CIRIA C611 London 2003

# Safe access for maintenance and repair

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**Safe access for maintenance and repair: best practice guidance**

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*Construction Industry Research and Information Association*

CIRIA C611 © CIRIA 2003 RP649 ISBN 0-86017-611-8

**Keywords**

Construction management, facilities management, health and safety, refurbishment, supply chain management

**Reader interest**

Clients, designers, architects and engineers, planning supervisors and others involved in the design and maintenance of structures and buildings.

**Classification**

| | |
|---|---|
| AVAILABILITY | Unrestricted |
| CONTENT | Subject area review |
| STATUS | Committee guided |
| USER | Clients, designers, architects and engineers planning supervisors, owners and facility managers |

**British Library Cataloguing in Publication Data**
A catalogue record is available for this book from the British Library.

Published by CIRIA, Classic House, 174–180 Old Street, London EC1V 9BP.

# Summary

The introduction of the Construction (Design and Management) Regulations in 1995 provided the regulatory impetus for designers to give due attention to the whole-life aspects of facilities. With the advent of Private Finance Initiative and Public Private Partnership style undertakings, attention is increasingly being focussed on the efficient lifetime care of buildings. The purpose of this document is to assist designers, by providing best practice guidance aimed specifically at designing for safe access for maintenance and repair.

This guidance is targeted primarily at building designers but will be of interest to clients, planning supervisors and facilities managers. It is noted that design input occurs at any point in the supply chain and the definition of designer encompasses anyone involved in design, irrespective of their role.

An overview of the commercial and regulatory backdrop, statutory obligations and alternative procurement processes is presented, followed by targeted design guidance for a variety of building elements and work situations. References are also given for further reading.

Rigorous attention to access provision will not only reduce accidents and ill health, but will promote efficient and hence cost-effective processes.

# Acknowledgements

**Research contractor**

This report is the main output from CIRIA research project 649. It was prepared by Arup in association with John Carpenter.

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Following CIRIA's usual practice, the research project was guided by a steering group, which comprised:

**Steering group chair**

Mr S Taylor of the Health and Safety Executive

**Steering group**

| | |
|---|---|
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| Mr A Churton | Estuary Housing Association (*representing the Confederation of Construction Clients*) |
| Mr P Devlin | Wright & Wright Architects |
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| Mr R Keenan | Sheppard Robson |
| Mr A Keiler | Centre for Windows and Cladding Technology |
| Mr A Perry | Group 4 Falck Global Solutions UK Ltd (*representing the British Institute of Facilities Management*) |
| Mr D Scott | Laing Construction Ltd |
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**Project funders**

This project was funded by:

The Health and Safety Executive

HL Plastics Ltd

CIRIA' Core Programme Sponsors

**Technical organisations**

CIRIA and the authors gratefully acknowledge the support of these funding organisations, the technical help and advice provided by the members of the steering group and the following individuals:

Colleagues and specialists throughout Arup in particular Phil King (Arup Façades), Mark Thomas (Arup Facilities Management) for reviewing the document and Amy Sebba (Arup Project Management) for assisting the authors in co-ordinating and collating all the technical contributions.

Contributions do not imply that individual funders necessarily endorse all views expressed in published outputs.

**Note**

Recent UK Government reorganisation has meant that DETR responsibilities have been moved variously to the Department of Trade and Industry (DTI), the Office of the Deputy Prime Minister (ODPM), the Department for Environment, Food and Rural Affairs (DEFRA) and the Department for Transport (DfT). References made to government agencies in this publication should be read in this context.

For clarification, readers should contact the Department of Trade and Industry.

# Contents

# 1 Introduction

## 1.1 Setting the scene

The Construction Industry contributes some 9 per cent of the UK's GDP, amounting to around £65 billion investment per annum (National Audit Office and Bourn, 2001). This is a significant contribution but what is not always appreciated is that the cost of maintaining and repairing the resulting asset base is some £26 billion. It is therefore vital for clients to be provided with assets that may be safely (and economically) maintained and repaired, and effort should be expended in the early stages of a project to ensure that design deliberations extend to a consideration of the whole-life requirements of the facility.

The obligation to consider these matters is already enshrined in law, but it is often not well done, and there is a lack of practical guidance. For many clients and designers, the concept of considering and planning for work that will be done on a facility, often long after its construction, represents nothing less than a cultural shift in work attitudes and thinking.

The need for safe access for maintenance and repair stems, in the main, from the interrelated consideration of the statutory responsibilities of those involved, the ever growing need for containment of cost, the management of risk in an holistic manner, and corporate social responsibility, which encompasses sustainability. As is explained in Section 1.5, there are growing pressures from these sources, which create strong incentives for improvement.

Those with the responsibility for managing the maintenance and repair of facilities are likely to find that the organisations who carry out this work, will in future increasingly demand adequate provision of safe access, or will price additionally for suitable mitigating and controlling measures to compensate for shortfalls in provision. They, after all, have their own statutory obligations. It is in everyone's interest to get it right first time.

In this book the term *safety* is intended to be an inclusive term, covering both health and safety. The former in particular is often neglected, but represents a major area of concern, and one that may be significantly avoided or mitigated at the design stage.

## 1.2 Purpose of this guidance

This guidance has been written to provide practical advice to all those with an ability to influence the design of safe access for maintenance and repair.

| **Influencers** | |
|---|---|
| clients | designers |
| specifiers | purchasers |
| facility managers | owners |
| manufacturers | contractors |

| **Maintenance includes** | |
|---|---|
| inspections | surveys |
| assessments | renewals |
| repairs | |

In addition, this book has a number of specific purposes.

1. To help designers discharge their responsibilities through providing compliant but cost-effective and appropriate access measures.
2. To broaden awareness generally of the importance of appropriate access for maintenance and repair, as part of a whole-life risk management strategy.
3. To assist clients in understanding the issues, and options available for safe access.
4. To provide a benchmark for future improvements to safe access provision.
5. To encourage feedback from those with experience of maintenance and repair work, such that this guidance may be updated for the benefit of industry as a whole.

