Temporary Works

Jan Andresen BEng CEng MIStructE
HM Specialist Inspector of Health and Safety

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Doing what's right isn't the problem. It is knowing what's right.

*Lyndon B Johnson*
This week’s absolute shocker only needs the big bad wolf (or slight breeze for that matter) to blow this house down. Note the meals area, an esky and a trestle, tucked under the house.

To ensure stability when raising a building to increase the floor height, all temporary supports and bracing arrangements should be designed by an engineer experienced in such works.
Definitions of Temporary Works

• Temporary works means all temporary works of every kind (other than contractors equipment) required on site for the execution and completion of the permanent works and remedying any defects (International Federation of Consulting Engineers (FIDIC) Conditions of Contract Definition)

• All temporary works of every kind required in or about the construction and completion of the works. (ICE Conditions of Contract Definition)
Definitions of Temporary Works

Temporary Works is defined in BS5975 : 2008 as

“parts of the works that allow or enable construction of, protect, support or provide access to the permanent works and which might or might not remain in place at the completion of the works”
Alternative Definition: Temporary Works

• Anything the contractor has to provide or do in order to construct the permanent works.
Temporary works

- Hoardings
- Welfare facilities
- Services
- Platforms
- Earth support
- Access
- Propping & shoring
Temporary Works Topics

• Earthworks - trenches, excavations, underpinning, piling platforms and cofferdams etc.

• Structures – formwork, falsework, back-propping, façade retention, edge protection, re-propping, scaffolding, bailey bridges, hoarding, and signage etc.

• Plant - mobile crane outrigger design, tower crane bases etc.
Problems With Temporary Works

- No planning or procedure.
- No design or poor design.
- Lack of competent contractor / developer.
- No temporary works equipment available.
- Inappropriate use of TW equipment or other non TW equipment being used for the purpose of temporary works.
Job creep, the enemy of planning
carry out proper investigation of ground conditions, services or adjacent structures.
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Inadequate horizontal and or diagonal bracing to resist lateral (wind) loads.
Lack of knowledge and inexperience of persons involved in temporary works design / and or erection/maintenance.
Inadequate foundations.
Unauthorised changes to an approved temporary works design.
Proper planning, by a competent person…………..
Who is a “Competent person”?

• A competent person is one who can demonstrate that they have sufficient professional or technical training, knowledge, actual experience and authority to enable them to:-
  • Carry out their assigned duties at the level of responsibility allocated to them.
  • Understand any potential hazards related to the work (or equipment) under consideration
  • Detect any technical defects or omissions in that work (or equipment), recognise any implications for health and safety caused by those defects or omissions, and be able to specify a remedial action to mitigate those implications.
Hoardings
HOARDINGS – A guide to good practice

This TWF Guidance is available as a free download from www.twforum.org.uk

(Note: If you need to print this document, be aware that the pages are prepared as alternate pages offset for your duplex (double sided) printing.)
Hoardings
Hoardings
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Hoardings
Proprietary hoardings and fencing
Proprietary hoardings and fencing

• Still the same issues as before (wind / overturning etc)
• But now ‘designed’ by manufacturer
• So does the contractor know / understand the limitations of the hoarding and what the system has been designed to take?
• Have they installed them correctly?
• Have they changed things (e.g. sheeted it or added a dirty great big advertising sign?)
Fencing
Excavations – basic principles

• No ground can be relied upon to stand unsupported.
• “1.2m depth” rule is often quoted on site but went years ago.
• Steps shall be taken where necessary to prevent danger to any person
**HSE enforcement expectations for excavations**

- Prior to C(HSW) 1996 all excavations in which someone was working required shoring
- C(HSW) 1996 – Risk assessment based approach not intended to impose lower standard
- CDM 2007 contains old C(HSW) provisions
- Excavation deeper than 1.2m being worked in without shoring – Prohibition Notice unless justified by suitable & sufficient risk assessment
Soils fail in different ways

- **Stiff clay**
  - Tension cracks caused by relief of lateral pressure and drying-out
  - Fall of trench sides

