National Federation of Demolition Contractors
Voice of the Global Demolition Industry

Temporary Works
GUIDANCE NOTES

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DRG106:2019

INTRODUCTION

The National Federation of Demolition Contractors (NFDC) is represented on the British Standards subcommittee which prepares the code of practice for demolition (BS6187) and is, along with the Institute of Demolition Engineers (IDE), the voice of the UK demolition industry.

Founded in 1941 to help spearhead London's post-Blitz clean-up campaign, the NFDC's members are responsible for more than 90% of all demolition that takes place in the UK.

Today, the NFDC is committed to establishing safe working practices for its members and to represent their interests in areas such as training, safety, the environment, waste management, industry guidance, legislative changes and codes of practice.

However, in researching and preparing the information contained within this document the NFDC cannot be held responsible for its subsequent use, nor for any errors or omissions it may contain.

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ABBREVIATIONS

The following abbreviations are used in this document or relate to content

DI	Designated Individual
TWC	Temporary Works Co-ordinator
TWR	Temporary Works Register
TWS	Temporary Works Supervisors
TWD	Temporary Works Designer
TWDC	Temporary Works Design Checker
PM	Project Manager
SM	Site Manager
CDM	Construction Design & Management Regulations 2015
RAMS	Risk Assessed Method Statement

1 SCOPE

The aim of this guidance is to provide information on the manner in which you can manage (ie plan,organise and control) temporary works operations in demolition and structural refurbishment.

The guidance is based on the roles, responsibilities and management arrangements specified in BS 5975:2008 +A1 2011 'Code of Practice for temporary works procedures and the permissible stress design of falsework'.

They are, together with BS6187:2011 'Code of Practice for full and partial demolition', the only UK national standards that set out a model to help ensure Temporary Works are designed, checked and verified. Practically all demolition work and structural refurbishment involves use of temporary works in one form or another.

The procedures set out in the following should be applied to all demolition/refurbishment.

2 DEFINITION

What are Temporary Works? As defined by the general procedures of BS5975:2008 Temporary Works are an 'engineered solution' 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 temporary access.

TEMPORARY WORKS IN DEMOLITION

Demolition and structural refurbishment may be carried out on structures that are in poor condition to start with. Demolition involves taking a structure apart which inevitably involves weakening and the controlled failure of structural elements and connections. Even where a carefully worked out sequence is used to minimise weakness and prevent uncontrolled sequential collapse, the structure will at times be in a temporary condition.

The process of demolition will also impose loads on the structures that differ from the original condition. In some cases this will be a significant overload when compared with original design or use, whereas in others there may be reduced loads or support.

Temporary works may be used to provide support to ensure that the temporary condition does not lead to a structural failure incident. This type of structural support may be inside or outside the structure being demolished, or for purposes of protection in adjoining structures. Temporary works are also used to enable plant and personnel access and working platforms, to provide security fencing, site accommodation and welfare and will almost certainly provide critical support for dismantling of individual elements within a structure.

The following lists typical temporary works seen on demolition projects. Note this list is not exhaustive:

- Hoardings and site fencing
- Traffic and Pedestrian barriers
- Site welfare and offices
  (includes temporary units as well as change of use of part of the structure to be demolished)
- Signage
- Ramps
- Exclusion Zones
- Scaffolding
- Tower scaffolds and similar access systems
- Temporary stair and ladder access towers
- Support systems/propping
- Shores (flying and raking)
- Facade Retention Systems & Party wall support
- Edge Protection
- Tower Crane Bases
- Anchors and Ties
- Working platforms used for cranes, high reach machines or drilling/piling rigs
- Support work to party walls, floors and excavations.

+ NOTES

1. Temporary Works management remains the responsibility of the contracting organisation whether or not the work is carried out by a subcontractor.

