

Category 1 Standard

S1062 Temporary Works

Issue No.: A4

Issue date: April 2015
Review date: April 2020

MAYOR OF LONDON



Contents

1	Purpose	3
2	Scope	3
3	Requirements	4
3.1	Temporary Works Management and Design	4
3.2	Appointment of the Temporary Works Coordinator, Temporary Works Supervisors and Designated Individual	4
3.3	Competency	4
3.4	The use of British and European Standards for Temporary Works Design	5
3.5	Assurance Regime	5
3.6	Temporary Works Design	7
3.7	Materials	8
3.8	Structure gauge	8
3.9	Falsework, Formwork, access and protection	8
3.10	Geotechnical	13
3.11	Underground – Deep Tube Tunnels and Shafts	17
3.12	Other Temporary Works	18
3.13	Temporary Works Construction on site	19
3.14	Earth Bonding	20
3.15	Inspection	20
3.16	Records	20
4	Responsibilities	21
5	Supporting information	21
5.1	Background	21
5.2	Safety considerations	22
5.3	Environmental considerations	22
5.4	Customer considerations	23
6	References	23
6.1	References	23
6.2	Abbreviations	25
6.3	Definitions	25
6.4	Person accountable for the document	26
6.5	Document history	26
7	Attachments	27
7.1	Attachment 1 – Conceptual Design Statement requirements for Temporary works	27



1 Purpose

- 1.1 The purpose of this Standard is to set down the requirements for Temporary Works (TW) on LU Infrastructure.

2 Scope

- 2.1 TW are defined in British Standard BS 5975 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”.

- 2.2 This standard covers the design, fabrication and erection of temporary works associated with all asset groups on LU Infrastructure. Material requirements are covered in LU standard 1-085 and Civil Engineering Technical specifications T0001, T0002, T0005, T0006 and T0007.

- 2.3 TW can often be substantial and large scale and include, but not limited to such activities, as site set-up, mobilisation and accommodation, excavation and earthworks, cofferdams, sheet piling, retaining walls, scaffolding, decking, formwork and falsework, tunnelling, shafts and the control of ground water.

- 2.4 They can also constitute an essential element of the permanent construction, as in the case of the Primary Lining in a sprayed concrete tunnel or shaft, a working shaft or the framing to form an opening or timber heading. Structurally, they can also be independent works, such as working gantries, access systems, thrust pits and walls.

- 2.5 TW are usually removed after their function is complete, however in certain circumstances elements of the temporary works may be left in situ (residual temporary works) or incorporated into the permanent structure.

- 2.6 TW within LU stations shall be subject to the requirements set out in LU standards S1371, S1354 and this standard.

- 2.7 LU standard S1027 Site Hoarding, Fencing and Barriers set out the requirements for hoardings, fences or other barriers around work sites or other areas that need to be temporarily segregated.

- 2.8 This standard does not apply to third party (outside party) TW being undertaken outside LU Infrastructure. This is covered by LU standard S1023 and LU guidance document G0023.

3 Requirements

3.1 Temporary Works Management and Design

- 3.1.1 The management and design of all TW shall be in accordance with the requirements of BS 5975.

Note: - BS 5975 Code of practice for Temporary Works Procedures and the Permissible Stress Design of Falsework provide recommendations and guidance on the procedures and controls to be applied to all aspects of temporary works in the construction industry. It includes design, risk, specification, construction, use and the dismantling of falsework. It also provides guidance on permissible stress design of falsework

PAS 8811 – Code of practice for temporary works – Client procedures provides useful guidance on the management of temporary works

The Temporary Works forum (TWf) has published its Clients' guide to temporary works providing recommendations for Clients, their representatives, programme managers and others on the design and coordination of temporary works at www.twforum.org.uk

3.2 Appointment of the Temporary Works Coordinator, Temporary Works Supervisors and Designated Individual

- 3.2.1 Where a Principal Contractor (PC) has been engaged by LU, it is the responsibility of the Project Manager/Maintenance Manager to ensure the PC has procedures in place to satisfy the requirements of BS 5975.
- 3.2.2 The PC shall appoint a Temporary Works Coordinator (TWC) with responsibility for the co-ordination of all activities related to the TW in accordance with the requirements of BS 5975. One or more Temporary Works Supervisors (TWS) may be appointed to assist the TWC where appropriate e.g. large sites or where work is being carried out at a number of small sites.
- 3.2.3 Where LU acts as the PC, the LU Project Manager/Maintenance Manager shall be responsible for appointing the TWC.
- 3.2.4 The LU Designated Individual, in accordance with the requirements of BS5975, shall be the Head of Civil Engineering and Construction.

3.3 Competency

3.3.1 Temporary Works Co-ordinator and Temporary Works Supervisor

- 3.3.1.1 Competency records shall be kept and maintained for TWC and TWS to demonstrate that they have relevant up-to-date training, relevant qualifications and the experience appropriate for the type, scale and complexity of the TW being undertaken.

