

BS 5975:2019



BSI Standards Publication

**Code of practice for temporary works
procedures and the permissible stress
design of falsework**

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Contents

	Page
Foreword	vii
Introduction	1
Section 1: General	2
1 Scope	2
2 Normative references	2
3 Terms and definitions	4
4 Abbreviations and symbols	9
5 Overview of temporary works procedures and training	13
5.1 Overview of procedures	13
<i>Figure 1 — Typical contractual interfaces between parties on a project</i>	17
<i>Figure 2 — Lines of responsibilities where a single contractor or a principal contractor (PC) is co-ordinating the temporary works</i>	19
<i>Figure 3 — Lines of responsibility where either a principal contractor's (PC) appointed sub-contractor or a client's contractor co-ordinate their own temporary works</i>	21
<i>Figure 4 — Schematic representation of relationships between principal contractor and contractor (client appointed or sub-contractor) including PC's TWC and contractor's TWC</i>	22
5.2 Training	23
Section 2: Procedural control of temporary works	25
6 Procedures	25
6.1 Introduction to procedural control	25
<i>Table 1 — Implementation risk classes for temporary works and examples of mitigation measures</i>	28
6.2 Temporary works register	29
7 Clients' procedures	30
7.1 General (Commercial/public clients)	30
7.2 Clients appointing contractors other than PCs	31
7.3 Client's DI	31
7.4 Domestic clients	32
8 Designers' procedures	33
8.1 General	33
8.2 Designers' DI	34
8.3 Permanent works designers	34
8.4 Temporary works designers	35
8.5 Principal designers	35
9 Contractors' procedures	36
9.1 Organizational interfaces	36
9.2 Contractors' DI	37
9.3 Responsibilities	38
9.4 Principal contractor	40
9.5 Contractors other than PC	41
9.6 Third-party employed contractor	42
10 Supplier/manufacturer procedures	42
10.1 Suppliers of temporary works equipment	42
10.2 Suppliers' DI	42
10.3 Suppliers' procedures	43
10.4 Verification of design information	43
10.5 Provision of information	43
10.6 Provision of design data	43
10.7 Provision of information for the safe use of equipment	44

10.8	Standard solutions	44
11	Temporary works co-ordinator	44
11.1	General	44
11.2	The PC's TWC	44
11.3	The TWC (other than the PC's TWC)	47
12	Temporary works supervisor	50
12.1	General	50
12.2	Role of the TWS	50
12.3	Duties of the TWS	51
13	Design of temporary works	51
13.1	General	51
13.2	Design brief	52
13.3	Design guidance	53
13.4	Choice of temporary works	55
13.5	Selection of materials and components	55
13.6	Design output	55
13.7	Design check	56
	<i>Table 2 — Categories of design check in temporary works</i>	57
13.8	Resolution of queries raised by the design checker	58
13.9	Alterations	59
13.10	Standard solutions	59
14	Site considerations	60
14.1	Co-ordination, supervision and checking of work on site	60
14.2	Loading and unloading temporary works	61
14.3	Dismantling	62
	Section 3: Falsework	63
15	General	63
16	Materials	63
16.1	General considerations	63
16.2	Testing and inspection	63
16.3	Steelwork (other than scaffold tube)	64
16.4	Timber	65
	<i>Table 3 — Basic stresses and moduli of elasticity for the wet condition</i>	66
	<i>Table 4 — Softwood species which satisfy strength classes in accordance with BS 4978</i>	66
	<i>Table 5 — North American softwood species and grade combinations which satisfy strength classes in accordance with national lumber grades authority (NLGA) and national grading rules for dimension lumber (NGRDL) joist and plank rules</i>	67
	<i>Table 6 — Hardwoods which satisfy the strength classes graded to BS 5756:2007</i>	67
	<i>Table 7 — Preferred target sizes and actual dimensions for constructional sawn softwood timber</i>	68
	<i>Table 8 — Modification factor K_3 for duration of load on falsework</i>	69
	<i>Table 9 — Modification factor K_4 for bearing stress</i>	70
	<i>Table 10 — Maximum depth-to-breadth ratios</i>	70
	<i>Figure 5 — Shear stress on a timber beam of rectangular cross-section</i>	71
	<i>Table 11 — Depth modification factor K_7 for solid timbers less than 300 mm depth</i>	72
	<i>Table 12 — Permissible stresses and moduli of elasticity for general falsework applications</i>	73
	<i>Table 13 — Permissible stresses and moduli of elasticity for load-sharing falsework applications</i>	73
	<i>Table 14 — Commercial grade timber suitable to produce mainly class C16 timber</i>	74
16.5	Concrete and concrete components	74
16.6	Brickwork and blockwork	76
16.7	Other materials	76

16.8	Steel scaffold tubes, couplers and other fittings	77
16.9	Manufactured components for falsework	79
	<i>Table 15 — Adjustable steel prop heights</i>	80
	<i>Figure 6 — Safe working loads for BS 4074:1982 props erected 1.5° out-of-plumb</i>	81
	<i>Figure 7 — Safe working load for BS 1065:1999 props erected 1° maximum out-of-plumb and with up to 10 mm maximum eccentricity of loading</i>	82
17	Loads applied to falsework	83
17.1	General	83
17.2	Weights of materials	84
17.3	Self-weights	84
17.4	Imposed loads	84
17.5	Environmental loads	87
	<i>Figure 8 — Fundamental basic wind velocity $v_{b,map}$ (in m/s)</i>	91
	<i>Figure 9 — Topography factor T_{wind} diagram</i>	92
	<i>Table 16 — Combined exposure factor, $c_e(z)c_{e,T}$</i>	93
	<i>Figure 10 — Displacement height diagram</i>	94
	<i>Figure 11 — Town, country and sea</i>	94
	<i>Table 17 — Force coefficients c_f for falsework</i>	97
	<i>Figure 12 — Wind on soffit parallel to secondary bearers</i>	99
	<i>Figure 13 — Wind on soffit parallel to primary bearers</i>	99
	<i>Figure 14 — Wind on two edge forms</i>	101
	<i>Figure 15 — Shelter factor</i>	101
	<i>Figure 16 — Wind on more than two edge forms</i>	102
	<i>Figure 17 — Wind loading – Combined formwork and unclad falsework (upper limit)</i>	103
18	Foundations and ground conditions	110
18.1	General	110
18.2	Site investigation for falsework foundations	110
	<i>Table 18 — Presumed allowable bearing pressure under vertical static loading</i>	111
18.3	Testing of soils	112
	<i>Table 19 — Identification and description of soils</i>	113
18.4	Allowable bearing pressures	113
18.5	Modification factors applied to presumed bearing pressures	114
	<i>Table 20 — Ground water level modification factor</i>	115
18.6	Simple foundations on sands and gravels	115
18.7	Simple foundations on cohesive soils	115
18.8	Heavy vibrations	115
18.9	Fill material	115
18.10	Piles	116
18.11	Protection of the foundation area	116
19	Design of falsework	116
19.1	Preamble to design	116
	<i>Figure 18 — Individual support members</i>	118
	<i>Figure 19 — Panels to facilitate the erection of individual prop systems (elevation)</i>	119
	<i>Figure 20 — Individual fully braced tower</i>	119
	<i>Figure 21 — Proprietary system, partially braced by discrete panels</i>	119
	<i>Figure 22 — Fully braced falsework system</i>	120
19.2	Forces applied to falsework	121
19.3	Analysis of the structure	123
	<i>Figure 23 — Free-standing structure</i>	125
	<i>Figure 24 — Top-restrained structure</i>	125

	<i>Figure 25 — Plate action (plan view)</i>	126
	<i>Figure 26 — Restraint provided on one side of the plate (plan view)</i>	127
	<i>Figure 27 — Restraint provided on two perpendicular sides of the plate (plan view)</i>	127
	<i>Figure 28 — Restraint provided on two parallel (opposite) sides of the plate (plan view)</i>	127
	<i>Figure 29 — Restraint provided on three sides of the plate (plan view)</i>	128
	<i>Figure 30 — Restraint provided on four sides of the plate (plan view)</i>	128
	<i>Figure 31 — Restraint provided by four permanent works columns (plan view)</i>	128
	<i>Figure 32 — Restraint provided by two permanent works columns (plan view)</i>	128
	<i>Figure 33 — Concrete pressures applied and the subsequent rotational forces induced (typical falsework plan)</i>	129
	<i>Figure 34 — Effects of eccentricity and sway on top-restrained structures</i>	131
	<i>Figure 35 — Effects of eccentricity and sway on freestanding structures</i>	131
	<i>Figure 36 — Effects of F_{H1} on individual towers</i>	132
	<i>Table 21 — Example of percentage of load transfer for less than 350 mm flat slabs</i>	133
19.4	Design	133
	<i>Table 22 — Roles and responsibilities of temporary and permanent works designers</i>	134
	<i>Table 23 — Requirements for stability checks in top-restrained falsework</i>	135
	<i>Table 24 — Requirements for stability checks in free-standing structures</i>	136
	<i>Figure 37 — Typical, free-standing, fully braced scaffolding (elevation)</i>	138
	<i>Figure 38 — Typical, top-restrained, fully braced scaffolding (elevation)</i>	138
	<i>Figure 39 — Member stability check for top-restrained systems (elevation)</i>	140
	<i>Figure 40 — Considerations for partially braced frames</i>	140
	<i>Figure 41 — Member stability check for free-standing systems (elevation)</i>	141
	<i>Figure 42 — Considerations for free-standing partially braced frames</i>	142
	<i>Figure 43 — Effective lengths in tube and coupler falsework</i>	143
	<i>Figure 44 — Lateral stability check for top-restrained structures</i>	144
	<i>Figure 45 — Lateral stability check for free-standing structures</i>	145
	<i>Figure 46 — Working space and stability during erection, loading and dismantling</i>	146
	<i>Figure 47 — Lateral restraint provided by friction</i>	148
	<i>Table 25 — Recommended values of coefficient static friction μ</i>	149
19.5	Beams and lattice girders	150
19.6	Foundations	150
	<i>Figure 48 — Base detail on slopes</i>	153
19.7	Additional considerations affecting certain design solutions	154
	<i>Figure 49 — Suggested bracing arrangement for falsework erected on beams or girders</i>	155
	<i>Figure 50 — Maximum deviation of load path</i>	157
20	Work on site	158
20.1	Introduction	158
20.2	Specific design instructions	158
20.3	General workmanship	158
	<i>Figure 51 — Points of measurement of tolerances for purposely fabricated steelwork</i>	161
	<i>Figure 52 — Skew lapping of primary beams to minimize eccentricity of load</i>	162
20.4	Checking falsework	163
20.5	Application of loads to falsework	165
20.6	Dismantling	165
20.7	Maintenance, inspection and identification of materials	166
Annex A	(normative) Permissible stresses and modulus of elasticity for steel grades generally used in falsework	167
	<i>Figure A.1 — I beam dimensions</i>	168

	<i>Table A.1 — Permissible bending stress in compressive members, p_{bc} for beams</i>	169
	<i>Table A.2 — Permissible axial compressive stress, p_c on cross-section</i>	170
Annex B	(normative) Properties of components in tube and coupler falsework	170
	<i>Table B.1 — Section properties of scaffold tube</i>	173
	<i>Table B.2 — Safe axial loads in compression for Type 4 steel scaffold tubes manufactured in accordance with BS EN 39:2001</i>	174
	<i>Table B.3 — Safe axial loads in compression for Type 4 steel scaffold tubes manufactured in accordance with BS 1139-1:1982</i>	175
	<i>Table B.4 — Safe working loads for individual couplers and fittings</i>	176
Annex C	(normative) Initial testing, quality control and inspection of falsework equipment	176
Annex D	(normative) Data on material properties	178
	<i>Table D.1 — Modulus of elasticity for concrete</i>	178
	<i>Table D.2 — Density of reinforced concrete</i>	179
	<i>Table D.3 — Density ranges for lightweight concretes</i>	179
	<i>Table D.4 — Masses of scaffolding material</i>	180
	<i>Table D.5 — Masses and densities of men and materials</i>	180
	<i>Table D.6 — Masses of corrugated steel sheeting</i>	180
Annex E	(normative) Wave forces	181
	<i>Figure E.1 — Non-breaking waves – Section diagrams</i>	183
Annex F	(normative) Site investigations for foundations for falseworks	183
Annex G	(informative) Examples of design brief contents	185
Annex H	(informative) Forces from concrete on sloping soffits	187
	<i>Figure H.1 — Distribution of forces on sloping soffits – Level surface, sloping base</i>	187
	<i>Figure H.2 — Distribution of forces on sloping soffits – Sloping surface and sloping base</i>	188
	<i>Figure H.3 — Distribution of forces on sloping soffits – All surfaces sloping and with top formwork</i>	188
	<i>Figure H.4 — Freestanding falsework</i>	189
	<i>Figure H.5 — Formwork connected to an existing structure</i>	190
	<i>Figure H.6 — Arch falsework</i>	190
Annex I	(informative) Blank	190
Annex J	(normative) Design of steel beams at points of reaction or concentrated loads	191
	<i>Table J.1 — Effective lengths and slenderness ratios of an unstiffened web acting as a column</i>	193
	<i>Figure J.1 — Stress dispersion – Buckling</i>	194
	<i>Figure J.2 — Stress dispersion – Bearing</i>	195
	<i>Table J.2 — Effective lengths of load bearings</i>	197
Annex K	(normative) Effective lengths of steel members in compression	197
	<i>Figure K.1 — Positional restraint of steel members in axial compression</i>	198
	<i>Table K.1 — Effective lengths of struts</i>	199
	<i>Table K.2 — Effective lengths for beams without intermediate lateral restraint</i>	200
	<i>Table K.3 — Effective lengths for cantilever beams without intermediate lateral restraint</i>	202
	<i>Figure K.2 — Girder restraint (1) – Plan view</i>	203
	<i>Figure K.3 — Girder restraint (2) – Plan view</i>	204
Annex L	(informative) Wind calculations for falsework	204
	<i>Table L.1 — Source of the basic wind equations</i>	205
	<i>Table L.2 — Values of direction factor, c_{dir}</i>	207
	<i>Table L.3 — Combined roughness factor, $c_r(z)c_{r,T}$</i>	212
	<i>Table L.4 — Turbulence intensity, $I_v(z)_{flat}$</i>	213

	<i>Figure L.1 — Orography factor, c_o</i>	214
Annex M	(normative) Shielding factor η for unclad falsework	218
	<i>Table M.1 — Shielding factor, η</i>	218
	Bibliography	220
	Index	224

Summary of pages

This document comprises a front cover, and inside front cover, pages i to viii, pages 1 to 238, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 May 2019. It was prepared by Subcommittee B/514/26, *Falsework*, under the authority of Technical Committee B/514, *Access and support equipment*. A list of organizations represented on these committees can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 5975:2008+A1:2011, which is withdrawn.

Information about this document

This is a revision of [Section 1](#) and [Section 2](#) of this British Standard. [Section 3](#) on the permissible stress design of falsework remains unchanged. The following principal changes have been introduced in this revision.

- BS 5975 was always intended to be used by all organizations involved in temporary works and provided details of the procedure for contractors to adopt, but lacked detail about the procedures for clients, permanent works designers and temporary works designers to adopt. The detail on these procedures is now included.
- The text has been updated to take account of the Construction (Design and Management) Regulations 2015 (CDM) [1], particularly in respect to the interface between the design of permanent works and the design of temporary works.
- The terms and definitions have been updated.
- The principal contractor's temporary works co-ordinator (PC's TWC) retains overall responsibility for the temporary works on the site, but where another contractor manages their own temporary works within that site, they have their own procedures and appoint their own TWC. The committee understood that some organizations were using the temporary works supervisor (TWS) of sub-contractors to act as de-facto TWCs but this is incorrect and the text has been changed to reflect this.
- [Section 2](#) has been updated to include recommendations for designers on the partial factors to be used in limit state design of temporary works and on design considerations to be applied for all temporary works design.
- Although a full revision of [Section 3](#) has not been undertaken at this point, an important safety point was brought to the committee's attention and a relevant note has been added in [16.3.5](#).

The following matters, from the partial revision in 2011, were re-considered and it was confirmed they were to be retained in this revision.

The European standard on falsework, BS EN 12812, exists in parallel with this British Standard. It specifies performance requirements for the design of falsework in accordance with one of three classes: A, B1 and B2. Limit state design methods are specified for design classes B1 and B2. It does not provide guidance for the structural design of Class A. It is recommended that [Section 3](#) is used to provide guidance for Class A falsework.

BS EN 12812 does not provide guidance on procedures necessary for the successful management of work on site. The recommendations of the Advisory Committee on Falsework (the Bragg Report [2]) in respect of the temporary works co-ordinator have not been included in BS EN 12812.

Subsequent to the revision of BS EN 12812, this British Standard was updated in 2011, to BS 5975:2008+A1:2011, and the principal changes introduced by that amendment were as follows.

- The term temporary works co-ordinator (TWC) was adopted to reflect the need for procedural controls of all temporary works and to recognize that the majority of contractors already control temporary works in this manner.
- Information on the wind loading on falsework and attached formwork, together with the effects of shielding of falsework members in unclad structures, in accordance with BS EN 1991-1-4:2005+A1 and the UK National Annex (NA) was retained.
- The section for the design of falsework was substantially rewritten, in BS 5975:2008+A1:2011, to bring it up-to-date with current practice and materials. It defines the conditions for top restrained and free standing falsework and the dependency of the former on the stability of the permanent works and plate action of the formwork.

Although BS EN 1991-1-4:2005+A1:2010 is widely applicable, its application in accordance with its National Annex (NA to BS EN 1991-1-4:2005+A1:2010) restricts its use to the UK. For other locations covered by BS EN 1991-1-4, users can refer to the relevant National Annex. For locations outside of those covered by BS EN 1991-1-4, local design codes can be used to calculate the peak velocity pressure.

Users of this British Standard are reminded that it might be necessary for them to appraise third parties, with whom they are not in contractual relations, of certain provisions in this code of practice.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of The Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

This British Standard was first published in 1982. It reflected the recommendations of the Bragg Report [2] and used, as the main reference document during the drafting stages, the report on falsework by the Joint Committee of the Concrete Society and the Institution of Structural Engineers [3]. These two reports were published in the 1970s following a number of significant collapses and an apparent lack of authoritative guidance.

The standard drew together all those aspects that need to be considered when preparing a falsework design using permissible stress methods, and in so doing included recommendations for materials, design and work on site. Because the success of temporary works is closely tied up with its management, this British Standard describes procedures as well as technical aspects. The standard provides guidance on the accuracy of construction required in order to be able to adopt the recommended design approaches.

Recommendations are given on the actions that ought to be taken and possible ways of allocating the duties to individuals. The Bragg Report [2] recommended that the duty of ensuring that all the relevant procedures and checks are carried out be given to one individual in the construction organization, such an individual being known as the “temporary works co-ordinator”. BS 5975:1982 endorsed such action, but adopted the narrower term “falsework co-ordinator”, because the procedures section of the standard did not consider the other activities covered by the general term temporary works, such as scaffolding and excavations. The 2008 edition, incorporating procedures for all temporary works, reverted to the term “temporary works co-ordinator”.

At the time of publication of the Bragg Report [2] the construction industry was very different from the industry we know today. Health and safety legislation was just beginning to bring improvements on sites. There was little sub-contracting of construction work and most trades were carried out by the main contractor's operatives.

Today very little construction work is carried out by the main contractor, now known as the principal contractor (PC), and in relation to health and safety legislation, the Construction (Design and Management) Regulations 2015 (CDM) [1] recognize the various contractors and sub-contractors which might be on site. The CDM Regulations require whoever appoints the PC, contractor or sub-contractor to check that the organization is competent to do the work. The organizations which are appointed also need to plan, manage and monitor their own work.

This philosophy was taken into account during this revision of BS 5975, to keep it aligned with health and safety legislation, and allow the contractors and sub-contractors to plan, manage and monitor their own work if they have the skills, knowledge, experience and organizational capability. The PC has overall responsibility for work on site and in keeping with the recommendations in the Bragg Report [2], the PC's temporary works co-ordinator (PC's TWC) has overall responsibility for all temporary works on the site, including those of contractors appointed by the client. With this in mind, procedures specific to other organizations, such as clients, designers, contractors and sub-contractors, and other roles have been introduced whilst ensuring responsibility is traceable from the PC's TWC to the PC's temporary works DI to the PC's board of directors.