## 1.3 Coverage

The guidance is centred around new building structures, but is also intended to be of use for refurbishment projects. It is geared towards the safe access required for planned maintenance and repair. This will involve those items of work that, from a risk management exercise undertaken by designers, are anticipated to occur during the lifetime of a facility. Sources of reference include manufacturers' literature, codes of practice, experience of use and a range of requirements and guidance from the Health and Safety Executive.

Chapter 1 considers:

- the purpose, scope and coverage of this guidance (see sections 1.2 and 1.3)
- who should read this guidance (see Section 1.4)
- why you should read and follow this guidance (see Section 1.5)
- the roles and responsibilities of the parties involved (see Section 1.6)
- the best practice processes for providing safe access (see Section 1.7).

Chapter 2 considers some of the general issues associated with access for maintenance, for example methods of access, space and environmental work issues.

Chapter 3 provides a series of building element examples to assist designers through the decision making process. These are sub-divided into the following sections:

- below ground (Section 3.1)
- primary structure (Section 3.2)
- building envelope (Section 3.3)
- building services (Section 3.4).

Chapter 4 deals with work place hazards, for example working near water and manual handling. It offers practical guidance to designers in addressing these circumstances.

## 1.4 Target readership

The guidance should be of interest to all those involved in the built environment, however it is specifically directed at four groups.

These are:

1 *Clients* – who have statutory responsibilities in respect of maintenance and repair works, and will also be interested in the whole-life cost of a facility.

2 *Designers* – architects and engineers who have statutory and (probably) contractual responsibilities for aspects of the operational phase of a facility.

3 *Planning supervisors* – who have statutory responsibility to ensure (so far as reasonably practicable) that designers fulfil their statutory role and that relevant information is provided.

4 *Others* – such as owners and facility managers who attract statutory responsibilities in the operational phase and are in a position to provide valuable feedback on matters relating to safe access provision.

Clients, in this context, are those parties who hold responsibility for a facility at a design stage, ie when decisions on matters relating to access are being made. Depending upon the procurement route chosen (see Section 1.7.3) this could occur at any time up to completion of the project.

Designers may appear in many guises: design decisions will be made throughout the project, and well into the construction phase. Responsibility for an area, or item, may shift from one designer to another as the project progresses.

Typically, designers exist as:

- scheme designers (architects and engineers)
- specialist contractor designers
- plant and equipment specifiers
- specifiers of package components, eg plant rooms.

Specifiers will also include those engaged in procurement, if their work involves stipulating access requirements.

The guidance will also give support to others (owners or facility managers for example) who have responsibility for existing facilities, and seek advice on what may be required to bring their access provision up to a recognised standard.

## 1.5 Key drivers

There are a number of drivers for considering safe access for maintenance and repair. Many of these, although originating from separate and unrelated sources, complement each other creating a logical and persuasive imperative for change.

### 1.5.1 The business case

Aside from complying with statutory obligations, there is another equally powerful reason for giving due consideration to safe access. Implicit also within the *Constructing Excellence*[a] agenda, the case is simply that if poor provision is made there is an increased likelihood of:

- civil action by those who may be affected (through accident or ill health), for example against employers or owners
- additional time to undertake tasks
- the need for additional personnel to undertake tasks safely
- additional training
- managers and operatives cutting corners to minimise the time spent working in adverse conditions
- omission of maintenance or repair activities
- additional costs arising from the shortfall in adequate safety provision
- risk of loss of use
- additional insurance costs arising from sub standard provision of safe access.

**Example 1**

A nine-storey building was situated on the corner of a very busy road in the city of London. A fit-out contractor had broken the inner sheet of the inner layer of laminated annealed glass. The broken panel was one of the largest on the building, and hence one of the heaviest. It was on the top floor, on a very prominent corner of the building,

The fit-out contractor spoke to the original cladding contractor to ask about arranging a replacement. The glass has to be re-glazed from the outside, it is bonded into a carrier frame and sits in an interlocking panelized system. The panel is at the corner of the building and, because of its size, cannot go on the building maintenance cradle. The building is on one of the key arteries in the City so a road closure for a crane is out of the question. Replacing the unit will require closing the square to the north of the building to traffic for a weekend, and will need an 80 tonne crane positioned on the wrong side of the building to rig a second, 200 tonne crane, also on the wrong side of the building, to lift the replacement panel over the 9 storey development and lower it into place above a busy, (and only partially closed) street.

The estimated cost of supplying and fixing one replacement-glazing panel will be approximately £40 000 to £45 000 equivalent to about £5000 per $m^2$.

[a] The umbrella body for implementation of the Rethinking Construction and Construction Best Practice programmes.

**Example 2**

A school plant room is situated on the roof. Access from the floor below is by a vertical access ladder, which prevents users from readily carrying loose items such as clipboards, lamps, or filters. As a consequence, a second person is needed to assist. The nature of the vertical access also discourages the school's facility manager from visiting the plant room as often as is required.

**Example 3**

In order to save money at design stage, a motorised window-cleaning gantry was downgraded to a manually operated version. Once in use it was found that the manual effort to move the gantry was excessive and the cleaning operation took too long. In addition, the difficulties of rescuing operatives in an emergency were exacerbated by this situation. The gantry was ultimately changed at a considerable premium compared to the cost of installing it (to the original specification) at the time of construction.

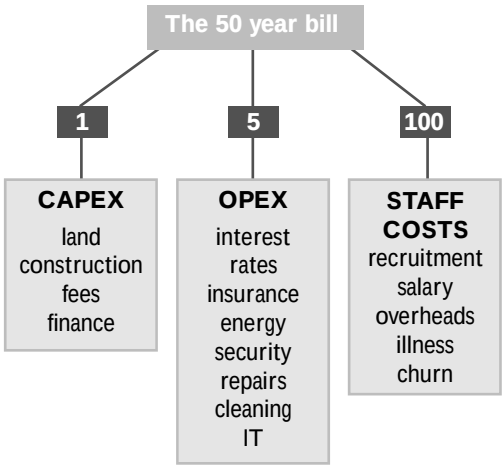
The importance of the business case is well illustrated by the 1:5:100 rule (Evans *et al* 1998). The ratios represent, for a typical commercial building (over its life):

1: construction costs

5: maintenance and operational costs

100: business staff costs.