- **Soft clay**
  - Slip
Soils fail in different ways

Sand
Basement / Deep underpinning construction

- High Risk Work
- Need Temporary works engineering input
- Method Statement should be in place
- Clear method of shoring excavations
- In poor soils - will need sacrificial back shutter
- HSE/ Bldg Ctrl Interface – Dangerous Structures
Underpinning – failure to survey existing wall and to prop
Construction (Design and Management) Regulations, 2007

• **Regulation 31**

• (1) **All practicable steps shall be taken, where necessary to prevent danger to any person**, including, where necessary, the provision of supports or battering, **to ensure that**—

• (a) **any excavation or part of an excavation does not collapse**;

• (b) **no material from a side or roof of, or adjacent to, any excavation is dislodged or falls**; and

• (c) **no person is buried or trapped in an excavation by material which is dislodged or falls**.
Construction (Design and Management) Regulations, 2007

• 31 (2) Suitable and sufficient steps shall be taken to prevent any person, work equipment, or any accumulation of material from falling into any excavation.

• 31 (3) Without prejudice to paragraphs (1) and (2), suitable and sufficient steps shall be taken, where necessary, to prevent any part of an excavation or ground adjacent to it from being overloaded by work equipment or material;
Temporary Works

Barton Bridge disaster 1959

Whilst erecting 4No, 200 ton steel girders, 80ft above the ground, the supporting scaffolding collapsed bringing down the girders and killing 4 men.

60 men, that would normally have been on the girders, were lining up for their pay at the time.

21 children were left fatherless.
Temporary Works

Evidence given at the Inquest:

Scaffolding not installed in accordance with the design drawings

The design drawing was not a working drawing and only gave an indication of the structure

Worn and corroded scaffold tubes had been used
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Lack of lateral bracing

Design carried out by an ‘estimator draughtsman’. Not ‘passed’ by an engineer

Bulging of the scaffold noted but not acted upon
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Tragedy struck again

Scaffold supporting 4 steel girders, 250ft long failed, killing 2 workers and injuring 8 others.
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The Coroner concluded that

“….the general picture was one of men fumbling about not knowing where anything was, or where to get anything…”
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That was 50 years ago
this wasn’t…..
Temporary works guidance

• **SIM 02/2010/04** The management of temporary works in the construction industry

• **BS 5975:2008** Code of practice for temporary works procedures and the permissible stress design of falsework

• **BS 5531:1988** Code of practice for safety in erecting structural frames  (*Withdrawn but gives useful advice*)
Temporary Works

So what does the law require?
Temporary works guidance

• Foreword to BS 5975:2008 states:
  • The term temporary works co-ordinator (TWC) has been adopted to reflect the need for procedural controls of all temporary works and to recognise that the majority of contractors already control temporary works in this manner.
  • Compliance with the Construction (Design and Management) Regulations 2007 (CDM) [3], [8] has been incorporated, particularly in respect to the interface between the design of permanent works and the design of temporary works.
Temporary works guidance

• CDM applies to all design
• requirement for the design of the Temporary Works to be co-ordinated to ensure that the risks are properly controlled.
• CDMC would have the competence to assess the safety considerations in the permanent works design, unlikely to have the competence to deal with the specialised area of Temporary Works. It is to cover this potential gap that the code of practice creates the role of the TWC.
Appointing a Temporary Works Coordinator, is it a legal requirement?

• Broadly, HSWA outlines the duty that work activity should be carried out, SFAIRP, without risk to the health and safety of those that may be affected by the work.

• CDM requires that design activities are co-ordinated with each other and that proper consideration is given by designers to ensuring that risks arising out of the construction of their design can be properly controlled. To this end, the client must appoint a “CDM Co-ordinator.”
Think of temporary works as
“A project within a project.”
The PC is responsible for the TW, and is therefore the “client” as he is procuring the work.
The TWC is therefore the “CDMC” for the TW project
Temporary works

• That’s fine for the big jobs, what happens lower down in the market?
• To most contractors, “Temporary Works” means propping using our old friend, the “Acrow” prop
“Acrows”
“Acrows”
“Strongboy”, safe load 350kg
Domestic jobs

- Often see the contractor overreaching by taking on work that isn’t within his experience or competence
Temporary Work Procedure

