

Category 1 Standard

S1062 Temporary Works

Please read the written notices attached

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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.

- 3.9.2.3 Façade support structures shall be designed to have a life not shorter than twice the intended period of support, but in no case less than 2 years.
- 3.9.2.4 All work shall be in accordance with the requirements of BS 5975 and shall comply with the recommendations contained in CIRIA Guide C579. Existing walls or foundations surcharged by the support structure shall be checked for adequacy. Guidance shall be sought from a competent Geotechnical Engineer where the ground conditions are complex

3.9.3 Scaffolding

- 3.9.3.1 It is a requirement of the Work at Height Regulations 2005 that unless a scaffold is assembled to a generally recognised standard configuration, e.g. NASC Technical Guidance TG20 for tube and fitting scaffolds the scaffold shall be designed by bespoke calculation, by a competent person, to ensure it will have adequate strength, rigidity and stability while it is erected, used and dismantled.
- 3.9.3.2 The selection, installation, erection, alteration, use, maintenance and also the dismantling of scaffolding shall comply with the requirements BS-EN-12811 and BS 5974 as appropriate. Putlog scaffolding shall not be used in facing brickwork or fair faced blockwork. The designer shall state clearly in the CDS and on working drawings the class of loading to which the scaffolding will be subjected.

Note: National Access and Scaffolding Confederation NASC TG20:13 Good Practice for Tube and Fitting Scaffolding publication provides guidance on best practice on the safe erection, operation and dismantling of scaffold. It also provides technical information and advice for the design of scaffold arrangements

- 3.9.3.3 The foundation or structure upon which the scaffolding is based must be adequate for the purpose. Any assumptions regarding the strength of the bearing material or structure shall be clearly stated in the CDS.
- 3.9.3.4 An assessment of any structure supporting a scaffold must be carried out and checked by a competent person, and if necessary a formal structural assessment in accordance with LU standard S1061 shall be undertaken.
- 3.9.3.5 The scaffold must be so arranged as to result in the minimum intrusion and obstruction upon the railway particularly where it is within operational and station areas. The design shall take into account the local managers' requirements and the use to which the area is put. Where necessary, track clearance as described in clause 3.8 shall be sought.
- 3.9.3.6 The type and extent of guards, sheeting, fans or other protection on the scaffold shall be determined following an assessment of the risks associated with the work to be carried out on or behind the scaffold, together with the sensitivity of the area and equipment in the vicinity.
- 3.9.3.7 Scaffolding shall only be erected, adapted and dismantled by operatives who have been certificated as properly trained and have reached an acceptable level of proficiency. Copies of their CITB or equivalent training certificates should be available for inspection on demand. They may also need other special training for the particular area that the work takes place.
- 3.9.3.8 Scaffold utilised in connection with falsework shall be in accordance with BS 5975.
- 3.9.3.9 No advertising or name boards should be affixed to the scaffold without LUs' prior written consent.
- 3.9.3.10 Safety nets, where used, shall be in accordance with BS EN 1263.
- 3.9.3.11 Sheet wrapping shall be compliant with LU standard 1-085.
- 3.9.3.12 Regular inspections of all scaffolding shall take place. As a minimum inspection shall be undertaken follows:
- a) Following installation / before first use
 - b) At an interval of no more than every 7 days thereafter
 - c) Following any circumstances liable to jeopardise the safety of the installation e.g. high winds.
- 3.9.3.13 The TWC or TWS shall carry out all scaffolding inspection. All registers should be kept up to date by the scaffolding contractor and made available for inspection on site as required.
- 3.9.3.14 Any scaffold not in use or incomplete shall be protected or fenced and signed (using the Scafftag system) so as to prevent unauthorised access.
- 3.9.3.15 Any lifting appliance used in connection with a scaffold must comply with the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER).
- 3.9.3.16 Scaffolds used as loading platforms shall have notices affixed to clearly indicate their safe working load that must not be exceeded. No load should extend above the protective screens particularly where the public or the railway is below
- 3.9.3.17 During railway non-traffic hours when the main traction current has been turned off, the current rails may be re-energised to about 50 Volts DC for railway maintenance purposes. Therefore, the Contractor must note that, where scaffolding is to be erected or dismantled on or over the track, the rails shall be covered with an appropriate insulating material to prevent contact with any metallic object being used by the Contractor.

- 3.9.3.18 All metallic elements of scaffolding shall be earth bonded (refer to clause 3.14) .
- 3.9.3.19 Adequate warning lights shall be provided and maintained. These shall be securely fixed to the scaffold in a position appropriate to their function. The lighting must be positioned and screened in order not to obstruct or distract the drivers' vision and must not be in any way similar to any railway or road traffic signals. In public or staff areas on the railway, temporary lighting shall be provided as necessary such that that illumination shall be to the same level to that which prevailed prior to the scaffolds erection.