Although these ratios will vary, depending upon the nature of the facility, the rule illustrates the importance of paying adequate attention to the creation of an appropriate inclusive and co-effective maintenance strategy. Decisions made at design stage will affect the efficiency and on-going costs of the facility for its lifespan (eg 50 years).



It is not difficult to see why the business case is such a powerful lever. Typically, the cost of providing access for a frequent maintenance activity accounts for 20-35 per cent of the overall job cost. Labour costs may account for a further 30 per cent. Careful thought at the design stage provides opportunity for significant savings and efficiencies. It is necessary to consider these benefits over the lifespan of the facility as it may be necessary to increase initial capital outlay (by installing a gantry for example), to realise the longer-term savings (less time or lower skill level required to complete the task and less disruption to users).

The 1:5:100 ratio also emphasises the need for maintenance and repair activities to avoid disruption to the on-going business, through the use of safe, well designed access.

It is well established that the cost of including or installing safe access provision as an after-thought (either after completion of design or of construction) is significantly more expensive than when it is done as an integral part of the overall scheme design or construction. Hence it makes good business sense to identify an access strategy early in the project so that appropriate monies may be allocated within the cost plan.

Well designed access for maintenance and repair will allow tasks to be performed in conditions that encourage quality work, within user-friendly and safe environments.

**Example 4**

The building services designer decided to specify a remote monitoring system for a plant room. As a consequence the need for maintenance contractors to visit the facility was significantly reduced. Although this resulted in a higher capital cost, the saving in on-going maintenance inspection expenditure was significant. This also benefited the client in whole-life risk management terms.

### 1.5.2 Insurance issues

Insurance costs are increasingly becoming an important element of the business case for good health and safety management and, by inference, specifically in respect of safe access. The beneficial link between insurance and risk management was raised in the Revitalising Health and Safety Strategy Statement, (DETR and HSC, 2000) where it was reported that “the Insurance Industry has indicated that the introduction of auditable management standards would assist them in encouraging better health and safety performance from their customers…” (paragraph 54).

Those seeking general building insurance will need to demonstrate that their risks are managed and controlled in a structured manner before being able to obtain cover at commercial rates. Although historically the influence of insurance has not significantly affected the provision of safe access, in future a

more stringent line may well be taken by insurance companies in order to protect their position.

This will impact on:

- building owners
- maintenance contractors
- tenants with maintenance obligations.

These groups are all exposed to employers and public liability insurance premium increases, and specifically so if they are involved in facilities with poor access provision.

### 1.5.3 Statutory obligations

The statutory obligations of those involved in the design of safe access for maintenance and repair, stem from the Health and Safety at Work etc Act 1974. In almost all cases, the projects requiring these access provisions will also fall under the auspices of the Construction (Design and Management) Regulations 1994.

Other health and safety regulations, such as the Workplace Regulations, and Building Regulations requirements (Part K for instance) will also be relevant when designing for safe access. The introduction of new regulations in 2004 to implement the EU Working at Height Directive will bring added focus.

A feature of UK legislation in respect of health and safety matters is that a degree of responsibility is attached to all parties involved in the provision of a facility (and hence its repair and maintenance). This responsibility may not be passed on to others and often extends over the entire lifespan of the facility.

The nature of the legislative framework is such that, for the most part, it is goal setting. The appropriate measures to be taken have to be derived on the basis of the specific circumstances, in accordance with risk management principles, informed by industry norms and best practice guidance, such that foreseeable risks are avoided, mitigated or controlled so far as reasonably practicable.

With regard to the provision of safe access for maintenance and repair, these actions will involve all those who are involved in the design of facilities. Responsibilities are considered further in Section 1.6.[b] The forward thinking project team will use these obligations to avoid, mitigate or control risk as an opportunity to bring a pragmatic and thorough business orientated approach to their design, and to manage health and safety risks as well as wider project risk issues.

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[b] The assessment of safety and risk, albeit in relation to structural safety, has been discussed by SCOSS (Standing Committee on Structural Safety). The arguments and issues raised however, and illustration of statutory obligation, are equally applicable to those in relation to risk management of access for maintenance and repair (SCOSS, 1999).

**Point to note**

Organisations found guilty of health and safety related offences, now have their details publicised on the HSE website.

### 1.5.4 Government and industry initiatives

There are two key government and industry initiatives particularly relevant to this guidance:

- Revitalising Health and Safety Strategy Statement
- Constructing Excellence.

#### Revitalising Health and Safety Strategy Statement

In June 2000 the DETR published the government's ambitious, but necessary, 10-year plan to improve health and safety within the workplace (DETR and HSC, 2000). This was promoted in recognition of the significant suffering and cost to organisations, and hence the nation, of ill health and accidents at work, and was designed to achieve a step change in health and safety performance and thinking.

The strategy aims for:

- a reduction in the number of working days lost per 100 000 workers from work related injury and ill health by 30 per cent by 2010
- a reduction in the incidence rate of fatal and major injury accidents by 10 per cent by 2010
- a reduction in the incident rate of cases of work related ill health by 20 per cent by 2010
- to achieve half the improvement under each target by 2004.

To achieve these aims, all those able to bring influence to bear should do so to enable the workplace, and its access and egress provision, to become safer than at present.

The emphasis on health is particularly relevant to this guidance as designers can significantly influence the likelihood of workplace ill health occurring during maintenance or repair operations. Examples of situations where ill health may be an issue, if the conditions persist, are given in Section 1.7

#### Constructing Excellence

Constructing Excellence is the umbrella body charged with overseeing the implementation of the recommendations from *Rethinking Construction* (Egan 1998). It has spawned a number of key initiatives and business aids promoted to help the industry improve its performance over a wide range of areas. The overall aims of Constructing Excellence fit well with the philosophy outlined in

this guidance and it is commended to users of this book. Linking with this, *Accelerating Change* (Strategic Forum for Construction, 2002) takes forward the Constructing Excellence agenda, and sets out three key themes, all of which are relevant to the subject of this guidance.

