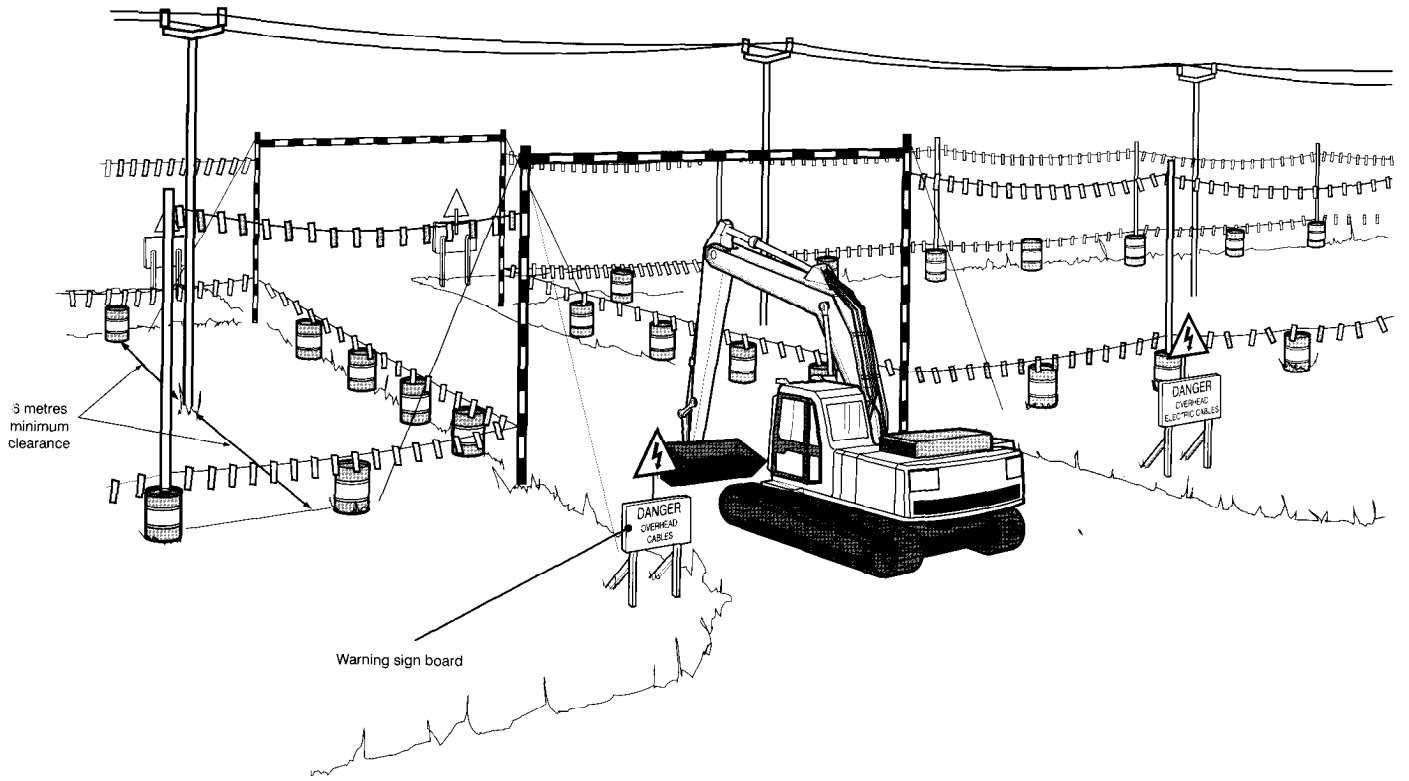


Figure 3 Overhead cable protection on a vehicle traffic route

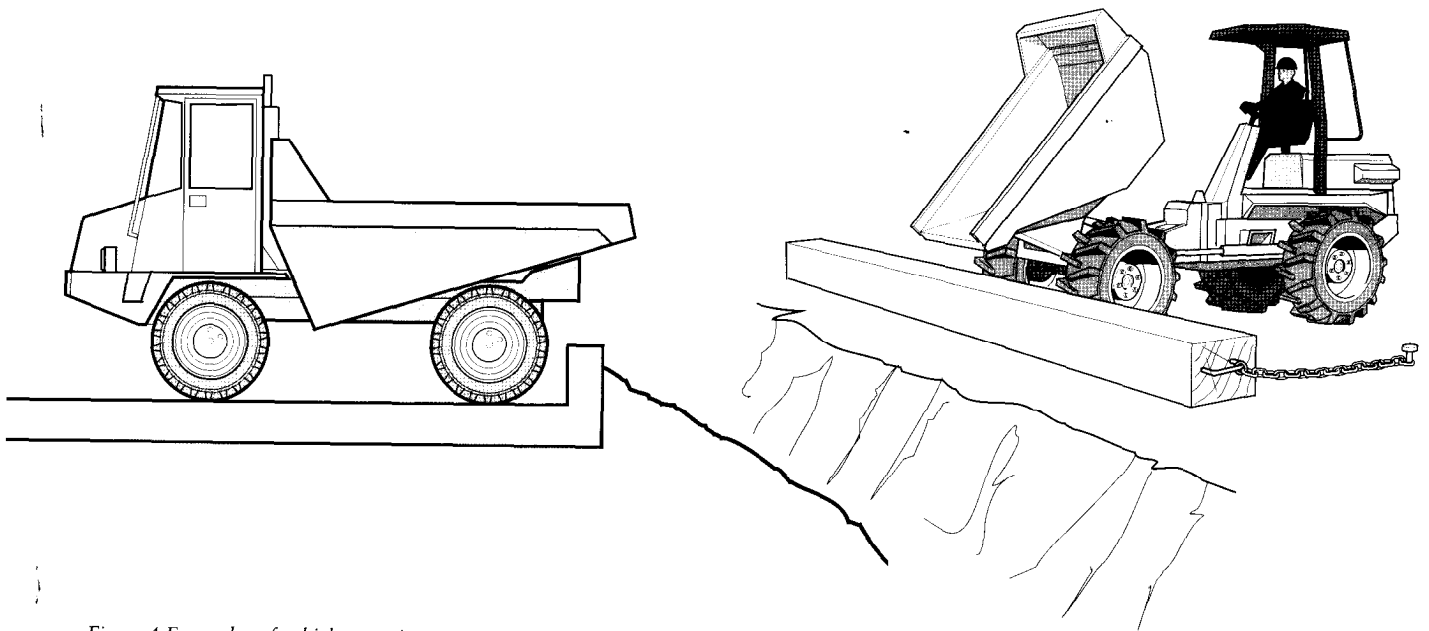


Figure 4 Examples of vehicle restraints

(a) Concrete wheel stop

(b) Timber baulk wheel stop

17 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 1996.⁸

LOADING AND STORAGE AREAS

18 Work on site should be planned to minimise vehicle movements, 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:

- (a) be located away from pedestrian-only areas and main pedestrian routes;
- (b) exclude pedestrians so far as reasonably practicable;
- (c) have one-way systems and safe exit points;
- (d) have sufficient room for vehicle movements; and
- (e) 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.