3.9.4 Temporary station platforms

- 3.9.4.1 A temporary station platform design shall be in accordance with the requirements of LU standard S1131 except that the design life shall be at least 1.5 times the intended period of the platform service life. The imposed floor or horizontal surface loading shall be designed in accordance with LU standard S1053 clause 3.1.16.3.

3.9.5 Way beams

- 3.9.5.1 Where way beams are required, their design shall comply with the loading requirements of LU standard S1051 clauses 3.1.16.3 a) and 3.1.17.1. Reference shall be made to track standards for the position of way beams relative to track components, the allowable tolerances and method of installation and removal. Clearance approval shall be obtained before way beams are installed.

3.9.6 Temporary roofs

- 3.9.6.1 Erection of temporary roofs shall comply with the requirements of BS EN 12811-1.

3.9.7 Protection

3.9.7.1 Protection Decks

- 3.9.7.1.1 Loading criteria shall be developed for each site, considering the activity that will occur above the protection deck, the equipment and materials used and the height of the working platform. The protection deck loading shall be determined by the TWD following consultation with the TWC. When required protection decks shall be designed and erected in accordance with the recommendations given in BS EN 12811-1 and the required track clearances contained in LU standard S1156.
- 3.9.7.1.2 The fixing of a temporary works protection deck to an existing structure must take into account demolition and construction sequences of the permanent work to ensure that the integrity of connections with existing structures are sustained throughout the life of the protection deck and the requirements of LU standard S1063 shall apply.

3.9.7.2 Work-Site Hoardings (including Lifts and Escalator Works)

- 3.9.7.2.1 LU standard S1027 is be the authoritative reference document for hoardings, and will take precedence over all references to Work-Site Hoardings in this standard.
- 3.9.7.2.2 All hoardings are TW and the requirements for a TW Conceptual Design Statement apply.
- 3.9.7.2.3 All hoardings accessible to the general public shall be designed to resist the loadings set down in LU standard S1053 clause 3.1.16.7 Handrails and Barriers. The line loads shall be applied at a height of 1.1m above the floor or ground level and infill loads shall only be applied to the hoardings below the height of 1.1m.

- 3.9.7.2.4 The TWD shall check for train pressure/suction effects in accordance with the requirements set down in LU standards S1051 and S1053.
- 3.9.7.2.5 Hoardings in the open shall be designed in accordance with the requirements set down in LU standards S1051 clause 3.1.16.5 Wind Loading for Bridge structures or S1053 clause 3.1.16.13 Wind Loading for building and station structures.
- 3.9.7.2.6 The loadings set down in clauses; 3.9.7.2.3, 3.9.7.2.4 and 3.9.7.2.5 above are not to be considered additively. The design shall be based on the worst case and the other cases checked against that load. The accidental impact loading specified in clause 3.6.5 does not apply to hoardings.
- 3.9.7.2.7 Where hoardings 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.
- 3.9.7.2.8 Where applicable, vehicular loadings shall be in accordance with BSEN 1317-2.

3.10 Geotechnical

3.10.1 Ground Investigation

- 3.10.1.1 A ground investigation will be required for all temporary geotechnical works design in order to determine the ground and groundwater conditions and derive the design parameters. The required information may already be available from the permanent works design information.
- 3.10.1.2 The requirements and the scope of the ground investigation shall be in accordance with the requirements of BS EN1997-2.
- 3.10.1.3 Guidance shall be sought from a competent Geotechnical Engineer where ground conditions are complex.

3.10.2 Excavation support

- 3.10.2.1 No unsupported excavations of any height shall be carried out unless otherwise approved by the TWC in accordance with the requirements of BS5975 and this standard.
- 3.10.2.2 Design and construction of temporary excavations shall be in accordance with the requirements of BS 6031 and or BS EN 1997.
- 3.10.2.3 Shallow Excavations
 - 3.10.2.3.1 For shallow excavations the works shall comply with the recommendations of The TRADA Publication Timber in Excavations and CIRIA R97.
 - 3.10.2.3.2 The trench support shall be installed without delay as the excavation progresses, and the strutting completed before the ground relaxes significantly.
- 3.10.2.4 Deep Excavations
 - 3.10.2.4.1 Design of retaining structures for deep excavations shall be in accordance with the requirements of BS EN 1536:2010, BS EN 12063: 1999 and BS6031. CIRIA Report C580, Piling Handbook, 8th Edition, CIRIA 517, CIRIA PR77 and ICE Specification for Piling and Embedded Retaining Walls may be used as a guide for design and construction of embedded retaining walls.
 - 3.10.2.4.2 Specialist geotechnical techniques (e.g. grouting, ground freezing) may be used where the effects on the surrounding ground mass, existing structures, buildings



and services can be shown not to be detrimental. This may require a full safe load assessment in accordance with LU standard S1061.

