
**VOLUME 6 DEPARTMENTAL
STANDARDS AND ADVICE
NOTES ON CONTRACT
DOCUMENTATION AND
SITE SUPERVISION**

SECTION 1 STANDARDS

PART 2

SD 11/05

**CONSTRUCTION (DESIGN AND
MANAGEMENT) REGULATIONS 1994:
REQUIREMENTS FOR HEALTH AND
SAFETY FILE**

SUMMARY

This Standard sets out the requirements for the preparation of the health and safety file as required by the Construction (Design and Management) Regulations 1994 for projects involving the construction of trunk roads, including motorways, and encompasses, preparatory, cleaning, maintenance, alterations, dismantling and demolition works.

INSTRUCTIONS FOR USE

This is a new document to be incorporated into the Manual.

1. Remove existing contents page dated November 2004 and insert new contents page dated May 2005 into binder for Volume 6.
2. Remove SD 11/95 from Volume 6, Section 1, which is superseded by this Standard and archive as appropriate.
3. Insert SD 11/05 into Volume 6, Section 1.
4. Please archive this sheet as appropriate.

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THE HIGHWAYS AGENCY



SCOTTISH EXECUTIVE



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

**WELSH ASSEMBLY GOVERNMENT
LLYWODRAETH CYNULLIAD CYMRU**



**THE DEPARTMENT FOR REGIONAL DEVELOPMENT
NORTHERN IRELAND**

Construction (Design and Management) Regulations 1994

Requirements for Health and Safety File

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1. INTRODUCTION

Construction (Design and Management) Regulations 1994

1.1 The construction industry covers a wide range of activities, hazards, materials, techniques, employment patterns and contractual arrangements. In these circumstances, good management of construction projects from conception through to demolition is essential if health and safety standards are to improve. Poor management is a prime cause of the unacceptable accident and occupational health record of the construction industry. The Construction (Design and Management) Regulations 1994 (CDM Regulations) are intended to protect the health and safety of people working in construction, and others who may be affected by their activities. The CDM Regulations require the systematic management of projects from conception to completion: hazards must be identified and eliminated where possible, and the remaining risks reduced and controlled. This approach will reduce risks during construction and additionally throughout the life cycle of the structure (including eventual demolition). In summary the CDM Regulations require:

- (a) a realistic project programme with adequate time allowed for the construction work including planning and preparation;
- (b) early appointment of key people;
- (c) competent duty holders with sufficient resources to meet their legal duties;
- (d) early identification and reduction of risks;
- (e) provision of health and safety information from the start of the design phase, through construction and maintenance to eventual demolition, so that everyone can discharge their duties effectively;
- (f) co-operation between duty holders;
- (g) effort and resources proportionate to the risk and complexity of the project to be applied to managing health and safety issues.

1.2 The CDM Regulations clarify the duties and amplify the responsibilities arising from the Health and Safety at Work etc Act 1974 (HSW Act), the

Management of Health and Safety at Work Regulations 1999 (MHSW Regulations) and the Construction (Health, Safety and Welfare) Regulations 1996 as applied to construction projects. The CDM Regulations impose duties on clients, designers and contractors at every stage of a project from conception, design and preparation through to the execution of the works, and any subsequent alterations, maintenance and demolition. In addition, the CDM Regulations introduced the roles of the planning supervisor to undertake specific duties in respect of health and safety requirements throughout the life of a project and a principal contractor to carry out specific functions during the construction phase.

1.3 The CDM Regulations came into force on 31 March 1995 and were accompanied by an Approved Code of Practice titled 'Managing Construction for Health and Safety' issued by the Health and Safety Commission (HSC). On 1 February 2002 a combined Approved Code of Practice and Guidance (ACoP and Guidance) titled Managing Health and Safety in Construction came into effect. This document, which was issued by the HSC, was published with the intention of clarifying the following issues:

- (a) the roles of the various duty holders;
- (b) how to assess competence and resources;
- (c) how to prepare health and safety plans; and
- (d) what information must be provided in the health and safety file.

The original Approved Code of Practice was withdrawn on the same date as the revised document was issued.

