Construction (Design & Management) Regulations 2015: Designer's Guide

OHS-C-16.G2

Guide

1. Introduction

CDM2015 update

The main duties of Designers continue unchanged from previous iterations of the CDM Regulations. This updated guidance reflects general revisions introduced by CDM 2015 and the two additional duties imposed on all Designers. (Additional duties relate to the provision of information to the Principal Designer (where appointed) and updating of the Health and Safety File (as required).

Successful management of health and safety risks arising in Construction Projects is very much dependent on a successful interaction across the whole Project Team. Designers have a key role. They have a strong influence during the concept, feasibility and design stages of a project. The earliest decisions can fundamentally affect the health and safety of those who will construct, maintain, use, work within, repair, clean, refurbish and (eventually) demolish a building.

To ensure effective cooperation and coordination at all stages of the Project, Designers must familiarise themselves with the roles and responsibilities of other CDM duty holders effective Project Team.

CDM Designer duties apply irrespective of the size, scope, extent, or notification status of the Project.

The aim is for health and safety considerations to be treated as an essential, but normal, part of Construction Project development – not as an after thought or "bolt –on extra".

CDM compliance, in terms of communicating health and safety risks, is about

"THE RIGHT INFORMATION FOR THE RIGHT PEOPLE, AT THE RIGHT TIME"

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2. Scope

This Guidance applies to all Designers (including external appointments) working on Fife Council Projects. It should be read in conjunction with the general CDM and related guides available at our Intranet Construction Safety and CDM compliance pages and Fife.Gov at http://www.fifedirect.org.uk/CDM

3. Purpose

This Guidance document describes the role, responsibilities and Fife Council's expectations of those undertaking the role of Designer in Construction Projects. It provides essential information to aid designers, Principal Designers and others working on the Project in the identification, elimination and reduction of risks arising from construction design.

4. Guidance

4.1 The Designer's Role

At concept and Project design stages, the Designer must consider the health and safety of those who will repair, clean, maintain, work within, use, modify, or eventually demolish a structure. Failure to address **all** these life-cycle aspects adequately at the design stage may make it difficult to devise safe and cost effective systems of work later on.

Designers must reduce foreseeable risks to health and safety. Decisions about "foreseeable" risks are based only on the information available and industry knowledge when the design is prepared or modified. Designers cannot be accountable for emergent, hitherto unforeseeable health or safety risks.

CDM is not about stifling creativity or innovative designs, however designers must not produce designs that cannot be constructed or maintained safely.

Table 1 "The Design Process under CDM" is intended to assist Designers and others involved in Project risk evaluation.

Note that the Designer's involvement with the Project often extends well beyond the initial Project Design stages. There may be on-going design extending into the Construction Phase, arising alterations or Architect Instruction issues that require a continued close cooperation and coordination with Contractors and others involved with the Project.

4.2 What designers must do for all Projects.

The Construction (Design and Management Regulations) (CDM) require that all Designers:

(a) when carrying out design work, avoid foreseeable risks to those involved in the construction and future use, maintenance, etc. of the structure. In doing so, they should eliminate hazards and (as far as is reasonably practicable, taking account of other design considerations) reduce risk associated with those hazards which remain.

(b) provide adequate, comprehensible information, in good time, about any remaining significant risks associated with the design to others involved with the Project.

(c) co-ordinate their work and cooperate with others involved with the Project to improve the way in which risk is managed and controlled.

(d) ensure appropriate information is included in the health and safety file *(new for 2015).*

In carrying out these duties, designers need to consider the safety of those who:

- carry out construction work (including ultimate demolition of the structure);
- clean any window or transparent or translucent wall, ceiling or roof in or on a structure or maintain the associated plant, equipment, permanent fixtures and fittings;
- occupy or use the structure or building
- use a structure or building as a workplace

4.3 Evaluating & combating risk

Designers are not expected to consider or address risks that cannot be foreseen, and the CDM Regulations do not require (impossible) 'zero risk' design. Designers must however produce designs that can be constructed, maintained, used or demolished in reasonable safety.