The Bragg Report [2] made recommendations about courses on civil engineering, which B/514/26, the committee responsible for this British Standard, believe to be as relevant today as when they were written. This standard therefore endorses the Bragg Report recommendations.

Section 1: General

1 Scope

This British Standard gives recommendations and guidance on the procedural controls to be applied to all aspects of temporary works in the construction industry. It also includes guidance on design, specification, construction, use and dismantling of falsework. This standard gives guidance on permissible stress design of all falsework. The guidance also applies to the design of class A falsework¹ defined in BS EN 12812, the design of which is specifically excluded from BS EN 12812.

[Section 1](#) gives recommendations in relation to training and education.

[Section 2](#) gives recommendations for procedures to ensure that temporary works are conceived, designed, specified, constructed, used and dismantled all in a safe and controlled manner suitable for all construction projects. These procedures include clauses relating to all roles involved in temporary works: clients, permanent works designers, temporary works designers, contractors (including construction management organizations), suppliers and manufacturers.

Construction sites and methods adopted for controlling the temporary works vary. This British Standard recognizes that the extent of control measures required are greater on the larger or more complex projects, as can be encountered on major infrastructure projects, power stations, airports etc. Generally procedures are to be in accordance with this standard but additional client specific procedures might be required on major infrastructure projects.

[Section 3](#) covers the design of temporary works and in particular the design of falsework and relevant formwork. In addition [Section 3](#) covers: materials including material factors; loads and load factors; design of falsework, including both proprietary equipment and traditional scaffolding solutions; wind loading (reference to temporary and permanent stability) and reference to other British Standards for the design of structural steelwork, reinforced concrete and excavation support. Although [Section 3](#) was written for permissible stress design, the design concepts and the service loads stated are applicable to limit state design. The loads, including wind loads, are the unfactored service loads and conform to both BS EN 1991-1-4 and BS EN 12812.

The structural design element in this British Standard is additional information necessary for the structural design of falsework. It can be used in conjunction with existing structural standards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.²

BS 449-2:1969 (withdrawn), *Specification for the use of structural steel in building — Part 2: Metric units*

BS 648 (withdrawn), *Schedule of weights of building materials*

1 BS EN 12812 states that design class A is only to be adopted where: a) slabs have a cross-sectional area not exceeding 0.3 m² per metre width of slab; b) beams have a cross-sectional area not exceeding 0.5 m²; c) the clear span of beams and slabs does not exceed 6.0 m; d) the height to the underside of the permanent structure does not exceed 3.5 m.

2 As [Section 3](#) has not been updated as part of this revision, it refers to some standards which have now been withdrawn. These have been marked as such.

- BS 1139-1:1982 (withdrawn), *Metal scaffolding — Part 1: Tubes — Specification for tubes for use in scaffolding*
- BS 1881-115 (withdrawn), *Testing concrete — Part 115: Specification for compression testing machines for concrete*
- BS 1881-116 (withdrawn), *Testing concrete — Part 116: Method for determination of compressive strength of concrete cubes*
- BS 1881-117 (withdrawn), *Testing concrete — Part 117: Method for determination of tensile splitting strength*
- BS 1881-118 (withdrawn), *Testing concrete — Part 118: Method for determination of flexural strength*
- BS 1881-119, *Testing concrete — Part 119: Method for determination of compressive strength using portions of beams broken in flexure (equivalent cube method)*
- BS 1881-120 (withdrawn), *Testing concrete — Part 120: Method for determination of the compressive strength of concrete cones*
- BS 4074:1982 (withdrawn), *Specification for metal props and struts*
- BS 4978:1996, *Specification for visual strength grading of softwood*
- BS 5268-2:2002 (withdrawn), *Structural use of timber — Part 2: Code of practice for permissible stress design, materials and workmanship*
- BS 5507-1, *Methods of test for falsework equipment — Part 1: Floor centres*
- BS 5507-3, *Methods of test for falsework equipment — Part 3: Props*
- BS 5628-1:2005 (withdrawn), *Code of practice for the use of masonry — Part 1: Structural use of unreinforced masonry*
- BS 5756:2007, *Visual strength grading of temperate hardwood — Specification*
- BS 5930:1999, *Code of practice for site investigations*
- BS 6399-1 (withdrawn), *Loading for buildings — Part 1: Code of practice for dead and imposed loads*
- BS 8002, *Code of practice for earth retaining structures*
- BS 8110-1 (withdrawn), *Structural use of concrete — Part 1: Code of practice for design and construction*
- BS 8110-2 (withdrawn), *Structural use of concrete — Part 2: Code of practice for special circumstances*
- BS 8110-3 (withdrawn), *Structural use of concrete — Part 3: Design charts for singly reinforced beams, doubly reinforced beams and rectangular columns*
- BS EN 39:2001, *Loose steel tubes for tube and coupler scaffolds — Technical delivery conditions*
- BS EN 74-1, *Couplers, spigot pins and baseplates for use in falsework and scaffolds — Part 1: Couplers for steel tube — Requirements and test procedures*
- BS EN 1011-1, *Welding — Recommendations for welding of metallic materials — Part 1: General guidance for arc welding*
- BS EN 1011-2, *Welding — Recommendations for welding of metallic materials — Part 2: Arc welding of ferritic steels*
- BS EN 1065:1999, *Adjustable telescopic steel props — Product specifications, design and assessment by calculation and test*
- BS EN 1313-1:1997, *Round and sawn timber — Permitted deviations and preferred sizes — Part 1: Softwood sawn timber*

BS EN 1313-2:1999, *Round and sawn timber — Permitted deviations and preferred sizes — Part 2: Hardwood sawn timber*

BS EN 1991-1-1, *Eurocode 1 — Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings*

BS EN 1991-1-4:2005+A1:2010, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

BS EN 1991-1-6, *Eurocode 1 — Actions on structures — Part 1-6: General actions — Actions during execution*

BS EN 1992-1-1, *Eurocode 2 — Design of concrete structures — Part 1-1: General rules and rules for buildings*

BS EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

BS EN 12811-1:2003, *Temporary works equipment — Part 1: Scaffolds — Performance requirements and general design*

BS EN 12812:2008, *Falsework — Performance requirements and general design*

BS EN 12813, *Temporary works equipment — Load bearing towers of prefabricated components — Particular methods of structural design*

NA to BS EN 1991-1-4:2005+A1:2010, *UK National Annex to Eurocode 1 – Actions on structures – Part 1-4: General actions – Wind actions*

PD 6688-1-4:2009, *Background information to the National Annex to BS EN 1991-1-4 and additional guidance*

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions, together with those given in [Annex E](#), apply.

3.1 adjustable telescopic steel prop

prop comprised of two tubes which are telescopically displaceable one within the other

NOTE 1 See also [3.39](#) prop.

NOTE 2 A prop has coarse adjustment with a pin inserted into holes in the inner tube and a means of fine adjustment using a threaded collar.

3.2 asset

permanent structure, building, wall, tunnel, rail track, waterway, road, cutting or earthwork which provides support to a structure, rail track, waterway, road or other construction

3.3 backpropping

propping installed at levels below the slab that supports the falsework in order to distribute the load on the uppermost slab to suitable supports, such as lower slabs or the foundations

3.4 base plate

rigid plate used for spreading the load in a standard, raker or other load-bearing member over a greater area

3.5 bay length

distance between the centres of two adjacent standards, measured horizontally

3.6 beam bearer

spanning member, usually horizontal, used to transfer load to supports, commonly timber, aluminium or steel

3.7 blinding

layer of lean concrete on soil to prevent local degradation and provide a clean workplace for construction work

3.8 brace

component placed diagonally with respect to the vertical or horizontal members of a structure to afford stability

3.9 camber

internal curvature of a beam or formwork, either formed initially to compensate for subsequent deflection under load, or produced as a permanent effect for aesthetic reasons

3.10 characteristic strength

strength at which members tested would fail, normally associated with a confidence limit that 95% would fail above the value stated

3.11 check list

document that lists activities that need inspection and/or testing

NOTE 1 This list could be available as either a generic list, as an aide-memoire on a particular subject, or as a specific list sequencing the activities in correct order.

NOTE 2 This can be enhanced with a signature to verify that the work has been completed satisfactorily as part of the management process.

NOTE 3 An example of a specific check list would be the order of activities to operate a climbing or advancing formwork system, to ensure that the correct sequence was carried out.

3.12 client

organization or person for which/whom a construction project is carried out

3.13 competent person/organization

person/organization with the necessary skills, knowledge and experience (and organizational capability) of the specific tasks to be undertaken and the risks which the work entails, to enable them to carry out their duties in relation to the project, to recognize their limitations, and to take appropriate action in order to prevent harm to those carrying out construction work, or those affected by the work

3.14 component

part of the temporary works structure used and identifiable as a distinct unit

3.15 contractor

any person (including a non-domestic client) who, in the course or furtherance of a business, carries out, manages or controls construction work

NOTE 1 Anyone who directly employs or engages construction workers or manages construction is a contractor. Contractors include principal contractors, sub-contractors, any individual, sole trader, self-employed worker, or business that carries out, manages or controls construction work as part of their business. This also includes companies that use their own workforce to do construction work on their own premises. The duties on contractors apply whether the workers under their control are employees, self-employed or agency workers.

NOTE 2 Where contractors are involved in design work, including for temporary works, they also have duties as designers under the CDM Regulations 2015 [1].

3.16 coupler

component used to fix scaffold tubes together

3.17 design certificate

certificate issued by the designer to indicate that the design is satisfactory and conforms to the design brief, and where provided, the design statement

3.18 design statement

document prepared by the designer outlining the means by which the design is to be developed, the assumptions, method of analysis and other controls

NOTE The design statement can include the potential of the temporary works to affect/impact operational infrastructure.

3.19 designated individual (DI)

senior person within an organization with responsibility for establishing, implementing and maintaining a procedure for the control of temporary works for that organization

3.20 domestic client

client for whom a project is being carried out which is not in the course or furtherance of a business of that client

NOTE Local authorities, housing associations, charities, landlords and other businesses might own domestic properties, but they are not considered to be a domestic client for the purposes of the CDM Regulations 2015 [1]. If the work is in connection with a business attached to domestic premises, such as a shop, the client is not a domestic client.

3.21 effective length

theoretical length of a compression member as determined by the restraint at its ends

3.22 factor of safety

ratio of failure load to the maximum working load

3.23 falsework

temporary structure used to support a permanent structure while it is not self-supporting

3.24 floor centre

beam of adjustable length, usually a metal lattice or sheet metal box beam, used to support decking for a floor slab

3.25 forkhead

U-shaped housing used to support bearers, beams, joists or similar

3.26 formwork

structure, usually temporary, but in some cases wholly or partly permanent, used to contain poured concrete to mould it to the required dimensions until it is able to support itself

NOTE Formwork consists primarily of face-contact material and the bearers that directly support the face-contact material.

3.27 frame

principal panel unit of a prefabricated falsework structure formed from aluminium or steel sections

NOTE A frame can include connecting components.

3.28 grade stress

stress that can be safely sustained by timber of a particular strength class, or species and grade

3.29 hold point

stage in the temporary works process where no further progress is to be made until the necessary permit or action has been completed

3.30 inspection and test plan (ITP)

document that prescribes the design output to be used to produce an item of work, and the inspections and tests required to verify that the item of work conforms to the design output

NOTE An ITP can refer to quality control check lists to detail and evidence the inspection or test.

3.31 joint pin

expanding fitting placed in the bore of a tube to connect one tube to another coaxially

3.32 joist

small horizontal or sloping member, e.g. the horizontal members that carry decking for a suspended concrete slab

3.33 kentledge

material placed on a structure to provide stability by the action of its dead weight

3.34 lacing

generally horizontal members that connect together and reduce the unsupported length of compression members

3.35 node

theoretical point where two or more members are connected together

3.36 permissible stress

stress that can be sustained safely by a structural material for the particular condition of service or loading

3.37 permit

certificate issued to release a hold point

NOTE Examples include permit to load, permit to take out of use.

3.38 primary

principal bearing member transferring load to the falsework

3.39 prop

compression member used as a temporary support

3.40 quality control check list

document that lists the elements of an inspection or test, that is endorsed to show that the item of work has satisfied that inspection or test, or that the operation has been witnessed

3.41 re-propping

system used during construction in which the temporary supports to a recently cast slab are removed and replaced in a planned sequence

3.42 scaffold

temporary structure that provides access, or on or from which persons work, or that is used to support material, plant or equipment

NOTE See also [3.23](#) falsework.

3.43 soffit

underside surface of a concrete member or slab

3.44 sole plate

timber, concrete or metal spreader used to distribute the load from a standard or baseplate to the ground

3.45 standard

vertical tube or member

3.46 strength class

classification of timber based on particular values of grade stress

3.47 strut

member in compression

NOTE See also [3.39](#) prop.

3.48 sub-consultant

individual or organization appointed by a consultant or designer to provide technical advice, including advice on methodology, and/or design in a specialist area of temporary or permanent works

3.49 sub-contractor

contractor employed by another contractor to carry out or manage construction work

NOTE See also [3.15](#) contractor.

3.50 sway

horizontal displacement at the top of the falsework in relation to the bottom, under application of the load

3.51 temporary works co-ordinator (TWC)

competent person with responsibility for the co-ordination of all activities related to the temporary works

3.52 temporary works supervisor (TWS)

competent person who is responsible to and assists the temporary works co-ordinator

3.53 third party

party, independent of the project, whose procedures are to be followed, and approvals obtained, for temporary works proposals affecting their assets, users or their land ownership

NOTE An example of a third party would be a highway authority, affected by a new rail structure over their asset, required as part of the client's project.

3.54 top restraint

method by which stability of falsework is provided by surrounding permanent works or specifically designed temporary works

3.55 tower

tall composite structure, used principally to carry vertical loading

3.56 wedge

piece of material, timber or metal that tapers in its length and is used to adjust elevation or line or angle

NOTE Folding wedges comprise a pair of wedges laid one above the other so that their outer faces are parallel.

4 Abbreviations and symbols

The following abbreviations are used in this British Standard.

ACoP	approved code of practice
AIP	approval in principle
BIM	building information modelling
CDM	Construction (Design and Management) Regulations 2015
CEM	cement
CIRIA	Construction Industry Research and Information Association
CPD	continuing professional development
CS	Concrete Society
DI	designated individual
EIR	employer's information requirements
FoS	factor of safety
GS	general structural (timber category)
HAZOP	Hazard and operability study
HSE	Health and Safety Executive

MC	moderately conservative
M&E	mechanical and electrical
NASC	National Access and Scaffolding Confederation
NGRDL	National Grading Rules for Dimension Lumber
NLGA	National Lumber Grades Authority
PC	principal contractor
PC's TWC	principal contractor's temporary works co-ordinator
PD	principal designer
PW	permanent works
PWD	permanent works designer
RAMS	risk assessment and method statement
RSJ	rolled steel joist
SS	special structural (timber category)
TW	temporary works
TWC	temporary works co-ordinator
TWD	temporary works designer
TWDC	temporary works design checker
TWS	temporary works supervisor

The following symbols are used in this British Standard.

Symbol	Meaning	Unit
τ_1	Average shear stress	N/mm ²
τ_2	Maximum shear stress	N/mm ²
A	Altitude of the site	m
A	Cross-sectional area of standard	mm ²
A_d	Area of obstruction presented by trapped debris and falsework	m ²
A_e	Effective area of the component	m ²
A_w	Effective area normal to the flow	m ²
A_x	Cross-sectional area of pipeline	mm ²
b	Width of beam	mm
b	Width of falsework	m
b	Stiff length of the bearing	mm
c	Undrained shear strength	N/m ² , kN/m ²
c_f	Force coefficient for the component	non-dimensional
C_{pe}	Net pressure coefficient	non-dimensional
c_s	Site coefficient	non-dimensional
C_w	Coefficient for water appropriate for falsework members	non-dimensional
d	Height of the leeward parapet	m
Δ	Delta	mm, m
D	Overall depth of beam or section	mm

Symbol	Meaning	Unit
d	Still water depth	m
d_1	Depth from top of soffit to underside level of primary bearer	mm
d_2	Depth from top of soffit to underside level of secondary bearer	mm
d_f	Clear distance between flanges	mm
E	Young's modulus of elasticity	N/mm ²
e_o	Eccentricity of a beam	mm
f	Max. force exerted by the wind on a component of a falsework structure	N
F_{bc}	Max. applied compressive bending stress	N/mm ²
F_C	Horizontal concrete force	N
F_c	Max. applied compressive axial stress	N/mm ²
F_d	Force on trapped debris	N
F_f	Limiting value of the frictional force	N
F_H	Horizontal disturbing force	N
F_{Rc}	Maximum applied compressive stress in the web	N/mm ²
F_s	Partial soil factor	non-dimensional
F_v	Shear force	N
F_W	Force due to water flowing around falsework members	N
F_x	Force due to concrete pipeline	N
f_y	Yield stress	N/mm ²
h	Depth of beam	mm
H	Reference height	m
h	Depth/height	m
H	Wave height	m
H_c	Compression flange restraint force	N
H_e	Effective height of the falsework	m
h_f	Total height of the formwork	m
h_F	Total height of the falsework	m
I	Moment of inertia	cm ⁴
J	Moment of inertia of stiffener	mm ⁴
K_a	Active pressure coefficient	non-dimensional
K_n	Timber modification factor	non-dimensional
K_p	Passive soil resistance coefficient	non-dimensional
L/l	Length	mm
λ	Slenderness ratio	non-dimensional
L	Wave length	m
L_b	Clear length of a beam	mm
L_d	Horizontal distance of the slope downwind	m
L_e	Effective length of a strut	mm
L_E	Effective length	mm
L_s	Clear length of a column or strut	mm
L_u	Horizontal distance of the slope upwind	m
L_w	Width between vertical forms	mm
m	Factor for cantilever projection	non-dimensional
M_c	Safe working moment	kN/m
N	Characteristic compressive strength of a tubular strut	N/mm ²
n	Number of node points	non-dimensional

Symbol	Meaning	Unit
n_1	Length obtained by dispersion at 45°, from extreme of stiff bearing	mm
n_2	Length obtained by dispersion at 30°, from extreme of stiff bearing through the flange plates	mm
N_H	Notional internal force	N
ϕ	Mathematical function	non-dimensional
p	Maximum pressure in pipeline	N/mm ²
p	Force	N
p_1	Clapotis pressure	kN/m ²
p_a	Active soil pressure	N/m ²
p_B	Concrete force	N
p_b	Allowable bearing stress	N/mm ²
p_{bc}	Permissible bending stress in compression members	N/mm ²
p_{bc}	Permissible compressive stress due to bending	N/mm ²
p_{bt}	Permissible bending stress in tension members	N/mm ²
p_c	Permissible axial compressive stress	N/mm ²
P_c	Safe load in compression for a column	N/mm ²
p_c	Max. water pressure at level C	kN/mm ²
p_c	Permissible axial stress for struts	N/mm ²
p_{cw}	Permissible compressive stress in the web	N/mm ²
$p-\Delta$	P-delta, 2nd order effect	
P_h	Concrete force	N
P_L	Concrete force	N
p_p	Passive soil resistance (or pressure)	N/m ²
P_R	Concrete force	N
p_t	Permissible axial tensile stress	N/mm ²
P_v	Concrete force	N
q	Max. dynamic wind pressure	N/m ²
Q_5	Total force on the falsework	N
$Q_{5,limit}$	Upper limit of force	N
q_b	Allowable bearing pressure	kN/m ²
q_s	Dynamic pressure	N/m ²
q_w	Dynamic pressure of flowing water	N/m ²
R	Reaction	N
r	Radius of gyration	mm
R_c	Reaction to horizontal concrete force F_c	N
$R_{cx, cy}$	Orthogonal components R_c	N
r_g	Radius of gyration	mm
R_H	Reaction to horizontal disturbing force F_H	N
S	Wind factor	non-dimensional
S	Plastic modulus	cm ³
S_a	Altitude factor	non-dimensional
S_b	Terrain and building factor	non-dimensional
S_d	Direction factor	non-dimensional
S_p	Probability factor	non-dimensional
S_s	Seasonal factor	non-dimensional
T	Mean thickness of flange	mm

Symbol	Meaning	Unit
T	Topographical factor	non-dimensional
T_{\max}	Max. thickness of compression flange	mm
t_s	Web stiffener thickness	mm
t_w	Web thickness	mm
U	Concrete cube strength	N/mm ²
V_b	Basic wind speed for the site	m/s
v_b	Basic wind speed	m/s
v_e	Effective wind speed	m/s
V_H	Hourly mean wind speed at reference height H	m/s
V_s	Design wind speed	m/s
v_s	Site wind speed	m/s
V_w	Speed of water flow	m/s
W	Applied vertical load	N
w	Force applied per unit volume of water	kN/m ³
W_w	Max. wind force during working operations	m/s
X	Depth of bracing panel	mm
γ	Soil density	kg/m ³
γ_f	Partial safety factor for loads	non-dimensional
γ_m	Partial safety factor for resistances	non-dimensional
Δb	Out-of-straightness of a beam	mm
Δv	Inclination from vertical	mm
Δs	Out-of-straightness of a column or strut	mm
η	Shielding factor	non-dimensional
θ	Angle from horizontal	degrees
μ	Coefficient of static friction	non-dim
τ	Shear stress	N/mm ²
φ	Angle of internal friction	degrees
χ	Mathematical function	non-dimensional

5 Overview of temporary works procedures and training

5.1 Overview of procedures

5.1.1 General

- 5.1.1.1** Temporary works can be described as providing an "engineered solution" that is used to support or protect either an existing structure or the permanent works during construction, or to support an item of plant or equipment, or the vertical sides or side-slopes of an excavation during construction operations on site or to provide access. It is used to control stability, strength, deflection, fatigue, geotechnical effects and hydraulic effects within defined limits.