1.4 At each stage of a project the CDM Regulations require the health and safety of those involved in the project to be properly considered, managed and co-ordinated. To achieve this, the CDM Regulations impose specific responsibilities on key duty holders to ensure that at various stages:

- (a) hazards to the health and safety of workers and others are identified;
- (b) the risks from those hazards are assessed;

- (c) the risks are eliminated, avoided, or, if this is not possible, hazard control measures introduced so that risks are minimised to a level as low as is reasonably practicable.

This includes the requirement for a health and safety file (file) containing information on the design and construction of the project to be developed, maintained and subsequently presented to the client on completion. It is intended that the file will provide a record of the project to assist persons undertaking future construction, cleaning, maintenance, alterations, dismantling or demolition work on the project or structures making up the project.

Scope

1.5 This Standard is to be read in conjunction with the ACoP and Guidance document *Managing Health and Safety in Construction* and encompasses preparatory works, cleaning, maintenance, alterations, dismantling, and demolition.

1.6 This Standard applies for trunk road schemes, including those undertaken on motorways, and is concerned with the responsibilities of duty holders solely in connection with the preparation and content of the file as required by the CDM Regulations.

1.7 The various parties involved in construction projects have additional duties under the CDM Regulations beyond the preparation of the health and safety plan. Reference must be made to the CDM Regulations and the ACoP and Guidance document for details.

Definitions

1.8 The definitions and terms used in this Standard have the same meaning as those given in CDM Regulation 2. The term *highway structure* used in this Standard has the same meaning as in BD 2 (DMRB 1.1.1).

Implementation

1.9 This Standard is applicable to all projects on trunk roads, including motorways, and encompasses preparatory works, cleaning, maintenance, alterations, dismantling and demolition, unless exempt by virtue of Regulation 3 of the CDM Regulations. Design organisations must confirm its application to a particular scheme with the overseeing organisation.

Northern Ireland

1.10 Whilst the general principles of the advice and guidance contained in this document are endorsed this Standard is not mandatory for use in Northern Ireland. Reference must be made to the Department for Regional Development, Road's Service safety management system for the procedural approach in Northern Ireland.

2. HEALTH AND SAFETY FILE

2.1 The planning supervisor must ensure that the file is prepared and delivered to the client. The client and planning supervisor need to agree the format and structure of the file, as well as who is to prepare it at the start of the project. They must also ensure that there are appropriate arrangements in place for collecting and compiling the information needed for the file.

2.2 The file is a reference document, the objective being to provide information to assist persons undertaking future construction works which includes cleaning, maintenance, alterations, dismantling and demolition. To ensure future work on each structure within the project is undertaken safely, the file must contain, as appropriate, the following information in addition to that stated within Appendix 4 of the ACoP and Guidance document on each structure:

- (a) an executive summary that contains clear, concise and relevant information on the hazards and residual risks associated with each structure. The document must also contain any measures incorporated into the project and/or safe systems of work identified to help facilitate preparatory, cleaning, maintenance, alteration, dismantling and demolition works be undertaken safely.

The content of the file will be dependent on the size and type of project, the requirements of the end user and the nature of the risks likely to be involved in such work. Annex A extends the outline requirements given above providing advice on the detailed content of the file.

2.3 The information needed for the file will in some instances overlap with that required for other uses. Where this is so, duplication of records is to be avoided and information already collected should be modified as necessary to meet the requirements of the file. The file or other records must then cross-refer for information as required. Depending on the type and content of records, the file may or may not be the primary source of information. This will apply particularly to highway structures for which extensive records including health and safety information is collected to the requirements of BD 62 (DMRB 3.2.1). In this particular instance, those records will be the primary source of information with the file cross-referring and highlighting any additional significant health and safety issues.

2.4 The structure of the health and safety files will need to take account of the different forms of procurement but the content must always be driven by the client's end use. On maintenance projects, where there are usually a large number of construction activities relating solely to maintenance and replacement of existing street furniture on a like for like basis, there may be no material effect on the information within the file for the structure e.g. the carriageway on a road resurfacing contract. This requirement to consider different forms of procurement needs to be addressed in the health and safety file management custodian arrangements, together with how health and safety files relating to capital works are provided to the maintaining organisation. The health and safety plan may also contain specific requirements for the style and content of the file.