3 CLASSIFICATION

All items of temporary works are classified in BS5975 for the purposes of Design checking as Class 0, 1, 2 or 3. In essence Class 0 at one end of the scale involves standard equipment and arrangements ('standard solutions') in straightforward situations; and Class 3 at the other end of the scale involves complex and difficult situations where novel solutions may be needed.

Class 0 to 3 temporary works must be managed in accordance with the temporary works procedures. All temporary works must be recorded on the project Temporary Works Register together with their classification. It may at times be necessary to increase the class due to site conditions causing a greater risk. Where doubt exists consult your TWC in consultation with the TWD.

All temporary works shall be designed (including Class 0).

The design checking requirements for the classes are as follows:

- **Class 0** - temporary works may be checked by another member of the site or design team. Standard solutions often come with manufacturer calculated working or ultimate capacities but still need to be checked for compliance with the design criteria to ensure they will be fit for purpose.
- **Class 1** - temporary works can be design checked by another member of the design team.
- **Class 2** - temporary works must be design checked by someone independent from the design team (not involved in or consulted by the original design team).
- **Class 3** - temporary works must be design checked by a third party organisation independent from the design team organisation.

It is particularly important that the design check considers the task to be undertaken, the concept, suitable combinations of the worst case static and dynamic loadings, the proposed arrangements and their adequacy.

BS5975 does not give examples of the types of work that are likely to be in each category but the following is adapted from an example list published by the HSE.

Examples of temporary works classification (not exhaustive) (use of the term 'risk' in the headings refers to all incident risks including health, safety and commercial):

Class 0: Basic Construction Methods - lower risk

Shallow trenches and pits, not exceeding 1.2m depth with no significant surcharge or groundwater. Low-rise formwork at ground/excavation level, max 2.4m double sided, 0.9m single sided, Standard scaffolds to TG20:13 tables, Site hoarding and fencing up to 2m high. Single storey welfare cabins.

Class 1: Routine Construction Methods - low to medium risk

Use of standard components to catalogue design for support in pits and trenches to CIRIA 97 Trenching Practice. Designed scaffolds and loading platforms to TG20:13 tables or software. Double sided formwork with access platforms at ground/excavation level. Single sided formwork to 2.4m. Formwork/falsework at not more than 6m height, Permanent formwork e.g. metal decking. Mobile crane outrigger pads and foundations in good ground crane to 50te. Concrete pumps on outriggers/pads with good access/good ground conditions. Site hoarding and fencing greater than 2m high. 2 storey welfare cabins.

Class 2: Specialist construction methods - medium to high risk

Departures from catalogue design for standard components

- Propping involving multiple props on multiple levels
- Demolition/dismantling methods and temporary conditions – generally.

Backpropping designs

- Special designed scaffolds.

Excavation using walking frames

- Piling, demolition and cranage platforms; outrigger foundations in good ground crane exceeds 50T
- Designed lifting equipment
- Barge mounted equipment
- Conventional tower crane bases unless of complex design
- Routine stress cases in the permanent works resulting from temporary conditions.

Backpropping designs

- Any class 1 method used in an unusual or high risk situation
- Small facade retention schemes not close to public areas
- Large basement excavation and propping schemes.

Class 3: Complex, unusual, bespoke construction methods - high risk

- Temporary works combining inter-acting multiple design
- Unusual concepts
- Façade retention schemes close to public areas
- Bridge demolition
- Partial demolition or modification of existing structures
- Excavations and cofferdams in tidal conditions
- Excavations and cofferdams in poor ground
  (eg weak clay fill to deeper than 5m, water bearing fill deeper than 5m)
- Demolition plant operating on a suspended slab where more than the immediate bay floor is vulnerable
- Use of the existing structure as anchorage for cutting away and lowering large steel or concrete cantilevered sections
- Preweakening and collapse schemes for explosive demolition where the surrounding clear area is less than 1x building height in all directions
- Any class 2 method used in an unusual or high risk situation.

+ NOTES

1. Some contracts will stipulate a higher level of checking where the surrounding area contains high risk features or processes - such as work at refineries or chemical works.