These are:

1 **Client involvement –** clients are urged to play an active role in establishing a forward thinking culture within the team, and to create an environment that delivers excellence in health and safety performance (throughout a facility's life).

2 **Integrating the team –** the report emphasises the benefits to be obtained from integration, and utilising the skills and experience from within the entire supply chain.

3 **People issues** – the recognition of people issues is a key element to a successful project. This subject encompasses a wide range of considerations, but in relation to maintenance and repair it would include the active goal of achieving a safe, and healthy work environment.

## 1.6 Responsibilities

This section gives guidance on the key statutory obligations that arise as a consequence of the Health and Safety at Work, etc Act 1974 (HSWA), and its subordinate legislation. It also considers the benefit of a best practice approach, and the underlying liabilities that may accrue if insufficient attention is paid to safe access at an early stage in the project.

The parties involved providing a safely accessible facility, may attract responsibilities from a number of sources.

These include:

- a general duty of care
- a code of conduct imposed by professional or trade bodies
- contractual responsibilities
- **statutory obligations**.

The last two points are very different. Contractual responsibilities will vary from project to project, and are discussed in connection with procurement strategies in Section 1.7.3. Although projects may be procured via numerous contractual routes, statutory responsibility is largely unaffected, and may not be passed on through these contractual arrangements.

In considering the responsibilities of those involved, this section groups the parties as client, designers, planning supervisors and others. Client is as defined in the CDM Regulations.

### 1.6.1 Client

The client is in the unique position of being able to set the tone and standards for a project. Their attitude to health and safety matters, and the importance attached to whole-life consideration of risk will significantly affect the manner in which the project progresses. A best practice client will wish to ensure that the project designers have similar aspirations and beliefs.

The key statutory obligations of clients, which will have a direct bearing upon effective provision of safe access, include the following.

| | |
|---|---|
| Ensuring competency of designers and planning supervisors | Time invested in an appointment process that accords due weight to a genuine knowledge of health and safety principles and working practices, and an understanding of best practice as exemplified by Constructing Excellence, will pay dividends. |
| Provision of existing data | If the project relates to modification/extension of existing facilities, the prompt provision of background data (including existing health and safety files if applicable) will assist the designers in understanding current provision and shortfalls.<br>Details of any relevant insurance claims relating to access issues will also assist. |
| Management strategy | The CDM ACOP (paragraph 13) (SI 1994: 3140) requires the client to have appropriate arrangements to ensure that projects are properly managed. These must be in writing for all but the simplest of projects. (paragraph 16) |

**Point to note**

Where clients regularly commission buildings, ensure that lessons learned and any shortfalls discovered are directly fed back into any further projects, and the designers are made aware of these issues. Further on-going improvements may then be introduced.

Clients' obligations have been reinforced over the years by important legal judgements, relating particularly to the competency and monitoring of employed designers and contractors. In addition to these statutory duties, the client will also gain advantage by ensuring adequate feedback and briefing.

Even for one off clients, or those with no normal involvement in the Construction Industry, feedback will be of relevance, as improvements made to access provision, derived from information received, will assist in reducing costs and liabilities in the future. For those clients who do operate in the built environment, there is everything to be gained by an open, no blame, transfer of learning experience.

## 1.6.2 Designer

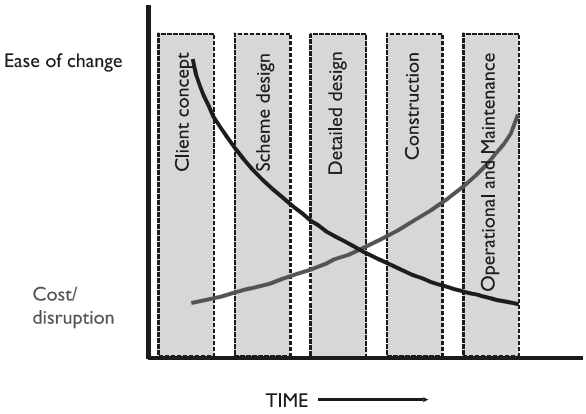
Notwithstanding the importance of all contributors, the designer is key to the successful provision of safe access. Designers may appear in various guises throughout the project. In respect of consideration of safe access their general obligations remain the same, although their contractual role may vary.

Although the CDM regulations do not impose duties on designers in respect of:

- the maintenance of plant
- the general use or operational phase of facilities,

obligations under Health and Safety at Work, etc Act 1974 (HSWA), the Management of Health and Safety at Work Regulations 1999, and the Workplace (Health, Safety and Welfare) Regulations 1992 for example, do impose a duty to manage risk, in all situations. Designers must, therefore, give consideration to the entire lifespan of a facility when making design decisions. If these are taken in the early stages of a project, they will generally give greatest scope for choice, while minimising additional cost. For further information on regulations see Appendix 1.

This figure shows that the earlier the change is made during the project's life cycle the easier it is to implement.




The statutory obligations of designers, in respect of safe access considerations, include the following.

**Advising the client of his duties** — This general obligation is an ideal opportunity to impress upon the client, not only his statutory obligations, but also the business benefit of a well considered access strategy.

**Co-operating with other designers** — This will involve discussions and transfer of information primarily with the scheme design team, and specialist designers at later stages. Access design, proposed by one designer, will often impact upon the remit of another.

**Example 5**

In order to judge the prospective design team member's commitment to best practice and health and safety risk management the client visited the design teams offices to be shown at first hand the approach to other projects. The client also asked for a presentation on how they intended to add value to the project in respect of maintenance issues.

The client agreed to a survey of access provision on an existing facility that was being extended. The design team demonstrated that upgrading the whole facility, while constructing the extension would not only be cost-effective, but would protect the client's statutory position and show long-term savings in maintenance costs.

**Providing information**

The provision of information is vital to achieving safe access. This may relate to:

- deriving an *access strategy* via individual *design philosophy* statements during initial design stages for comment by the team and approval by the client (see Section 1.7.2)
- setting out in the tender documents the clear expectations, limitations and standards expected of any design requiring further development by others, with clear demarcations between packages of work
- including in the health and safety file, the final *access strategy*, where clarification or design assumptions are relevant.