2.5 In the instance of an area maintenance contract for lengths of trunk road, within a particular area of the trunk road network, it may be advisable for there to be a separate file for each trunk road within the maintenance area covered by the contract. Therefore a number of files would cover all of the sections of carriageway and highway structures in the maintenance area. In such a file the details of the carriageway and each highway structure along a particular route could be filed in order of chainage, with generic safety hazards/risks/procedures contained at the beginning of the file. Details of maintenance works could be filed in the relevant chainage section, or under the section dealing with a particular highway structure. A file compiled in this manner would constitute a large number of volumes and therefore could benefit from the use of an electronic document management system to control the management of the file.

2.6 The preparation of the file must start during the design and preparation stage of a project. The designer must refer to the Standards within the DMRB that are relevant to the design, construction, maintenance, alteration, dismantling, and demolition of the project under consideration. This is necessary as these documents may identify hazards, specify the requirement for permits to work or method statements for specific construction activities, offer advice on safe working procedures or detail what information must be provided within the health and safety plan and health and safety file. Once construction has started the planning supervisor must review the information

required for the file and the procedures for obtaining, where necessary, information from the principal contractor, contractors, and designers with the author of the file. The file will thus be developed during the construction phase and finalised as soon as is reasonably practicable following completion of the project. It will then be delivered to the client.

2.7 The file for a particular project is required to be kept available while the structures making up the project remain in existence. This means that effectively for a project involving road construction the information will need to be kept in perpetuity. However, whenever maintenance alterations, dismantling and demolition work is undertaken, then the file will require updating to take account of any changes. The file will therefore represent the sum of all of the work that falls under the requirements of the CDM Regulations undertaken on a particular length of road and provide a source of up to date information on its design and construction. It is therefore essential that the format chosen for the file is such that it is durable and can be readily accessed and updated.

2.8 For Highways Agency Contracts information on general procedures, specific aspects of routine maintenance and management of health and safety are provided in the Trunk Road Maintenance Manual 1999 (TRMM). The Design Organisation must refer to this document, or any document that supersedes it, for information relating to maintenance activities when producing a file for works undertaken on the trunk road network.

SUPERSEDED

3. REFERENCES

- 3.1 Design Manual for Roads and Bridges (TSO)
- Volume 1: Highway Structures: Approval Procedures and General Design
- Volume 2: Highway Structures: Design (Substructures and Special Structures) Materials
- Volume 3: Highway Structures: Inspection and Maintenance
- BD2 Technical Approval of Highway Structures (DMRB 1.1.1)
- BD 62 As Built and Maintenance Records, and Records for Operational and Maintenance Requirements (DMRB 3.2.2)
- TA 92 Crossover and Changeover Design (DMRB 8.4.6)
- BD 78 Design of Road Tunnels (DMRB 2.2.9)
- HD 22 Managing Geotechnical Risk (DMRB 4.1.2)
- 3.2 Health and Safety at Work etc Act 1974: HMSO
- 3.3 Management of Health and Safety at Work Regulations 1999: TSO
- 3.4 Construction (Design and Management) Regulations 1994: HMSO
- 3.5 Construction (Health, Safety and Welfare) Regulations 1996: HMSO
- 3.6 Managing Health and Safety in Construction: Construction (Design and Management) Regulations 1994 : HSE Books (HSG224)
- 3.7 SI 399 Diving Operations at Work Act 1981: HMSO

4. ENQUIRIES

All technical enquiries or comments on this Standard should be sent in writing as appropriate to:

Chief Highway Engineer
The Highways Agency
123 Buckingham Palace Road
London
SW1W 9HA

G CLARKE
Chief Highway Engineer

Chief Road Engineer
Scottish Executive
Victoria Quay
Edinburgh
EH6 6QQ

J HOWISON
Chief Road Engineer

Chief Highway Engineer
Transport Wales
Welsh Assembly Government
Cathays Parks
Cardiff
CF10 3NQ

M J A PARKER
Chief Highway Engineer
Transport Wales

Director of Engineering
The Department for Regional Development
Roads Service
Clarence Court
10-18 Adelaide Street
Belfast BT2 8GB