- 3.10.2.4.3 Excavation shall not interfere with any adjacent structures such as drainage, retaining walls, wing walls, etc., unless the works include planned installation, improvements and alterations to these structures which shall be detailed in the CDS.
- 3.10.2.4.4 Excavation on cuttings and embankments shall be undertaken in short bays which shall not exceed the length specified in the approved temporary works CDS.

3.10.3 Dewatering

- 3.10.3.1 The design of TW shall, as far as possible, avoid lowering the external water table. The full significance of any dewatering on adjacent property must be allowed for. Dewatering shall not be used unless a cut-off wall is provided. CIRIA Report R113 may be used as a guide.
- 3.10.3.2 Any dewatering that will be undertaken shall obtain the required consents and approvals from the relevant authorities.

3.10.4 Piling and crane platforms

- 3.10.4.1 Design, installation, maintenance and repair of ground supported platforms for piling rigs, cranes and excavation plant shall be in accordance with BRE Report BR470 – Working Platforms for Tracked Plant.
- 3.10.4.2 All topsoil and soft materials shall be removed prior to construction of the platform. Where required, a geogrid shall be incorporated into the design to provide enhanced stability of the platform.
- 3.10.4.3 Testing of the finished platform shall be carried out to ensure that the platform meets the requirements of the design and can provide the required bearing capacity.

3.10.5 Earthworks

- 3.10.5.1 Temporary earth works may be constructed to provide a working platform for construction plant on embankments and cuttings.
- 3.10.5.2 The design and construction of the earthworks shall be in accordance with the BS 6031 and BS EN1997 and the Manual of Contract Documents for Highway Works – Volume 1 – Specification for Highway Works.

3.10.6 Temporary ground anchors

- 3.10.6.1 Temporary ground anchors may be required to provide additional temporary lateral support to retaining structures and coffer dams.
- 3.10.6.2 The design of grouted anchors shall be carried out in accordance with the requirements of BS EN 1537 and BS 8081 (partially replaced, under review).
- 3.10.6.3 Design of ground anchors shall consider if the anchors extend beyond the LU boundary and whether any approval or easement is required.
- 3.10.6.4 Testing of anchors and verification of design parameters will be required as part of the design and construction of anchors.
- 3.10.6.5 Depending on the design life of the anchors consideration shall be given to corrosion protection and any maintenance required.

3.10.7 Cofferdams

- 3.10.7.1 Cofferdams may be required to allow construction in water bearing ground or in water.
- 3.10.7.2 The design of cofferdams shall be carried out in accordance with BS EN 1997.

Note: BS EN 12063:1999, BS 6031 and Specifiers' Guide to Steel Piling, 2002, SCI Publication P308, CIRIA Report C580, Piling Handbook, 8th Edition, CIRIA 517 and ICE Specification for Piling and Embedded Retaining Walls may be used as a guide for design and construction of Cofferdams.

- 3.10.7.3 The ability of the cofferdam to prevent water ingress into the excavation is important in the design of temporary cofferdams in order to reduce pumping of water and the associated risk and cost to acceptable levels.
- 3.10.7.4 Sheet pile clutches shall be of a type which shall prevent unacceptable ingress of water into the excavations and shall be of a strength and rigidity such that distortion during handling, pitching and driving shall not occur.
- 3.10.7.4.1 The quantity of water entering the cofferdam must be controllable by pumping
- 3.10.7.4.2 At any stage in the construction the formation level must be stable and not subject to excessive heave or boiling.
- 3.10.7.5 Deflection of the cofferdam walls and bracing must not affect the permanent structure or any existing structure adjacent to the cofferdam.
- 3.10.8 Grouting**
- 3.10.8.1 Design and execution of any geotechnical grouting shall be carried out in accordance with the requirements of BS EN 12715 and BS EN 12716.

Note: Guidance on design and construction of grouting for ground engineering is provided in CIRIA C514.

3.10.9 Temporary Access/Haul Roads

- 3.10.9.1 Temporary access roads and haul roads including ramps shall be of width and gradient to suit the construction plant. The surface of the road shall be durable and resilient against wet and winter conditions. The placement and compaction of fill materials shall be carried out in accordance with the Manual of Contract Documents for Highway Works – Volume 1 – Specification for Highway Works.