**Providing safe designs**

These are derived by utilisation of the risk management process, outlined in Regulation 13 of CDM, designer duties, in conjunction with other specific Regulations, British Standards, Building Regulations and best practice, and should include the development of an *access strategy* as part of this process. Designs should take account of the known key hazards when considering safe access. For an overview of the CDM regulations see Appendix 1.4.

**Example 6**

In order to derive an access strategy for all the façades of a new building the architect arranged meetings with specialist façade suppliers, hirers of hydraulic platforms and suppliers of cleaning gantries. By using specialists to review the design at an early stage it was possible to determine all the crucial aspects of a maintenance strategy, and to produce an accurate cost plan.

Designers will realise that the derivation of the permanent works design interacts with that of the design for safe access for maintenance and repair. The two have to be considered as an integral whole when assessing the overall risk rating and whole-life costings (see example 7).

**Example 7**

The services design for a retail unit refurbishment incorporates an item of plant attached to the floor soffit within a 1.5 metre deep ceiling void.

It is recognised that a standard suspended ceiling grid will not readily permit safe access over this height. The services engineer therefore asks the architect to specify a modified grid layout in that location to enable adequate access to be achieved from floor level.

**Point to note**

Façade options have varying requirements in respect of sealant and glazing replacement. These impinge significantly upon access requirements and interruption to work activities within offices during replacement operations.

The choice of façade design will take account of access required at ground level, to the façade face, and from within the building. An upgraded window-cleaning gantry, installed at the time of construction, may allow some of these activities to be undertaken without bringing in additional plant.

Pertinent questions for designers to ask themselves are:

"If I were the operative maintaining this plant/roof/ etc, what would I want to be provided to achieve safe working access, in a manner that will not affect my health?"

"If I were the facilities manager, about to engage contractors to undertake maintenance work, is it likely that I would be paying a premium due to poorly thought out access provision?"

### 1.6.3 Planning supervisor contributions to safe access provision

The planning supervisor only exists as a statutory function, created under the Construction (Design and Management) Regulations 1994. (CDM)

A competent planning supervisor will be able to add significant value to the consideration of safe access, by ensuring that the designers:

- co-operate and co-ordinate their designs, such that the issues relating to safe access are resolved in an integrated manner throughout the project

- emphasise and realise the commercial and social benefit that pragmatic application of the CDM Regulations will bring to a client, in addition to statutory compliance.

It will often fall to the planning supervisor to provide the client with the broad overarching arguments for a considered strategy.

| | |
|---|---|
| **Feasibility stage** | Ensuring the principles of access provision are considered by the design team and facilitating agreement with the client. |
| **Detailed design stage** | Facilitating a written, costed, *access strategy* by the designers, based on a risk managed approach, to present to the client.<br>Encouraging the use of specialists (regulators, suppliers or contractors) as advisors where necessary.<br>Encouraging designers to discuss this *access strategy* with those who will maintain the facility, if they are known at this stage. |
| **Contract preparation** | Ensuring that the responsibility for the necessary development, timing, and demarcation, of access proposals by others (eg specialist subcontractors) has been considered by the designers and is included within the tender documents. |
| **Use of specialist designers** | Ensuring that construction phase design, usually by specialist or trade contractors, integrates with the initial design from a safe access viewpoint and that the final details are included within the *access strategy*. |
| **Health and safety file** | Ensuring that final details of *access strategy* and provision are included. |

The health and safety file should clarify to future users the designers' assumptions in respect of access requirements. The more complex instances are likely to need broad *design philosophy statements* assembled into an *access strategy* (see Section 1.7.2).

This approach does not avoid the need for those undertaking repair or maintenance to satisfy themselves as to the appropriateness of the suggested methodology, given the circumstances pertaining at the time. Neither does it prevent them from adopting a different approach that suits their method of working (providing it is safe to do so and they are contractually permitted). It does give them a starting point, however, and confirms to the client that maintenance and repair issues have been thought through.

### 1.6.4 The role of others

Those with responsibility for implementing or managing the maintenance and repair process will not usually have any design related function nor any of the associated statutory obligations. (If they do in fact have a design role, their

obligations are no different from those of designers outlined above). They may fulfil the very useful role of providing feedback. They will be the closest of all the parties involved to the actual usage of the access provided.

These parties might typically include the following.

**New (downstream) owner*** – should endeavour to obtain feedback to ensure that this informs the next purchase/lease of a facility.

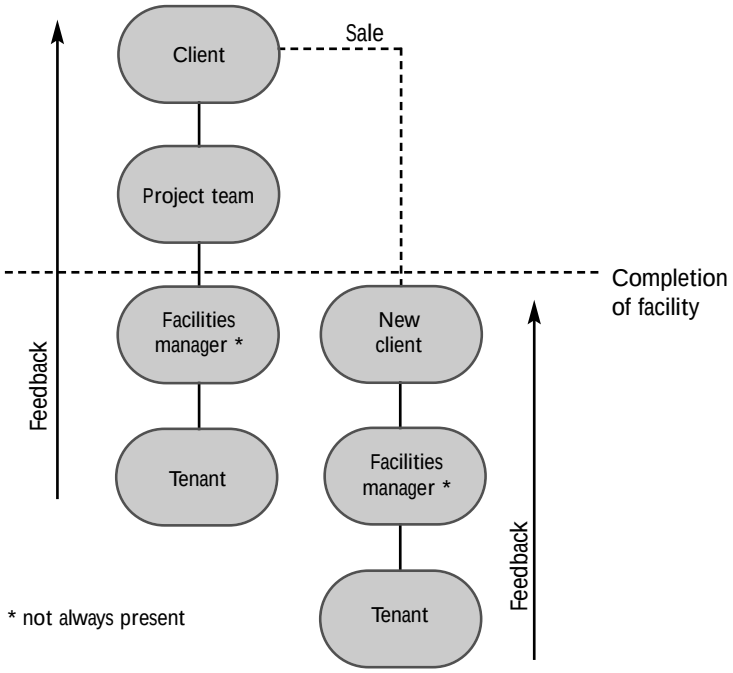
**Tenant (insuring and repairing leases)** – contract should oblige tenant to provide feedback to their landlord where work is undertaken by them.