Designers are required to consider the impact of risks arising from the existing environment (including the surrounding 'built environment' and its uses), and from existing structures when preparing their designs, as well as the risks arising from their own designs.

Use of the OHS-C-16.F2 Checklist is mandatory for all Projects involving the preparation of new (or significant alteration to existing) designs.

The Council's **CDM Project Checklist" OHS-C-16.F2** shall be used to assist Designers and other duty holders in identifying, considering and mitigating risks arising in Projects, and as a primary means of communicating risk information at pre-construction stage.

Designers must apply the general principles of prevention (sometimes referred to as a hierarchy of control) when evaluating health and safety risks. These general principles are often summarised as the acronym "**ERIC**"; the first duty (where possible) being to **E**liminate risk, followed thereafter by **R**educe, **I**nform and **C**ontrol.

Further information about the application of "ERIC" is given at Appendices 3 & 4.

4.4 Occupational Health Risks in Construction

Occupational health risks are often given inadequate consideration at the design stage. The incidence of long-term ill-health in the construction industry is a continuing and serious problem and Designers (and others) could do more about this by reducing or eliminating:

- *musculo-skeletal risks* (e.g. by considering component weights and improving provision for mechanical handling);
- *hand –arm vibration risks* (e.g. by avoiding processes which involve lengthy use of high-impact, vibratory or percussive hand-held power tools);
- avoiding *respiratory risk*s to construction workers by specifying finishes which do not involve generation of dust or the release of organic solvents.

In many instances, these occupational health risks may be reduced significantly by specifying off-site prefabrication processes. Other benefits and cost reductions can often arise from an early consideration of alternative approaches.

4.5 Communicating information about residual risk

The preferred method of communicating information about significant residual risk to contractor is on or with the design – usually in the form of notes on drawings.

Where the instruction or information is lengthy or complex, it may be cross-referenced and provided in writing (e.g. a suggested or required construction method statement). Remember that the information you provide about residual risk must be focused and concise, relating to areas of significant residual risk arising from the Project and Project design.

Your focus should be on issues which the competent contractor could not reasonably be expected to know about.

You must **avoid:**

- stating the obvious or discussing trivial every-day risks,
- reiterating that which is already contained in contract terms or tender documents,
- reiterating generic information covered elsewhere, e.g. Generic Site Safety Rules.

Communication with other Project Team members will extend beyond the provision of drawings or additional instruction to the contractor - Designers must take effective part in regular and meaningful dialogue with others, including Clients, other Designers & disciplines (and where appointed, the Principal Designer); agreeing effective ways of eliminating hazards & dealing with Project significant residual risks.

The Project Checklist referenced at 4.4 will be used as the primary means of communicating and coordinating health, safety and related risk information at the pre-construction stages of the Project.

4.6 Providing Information for the Health and Safety File

CDM 2015 introduced an additional duty on all designers to ensure that relevant information is included in **the Health and Safety File**. Where a Principal Designer is appointed for the Project, the duty of others designers will be discharged by ensuring that appropriate information is passed to him.

Relevant information is that which may affect the people listed at 4.2(d) above. Note that not all design work will have an impact on the File. Where it does, the duty can often be discharged by ensuring an appropriate, brief, prominent note is inserted in the File. The note may in turn make reference to a relevant drawing or manual – particularly where the note is intended for specialist contractors or maintenance personnel. Designers must liaise with the CDM Client to confirm location and required or preferred layout of the Health and Safety File. More information about Health and Safety Files available within Guide **OHS-C-16.G10**.

4.7 Design considerations for buildings used as a Workplace

All designs intended to be used as work places must comply with the ***Workplace Health Safety and Welfare Regulations 1992 (WHSAWR)***. Remember that most buildings (other than wholly domestic property) will be *somebody's* workplace!

Designers will usually satisfy the requirements of WHSAWR by following the various well-established complimentary building codes, standards and regulations.