19 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:

- (a) suitable vehicles;
- (b) appropriate pedestrian and vehicle traffic management systems;
- (c) site fencing;

- (d) signallers or security guards; and
- (e) effective vehicle immobilisation systems and key custody procedures.

20 Where vehicles cross the public footway, measures need to be taken to protect members of the public and control their movement to ensure safety, for example 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.

21 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.

22 Site security measures should ensure unauthorised persons, especially children, do not have access to sites. HSE's booklet ***Protecting the public - your next move***⁹ 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.

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

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

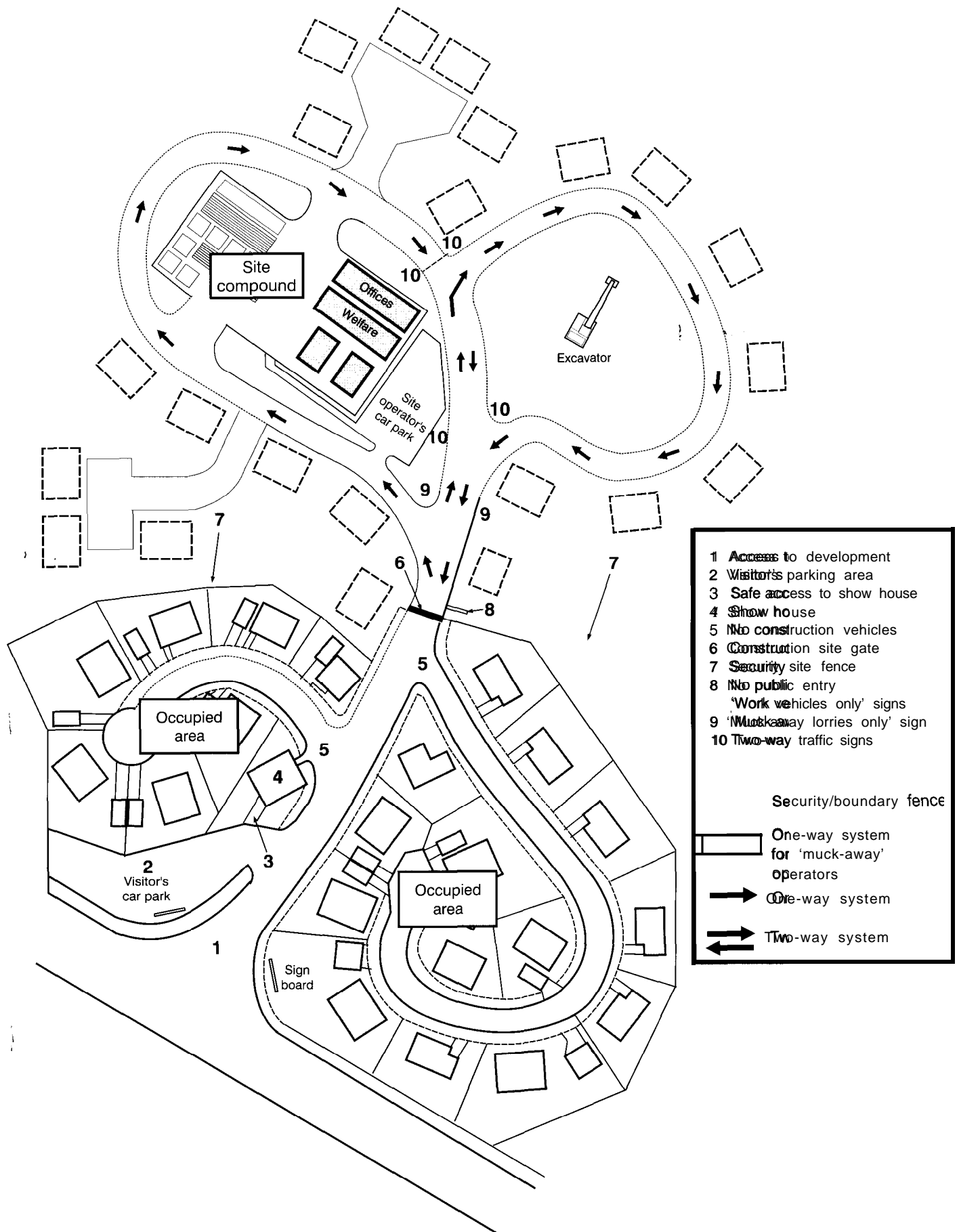


Figure 5 Example of traffic routes on a housing development site (road markings omitted for clarity)

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 weigh bridges off primary vehicle routes	Provide safe pedestrian access across vehicle routes to all places of work

See also Figure 6, page¹⁰

I N F O R M A T I O N

24 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:

- (a) verbal instructions on arrival at site;
- (b) site induction;
- (c) issue of site maps to drivers;
- (d) giving site-specific delivery instructions when ordering materials from suppliers; and

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

25 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 construction phase site health and safety plan will need to be updated as the project progresses and traffic routes and site rules change.