**Operator/facilities manager** – contract should obligate operators to provide feedback to owner.

**Maintenance contractor** – contract should obligate contractor to provide feedback to their client (and then on, up the supply chain).

*where the project has been sold on or transferred.

Those mentioned above do have other obligations however under the HSWA, and subordinate legislation. Hence any shortfall in the safe provision of access must be taken into account by them when either engaging parties to undertake work, or in its execution. It is to their distinct advantage, therefore, that the provision of access for maintenance and repair has been properly thought out in the design stage.



## 1.7 Statutory and best practice processes leading to safe access provision

Safe access provision stems from the application of best practices processes within the statutory framework.

### 1.7.1 Risk management

Designers and operators are obliged to apply the principles of risk management when designing for safe access for maintenance or repair activities. There are many sources of guidance available on this topic. This document only gives an overview, with the overriding aim of encouraging a pragmatic, business orientated approach.

There a number of key hazards likely to occur during maintenance and repair work. A number of processes may be used during design and operation to assess, reduce and control these hazards.

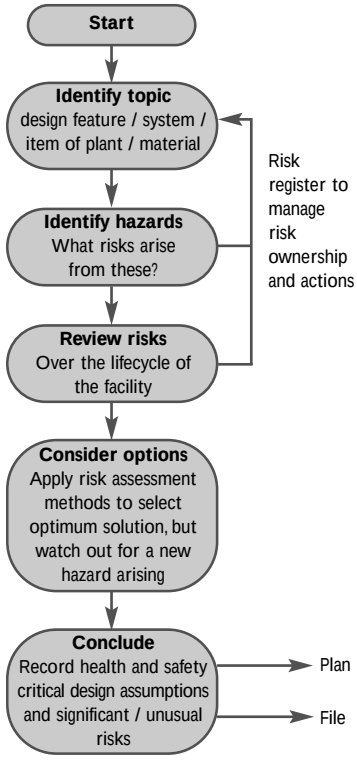
**Key hazards: accidents**

| Hazards | Concerns |
|---|---|
| working at height | inadequate provision to prevent falling of persons, tools or materials<br>reliance on personal protective equipment as first choice solution<br>lack of strategy to rescue persons using fall arrest equipment |
| electricity | unnecessary proximity of electrical items to other plant or work areas<br>use of 240v in external or damp locations |
| traffic | lack of space to separate pedestrians from vehicle movement |
| environment | work undertaken in exposed areas (resulting in low or high temperature, rainy or windy conditions affecting items being handled)<br>confined spaces<br>adjacent hazards |
| fire | avoidable or remote hot work. |

**Key hazards: health**

| Hazards | Concerns |
|---|---|
| musculoskeletal | poorly designed operational space or the need to lift heavy or awkward items |
| noise | reliance on ear defenders as first choice solution |
| vibration (HAVS) | use of vibratory tools |
| hazardous materials | presence of materials with potential to cause harm, eg skin defects, breathing difficulties, or toxic contamination. |

A common approach to risk management is illustrated below.




| Severity of harm / Likelihood of harm | HIGH 3 fatality, major injury / illness long-term disability | MEDIUM 2 Injury / illness causing short-term disability | LOW 1 Minor injury / illness |
|---|---|---|---|
| HIGH 3 certain/ nearly certain | 9 | 6 | 3 |
| MEDIUM 2 reasonably likely | 6 | 4 | 2 |
| LOW 1 Seldom | 3 | 2 | 1 |

**score 9** risk cannot be left; action must be taken

**score 3–6** risk needs to be avoided or mitigated

**score 1–2** risk sufficiently low to ignore at design stage

**scores of 6 and below** are usually qualified by "so far as reasonably practicable"

**Prevention and protection**

The designer is required to apply the principles of prevention and protection as follows:

PREVENT the hazard arising and thus

AVOID the risk, otherwise minimise the risk first by

REDUCING the numbers or frequency or duration of people exposed to the hazard

CONTROL, through

- COMMUNAL PROTECTION

and, finally

- PERSONAL PROTECTION.

When deriving the type of access, as part of the risk management process, it is important to reflect the statutory obligation (so far as reasonably practicable) to:

**Avoid risk –** this should be the first aim. For example, place the Air Handling Unit (AHU) at ground level, rather than on the roof, avoiding the need to inspect and maintain at height.

**Combat risk at source –** introduce permanent non-slip walkway material across the roof, rather than rely on de-icing salt application or warnings to take care.

**Provide collective preventative measures –** provide guardrails to the workplace, at the edge of the roof, rather than rely on safety lines and harnesses.

**Provide individual protective measures –** for example, safety lines and harnesses, gloves, facemasks. The use of personal protective equipment should always be the last choice.

It is a requirement to consider the options in the order given (Health and Safety Commission, 2001; SI 1999: 3140). Failure to do this will lead to non compliance with, for example Regulation 13 of the CDM regulations, and may also result in an uneconomic design when considered from a whole-life standpoint.

Designers should be alert to the danger of inadvertently introducing a further significant risk in the attempt to deal with a previously identified one.

The following suggestions are given to aid the process of effective risk management.

Methodology

There is great advantage in undertaking the evaluation and management of risk through team meetings where a number of people may contribute. In this fashion, there is less likelihood of items falling between two stools and a broad holistic approach may be taken. Examples of this technique are given in www.learning-hse.com where it may be seen that group discussion, with the key points recorded and circulated, provides a rapid, practical and useful means of satisfying Regulation 13 (CDM).

Differentiation

The designer needs to have sufficient experience to appreciate the issues that are important, and which may be influenced and improved, without getting overwhelmed by the insignificant.

Site wide approach

Designers need to be aware that site wide issues are as important as those relating directly to the element of facility being maintained or repaired. For example:

- Will it be necessary to close an adjacent road?
- Will the activity interfere with adjacent tenants?