The principle objective of WHSAWR is to reduce the risks associated with work in or near buildings, and that due regard is given to the elements listed overleaf:

- *maintenance of the workplace and of the equipment servicing it*
- *ventilation, temperature and lighting*
- *cleanliness*
- *workspace allocation*
- *workstation design and arrangement*
- *traffic routes(vehicle and pedestrian), roadways and floors (see also OHS-C-16.G6)*
- *glazing*
- *doors and gates*
- *travelators /escalators*
- *sanitary and washing facilities*
- *drinking water supply*
- *accommodation for clothing*
- *facilities for changing, rest and to eat meals*
- *fall protection*

5. References and Related Documents:

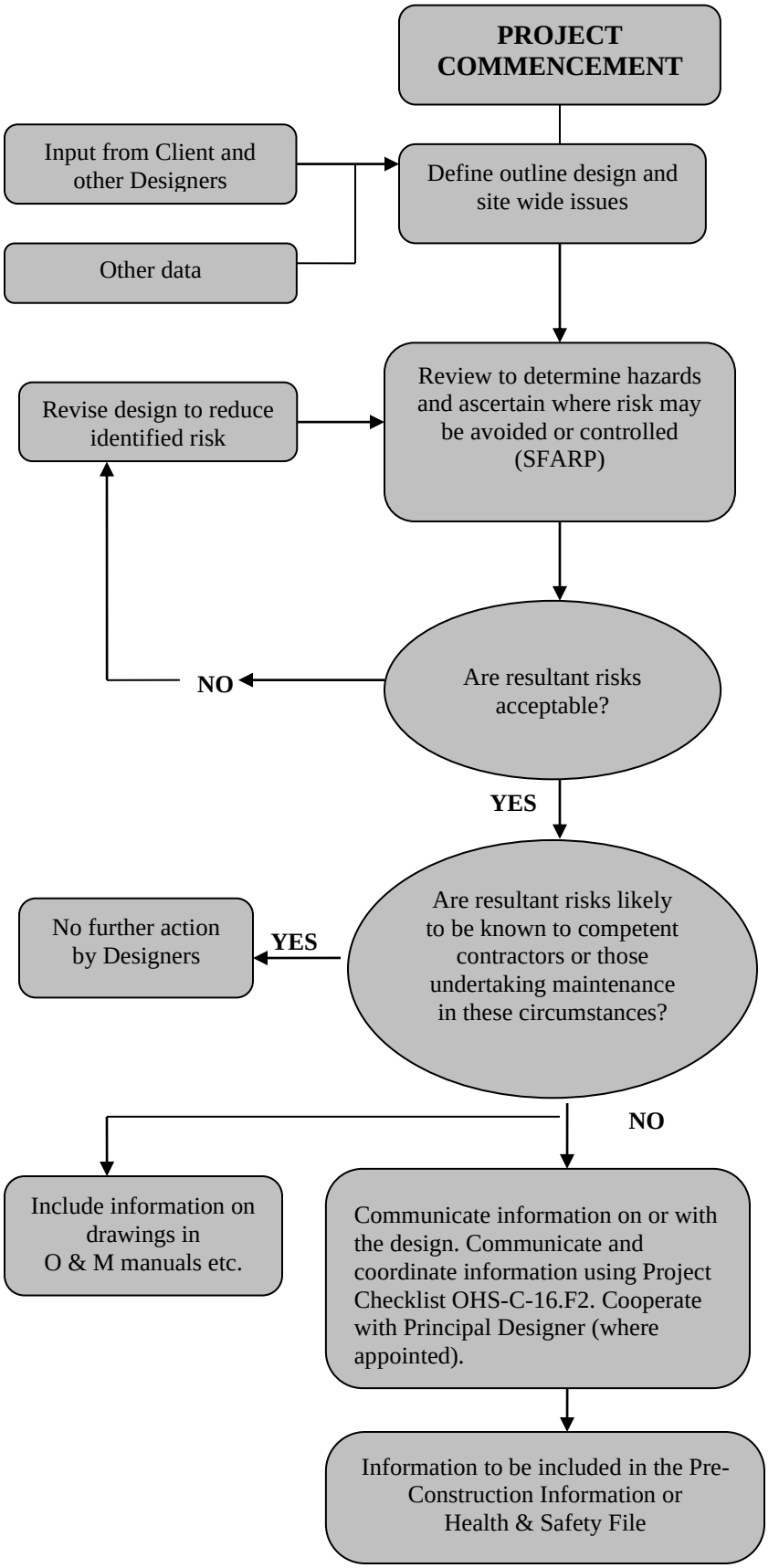
Those engaged in Construction Design will find a wealth of free resources at: http://www.dbp.org.uk/welcome.htm

