## Eliminate, Reduce and Control Risks through Design

Design decisions can affect the health and safety of workers and others who will construct, maintain, repair, clean, refurbish and eventually demolish or remove the building or structure, as well as those who will use it as a completed workplace. Taking risks arising from the design into account can positively affect the project and make it easier for these risks to be managed by contractors and those who will maintain or use the structure.

Design risk management is achieved through the identification and elimination of hazards through changes in design, and reduction of likely risks from hazards where elimination is not possible. This approach needs to take into account other design considerations or restrictions on a project including cost, fitness for purpose, aesthetics, site constraints, planning conditions, building regulations and environmental impact. Furthermore, in deciding what action is required to eliminate hazards and reduce risks from hazards that cannot be eliminated the general principles of prevention must be taken into account. See Appendix 1.

The outcome of design risk management should be documented and made available to those that need this information including other designers and contractors. This is achieved using:

* Design Risk Registers
* Hazard symbols and notes on drawings

Red, Amber, Green (RAG) lists are provided in Appendix 2 to provide a practical aid to designers on what to eliminate or avoid, and what to encourage.

## Co-operation, Co-ordination and Communication

Designers must cooperate with the client, other designers (including those designing temporary works) and contractors. This is to ensure that incompatibilities between designs are identified and resolved as early as possible, and that the right information is provided in the pre-construction information. This is achieved through design team meetings and workshops which allow for design reviews with other members of the project team.

On projects where more than one contractor is involved or is likely to be involved, a principal designer will be appointed and will take the lead in design reviews. Other designers should fully cooperate with any reasonable arrangements for design reviews.

## Workplace (Health, Safety & Welfare) Regulations 1992

Where the building or structure will be used as a workplace the designs must comply with the Workplace (Health, Safety and Welfare) Regulations. Guidance is provided relating to compliance with the Workplace (Health, Safety and Welfare) Regulations within the Health and Safety Business Management System under Construction (Design and Management) Regulations 2015 / Guidance:

CDM 2015 – Outline of the Requirements of the Workplace (Health, Safety and Welfare) Regulations

**Templates**

A template for a Design Risk Register is provided within the A to Z of Safety under Construction (Design and Management) Regulations 2015: (CDM 2015 - Design Risk Register )

## Appendix 1

## General Principles of Prevention

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|  | **General Principles of Prevention** | **Examples of Applying them in Practice** |
| **A** | Avoiding risks by asking if you can get rid of the problem (or hazard) altogether | Move air conditioning plant on a roof to ground level, so that work at height is not required for either installation or maintenance  Position a door away from a traffic route  Design a roof with a high parapet to eliminate the risk of falls |
| **B** | Evaluating the risks that cannot be avoided | Work out whether the effort and expense of installing a fixed access system is appropriate if an area is only occasionally reached and the work can be done using a MEWP |
| **C** | Combating the risks at source | Arrange for services to be isolated and diverted to where they will be away from the work area |
| **D** | Adapting the work to the individual, especially the design of workplaces, the type of work equipment and the choice of working and production methods, with a view, in particular, to reducing the health effects of monotonous work and work at a predetermined rate | Provide workstations at an appropriate height  Position lighting so it can be accessed easily for maintenance, such as by positioning bulkhead lights on landings and not halfway down staircases |
| **E** | Adapting to technical progress: consider new techniques or technologies | Specify self-cleaning glass  Prefabricate elements off site |
| **F** | Replacing the dangerous with the non-dangerous or the less dangerous | Switch to using a paving block that is lighter in weight  Substitute solvent-based products with water-based equivalents  Recycle tyre kerbs instead of using heavy concrete ones |
| **G** | Developing a coherent overall prevention policy which covers technology, organisation of work, working conditions, social relationships and the influence of factors relating to the working environment  Set standards | Specify that all blocks should be cut using block splitter techniques rather than mechanical cutting, which produces large amounts of harmful silica dust. |
| **H** | Giving collective protective measures priority over individual protective measures, and making provisions so that the work can be organised to reduce exposure to hazards | Make provision for traffic routes so that barriers can be provided between pedestrians and traffic  Provide fixed edge protection (barriers) rather than running lines |
| **I** | Giving appropriate instructions to employees | Provide information on drawings or instructions, such as intended sequencing |