- Is there sufficient space surrounding the facility to place a crane/cherry picker, etc?
- Is there an interface with the public?

Recording

Although the CDM regulations do not require the recording of risk assessments made by designers, it is considered good practice to do so. Such action will allow reference back at a future stage and will enable a designer to demonstrate that the task was accomplished, in accordance with most QA procedure requirements.

Outputs

The majority of the output will feature as part of the design itself, for example the decision to use a stairway as opposed to a vertical ladder. Other outputs will be in the form of a design philosophy statement, ie "this is how we see the task being done" in order to avoid / mitigate and control risk. These need to feature as part of the project *access strategy* document (see Section 1.7.2).

**Example 8**

The building services engineer called a team meeting to discuss safe access to the plant room for removal of a boiler and generator. The whole team were able to contribute to the various facets of the strategy, for example architect (demountable wall to allow removal of components and layout of hard landscaping below to allow crane access), structural engineer (structural framing revised to allow wall to be removed, and local strengthening of roof to accommodate new generator), services engineer (review of orientation of plant to allow sufficient room for manoeuvre and easy access to shut off valves). This produced an integrated strategy and allowed risks to be avoided, minimised or controlled. The plant replacement strategy was documented within the health and safety file.

## 1.7.2 Design processes

The active, and continuing attention to safe access issues, throughout the design stages, is not always achieved as designers' attention often concentrates on what are perceived to be more immediate concerns. This section is provided to assist in ensuring that safe access is properly considered.

### Whole-life risk management

Designers are obligated to consider health and safety issues over the entire lifespan of a facility. It is by considering the big picture, ie by taking a holistic approach to risk management, that enhanced flexibility and additional options present themselves. For example an access solution that might involve what appears to be a high capital cost (eg a stairway compared to a vertical ladder), may result in lower maintenance costs over the lifespan (as no hoist will be required and fewer restrictions need be placed on persons using a ladder). Designers, supported by planning supervisors, will need to explain and illustrate to clients the benefits of taking the broader view.

**Example 9**

The initial design for a 2.0 m diameter services tunnel included a number of 600 mm diameter access points. While this was convenient from a design perspective, on further examination it was realised that it would result in the need for an involved maintenance procedure utilising escape winches and harnesses in case of an incident. The designers realised that by enlarging the access points to rectangular slots, not only was specialist equipment unnecessary, but replacement materials and other items could be placed more readily thus reducing the time needed to complete remedial tasks.

### Information flows and gateways

Use of project based holistic risk management will also ensure the comprehensive dissemination of information throughout the team. The transfer of information, between team members, (horizontal communication) and then through the supply chain (vertical communication) is essential to success. This may be likened to a matrix structure, and the use of a documented *access strategy* is strongly recommended as a tool to achieve this, allowing:

- the client to understand the liabilities and requirements of maintenance and repair over the lifespan of the facility
- those undertaking the work (or specialists acting in an advisory role if needed) to confirm the suitability of the proposals
- information to be passed on to contractors where there is a later design/build element
- the design life, and maintenance regime assumed, (to be identified for designs carried out in accordance with the Structural Eurocodes (BS EN 1990:2002)).

On complex projects it may be worth appointing a specialist consultant to prepare or review the *access strategy*.

The use of gateways, promulgated by the Office of Government Commerce (OGC, 2001), and more recently by the Strategic Forum (Strategic Forum for Construction, 2002) is an effective tool for the client, project manager or lead designer to use as a check before advancing into the next project stage. In respect of safe access provision, these gateways might consist of the following.

| Stage completed | Gateway check |
|---|---|
| Feasibility | Have strategic issues associated with safe access been identified and assessed? |
| Scheme design | Has a draft, costed *access strategy* been developed? |
| Detailed design | Is the strategy sufficiently developed, for the stage of design attained?<br>Is the strategy part of the cost plan?<br>Have *design philosophy statements* been produced by each designer?<br>Has the *access strategy* been signed off by the client? |
| Tender preparation | Do the tender documents clearly indicate the responsibilities of specialist contractors? |
| Construction (prior to issue of practical completion) | Has the *access strategy* been fully completed and included within the health and safety file? |

**Example 10**

The design team proposed to a developer client that the scheme being prepared for a major international company should not proceed beyond RIBA Stage D without a considered and costed access strategy. This ensured that specialist access provision, such as cleaning gantries and roof walkways, was accounted for. It also ensured that the developer would be able to explain to the building managers for prospective tenants, how the facility was to be economically and safely maintained and repaired.

### Design philosophy statements

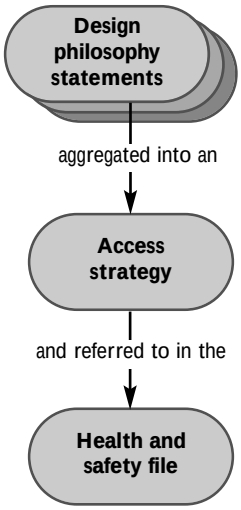
In order to discharge their obligations, it is necessary for those designers with responsibility for considering access for maintenance and repair to have established, in their own mind, a safe means of achieving this end.

For example does the design make clear:

- how the external steelwork will be accessed for repainting, given that there is a glazed roof immediately below?
- how the roof will be accessed, bearing in mind the frequency and nature of the work to be undertaken?
- how the deep drainage sump will be accessed?

Although the contractor engaged to undertake this work, is responsible on the day for a safe method of work, and may choose to do it differently, it is good business practice to have a workable solution to hand. It will also demonstrate, should the need arise, that the designers duties under CDM have been met.

This diagram shows how *design philosophy statements* are collected together to form the *access strategy* for the project, which is then referred to in the health and safety file.