Note: It is expected that formal industry accredited training for TWC and TWS will form part of these competency records

Guidance on the Competency requirement for the TWC has been published by the Temporary Works forum (TWf) at www.twforum.org.uk

3.3.2 Temporary Works Designer

- 3.3.2.1 The TWC shall satisfy him/herself that the skills, knowledge and experience of the Temporary Works Designer (TWD) are suitable for the type, scale and complexity of the TW being undertaken.
- 3.3.2.2 Competency records shall be kept and maintained for the TWD to demonstrate that they have relevant up-to-date training, relevant qualifications and the experience appropriate for the type, scale and complexity of the temporary works being designed.

3.4 The use of British and European Standards for Temporary Works Design

- 3.4.1 Historically, the majority of TW in the UK have been designed to British Standards using permissible stress methods. The harmonisation of European structural design codes has led to the withdrawal of many of these documents and a change to a limit state approach. The TW sector is currently in a state of transition and the TWD is free to choose a suitable method of design using British or European Standards as appropriate.
- 3.4.2 The majority of the European structural design standards and all of the European Standards BS EN 1990 to 1999 are aimed at the design of Permanent Works. Because of the differences between TW and Permanent Works, the straight application of the European Standards to the design of TW may not be appropriate and could lead to unacceptably low factors of safety. The TWD shall consider these differences and apply European Standards appropriately.

Note: Where European Standards are to be used for the design of temporary works, useful guidance can be found in PAS 8812 – Guide to the application of European Standards in temporary works design

3.5 Assurance Regime

- 3.5.1 All TW shall be assured in accordance with S1538
- 3.5.2 The TWC shall ensure that a Temporary Works Design Brief is prepared for the TWD in accordance with the requirements of BS 5975 to establish the performance and other characteristics required of the TW and the information that is to be used to progress the design.
- 3.5.3 The design brief shall consider whether it is appropriate to have a bespoke Temporary Works 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. The construction of standard solutions can be safely managed by competent persons in site teams without design, by following custom and practice and an industry standard safe system of work.
- 3.5.4 All bespoke TW design requires a Temporary Works Conceptual Design Statement (CDS) (unless the LU Head of Technical Discipline or an accredited Engineer has agreed in writing that a CDS is not required) to be submitted for approval by the LU Head of Technical Discipline or an Accredited Engineer to confirm the technical basis for design. The CDS is normally prepared by the TWD.

- Note:** Examples where a CDS may not be required is when the temporary works are characterised as low risk in terms of
- Impact on LU or third party infrastructure or on any person other than those under the direct control of the principal contractor e.g. construction of a retained excavation with no adjacent asset
 - Consequence of failure (should it occur)
 - Design complexity
 - Execution criticality

Conversely an example where a CDS will always be required is when temporary works are required for ground support in proximity to the operational railway.

Further advice and guidance can be found in PAS 8811 – Code of practice for temporary works – Client procedures.

- 3.5.5 The TW CDS shall be completed in accordance with S1538 and the requirements given in Attachment 1 of this Standard.
- 3.5.6 The TWC will need to ensure all LU approvals are in place prior to the installation of the TW. Depending on the type of TW being carried out, typical LU approvals which are required, but not limited to are as follows:
- Bb224 approval - as required in LU standard Bb224 (*note: Bb224 is to be replaced with LU Standard S1088 and is expected to be published later in 2015*).
 - Track Clearance approvals – as required in LU standard S1156
 - Space Allocation Approval – as required in LU standard S1472
 - Tall Plant Approval – as required in LU standard S1050
- 3.5.7 The installation of the TW shall not commence until the assured design has been checked and approved by a competent person(s). In addition, the TW shall not be used or loaded until a permit to load (bring into use) certificate (as described in BS5975) has been issued by the TWC or TWS to confirm that the installation is in accordance with the approved drawing and specification.
- 3.5.8 Procedures shall be in place for controlling any changes to the TW design during the fabrication, installation, testing and commissioning phases. Such procedures shall ensure that:
- a) proposed design changes are not implemented until they have been duly considered and approved by a person competent to appreciate their impact on construction methodology and their implications for the safety of the operational railway
 - b) records are made of the design changes and their approval.
 - c) they differentiate between a material change requiring full design change control procedure and a minor change which can be approved by a simple mechanism.

3.5.9 Changes of TW concept design after approval of the CDS will require submission of a Technical Justification Paper to be approved and signed by the LU Head of Technical Discipline or an Accredited Engineer, to satisfy the principles of LU standard S1538.

3.5.10 Where TW are fixed to, and or impact upon existing assets, the requirements for structural assessment contained in LU standard S1050 clause 3.10 and LU standard S1063 must be addressed in the CDS.

3.6 Temporary Works Design

3.6.1 The Temporary Works Design shall be undertaken in accordance with the requirements of BS 5975 Section 9.

3.6.2 Where the residual TW are liable to alter the load path of the permanent works (in the temporary or permanent case), this shall be considered in the permanent works design.