Related Fife Council Documents are available at **our Construction Safety and CDM compliance** page and via **https://www.fife.gov.uk/CDM**

Acknowledgements:

With acknowledgement to HSE, Chris Fitt of Managing CDM Ltd, and BAA Terminal 5, who provided several of the examples given at Appendix 4 below.

Table 1 THE DESIGN PROCESS UNDER CDM



NOTES

Refer to existing Health and Safety File where available and to other pre-construction information.

Preferably done as a team exercise. If done by individual Designers, outcome should be circulated around team. (SFARP: So Far As is Reasonably Practicable.)

i.e. can the design by safely constructed, maintained etc. with appropriate control measures?

If design subsequently changes, further reviews will be required.

It is only necessary to pass information about significant risks that would not be known or expected by competent contractors.

Include information that relates to the Construction Phase in the Pre-Construction Information. Data relating to later safe maintenance, repair, alteration, or decommissioning will feature in the Health & Safety File.

Appendix 1: CDM - Dos and Don'ts

The term 'Designer' has a very broad meaning in CDM. It includes architects, technicians, and consultants and also quantity surveyors, building services engineers and temporary works engineers where they specify the "what" or "how" in detail.

There are a lot of misconceptions about CDM, so let's start with what **designers *don't* have to** do:

- CDM does not require designers to stifle their creativity, limit their design freedom or place safety above aesthetics;
- CDM does not require the elimination of attractive features such as atria;
- CDM does not require designers to choose "the safest form of construction" (e.g. choosing between concrete, steel or timber frameworks);
- CDM does not require designers to have a *detailed* knowledge of the construction process, nor ask them to specify standard construction processes or precautionary measures to the contractor;
- CDM does not hold designers responsible for what was a wholly unforeseeable hazard or element of risk;
- CDM does not require designers to exercise any health and safety management functions over contractors (who often have designer duties themselves) or other designers – unless they are the appointed Principal Designer (see **OHS-C-16.G4**)

CDM does place certain specific duties directly on designers. **Designers have duty to**:

- eliminate hazards where feasible (e.g. specify non-fragile roof lights);
- reduce risks from those hazards that cannot be eliminated (e.g. specify designs and coatings for materials at height to reduce the need/ frequency for replacement, cleaning and re-painting);
- provide information on residual risks if they are significant (e.g. if a set sequence of assembly or demolition is required to maintain structural stability).

To effectively discharge these duties a competent designer will need *some* knowledge and experience of the construction process. For instance:

- to know what the potential hazards will be during the construction, maintenance, cleaning and dismantling of your design.

- to satisfy themselves that there is at least one safe way of constructing their design. (Your client doesn't want a design that can't be built or can only be built at disproportionate expense)
- The competent designer will also recognise his own limitations and seek specialist advice, and /or work with other Project Team members when required.

Appendix 2: Who is a designer?

The term 'designer' has a very broad meaning in the CDM Regulations. Designers are those who have a trade or business that involves them in:

- Preparing designs for construction work (including variations or Architect Instructions) – this includes preparing drawings, design details, specifications, bills of quantities and the specification of articles and substances, as well as all the related analysis, calculations and preparatory work; or
- Arranging for their employees or other people under their control to prepare designs relating to a structure or part of a structure.