This description of temporary works includes, but is not limited to:

- a) supporting or protecting either an existing structure or the permanent works during construction, modification or demolition;
- b) provision of stability to the permanent structure during construction, pre-weakening or demolition (e.g. propping, shoring, facade retention etc.);

- c) securing a site, or providing access to a site or workplace on site or segregation of pedestrians and vehicles (e.g. hoarding, haul roads, fencing, stairs);
- d) supporting or restraining plant, materials or equipment, including stability of water-borne craft;
- e) provision of earthworks or slopes to an excavation or supports to the side or roof of an excavation or supports or diversions to watercourse during construction operations;
- f) providing a safe platform for work activity on land or water (e.g. jetty, scaffolding, edge protection or towers);
- g) providing measures to control noise, dust, debris, fume, air quality, groundwater or any site discharges during construction or demolition (e.g. screens, bunds, de-watering, demolition debris);
- h) providing protection or support to services; and
- i) facilitating testing (e.g. pressure testing pipes, pile testing, pre-demolition floor load capacity testing).

5.1.1.2 The temporary works could be removed or left in place (hence becoming sacrificial, e.g. profiled metal decking) after the completion of the permanent works, but in the latter case would not necessarily contribute to the strength of the permanent works.

5.1.1.3 When a project has, or might be anticipated to have, the requirement for any temporary works, all organizations involved in the management of the temporary works, whether implemented by themselves or others, should have and implement a procedure which outlines how they are to discharge their duties in relation to the temporary works.

NOTE The purpose of the procedures is to manage and control the organization's involvement both within their own organization and when they are employing others or working with other organizations to carry out temporary works roles.

5.1.1.4 This overview explains the core principles and organizational interfaces which are recommended, before expanding on the procedural control details in [Section 2](#).

5.1.1.5 All types of organizations, from the use of temporary works by small contractors to the very large organizations and/or utilities should use the procedures outlined in detail below. This includes civil engineering companies and building companies. The approach adopted in [Section 2](#) is "organization focused" so the procedures for each organization are separated – it is accepted that this includes some duplication of text.

NOTE The term "organization" includes clients, designers, permanent works designers, temporary works designers, principal designers, contractors, principal contractors, sub-contractors, specialist contractors, third-party contractors and supplier/manufacturers.

5.1.1.6 To cater for the wide range of knowledge, skills, experience and qualifications which are encountered, this British Standard is drafted in the broadest terms. This should allow the duties, of the TWC and TWS for example, to be carried out by individuals who do not have engineering qualifications.

5.1.1.7 One of the main aims of the procedure and the method of work adopted, should be to minimize the chance of errors being made, and to maximize the chance of errors being discovered if they are made. There should be effective communication of information and requirements between all levels of the construction organizations involved, whether they are concerned primarily with the permanent works or the temporary works. An effective system of checking, both for the design and its implementation, should also be implemented.

5.1.1.8 Procedures should be put in place to manage potential problems in temporary works which can arise at interfaces. The interfaces might be:

- a) between areas allocated to be managed by different people, controlled by appointing a lead person; between the perimeter of one area and another part of the PC's site, controlled by exchange of design briefs; or
- b) between the design of the main temporary works and the design of additional items of temporary works by another designer, controlled by a lead designer.

5.1.1.9 Work on site should be directed, supervised and checked to ensure that the temporary works are constructed safely in accordance with the agreed design and sequence using materials of agreed quality, and that only when all checks have proved satisfactory are the temporary works used/loaded, and then taken out of use/unloaded in accordance with an agreed procedure (see [6.1.4](#)).

5.1.1.10 It should be recognized that there are three fundamental principles for controlling temporary works.

- 1) All organizations have a duty to manage and control their work.
- 2) The contractor is responsible for building the permanent works, and that includes any associated temporary works in order to construct the project.
- 3) One person should take overall responsibility for managing the temporary works. For very large or technically complex sites, this should be managed in accordance with [5.1.4.6](#).

5.1.1.11 The first principle (see [5.1.1.10](#)) should be managed by the appointment of a "senior person", defined by the term designated individual (DI), who should be appointed to prepare and manage the organization's procedures.

5.1.1.12 The third principle (see [5.1.1.10](#)) that one person is to be appointed with overall responsibility for managing the temporary works on a site was first established in the Bragg Report [2]. A temporary works co-ordinator (TWC) should be appointed with overall responsibility for managing the temporary works on a site. This person should be appointed by the principal contractor and should be referred to as the "PC's TWC".

NOTE The TWC can, if necessary, delegate certain day to day activities, such as site inspection, to a temporary works supervisor (TWS).

5.1.1.13 A TWC may be appointed by another contractor to manage their temporary works but this individual should be responsible both to their DI and the PC's TWC.

NOTE The term "contractor" is taken to mean sub-contractor employed by the PC or a contractor employed directly by the client or a third party (see [3.15](#)).

5.1.1.14 Many of the duties of the DI, the PC's TWC, TWC and TWS detailed in this British Standard are activities already being carried out "as routine" by competent persons in the construction team. The activities of these individuals should be formalized in company procedures in accordance with the various clauses below to ensure the temporary works are implemented in a controlled manner. Only in larger organizations and/or on larger sites, with significant temporary works, is it justified to employ specific staff exclusively in the role of DI or TWC.

5.1.2 Summary of control measures

Control measures should be used to ensure safety for all temporary works; a summary of these are given below.

- a) Every organization that has an involvement with temporary works should appoint a senior person to prepare, maintain and implement the organization's procedure for the control of temporary works. This person, usually reporting to the board of directors, is referred to as the designated individual (DI). See [6.1.2.1](#).

- b) Where there is only a single contractor on a site, the contractor should appoint a temporary works co-ordinator (TWC) responsible for all temporary works on that site. See [9.2.3d](#).
- c) Where several contractors are on a project/site, the principal contractor (PC) should have a TWC (PC's TWC) responsible for all temporary works on the project. On particularly large or complex sites more than one PC's TWC may be appointed. See [9.3.2.5](#), [9.4.1](#), [9.5.1.6](#), [11.2.2.1](#) and [11.3.2.6](#).
- d) The PC's TWC's should be appointed by the PC's DI. See [9.3.2.1](#).
- e) The PC's TWC should be employed by the PC either as an employee, or be an employee of an organization contracted to provide the services of a TWC on behalf of the PC for all the temporary works on the site/project area. See [9.3.2.1](#).
- f) Each PC's TWC should be responsible for a distinct, well-defined area of work. See [9.3.2.5](#).
- g) Where necessary, the PC's TWC may be responsible for several projects if the level of temporary works on each project does not warrant a full-time TWC. See [5.1.4.4](#).
- h) If there are multiple PC's TWC's on a site there should always be one who takes the role of lead PC's TWC. See [9.3.2.5](#).
- i) A sub-contractor to the PC or another contractor (such as a client's contractor) who is contracted to manage their own temporary works and are working within a PC's TWC's area of responsibility should appoint a TWC. See [9.3.3](#).
- j) The TWC should report to the relevant PC's TWC for the area in which they operate. See [9.5.1.4](#), [11.2.4.1](#), [11.3.2.1](#) and [11.3.2.6](#).
- k) The TWC should be appointed by the contracted organization's DI. See [9.3.3.1](#) and [9.5.1.3](#).
- l) Where there is more than one PC's TWC and/or TWC, the limits of responsibility, interfaces and boundaries should be recorded in writing. See [9.1.2](#), [9.1.4](#) and [9.3.2.5](#).
- m) The PC's TWC and TWC should have the same level of management training. Their technical and practical knowledge should be commensurate with the complexity of the work. See [5.2](#), [9.3.2.2](#) and [9.3.3.2](#).
- n) Where required, the PC and contractor may appoint temporary works supervisors (TWSs) who report to their TWC. See [9.3.4.1](#).
- o) The organization's DI may delegate the appointment of a TWS to an individual who has the necessary skill, knowledge and experience, for example a contract or project manager or their TWC for the project. The appointment of the TWS should be approved by the DI of the organization for whom the TWS works. See [9.3.4.3](#) and [9.3.4.4](#).
- p) Except for very low risk temporary works, a design brief should be prepared for the temporary works by the site team and issued by the TWC to the TWD. See [11.2.3](#), [11.3.3](#) and [13.2](#).
- q) Where the category of design check has not been specified, the TWD, in consultation with the relevant TWC, should confirm the category and prepare the necessary design output. See [8.1.4a](#)), [8.4.1.3](#) and [13.7](#).
- r) The TWDC should carry out the design check of the temporary works, and, in certain categories without reference to the TWD's calculations, before issuing a certificate confirming the design is satisfactory. See [13.7.3](#).
- s) The site team should construct the temporary works in accordance with the certified design. See [11.2.3](#), [11.3.3](#) and [14.1](#).

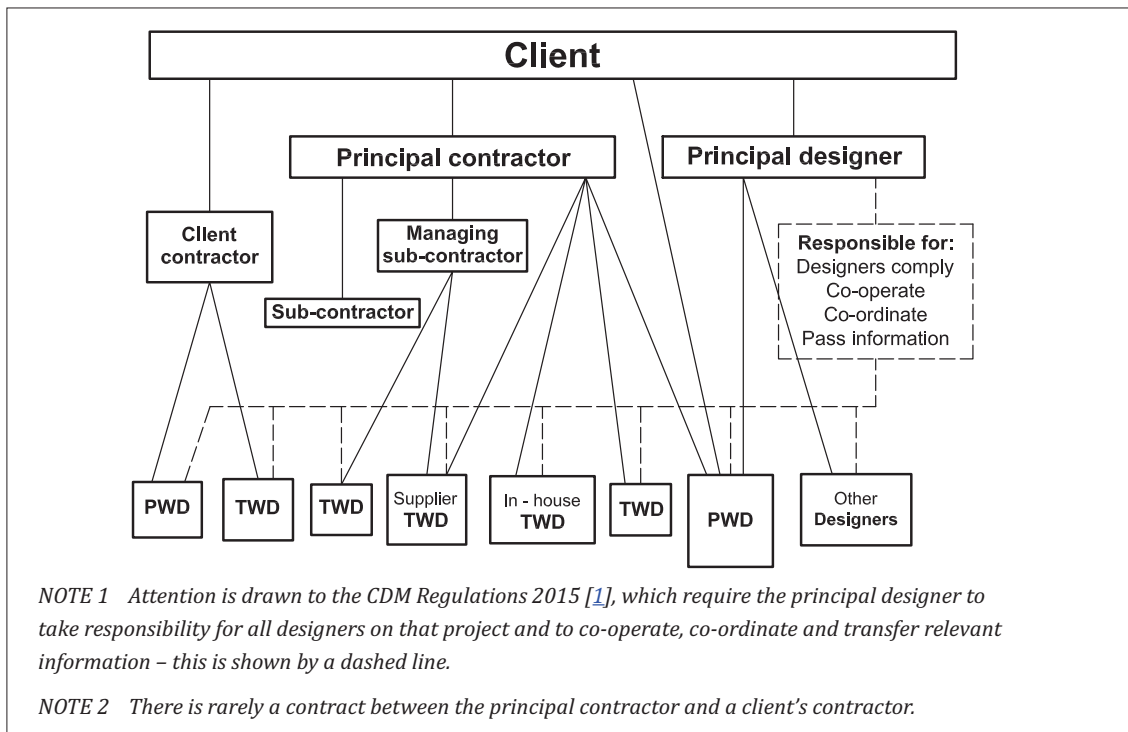
- t) The TWC or TWS, as appropriate, should issue a permit to proceed confirming the temporary works have been erected in accordance with the certified design and any agreed revisions. See [11.2.3](#), [11.3.3](#) and [12.3](#).

5.1.3 Organizations involved in temporary works

5.1.3.1 There are many combinations of organizations that can be involved in temporary works. They can include clients, management contractors, contractors, sub-contractors, utility authorities, service suppliers (M&E), equipment suppliers, consultants and specialist contractors. Each have different contractual arrangements from project to project but the over-arching principle is that the PC's TWC has overall responsibility on site.

5.1.3.2 The framework of contractual relationships should be taken into account when planning the management of temporary works; an overview of likely contractual relationships between clients, contractors and designers, including both permanent work designers (PWDs) and temporary works designers (TWDs) is shown in [Figure 1](#). [Figure 1](#) also demonstrates the typical links showing how the designers should co-operate, even when not in a contractual relationship (shown as dashed).

Figure 1 — Typical contractual interfaces between parties on a project



5.1.4 Responsibilities where a contractor co-ordinates the temporary works

5.1.4.1 General

The various ways in which the control measures (see [5.1.2](#)) are likely to be implemented on different projects of varying complexity are shown as lines of responsibility in [Figure 2](#). In all the cases the sole contractor or principal contractor should manage and co-ordinate the temporary works on the project themselves.

5.1.4.2 Small contracts

Small contracts, including domestic client projects, often have only one contractor. This is shown in [Figure 2a](#) and applies to the majority of small organizations, including builders and scaffolding providers.

The contractor should have a company director responsible for the technical work of the company. This person is effectively the DI and their duties include control of any temporary works. In very small companies the same person might also take on the TWC role.

The temporary works is managed either by a TWC, or, more likely, the site would have a trade-based supervisor handling the day-to-day site temporary works, i.e. performing the TWS role.

5.1.4.3 Projects with more than one contractor

If there is more than one contractor, one should be appointed as the principal contractor (PC); and it is the PC who takes the responsibility for the site and all the construction on it, whoever carries it out (see [5.1.1.12](#)). The temporary works should be managed by the PC's appointed TWC, known as the PC's TWC.

Depending on the size or accessibility of the site, the temporary works may be controlled either directly by the PC's TWC or by responsible TWSs [see [Figure 2b](#)]. If the site is large, or there is another site in the local area, then other TWSs could be incorporated into the TW control process. The arrangement at [Figure 2b](#)) is common to many construction sites operating with their own staff.

5.1.4.4 PC with several sites

Small contractors, such as local house builders and many utility companies, operate with multiple small sites, often with only a few operatives to each site; they should operate in accordance with their organization's procedures, including the control of temporary works, even where they are undertaking routine work.

The PC's TWC should be appointed by the organization to cover the group of sites, and may be based in a regional office. The day-to-day control should be left to the responsible TWS on each site.

This procedure, shown at [Figure 2c](#)) is common practice with utility organizations and small building companies.

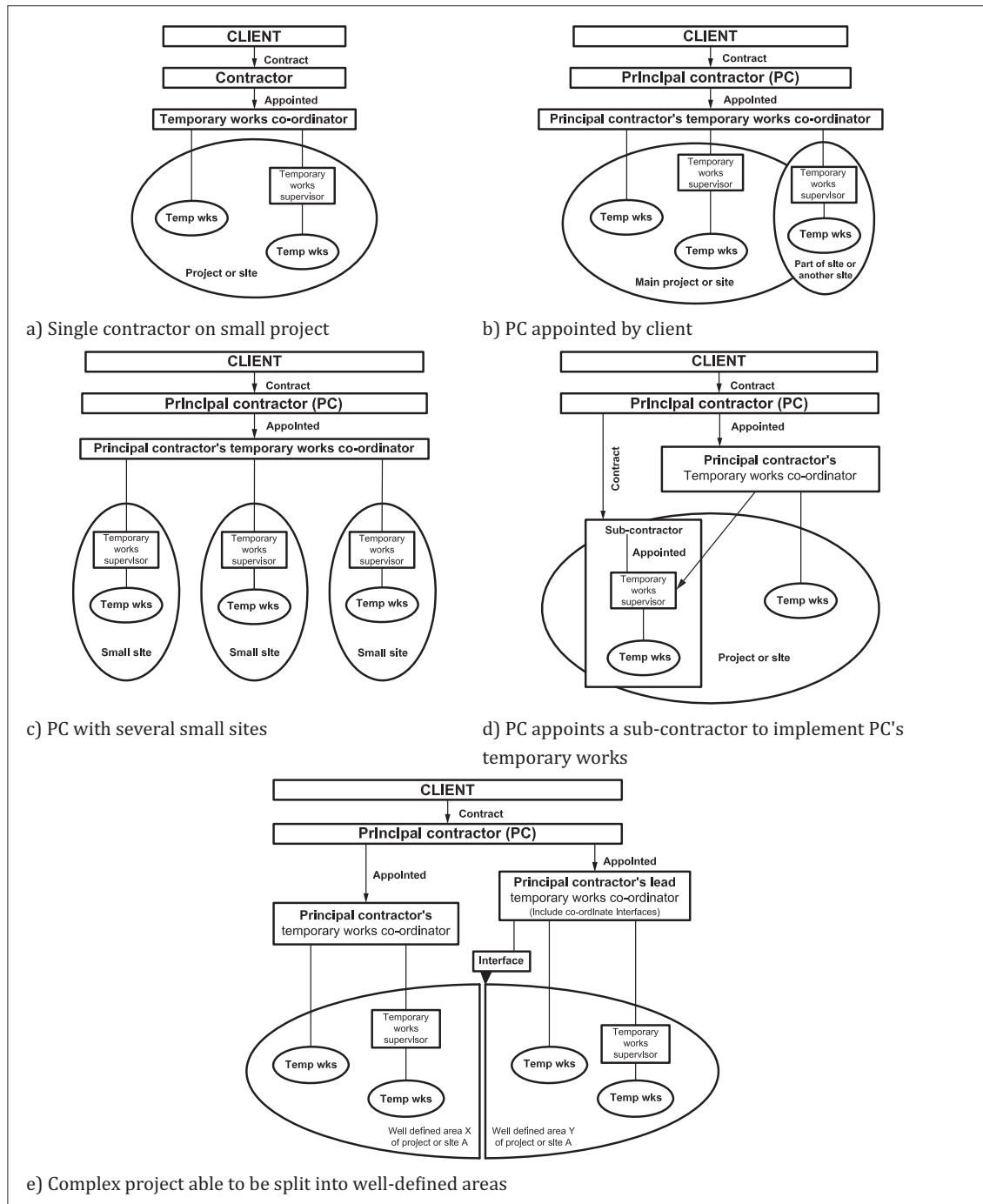
5.1.4.5 PC appoints a sub-contractor

Where the PC appoints a sub-contractor to provide the labour, and possibly also the equipment to be used for the temporary works, but retains the management role for the temporary works, the contractual relationship changes. This is shown in [Figure 2d](#)).

The sub-contractor should manage their own work (see the first principle in [5.1.1.10](#)) and should appoint TWS(s) to assume day-to-day responsibility. The sub-contractor's TWSs should report to the PC's TWC on all temporary works matters.

The management, design and control of the temporary works, along with any other temporary works on the site, should remain with the PC's TWC.

Figure 2 — Lines of responsibilities where a single contractor or a principal contractor (PC) is co-ordinating the temporary works



5.1.4.6 Splitting large/complex projects

Whereas the third principle (see [5.1.1.10](#)) limits one person for ultimate control, this British Standard accepts flexibility for particularly technically or logistically complex projects. It would be unrealistic to give individual responsibility for knowing all that was going on to one person for a major project.