G W ALLISTER
Director of Engineering

ANNEX A: INFORMATION TO BE SUPPLIED FOR HEALTH AND SAFETY FILE

1. This annex is provided as additional industry-specific guidance and is designed to compliment the requirements detailed in Chapter 2 of this Standard and the ACoP and Guidance document, particularly Appendix 4, when preparing a health and safety file. The drawings and other information listed in the following sections must be provided as appropriate to form the health and safety file (file) for the project. The file must include or address all of the topics listed below to a level of detail consistent with the nature and scope of the proposed construction project although only where they are considered relevant. Where a heading is not relevant to a specific construction project the heading must remain in the file with the comment "No specific requirement" included to indicate that the issue has been considered. The file for a project will in most instances be a composite document incorporating information on individual structures making up the project, although where a project incorporates a major structure such as a tunnel a separate file for this element may be appropriate. The planning supervisor must ensure that the file is prepared, reviewed and amended as necessary and delivered to the client on completion of the overall project or on a structure-by-structure basis as appropriate. In practice, the file may be passed to or retained by the organisation responsible for maintenance. The format, media (e.g. paper, CD ROM, database and GIS database) and numbers of copies of the information contained in the file must be agreed between the client and the planning supervisor on a project specific basis. The file must contain an index listing all drawings and other information provided with particular reference to relevant health and safety information held elsewhere to which the file simply cross-refers.

2. Where the project involves alterations or additions to roads or other features outside the trunk road boundary, the information appertaining to such must be in a separate file or separately identified so that it can be passed to the "owner" of the road or feature. In such cases it will not be acceptable to cross reference to other records and the file or part must be a stand alone document. This will also be the case for highway structures where information to BD 62 (DMRB 3.2.1) will need to be provided separately.

A. DESCRIPTION OF THE WORKS

- (i) A short description of the scope of the construction works must be included

B. AS BUILT DRAWINGS

Important note: Residual hazards must be highlighted on the drawings. Only drawings relevant to health and safety must be included within the file. Examples are given below:

- (i) **General** - General arrangement drawings referenced to the O.S. Grid Reference or maintenance reference system covering:
 - (a) horizontal alignment including land boundaries to a scale of 1/2500 or 1/1250 in urban areas;
 - (b) vertical alignment showing the final and original ground levels on the centre line of the road or new and existing surface levels where reconstructing an existing road.

The drawings should have all non-existing background information removed and the boundaries of the trunk road clearly shown in relation to side roads or other features.
- (ii) **Earthworks** - Drawings depicting the following information:
 - (a) profiles depicting new and existing levels annotated with basic information on soil types including any capping layers and backfill to structures;
 - (b) plans and profiles of any areas of contaminated land depicting the extent, details of any treatment and analysis of contaminants;
 - (c) locations and details of treatment for any mine shafts, mine workings, swallow holes etc encountered in the project;

- (d) details of any soil retention methods (e.g. soil nailing);
- (e) locations and details of soil treatment (e.g. lime stabilisation);
- (f) reports produced as part of the geotechnical certification procedure identified within HD 22 (DMRB 4.1.2).
- (iii) **Drainage** - Drawings depicting the following information:
- (a) plans and sections of foul/surface water drainage networks depicting location and invert levels of chambers, types and sizes of pipes, bedding/backfill details and any protection;
- (b) plans showing locations of fin drains including details of type, make and depth;
- (c) plans depicting outfalls into watercourses including provisions for oil interceptors or other pollution traps;
- (d) plans depicting balancing ponds and other drainage features;
- (e) plans showing land drain connections;
- (f) drawings depicting types and locations of manholes and catchpits, including details of proprietary systems if used and gullies, gratings and frames;
- (g) details of water bearing strata;
- (h) any locations requiring confined space procedures;
- (i) areas, which may flood in severe storms.
- (iv) **Pavement** - Drawings depicting the extent of pavement including type of materials, thicknesses and mix design for bituminous pavements and details of joints/mix design and reinforcement for concrete pavements.
- (v) **Highway Structures** - Drawings depicting comprehensive information in respect of highway structures are prepared as part of the structural records in accordance with the requirements of BD 62 (DMRB 3.2.1). All aspects that may have relevance to health and safety are recorded as part of these records and references must be made to them for such information. It should be noted that CCTV masts, portal and cantilever signs/signal gantries, lighting columns are all classified as highway structures and therefore information must be recorded accordingly.
- A simple general arrangement drawing could be useful for the main file highlighting residual health and safety risks. These risks could include height, width or load restrictions and the need for confined space procedures for access etc.
- (vi) **Fencing** - Drawings depicting the location of fencing including type of fence, protection given, type of protective treatment e.g. wood preservative, and any special features such as additional netting and its function (e.g. to retain a particular species of fauna).
- (vii) **Road Restraint Systems** - Drawings depicting the location and types of road restraint systems including details of the post fixings and any standard/non-standard drawings and instructions used in the design and installation. Manufacturer's inspection, repair and maintenance instructions must also be included. For tensioned systems, include procedures for de-tensioning.
- (viii) **Road Markings and Traffic Signs** - Drawings depicting the locations and details of road markings and traffic signs including materials, fabrication, foundations, lighting and power supply where applicable.
- (ix) **Traffic Signals** - Drawings depicting the locations of traffic signal apparatus including type of signal heads, detectors, routes of interconnecting cables, power supply and connections (if any) to other systems such as SCOOT/MOVA. A Statement of the equipments functionality must also be provided.
- (x) **Lighting** - Drawings depicting the location of road light apparatus including details of the type of column, lantern, foundations and power supply.
- (xi) **Statutory Undertaker Companies Equipment** - Drawings depicting the responsible authority/company, location, depth, size and type of equipment. Methods of marking/identification of statutory undertakers equipment must be included. Drawings must include a reminder that any future proposals require liaison with the relevant authority/company.

