Health and Safety
Executive

HSE

Temporary Works

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Six questions on temporary works

1. What has this got to do with you?
2. Why are temporary works important?
3. What happens when temporary works go wrong?
4. Why should you be interested in temporary works?
5. What is HSE doing?
6. What should **YOU** be doing?

HSE Interest

- Inadequate or poor temporary works is implicated in many incidents
  - Trench collapses
  - Scaffold collapses
  - Basement /underpinning collapses
  - Structural collapse
- Reflects
  - Poor clients
  - Incompetent contractors
  - Overlooked by CDMC?

Was this one of your jobs?

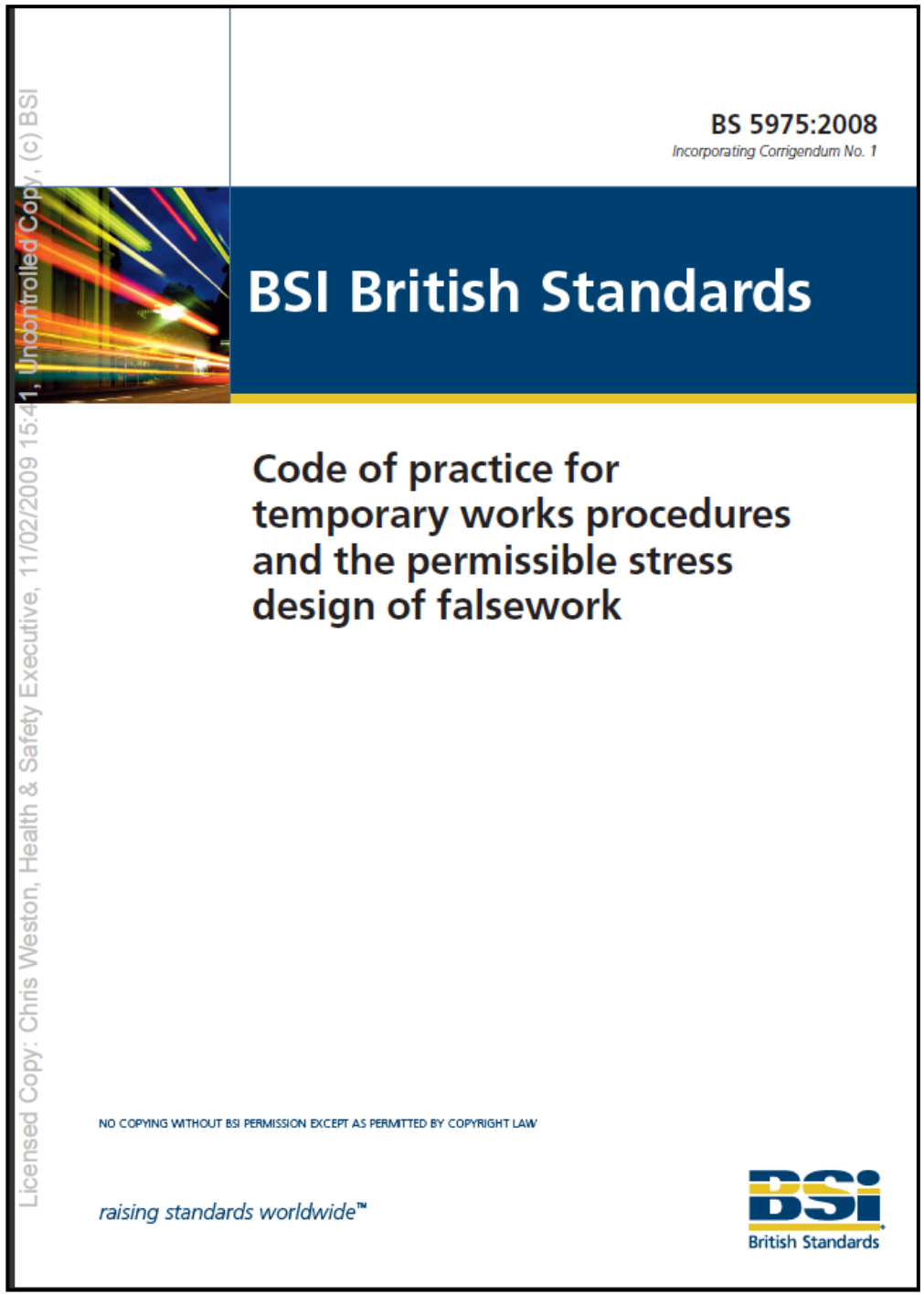
- Was the contractor competent ?
- Was the initial construction phase plan suitable?