## Appendix 2

## CDM 2015 - Red, Amber and Green (RAG) Design Considerations - What to Encourage, Avoid and Eliminate

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| **RED – Eliminate and Avoid**  **Hazardous procedures, products and processes that should be eliminated from the project where possible** |
| * Lack of adequate pre-construction information (e.g. asbestos surveys, details of geology, obstructions, services, ground contamination and so on). * Hand-scabbling of concrete (e.g. ‘stop ends’). * Demolition by hand-held breakers of the top sections of concrete piles (pile cropping techniques are available). * Specification of fragile roof lights and roofing assemblies. * Processes giving rise to large quantities of dust (e.g. dry cutting, blasting and so on). * On-site spraying of harmful substances. * Specification of structural steelwork which is not purposely designed to accommodate safety nets. * Designing roof mounted services that require access (for maintenance and so on), without provision for safe access (e.g. barriers). * Glazing that cannot be accessed safely. All glazing should be anticipated as requiring cleaning replacement, so a safe system of access is essential. * Entrances, floors, ramps, stairs and escalators not specifically designed to avoid slips and trips during use and maintenance, including taking into account the effect of rain water and spillages. * Design of environments involving adverse lighting, noise, vibration, temperature, wetness, humidity and draughts or chemical and/or biological conditions during use and maintenance operations. * Designs of structures that do not allow for fire containment during construction. |

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| **AMBER – Eliminate and Avoid Where Possible. Only Specify When Unavoidable**  **Products, processes and procedures to be eliminated or reduced as far as possible and only specified or allowed if unavoidable.** |
| * Internal manholes and inspection chambers in circulation areas. * External manholes in heavily used vehicle access zones. * Specification of ‘lip’ details (i.e. trip hazards) at the tops of pre-cast concrete staircases. * Specification of small steps (e.g. risers) in external paved areas. * Specification of heavy building blocks (e.g. those weighing more than 20kgs). * Large and heavy glass panels. * Chasing out concrete, brick or blockwork walls or floors for the installation of services. * Specification of heavy lintels (slim metal of hollow concrete lintels are better alternatives). * Specification of solvent-based paints and thinners, or isocyanates, particularly for use in confined areas. * Specification of curtain wall or panel system without provision for the tying or raking of scaffolds. * Specification of blockwork wall more than 3.5 metres high using retarded mortar mixes. * Site traffic routes that do not allow for one-way systems and/or vehicular traffic segregated from site personnel * Site layout that does not allow adequate room for delivery and/or storage of materials, including site specific components. * Heavy construction components which cannot be handled using mechanical lifting devices (because of access restrictions/floor loading and so on). * On-site welding, in particular for new structures. * Use of large piling rigs and cranes near live railways and overhead electric power lines or where proximity to obstructions prevents guarding of rigs. |

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| **GREEN – To be positively encouraged**  **Products, processes and procedures to be positively encouraged** |
| * Adequate access for construction vehicles to minimise reversing requirements (one-way systems and turning radii). * Provision of adequate access and headroom for maintenance in plant room, and adequate provision for replacing heavy components. * Thoughtful location of mechanical and electrical equipment, light fittings, security devices and so on to facilitate access, and placed away from crowded areas. * Specification of concrete products with pre-cast fixings to avoid drilling. * Specification of half board sizes for plasterboard sheets to make handling easier. * Early installation of permanent means of access, and prefabricated staircases with hand rails. * 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 works co-ordinator (BS 5975) * Off-site timber treatment if PPA- and CCA-based preservatives are used (boron or copper salts can be used for cut ends on site). * Off-site fabrication and prefabricated elements to minimise on site hazards. * Encourage the use of engineering controls to minimise the use of personal protective equipment. |