3.10.9.2 Temporary Foundations

3.10.9.3 Foundations for lifting appliances and hoists

- 3.10.9.3.1 Tests, inspection and investigation shall be carried out to establish if the bearing capacity of the ground over which the lifting appliance or hoist has to travel or operate is sufficient to carry the anticipated loading. This investigation shall include a check for underground hazards such as:
- a) cellars and basements (filled or not);
 - b) recently filled excavations;
 - c) ground which has been made-up to provide a base for the crane
 - d) The condition of any materials used to provide foundation support, i.e. sleepers should be of sound condition;
 - e) tidal or floodwater areas where the ground water table is high;
 - f) buried pipes and services;
 - g) drainage culverts;
 - h) tunnels and covered ways (LU and other railway);
 - i) any other subterranean structure

- 3.10.9.3.2 The loadings from the base frames, wheels, tracks, outriggers and jacks of the lifting appliances shall be ascertained for appropriate loading cases.
- 3.10.9.3.3 The load from the lifting appliance or hoist shall be spread over a sufficiently large bearing area to ensure the stability of the appliance or hoist. Calculations will be required to confirm the method of spreading the load.
- 3.10.9.3.4 Where lifting appliances or hoists take support from an existing structure (including earth structures) a structural assessment shall be prepared to show that the structure can safely carry the required loading.
- 3.10.9.4 Site compound
- 3.10.9.4.1 The scope of the site compound including the foundations for the accommodation and storage, loading bays, hoarding, fencing and utilities etc. shall be included in the temporary works CDS.
- 3.10.9.4.2 When required temporary building supports shall be designed and erected in accordance with the recommendations given in BS EN 1997-1. Temporary building supports shall be designed and constructed so that they are adequate for purpose and the TWC shall make sure that they are placed in position at the appropriate time.

3.11 Underground – Deep Tube Tunnels and Shafts

3.11.1 Loading for temporary works

- 3.11.1.1 The temporary structure shall be designed to carry and transfer design loads and load effects for the design life.
- 3.11.1.2 The TWD shall define with justification the loads and load effects for each element of the design

Note: Where redistribution of the overburden loads around structures, such as openings, can be demonstrated by the TWD, the TWD may reduce the overburden load to a proportion of the overburden or a value related to the time the TW will be loaded

The TWD may find it useful to consider the historical approach to the design of traditional timber support. Guidance can be found in British Tunnelling Society publication Traditional Timbering in Soft Ground Tunnelling - A Historical Review by CNP Mackenzie.

LU Guidance document G055 provides information on time related loading in clay soils.

Where it is anticipated that loading is going to be less than full overburden, then steps should be taken install monitoring during construction, to monitor the actual loads imposed on the temporary works. This will aid the TWD in validating the design assumptions and also provide valuable data for other projects in similar ground.

3.11.2 Face Watch

- 3.11.2.1 The frequency of inspecting the temporarily supported tunnel face shall be risk based and agreed with a LU Accredited Tunnel Engineer.
- 3.11.2.2 In determining the frequency, the following shall be considered:
 - a) Design life of temporary support

- b) Ground conditions (especially presence of water and/or materials which can run)
- c) Data available from monitoring (including movement)
- d) Consequences of failure (risk to the works, risk to the railway, risk to third parties etc)
- e) Security of site
- f) Impact of any adjacent works

3.11.2.3 The Tunnelling contractor shall be responsible for carrying out the inspection and reporting the observations to the project team and the LU Accredited Tunnel Engineer

3.11.2.4 The reporting format and escalation process need to be agreed in advance.

Note: The Tunnelling Contractor should have the capability and resource to respond with additional inspections as a reaction to unexpected events. For example a burst water main near a site should trigger a check that the tunnel has not been flooded

3.12 Other Temporary Works

3.12.1 Full and Partial Demolition

3.12.1.1 Full or partial demolition of structures shall be in accordance with BS 6187 – Code of Practice for Full and Partial Demolition

3.12.2 Hoists, Hoist towers/Support Structures

3.12.2.1 The design of hoist towers and/or support structures shall include the design of:

- a) foundations/anchorages (see clause 3.10.9.3 for requirements);
- b) standards, bracing, ledgers and transoms;
- c) tying to permanent works;
- d) protection and access.