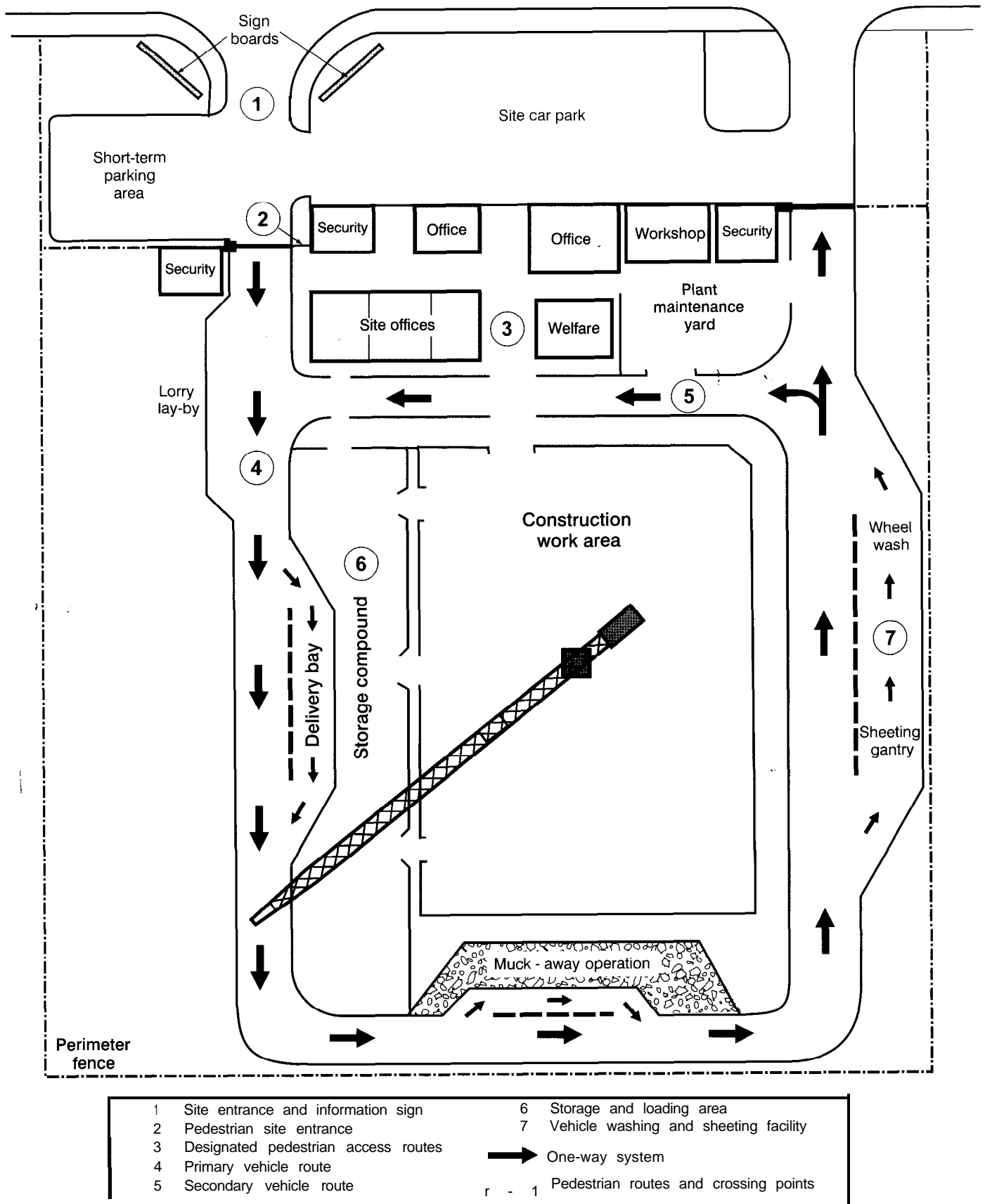


Figure 6 Example Of site traffic route plan.

Figure 6 shows an idealised site plan with a range of transport-related safety measures in place. Table 2 (on page 9) describes the measures taken to ensure vehicle and pedestrian safety

2: SAFE VEHICLES

26 This section provides guidance on health and safety aspects of the selection and maintenance of construction vehicles.

VEHICLE SELECTION

27 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.

28 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:

- (a) stability under all foreseeable operating conditions;
- (b) safe access to and from the cab and other working locations on the vehicle;
- (c) effective braking systems;
- (d) adequate visibility for the driver all around the vehicle;



Figure 7 Site dumper with ROPS

- (e) headlights, a horn, windscreen wipers and warning devices, eg reversing alarms;
- (f) physical guards to protect dangerous parts such as power take-off shafts, chain drives, trapping points and exposed exhaust pipes;
- (g) protection for the driver from work hazards, eg falling objects and the effects of the vehicle overturning; and
- (h) protection for the driver from the weather, noise, vibration, noxious fumes and dusts.

29 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.

30 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.

31 Where the risk of vehicles overturning is significant, eg dumpers used on sloping ground, vehicles should be fitted with roll-over protective structures (ROPS). 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).

32 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.

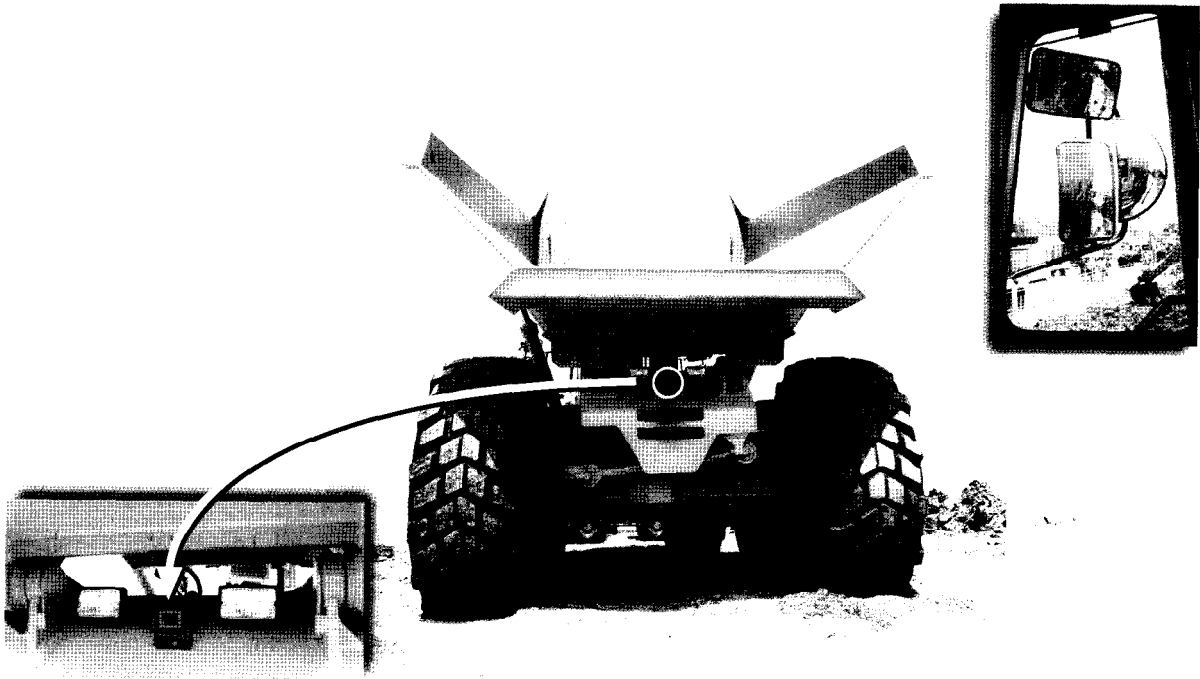


Figure 8 Photo montage of large dumper truck fitted with cctv and mirrors to improve visibility from the driving position