(xii) **Control and Communications Equipment** - Drawings depicting location and details of the type of equipment and routes of interconnecting cables and power supply. A statement of the equipment's functionality must be included.

(xiii) **Legislative Requirements** - Plans needed to identify the area of highway land available for maintenance and possible future improvements must be included. Maintenance easements for drainage etc and discharge storm water rights must be shown.

C. DESIGN INFORMATION

(i) The following information must be provided as appropriate:

- (a) for highway structures reference must be made to the structural records prepared in accordance with BD 62 (DMRB 3.2.1). For highway bridges the height, width, design loads and load restriction must be given in addition to the completed approval in principle (AIP) used for the design, a design summary, design checks and certificates and other design requirements in the appropriate Standards within Volume 1 of the DMRB;
- (b) for substructures and special structures e.g. crib retaining walls bridge abutments, foundations, CCTV masts, buried rigid pipes and portal and cantilever signs/signal gantries, design information must be provided that has been used to design the substructure/structure in accordance with the relevant standard within Volume 2 of the DMRB;
- (c) for tunnels reference must be made to the requirements of BD 78/99 (DMRB 2.2.9) and the relevant design information provided accordingly;
- (d) for safety barriers details must be provided of the classification, with reasoning, of the barrier system chosen, and the working width, set back and length of barrier provided;
- (e) basic design parameters used for cutting/embankment slope calculations with a list of slope batters;

(f) details of drainage design calculations for culverts/sewers, combined kerb and drainage systems and linear drainage systems including the maximum storm period used e.g. 1 in 5 year time of concentration;

(g) details of predicted/actual/maximum design traffic flows and pavement design loadings and assumptions e.g. strength of sub grade (CBR);

(h) details for designed/retained maintenance crossovers e.g. design speed, length, pavement details as (d) above;

(i) details of road lighting calculations;

(j) details of traffic signal calculations (e.g. traffic signal timings, predicted queue lengths etc.);

(k) This list is not exhaustive either in terms of the design elements listed or the required information identified. In providing design information for the file the designer must refer to the requirements of the relevant Standards and any site specific issues.

D. CONSTRUCTION METHODS

(i) Reference must be made to the structural records for information that may be relevant if a structure has to be extensively modified, e.g. where a highway structure is post tensioned.

(ii) Provide information on methods of construction where special techniques were necessary, e.g. dewatering or ground freezing, lime stabilisation, use of caissons or cofferdams to construct underwater structures, any site specific traffic management layouts utilised in the construction of the project, and the use of light weight fill materials such as polystyrene in the construction of embankments.

(iii) Describe any significant health and safety problems not anticipated in the pre-construction phase that subsequently arose during construction and the steps taken to overcome them e.g. unstable ground conditions and the use of sheet piling to retain any excavations.

- (iv) Provide copies of risk assessments, permits to work, method statements and safe working procedures that were used in the construction of the project and it is anticipated would be of use in undertaking maintenance, alterations, dismantling or demolition of any part of a structure.
- (v) Some specialist activities are covered by legislation in addition to the HSWA and health and safety regulations. Where this is the case, e.g. diving operations are also covered by SI 339 Diving Operations at Work Act 1281, then information must be recorded in accordance with the requirement of this legislation.