- 3.12.2.2 All work shall be in accordance with the requirements of BS EN 12811-1 and BS 7212.
- 3.12.2.3 Hoists shall be installed, tested and operated in accordance with the requirements of BS 7212, Lifting Operations and Lifting Equipment Regulations (LOLER) and . Provision and Use of Work Equipment Regulations (PUWER).
- 3.12.3 Runway Beams**
- 3.12.3.1 The design steel runway beams shall be in accordance with BS EN 1993.
- 3.12.3.2 Runway beams shall be tested in accordance with the requirements set out in BS 2853 – Specification for the testing of steel overhead runway beams for hoist blocks
- 3.12.4 Cable Run Management Systems**
- 3.12.4.1 Temporary supports to cable runs shall carry the cables in a manner approved by the owner of the cables and shall not deflect, settle, or move in any way that will allow movement of the cables. Design of temporary structures and safe load assessments of affected existing structures shall be carried out for such support in accordance with LU Standards and the partial factors therein.
- 3.12.4.2 The presence of cables buried in the ground, in duct blocks and in ducts in solid fill platforms is likely on the LU system. The requirements of LU standard S1114 “Safe Systems of Work on or near Electrical Equipment” shall be applied.
- 3.12.5 Existing Structures**
- 3.12.5.1 Where existing structures are subject to loading from TW they shall be assessed in accordance with LU standard S1061.
- 3.12.6 Fabricated Structural Steelwork**
- 3.12.6.1 The Construction Products Regulation (CPR) requires all fabricated structural steelwork delivered to site to be CE Marked including those for TW. All fabricated structural steelwork shall comply with BS EN 1090: Execution of steel structures and aluminium structures and T0005 Technical Specification – Bridges and Structures – Materials and Workmanship.
- 3.13 Temporary Works Construction on site**
- 3.13.1 Construction shall be undertaken in accordance with the requirements of BS5975 to ensure that the TW are constructed safely in accordance with the design and specified materials, and that only when all checks have proved satisfactory is the works loaded, used, maintained and then dismantled in accordance with the design documentation and method statement
- 3.13.2 The designer shall provide an outline method statement complying with the requirements of LU standard S1552 for the TW erection process, incorporating the output from the design risk assessment.
- 3.13.3 The Contractor shall prepare a detailed safe system of work complying with the requirements of LU standard S1552 for the TW erection process, incorporating the designers outline method statement.
- 3.13.4 In cases where TW are to be fixed to, or supported from existing structures assessment of the existing structures shall be carried out in accordance with the requirements of LU standard S1061 before work is allowed to proceed on site.

- 3.13.5 Hot working processes shall be carried out in accordance with LU Guidance Document G1158 Hot Works Permit and Forms F0092 and F0093 used as appropriate.
- 3.13.6 Where way beams are used, their installation shall be approved for compliance with both structural and track requirements by safety critical licensed individuals as appropriate.

3.14 Earth Bonding

- 3.14.1 All temporary works metal work shall be earth-bonded to eliminate the risk of electrocution to any individual by touch in the event that the installation becomes electrically charged. The earth bonding must comply in all respects with the requirements of LU standard 1-106.

3.15 Inspection

- 3.15.1 All TW shall be inspected at regular intervals by the TWC or TWS as required by the relevant Regulations or described in the TWD's checklist (whichever is the most onerous). The TW shall be inspected and reported on, by the TWC or TWS:
- a) before first use;
 - b) after alteration;
 - c) after an event likely to have affected its strength or stability, for example, after strong winds;
 - d) at regular intervals not exceeding seven days (or more frequently if the temporary work is of a particularly critical nature, such as locked off jacks).
- 3.15.2 An inspection and monitoring regime shall be set up to monitor the performance of the TW and the affected adjacent structures. If necessary appropriate green, amber and red trigger levels shall be set up to manage and mitigate the risk during construction. Appropriate mitigation measures shall be put in place in case the trigger levels are exceeded
- 3.15.3 On completion of the permanent works, the TW shall be removed from site. Alternatively, the TW may be left in situ provided that the likely long term behaviour of the TW has been assessed and approved in accordance with requirements of LU standard S1538.

3.16 Records

- 3.16.1 Records of TW that are to remain in situ shall be recorded on as-built drawings and Health and Safety file which shall be archived in Livelink.
- 3.16.2 The local Asset Manager shall be advised of the presence of any TW left in situ and shall be sent a copy of any as-built record drawings.

4 Responsibilities

- 4.1 The Head of Civil Engineering and Construction shall be responsible for ensuring that a coordinated programme of audit and inspection is implemented to ensure compliance with this and other related standards
- 4.2 The LU Procurement Agent shall be responsible for incorporating the requirements of this LU Standard in any contract to which it is relevant and shall stipulate that a programme of audits are implemented by the contractor which ensures that these requirements are complied with. This programme and its results shall be available for verification by the LU Head of Civil Engineering and Construction.
- 4.3 The Supplier shall be responsible for incorporating the requirements of this LU Standard in any contract to which it is relevant and shall stipulate that a programme of audits are implemented by the Supplier which ensures that these requirements are complied with.
- 4.4 The LU Project Manager must shall ensure that a TWC is appointed by the Principal Contractor in accordance with the requirements of BS5975.
- 4.5 The responsibilities of the TWC and TWS are set out in BS5975. In addition, the TWC must check that the various TW do not clash and that the loads imposed from one set of TW do not adversely impact on permanent or other TW.
- 4.6 The TWD shall be responsible for implementing the requirements of BS 5975 and this standard in conjunction with current industry good practice. Where TWD's are not responsible for the design of the permanent works, they shall co-ordinate with the permanent works designer as necessary to understand the design assumptions for the permanent works.
- 4.7 TWD's shall be responsible for assessment of the effect of the TW on the railway and permanent works submitting their proposals to the relevant Head of Technical Discipline or Accredited Individual for approval via the CDS process.