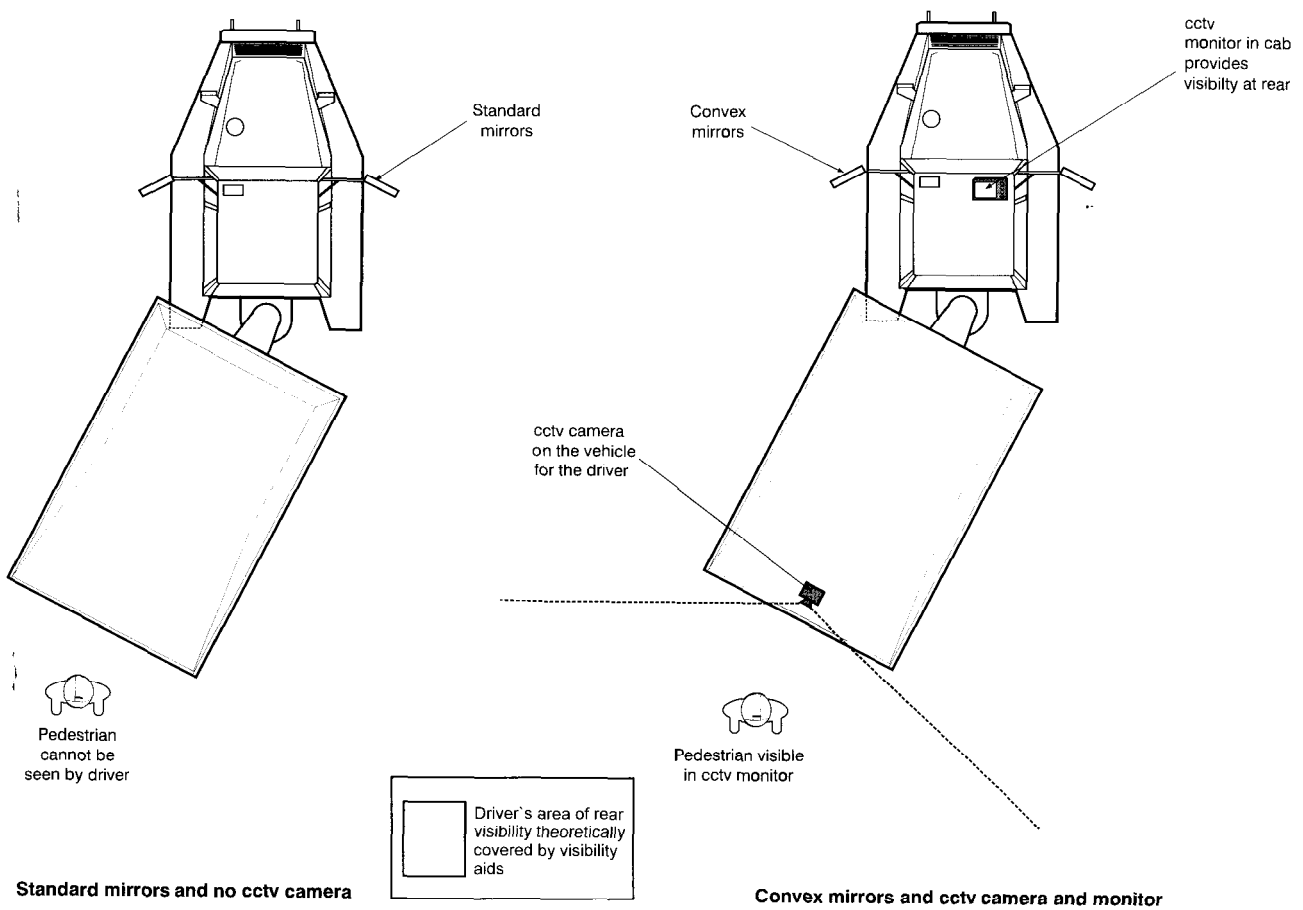


Figure 9 Plan view of visibility alongside and at rear of a large articulated vehicle

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

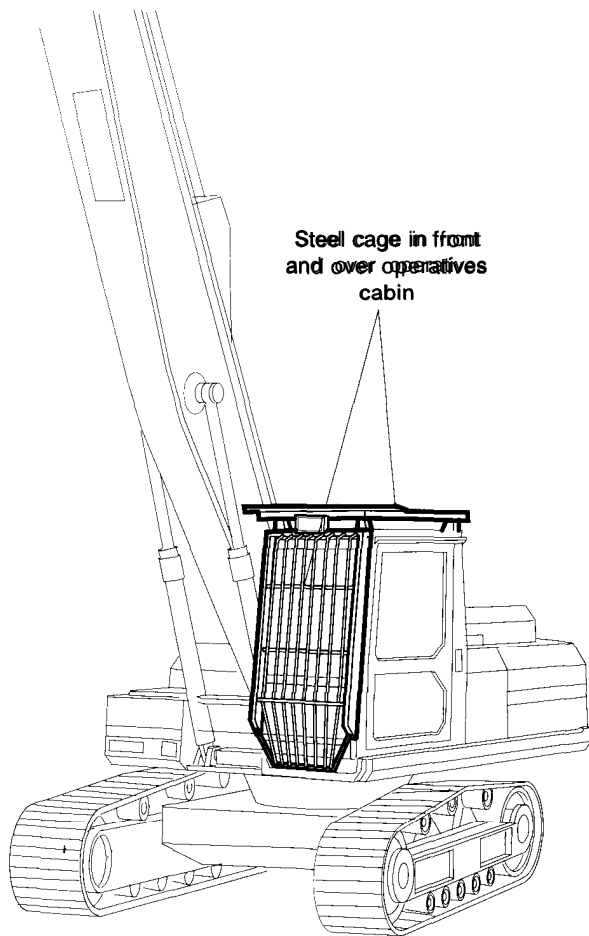


Figure 10 A 360° excavator with FOPS

VEHICLE INSPECTION AND MAINTENANCE

33 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.

34 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.

35 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:

- (a) braking systems;
- (b) seat belts;
- (c) tyres, including condition and pressures;
- (d) steering;
- (e) convex mirrors, CCTV and other visibility aids;
- (f) lights and indicators;
- (g) safety devices such as interlocks;
- (h) warning signals;
- (i) windscreen washers and wipers;
- (j) fire-fighting equipment;
- (k) condition of cab protection devices, eg ROPS and FOPS;
- (l) functional checks on the vehicle, including controls and starting systems; and
- (m) correct location of guards and panels on the vehicle.

3: SAFE DRIVING AND WORK PRACTICES

36 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.

37 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.

38 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.

39 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 are only appropriate for low-risk situations if they are the only precaution used.

Table 3 Hierarchy of control measures for reversing operations

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

LOADS

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

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

41 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.

42 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. Further guidance can be found in HSE's booklet *Sheeting and unsheeting Of tipper lorries.*"

43 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 liquid petroleum gas (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.