3.6.3 Additional analysis shall be carried out when:

- a) The manufacturer's specifications and limitations are being exceeded in the use of proprietary systems;
- b) If proprietary systems are used beyond the scope of their original design criteria.

3.6.4 The TWD shall ensure that the TW does not affect any Fire Risk assessments, that the means of escape from any TW is assessed and that any approvals for the works (e.g. Bb224 fire Compliance approvals – *note: Bb224 is to be replaced with LU Standard S1088 and is expected to be published later in 2015*) are obtained.

3.6.5 Accidental Impact

3.6.5.1 TW are of necessity in place for only a short time, and support construction loads, hence there is no general requirement for them to resist accidental loading. However, if they are in close proximity to construction or vehicular traffic and the risk of vehicle impact is considered likely, separate vehicular barriers or other means shall be adopted to avoid vehicles impacting with the TW.

3.6.6 Operational Resilience working above and adjacent to the operational railway

3.6.6.1 The TWD shall consider the impact of installing the TW in relation to existing assets. Depending on the type of TW being carried out, typical considerations which are required, but not limited to are as follows:

- Effects on signal sighting
- Effects on CCTV coverage or other Comms equipment
- Effects of Lux levels on station lighting
- Effects on Premises standards (e.g. minimum passage/platform widths, stair/escalator run-offs, minimum head heights)

3.6.6.2 The designers risk assessment shall include an assessment of the impact of TW construction on any LU Infrastructure

- Note:** The risk assessment should consider inter alia :
- Operational criticality of the LU infrastructure
 - Robustness of the existing LU infrastructure.
 - Consequence of Temporary Works failure (should it occur)
 - Temporary Works Design complexity
 - Propensity for failure resulting from issues related to Temporary Works implementation, workmanship and/or materials.
 - Track clearance and structure gauge

3.6.7 The TWD shall communicate the significant residual risks that may not be obvious to the construction team implementing the Temporary Works Design. The Temporary Works drawings shall include a Safety Health and Environmental (SHE) box to identify the significant residual risks from which remain in the TW design.

3.6.8 The TWD shall prepare inspection check lists for use on site, and shall state the frequency with which inspection is required, which shall comply with the requirements of BS 5975 and Health and Safety in Construction HS(G)150.

3.7 Materials

3.7.1 Materials used in TW shall comply with the requirements of LU Civil Engineering technical specifications T0001, T0002, T0005, T0006, and T0007 and with the requirements set down in LU standard 1-085 Fire Safety Performance of Materials.

3.7.2 LU maintains a Products Register (<http://www.lu-apr.co.uk>). Products on that register are deemed approved for use on LU. Should a supplier or contractor wish to use a product not on the register then special approval from the relevant LU Head of Technical Discipline shall be sought and granted before it can be incorporated in to the works. The product shall then be submitted for formal approval and entry on to the Products Register as soon as practicable thereafter

3.8 Structure gauge

3.8.1 No part of any TW which is to remain in position during traffic hours shall encroach upon the structure gauge as defined in standard S1156 under any condition of loading or settlement.

3.8.2 Where it is intended to undertake TW in the vicinity of the railway, clearance requirements set out in LU standard S1156 shall be met. Clearance approval in accordance with LU standard S1156 shall be obtained prior to the installation of any TW or material alteration to any existing TW in the vicinity of the railway.

3.9 Falsework, Formwork, access and protection

3.9.1 Falsework and Formwork

3.9.1.1 The design of falsework and formwork includes:

- a) formwork;
 - b) propping to formwork;
 - c) propping to permanent works; and
 - d) foundations to propping.
- e) needling



3.9.1.2 All work shall be in accordance with the requirements of BS EN 12811, 12812 12813 or BS 5975 as appropriate.

3.9.2 Façade retention

3.9.2.1 Façades to be supported shall be surveyed to assess:

- a) the principal structural members, how they fit together and how they are connected to the façade;
- b) the dimensions of the façade, including out-of-plumb and bow;
- c) the form of the construction of the façade, and the materials used (e.g. facing and backing material);
- d) defects in the façade which can be seen, and likely defects which are hidden;
- e) alterations to the façade during the life of the building (e.g. openings, extra storeys, new facing);
- f) the conditions below ground (e.g. basement level and foundation), including any earlier underpinning.

3.9.2.2 Façade supports shall be arranged to fully support the wall taking account of the ability of the existing walls to span between supports, and shall be designed for the worst combinations of lateral loads including, but not restricted to, consideration of the following:

- a) wind loading and the effects of air pressure from moving trains, over the gross area, (to include loads on the facade, support structure and any huts or hoarding supported by the structure), plus;
- b) the lateral loading effects arising from non-verticality, bow and eccentricity, plus:
- c) a lateral restraining load of 2.5% of the total vertical load at each point of support, plus
- d) the worst likely horizontal impact load, but not less than 25 kN applied 1 m above ground level.