5 Supporting information

5.1 Background

- 5.1.1 This Standard is one of a suite of Standards, which cover the whole life cycle of Civil Engineering assets. Other Standards in this suite have a bearing on the activities covered by this Standard. In many cases a direct reference to another Standard is given; in other instances the need to refer to another Standard is implied.
- 5.1.2 The complete suite of LU Civil Engineering standards comprises the following documents:

Number	Title
S1050	Civil Engineering – Common Requirements
S1051	Civil Engineering – Bridge Structures
S1052	Civil Engineering – Gravity Drainage Systems
S1053	Civil Engineering – Building and Station Structures
S1054	Civil Engineering – Earth Structures
S1055	Civil Engineering – Deep Tube Tunnels and Shafts
S1056	Civil Engineering – Pumping Systems
S1057	Civil Engineering – Miscellaneous Assets
S1060	Civil Engineering – Bridges and Structures inspection standard
S1061	Civil Engineering – Bridges and Structures Assessment
S1062	Temporary Works



S1063	Civil Engineering - Cutting, grinding, drilling, fixing to and supporting from existing structures
S1064	Civil Engineering - Waterproofing
S1800	Cable Runs

- 5.1.3 The following Manuals of Good Practice have also been prepared to give guidance and explanation to each of the above standards:

Number	Title
G-050	Civil Engineering – Common Requirements
G0051	Civil Engineering – Bridge Structures
G0052	Civil Engineering – Gravity Drainage Systems
G0053	Civil Engineering – Building and Station Structures
G-054	Civil Engineering – Earth Structures
G-055	Civil Engineering – Deep Tube Tunnels and Shafts
G0056	Civil Engineering – Pumping Systems
G0057	Civil Engineering – Miscellaneous Assets
G-058	Civil Engineering – Technical Advice Notes
	Temporary Works Procedure (for use where LU is acting as Principal Contractor) - - to be published April 2015

- 5.1.4 The following technical specifications for materials and workmanship have been prepared:

Number	Title
T0001	Technical Specification - Civil Engineering - Track and Off-track Gravity Drainage
T0002	Technical Specification - Civil Engineering - Pump Drainage Systems
T0003	Technical Specification - Critical Pump Sites Control Panel Specification
T0004	Technical Specification – Priority Pump Sites – Control Panel Specification
T0005	Technical Specification – Bridges and Structures – Materials and Workmanship
T0006	Technical Specification - Deep Tube Tunnels – Materials and Workmanship
T0007	Technical Specification - Earth Structures – Materials and Workmanship
T0008	Technical Specification - Non-Critical Pump Sites Control Panel Specification

5.2 Safety considerations

- 5.2.1 It is essential that the safety of persons and structural integrity of the temporary and permanent works under all conditions of loading that may occur during the erection, use and removal of TW be considered, the risks assessed and the works designed to limit these risks
- 5.2.2 The TWD shall consider safety aspects throughout the design process including during the development of the CDS . The Construction (Design and Management) Regulations 2015 and the requirements it places on the client, designers and contractors shall also be complied with.

5.3 Environmental considerations

- 5.3.1 All activities relating to TW including planning, design, procurement, construction, installation, testing, commissioning, operation, maintenance, decommissioning and

disposal must comply with current environmental legislation, approved Codes of Practice and authoritative guidance issued by relevant statutory bodies.

5.4 Customer considerations

- 5.4.1 TW provide effective support to the track formation, stations, buildings, service posts, etc and maintain the structure gauge requirements, and shall be constructed and maintained to the specifications as described in this Standard, so as to allow uninterrupted and smooth operation of the railway to meet the needs of customers.