DAYS A WEEK

Temporary Works – CD Work plan 2010/11

The aim is to:

- Promote awareness and knowledge of the importance of managing temporary works effectively
- Improve contractors management arrangements of temporary works
- Increase the competence of those engaged in temporary works management and design
- Reduce accidents arising from temporary works failures



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Now contains

198 pages of experience

Contents

Definition 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

NOTE: Examples of temporary works are structures, supports, back-propping, earthworks and accesses.”

Temporary Works Examples

- Earthworks
- Structures
- Plant

Temporary Works Examples

Procedural control of temporary works

6 Procedures

6.1 General

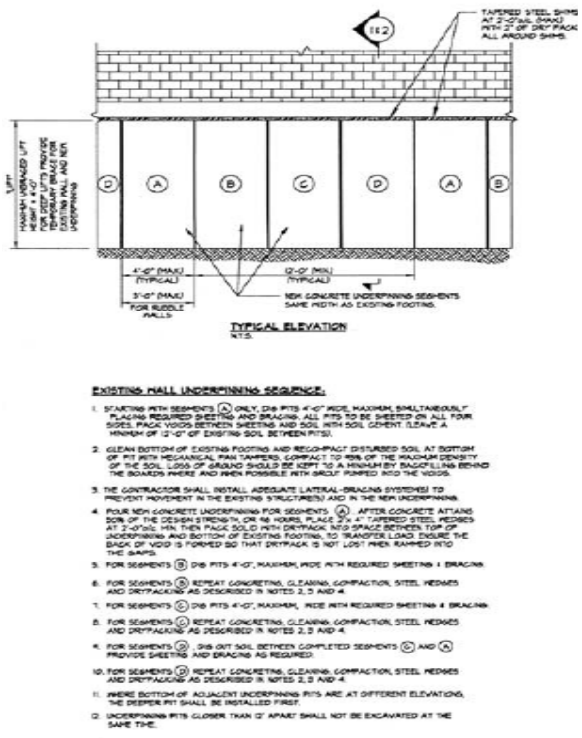
6.1.1 Temporary works is an "engineered solution" used to support or protect either an existing structure or the permanent works during construction, or to support an item of plant or equipment, or the vertical sides or side-slopes of an excavation during construction operations on site or to provide access.

Temporary Works Examples

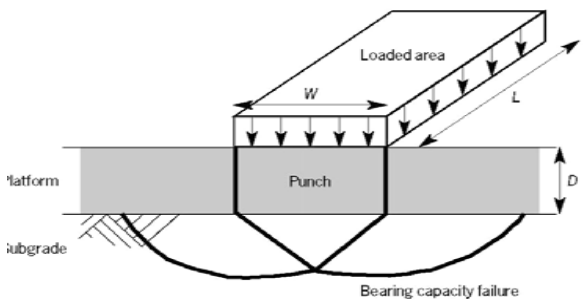
- Earthworks - Piling Platforms, Underpinning and Cofferdams etc.

Construction of a Piling Platform

Completed Piling Platform



Underpinning

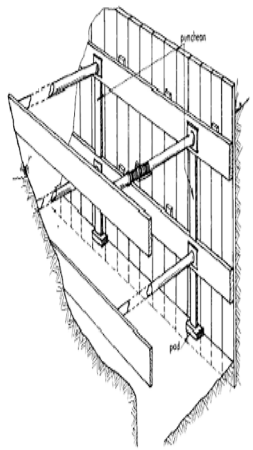


Temporary Works Examples

- Earthworks – (Supports) for Trenches, Excavations

Trench Boxes

Design of trench box - access ladder and edge protection attached to box



Close Boarded Trench Support

Strutting Frame

Waler Frames – For Medium Sized Trenches

Hydraulic / Mechanical Struts

Temporary Works Examples

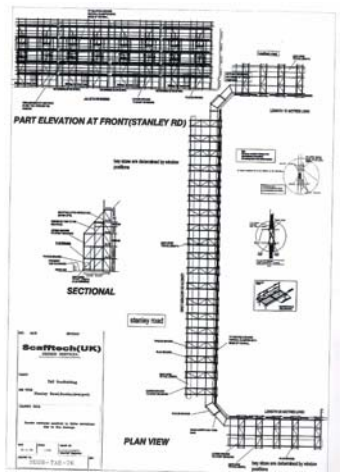
- Structures – Formwork & Falsework,

Formwork (Shuttering)