4 ROLES AND RESPONSIBILITIES

For all sites it is important to establish management procedures and roles that are suitable for ensuring that all temporary conditions are understood and temporary works used where needed. The procedures must ensure that experienced and knowledgeable persons and organisations specify, design, plan and oversee each stage of the work. Where several organisations are involved the procedures for communication and cooperation between the parties are critical.

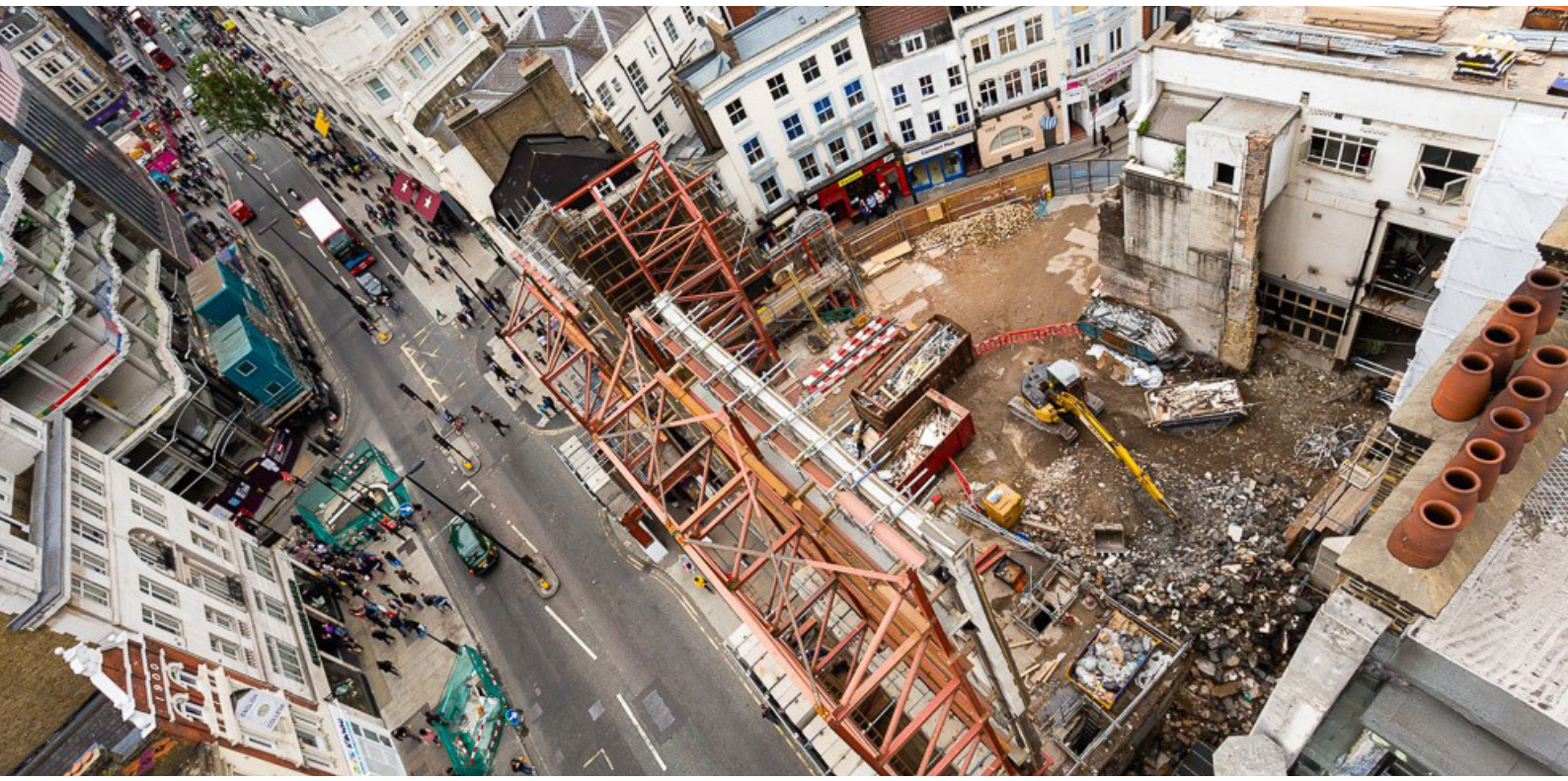
The Principal Contractor should appoint a Temporary Works Coordinator (TWC) for every site who is responsible for implementing the organisation's procedures. On large projects each of the subcontractors may be required to appoint one or more Temporary Works Supervisor/s (TWS).

