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## THE ROLE AND RESPONSIBILITIES OF PERMANENT WORKS DESIGNERS WITH REGARD TO TEMPORARY WORKS

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### Purpose of paper

This note is written to assist permanent works designers (PWD) in their legal obligations in relation to temporary works, stemming from CDM2015, and also to demonstrate the wider project benefits of careful consideration.

It will also be of use to Principal Designers (most projects will have one of these appointed) and to Clients, informing them of what should be expected of PWDs on their projects.

Temporary works cover a wide field of activity: these are illustrated in Appendix B and C of the TWf 'Client's Guide to temporary works'<sup>1</sup>.

Note that the definition of temporary works adopted by TWf includes interim states of the permanent works and the loading of the permanent works by temporary construction loads.

### 1 Introduction

- 1.1 Much advice already exists on temporary works; however it tends to concentrate on Contractors and the safe construction and use of temporary works. Very little is available specifically directed at the PWD and the role they can play, and the responsibilities they carry, in this regard (see (1), however).

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<sup>1</sup> [https://www.twforum.org.uk/media/58911/twf2014.02\\_client\\_guide\\_26\\_january\\_2015\\_final.pdf](https://www.twforum.org.uk/media/58911/twf2014.02_client_guide_26_january_2015_final.pdf)



- 1.2 The main concern is one of safety, i.e. an action falling to the PWD, which, if not taken at an early stage, could lead to an unnecessary or enhanced risk on site. In the extreme this could precipitate failure and affect the well-being of others. However, there are other actions, which, although lacking the same degree of safety concern, could add unnecessary cost or time to a project if not thought through by the PWD.
- 1.3 Although safety issues tend to dominate, ill-health associated with temporary works, but arising from poorly thought out permanent works design, is also an important aspect which needs to be considered by PWDs. In this paper, the term 'safety' is also intended to cover ill-health<sup>2</sup>.
- 1.4 On many projects temporary works are, in effect, a 'hidden' element despite forming a significant cost component; they are not explicitly billed or identified, nor do they feature as part of what the Client receives on project completion, and hence often do not receive the same attention as that given to the permanent works at the design stage. However, attention to detail can bring commensurate project savings in addition to eliminating or reducing unnecessary safety risk.
- 1.5 The duty of PWDs to consider safety risk in connection with temporary works arises under a general duty of care, but specifically under statute and often under contract. PWDs may be employed directly by the Client, or by a Contractor.

#### **Risk does not respect project size**

The loft conversion, or house extension, can create complex and safety-critical temporary works situations just as the larger project.

The duties falling to PWDs are the same in all cases.

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<sup>2</sup> Ill health is a major concern generally as it affects, and kills, many more people than does safety related shortcomings.



### ***Statutory obligation***

- 1.6 The statutory obligation on PWDs arises from Regulation 9 of CDM2015. This requires PWDs to:
  - i. eliminate risk or, if not reasonably practicable, to reduce risk, so far as is reasonably practicable (SFARP), and
  - ii. to provide information on significant residual risks to others (specifically the Principal Designer, but required by the Principal Contractor).
- 1.7 The risks here are those which adversely affect the safety of others, however the approach may be used to consider all adverse risks.
- 1.8 CDM2015, as its predecessors, does not make any distinction between temporary works or permanent works. Thus temporary works designers will also be following the above requirement. To do this they will require adequate base data on the permanent works (in the Pre-Construction Information) on which to base their design, and the means to co-ordinate the temporary works design with the permanent works.
- 1.9 To discharge this statutory duty the PWD must:
  - i. Understand how the structure can be constructed, and temporary works erected, used and dismantled safely, and

*There may be a number of ways this could be done, but the PWD must have identified at least one likely and feasible method, and understand the manner in which the permanent works design impinges on this, or vice versa.*

- ii. Determine if, by altering or supplementing the permanent works design in some way (SFARP), temporary works risk arising from construction, use or dismantling of temporary works can be eliminated or reduced.



This can be achieved in a number of ways, for example (as part of the permanent works):

- *Ways of facilitating lifting*
- *Providing a moment connection (even though not needed in the final structure) so as to allow for a predictable temporary situation*
- *By making provision for predictable temporary works cast-in elements*
- *Adding bracing or reinforcement to accommodate predictable interim conditions*
- *Enhancing the strength of a member so as to accommodate predictable temporary loading*
- *Ensuring adequate space is provided for predictable temporary works items*
- *Considering issues associated with demolition-related temporary works*

- iii. Consider what useful information should be passed on to the Contractor (via the Pre-Construction Information)

*This is very important and is discussed later in the paper; as a minimum the suggested construction sequence should be illustrated (generally as an option) unless it is obvious to a capable (Note 1) contractor, with no significant issues which might be unexpected.*

Note 1:

'capable' is the term used in CDM015. It replaces 'competence', having regard also to resource, used in CDM2007.