For many access needs, statements produced by the designers may be unnecessary as the task is obvious and straightforward. A sensible view should be taken in order for any statement to have added value. For those instances where it is considered desirable, a *design philosophy statement* might set out the following.

| Element | Example |
|---|---|
| **The anticipated tasks, and their frequencies** | ■ AHU filter replacement at 3 monthly intervals |
| **The route to be taken to access the particular area/piece of plant and the means of travel** | ■ use hired in cherry picker etc, and then marked access across roof |
| **Specific safety measures assumed** | ■ use of harness attachment points adjacent to glazing |
| **Specific risks** | ■ hot surfaces from adjacent pipes (burning)<br>■ isolated area (lone working) |
| **External issues** | ■ need to close roads<br>■ avoidance of weak spots eg manhole covers<br>■ traffic management measures. |

The specific risks would only relate to those that a competent contractor would not reasonably expect or be aware of. These might be those of an unusual nature, or common risks occurring in an unusual circumstance.[c] It will not help if a long list of all foreseeable risks is produced. The *design philosophy statement* may be developed over a period of time, particularly if the detailed design is completed by specialist package contractors. It should, however, finally end up as part of the overall *access strategy* document and be placed in the health and safety file.

#### Access strategy

The *access strategy* is composed of all the individual *design philosophy statements*, providing those with responsibility for maintenance and repair a comprehensive outline of the designers assumptions and expectations. This document should be concise and relevant, generally excluding generic material.

In some cases, particularly in respect of existing facilities, the *access strategy* document may interact with a life-care plan. These are documented arrangements for a facility, written to inform the client or operator of the likely inspection, assessment, component replacement and remediation needs over the designed lifespan (Institution of Civil Engineers, 2002; BS ISO 15686-2:2001). Although the ICE Report (2002) presents these plans in relation to car park structures, there is no reason why they should not have universal applicability. If appropriate, it is recommended that part of the life-care plan should contain the *access strategy*, which is made up of the *design philosophy statements*.

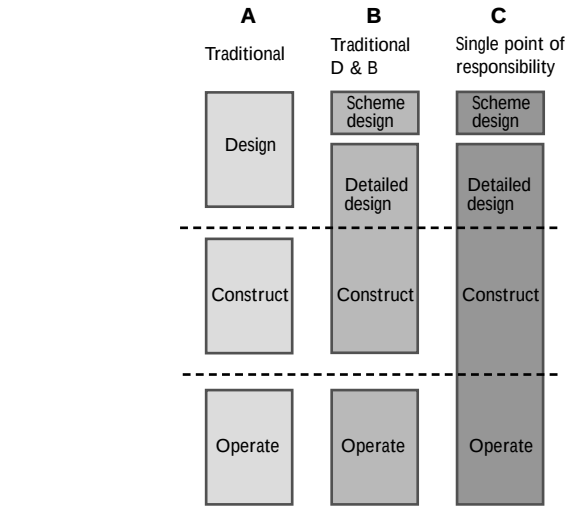
### 1.7.3 Procurement and construction processes

#### Benefits of integrated teams

In today's construction market there is a myriad of procurement routes and options. Three generic models are illustrated in the following figure.

[c] See CDM ACOP, para 127. Examples might include the need to lift replacement plant over third party air rights, or over other occupied areas.

**Project procurement options**




| | A | B | C |
|---|---|---|---|
| Direct link with specialist designers | No | Yes | Yes |
| Direct link with maintenance contractors | No | No | Yes |

The chosen option, from these and other variants, will be selected for a number of reasons and will not necessarily be compatible with the ideal of a fully integrated team.

The benefit of a fully integrated team, in this context, is that those who have experience of maintenance and repair are at hand and able to advise on appropriate solutions and options, during the early stages of the project. In the case of PFI or prime contracting, the same point of responsibility pertains throughout the operational life (or at least for a reasonable period) and hence they will be living with the advice given during the design process. In conventional design and build, this responsibility is not there, as the contractor has no long-term operational responsibility.

Although integrated teams will not always be achieved, alternative means are available to provide the same benefits. It is suggested that where access provision involves knowledge of maintenance or repair work types and techniques outside the direct experience of the (consultant) design team, specialist contractors or facility managers, are approached to give advice in their field of expertise (see example 6). Careful thought needs to be given as to whether this is achieved as free advice, or on a consultancy basis. If the latter, this will usually be money well invested and will pay dividends later in the operational phase of the facility.

### Framework agreements

There is much to be gained by all those in the supply chain from a contractual arrangement, which establishes a long-term relationship. These are usually referred to as framework agreements and may occur between any two or more parties in the supply chain, although they are most commonly associated with client led agreements.

In this regard:

- lessons learned on one project may be readily put into practice thereafter
- processes may be honed with experience and feedback
- long-term investment by designers, contractors and suppliers is more attractive.

This enables consistent standards be set in respect of access for maintenance and repair, and provides an opportunity to introduce improvements over time more readily than if varying teams were appointed on a project by project basis.

### Contractual issues

It is important that the contract established with project members reflects a suitable division and coverage of responsibility in respect of safe access provision. Typically these contracts will be with the client (client-designer), or with the contractor (client-contractor-trade contractor/designer).

Areas where confusion may arise, and hence a lack of due consideration, include access to:

- package plants sitting on a frame designed by others
- services within a service duct or void designed by others
- life support system components placed within areas designed by others
- building surrounds due to hard landscape layout, or internal space due to design of fittings.

It is at such design package interfaces that the greatest scope for omission of risk management often occurs.

### Content of operations and maintenance (O&M) manuals and health and safety files

Many bespoke contracts have standards clauses for O&M manuals and health and safety files that tend to be used on a repeat basis. Some industry forms, for example JCT, also have standard clauses. While these are a valuable aid, and avoid the need to reinvent the wheel for each contract, they often promote a lack of attention as to their suitability in respect of specific contract needs, and the requirement for full details of safe access provision in particular.

Designers should be satisfied that these contract clauses adequately spell out the requirements in respect of the following.

*Timing of submission of access proposals* – will this suit the approval process, and the need to have data available for phased or total use of the facility?

*Design issues relating to access* – how will residual risks, identified by specialist designers, be passed on to the planning supervisor, and the health and safety file?

*Drawings of access provision* – will complete a set of construction drawings be provided, with time for commentary, before use of the facility?

*Manufacturers' literature and details* – do proprietary products, eg eyebolt fixings, which will require regular testing, have data available in an appropriate format?