4.1 TEMPORARY WORKS - DESIGNATED INDIVIDUAL (DI)

The overall responsibility for the control of Temporary Works within any contracting organisation will lie with the 'Designated Individual (DI)'. This is set out in Clause 6.3.1.1 of BS 5975:2008.

The Designated Individual has, unless formally passed on, overall accountability. The DI is a role defined in BS5975:2008 as the individual within the contracting organisation who is responsible for establishing and implementing a procedure for controlling temporary works.

The procedure should cover the management of the design process, and include measures for ensuring the design function and the roles of the Temporary Works Co-ordinator and Temporary Works Supervisor are carried out by competent individuals.



4.2 TEMPORARY WORKS CO-ORDINATOR (TWC)

The TWC should be appointed by and is responsible to the DI as appointed in writting. The TWC should have the authority to stop works at any time if it is not being carried out satisfactorily.

The TWC is responsible for ensuring the temporary works design is implemented in accordance with the drawings and specification. It is preferable that the TWC is not responsible for the day to day progress of the temporary works under consideration.

It is the Temporary Works Co-ordinator's responsibility to ensure that:

- He/she is point of contact between the designer and the site team
- The organisation's procedure is being adhered to on site
- Temporary work activities are co-ordinated
- Responsibilities are allocated and accepted
- The design brief has been prepared in accordance with and is adequate for the actual site situation
- Any residual risks are included in the design brief
- That a satisfactory temporary works design is carried out
- That a design check is carried out which should include:
  - concept
  - structural adequacy
  - compliance with the brief
- Make the design available to other interested partied such as the CDM Co-ordinator or designer of permanent works
- Record all drawings, calculations and other relevant documentation
- Give full details to those carrying out on-site supervision - including full details of the design and limitations plus sequence and timing aspects, and information about the influence of other work taking place nearby
- All checks are made at appropriate stages and maintained
- In consultation with the TWD, assess the implications of design changes and accept or reject these
- Issue formal permission to load/bring in to use
- Issue formal permission to unload/dismantle.

4.3 TEMPORARY WORKS SUPERVISOR (TWS)

On larger contracts the TWC may need assistance or may not be based on site full time. In these cases one or more Temporary Works Supervisors (TWS) may be appointed to oversee the temporary works on site. The TWS are responsible to the TWC. The TWS will assist the TWC in the supervision and checking of the temporary works.

This should include the supervision of erection, use, maintenance and dismantling of the temporary works as applicable. This may also include carrying out checks of the scheme during demolition/construction on site recording and reporting to the TWC to ensure any modifications to the scheme or differences from the envisaged conditions (use or environmental) are drawn to the attention of the TWD designer. It is imperative that when there is more than one TWS that the processes of communication are established and areas of responsibility defined.

4.4 TEMPORARY WORKS DESIGNER (TWD)

The Temporary Works Designer is usually appointed by the TWC. The designer must be assessed and be competent with Demolition contract experience to carry out the design required.