6 References

6.1 References

- 6.1.1 References in the text are made to latest editions unless specific editions are cited. Where references are made to other corporate engineering documents which are not yet published, existing documents shall be followed until new documents have been authorised for use

6.1.2 Statutory documents

Document no.	Title
SI 1998 no. 2306	The Provision and Use of Work Equipment Regulations 1998
SI 1998 no. 2307	The Lifting Equipment Operations and Lifting Equipment Regulations 1998
SI 2005 no. 735	Work at Height Regulations 2005
SI 2015 no. 51	Construction (Design and Management) Regulations 2015

6.1.3 European/British Standards

Document no.	Title
BS 2853	Specification for the testing of steel overhead runway beams for hoist blocks
BS 5974	Code of Practice for the planning, design, setting up and use of temporary suspended access equipment.
BS 5975	Code of Practice for temporary works procedures and the permissible stress design of falsework
BS 6031	Code of Practice for Earthworks
BS 7212	Code of Practice for the safe use of construction hoists
BS 6187	Code of Practice for full and partial demolition
BS 8081	Code of Practice for ground anchorages
BS EN 1090	Execution of steel structures and aluminium structures Part 1: Requirements for conformity assessment of structural components Part 2: Technical requirements for steel structures Part 3: Technical requirements for aluminium structures
BS EN 1317-2	Road restraint systems – Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicular parapets
BS EN 1263-1	Temporary works equipment. Safety Nets. Safety requirements, test methods
BS EN 1263-2	Temporary works equipment. Safety Nets. Safety requirements for the positioning limits
BS EN 1536	Execution of special geotechnical works – bored piles

Document no.	Title
BS EN 1537	Execution of special geotechnical works – Ground anchors
BS EN 1990	Basis of structural design
BS EN 1991	Action on structures
BS EN 1992	Design of concrete structures
BS EN 1993	Design of steel structures
BS EN 1995	Design of timber structures
BS EN 1997	Geotechnical design
BS EN 1999	Design of aluminium structures
BS EN 12063	Execution of special geotechnical works – Sheet piling
BS EN 12715	Execution of special geotechnical works - grouting
BS EN 12716	Execution of special geotechnical works – jet grouting
BS EN 12811	Temporary Works equipment Part 1: Scaffolding performance requirements and general design Part 2: Information on materials Part 3: Load Testing
BS EN 12812	Falsework. Performance requirements and general design
BS EN 12813	Temporary Works Equipment. Load bearing towers of prefabricated components. Particular methods of structural design

6.1.4 Other national standards

Document no.	Title
HS(G)150	Health and Safety in Construction

6.1.5 Industry codes of practice/guidance

Document no.	Title
BR470	BRE Report – Working platforms for tracked plant
CIRA PR77	Prop loads in large braced excavations
CIRIA R97	Trenching practice
CIRIA R113	Control of groundwater for temporary works
CIRIA C514	Grouting for ground engineering
CIRIA C517	Temporary propping of deep excavations – guidance on design
CIRIA C579	Retention of masonry facades – Best practice guide
CIRIA C580	Embedded retaining walls - Guidance for economic design
NASC TG20:13	National Access and Scaffolding Confederation - Guide to Good Practice for Tube and Fitting Scaffolding
PAS 8811	Code of practice for temporary works – Client procedures
PAS 8812	Guide to the application of European Standards in temporary works design
SCI P308	Specifiers guide to steel piling
-	British Tunnelling Society publication – Traditional Timbering in Soft Ground Tunnelling – A Historical Review by CNP Mackenzie
-	ICE Specification for piling and embedded retaining walls
-	Manual of Contract Documents for Highway Works – Volume 1 – Specification for Highway Works
-	The Piling Handbook 8 th Edition
-	TRADA Timber in Excavations 3 rd Edition

6.1.6 Other LU company documents

Document no.	Title
1-085	Fire safety performance of materials
1-106	Earthing and Bonding of LU Electrical Networks
S1023	Infrastructure Protection
S1027	Site Hoarding, Fencing and Barriers
S1114	Safe Systems of Work on or near Electrical Equipment
S1131	Premises – Station Platforms
S1156	Gauging and Clearance
S1354	Customer Facing Aspects of Temporary Works in Stations
S1371	Station Planning
S1472	Allocation of Space on Operational Property
S1538	Assurance
S1552	Contract QUENSH Conditions
Bb224	Fire Precautions Compliance With Fire Precautions And The Process For Change (<i>to be replaced by S1088 – see below</i>)
S1088	Management of Fire Plans (<i>Expected to be published later during 2015</i>)
G1158	Hot Works Permit
G0023	Infrastructure Protection – Special Conditions for Outside Party Works on or near the Railway

6.2 Abbreviations

The following abbreviations are created:

- a) within London Underground's Glossary of Terms (S1622) (a Category 1 Standard);
- b) from published sources that are clearly identified.

Abbreviation	Definition	Source
CDM	Construction, Design and Management Regulations	a
CDS	Conceptual Design Statement	a
CIRIA	Construction Industry Research and Information Association	a
CITB	Construction Industry Training Board	a
HSE	Health and Safety Executive	a
LCS	Location Coding System	a
LU	London Underground	a
PM	Project Manager	a
QUENSH	Quality, Environment, Safety, Health	a
PC	Principal Contractor	b(this document)
TWC	Temporary Works Co-ordinator	b(this document)
TWS	Temporary Works Supervisor	b(this document)
TWD	Temporary Works Designer	b(this document)
TRADA	Timber Research and Development Association	b (this document)

6.3 Definitions

The following topic specific definitions are created:

- a) within London Underground's Glossary of Terms (S1622) (a Category 1 Standard);
b) from published sources that are clearly identified.