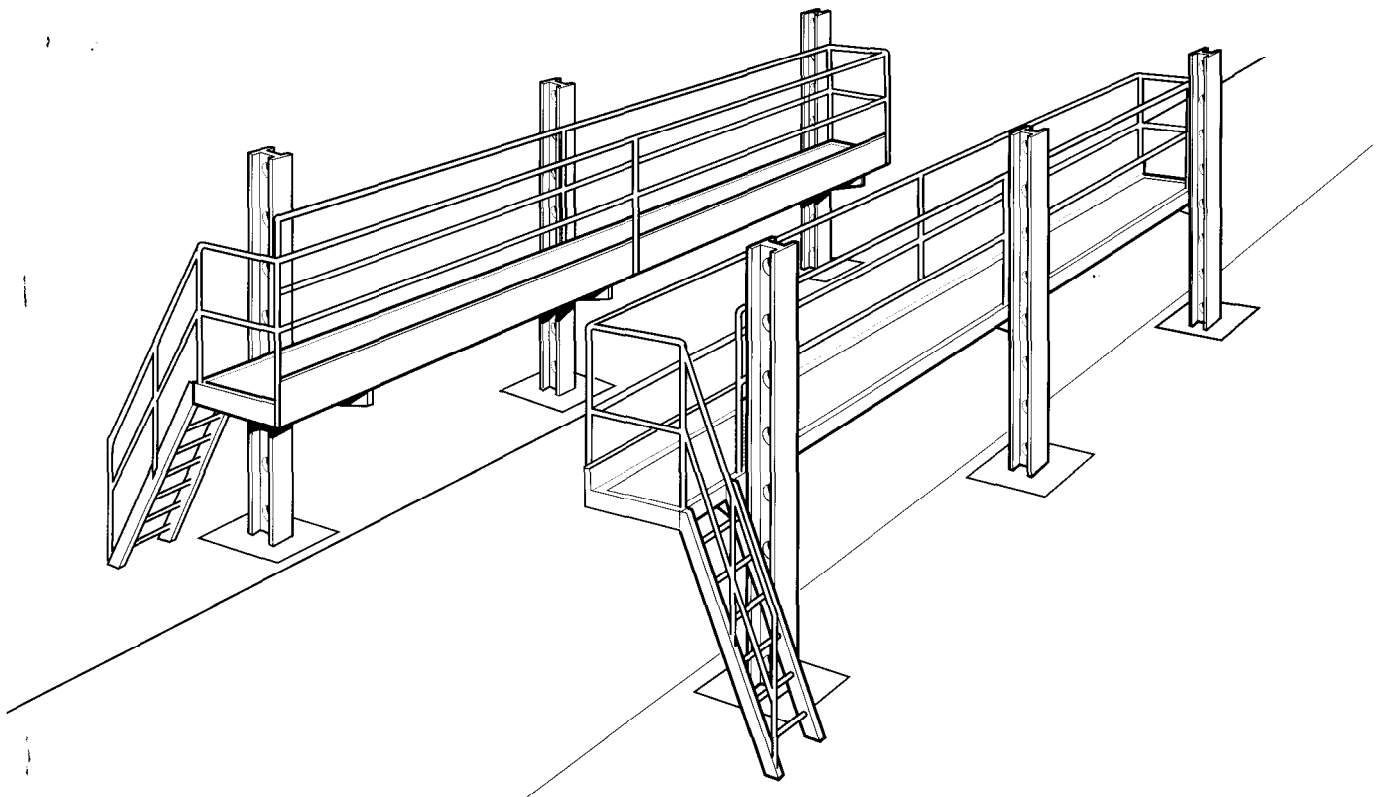


Figure 11 Sheetting gantry providing safe access for sheeting vehicles

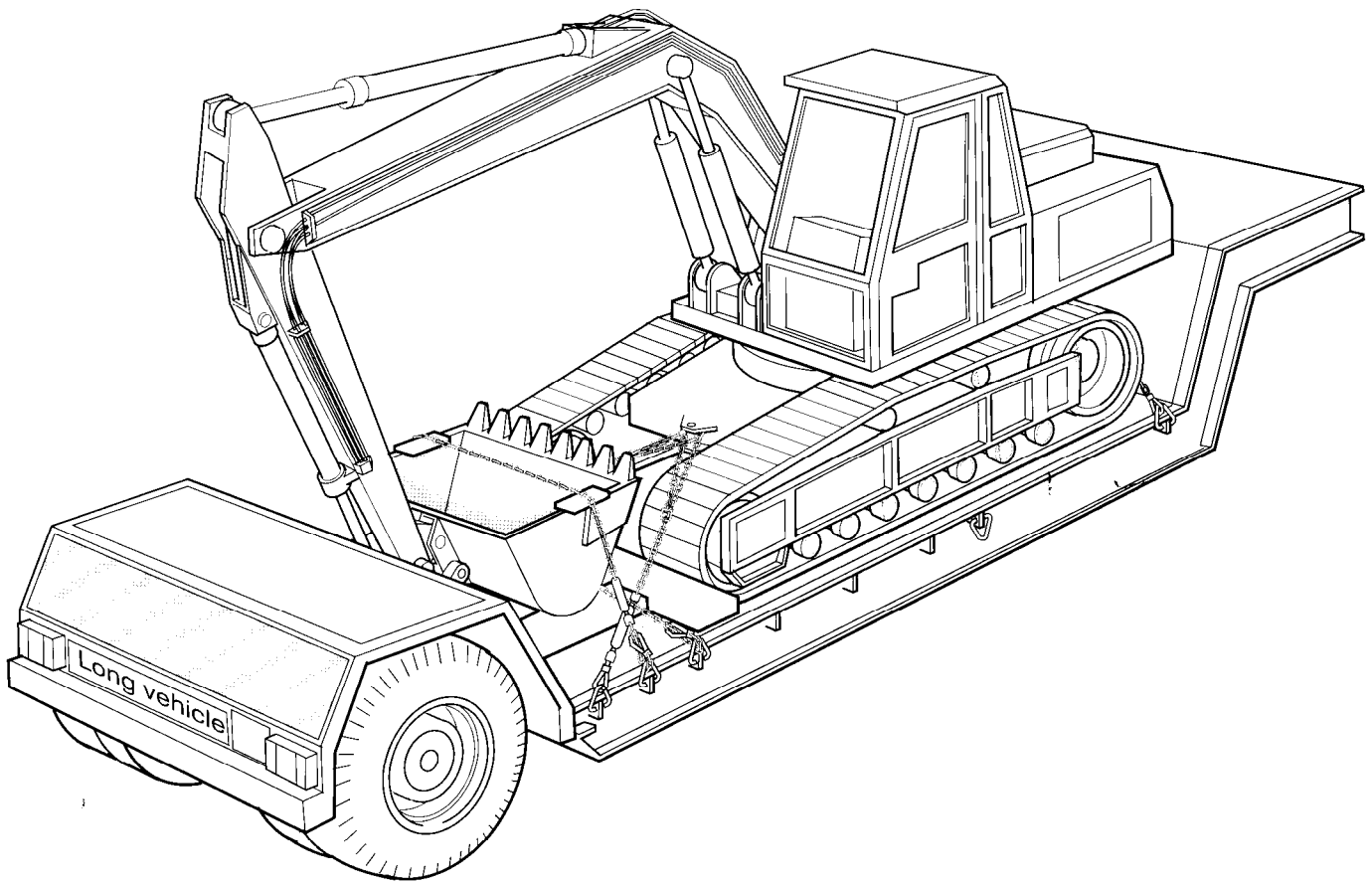


Figure 12 Excavator secured for transportation

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

- (a) dismantled so far as possible to keep them within the dimensions of the carrying vehicle;
- (b) emptied of fuel, so far as possible;
- (c) relieved of hydraulic pressure by moving all control levers through all positions, twice, before transportation; and
- (d) secured and restrained to prevent movement, 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.

45 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.

DRI V E R S

Following an accident in which an untrained and inexperienced driver was killed when the dumper he was driving overturned, a company was fined £1 50 000.

46 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. 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.

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

- (a) drivers should be competent in the safe operation of the vehicles and their daily maintenance checks;
- (b) training certificates should be checked for validity;
- (c) caution should be exercised with drivers who may be unfamiliar with the hazards of construction sites, including trainees and new staff; and
- (d) 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.

48 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

<ul style="list-style-type: none"> • Only operate vehicles if you are competent and authorised to drive them
<ul style="list-style-type: none"> • Do not drive when your abilities are impaired by ill health, poor vision, prescribed or illegal drugs, or alcohol
<ul style="list-style-type: none"> • Make sure you fully understand the operating procedures of the vehicles you control
<ul style="list-style-type: none"> • Know the site emergency procedures
<ul style="list-style-type: none"> • Understand the system of signals used on site
<ul style="list-style-type: none"> • Visiting drivers: seek appropriate authority to enter the site and operate vehicles
<ul style="list-style-type: none"> • Know the safe operating limitations of your vehicle, particularly relating to safe maximum loads and gradients
<ul style="list-style-type: none"> • Carry out daily checks on your vehicles and report all defects immediately to supervisors
<ul style="list-style-type: none"> • Follow site procedures and comply with all site rules
<ul style="list-style-type: none"> • Do not drive at excessive speeds
<ul style="list-style-type: none"> • Follow established site traffic routes
<ul style="list-style-type: none"> • Ensure that windows and mirrors are kept clean and clear
<ul style="list-style-type: none"> • Keep the vehicle tidy and free from items which may hinder the operation of vehicle controls
<ul style="list-style-type: none"> • Do not allow passengers to ride on vehicles unless safe seating is provided
<ul style="list-style-type: none"> • Park vehicles on flat ground wherever possible, with the engine switched off, the handbrake and trailer brake applied, and where necessary use wheel chocks
<ul style="list-style-type: none"> • Do not reverse without checking behind the vehicle for pedestrians, vehicles or obstructions
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Do not remain on vehicles during loading operations, unless the driver's position is adequately protected
<ul style="list-style-type: none"> • Ensure loads are safe to transport
<ul style="list-style-type: none"> • Do not attempt to get on or off moving vehicles
<ul style="list-style-type: none"> • Do not make adjustments with the engine running and guards removed
<ul style="list-style-type: none"> • Do not smoke during refuelling operations

SIGNALLERS