A project or site can be split into more than one well-defined area and a PC's TWC be appointed for each area, e.g. a length of motorway or railway [see [Figure 2e](#)]. Each individual PC's TWC should

be responsible for all the temporary works in the area allocated, irrespective of which organization carries out the temporary works in the area (see [9.3.2.5](#)).

The principle remains (see third principle in [5.1.1.10](#)) that only one PC's TWC should be responsible for a specific area at any one time. The interfaces should be clearly established and a lead PC's TWC should be appointed to manage the interfaces between the areas.

NOTE It is extremely rare that a building project would justify more than one PC's TWC.

5.1.5 Responsibilities where a contractor co-ordinates their own temporary works

5.1.5.1 General

Certain specialist sub-contractors, such as reinforced concrete (RC) frame contractors, ground workers or demolition contractors, have the experience and competence to organize their temporary works and have management capability, often including specialist temporary works design facilities; they can, therefore, be deemed competent to co-ordinate their temporary works.

Where a client appoints a contractor directly, for example an M&E contract, and that contract involves temporary works, then the temporary works should be controlled and managed.

Both the managing sub-contractor appointed by the PC and the client's contractor should manage their own works responsibly. The lines of responsibility are shown in [Figure 3](#). The contractor should appoint a TWC with a responsibility to the PC's TWC. They should also co-ordinate their temporary works with or through the PC's TWC to ensure no temporary works is affected adversely by any other temporary works or plant or other adjacent activities. Where necessary the contractors should also appoint their own temporary works supervisor(s) to manage the day-to-day site activities.

The relationships between the PC and contractor (i.e. a PC appointed sub-contractor or a client appointed contractor), including the roles of PC's TWC and TWC are summarized in [Figure 4](#), but the full details of the relationships, actions and responsibilities are as outlined in [Clauses 7, 9 and 11](#).

Figure 3 — Lines of responsibility where either a principal contractor's (PC) appointed sub-contractor or a client's contractor co-ordinate their own temporary works

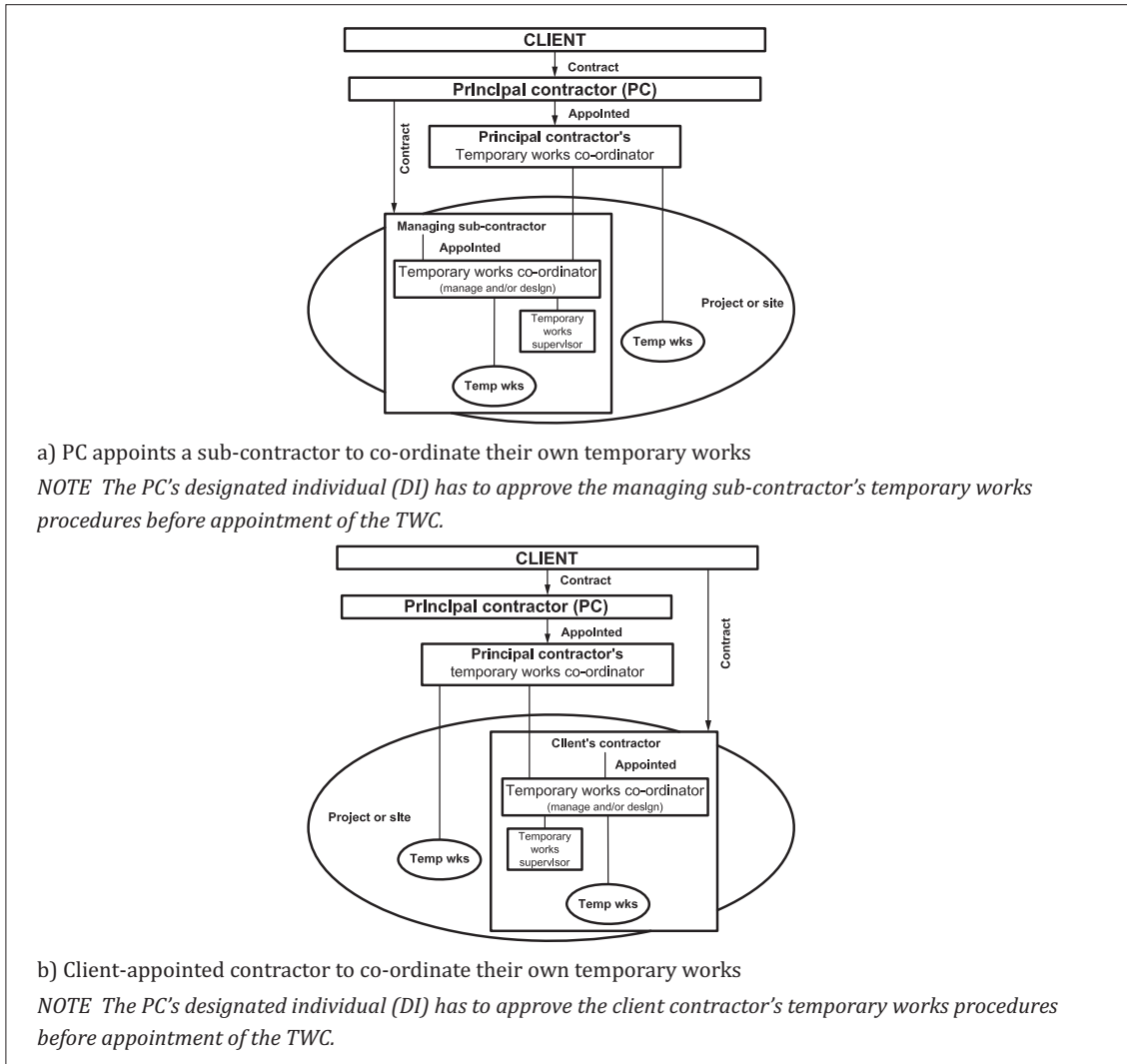
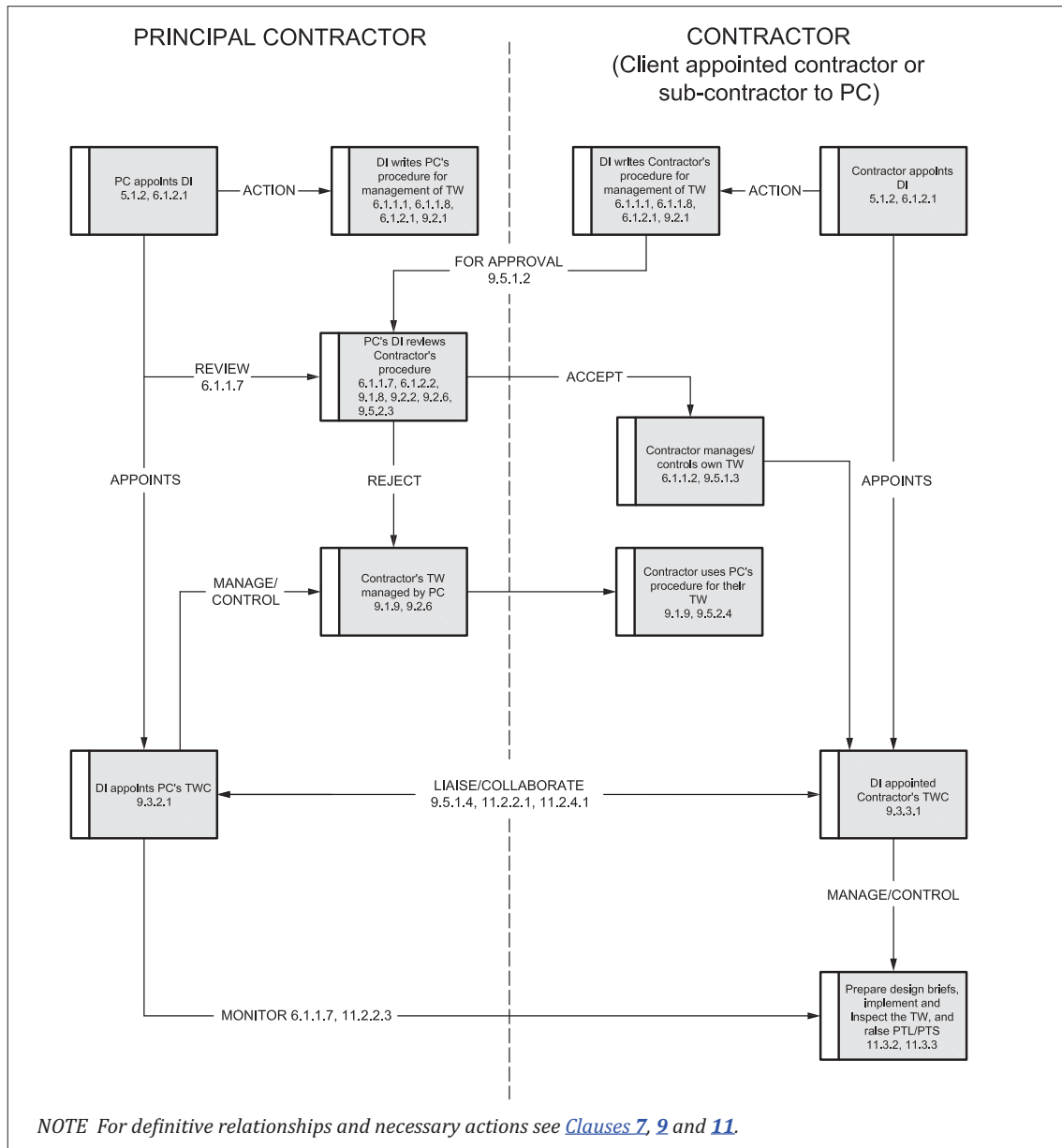


Figure 4 — Schematic representation of relationships between principal contractor and contractor (client appointed or sub-contractor) including PC's TWC and contractor's TWC



5.1.5.2 PC appoints a managing sub-contractor

The PC should check that the contracting organization has the ability and processes in place to manage temporary works; only then should the organization be contracted to manage the temporary works under their specific control [see [Figure 3a](#)]. In particular, the PC's DI should confirm that the sub-contractor's procedure for the control of temporary works is satisfactory.

The contractor/sub-contractor should appoint a TWC to control their own temporary works. In effect, the PC has delegated certain duties to the TWC with ultimate control for temporary works remaining with the PC's TWC.

The PC's TWC should control the other temporary works on the site, and liaise with other contractors, to control the various interfaces.

NOTE For example, a RC frame contractor would not necessarily be aware that a ground work sub-contractor was digging a trench across the site close to the RC frame construction.

5.1.5.3 Client-appointed contractor

Where a client appoints a contractor directly and where the work has a temporary works element, such as installing M&E equipment, the implications for the site and the PC can be significant and the effect on procedures should be considered to ensure the PC's TWC can discharge their responsibility in relation to temporary works (see [7.1.3](#)).

The PC's DI should confirm that the contractor's procedure for the control of temporary works is satisfactory and the client's contractor should appoint a TWC to control their temporary works [see [Figure 3b](#)].

The TWC should report to the PC's TWC and provide a method of communication to liaise between the site and the other contractors for temporary works.

As there is no contract between the parties involved in the temporary works (see [Figure 1](#)), the client should take into account that any such appointed contractor should be made aware of the implications and the continuing role of the PC's TWC on the project. This should be made clear to any contractor appointed by the client at an early stage in the procurement/management process.

5.2 Training

COMMENTARY ON 5.2

Competence assumes a sufficient up-to-date knowledge of temporary works relevant to the complexity of the project. Although it is desirable that temporary works is included in college and university courses, detailed practical knowledge of the subject is gained through practice. This knowledge is gained by observation, by CPD, or by experience, supplemented by regular training.

It is desirable that universities and colleges include temporary works within the syllabus for building, construction and civil engineering courses.

Although detailed technical knowledge on temporary works has historically been considered necessary for contracting staff, the experience and understanding of the effect of temporary works on design and construction leads to a broader based understanding and a more informed student. This promotes better design of permanent works and better informed engineers joining the construction industry.

A syllabus would be expected to include an introduction to the types of temporary works, both above and below ground; an understanding of likely management processes to be adopted to control the temporary works, with, where possible, indications of the cost implications of temporary works. Temporary works involves assessment of risk, and it is expected that risk management would already be included in the syllabus.

In addition to a general awareness of temporary works, the more commonly occurring temporary works of trenches, scaffolding, backpropping, crane pad foundations, hoardings etc. might justify more detailed coverage on most courses. It is desirable that the principles of stability of temporary works structures are included in this syllabus.

It is also desirable that non-technical courses at colleges and universities for subjects such as quantity surveying, building management etc. include awareness in temporary works. This significantly improves the recognition of temporary works as an important element in construction, contributing to safer, more economical construction.

College and university lecturers are advised to use CPD to keep up-to-date with the latest temporary works subjects, to ensure they have relevant knowledge and technical experience in temporary works.

- 5.2.1** All those managing temporary works should have, as a minimum, an understanding of:
- a) the procedures outlined in [Section 2](#) of this British Standard;
 - b) the specific procedures for the organization for whom the person works;
 - c) the risk management aspect associated with the management of temporary works;
 - d) technical knowledge relevant to both the role and the complexity of the work; and
 - e) practical knowledge relevant to the complexity of the work.
- 5.2.2** Technical and practical knowledge training to satisfy [5.2.1d\)](#) and [5.2.1e\)](#) should be related to the role and depend on the scale and specialization of the works. The depth of knowledge varies from general awareness training through to courses for detailed temporary works design and identification and rectification of defects in temporary works. Certain projects might require job-specific technical training (e.g. railway work, demolition, airports, tunnelling, oil and gas): where required, this should be established at an early stage of the project.

NOTE 1 Typical courses for general awareness and practical and technical knowledge are often only one day, increasing to two days for more technical design and awareness courses. Detailed temporary works design courses and practical courses that include the inspection and rectification of known defects in temporary works can be up to three or four days duration and are often in-house.

NOTE 2 Temporary works is essentially very practical, with attention to details often being critical, so on-line training or self-taught with mentoring might also require practical assessment.

- 5.2.3** Those procuring training should assess the actual trainer for competency, not the training provider; to ensure that the trainer has the relevant and up-to-date technical or practical experience in temporary works.

NOTE 1 Whereas risk management and procedural aspects of temporary works training can be carried out by safety professionals and/or competent skills centre tutors, they are unlikely to have the necessary understanding in technical and/or practical aspects of temporary works to satisfy the minimum training requirements identified in [5.2.1d\)](#) and [5.2.1e\)](#).

NOTE 2 The TWf (Temporary Works Forum), although not maintaining a specific list of competent temporary works trainers, does provide a useful source of knowledgeable members on the subject.

Section 2: Procedural control of temporary works

6 Procedures

6.1 Introduction to procedural control

6.1.1 General

6.1.1.1 When a project has, or might be anticipated to have, the requirement for any temporary works, the organizations listed in [6.1.1.2](#) should have and implement a procedure which outlines how that organization is to discharge its duties in relation to the temporary works. A description of what temporary works can entail is given in [5.1.1.1](#).

6.1.1.2 The following organizations should have procedures covering roles, responsibilities and appointments, all with the intention of removing ambiguity and making the PC's overall responsibilities clear. (Domestic clients are a special case and the organizations they employ and their roles and responsibilities are addressed in [7.4](#).)

- a) Clients.
- b) Management/cost consultants (this includes architects acting for a client).
- c) Contractors/sub-contractors/specialist contractors (including demolition contractors) all of which manage their own temporary works. This includes third-party employed contractors, such as utility providers and their contractors.
- d) Temporary works designers and permanent works designers.
- e) Manufacturers/suppliers.

NOTE Some organizations have multiple responsibilities, e.g. utility providers, management contractors.

6.1.1.3 Any organization employing another organization to carry out design or construction, in relation to temporary works, should check that they are competent to do so (see [3.13](#) for a definition of competent person). Specific requirements, roles and responsibilities of each of the parties identified within each organization are set down in [6.1.4](#).

NOTE This general recommendation is used in various clauses of the HSE Guidance L153 [\[4\]](#).

6.1.1.4 Where more than one contractor is present during the construction phase, each contractor should co-ordinate the planning, management and monitoring of their own work with that of the PC in relation to their temporary works.

- 6.1.1.5** Where there is an interface identified at the pre-construction phase between two or more projects, the PDs involved should co-ordinate their activities. Where there is an interface during the construction phase between two or more sites, the PCs involved should co-ordinate their activities.

NOTE Attention is drawn to Regulation 15 of the CDM Regulations 2015 [1] and paragraph 153 of the HSE Guidance L153 [4].

- 6.1.1.6** Where the method of construction of the permanent works differs from that which has been proposed by the permanent works designer, the temporary works design should include an assessment of the permanent works for the various stages of construction, modification or demolition to determine adequacy of strength and/or stability.

- 6.1.1.7** The PC has an overall duty for the safe execution of all works on site, including temporary works. Although the PC's duty is retained, the responsibility may be delegated by the PC (or by the actions of the client or a third party) to one or more sub-contractors or contractors or third-party employed contractors. The PC should, before appointment or permitting these other organizations to co-ordinate their own temporary works, carry out a robust and auditable vetting process to check the competence of these other contractor(s), and then be proactive in monitoring the performance of the contractor(s) and their compliance with their own procedures.

NOTE The PC's responsibility for the safe execution of temporary works on site can be dependent upon or affected by the involvement of other parties, typically clients, designers and project management organizations, which are not necessarily employed by or responsible to the PC.

- 6.1.1.8** Where a party/organization undertakes two or more roles (see [6.1.4](#)) the DI should establish and maintain suitable and separate procedures for each of the roles for which the party or organization is responsible or can constrain or influence.

- 6.1.1.9** During the conceptual or design stage, either the client's or the PD's procedures should be used, but once the PC is appointed, the PC's procedures should take precedence over the client's or the PD's.

NOTE Procedural control of temporary works can vary during the life of a project. This can change again during on-going maintenance of the permanent works during its lifetime and eventual demolition.

- 6.1.1.10** The organization's procedure should cover the management of the approval (by clients and/or third parties) of design and design checking processes, and include measures for ensuring that the design function and the roles of the TWC/TWS, where relevant, are carried out by competent individuals.

- 6.1.1.11** To understand, control or mitigate the risks, organizations involved in temporary works should write their own procedures relevant for their type of work, its complexity and the level of operator performance. Procedures should be regularly reviewed and updated as necessary.

6.1.2 Designated individual

- 6.1.2.1** All organizations which are party to a contract or otherwise involved in a project which has a requirement for temporary works are involved in temporary works (see [6.1.1.2](#)) and should appoint a designated individual (DI). The DI should be either a member of or directly responsible to a member of the organization's main supervisory board (of directors) and should have both responsibility and authority for establishing and maintaining a procedure to control those aspects of temporary works (and associated risks) for which the organizations have responsibility or which they can constrain or influence. The temporary works procedure should be approved by the main board or a main board director.

- 6.1.2.2** The DI should be responsible for ensuring that any organizations that they employ or recommend to be employed have adequate temporary works procedures if they are designing, carrying out and/or managing temporary works.

6.1.3 Control of risk

COMMENTARY ON 6.1.3

This clause relates to implementation risk and is not to be confused with the category of design check as outlined in 13.7 and specifically Table 2, for example, the implementation risk for the same temporary works structure erected in two different locations can vary significantly depending on proximity to local assets, such as an adjacent railway line, thus justifying different levels of risk, and changing the risk classification – in contrast the temporary works design might be unchanged requiring the same category of independent design check.

- 6.1.3.1** The risks associated with temporary works can be considered to arise from their design, their construction and use, and the consequences of their failure. Risks associated with design relate to the complexity of the design. Mitigation of design risk is addressed through the selection of the category of design check (see 13.7). Risks associated with the construction, use and removal of the temporary works relate to such aspects as workmanship, materials, experience and manner of use. These are termed execution risks. Risks associated with the consequence of failure of the temporary works come from the location of the temporary works, and what might be affected by the failure. Execution risk and consequence of failure risk combine to form an implementation risk.
- 6.1.3.2** To assess the risks associated with temporary works on a project, each item of temporary works should be classified and appropriate procedures adopted to control the risks. The classifications used should be “very low”, “low”, “medium” or “high” (see Table 1).
- 6.1.3.3** Each organization should determine the level of control for each risk class of temporary works, depending on their experience (including that of operatives), competence and the location of the particular temporary works and the consequence of its failure. The approach to be taken when managing risk under each of the implementation classes should be defined in the company procedures. Examples are given in Table 1.
- 6.1.3.4** Interfaces, in both design and execution, are one of the key areas where problems can occur in temporary works and should be controlled by all who can affect the interface to ensure the risk to the temporary works can be managed effectively. The PC’s TWC should be responsible for classifying temporary works, where there is an interface between contractors. Where there is no interface, the TWC of the organization carrying out the temporary works should be responsible for classifying the temporary works.
- 6.1.3.5** Classification should be done in consultation with other relevant parties, such as the construction team or the design team.