Falsework (Supports)

Temporary Works Examples

- Structures – Scaffold, Propping & Façade Retention



Façade Retention

Propping

Temporary Works Examples

- Structures – Edge Protection, Loading Bays, Temporary Bridges, Hoarding, and Signage etc

Edge Protection

Temporary Bridges

Signage

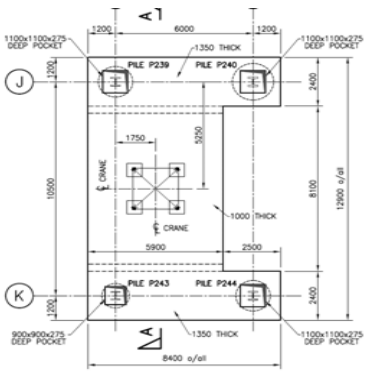
Loading Bays

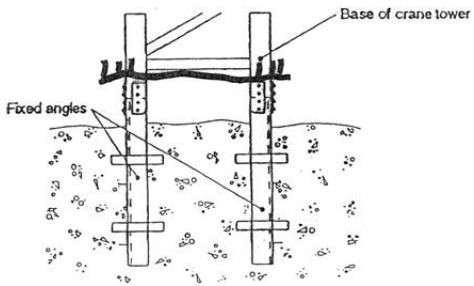
Hoarding

Signage On Scaffolds etc

Temporary Works Examples

- Plant - Mobile Crane Outrigger Design, Hoists, Loading bays, Tower Crane Bases etc.





Hoists

Tower Crane Base

Mobile Crane Outrigger Design

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.

TWC - Competence

Temporary Works Co-ordinator (TWC)

Formal Appointment in Writing

The Individual selected to be the Temporary Works Co-ordinator must be competent, experienced + formal qualification e.g.

(1) Degree / HND qualified as a minimum

(2) Chartered Civil / Structural Engineer

(3) Has completed formal Temporary Works training.

Temporary Works Procedure

Temporary Works Co-ordinator (TWC)

Rare to find these competencies for individuals undertaking small scale refurbishment and demolition projects

EASY SOLUTION

£ £

£ £

Hire in the expertise of a competent TWC and TWD the same as you would for an Architect or Structural Engineer who would provide the permanent works design.

Temporary Works Procedure

Temporary Works Co-ordinator (Typical Duties)

- To determine the temporary works for a project and compile a TW register and keep all temporary works records.
- To determine the type and risk class of temporary works on a project.
- To ensure that the responsibilities in relation to temporary works are clearly allocated, defined and understood by all parties and that each party is competent to carry out their responsibilities.
- To ensure that all temporary works are designed and checked appropriately.
- To ensure that all temporary works activities are adequately planned and supervised.

Examples of Temporary Works - Risk Classes

HIGH RISK TEMPORARY WORKS
•Trenchless construction including headings, thrust bores, mini tunnels
•Working platforms cranes and piling rigs
•Tower crane bases
•Façade retention schemes
•Jacking schemes
•Bridge erection schemes (Stability checks)
•Complex structural steelwork and pre-cast concrete erection schemes
•Hoist mast climbers
•Permanent ground support contiguous / diaphragm walls etc
•Ground support schemes greater than 3m deep including sheet piles and proprietary support systems.
•Complex scaffolding
•Site signboards, Hoardings, Fencing over 2m
MEDIUM RISK TEMPORARY WORKS
•Safety net systems installed in accordance with manufacturers recommendations and which are fixed to robust primary measures
•Trench excavation up to 3m deep in good ground
•Formwork for concrete columns and walls up to 3m
•Foundation underpinning not using piles
•False work up to 3m high
•Hoardings, Fencing up to 2m
LOW RISK TEMPORARY WORKS
•Simple scaffolding design
•Formwork less than 1200mm in height
•Fencing and hoarding up to 1200mm in height
•Internal hoarding systems and temporary partitions not subject to wind or differential air pressure or crowd loading.
•Shallow trenched less than 1200mm deep in good ground

Temporary Works Design Brief

- Purpose of temporary works – include 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 structures and access.
- Available materials and equipment.
- Construction sequence and loading stages, control programme.

Temporary Works Design Checks

- For “High Risk” temporary works there must be an independent check made on the design. This is normally made by a designer in a different office or design organisation.

- For “Medium Risk” temporary works the check can be undertaken by the same organisation as long as there is documentary proof of the independence of the checkers.