The Temporary Works Designer will as a minimum:

- Provide advice to sites on all aspects of Temporary Works and construction methods/sequence
- Assist sites in developing safe and economical systems of temporary support
- Assist sites in developing safe and economical methods of construction
- Liaise with the Permanent Works Designer to ensure both that the temporary works do not overload the permanent works; and that where needed the permanent works can provide sufficient support for the temporary works
- Provide Temporary Works schemes and construction information to assist estimators in producing tender prices
- Develop alternative designs through value engineering
- Provide background information on materials and construction methods
- Carry out their design work in accordance with the “Designers Duties” as set out in the Construction (Design and Management) Regulations. Design risk must be considered and mitigated as far as possible during design. For all significant residual risks involving the temporary works designs this should be a formal Design Risk Assessment with residual risks being communicated to site. This is particularly important where unusual arrangements or sequences of work are involved
- Carry out the design works in accordance with the programme of the works.

In addition the Temporary Works Designer will normally assist the TWC with the following:

- Produce outline methods of working as guidance to be used in the preparation by the project team of detailed working method statements
- Give advice on and assist with the production of Temporary Works schemes and methods of construction generally
- Provide an onsite inspection of temporary works where requested to do so by the TWC
- Check that Designers/Checkers have sufficient resources to comply with the Temporary Works programme
- Advise the permanent works designer of any temporary conditions or loads that should be considered in the permanent works design. This is particularly important in partial demolition work where the remaining structure may have been affected by the temporary works; and also in full demolition work where temporary works may be left in-situ - eg crane platforms; stockpiles of arisings; sheet piling; etc.
- Ensure that a satisfactory Temporary Works design is carried out and where appropriate a design certificate is issued
- Ensure a Design Risk Assessment has been carried out and mitigation responses are known to all parties. Where applicable ensure that detailed Risk Assessments/Method Statements (RAMS) for the erection, use and dismantling of Temporary Works are prepared. The Checker may require the RAMS form part of the documentation signed for on the Check Certificate

- Ensure that the design is independently checked for:
  - concept
  - structural adequacy
  - compliance with the brief;
  - and a design check certificate is issued
- Where appropriate, ensure that the design is made available to other interested parties, e.g. the structural designer, the Architect, the Resident Engineer, the Client's representative and the CDM Co-ordinator.

The roles and duties set out above are based on the model given in BS5975:2008/2011 for the management of temporary works. Note however that it is a fundamental principle that where the nature of the work and the complexity of the site and surroundings dictate that independent checking of the design is needed then this aspect must be truly independent. In the majority of structural support situations (all bar the simplest, most straightforward) this will include proof of adequacy by calculation based on a valid, site specific, load case.

+ NOTES

1. What is important is that the design, sequence and method must be assessed - not guessed.

5 TRAINING

The NDTG have developed courses for Temporary Works Coordinators course (minimum 2 days) and a basic course for Temporary Works Supervisors integrated as modules within core supervisor training course. The TWC course in particular requires candidates to have technical knowledge and extensive experience of temporary works methods, techniques and equipment in their area of work. This means that neither course would be suitable for someone who does not already have considerable demolition experience.

Temporary Works Designers need specific training and experience of temporary works. Especially in the demolition industry as temporary works tend to experience regular loading that is close to their design limit - ie they work under high loading for a higher percentage of their life than most permanent works. In addition temporary works can be subject to more unintentional dynamic loading - especially to horizontal loading - than permanent works. For these reasons it is important that the Temporary Works Designer has knowledge and experience of construction and demolition working practices and is able to plan for each stage of each task.

6 TEMPORARY WORKS MANAGEMENT

It is common for tendering and contract negotiation to be carried out by a different team to those who carryout the works. This means that consideration will already have been given to the type of temporary conditions and temporary work solutions likely to be needed.

Contractors must be aware of all available information including surveys, follow on predicted Temporary works loadings, party wall agreements etc, and avoid All Risks contracts. As part of the contract handover the appointed contract team including the TWD and TWC are to be briefed on the allowances included for temporary works. This will, where appropriate, include the preliminary Temporary Works Register. The DI will review the proposals and appoint the TWC if suitable and maintain a register of such appointments (usually in the site quality plan).