- Appointment of a Temporary Works Co-ordinator (TWC).
- Completion and Maintenance of a Temporary Works Register.
- Preparation of Design Briefs for Elements Identified in Register.
- Production of Temporary Works Designs.
- Preparation of Risk Assessments / Method Statements.
- Pre-erection / Installation Inspection of Materials & Components.
- Supervision of Erection / Installation of Temporary Works.
- Inspection & Check of Temporary Works Prior to Use.
- Approval – Permit to Load – (Temporary Works Loaded).
- Approval to Dismantle Following Checks – Permit to Dismantle.
- Temporary Works Dismantled and Signed Off.
28.—(1) All practicable steps shall be taken, where necessary to prevent danger to any person, **to ensure that any new or existing structure** or any part of such structure which may become unstable or in a temporary state of weakness or instability due to the carrying out of construction work **does not collapse**.

(2) Any buttress, temporary support or temporary structure must be of such design and so installed and maintained as to withstand any foreseeable loads which may be imposed on it, and must only be used for the purposes for which it is so designed, installed and maintained.

(3) No part of a structure shall be so loaded as to render it unsafe to any person.
Temporary Works

What is HSE doing?
What sort of questions might we ask?
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Do you have a formal TW procedure?

Who is the **named** TWC?

What is their background?

Do you have a TW register?

Is there a design brief?
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Has the work been ‘designed’?

Has the design been independently checked?

What checks have been made to ensure that the works have been installed in accordance with the design?

What involvement has the CDM-C had?
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What do we hope to see?
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Attention to temporary works management arrangements and procedures….

….commensurate with the scale and complexity of the project and the construction risks involved

Medium / large projects – formal procedures
Small, simple projects – principles of BS5975
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What have we been finding?
Temporary Works

It depends.....
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For the larger projects, then normally some form of TW procedure. Some follow BS5975 quite closely, some follow the principles.

But not much involvement by CDM-Cs
Temporary Works

and the smaller projects…?
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At best, a recognition that TW can be hazardous and needs particular attention
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But more often......
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“I don’t see what the problem is….”

Adequately supported?

Adequately supported?
Temporary Works
Temporary Works

“Erm, no, I’ve not spoken to an Engineer”
Temporary Works
Temporary Works
Temporary Works
Temporary Works – common failings

- Lack of adequate lateral stability
- Inadequate foundations
- Overloading
- Inappropriate parts being used
- Poorly designed (if at all)
- Poorly constructed
Temporary Works – common failings

- Workforce not competent for tasks required
- Don’t appreciate the true force of wind
- No investigation of existing conditions (ground, services, structural condition etc)
- *Ad hoc* changes made
- General lack of control, management and supervision
Temporary Works Design Brief

• **Purpose of temporary works** – including drawings of permanent works and any specifications.

• Required dimensions and any **known constraints**.

• Particular **loads** including impact loads - loadings from construction material, plant and personnel in addition to environmental loads.

• **Ground conditions** information soils, groundwater etc provide geotechnical information.

• **Site conditions** including services, adjacent
Temporary Works Design Checks

- **“High Risk”** temporary works - independent check, normally a designer in a different office or design organisation.

- **“Medium Risk”** temporary works - check can be by the same organisation if documentary proof of independence of checkers.

- **“Low Risk”** temporary works the checks can be by someone in the site team or the design team.
REMEMBER

• The majority of contractors are aware of the need to prop vertically but often fail to understand the importance of maintaining the lateral stability of the supports.
• Most things fail sideways rather than vertically.
• Preventing sideways movement can eliminate the most common cause of unintended collapses.
Temporary Works

Inadequate or poor TW is implicated in many incidents. Research carried out by CIRIA and Loughborough University for HSE identified 8 key issues:

Issue 6: The effective management of TW is crucial to success.

Issue 5: Competence is key.
“….those who break the law should pay their fair share of the costs to put things right - and not the public purse” – Government policy

**Fee for Intervention** - a legal duty placed on HSE to recover its costs for carrying out its regulatory functions under HSWA. The aim is to shift some of the costs of health and safety regulation from the public purse to businesses and organisations that break health and safety laws.

Triggered when there has been a “material breach”

**Material breach** - when in the inspector’s opinion there is or has been a contravention of health and safety law requiring notification in writing of that opinion, either by notification of contravention, improvement notice, prohibition notice or prosecution.

Came into force 1st October 2012