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

Category of Design Checks Table 1 BS5975:2008

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.	This applies to the use of standard solutions and Not the original design, which will require 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 site or design team.
1	For simple designs. These may include: formwork: false work (where top restraint is not assumed): 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, for foundations, for structural steelwork connections, for reinforced concrete.	Category 2 checks would include designs where a considerable degree of interpretation of loading or soils' information is required before the design of the foundations or excavation support or slope	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.	These designs include unusual designs or where significant departures from standards, novel methods of analysis or considerable exercise of engineering judgement are involved.	The check should be carried out by another organization.

Temporary Works Design Checks

In all cases the design check should provide an independent check on:-

(1) Design concept

(2) Strength and structural adequacy

(including lateral stability and overturning etc)

(3) Compliance with the design brief.

2. Why are temporary works important?

GOOD temporary works can bring….

- Better safety
- Enhanced efficiency, quality, productivity
- More certainty on completion times and cost

BAD temporary works increase risk of….

- Injuries and/or fatalities
- Failure/collapse of permanent/temporary works
- Damage to adjacent properties/premises
- Delays and increased costs

Basement construction, London

Basement construction, London

3. What happens when temporary works go wrong? (1)

Causes

- Lack of adequate lateral stability
- Inadequate foundations
- Overloading
- Unavailability and/or use of inappropriate parts
- Lack of competent temporary works designer and/or erectors
- Poorly constructed

AA Fanum House, Cardiff
Scaffold collapse, 13 December 2000

3. What happens when temporary works go wrong? (2)

Causes:

- No (or inadequate) temporary works procedure
- No (or inadequate) TWC appointed
- No (or inadequate) temporary works **BRIEF OR DESIGN**
- No (or inadequate) investigation of ground conditions, underground services, structural condition of exist. buildings
- Unauthorised changes to approved TW design
- Lack of competent contractor/builder/developer

3. What happens when temporary works go wrong? (3)

Consequences

- Collapse or failure of the temporary works
- Structural failure and/or collapse of the permanent works
- Uncontrolled ingress or egress of spoil, water or materials
- Collapse of adjacent structures
- Risk of fatalities and injuries to workers and MOP’s
- Risk of delay & increased costs
- Financial & commercial risks to contractors, sub-contractors, designers, suppliers & clients

Ask what load
they've got to carry

4. Why should you be interested in temporary works?

A. Legislation – CDM Regulations 2007 ACOP specifically mentions temporary works

B. Industry interest – Revision of BS5975 and establishment of TW Forum

C. Research – HSE Research Report RR834, 2011, *"Preventing Catastrophic Events in Construction" (free download - on HSE's website)*

D. HSE interest – Management of temporary works projects

5. What is HSE doing?

Projects looking specifically at the management of temporary works:

- Inspectors to target TW activities during routine site inspections (SIM 02/2010/03)
- Programme of targeted visits to medium/large PC's to review in more detail the adequacy of the TW management arrangements with "track-back" to designers & CDMC's

Temporary Works – Regulation CDM 2007

Regulation 4 (**competence**): competence required of all those with a role to discharge in the planning, design and execution of temporary works.

Regulations 5&6 (**cooperation and coordination**): cooperation and coordination of activities, including temporary works, incumbent on all involved.

Regulation 10 – (**client's duty to provide information**): provision by client of pre-construction information (e.g. ground conditions, structural drawings).

Regulation 11 (**duties of designers**): avoidance of foreseeable risk arising from preparing or modifying designs.

Regulation 13 (**duties of contractors**): planning, management and monitoring of construction work.

Regulation 18 (**additional duties of designers**): provision of information to assist the CDM coordinator CDM(C).

Temporary Works – Regulation CDM 2007

Regulation 20 (**duties of CDM(C)s**): all reasonable steps to ensure designers comply with their duties and to ensure cooperation between designers and principal contractors in relation to any design or design change.

Regulation 22 (**duties of the principal contractor**): planning, managing and monitoring the construction phase.

Regulation 28 (**stability of structures**): any support or temporary structure must be designed, installed and maintained so as to withstand foreseeable loads.

Regulation 29 (**demolition or dismantling**): planning and recording of arrangements.

Regulation 31 (**excavations**): planning and execution.

Regulation 32 (**cofferdams and caissons**): design, planning and execution.

Regulation 36 (**temporary traffic management**): on any part of the highway any temporary traffic management design should be designed (see Chapter 8).

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Any questions?