The TWS may be appointed at site level and notified to the DI. Each TWC will be given a Class level to sign-off to and must arrange for a suitable competent person to inspect and sign-off higher Classes. When TWS's are appointed the DI must be notified by copy for record purposes. Some larger projects with distinct sections of work, or distinct phases involving different types of work, may each have theirown controlling TWC appointed, responsible to the DI and closely liaising with the project manager or contracts manager as appropriate.

The TWC should prepare a more detailed Temporary Works Register and maintain an up-to-date copy on site. The control and record of this will remain with the TWC but can be assisted by other project team members. The project team must ensure each item is on the Temporary Works Register and the Temporary Works Category has been correctly identified.

Planning of temporary works items must be undertaken in good time to suit the overall project delivery schedule and the requisite periods for investigations, designs, approvals and checking. Adequate periods will also be allowed to communicate to interested parties and to generate the requisite documentation and material lead-in times for successful installation on site. This will need to be in accordance with the project programme.

Design Process (per item on temporary works schedule)

All items of temporary works in Category 1 and above must be designed and checked and the design output should normally be presented in the form of uniquely numbered sketches or drawings. Compile and issue a Design Brief including where appropriate conceptual solutions, method statements and material lists to aid design development for each of the items on the Temporary Works register. The TWC will have overall responsibility for the accuracy and updating of the temporary works register at all stages of the works on site.

The TWD carries out the design and delivers the design output in the form of sketches or drawings to the TWC. As part of his duties the TWD should carry out a Design Risk Assessment (DRA). A formal written Design Risk Assessment is required where there are still significant residual risks The TWC reviews, with the TWD, the completed design package for compliance with the original brief and new information or changes to situation and constraints.

The TWC (this may also be carried out by the TWD) issues the design for review and or approval to the permanent works designer and any other third parties required under the contract. At an early stage the TWC should list in the TWR who this is allocated to and ensure it is carried out, with the TWR updated accordingly. (At this stage drawings should still be marked eg ‘not for construction’.)

The TWC issues the final design documents, method statements and risk assessments to the site team marked eg ‘issued for construction’ and follows the standard procedures for briefing the workforce about the chosen system of work and sequence for carrying out each part of the task.

For most situations this will involve use of a prepared method statement. For clarity this should ideally be based around a sequence of sketches or photos illustrating the process step by step. Any questions and in particular any concerns raised by the workforce should be considered and dealt with. This aspect is particularly important on demolition and structural refurbishment jobs where the detailed experienceof some workers may give additional insight to the situation and arrangement of the structures involved.

Where any temporary works systems are to remain in-situ on completion the design must be issued to the permanent works designer for inclusion in the site health and safety file.

Erection, Use and Dismantling (For each item of temporary works)

Erect the temporary works in accordance with the prepared design and method statement. This will be monitored by the TWC and if the scale of the project is relatively small this may be a visiting role for inspections. Interim inspections may be carried out on site by the TWS.

Report or identify any non-conformances to the TWC who should consult the Temporary Works Designer (TWD) to review the non-conformance and in particular any requests for changes to the design. On a complex or difficult job the procedures should include a permit or authorisation to alter
the design.

Loading of the temporary works should also be based around formal authorisation to load which may use a permit based arrangement. This can also be used to create hold points. An example of this would be the inspection of a propping scheme before the demolition moves onto the next bay.

Once complete the TWC will arrange the final inspection and if satisfactory in all respects issue the final permit to load. The permit to load must be issued by a competent person who has physically inspected the works on site, this may therefore range from the TWC/TWD depending on the complexity of the specific element of the work being carried out.

TWC's will be allocated an appropriate class of authorised sign-off by the DI when appointed based on the relevant qualifications, experience and training they hold. Over this level or for specialist sign-off the TWC must arrange for an appropriate competent person to attend site, inspect and sign-off.