This means that designers include (this is not an exhaustive list)**:**

- Architects, civil and structural engineers, building surveyors, landscape architects and design practices (of whatever discipline) contributing to or having overall responsibility for any part of a design, e.g. drainage engineers designing the drainage for a new development;
- Anyone who alters or specifies a designer who specifies the use of a particular method of work or materials, e.g. a quantity surveyor who insists on a specific material or a client who insists on a particular layout in a new production building;
- Building service engineers, engineering practices or others designing fixed plant (including lifts, ventilation, heating, electrical systems and designers of permanent fire extinguishing systems);
- Those purchasing materials where the choice has been left open, e.g. people purchasing building blocks and so deciding the weights which bricklayers will handle;
- Contractors carrying out detailed design work as part of their contribution to a project, e.g. an engineering contractor providing design, procurement and construction management services;
- Temporary works engineers, including those designing formwork, false work, scaffolding, sheet piling or other remedial measures;
- Interior designers, shop fitters and fit-out contractors who specify articles or substances or draw up specifications for refurbishment works;

- Anyone specifying how or designing how demolition, dismantling work, structural alteration or the formation of openings is to be carried out;
- Heritage organisations who specify how work is to be done in detail, e.g. providing detailed requirements to stabilise existing structures.

Appendix 3: Examples of Potential Hazards for Designers to consider

Hazardous activity	Examples of hazards	Examples of designer's intervention to aid control of the risk
Work at height	Fall from a flat roof	Design in a parapet or barrier. Design in provision to ease installation of temporary handrails.
	Fall through fragile roof/skylight assemblies	Don't specify fragile materials. Identify existing fragile assemblies. Position ventilation and extraction equipment to avoid going on roofs.
	Fall from ladder	'Design out' the need for ladders during construction, cleaning and maintenance operations, e.g. • Design stairways for use during construction. • Design hard standing to allow use of mobile access equipment. • Design windows to be cleaned from the inside. • Specify materials that don't need routine painting, or design in safe access for maintenance. Consider prefabrication so that sub-assemblies can be erected at ground level and then safely lifted into place.
Working in or close to excavations	Poor ground conditions	(resulting in collapse, inundation, asphyxiation, etc. or contact with contaminants) Provide adequate information about ground conditions and position of services. Limit depth of excavation
Working close to plant and vehicles	Struck/trapped by moving plant or vehicles	Position structures to allow: • Safe access and egress onto public roads • Minimising reversing • The segregation of pedestrians and vehicles
Working on electrical systems	Exposure to live contacts. Contact with overhead or underground cables.	Identify existing service positions Position structures to minimise risks from: • Buried services • Overhead cables Design services so isolation is possible.

Work on altering or erecting structures	Collapse of the structure due to instability	Suggest a sequence of erection. Design sacrificial bracing elements to aid erection. Design structure for erection loads. State design philosophy and assumptions for stability. Provide limitations on lifting sling angles. Inform client of his duty to provide information, e.g. a structural survey
Working in strenuous conditions	Inappropriate and repetitive manual handling	Specify light blocks (<20kg). Design re-bar cages for mechanical lifting.
	Handling heavy loads, e.g. kerb stones	Adapt design for the use of mechanical aids. Specify lighter alternatives
	Lifting in awkward posture, e.g. needing to twist and turn, particularly when repeated	Design for ease of access, e.g. avoiding need for awkward postures or twisting in plant rooms. Consider space requirements for access, e.g. services in ceiling voids.
Working with hand held tools	Hand arm vibration syndrome (HAVS)	Specifying surface finishes that don't require scabbling. Avoid chasing. Avoid hand tunnelling. Design piles so that mechanical pile cropping (demolition) is possible.
Working with hazardous materials	Exposure to irritants, corrosives, asbestos, biochemicals, radiological agents, toxins, etc., e.g. contact with wet cement	Specify low chrome cement. Design to use bulk supply pumped concrete, to reduce skin contact. Provide enabling works, to allow welfare facilities to be installed at the start of a Project. Inform client of his duty to provide information, e.g. an asbestos survey. Specify adhesives that have non-volatile solvents, e.g. water-based adhesives.
Working in noisy environments	Noise, resulting in hearing loss.	Adapt the design to allow the use of less noisy solutions, e.g. hydraulic piling. Consider the use of self-compacting concrete Specify crack-inducers, where appropriate, to avoid saw cutting. Use cast-in or hammer-on brick ties, instead of shot-firing or drilling.
Working in confined spaces	Asphyxiation, noise, inundation, etc.	Examine whether the design can *avoid* a confined space. Make provision in the design for prompt and easy rescue. Make adequate provision for access. Avoid on-site welding.
Work on restricted sites, e.g. refurbishment	Handling of heavy and unwieldy components	Use alternative structural sections, e.g. multiple rolled steel angles for a single universal beam. Specify spliced beams.