Table 1 — Implementation risk classes for temporary works and examples of mitigation measures

Implementation risk class	Risk	Permits required	Other control measures
Very low	<ul style="list-style-type: none"> No identified practical mode of failure. No impact if failure occurs. 	N/A	Control via RAMS. Inspection by site team, not necessarily recorded on the temporary works register and might not require a design brief.
Low	<ul style="list-style-type: none"> Minor structures with high levels of robustness. Very experienced workforce. Failure is entirely within the site, of low impact. Inconvenient, but personal injury unlikely. 	Permits can be signed by a TWC or an authorized TWS.	Follow company procedures, including inspection and test plan (see Clause 14).
Medium	<ul style="list-style-type: none"> Conventional structures. Conventional construction methods. Relatively experienced workforce. Failure would be major, potentially involving injury, fatality or significant economic loss. Would not initiate secondary events. 	Permits can be signed by the PC's TWC or an authorized TWC.	Follow company procedures, including inspection and test plan (see Clause 14).
High	<ul style="list-style-type: none"> Schemes with dependency on critical structural details, with little or no redundancy, or with stability reliant on critical elements. Schemes with complex interfaces where various items of temporary works impact on one another Inexperienced workforce. Unfamiliar processes or equipment. Failure would be catastrophic in its own right, or if minor might initiate a secondary or chain reaction of major or catastrophic events. 	Permits signed by PC's TWC.	Follow company procedures, including inspection and test plan (see Clause 14). PC's DI to ensure the scheme is reviewed, e.g. HAZOP or peer review.

NOTE 1 The TWC's and TWS's scope of work is covered in [11.2.2](#), [11.3.2](#) and [12.2](#) respectively.

NOTE 2 The PC's TWC agrees the signatory for each permit applicable to the item of temporary works.

NOTE 3 It is outside the scope of this British Standard to classify particular temporary works.

6.1.4 Organization roles and procedures

The procedure for each type of organization and role of DI should be in accordance with the relevant clause(s) as follows.

- a) Clients (see [Clause 7](#)).
 - General (Commercial/public clients) (see [7.1](#)).
 - Appointing contractors other than PC (see [7.2](#)).
 - Client's DI (see [7.3](#)).
 - Domestic clients (see [7.4](#)).
- b) Designers (see [Clause 8](#)).
 - Designers' DI (see [8.2](#)).
 - Permanent works designers (see [8.3](#)).
 - Temporary works designers (see [8.4](#)).
 - Lead designers (in relation to temporary works designs) (see [8.4.2](#)).
 - Principal designers (see [8.5](#)).
- c) Contractors (see [Clause 9](#)).
 - Contractors' DI (see [9.2](#)).
 - Contractors' responsibilities (see [9.3](#)).
 - Principal contractor (see [9.4](#)).
 - Contractors other than PC (see [9.5](#)).
 - Third-party employed contractor (see [9.6](#)).
- d) Suppliers/manufacturers (see [Clause 10](#)).
 - Suppliers' DI (see [10.2](#)).

6.2 Temporary works register

COMMENTARY ON 6.2

Registers are generally available as a company spreadsheet. This allows continuous monitoring and is usually on a project-specific database. It gives the opportunity for several different staff to monitor progress of the temporary works, but it remains the responsibility of the PC's TWC throughout the project.

The register is also an aide memoire to assist categorizing, designing and checking all the relevant temporary works. Correct use of such a register is an important management tool for the site. The register is also useful as verification that a safe procedure is in use on the site.

There is no standard format of a register; each organization needs to relate its register to the type of work carried out and the nomenclature/forms, etc. used in the company procedures. What is important is how it is used and the way in which it is maintained and kept up to date as the project progresses.

- 6.2.1 The PC's TWC should ensure that a temporary works register is prepared and maintained throughout the project. The register should identify what temporary works are needed on the contract. The register, often commenced at tender stage in outline, is not expected to identify all the details of all the temporary works to be required. As the project progresses the register should be maintained as an "active document" and the PC's TWC should ensure that it is kept up to date.

6.2.2 Where a contractor has been appointed to manage their own temporary works the relevant TWC should also prepare and maintain a local temporary works register. The TWC should provide relevant information to the PC's TWC to enable the master temporary works register to be maintained. It should be provided each time it is updated and at a regular agreed interval. The register should be in a common format to allow incorporation of the TWC's data into the PC's TWC's master register for the project.

6.2.3 A temporary works register should include:

- a) reference number and short description;
- b) date design brief issued;
- c) date required;
- d) risk classification of temporary works (see [Table 1](#));

NOTE 1 The implementation risk classification might be influenced by the client's requirements, such as increasing the risk level for a particular section of temporary works.

- e) designer (company and/or individual);
- f) design checker (company and/or individual);
- g) design check category;

NOTE 2 The design check category can be influenced by the client's or third-party's requirements (see [13.7](#)) or by a minimum category of check for a particular type of temporary works set by the PC or contractor.

- h) date design completed;
- i) date design checked/approved;
- j) erection complete and checked with date of permit to load (bring into use);
- k) date of permit to unload (take out of use) as necessary; and
- l) third-party approvals.

6.2.4 The register is an important management tool, and the company should have a process by which such registers are regularly audited. The auditing should be carried out by someone familiar with temporary works.

7 Clients' procedures

7.1 General (Commercial/public clients)

7.1.1 There are three possible scenarios for client roles.

- a) The client takes on the role of PD, or the client employs the PC to construct the works (this implies that the PC is paid for all work, however it is procured, and is responsible for the whole project).
- b) The client appoints a PC but retains the appointment of contractors and suppliers.
- c) The client does not appoint a PC and appoints contractors and suppliers directly, and therefore the client takes on the role of PC.

7.1.2 All clients initiating construction projects where temporary works are involved should have in place a procedure to define their duties in relation to the management of temporary works and assist the PC in controlling any temporary works.

NOTE A domestic client is not normally expected to carry out the same duties as placed on a commercial client (see [7.4](#)).

- 7.1.3** The client's procedure should ensure client-appointed contractors are informed that they should provide their procedure to the PC's DI for approval before undertaking the management of their own temporary works and should work to the PC's procedure in the event that approval is not given. In addition, the contractor should be informed that the contractor's TWC should work under the direction of the PC's TWC where temporary works' interfaces have to be managed.
- 7.1.4** If the client fails to appoint a PD the client should fulfil the duties of the PD, in relation to the development and implementation of a PD's procedure for temporary works (see [8.5](#)).
- 7.1.5** If the client fails to appoint a PC, the client should fulfil the duties of the PC and should develop and implement a PC's procedure for temporary works (see [Clause 9](#)). This should include the appointment of a PC's TWC.

7.2 Clients appointing contractors other than PCs

- 7.2.1** Where the client directly appoints a contractor, other than the PC, where temporary works are involved in the contract, the contractual obligations and responsibilities should be carefully considered, detailed and communicated. Although the client is responsible for the contractor, the PC's DI should have ultimate control of the management of all temporary works on the project, in spite of the fact that the PC has no contract with the contractor.
- 7.2.2** The client should take into account at a minimum the following when appointing the client contractor:
- the contractor's procedures, competence of contractor, the contractor's designer and proposals for design checking, including competence of any checking organization;
 - acknowledgement that the appointed PC has ultimate decision on design check category, construction risk category etc.;
 - the client should not place commercial or contractual constraints on the PC's ultimate responsibility; and
 - acceptance that the PC appoints a PC's TWC and that the PC's TWC or PC's TWS (subject to limits of authority) can be the final signatory on permits.

7.3 Client's DI

- 7.3.1** Clients should establish and maintain a procedure to control those aspects of temporary works (and associated risks) for which they have responsibility or can constrain or influence. The senior person responsible is defined as the client's DI (see [6.1.2](#)).
- 7.3.2** The client's DI should establish a procedure detailing how the main items for which the client has responsibility should be managed. The main items to be addressed are as follows.
- The PD and PC and any other organization directly employed by the client should have in place a temporary works procedure in accordance with the recommendations of this British Standard.
 - The client's DI should ensure that the PD's and PC's procedure(s) for the control of temporary works are being implemented.
- NOTE 1 Implementation can be checked either by using the client's own staff during the contract, by using a consultant or an independent third-party audit and/or certification scheme.*
- Any assets belonging to the client or third party that might be affected by any temporary works should be identified.
 - Any requirement for review or formal acceptance of the temporary works by the client, including design brief and/or design statement and/or design output should be defined.

- e) The client should provide all necessary information to enable the PD and/or the PC to design, construct and remove temporary works and, where necessary, protect any assets which belong to the client or a third party.

NOTE 2 This information could include site investigation information (including that for the design of working platforms), computer models (including BIM [building information modelling] and/or design package input) to allow the temporary works designer to input the new information in relation to the temporary works, information on the assets which might be affected by the temporary works (drawings, results of any invasive investigations of the assets and any calculations which might be available).

- f) Any requirement for client-specified hold points for temporary works, including signing of an acceptance certificate to release any hold point (as a permit to proceed), should be defined.
- g) The procedures should define the actions to be taken in the event that a client does not accept a TW proposal, or withholds or delays the release of a hold point.
- h) Any other constraints or criteria, performance or otherwise, should be defined.

7.3.3 Where the client directly appoints organizations, other than the PD and PC, that are involved in temporary works, the additional items for which client responsibility should be established are as follows.

- a) Any organization directly employed by the client should be informed that they should adhere to the PD's or PC's procedures unless their own procedures are approved by the PD's DI or PC's DI, as appropriate, for use.
- b) The arrangements should include provisions for the organization's management to both liaise with and be responsible to the PC's TWC on matters related to their temporary works input (see [9.5.2](#)).

7.4 Domestic clients

COMMENTARY ON 7.4

A domestic client is one for whom construction work is being carried out on their own home, or the home of a family member that is not being done in connection with a business, whether for profit or not. A domestic client is not normally expected to carry out the same duties as placed on a commercial client and hence would not be expected to have a formal temporary works management procedure. The duties of a domestic client are normally transferred to:

- a) the contractor on a single contractor project; or*
- b) the principal contractor on a project involving more than one contractor.*

However, the domestic client can choose to have a written agreement with the PD to carry out the client duties.

7.4.1 Whoever takes on the duties of the client (PD or PC) should have a suitable temporary works management procedure to suit the complexity of the project. This should incorporate their own duties as well as the clients' duties relating to temporary works as outlined in this document.

7.4.2 Householders who carry out work themselves by hiring or obtaining temporary works equipment, such as scaffolding for access purposes to their home, or a relative's, are not covered by the CDM Regulations [1] and the householder should ensure they comply with the manufacturer/supplier's recommendations for use of the equipment.

7.4.3 The role of a designer, PD, contractor or PC on a project for a domestic client should be no different to the role undertaken for a commercial client. The various duty holders should carry out their duties in proportion to the risks involved in the project.

8 Designers' procedures

COMMENTARY ON CLAUSE 8

This clause applies to individuals or organizations designing or influencing permanent works; designing or influencing temporary works; carrying out design checks; arranging for or instructing others to carry out design; or any combination of the above.

8.1 General

8.1.1 Designers should have the qualifications, skills, knowledge and experience required to carry out the design and co-ordination roles and the passing/receiving of information relevant to any temporary works. Design organizations should verify the competence of both designers and checkers of temporary works within their organization.

8.1.2 Designers should address the buildability of permanent works, temporary works, their interfaces, their proposed methods of construction and any related design assumptions.

NOTE 1 This is to identify foreseeable hazards to health or safety associated with their design contribution, such that measures for elimination or mitigation can be identified. Attention is drawn to the duties of designers under the CDM Regulations 2015 [1] and the expectation that they provide and receive relevant information on temporary works.

NOTE 2 An example of buildability would be consideration of transfer of loads through slabs in multi-storey construction and use of backpropping.

8.1.3 Designers should apply the general principles of prevention to the identified risks, and highlight any residual risks. Appropriate and proportionate information about the residual risks should be provided to those who need it.

NOTE Unnecessary information (risks that a competent contractor could readily identify) can prevent the clear communication of key messages.

8.1.4 Designers should:

- a) liaise with the PC's TWC, or TWC where appropriate, including agreement of the category of temporary works design check (see [Table 2](#));
- b) respond promptly and clearly to any reasonable request from the PC's TWC, or TWC where appropriate, for information or design criteria in respect of temporary works to allow the PC's TWC to manage and discharge their responsibilities by providing the information to the TWC or temporary works designer, as appropriate. This allows the co-ordination of all temporary works by all parties across the site;
- c) clearly communicate the design, in accordance with any agreed format, to the PC's TWC, or TWC where appropriate. The design output includes the residual risks associated with the design; any hold points required by the designer, and which criteria allow their release; limitations of the use of the design and/or an outline methodology on how the temporary works should be constructed (where this is not obvious to a competent contractor); and data required by other designers interfacing with this design, for example loads on foundations; and
- d) ensure that any areas of temporary works design responsibility which are excluded for whatever reason are clearly highlighted and communicated.

NOTE 1 Typical exclusions can include stability of top restrained falsework systems, foundations to support proprietary falsework equipment, scaffolding or cranes, make-up sections in timber, make-up pieces in access.

NOTE 2 3D and 4D (3D+time) models can be used to communicate the design intent and sequencing to enable better communication and identify residual risks.

8.2 Designers' DI

- 8.2.1** Organizations carrying out permanent and/or temporary works designs should have a DI to ensure that a procedure suitable to their organization is in place and managed.
- 8.2.2** The designers' DI should establish a procedure describing how the main items for which the designer has responsibility should be managed. The main recommendations to be addressed, in addition to those in [8.1](#), are as follows.
- a) Procedures should be appropriate to the type and complexity of work, and associated risks, which the designer is to consider.
 - b) Sub-consultants should have adequate procedures for managing the temporary works design.
 - c) Any temporary works design commissioned by a PC or other organization should be initiated with a design brief, from the PC's TWC or TWC. The designer should prepare a design statement or approval in principle (AIP) or equivalent where so required.
 - d) Any temporary works design checker commissioned by a PC or other organization should be provided with the design brief, design statement or AIP or equivalent where prepared and the necessary drawings and other documents [as noted in [8.1.4c](#)] but not calculations] before the design check is undertaken.
 - e) The designer should respond promptly and clearly to any request from the PC or a contractor, appointed to manage part of the temporary works, for information or design criteria, in respect of temporary works, to allow the TWD to complete the design and allow the PC or other contractor to manage and discharge their responsibilities.
 - f) The designer should liaise fully and clearly with all parties, initially with the TWC, but this may be extended to cover other designers and/or design checkers.

8.3 Permanent works designers

- 8.3.1** Permanent works designers should address the buildability of the permanent works and identify, and make provision for, any temporary works and temporary conditions required by their design and their assumed method of construction. This should include:
- a) a proposed method and sequence of construction which should have no adverse effects on the permanent works;
 - b) deciding on and communicating the intended construction process, giving particular attention to new or unfamiliar processes;
 - c) considering the stability of existing structures and partially constructed/erected/ demolished structures and, where this is not immediately obvious, providing information to show how temporary stability could be achieved;
 - d) identifying where standard industry details are not suitable, and where detailed structural design is to be carried out by others;
 - e) considering the effect of the proposed work on the integrity of adjacent/existing structures, particularly during refurbishment;
 - f) ensuring that the overall design takes account of temporary works which might be needed, no matter who is to develop those works;
 - g) ensuring that consideration has been given to the availability of sufficient space required to construct or maintain the structure; and
 - h) clearly stating loads for which the structure has been designed including the proposed plant installation loads and plant routes.

- 8.3.2** The designer should liaise with the PD to provide all necessary information relevant to any temporary works or temporary condition(s) to the PC through the PD.

8.4 Temporary works designers

8.4.1 General

- 8.4.1.1** TWDs and TWDCs (temporary works design checkers) should confirm that the design details and outline methodologies are accurately translated into the design output, and that the design follows appropriate engineering principles. This includes any assumed construction methods, sequences, temporary works requirements, and loads to be either imposed on or supported by the permanent works.

- 8.4.1.2** TWDs and TWDCs should confirm that the design output adequately describes the design in a design check certificate or other suitable form of record (see [13.7.5](#)).

- 8.4.1.3** Where the category of design check is not specified by the contractors' procedures or the client, the TWD, in consultation with the TWC, should advise the minimum category of design check (see [13.7](#)).

8.4.2 Lead designers (in relation to temporary works design)

- 8.4.2.1** Where a temporary works scheme involves design contributions from more than one designer, one of the designers should undertake the role of lead designer, and manage the design interfaces. The name of the nominated lead designer should be recorded. The lead designer for a temporary works scheme might not necessarily be the principal designer. On completion of the design, a single design certificate should be issued (see [13.7.5](#)).

- 8.4.2.2** The lead designer should ensure that:

- a) there is a distribution of design tasks amongst appropriate designers, especially where the design of temporary works is an integral part of the permanent works methodology;
- b) the communication of design data between organizations is controlled and any iterations are completed to the required levels;
- c) design contributions from all designers are compatible with each other;
- d) they have a holistic understanding of the whole design;
- e) the design output is complete and clearly communicated; and
- f) the principal designer and TWC are informed about significant residual risks associated with the design.

- 8.4.2.3** The same approach, as outlined in [8.4.2.1](#) and [8.4.2.2](#), should be taken where the check of a temporary works scheme involves contributions from more than one design checker.

8.5 Principal designers

In relation to temporary works, the PD should ensure that:

- a) there is a coherent construction method which identifies all key temporary conditions and temporary works;
- b) the finally agreed construction method, sequence and temporary works are not deleterious to the permanent works design;

- c) designers follow the recommendations of the relevant clauses within this British Standard (see [8.2](#), [8.3](#) and [8.4](#));
 - d) they share information with designers, and the PC's TWC and TWS, that might influence the design of temporary works or the selection of construction methods;
 - e) designers take account of the construction phase plan;
 - f) they retain appropriate information relating to temporary works that would be required for the health and safety file; this should include information on construction method or sequence including associated temporary works which might impact on future maintenance or deconstruction; this information should be obtained from the PC's TWC; and
 - g) they carry out the domestic client's duties with respect to temporary works, where these have been transferred to the principal designer (see [7.4](#)).
-

9 Contractors' procedures

9.1 Organizational interfaces

- 9.1.1** The design and construction of permanent works and the attendant temporary works often involves several organizations, therefore introducing a number of organizational interfaces. Common arrangements include the following and combinations thereof:
- a) equipment can be hired, with the supplier carrying out the design, or supplying the basic design data;
 - b) equipment can be erected using operatives who are not direct employees of the main construction organization, e.g. the supplier of the equipment might also erect it; and
 - c) use of a design produced by another organization.
- 9.1.2** When work is being carried out by different organizations, the organizational interfaces can be manifested on site as physical interfaces between different phases of the scheme, e.g. it is common for one organization to prepare and provide the foundations upon which another subsequently erects the main temporary works structure. The physical interface in this example is particularly critical, but in all cases the physical constraints and interface conditions should be clearly defined and the work procedures adopted should take account of these interfaces.
- 9.1.3** The TWC should manage these interfaces and retain an overview of the whole scheme to ensure each step of the procedure is completed and does not adversely affect the scheme.
- 9.1.4** Details of the interfaces should be included in the construction phase plan.
- 9.1.5** When work is being carried out at a number of small sites, a TWS with an appropriate level of authority may be appointed for each individual site, under the overall responsibility of a single TWC.
- 9.1.6** Contractors are appointed by clients, or by other contractors to carry out the works. Where there is more than one contractor appointed by the client, one contractor should be appointed PC. In all cases the contracting organization's procedures should recognize that, whatever the method of procurement, the PC has ultimate responsibility for the safe execution of all temporary works on site.
- 9.1.7** The contractor's procedure should cover the management of any temporary works and include measures for ensuring that the roles of a TWC and TWS are carried out by competent individuals.

- 9.1.8** Where contractors are appointed by the client and/or PC, the PC's DI should ensure that contractors' temporary works procedures are satisfactory. The contractor should supply evidence of how the procedure has been implemented on previous contracts and which type of temporary works the contractor has been responsible for.