49 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. 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 can be 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.

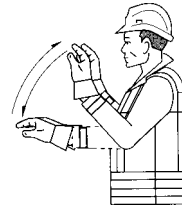
Table 5 Signallers' safe work practices checklist

<ul style="list-style-type: none"> • Ensure you know and understand relevant safety procedures and correct signalling systems
<ul style="list-style-type: none"> • Ensure drivers understand the correct signalling systems
<ul style="list-style-type: none"> • Signal instructions clearly
<ul style="list-style-type: none"> • Ensure you are visible to the driver and the driver is visible to you; if not, stop the vehicle moving
<ul style="list-style-type: none"> • Stand in a safe location at all times
<ul style="list-style-type: none"> • Warn pedestrians and make sure they are kept away from vehicle operations
<ul style="list-style-type: none"> • Wear appropriate protective equipment, including high-visibility clothing
<ul style="list-style-type: none"> • Report work hazards to supervisors
<ul style="list-style-type: none"> • Make sure you have can get to and from your work location safely
<ul style="list-style-type: none"> • Do not ride on the vehicle you are directing unless you are in a designated safe position
<ul style="list-style-type: none"> • Do not direct vehicles if your ability is affected by alcohol or drugs

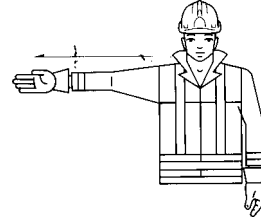
Move forwards



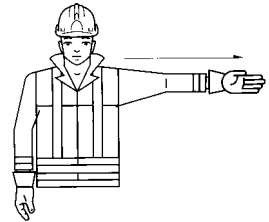
Move backwards



Turn left



Turn right



Danger (emergency stop)

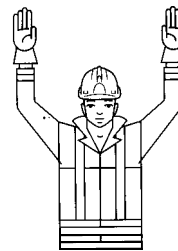


Figure 13 Signals to drivers

SAFE WORKING PRACTICES FOR SPECIFIC VEHICLES

50 Paragraphs 51-62 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.

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

- (a) using site dumpers on gradients beyond their safe working capacity;
- (b) inexperienced and untrained drivers operating site dumpers;
- (c) inadequate maintenance of braking systems;
- (d) carrying passengers in unsafe positions; and
- (e) failing to provide stop blocks at the edges of excavations and spoil heaps.

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.

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



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

Table 6 Safe use of site dumpers checklist

- 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
- Do not drive on gradients in excess of those safe for the dumper (see manufacturer's instructions)
- 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 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

53 Materials handling vehicles are at risk of overturning when:

- (a) overloaded;
- (b) working on sloping, uneven or unstable ground;
- (c) driving with raised loads; and
- (d) driving at excessive speed around corners.

54 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.

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

- (a) 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;
- (b) people should be kept away from the areas of excavator operation by the provision of suitable barriers;
- (c) a signaller should be provided and in a safe position to direct the excavator's operation and any pedestrian movements; and
- (d) 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.

56 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 assist 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.

57 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

58 Rear-tipping lorries can overturn during tipping operations. On unmade or uneven ground, tipper-trucks of Stability Category A or equivalent, should be used (***Tipper stability***).¹ To prevent overturning:

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

59 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.