1.10 In considering the above, it is not intended to restrict the Contractor in how the facility is constructed (unless there is good reason to do so). Nor is it to take responsibility for site matters. The aim is to explain the permanent works designer's thinking, remove or reduce unnecessary obstacles, and provide information. It is then for the contractor to ensure the safety of the method eventually adopted.

1.11 To do this the PWD clearly needs to have a good understanding of contemporary construction techniques, including the associated likely temporary works solutions, and to know the critical aspects of the permanent



works design, e.g. an interim stage of possible instability, reliance on adjacent structures or limits to deflections or movements.

- 1.12 Clear thinking and action in this regard will help in the management of safety risk, but also in the management of other business related risks e.g. programme or unexpected costs.

#### *Co-operation, Co-ordination and Communication*

- 1.13 The PWD must co-operate, co-ordinate and communicate with others, in respect of temporary works (safety) issues, as for any other aspects of the design, where reasonably practicable. Taking these actions will also assist in other regards. For example:

Co-operate	Assisting the Principal Contractor, via the Pre-Construction Information and the Principal Designer as required, to understand the intricacies of the permanent works design and considering options to assist in the build process
Co-ordinate	Taking steps to ensure the permanent works design is compatible with temporary works needs
Communicate	Ensuring that appropriate communication channels are available, and used.

However, much of the above depends upon the nature of the contractual arrangements (see also Section 2). Where the contractual arrangements militate against this e.g. by the timing of appointments, the PWD should ensure that reasonable alternative action is taken.

#### *Risk management*

- 1.13 Unfortunately, neither CDM2015, nor the accompanying guidance (Management of health and safety in construction, L153, published by HSE), explain how the PWD determines if the risk management action taken is compliant. This is a long-standing deficiency and is discussed elsewhere (2). In the absence of such advice it is suggested that PWDs:
- i. Follow contemporary industry practice where it is available; if it is available, but not adopted for good reason, provide an explanation for record purposes.
  - ii. Where no contemporary advice is available, use engineering judgement stemming from capable individuals.



Ask:

**“If I was the constructor or the temporary works designer, what would I reasonably expect, or want to know, so that I could proceed safely, but also economically.”**

1.14 What must be avoided, without exception, is overtly dangerous situations occurring on site as a result of poor design consideration (see Table 1).

Absence of Site Investigation, or other data, e.g. presence of asbestos	Without this the Contractor is unable to properly plan the works at tender stage, and insufficient time may be available during the construction phase to implement the necessary investigation.
Failure to provide adequate details of adjacent structures	Without this data the Contractor is unable to assess the safety of proposed construction methods.
A permanent works design which does not allow sufficient space for safe construction	This will lead to unnecessary risk, often with serious safety or health consequences.
A permanent works design which depends upon a particular sequence of construction but which is not provided	The Contractor cannot be expected to determine this during the limited time at tender, and it may still not be understood when on site. This could lead to catastrophic failure.
Required amendment to existing structures without the necessary provision of structural information and investigation	Such a circumstance could lead to catastrophic failure.

**Table 1: Examples of overtly dangerous situations arising from poor design or lack of pre-construction information**



- 1.15 A careful consideration of the construction sequence and the associated temporary works, and using this to identify associated hazards and risks, will then allow consideration of whether any of these may be eliminated or reduced. A useful model for this, conducted if possible in a group with a facilitator, is **ERIC**. Such a facilitator should be capable in temporary works design and construction techniques; this could be from the design team, the Principal Designer, or from a Contractor (including where sensible and feasible, the Temporary Works Co-ordinator (TWC) as set out in BS5975:2008+A1:2011).
- 1.16 The PWD should be aware that even common-place designs e.g. multi-storey flat slab can present difficulties to contractors if not thought through, for example, in terms of propping constraints and safe temporary loading.

#### *Using ERIC*

- 1.17 **ERIC** is an acronym for Eliminate, Reduce, Inform and Control and helps to provide a framework to the consideration of hazard and risk. Examples of ERIC in use are available (1) which illustrate the ease of use and the broad application.