NOTE Attention is drawn to the CDM Regulations 2015 [1] and the HSE Guidance Notes on the Regulations [4].

- 9.1.9** If the contractors' procedures are deemed not acceptable by the PC's DI, then they should work to the temporary works procedures of the PC.

9.2 Contractors' DI

- 9.2.1** All contractors involved in temporary works (PCs, sub-contractors and those appointed by clients and third parties) should appoint a DI (see 6.1.2) to ensure that a procedure suitable to their organization is used to control those aspects of temporary works (and associated risks) for which the contractor is responsible. In addition the DI should verify the competence of the individuals to be appointed as TWC. The DI should ensure the proposed TWC has a full understanding of the procedure and their specific responsibilities.

- 9.2.2** The PC's DI should have ultimate responsibility for the temporary works procedures on the project so that, although other contractors are required to appoint their own DIs, any other DIs are aware of the responsibilities and procedural requirements of their contracts. Where contractors are appointed either by the PC or by the client or by a third party, the PC's DI should ensure that contractors' temporary works procedures are satisfactory (see 9.2.6).

- 9.2.3** The DI should ensure that:

- a) for the type, scale and complexity of work/projects undertaken by the organization, the TW risks can be identified, classified and effectively managed;
- b) there is a clear process for on-site management of the design, design checking, erection, use, maintenance, monitoring and dismantling of temporary works;
- c) the risks, roles and responsibilities associated with the sub-contracting of any elements of temporary works are addressed;
- d) a TWC is appointed for each project who is: competent; given clear written authority; technically responsible to the DI; responsible for the implementation of the organizations procedure; and the final authority on site for the safe use of any temporary works;
- e) provision is made for the appointment by the organization of one or more TWSs, where required; and
- f) the TWC is given sufficient time and resources to fulfil the role.

- 9.2.4** Where the PC appoints contractors or they are appointed by the client or third parties, the PC's DI should ensure that the PC's procedure includes details of:

- a) when the contractor's procedure should be provided (generally with any offer to carry out works on the PC's site);
- b) how the PC's DI should check the contractors' procedure, and associated evidence of its implementation on previous contracts to verify that it is in accordance with the recommendations of this British Standard;
- c) how the PC should proceed in the event the contractor's procedure is found to be inadequate in any way;
- d) how the PC's TWC should interact with the TWC of other contractors, including acceptance of design briefs, verification that designs and design checks have been carried out and the implementation is in accordance with the certified design;

- e) how the PC's TWC should verify the contractors' temporary works are being managed and take account of all operations across the site;
- f) when and how the PC's TWC should check, including checking it does not adversely affect other temporary works by the PC or other contractor, and accept each design brief submitted by the contractor, where appropriate; and
- g) when and how the PC's TWC should verify that each temporary works scheme has been designed and design checked before its implementation.

9.2.5 The PC's DI should be provided with a copy of the contractor's DI assessment of the organization's TWC and confirm acceptance or otherwise via the PC's TWC.

9.2.6 The PC's DI should confirm that any other contractor's procedure for the control of temporary works is satisfactory and that evidence has been provided which confirms that the procedure has been satisfactorily implemented elsewhere. This should include the appointment of a TWC where relevant, i.e. the contractor is deemed to have the knowledge, skills, experience and organizational capability to manage its own temporary works.

9.3 Responsibilities

9.3.1 General

9.3.1.1 The contractor's procedure should ensure that responsibilities are properly allocated and communication arrangements established. The key items are:

- a) responsibilities should be clearly defined;
- b) all instructions should be clear and complete; and
- c) documented records of responsibilities allocated, instructions given and actions taken should be maintained.

9.3.1.2 The main items for which responsibility should be established are as follows:

- a) the appointment of a TWC and, where appropriate, a TWS;
- b) the limits of authority of the TWC, any TWC appointed by contractors other than the PC and TWS, where appointed, including any authorization to release hold points, such as permits to load (bring into use) or unload (take out of use) the temporary works;
- c) the preparation of an adequate design brief, including where appropriate the establishing of the scheme concept and risk classification;
- d) the design, including calculations, sketches, drawings, specification, preparation of a risk assessment and where necessary a designer's construction sequence for the temporary works scheme;
- e) the independent checking of the design; this should include the design check category (see [13.7.3](#));
- f) the issue of a design/design check certificate or other suitable form of record, where appropriate;
- g) obtaining acceptance of the temporary works scheme directly from third parties as required;
- h) the procurement of materials in accordance with the TWD's specification;
- i) the control of erection, safe use, maintenance and dismantling on site;

- j) the checking of the erected temporary works, and control of their use, maintenance and dismantling, in stages where necessary, to ensure compliance with the design and any hold points; and
- k) where necessary, the issue of a formal “permit to load” or permit to proceed.

9.3.1.3 Those who are allocated responsibilities should have the authority to take and enforce decisions, including to stop the works.

9.3.2 Appointment of the PC's TWC

9.3.2.1 The PC's TWC should be appointed by the DI of the PC. The PC's TWC should be either an employee, or be an employee of an organization contracted to provide the services of a TWC on behalf of the PC for all the temporary works on the site/project area. The PC's TWC can be proposed by a contracts director/manager or senior manager, but the DI should be satisfied that the proposed PC's TWC has the relevant competence (see [5.2.1](#)), before making the appointment.

9.3.2.2 The PC's TWC should be competent and have relevant up-to-date training and the necessary skills, knowledge and experience appropriate to the complexity of the project and anticipated temporary works.

9.3.2.3 The PC's TWC should be responsible to the PC's DI for the implementation of the organization's procedure.

9.3.2.4 The appointment of the PC's TWC should be confirmed in writing and the post formally accepted. Copies of the appointment confirmation document should be provided to the site, the PC's DI, the client and the principal designer as a minimum.

9.3.2.5 Where a particularly technically or logistically complex project can be split into more than one well-defined area, then a PC's TWC may be appointed for each area. Each individual PC's TWC should be responsible for all the temporary works in the area allocated, irrespective of which organization carries out the temporary works in the area. Only one PC's TWC should be responsible for a specific area. One of these individuals should be appointed as lead PC's TWC to manage the interfaces between the areas.

NOTE On a contract such as a motorway or railway the project could be split into sections, having a PC's TWC for each section, provided that the interface is clearly established. It is extremely rare that a building project would justify more than one PC's TWC.

9.3.3 Appointment of the TWC (not appointed by the PC)

9.3.3.1 Where either the PC has appointed a sub-contractor to manage and/or design temporary works, or a client has appointed a contractor other than the PC, a TWC should be appointed by the DI of the organization for whose work the TWC is responsible. The TWC should be either an employee, or be an employee of an organization contracted to provide the services of a TWC on behalf of the contractor for all the organization's temporary works on the site/project area. The TWC can be proposed by a contracts director/manager or senior manager, but the DI, for whom the TWC is employed, should be satisfied that the proposed TWC has the relevant competence, as outlined in [5.2.1](#), before making the appointment.

NOTE Where the appointment of the organization does not involve management or design of the temporary works, no TWC is required as the PC's TWC is responsible for overall co-ordination.

- 9.3.3.2** The TWC should be competent and have both relevant up-to-date training and the necessary skills, knowledge and experience appropriate to the complexity of the project and anticipated temporary works. As the TWC is taking on management roles similar to those of the PC's TWC, the training and experience should be appropriate.
- 9.3.3.3** The appointment of the TWC should be confirmed in writing and the post formally accepted. The confirmation should include the name of the PC's TWC. Copies of the appointment confirmation document should be provided to the PC's DI, the PC's TWC and the principal designer as a minimum.
- 9.3.3.4** [Figure 3](#) in [5.1](#) shows the various lines of responsibilities that can occur when PCs appoint sub-contractors to manage and/or design and where client-appointed contractors manage temporary works.
- 9.3.3.5** It is important that where the appointment gives the TWC the authority to carry out management tasks, that authority should be included to allow the TWC to stop the work if it is not being carried out satisfactorily.

9.3.4 Appointment of the TWS

- 9.3.4.1** On larger sites or where the site manager or project manager considers it necessary, or where the PC's TWC or TWC requests assistance, one or more TWS's may be appointed. The TWS may also be appointed by a contractor or sub-contractor, provided the PC's DI has approved their procedure.
- 9.3.4.2** The TWS should be appointed by the organization for whose work the TWS is responsible (see [Figure 2](#) and [Figure 3](#) in [5.1](#) for lines of responsibility). The TWS should be an employee of the organization. Copies of the appointment confirmation document should be provided to the PC's TWC with any limits of authority noted.
- 9.3.4.3** The TWS should have relevant up-to-date training and the necessary skills, knowledge and the experience appropriate to the complexity of the project. The person appointed should be aware of the limitations of their knowledge and have the language and literacy level to raise any query with more knowledgeable persons.
- 9.3.4.4** The TWS can be proposed by a contracts director/manager, PC's TWC, TWC or senior manager, but the DI of the organization for whose work the TWS is responsible should be satisfied that the proposed TWS has the abilities outlined in [9.3.4.3](#) before approving the appointment.

9.4 Principal contractor

- 9.4.1** The PC has ultimate responsibility for all work on site, irrespective of how the work is procured/managed commercially. The PC's recommended lines of responsibilities are shown in [Figure 2](#) and [Figure 3](#) in [5.1](#).
- 9.4.2** The PC's procedures or others approved by the PC's DI should take precedence during the construction phase.
- 9.4.3** The PC's TWC should decide the implementation risk classification (see [Table 1](#)). The risks and mitigation measures should be communicated to temporary works designers and contractors managing the execution of the works on site.

NOTE The various risks might have been identified in documents including design output and/or RAMS which may be used during briefings to contractors and temporary works designers.

- 9.4.4** In the assessment of TWDs or TWDCs (employed directly by the PC or via a contractor), the PC should check the designer's procedures to ensure that the design is undertaken by competent persons.

9.5 Contractors other than PC

9.5.1 General

- 9.5.1.1** In addition to the procedural items outlined in [9.1](#) applicable to all contractors, the contractor should be aware that the PC checks the capability of any contractor to plan and implement any temporary works which might be required under their contract.

NOTE Typical lines of responsibilities are shown in [Figure 1](#) in [5.1](#).

- 9.5.1.2** The contractor should ensure that the PC's DI is provided with a copy of their temporary works procedure, and associated evidence, to verify that it is in accordance with the recommendations of this British Standard.

- 9.5.1.3** Where the contractor is appointed to both manage and design the temporary works, in addition to the recommendations at [9.3.1.2](#), the organization's procedure should cover the management of any temporary works design process, and include measures for ensuring the roles of TWD, TWC and TWS are carried out by competent individuals and how they interact with the PC's TWC.

NOTE Typical lines of responsibilities for sub-contractors managing temporary works are shown in [Figure 3a](#)) in [5.1](#).

- 9.5.1.4** A temporary works protocol should be established, at the start of the contract, between the PC's TWC and the TWC, which defines the appropriate degree of control, by each party, to ensure the co-ordination and safe execution of the temporary works on the project.

NOTE The protocol might include who is to review design briefs, permitted signatories, etc.

- 9.5.1.5** The protocol should include how the interfaces between the contractor's temporary works with other temporary works and permanent works should be managed in order that none has an adverse effect on the other.

- 9.5.1.6** The contractor's procedure should recognize that the PC has ultimate responsibility for all work on site, irrespective of how the work is procured/managed commercially.

- 9.5.1.7** The contractor's procedure for the management of temporary works should address the type, scale and complexity of their work/projects so that the associated foreseeable risks can be identified, classified and effectively managed (see [6.1.3](#)).

9.5.2 Contractor(s) appointed by the client

- 9.5.2.1** The client contractor's roles and responsibilities are the same as those for the contractor appointed by the PC and should be in accordance with [9.5.1.1](#) to [9.5.1.7](#).

- 9.5.2.2** The client contractor's DI should be aware of the responsibilities and procedural requirements of their contract.

NOTE Typical lines of responsibilities for a client's contractor are shown in [Figure 3b](#)) in [5.1](#).

- 9.5.2.3** The PC's DI has a responsibility to ensure the client contractor's procedures are satisfactory (see [9.2.4](#) and [9.5.1.1](#)).
- 9.5.2.4** If the client's contractor does not have their own procedures, or they are deemed not acceptable by the PC's DI, then they should be required to work to the temporary works procedures of the PC.

9.6 Third-party employed contractor

COMMENTARY ON 9.6

There might be occasions when a third-party organization, for example a utility company or archaeologist, is required to carry out planned work associated with or required by the "works", where a PC is appointed. They might or might not appoint their own contractor to carry out the works.

- 9.6.1** The third-party organization should have an appointed DI and an established procedure with lines of responsibility established.
- 9.6.2** The third party should take the following points into account.
- The procedure should address the role and responsibility of the PC.
 - The procedure should accept that the PC remains responsible for co-ordination of all temporary works on the site and the PC should satisfy themselves of the correctness/suitability of the specialist proposals before permitting the works.
 - Where the third party appoints a separate TW contractor for their works, they should assess their procedures, competence of the contractor, the contractor's designer, and proposals for design checking including competence.
 - The third party and any appointed third-party contractors should recognize that the PC retains ultimate responsibility for all aspects of the temporary works. The third party should provide justification to the PC of their safe system of work including any necessary temporary works.
 - The procedures should accept that the PC's TWC (subject to limits of authority) might be required as final signatory on permits.
 - When a third-party contractor supplier is employed for complex or specialist temporary works the PC may seek advice and/or support from specialists.
- 9.6.3** For emergency works the third party, or their contractor, should work within an area cordoned off from the rest of the PC's area of control to allow them to work without affecting/being affected by other temporary works. In this case the provisions of [9.6.2](#) b), d), e) and f) do not apply. Any temporary works within the third party's area should otherwise be in accordance with the provisions of this British Standard.

10 Supplier/manufacturer procedures

10.1 Suppliers of temporary works equipment

When suppliers carry out other services such as design or installation then they should also comply with the recommendations of [8.4.1](#) and [9.5.1](#).

10.2 Suppliers' DI

Suppliers should appoint a DI responsible for establishing, implementing and maintaining procedures to manage those aspects of temporary works with which they are involved.

10.3 Suppliers' procedures

The supplier's procedure should cover:

- a) ensuring their equipment conforms to their published technical data;

NOTE Where multiple versions of similar equipment are available, the supplier should ensure that each version can be easily identified and conforms to the appropriate technical data. Limitations on use of mixing versions should be identified in the data.

- b) the original design of the components, verification and production of technical information for individual and assemblies of proprietary items;
- c) ensuring that manufactured and repaired items conform to the original design requirements for the initial and all subsequent production through the application of robust quality control;
- d) material handling and transportation;
- e) maintenance and repair of items that are hired or offered for second-hand sale; and
- f) equipment substitutions when the original component is not available.

10.4 Verification of design information

The supplier should carry out sufficient calculations and testing to prove the capacity of all temporary works components/equipment, including connections. Calculations and any necessary testing should be carried out to recognized standards. Any testing should be representative of the actual conditions of use and be sufficient in number to give statistically significant results.

10.5 Provision of information

The supplier should provide all information necessary for the design, assembly, use, dismantling and maintenance of components offered for use as temporary works equipment. Performance data issued by a supplier of equipment can reasonably be relied on without further justification.

The information should relate to the properties of the individual components, their use in expected assemblies, and any specific requirements or constraints for use, inspection and maintenance. The information provided to third parties should be sufficient to enable them to carry out their own design(s) or independent checking of the supplier's design.

10.6 Provision of design data

The supplier should either provide published technical data or justify the capacities by specific calculations and certificates (see also [10.5](#)).

NOTE 1 Attention is drawn to section 6 of the Health and Safety at Work, etc. Act 1974 [5] and the duty of suppliers and importers of equipment to supply relevant and correct performance data.

The design data should include:

- a) the intended uses for the components and how they can be identified;
- b) appropriate dimensions, section and material properties and masses;
- c) structural properties for various conditions of use, such as different extensions and eccentricities, together with details of any necessary bracing or lacing;
- d) a clear statement on whether capacities are in terms of characteristic strength or maximum safe working loads;
- e) what factors of safety have been included or assumed;

NOTE 2 For characteristic strength this includes recommended partial material and load factors. For maximum safe working load this is the global factor on the failure (see also [16.9.4](#)).

- f) whether the components conform to the requirements of an appropriate British or European Standard;
- g) details and capacity of connections where loads are received into one or more components, transferred from one to the other, and transmitted to other supports such as foundations; and
- h) any limiting deflection conditions.

The supplier need not publish test reports or manufacturing drawings but should be prepared to share this information with specific users of the equipment, putting confidentiality agreements in place if necessary.

10.7 Provision of information for the safe use of equipment

The supplier should provide the following and specify any specific testing, maintenance or inspection regimes:

- a) detailed user guides, in an appropriate format, explaining how the items should be used;
- b) information on transportation and safe handling of temporary works equipment on site, e.g. lifting points, safe stacking and storage; and
- c) identification of critical items requiring inspection, such as connections or items prone to deterioration over a period of time.

10.8 Standard solutions

The supplier should provide published technical data in the form of arrangements of their equipment based on certain conditions of use; these arrangements, known as standard solutions and often presented in a tabular or readily assimilated format, should relate to the supplier's products only (see [13.10](#)).

11 Temporary works co-ordinator

11.1 General

11.1.1 For every site, responsibility for and the scope of the work of all organizations and individuals involved in any aspect of temporary works should be established. [Figure 2](#) and [Figure 3](#) in [5.1](#) shows the various lines of possible responsibilities that commonly occur on sites involving temporary works where the PC manages and/or designs the works.

11.1.2 The person designated as responsible for the co-ordination of the temporary works should be named as the temporary works co-ordinator. (See [9.3.2](#) for recommendations on the appointment of a PC's TWC and [9.3.3](#) for recommendations on the appointment of a TWC not by the PC.)

11.1.3 One or more TWS may be appointed to assist the PC's TWC and/or the TWC (see [Clause 12](#)).

11.2 The PC's TWC

11.2.1 General

11.2.1.1 For a given site, the PC's DI should appoint a PC's TWC who is responsible for the implementation of their organization's temporary works procedures and checking that other contractors who are directly or indirectly in their employ are implementing their procedures.

NOTE This includes contractors directly employed by the client.

11.2.1.2 The PC's DI should define the PC's TWC's lines of responsibility in relation to each contractor's TWC and/or TWS employed on the site, using [Figure 2](#) and [Figure 3](#) for guidance.

11.2.2 Role of the PC's TWC

- 11.2.2.1** The PC's TWC should have overall responsibility for the co-ordination of all temporary works across the site, whether the temporary works are being implemented by the PC, a sub-contractor or a client's appointed contractor.
- 11.2.2.2** The PC's TWC should be the single point of contact for providing and receiving relevant information from the client, principal designer, temporary works designer, the site team and any TWC, where appointed, for all temporary works matters.
- 11.2.2.3** The PC's TWC should be responsible for ensuring that the organization's agreed procedure for the control of temporary works is implemented on site. This responsibility includes co-ordinating other contractors whose procedures might be accepted for use for agreed parts of the work and checking that those contractors are implementing those procedures.
- 11.2.2.4** The PC's TWC should be responsible for providing information to and receiving information from the TWC of any contractor which has been approved to manage its own temporary works schemes.
- 11.2.2.5** The PC's TWC should be responsible to the PC's DI for ensuring the temporary works design is implemented in accordance with the relevant construction issue drawings and the specification.
- 11.2.2.6** The PC's TWC should not be responsible for the day-to-day progress of the temporary works or other project matters (e.g. commercial or programme matters). Where this is not possible, the PC's TWC should recognize that the role of TWC overrides other responsibilities the individual might have and should not put progress of the works above the safety of the temporary works. However, it is recognized that this might not be possible on projects that have few or no engineering staff.
- 11.2.2.7** If the PC's TWC has responsibility for both checking the temporary works and progress of the construction works, decisions should not be compromised by commercial or other pressures. If the PC's TWC considers that they are under undue pressure to achieve production at the expense of structural stability, then they should seek assistance from their DI (see [9.2.3](#)).
- 11.2.2.8** The PC's TWC should bring matters of concern to the DI that cannot be adequately resolved at site level.
- 11.2.2.9** The PC's TWC should ensure that adequate checks have been completed to confirm the proposed temporary works have no adverse effect on the permanent works. This should be either by a certificate signed by the TWD and TWDC or by a statement that the temporary works design is in accordance with the PWD's sequence/methodology or by confirmation from the PWD that the proposed temporary works have no adverse effects on the permanent works.
- 11.2.2.10** The PC's TWC should have adequate authority to carry out their tasks including authority to stop the work if it is not being carried out satisfactorily. The PC's TWC should be responsible for ensuring the provision of formal permission to load or progress beyond the hold point. The PC's TWC should not permit work to continue beyond any critical stage until it is to the standard specified. The PC's TWC should ensure that once the temporary works has been checked and passed, it is not altered until the loading stage has been completed, and the design allows for it to be dismantled or altered.