60 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.

61 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.

62 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.

4: MANAGING CONSTRUCTION TRANSPORT

63 This section examines different duty holders' roles in managing construction vehicle safety using the framework of the Construction (Design and Management) Regulations 1994 (CDM).'

64 The earlier in the life of a project that health and safety issues are considered, the greater the potential for accident prevention. HSE's guidance **"Successful health and safety management"** 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:

- (a) senior management's commitment;
- (b) clear objectives;
- (c) competent and trained personnel;
- (d) effective work planning including risk assessment;
- (e) positive implementation in the workplace; and
- (f) checking and reviewing performance.

6.5 Figure 15 indicates the ways in which 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.

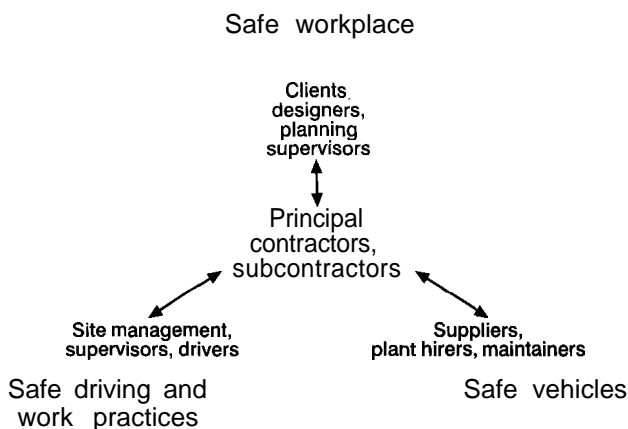


Figure 15 Responsibilities for ensuring safe site vehicle operations

CLIENTS

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

- (a) previous experience and performance;
- (b) health and safety management systems; and
- (c) systems for assessing the competence of their appointees.

67 CDM requires the client to provide the planning supervisor with relevant health and safety information. Transport-related information includes:

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

DESIGNERS

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

- (a) allowing space around structures and site boundaries for safe traffic movement;
- (b) designing one-way systems and drive-through areas to reduce the need for reversing;
- (c) removing hazardous gradients and embankments;
- (d) 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;
- (e) 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;

- (f) indicating the maximum loading limits of floors used by vehicles, particularly during construction, demolition and refurbishment;
- (g) relocating or protecting vulnerable services such as gas pipes and electricity cables; and
- (h) passing information on any features of the design presenting significant transport risks to the planning supervisor for inclusion in the pre-tender health and safety plan.

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.

PLANNING SUPERVISORS

69 Planning supervisors should ensure project designs take account of the issues in paragraphs 67 and 68, and that the pre-tender health and safety plan contains information on specific transport risks. The same plan may also need to provide information on factors such as:

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

PRINCIPAL CONTRACTORS

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

- (a) planning work, preparing method statements and detailing safe systems of work to workers;
- (b) implementing systems of work which ensure that pedestrians and vehicles are kept apart as far as possible;
- (c) ensuring subcontractors make adequate provision for the selection and supervision of drivers and general vehicle safety;
- (d) making specific reference to vehicle safety in the construction phase health and safety plan, including emergency procedures, vehicle access and site rules;
- (e) setting standards for driver competence, vehicle safety and maintenance, and maintaining a site register of authorised drivers;

- (f) ensuring co-ordination and co-operation between contractors;
- (g) co-ordinating the views of safety representatives and workers;
- (h) ensuring all workers receive site induction training covering safe traffic routes and site rules for operating vehicles;
- (i) 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
- (j) reviewing the health and safety performance of everyone on site. }

Following client requirements, 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.

71 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

72 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 70.



Remember:



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



To prevent death and injury ensure that you have:



(a) a safe workplace;



(b) safe vehicles; and



(c) safe driving and work practices.

APPENDIX 1: Construction vehicle accident statistics

1 Construction vehicle accidents account for an average of 15% of fatal accidents in the construction industry. Between 1991/2 and 1995/6 construction vehicle accidents resulted in 72 deaths¹ and over 500 major injuries. Every year, construction vehicle accidents cause on average:

- (a) 15 deaths; and
- (b) around 700 injuries.

2 Construction transport accidents occur throughout the industry, including during loading and unloading operations, material movements, ground works and road works. Ground works account for the largest number of transport-related accidents in the construction industry followed by road construction work and the movement of materials on site (see Table 1 of this appendix).

3 The most common types of vehicle involved in accidents to people on construction sites are site dumpers, dumper trucks, excavators and goods vehicles. On average two people are killed and over 40 people injured every year by site dumpers and dumper trucks, and three people are killed and over 50 people are injured every year by excavators (see Table 2 of this appendix). Tipper lorries reversing in confined sites result in an average of two fatal accidents each year.

Table 1 Construction vehicle accidents by activity

<i>Activity</i>	<i>Totals 1991/2 -1995/6</i>
Groundworks	21 fatal 148 major 192 > 3-day
Loading and unloading	5 fatal 31 major 66 > 3-day
Road construction works	18 fatal 102 major 185 > 3-day
Plant hire	1 fatal 35 major 36 > 3-day
Movement of materials	17 fatal 46 major 190 > 3-day
Finishing works	0 fatal 22 major 51 > 3-day




Table 2 Construction vehicle accidents by type Of vehicle

<i>Type of vehicle</i>	<i>Totals 1991/2 -1995/6</i>
Small site dumpers and dumper trucks	10 fatal 85 major 118 > 3-day
Excavators	12 fatal 87 major 125 > 3-day
Road-making vehicles	3 fatal 42 major 104 > 3-day
Goods vehicles	16 fatal 37 major 89 > 3-day
Lift trucks	4 fatal 60 major 117 > 3-day
Private vehicles	5 fatal 54 major 116 > 3-day

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 were equivalent to 8% of the tender price (see ***The costs of accidents at work***.) As well as the human and material losses produced, accidents can lead to low morale and reduced opportunities for tendering for work.

 **Remember:**

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


APPENDIX 2: Legislation and the safe use of vehicles in construction

1. Table 1 of this appendix gives details of the principal legal requirements applicable to the safe use of vehicles in the construction industry. For the full titles of the regulations, see page 1.