Appendix 4: CDM - Red, amber and green lists

Red, Amber and Green lists are practical aids to designers on what to eliminate or avoid and what to encourage.

Red lists - Hazardous products, processes and procedures to be eliminated from the project.

Amber lists - Products, processes and procedures to be eliminated or reduced as far as possible and only specified/allowed if unavoidable. Including amber items would always lead to the provision of information to the Contractor.

Green lists - Products, processes and procedures to be positively encouraged.

It is the Client's needs that the Designer is addressing, and the Client may have concerns about how their needs are met (e.g. an NHS Trust may not want its new physiotherapy wing built with heavy blocks!). Clients may not immediately recognise such potential for self-interest, or demonstration of best practice, but the designer can provide added value by bringing such issues to the Client's attention.

The designer also has the potential to incorporate some of these ideas into their specifications in their own right, or through liaison with the Project Team.

The 'red, amber, green' issues published here capture current best practices within the wider design community and are intended to encourage wider adoption of the concept.

Red, Amber and Green Lists: Examples

Red List issues

- The project Pre-Construction Information is not to be issued until detailed structural surveys, asbestos surveys, etc. are completed
- Scabbling of concrete
- Demolition by hand-held breakers of the top sections of concrete piles (pile cropping techniques are available)
- The specification of fragile roof lights and roofing assemblies
- Processes giving rise to large quantities of dust (dry cutting, blasting etc.)
- On-site spraying of harmful particulates
- The specification of structural steelwork which is not purposely designed to accommodate safety nets
- Designing roof mounted services requiring access (for maintenance, etc), without provision for safe access (e.g. barriers)

Amber List issues

- Internal manholes in circulation areas
- External manholes in heavy used vehicle access zones
- The specification of f.f.l. “lip” details (i.e. trip hazards) at the tops of pre-cast concrete staircases
- The specification of shallow steps (i.e. risers) in external paved areas
- The specification of heavy building blocks i.e. those weighing > 20kgs
- Large and heavy glass panels
- The chasing out of concrete / brick / block work walls or floors for the installation of services
- The specification of heavy lintels (the use of slim metal or concrete lintels being preferred)
- The specification of solvent-based paints and thinners, or isocyanates, particularly for use in confined areas
- Specification of curtain wall or panel systems without provision for the tying of scaffolds
- Specification of dense or non-absorbent masonry units with retarded mortar mixes.

Green List issues

- Adequate access for construction *and* final-user vehicles to minimise reversing requirements (one-way systems and turning radii)
- Provision of adequate access and headroom for maintenance in plant rooms, and adequate provision for replacing heavy components
- Thoughtful location of mechanical / electrical equipment, light fittings, security devices etc. to facilitate access and away from crowded areas
- The specification of concrete products with pre-cast fixings to avoid drilling
- Specify half board sizes for plasterboard sheets to make handling easier
- Early installation of permanent means of access, and prefabricated staircases with hand rails
- The provision of edge protection at permanent works where there is a foreseeable risk of falls after handover
- Practical and safe methods of window cleaning (e.g. from the inside);
- Appointment of a Temporary Work Coordinator (HSE publication CIS 56 and British Standard BS 5975 further refer)
- Off-site timber treatment if Propionic acid or other hazardous preservatives are used (Boron compounds or copper salts can be used on-site for cut ends on site)