E. MATERIALS

- (i) Provide safety data for hazardous proprietary materials (e.g. paints and protective coatings used on highway structures) and existing hazardous products (e.g. asbestos drainage pipes, contaminated land, and bituminous planings utilised as sub base) that have been either used or retained in the project. Other unusual materials must be included if it is anticipated that in future they would be difficult to obtain. Where sub-contractors were responsible for operations involving the installation or application of products or materials, names and addresses must be given. This information in respect of highway structures is contained in the structural records prepared in accordance with BD 62 (DMRB 3.2.1).
- (ii) Waste transfer notes must be held in the file to comply with legislation and provide information on any contaminants removed from site.
- (iii) Test certificates for materials must be provided if not included in operation and maintenance manuals.

F. MAINTENANCE PROCEDURES

- (i) Full information on maintenance facilities, procedures, and manuals for highway structures must be provided in the structural records prepared in accordance with BD 62 (DMRB 3.2.1). Information on the inspection, maintenance, repair, and assessment of highway structures including tunnels and buried concrete box structures is provided within Standards in Volume 3 of the DMRB. The Designer must

provide information within the file in accordance with the requirements of the relevant Standards.

- (ii) A maintenance manual must be provided for any plant, machinery or equipment forming part of the permanent works for the project that is not required as part of a highway structure as defined within BD 62 e.g. gantries and electrical switchrooms in road lighting systems. The manual must detail the methodology for comprehensive testing, routine maintenance, fault repair and testing.
- (iii) Details must be provided of any features incorporated into the project to facilitate future maintenance operations to be undertaken e.g. access/egress arrangements for tunnels, other buried structures and highway bridges with steel box sections, lane closure arrangements for certain maintenance work and temporary cross-over arrangements on dual carriageways (See TA 92/03, DMRB 8.4.6).
- (iv) Where Operation and Maintenance Manuals are to be provided, within or outside the file, they must highlight significant residual hazards.
- (v) Where it is known or anticipated that hazardous or toxic substances are present then these must be identified. It should be noted that in addition to hazardous substances used in the construction process hazardous or toxic substances may be present due to the use of the structure e.g. carbon monoxide, sulphur dioxide and rat urine in sewers, bird faeces on the underside of bridge decks and mould growth in tunnels and other buried structures. Additionally maintenance, inspection and testing procedures may require the use of substances hazardous to health, e.g. silane used in the impregnation of concrete highway structures, utilising the technique of radiography in the inspection of structures, and substances used in the waterproofing of structures. Where substances hazardous to health are utilised in maintenance, inspection and testing procedures information must be provided as identified within E1 above.
- (vi) The Highways Agency's Trunk Road Maintenance Manual 1999 (TRMM) includes information on health and safety issues relating to maintenance activities to be undertaken on trunk roads. Therefore, the Designer must refer to this document, or any document that supersedes it, for information relating to maintenance activities.

G. DEMOLITION

- (i) Provide information on the health and safety implications where temporary (e.g. to renew time-expired components such as joints or bearings within highway structures) or permanent decommissioning, demolition or dismantling of structures is anticipated/proposed. Cross-reference to the structural records prepared in accordance with BD 62 (DMRB 3.2.1) where temporary or permanent decommissioning, demolition or dismantling of a highway structure is proposed.
- (ii) Potential health and safety problems with the future demolition of any structure must be highlighted e.g. post-tensioned highway structures and hazardous substances such as lead that were traditionally used in the manufacture of paint and statutory utilities apparatus.
- (iii) Detail any health or safety implications that the removal of any plant, machinery or equipment (particularly electrical/electronic such as that used in switchrooms within road lighting equipment) may have on others outside of the site or working area e.g. removal of paint from highway structures.

H. HAZARD AND RISK INFORMATION

- (i) An executive summary containing clear, concise and relevant information on the hazards and residual risks associated with each structure must be started during the design and preparation stage of a project. The document which must also contain any measures incorporated into the project and/or safe systems of work identified to help facilitate preparatory, cleaning, maintenance, dismantling and demolition works be undertaken safely, must be progressed, reviewed, and amended as necessary throughout the design and construction phases of the project.