- 11.2.2.11** The role of the PC's TWC should not include a responsibility for carrying out any design or design checking of temporary works.

NOTE This exclusion also covers the determination of specific loads, assessment of load paths, engineering checks of any kind, determination of foundation capacity etc.

- 11.2.2.12** The appointment of a person as PC's TWC should not preclude them from carrying out design and/or design checking if they are considered competent and it is within their experience based on the complexity of the project (see [5.2.1](#), [8.4.1](#) and [Table 2](#)).

11.2.3 Duties of the PC's TWC

The PC's TWC should:

- a) co-ordinate all temporary works activities;
- b) ensure a temporary works register is established and maintained (see [6.2](#));
- c) ensure that information relevant to the temporary works has been received from the client, principal designer and permanent works designer, as appropriate;
- d) ensure that a design brief is prepared (see [13.2](#)) with consultation within the project team and that it is both adequate and in accordance with the actual situation on site;
- e) ensure that any other temporary works in the vicinity are referenced in the design brief;
- f) ensure that any residual risks, identified at the design stage, assumed methods of construction or loading constraints identified by the PWD are included in the design brief;
- g) ensure that the design brief is issued to the TWD for a satisfactory temporary works design to be carried out;
- h) ensure that a design check is carried out by someone who was not involved in the original design (see [13.7](#));
- i) where appropriate, ensure that information on the certified temporary works design is made available to other interested parties, e.g. the principal designer and/or the designer of the permanent works, and, where required to the client;
- j) register or record the drawings, calculations and other relevant documents relating to the final design;
- k) ensure that the relevant client and/or third-party approvals, required by the contract, have been received;
- l) ensure that those responsible for on-site supervision receive all the details of the design, any residual risks, including any limitations and guidance notes associated with it and ensure that a specific method statement, which details a safe system of work, is prepared;
- m) ensure that an inspection and test plan is prepared, along with an appropriate quality control check list(s), based on the temporary works design output and is used to verify that the temporary works have been constructed in accordance with the certified design;
- n) ensure that any proposed changes in materials or construction are checked against the original design and appropriate action taken;
- o) ensure that checks, inspections and tests are made at appropriate stages;
- p) advise the designer of any changes or modifications to the scheme or differences from the envisaged conditions (use or environmental);

- q) in the event that any inspections carried out reveal discrepancies between the certified and as constructed temporary works, prevent loading (or unloading) until the discrepancies have been rectified to their satisfaction;
- r) ensure a permit to load or proceed (bring into use) is issued after a final check, which is satisfactory, by either the PC's TWC, TWC or TWS (see [14.2.1](#));
- s) ensure that during use of the temporary works all appropriate maintenance is carried out;
- t) ensure a permit to unload or proceed (take out of use) the temporary works is issued, when it has been confirmed that the permanent structure has attained adequate strength and/or stability, by either the PC's TWC, TWC or TWS (see [14.2.2](#));
- u) ensure that a documented safe system of work is in place and implemented for the dismantling of any temporary works; and
- v) ensure that any relevant information for the health and safety file is transmitted to the principal designer.

11.2.4 Duties of the PC's TWC in relation to other contractors

11.2.4.1 In relation to other contractors, the PC's TWC should:

- a) receive the contractor's DI's assessment of the capability of the TWS (and TWC where appointed), including the individual's acceptance of the role;
- b) ensure that the TWCs and TWSs are operating in accordance with the approved procedures;
- c) provide copies of all information relevant to the contractor's temporary works design to the contractor's TWC;
- d) define the interfaces between the contractor's works and those of the PC or other contractors to establish which design briefs should be provided to the PC's TWC for approval before issue to the relevant TWD;
- e) receive copies of the relevant design briefs produced by the contractor's TWC and confirm there are no adverse effects on any other works (including temporary works) which might be planned;
- f) for relevant designs, receive copies of the design output, design and design check certificates prior to implementation of the contractor's temporary works; and
- g) inspect the contractor's temporary works, where necessary.

11.2.4.2 The PC's TWC should ensure that a contractor's proposals for temporary works do not adversely affect/are not adversely affected by other construction works including other temporary works.

11.3 The TWC (other than the PC's TWC)

11.3.1 General

11.3.1.1 Where a client appoints a contractor, or a PC appoints a sub-contractor to manage and possibly also design the temporary works for which they are contracted, a TWC should be appointed to assist the PC's TWC to fulfil their duties (see [11.2.3](#)).

11.3.1.2 The TWC should be aware that the PC's DI defines the PC's TWC's lines of responsibility in relation to each contractor's TWC and/or TWS, which is employed on the site, using [Figure 2](#) and [Figure 3](#) for guidance (see [5.1](#)).

11.3.2 Role of the TWC

11.3.2.1 The TWC should be the single point of contact for providing and receiving relevant information from the PC's TWC and the contractor's site team for their organization's temporary works matters.

11.3.2.2 The TWC should be responsible for the implementation of the contractor's approved procedure for the control of temporary works.

11.3.2.3 The role of the TWC should not include a responsibility for carrying out any design or design checking of temporary works.

NOTE This exclusion also covers the determination of specific loads, assessment of load paths, engineering checks of any kind, determination of foundation capacity etc.

11.3.2.4 The appointment of a person as a TWC should not preclude them from carrying out design and/or design checking if they are considered competent and it is within their experience based on the complexity of the project (see [5.2.1](#), [8.4.1](#) and [Table 2](#)).

11.3.2.5 When appointed, the TWC should co-ordinate the contracting organization's temporary works on site, liaising with the PC's TWC and any PC's TWS (see [11.3.3](#)) including the preparation of design briefs, provision of information regarding any proposed TW designers and design checkers, inspection of temporary works on site, provision of any design and design check certificates to the PC's TWC and checking the erected temporary works on site before loading/unloading.

11.3.2.6 The TWC should be responsible to both their organization's designated individual, for the implementation of their organization's procedure, and the PC's TWC (see [11.2](#)) for ensuring that their temporary works is managed and designed in accordance with the relevant procedures, drawings and the specification.

NOTE The PC's TWC remains ultimately responsible for the temporary works on the project/site.

11.3.2.7 The TWC should not be responsible for the day-to-day progress of the temporary works or other project matters (e.g. commercial or programme matters). Where this is not possible, the PC's TWC should recognize that the role of TWC overrides other responsibilities the individual might have and should not put progress of the works above the safety of the temporary works. However, it is recognized that this might not be possible on projects that have few or no engineering staff.

11.3.2.8 If the TWC has responsibility for both checking the temporary works and progress of the construction works, decisions should not be compromised by commercial or other pressures. If the TWC considers that they are under undue pressure from site management to achieve production at the expense of structural stability, then they should seek assistance from the organization's designated individual and/or the PC's TWC.

11.3.2.9 On larger sites the TWC may request that one or more temporary works supervisors (TWSs) be appointed to supervise their specific temporary works (see [Clause 12](#)).

11.3.3 Duties of the TWC

The duties of the TWC should include to:

- a) co-ordinate the temporary works activities of their organization;

- b) ensure that the PC's DI has given approval to the contractor to manage and design the temporary works, and confirm that the organization has accepted their appointment;
- c) ensure that the PC's DI has either given approval to the contractor to use their own temporary works procedure, or ensure that the agreed procedure is in use for their temporary works;
- d) be aware of any limitations on use of their temporary works for which their organization is responsible;
- e) liaise with the PC's TWC to ensure that those involved understand the types and limits of permits and when they have the authority to proceed by releasing the hold points;
- f) be responsible for providing information to and receiving information from the PC's TWC to manage the temporary works schemes for which they are responsible;
- g) ensure a temporary works register is established and maintained for the temporary works involved (see [6.2](#));
- h) ensure that their register is copied to the PC's TWC at each major update and to an agreed regular timescale;
- i) ensure that a design brief is prepared (see [13.2](#)) with consultation within the project team, is adequate, and is in accordance with the actual situation on site;
- j) where required, provide copies of any design briefs prepared and submit to the PC's TWC and receive confirmation there are no adverse effects on the temporary works which might be planned;
- k) ensure that all temporary works designers and design checkers are competent and have been verified by the organization's DI for carrying out designs;
- l) ensure that any residual risks, identified at the design stage, assumed methods of construction or loading constraints identified by the designer of the permanent works are included in the design brief;
- m) receive copies of the design output, design and design check certificates prior to implementation of the temporary works and, where required, provide evidence to the PC's TWC that the design and checking has been carried out;
- n) ensure that the relevant client and/or third-party approvals, required by the contract, have been received from the PC's TWC;
- o) ensure that a documented safe system of work is in place and implemented for the erection of any temporary works;
- p) ensure that an inspection and test plan is prepared, along with an appropriate quality control check list(s), based on the temporary works design output and is used to verify that the temporary works have been constructed in accordance with the certified design;
- q) ensure that checks, inspections and tests are made at appropriate stages and that the inspection and test plan (at relevant stages) and check list(s) are signed by the TWC or TWS as appropriate (see [14.1](#)) and, where required, the PC's TWC;
- r) ensure that any changes or modifications to the scheme or differences from the envisaged conditions (use or environmental) are drawn to the attention of the designer;
- s) issue a notice to prevent loading (or unloading) in the event that any inspections reveal discrepancies between the certified and as constructed temporary works, until the discrepancies have been rectified to the satisfaction of the PC's TWC and/or TWC;

- t) ensure that any instructions from the PC's TWC in connection with any identified discrepancies in the temporary works have been rectified to the satisfaction of the PC's TWC;
- u) ensure that any agreed changes, or corrections of faults, are correctly carried out on site;
- v) ensure that during use of the temporary works all appropriate monitoring and maintenance is carried out;
- w) ensure a permit to load or proceed (bring into use) after a final check, which is satisfactory, is issued by either the PC's TWC, TWC or TWS (see [14.2.1](#));
- x) ensure that a permit to unload or proceed (take out of use), the temporary works is issued, when it has been confirmed that the permanent structure has attained adequate strength and/or stability, by either the PC's TWC, TWC or TWS (see [14.2.2](#));
- y) register or record the drawings, calculations and other relevant documents relating to the final design of their temporary works and, where required, submit to the PC's TWC;
- z) ensure that a documented safe system of work is in place and implemented for the dismantling of any temporary works;
- aa) ensure that any relevant information for the health and safety file is transmitted to the PC's TWC; and
- bb) ensure that any appointed TWS is operating in accordance with the correct approved procedure.

12 Temporary works supervisor

12.1 General

The TWS should be aware that the PC's DI defines the PC's TWC lines of responsibility in relation to each contractor's TWC and/or TWS, which is employed on the site, using [Figure 2](#) and [Figure 3](#) for guidance (see [5.1](#)).

12.2 Role of the TWS

- 12.2.1** The TWS, where appointed, should be responsible to the PC's TWC or TWC as appropriate. The TWS should assist the PC's TWC or TWC, as appropriate, in the supervision and checking of the temporary works.

NOTE The line of responsibility is appropriate to the organization making the appointment and whether the organization is approved to manage their own temporary works.

- 12.2.2** A TWS should only be authorized to issue a permit to proceed, e.g. load (bring into use) or unload (take out of use), if the DI of their organization and the PC's TWC are satisfied that:

- a) an individual TWS is competent and has been given the appropriate authority in respect of that individual; and
- b) the risk classification (see [6.1.3](#) and [Table 1](#)) identified is low or very low.

- 12.2.3** The role of the TWS is to provide on-site support to the PC's TWC or TWC for the control of temporary works; as such the TWS should not be responsible for any design or design checking of temporary works but should be responsible for the implementation of the PC's or contractor's procedure for the control of temporary works.

NOTE This exclusion also covers the determination of specific loads; assessment of load paths; engineering checks of any kind; determination of foundation capacity, etc.

- 12.2.4** The appointment of a person as TWS should not preclude them from carrying out design or design checking if they are considered competent (see [5.2.1](#), [8.4.1](#) and [Table 2](#)).

NOTE The organization's DI can appoint the same individual to carry out specific design and/or design checking but this would be under a separate specific nomination relating to design.

12.3 Duties of the TWS

Where appointed, the main activities of the TWS should be to:

- a) liaise and co-operate with the PC's TWC or TWC where appropriate;
- b) assist the appropriate TWC in ensuring that the site is operating in accordance with the approved procedures;
- c) check that information relevant to the temporary works has been received prior to commencement of work on site; this should include any residual risk information from the TWD;
- d) supervise the erection, use, maintenance and dismantling of the temporary works as applicable;
- e) carry out or supervise the required checks at appropriate stages during the construction erection or installation of the temporary works;
- f) carry out or supervise any planned maintenance of the temporary works;
- g) ensure that any changes or modifications to the scheme or differences from the envisaged conditions (use or environmental) are drawn to the attention of the PC's TWC or TWC as appropriate, and the designer if appropriate;
- h) carry out the final check prior to use of the temporary works;
- i) in the event that any inspections reveal discrepancies between the certified and as constructed temporary works, issue a notice to prevent loading (or unloading) until the discrepancies have been rectified to the satisfaction of the PC's TWC and/or TWC;
- j) after a final check, which is satisfactory, and when authorized, ensure a permit to load or proceed (bring into use) is issued and provide a copy of the permit to the PC's TWC and/or TWC (see [14.2.1](#)); and
- k) when it has been confirmed that the permanent structure has attained adequate strength and/or stability, and when authorized, ensure a permit to unload (take out of use) the temporary works is issued and provide a copy of the permit to the PC's TWC and/or TWC (see [14.2.2](#)).

13 Design of temporary works

13.1 General

13.1.1 The design of temporary works should be undertaken with reasonable professional skill and care.

13.1.2 The permanent works designer should have considered the risks involved in the buildability of the structure. Their overall design should have taken account of the methods of construction and the space required for any temporary works. The permanent works designer should provide the relevant information, particularly the significant residual risks involved in its construction. The temporary works designer should take this information into account in the preparation of the design.

13.1.3 If the permanent works designer has any requirements for a particular sequence in which the works should be built, or for any particular feature (such as stiffness or point of support) in the temporary works scheme, these should be clearly illustrated or communicated in the permanent works design output.

13.1.4 If the TWC or TWD wishes to depart from these requirements, then the TWC should confirm with the PWD that the change is acceptable.

13.1.5 A designer includes anyone who specifies a design, design standard or design method, alters a design, or specifies a particular method of work or material, or arranges for or instructs someone else to do so. The designer should justify their requirements by identifying the associated risks and how they might be mitigated.

13.2 Design brief

13.2.1 A design brief should be prepared to serve as the basis for subsequent decisions, design work, calculations, drawings and design checks. All concerned with the construction should contribute towards the preparation of the brief.

13.2.2 The brief should include all data relevant to the design of the temporary works including residual risks introduced by the methodology chosen by the site team or by the PWD. It should be prepared early enough to allow sufficient time for all subsequent activities, i.e. design, design check, procurement of equipment and construction/erection of the scheme.

13.2.3 The preparation of the brief might involve relatively little work for the smaller scheme, but for major work such as the construction of a large bridge or deep excavation a large amount of information might be needed; the TWC should ensure that sufficient and comprehensive information is collated before design work can commence or a programme for the construction of the temporary works can be drawn up (see [Annex G](#)).

13.2.4 The following information should be taken into account for inclusion in the preparation of the brief:

- a) details of the organizations involved in the design of the scheme and their respective responsibilities, including the name and contact details of the PC's TWC, the TWC or both as appropriate;
- b) appropriate details of the permanent works in an agreed format;
- c) appropriate clauses from the specification for the permanent works;
- d) statement of any requirement to design the temporary works in accordance with a particular standard or guidance document;
NOTE 1 For example, in the case of falsework, whether the design method is to be in accordance with [Section 3](#) of this British Standard or BS EN 12812.
- e) information on any significant residual risk associated with the design of the permanent works;
- f) programme for the construction of the permanent works;
- g) programme for the various phases of the design, design check, any external approvals, procurement and erection of the temporary works;
- h) the timing for the removal of the temporary works in relation to the ability of the permanent works to be self-supporting;
- i) any requirements for access onto, under, or around the permanent works or temporary works;
- j) requirements for access for erection, maintenance, use and dismantling of the temporary works and for other site activities;
- k) any requirements for public access, for example a requirement to keep a public footpath open;
- l) equipment and materials available for use in the temporary works;
- m) proposals for any moving and re-use of temporary works;
- n) environmental information such as the location, altitude and topography of the site, the distance from the nearest sea, rainfall, water levels and current velocities;

- o) site investigation data and reports relating to the areas under and adjacent to the foundations of the temporary works or proposed excavations; this should include information on all underground and over-head services;
- p) specific requirements including any limitations on the staged construction of the works due to positioning of construction joints, sequence of separate pours, rate of successive pours, timing of post-tensioning and removal of supports;
- q) any requirements for pre-cambering or residual camber;
- r) loads that might be induced in the temporary works by permanent works that have been completed, such as the application of staged post-tensioning, load re-distribution and any movements of significance including any settlements or deflections that can be anticipated from the permanent works as load is progressively increased;
- s) any limitations stated by the PWD on the position and extent of loads imposed by the temporary works onto elements of the permanent works which have been constructed, such as loads imposed by successive floors of multi-storey construction onto lower floors or loading of permanent foundations required to support the temporary works;
- t) any limitations on the positioning of loads from temporary works over underground services or voids, adjacent to excavations or retaining walls forming part of the permanent works;
- u) proposals for the protection of the temporary works, including its foundations, against disturbance or impact;
- v) limitations imposed by various authorities in relation to working within or adjacent to railways, highways, water-courses, etc.;
- w) any environmental constraints placed on the site by the local authority or other body, for example a requirement by the local authority to limit noise to certain hours of the day;
- x) details of obstructions that might preclude or influence the position of the temporary works;
- y) requirements for design deliverables from the TWD and the format of the design output; and
- z) proposed level of design check category.

NOTE 2 The information required might need to be obtained from various sources, and might include data from earlier site operations or details of existing structures. Certain information might be of direct relevance to both the permanent works designer and the temporary works designer, such as site investigation information or where the temporary works affect or take support from the permanent works.

- 13.2.5** The TWD should be provided with a design brief, irrespective of whether they are from the construction organization or not.

NOTE Some of the required information might only be available from other designers. Attention is drawn to the responsibility of designers under the CDM Regulations 2015 [1] to co-operate with the PD and any other designer.

13.3 Design guidance

- 13.3.1** Those responsible for the design of a temporary works scheme should base their design on the previously agreed design brief (see [13.2](#)).

- 13.3.2** If the designer is not able to fully accommodate the requirements of the design brief, then any proposed modifications should be drawn to the attention of the PC's TWC or TWC as appropriate, as soon as the changes are identified and the design brief amended.

- 13.3.3** The TWD should choose the appropriate design standards and other technical guidance.

NOTE Where codes of practice are specified by the contract or design brief, the TWD may seek authority to use other equivalent codes providing equivalent (or better) factors of safety.