A checklist of items which could be used as a prompt list include (Table 2):



Aspect	Action	Comment
<b>Capability</b>  (See Note 1, under 1.9. iii)	Ensure the PWD members have, as a team, the appropriate capability to appreciate the temporary works issues.	Where this is lacking take steps, depending upon the nature of the project and the anticipated temporary works, to procure advice (see 'Sources of advice for the PWD', below)
<b>General</b>	Discuss with the Principal Designer the key temporary works issues for the project, providing appropriate information for inclusion on the Pre Construction Information distributed by the Principal Designer.	Include the items identified in this prompt list, and how PAS8811 (3) can be adopted.
<b>Procurement</b>	Discuss with the Client the contractor procurement arrangements in order to highlight the benefits/disadvantages of the different formats.	Where the form of procurement adopted does not provide for ready contact with contractors and temporary works designers, determine a PWD procedure to cover this, in conjunction with the Principal Designer.
	Ensure the interview/appointment process for the principal contractor includes an assessment of their capability in temporary works	See PAS8811, Section 6 (3)
<b>Contract provisions</b>	Ensure the appropriate construction contract provisions are included	See 'Contract', below Consider also the provisions of PAS8811:2016 (3)
<b>Design</b>	Ensure the design takes account of construction methodology and the associated temporary works.	
	Ensure the design is checked (and, if appropriate reviewed), by a competent person.	Review is different from 'check' and is set out by SCOSS (4)
	Ensure that there is a formal, managed process for dealing with site-based requests and decisions relating to temporary works	These may include, for example, an amendment to the permanent works, or a check on interim stages of construction.

**Table 2: Typical risk categories for consideration**





*Information*

1.18 The key issue here is to distinguish between general information of which the Contractor will already be aware by virtue of being a capable Contractor, and ‘significant residual risk data’ which the contractor will find of use - either in the actual construction, use or dismantling of the temporary works or in its design. Examples are given in Table 3:

<b>Ground conditions and design characteristics (affecting safety and health)</b>	Provision of Site Investigation (SI) data. The PWD should also give consideration, when setting up the permanent works SI, as to whether additional tests or data collection (including actions required to determine contaminants and the like) will assist in the design of predictable temporary works or the protection of associated workers. This may require an extended SI time period.
<b>Restrictions on horizontal/vertical movements and deflections to existing assets or the permanent works</b>	Essential information in order to plan and design the temporary works
<b>Maximum loads to be applied to existing assets or to the permanent works</b>	The PWD should have regard to predictable temporary loads on the permanent works and accommodate these into the design, where reasonably practicable. Data on this may be obtained from a number of sources: industry bodies, e.g. BCSEA, the TWf, or Contractors (Note 1)
<b>How interim strengths are to be determined</b>	For example the early strength of concrete floors.
<b>Interim stages of construction involving potential instability</b>	Essential information in order to plan and design the temporary works
<b>Party wall details</b>	The contractor should be informed of all Party Wall matters, including the name of the Party Wall Surveyor, existing party wall details, investigations and the like.
<b>Traffic flows</b>	As Traffic Management can be defined as temporary works, useful information would be traffic flows, speed and use restrictions to allow the Traffic Management to be sensibly designed.
<p>Note 1:            Examples include the inability of a suspended floor slab to take predictable temporary works propping loads (supporting the next floor). However, it would be better if the PWD eliminated the problem by increasing the strength of the slab.</p>	
<b>Table 3: Examples of useful information for contractors and their designers</b>	

## 2 Contract

### *Contract arrangements*

- 2.1 Notwithstanding statutory obligations, the manner in which the project team is assembled can have a significant effect upon the management of risk and the transfer of information. The PWD needs to be aware of how the chosen arrangements may impede the necessary actions.
- 2.2 On Design & Build projects (or similar arrangements) the contractor has contractual control over all designers and thus the PWD is able to ensure that the permanent works design takes account of construction issues as they are able to make direct contact with the relevant contractors and temporary works designers. This allows a design, and the provision of information, which suits those who are going to design and construct the works. The PWD should be pro-active in this regard and should also expect to have contact with the Principal Designer and, when appointed, the TWC.
- 2.3 However, on projects where the Client appoints permanent works designers and contractors separately the process is more complex (Figure 1).