Instigate an inspection regime in accordance with legal requirements (such as those for scaffolds and excavations) or other periods determined by the TWC/TWD. The inspection arrangements for each location and type of temporary works should be identified on the temporary works register. Some types of temporary works and the structures they support are very sensitive to the sequence in which they are dismantled. This includes some falsework and propping schemes. All temporary works dismantling or striking should be carried out to an agreed and checked method statement, specifying constraints (e.g. concrete strength to be achieved before commencing; or eg do not remove until bay ahead had been demolished and arisings cleared) and sequence of dismantling. In some instances sections of eg scaffold, or propping, or additional back-propping need to be either left in or added. This may need additional ties or bracing and following the design to an agreed sequence can be critical. Obviously it is good design practice for the designer to devise a scheme that is as straightforward and robust as possible, but in some cases a precise sequence must be followed and this should be set out on the drawings and paperwork.

The complexity of the arrangements, including briefing, stage checks, permits, etc should be based on the complexity and sensitivity of the situation. Sensitive temporary works need an authorisation or permit to strike procedure to be in place the appropriate permit should be issued by the TWC/TWD.

In some situations the temporary works are sacrificial and demolished in-situ - ie typically used to prevent an unplanned sequential ‘domino’ collapse occurring. Temporary works materials recovered from the arisings are unlikely to be suitable for reuse for their original purpose unless they have been overdesigned to cope with collapse and impact damage. Any reuse must only be after full checking and maintenance. Reuse must not be allowed where any damage - especially hidden damage - could cause premature failure during use for structural support. Items, such as acrows, recovered from areas of planned collapse may need to be cut up to prevent the temptation of sale back into the industry or reuse.

The TWC will file all documents (Brief, Drawings, Check Certificates, RAMS, Permit’s etc.) with the Temporary Works Register. When project works are completed the final completed version of the TWR must be sent to the DI for record purposes. The principle contractor should also send relevant records to the Principle Designer for inclusion in the site Health and Safety File. Relevant records are those relating to the permanent situation on site - eg temporary works left in-situ.

7 CHECKING

The TWC shall be responsible for ensuring that all checks and inspections are carried out and recorded, inspections may be carried out by the TWS as directed by the TWC.

Frequency of checking will depend on the nature of the temporary works (Section 6.2.4 and Section 11 of BS 5975:2008 provides guidance) but in general checking should be carried out at sufficiently frequent intervals to enable any faults to be rectified before they can have an impact on the safety of the task or project.

The following check list (8.0) is a guide to the general and particular points to be examined when inspecting temporary works. It is not exhaustive as there will be contracts where the temporary works have their own exceptional requirements which will need special treatment. To be effective, inspections must be conscientious and thorough, even though on some contracts the same temporary works methods may be repeated several times. Do not let familiarity breed contempt.

8 STATUTORY NOTIFICATIONS AND COMPLIANCE WITH SAFETY LEGISLATION

Statutory regulations have been complied with including:

- Health and Safety at Work Act 1974
- CDM Regulations 2015
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- Provision and Use of Work Equipment Regulations 1998 (PUWER)
- Company Safety Policy has been complied with (including design risk assessments)
- The construction methods about to be employed are consistent with those envisaged in the design
- All calculations and drawings have been checked (including those of any subcontractors)
- The materials are as specified
- The actual loading conditions are within the limits set out in the design
- The site conditions are as used in the design, for example:
  - soil types and properties
  - exposure to wind, water etc.
  - site restrictions - including other works underway nearby
- Any proposed changes to the temporary works have been checked with and approved by the designer and have been recorded.
- All structural members are correctly positioned and no unintended eccentricities are present
- No ad-hoc solutions to site problems have been incorporated without reference to the designer and/or the TWC and their agreement (in writing for all situations)
- Tolerances have not been exceeded
- The quality of any welding is adequate and meets the design specification
- Temporary props etc have been fixed in place to prevent them being knocked or eg vibrated and moving or falling out
- No part of the temporary works is being used for any purpose other than that for which is was designed.

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