Table 1 Principal legal requirements applicable to the safe use of vehicles in the construction industry

HSW Act requires 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
- designers and suppliers to ensure their products may be used safely
- employees to take care of their own and others' health and safety

MHSW requires employers and self-employed workers to:

- identify the measures they need to take by carrying out risk assessments
- institute safety management systems
- appoint competent persons to assist in health and safety management
- ensure co-ordination and co-operation
- formulate emergency procedures
- provide information and relevant training to employees

CDM applies to all stages of a construction project and places duties upon clients, designers and contractors. The Regulations aim to ensure:

- selection of competent appointees and provision of adequate resources
- reduction of risk at the design and planning stages of a project
- effective management of health and safety throughout the project

CHSW contains two specific regulations that are aimed at ensuring the safe use of vehicles on construction sites:

- sites need to be organised so that pedestrians and vehicles can move around safely
- all vehicles should be driven, operated or towed in a safe manner, and be loaded so that they can be used safely

SM(S) places duties on manufacturers and suppliers to ensure the safety and integrity of their products and provide information to ensure their safe use

PUWER applies to the selection, use and maintenance of work equipment including vehicles

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 MHSW and regulation 13 of CDM. Guidance on risk assessment is contained in the HSE leaflet 5 steps **to risk assessment**.¹⁴

2 Transport hazards and the risks they present need to be identified and assessed. Table 1 of this appendix 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.

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:

- (a) vehicle arrival and departure;
- (b) loading and unloading;
- (c) movement around site; and
- (d) maintenance works.

4 Where specific hazards cannot be avoided, the risks they present should be minimised and controlled. Table 2 of this appendix 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.

Table 1 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 prior to 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			

Table 2 Examples of measures to avoid common problems and control the risks associated with the use of vehicles in construction

Common <i>problems</i>	<i>Avoid</i>	<i>Control</i>
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 which reverse as part of their designated tasks should provide 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, 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>
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

- 1 **Workplace transport safety** HSG136 HSE Books 1995 ISBN 0 7176 0935 9
- 2 **A guide to Health and Safety at Work etc Act 1974** L1 HSE Books 1992 ISBN 0 7176 0441 1
- 3 **Management of health and safety at work Management of Health and Safety at Work Regulations 1992 Approved Code of Practice** L21 HSE Books 1992 ISBN 0 7176 0412 8
- 4 **Managing construction for health and safety Construction (Design and Management) Regulations 1994** L.54 HSE Books 1995 ISBN 0 7176 0792 5
- 5 **A guide to Construction (Health, Safety and Welfare) Regulations 1996** INDG220 L HSE Books 1996 (also available in priced packs of 10, ISBN 0 7176 1161 2)
- 6 **The Supply of Machinery (Safety) Regulations 1992** MISC09 HSE Books 1995
- 7 **Safe use of work equipment Provision and Use of Work Equipment Regulations 1998 Approved Code of Practice and Guidance** L22 HSE Books 1998 ISBN 0 7176 1626 6
- 8 **Signpost to the Health and Safety (Safety Signs and Signals) Regulations 1996** INDG184 HSE Books 1996 (also available in priced packs, ISBN 0 7176 1139 6)
- 9 **Protecting the public - your next move** HSG151 HSE Books 1997 ISBN 0 7176 1148 5
- 10 **Sheeting and unsheeting of tipper lorries** HSG148 HSE Books 1996 ISBN 0 7176 0888 3
- 11 **Tipper stability** Institute of Road Transport Safety 1992 9 Cromwell Place, London SW7 2JF, Tel: 0171 589 3744

- 12 **Successful health and safety management** HSG65(rev) HSE Books 1997 ISBN 9 780717 612765
- 13 **The costs of accidents at work** HSG96 HSE Books 1993 ISBN 0 7176 0439 X
- 14 **5 steps to risk assessment** INDG163L(rev1) HSE Books 1994

FURTHER READING

Legislation

- Safety representatives and safety committees** L87 HSE Books 1996 ISBN 0 7176 1220 1
- A guide to Health and Safety (Consultation with Employees) Regulations 1996** L95 HSE Books 1996 ISBN 0 7176 1234 1
- Managing vehicle safety at the workplace** INDG199 HSE Books 1995 (also available in priced packs of 10, ISBN 0 7176 0982 0)

Vehicle safety

- Reversing vehicles** INDG148L HSE Books 1993
- Motor vehicle repair** HSG67 ISBN 0 7176 0483 7 HSE Books 1991

Health and safety management

- Managing health and safety: five steps to success** INDG275 HSE Books 1998
- Five to successful health and safety management** INDG132 L HSE Books 1992
- A guide to occupational health and safety management systems** BS 8800: 1996 ISBN 0 580 35859 9
- Managing health and safety - an open learning workbook for trainers and managers** HSE Books 1997 ISBN 0 7176 1153 1
- A guide to managing health and safety in construction** HSE Books 1995 ISBN 0 7176 0755 0

General titles

- Designing for health and safety in construction** HSE Books 1995 ISBN 0 7176 0807 7
- Health and safety on construction sites** HSG150 HSE Books 1995 ISBN 0 7176 0806 9
- Safety in working with lift trucks** HSG6 HSE Books 1993 ISBN 0 7176 14409

Videos

In the driving seat INDG242L HSE Books 1996
(also available in priced packs, ISBN 0 7176 1314 3)

Power take-offs and power take-off drive shafts
AS24(rev) HSE Books 1997

Safety signs and signals L64 HSE Books 1997 ISBN 0 7176 0870 0

Safety of transport and machinery: A survey of standards and accidents associated with earth moving machinery
SIR 53 HSE Books 1998

Code of Practice for the safe application and operation of lorry loaders Association of Lorry Loader Manufacturers 1993

Safe loading Freight Transport Association 1996 Hermes House, St Johns Road, Tunbridge Wells, Kent TN4 9UZ
Tel 01892 526171

Safety of loads on vehicles Code of Practice DoE 1984
ISBN 11 550261 0

CDM Regulations - work sector guidance for designers
CIRIA Report 166 **Construction Industry Research and Information Association 1997** ISBN 0 86017 464 6

A guide to risk assessment requirements INDG218L HSE Books 1996

5 steps to information, instruction and training
INDG213L HSE Books 1996

Visibility from the driving position of workplace vehicles - An assessment of visibility aids and their current uses
Health and Safety Laboratory Sheffield

Avoidance of danger from overhead electrical lines
GS6 HSE Books 1997 ISBN 0 7176 1348 8

Danger: Vehicles at work CFL Vision PO Box 35,
Wetherby, West Yorkshire

Safely does it II: Safe working with and around mobile plant
Construction Industry Training Board (CITB) - Bircham
Newton, Kings Lynn, Norfolk, PE3 1 6RH

The following organisations can give advice on training courses:

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GLOSSARY

CDM	Construction (Design and Management) Regulations 1994
CHSW	Construction (Health, Safety, and Welfare) Regulations 1996
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 undertakes the design of: structures, traffic routes (including traffic route planners) or vehicles
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
MHSW	Management of Health and Safety at Work Regulations 1992
Planning supervisor*	The appointee to co-ordinate the health and safety aspects of project design and planning
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 persons or materials from one place to another

* CDM definitions



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