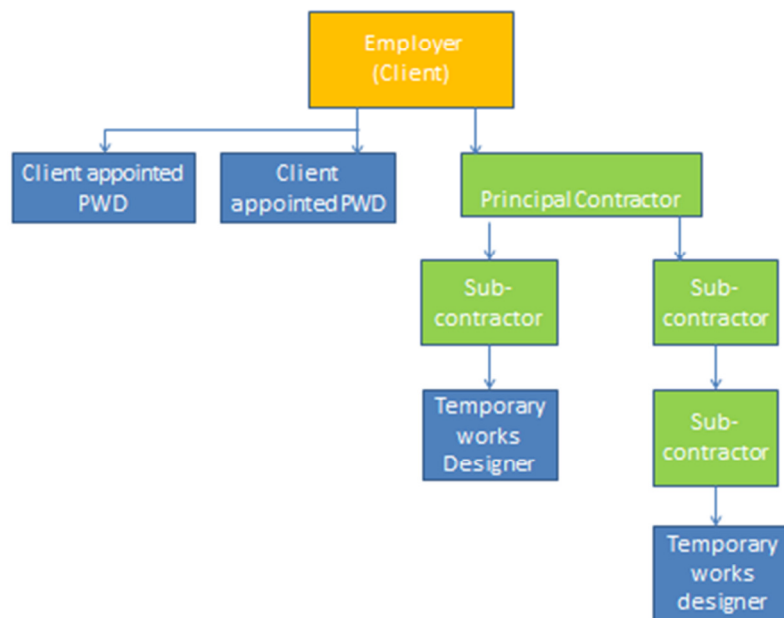


Figure 1: Typical separate appointments route



2.4 In these cases, depending upon the specific arrangements and timings, the PWD may not be able to make direct contact with the principal contractor, still less the subsequent sub-contractors or temporary works designers. Hence if this is so, the PWD should:

- Discuss any specific issues with the Principal Designer, if appointed.
- Seek advice from other contractors/temporary works designers if there is any doubt about the likely method of construction or other temporary works issues, and
- Ensure adequate information is provided on the drawings for the benefit of those contractors yet to be appointed.

#### *Contract provisions*

2.5 The PWD should give careful consideration as to what contract provisions should be included in the construction contract. General provisions, which may need to be particularised for a specific project, are set out in PAS8811 (3)

### **3 Sources of advice for the PWD**

3.1 When necessary, the PWD is able to obtain advice from a number of sources, viz:

The Principal Designer	The PD will not necessarily be competent in this area but should be able to suggest others if this is the case.
Contractors	Although contractors may differ in their individual approach to construction, the PWD should be able to obtain relevant generic advice
The Temporary Works Co-ordinator (TWC)	A useful source of advice if appointed at the relevant stage and if specifically competent in design matters (5)
Temporary works designers	A useful source of advice if appointed at the relevant stage
Temporary Works Forum	The TWf cannot give project specific advice but its website contains a range of useful information ( <a href="http://www.twforum.org.uk">www.twforum.org.uk</a> )



3.2 The PWD will need to decide whether, if no contractual route is available, to obtain advice on a pro bono basis, or, perhaps for the more complex or safety-critical project to seek funds to engage one of the above to provide a consultancy service.

## REFERENCES

1	Designing for safer concrete structures November 2011, Carpenter, J. Concrete Centre
2	See, for example: <a href="http://www.shponline.co.uk/construction-design-dilemma-cdm2015/">http://www.shponline.co.uk/construction-design-dilemma-cdm2015/</a> and <a href="http://content.yudu.com/A3y8vi/SHPJan2016/resources/index.htm?referrerUrl=OSHmember">http://content.yudu.com/A3y8vi/SHPJan2016/resources/index.htm?referrerUrl=OSHmember</a> (Page 41)
3	PAS 8811:2016, Temporary works – Infrastructure client procedures – Code of practice
4	SCOSS, Peer review, at: <a href="http://www.structural-safety.org/media/24156/120_SC09.035_WEB_IR_Draft_form_of_Agreement_Jan_2009.pdf">http://www.structural-safety.org/media/24156/120_SC09.035_WEB_IR_Draft_form_of_Agreement_Jan_2009.pdf</a> and at: <a href="http://www.structural-safety.org/media/24153/119_SC09.034_WEB_IR_Guidance_Note_Jan_2009.pdf">http://www.structural-safety.org/media/24153/119_SC09.034_WEB_IR_Guidance_Note_Jan_2009.pdf</a>
5	Competencies of the TWC at: <a href="https://www.twforum.org.uk/publications/public-twf-documents/">https://www.twforum.org.uk/publications/public-twf-documents/</a>