- 13.3.4** The TWD should identify, from the design brief and associated information, the various loads that act on the temporary works together with the combinations in which they are considered and with what stiffness the temporary works should resist them.
- 13.3.5** Temporary works should be designed in accordance with recognized engineering principles (see [Section 3](#) or other recognized guidance). The design should take into account the variability of materials, workmanship, site conditions and construction (erection) tolerances.
- 13.3.6** All temporary works should be designed using global or partial factors appropriate to the situation, taking material quality, certainty of loading and standard of execution of the temporary works into account.
- NOTE 1 Issues that can affect material quality are use of second hand material and repeated use of components.*
- NOTE 2 PAS 8812 gives further advice on the application of European standards to the design of temporary works.*
- 13.3.7** For permissible stress design the global factors incorporated into the allowable working loads given in [Section 3](#) should be used for general falsework and other temporary work design.
- 13.3.8** For limit state design of temporary works the loads should be in accordance with BS EN 1991-1-6 and other relevant codes and industry best practice guidance.
- NOTE 1 BS EN 1991-1-6 states that the supported loads are to be treated as variable actions (imposed loads) and not as permanent actions (dead loads). In some situations geotechnical loads may be considered as permanent actions instead of variable actions.*
- NOTE 2 The loads given in [Section 3](#) are suitable as unfactored service loads for limit state design.*
- 13.3.9** For the design of steel or aluminium elements of temporary works, the partial factor for material at ultimate limit state should be a minimum of 1.1. Where temporary works are designed, manufactured and assembled for a single use using similar details and execution standards as adopted for permanent works then the designer may justify the use of a lower partial material factor.
- NOTE The increased partial material factor for temporary works applications is used to take into account reuse of equipment, increased tolerances, reduced stiffness at joints, reduced residual stiffness and reduced redundancy compared with permanent works.*
- 13.3.10** For each temporary works design, the designer should take into account:
- the structural strength and stiffness of the individual members and their connections to transmit the applied forces safely including any p-delta or feedback effects;
 - the lateral stability of both individual members and the structure as a whole;
 - the resistance to overturning or rotational failure of the temporary works structure;
 - positional stability; and
 - the effects on the permanent works and its surroundings.
- NOTE 1 Within these five considerations, subsidiary considerations might be necessary to allow for the different phases of construction and the varying stability and restraint conditions applied, including the particular case where falsework is designed as top-restrained.*
- NOTE 2 These five considerations apply to both limit state and permissible stress design.*
- 13.3.11** Software should be used with caution to ensure all appropriate checks are carried out.
- 13.3.12** Temporary works systems should be designed with regard to ease and safety of erection and dismantling. TWDs and suppliers should provide guidance on the implementation of their design.
- 13.3.13** Detailing of the temporary works structure should be such that any local failure within it does not lead to the progressive collapse of the whole.

13.4 Choice of temporary works

- 13.4.1** It should be decided whether it is appropriate to have a bespoke design or, alternatively, to proceed on the basis of a standard solution. A standard solution comprises a suitable arrangement for which the basic design work has already been carried out and presented in a tabular or other easily assimilated form, and for which no further structural calculations are necessary. When selecting a standard solution, those responsible for making the final choice should ensure that they understand and take full account of the limitations of these designs so that they are used only in appropriate circumstances (see [13.10](#)).

NOTE The choice of a standard solution can be influenced by such matters as availability of material and the particular experience of the supervisory and construction workforce.

- 13.4.2** If a design office produces standard solutions to suit their materials or operations, then such designs should be produced in accordance with the recommendations of relevant codes and should also be accompanied by information covering layout, loading, limitations, tolerances, lateral restraint requirements etc. (see [13.10](#) for specific recommendations).
- 13.4.3** Those who select a particular standard solution should be aware that they have responsibilities and duties as a designer (see [8.1](#), [8.4.1](#) and [13.10](#)).

13.5 Selection of materials and components

- 13.5.1** The properties of the materials and the components that are proposed to be used should be identified. When designing for the use of proprietary equipment the design should utilize the equipment in accordance with the current recommendations of the supplier of the equipment being used. Particular care should be taken to ensure that the terms used to define capacity are understood; they might be either in safe working loads or in characteristic strength. Where it is proposed to use the equipment in situations not specifically intended by the supplier, in the first instance the supplier should be consulted for specific advice about the proposed method of use.

NOTE 1 Where a characteristic strength (see [3.10](#)) is stated, an appropriate material factor has to be used together with an appropriate load factor to determine the component's safe working load. The characteristic strength is used in limit state design.

NOTE 2 Attention is drawn to the Health and Safety at Work, etc. Act 1974 [5], under which suppliers and importers of equipment have a duty to supply relevant and correct performance data. Performance data issued by a supplier of equipment can reasonably be relied on without further justification.

- 13.5.2** Where performance information is not readily available, or as an alternative means of obtaining the required data, the user should assess the capability of the material, equipment or component to resist the loading conditions using fundamental engineering principles and, where appropriate, arrange for testing.
- 13.5.3** When compliance testing is required, for example weld testing or confirmation of ground bearing capacity, this should be clearly indicated with the design output and a specification for the test given.
- 13.5.4** Where the design relies on specific site conditions, such as ground conditions, the TWC should be provided with guidance on the identification of the soil type and environmental conditions such as water level.

13.6 Design output

- 13.6.1** Sufficient and appropriate information should be provided by the TWD to ensure that the temporary works scheme can be checked and implemented correctly.

NOTE This might include drawings, equipment user guides, erection tolerances, outline method statements and residual risks.

- 13.6.2** The designer should consider the format of the design output, including the language, the units (for specified anchorages etc.), type of electronic or hardcopy drawings, any BIM material, all with particular regard to the accessibility of the format for the end user(s). The design output should also define the requirements for foundations (including simple tests to confirm bearing stratum capacity or soil type), positions of components, the details of connections to other components, limitations for loading and sequence of operations and anything else considered necessary.

NOTE 1 The designer's calculations do not form part of the design output.

NOTE 2 Attention is drawn to the CDM Regulations 2015 [1], which require that any designer provides adequate information about any residual risk associated with the design. There is also a requirement to co-ordinate the work with that of others in order to improve the way in which risks are managed and controlled. This might include the use of suggested construction sequences.

- 13.6.3** For complex schemes the temporary works designer should brief the site team on the key elements and hazards identified during the design process.
- 13.6.4** Any British Standards or other design guidance, or software, used in the design should be summarized separately from the design calculations in order that it can be available to the TWDC. For complex schemes the information may be presented in the form of a "design statement" which may also include: an idealized structure, method(s) of analysis, and the version of computer software, if any, used.

13.7 Design check

- 13.7.1** Prior to the commencement of the construction work, the proposed temporary works design should be checked for concept, adequacy, correctness and compliance with the requirements of the design brief. This check should be carried out by a competent person or persons, independent from those responsible for the design. The ability of the TWDC and their remoteness or independence from the TWD should be greater where new ideas are incorporated or the temporary works are complex.
- 13.7.2** When the design has been completed, or is advanced to an appropriate stage, the design brief should be provided to the organization/individual who is to carry out the design check, together with the relevant design statement, drawings and specification and associated information. The responsibility for stating the independence of the design check category should be established at an early stage as it can affect the level and quantity of design output. It should require input/advice from the designer. The check category is unlikely to be known at the time of writing the original register, but should be included when determined.
- 13.7.3** Design checks should be undertaken in accordance with one of the categories given in [Table 2](#).

NOTE 1 The categories relate to the level of independence of the design check and are not related to the classification of risk associated with implementation stated in [6.1.3](#) and listed in [Table 1](#).

NOTE 2 Implementation risk in temporary works is classified as very low, low, medium or high. This is used to establish the management level required, not the design check category.

- a) For Category 0, the check should include verification that the application selected suits the limits and conditions. The independence of the check is established by the person selecting the standard solution obtaining approval from a second competent member of either the site or design team. The degree of formality would be determined by the organization.
- b) For Category 1, the check should include verification both that the simple design suits the site conditions and that relevant technical information has been interpreted correctly. Approval from a competent member of the design team is required. The degree of formality would be determined by the organization.

- c) For Category 2 and Category 3, the checker should carry out the check without reference to the designer's calculations using only the design brief, including its associated information, and the design output.

Table 2 — *Categories of design check in temporary works*

Category	Scope	Comment	Independence of checker
0	Restricted to standard solutions only, to ensure the site conditions do not conflict with the scope or limitations of the chosen standard solution. These may include standard trench boxes.	This applies to the use of standard solutions and not the original design, which requires both structural calculation and checking to Category 1, 2 or 3, as appropriate.	Because this is a site issue, the check may be carried out by another member of the site or design team.
1	For simple designs. These may include: formwork; falsework; needling and propping to brickwork openings in single storey construction.	Such designs would be undertaken using simple methods of analysis and be in accordance with the relevant standards, supplier's technical literature or other reference publications.	The check may be carried out by another member of the design team.
2	On more complex or involved designs. Designs for excavations including excavation support using sheet piles, for foundations, for structural steelwork connections, for reinforced concrete. Designs where stability is obtained by restraint at the top of the temporary works (e.g. top restrained falsework).	Category 2 checks would include designs where a considerable degree of interpretation of loading or soils' information is required before the design of the foundation or excavation support or slope is carried out.	The check should be carried out by an individual not involved in the design and not consulted by the designer.
3	For complex or innovative designs, which result in complex sequences of moving and/or construction of either the temporary works or permanent works. It also includes basement excavations and tunnels.	These designs include unusual designs or where significant departures from standards, novel methods of analysis or considerable exercise of engineering judgment are involved.	The check should be carried out by another organization and should include an overall check to assure co-ordination of the whole design.

- 13.7.4** Where different organizations, or individuals, have prepared different parts of a design, the category of design check should be appropriate to the part of the design being checked. (See also [8.4.2](#) for the role of the lead designer.)

NOTE For example if a proprietary supplier is carrying out a falsework design for their equipment, and stability is assumed by being fixed at the head to the permanent work (i.e. top restrained), the check on the falsework would be Category 1 but the check that the structure is able to resist the applied horizontal load might be Category 2.

- 13.7.5** On completion of the design and design check, a certificate should be issued for Category 2 and Category 3 checks and, depending on the organization's procedures, might also be required for a Category 1 check. The certificate should confirm that the design conforms to the requirements of the design brief, state the standards/technical literature used and list the constraints or loading conditions imposed. The certificate should state the category of check and identify the drawings/sketches, specification and any methodology that are part of the design and it should be signed by the designer and design checker. The package of information issued to the TWC should include this certificate.

NOTE 1 Neither the designer's nor the design checker's calculations form part of the design compliance items listed on the signed design certificate.

NOTE 2 Table 2 can be developed by each organization's procedures to suit their particular range and scope of work and the examples given under scope are indicative.

NOTE 3 Where a standard solution (Category 0) is used, a certificate is issued when the solution is originally developed (see 13.7.1).

13.8 Resolution of queries raised by the design checker

- 13.8.1** In all categories of check the design checker should withhold signature of the design check certificate until they are completely satisfied that the design output contains all necessary information to allow the temporary works to be constructed without the site team having to develop it further. In addition the design checker should be satisfied that the design output is in accordance with the requirements of the design brief and has been produced in accordance with recognized engineering principles, relevant British Standards and other appropriate specialist guidance.
- 13.8.2** The design checker should identify areas in the design output where their calculations indicate an element (including connections) might be overstressed or exceed the allowable load in a proprietary member. The design checker should identify also any area where further or additional detail is required.
- 13.8.3** For Category 0 or Category 1 design checks queries should be raised directly with the designer and resolved before the design output is issued as a certified design. For Category 2 and Category 3 design checks a more formal process should be adopted.
- 13.8.4** For a Category 2 design check a schedule of queries should be prepared and issued directly to the designer with a copy of the query schedule issued to the TWC and copied to the PC's TWC as appropriate. The schedule should not contain references to calculations, but could indicate levels of stress in members or forces or ground pressures. The designer should respond to the queries and provide additional and/or revised details where necessary.
- 13.8.5** For Category 3 designs and design checks the design parameters (loads, idealized structures, soil parameters and design standards/guidance) should be identified in an AIP or similar document (design statement) prepared by the designer and agreed by the client's technical advisor before commencement of the design. In the event that the client does not appoint a technical advisor, the PD should agree the AIP (design statement). The design statement should form the basis for the design and checking and should assist in the resolution of queries.

NOTE This procedure is generally in accordance with the requirements of Highways England's BD2 [6].

- 13.8.6** For a Category 3 design check a schedule of queries should be prepared and copied to the PC's TWC, via the TWC as appropriate. It should then be issued to the designer. The schedule should not contain references to calculations, but could indicate levels of stress in members or forces or ground pressures. The designer should respond to the queries revising the design output where appropriate and copy the schedule with the responses to the PC's TWC, or TWC as appropriate, and ensure it is issued to the design checker. The design checker should review the schedule and annotate

it to accept or reject the designer's response. When there is an impasse over particular queries the PC's TWC, after consultation with the client, should confirm whether the designer and design checker should discuss the outstanding query(ies) and how these discussions should be recorded. The design checker should confirm all queries have been resolved and the designer should issue the revised design output in order that the design and design check certificate can be signed by the design checker.

13.9 Alterations

- 13.9.1** Changes in the requirements of the design brief should be recorded in writing, with reference to the original design brief, and issued to the designer. The designer should check the proposals against the certified design and incorporate the requirement for these alterations into the design and drawings (see also [20.2](#)). If there is no significant change to the design, the designer should confirm the acceptability of the proposals to the appropriate TWC.
- 13.9.2** Any alterations to the temporary works, proposed by the site team, should be referred to the PC's TWC or TWC as appropriate, who should contact the TWD for incorporation of the change into the design.
- 13.9.3** Where the designer considers that the alteration is significant, the alteration should be referred to the design checker. Any revised design or design check documentation should be recertified when considered appropriate by the PC's TWC or TWC as appropriate.

13.10 Standard solutions

- 13.10.1** An organization might publish technical data in the form of arrangements of temporary works of their equipment based on certain conditions of use; these arrangements, known as standard solutions and often presented in a tabular or readily assimilated format, should relate to the organization's products only. The organization should carry out the structural design calculations and verify the arrangements with design check certificates.

NOTE Provided the equipment is erected, used and operated within the limitations placed in the standard solution, a TWC does not need to further verify the actual design calculations of the standard solution (see design checks at [13.7](#) and [Table 2](#)).

- 13.10.2** For each standard solution the organization should identify the limitations of their use and of their design responsibility.

NOTE For example, a standard solution for a proprietary soffit system might not include design of the foundations, or the method by which top restraint is obtained for lateral stability. Equally it might not include design of any face contact material, although the standard solution might assume a certain grade of material is used.

- 13.10.3** Users of standard solutions should ensure that the:

- a) solution assumes that the equipment specified is used, without substitutions;
- b) concept is acceptable for the location;
- c) conditions of use and limitations on use are within the specified limits;

NOTE For trench support systems this includes verification that the ground conditions (including groundwater level) are as specified for the equipment

- d) assembly is erected to the expected tolerances;
- e) solution is within the experience of the workforce and its supervision;
- f) equipment is not damaged and does not show signs of excessive wear;
- g) method of loading the system is as stated in the standard solution;

- h) ancillary items, or additional temporary works (such as foundations), by others have been designed and supplied as required; and
 - i) arrangement, prior to use, has been separately checked for compliance with the guidance provided by the supplier or organization responsible for the standard solution.
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14 Site considerations

14.1 Co-ordination, supervision and checking of work on site

14.1.1 Work on site should be the subject of careful direction, supervision and inspection and checks to ensure that the temporary works is constructed safely in accordance with the design and specified materials and equipment, and that only when all checks have proved satisfactory is the works loaded, used, maintained, unloaded and then dismantled in accordance with an implementation plan.

14.1.2 The PC's TWC or TWC should ensure that a temporary works implementation plan is in place covering the erection/assembly, use, unloading and dismantling of the temporary works including what inspections, checks, hold points, permits and certification are required. This should include defining the regular inspections which are required during the use (loading) of the temporary works.

NOTE 1 The implementation plan could consist of the method statement, task specific risk assessment, inspection and test plan (ITP), checklists and other certification (for example, quality control check lists).

NOTE 2 The inspection and test plan can be used to define hold points, where works stops for an inspection or testing to take place. A permit is used to release the hold point and allow work to continue.

14.1.3 The implementation plan should be developed taking into account the site conditions, programme, original design brief and the construction phase plan and use of the drawings, specification and methodology supplied by the designer.

14.1.4 The plan should define hold points at which the structure should be checked for conformity and who is authorized to do so, including issuing permits to load or unload (release the hold point), signing of quality control check lists etc. by the PC's TWC, the TWC or the TWS, and how the results of these inspections should be communicated and acted upon. If the implementation plan has been produced by others it should be approved by the PC's TWC or TWC.

NOTE A TWS may issue the permit for a defined scope and range of work as described in the individual's appointment.

14.1.5 The PC's TWC or TWC should ensure that the guidance on the implementation of the design provided by the designer or supplier, including any residual risks [see [8.1.4c](#)] and [13.6](#)], are incorporated into the implementation plan. The design residual risks should be addressed in the method statement.

14.1.6 The design documentation and method statement should be followed but those responsible for work on site should bear in mind the need to compare conditions experienced on site during construction with those assumed by the design in order that appropriate action can be taken if it becomes apparent that they are different.

14.1.7 At all stages during fabrication/pre-fabrication, construction/erection, use and dismantling of the temporary works, the information being used should be checked to ensure that it is correct, and that the work carried out is in accordance with the design details (drawings/sketches) and is as specified to ensure that the completed structure will function as intended. This is necessary, not only to ensure that the temporary works are safe to use, but also to facilitate remedial work should this prove necessary; it is often difficult to do this later.

NOTE Details of checking procedures for falsework are given in [20.4](#).

- 14.1.8** Prior to bringing temporary works into service a final inspection should be carried out to verify that it has been constructed in accordance with the requirements of the design and any subsequent approved modifications. The results of these inspections, together with any requirements for improvement, should be recorded by the appropriate person as allowed by the implementation plan. For complex or innovative designs consideration should be given to an inspection by the TWD.

NOTE It might be necessary to carry out inspections of the temporary works at points during assembly/erection.

14.2 Loading and unloading temporary works

14.2.1 Loading (bringing into use)

- 14.2.1.1** As a means of exercising control over bringing the temporary works into use a formal procedure for giving permission to load, or proceed to the next stage in the implementation sequence should be part of the implementation plan.

NOTE In simple cases a single “permit to load”, when the temporary works has been checked, might be appropriate. In complex or larger cases, permits might be required at different stages, both as regards loading or for different areas or for excavation. It is normally desirable to limit the period of validity of the permit, as subsequent modifications or changes in circumstances (soil wash out under footings or similar) may take place. For example, a permit to load for a falsework is normally valid for 24 hours. The area over which loading can take place, and to what extent, is set down in the permit, e.g. it might be “reinforcement only”.

- 14.2.1.2** The PC's TWC, an authorized TWC or authorized TWS as identified in the implementation plan, should ensure that a permit to load or proceed (bring into use) is issued to the site team prior to its use [as stated in [11.2.3r](#)), [11.3.3w](#)) and [12.3j](#))].

- 14.2.1.3** The permit to load (or proceed), issued prior to release of the hold point, should confirm that:

- a) the temporary works have been constructed in accordance with the certified design (design and design check certificates have been issued and the drawings and specification used are the ones referenced on the certificates);
- b) any modifications to the temporary works have been approved by the designer; and
- c) the water, ground and environmental conditions and use are as envisaged by the design.

14.2.2 Unloading (taking out of use)

- 14.2.2.1** Where the temporary works is used to provide support to the permanent works until it is self-supporting, the PC's TWC, TWC or TWS, as identified in the implementation plan, should determine that the permanent works have attained adequate strength and/or stability, with reference to the PWD's specification or in conjunction with the PWD if necessary, prior to ensuring that a permit to unload or proceed (take out of use) is issued, as stated in [11.2.3t](#)). A TWC or TWS may issue the permit for a defined scope and range of work if authorized to do so by the PC's TWC in the implementation plan [see [11.3.3x](#)) and [12.3k](#))]; for example they might need to verify concrete strength or that all structural steelwork elements and connections are completed or that any post-tensioning has been carried out prior to issuing the permit.

- 14.2.2.2** The sequence and order of removing temporary works, where critical, should be defined in the design output and/or confirmed in the implementation plan. The sequence should be referenced in the permit to unload or permit to proceed.

- 14.2.2.3** The sequence and order of removing temporary works supports can be critical to avoid damage to the permanent works under construction. Generally the supports to spanning members should be removed starting mid-span, and for cantilever sections, should be removed starting at the tip. The PC's TWC, or TWC where appointed, should refer to the permanent works and/or temporary works designer if in any doubt about the sequence.
- 14.2.2.4** The sequence and level of props removed during backpropping operations (see [19.3.4](#)) is particularly important to avoid overloading of the completed slabs. The sequence should be agreed by the PC's TWC or the TWC with the permanent works designer and be included in the implementation plan (see also [14.1](#)).

14.3 Dismantling

When the structure being supported by the temporary works has become self-supporting, or the excavation has been backfilled or other condition, the temporary works should be dismantled (removed) in accordance with any restrictions imposed by the permanent works designer as set out in the implementation plan. As at the loading stage, a permit to dismantle the temporary works might be appropriate, particularly where this takes place in stages. Care should be taken to ensure that the temporary works remains stable during all stages of the dismantling process.