Term	Definition	Source
Designated Individual	The nominated person responsible for: a) establishing, implementing and maintaining a procedure for the control of temporary works for that organisation; b) And ensuring that any sub-contractors have adequate temporary works procedures if they are carrying out and managing temporary works.	b
LU Infrastructure	All LU owned running lines, depots, sidings and other land, up to boundary fences, including stations, buildings, lifts, escalators, structures, tunnels, track, drainage, signalling, power, electrical and mechanical equipment used for the purposes or supporting the Company's railway services.	b
Maintenance Manager	Nominated Manager responsible for the maintenance of a specific system or equipment.	a
Primary Lining	Structural tunnel lining that provides permanent or temporary cover and support to the rock or soil surface at the periphery of a tunnel excavation	b
Project Manager	The person nominated for the activity or work to manage, co-ordinate and bring it to a satisfactory completion	a
Way beam	A temporary longitudinal load bearing member which supports track, typically during bridge construction works	a

6.4 Person accountable for the document

Person accountable for the document
Brian McGinnity - Professional Head of Civil Engineering

6.5 Document history

Issue no	Date	Changes	Author
A1	December 2011	As per DRACCT No. 00397, a new standard, incorporating S-CV-0006 is documented.	Graham Bessant
A2	March 2012	Updated following feedback from Tubelines as part of DRACCT No. 00397	Graham Bessant
A3	September 2012	Amended as per DRACCT 01569	Graham Bessant
A4	April 2015	Revised as per DRACCT 03526. Standard updated to include LU's requirements for the management of temporary works. General update of design requirements also incorporated.	Farid Achha

7 Attachments

7.1 Attachment 1 – Conceptual Design Statement requirements for Temporary works

7.1.1 A conceptual design statement shall be prepared to describe the following requirements:

- a) **Design organisation:** contractor, consultant or design team undertaking the design including address and contact name;
- b) **Identification of structure affected by temporary works,** precise location, line, nearest station, Km post or station room number, LCS code, nearest road name (or road crossing). If an existing structure, include LU asset number.
- c) **Title of scheme:** project title. Include sub-title if part of a larger project;
- d) **Name of Supplier or Third Party**
- e) **Proposed dates of project start and completion**
- f) **Brief description of existing conditions:**
 - i. Site Investigation Reports
 - ii. Environmental conditions (include possible changes)
 - iii. Proposed additional surveys or investigations
- g) **Description of proposed temporary works and methods of construction with reasons for choosing:**
 - i. Type of temporary work (e.g. scaffold, crane, hoarding etc.)
 - ii. Brief reason for temporary works – Provide a short explanation of the reason that The Temporary Works are required e.g. Bridge refurbishment and painting requiring access and scaffolding required to carry workforce and materials
 - iii. Method of Construction – State how the structure will be constructed including access to site; any access constraints; any particular restrictions on size of member which may be handled ; manoeuvring of space for plant
 - iv. Special finishes or features
 - v. Clearance from other structures
 - vi. Disciplines involved or affected – Civil, Power, Mechanical, Electrical etc.
- h) **Brief description of other temporary works structural forms considered and reasons for their rejection**
- i) **Design criteria:**
 - i. Design Life of Temporary Works
 - ii. Loads to be resisted by the Temporary Works schedule of loading that will act on the structure, type and values together with the combinations in which they will be considered with reference to relevant standards. For bridges, include dynamic loadings (e.g. speed for centrifugal force, provisions for abnormal load). Also include, soil, groundwater and other foundation related parameters.

- iii. Loads imposed by temporary works or storage of materials on other assets and structures (e.g. spoil storage over existing pipework).
- j) **Proposed method of structural analysis: Design concept** i.e. description of the structural model (e.g. simply supported, continuous, portal frame). Method of calculating forces (e.g. by statics, moment distribution, finite element, limit state equilibrium).
- k) **Standards and codes of practice to be for Temporary Works Design:** state the standards to be used in the Temporary Works Design e.g. BS EN 12810 to 12813, BS EN 1997 Eurocode 7, BS5975 etc
- l) **Safety Considerations**
- m) **Track clearances:** include headroom and clearances to all trackside and platform structures, any restriction to passenger flows. Define areas that require track clearance approval for both temporary and permanent works. Current clearances should also be included where there is an existing structure; a statement must be made that a clearance certificate will be obtained before any works are started on site
- n) **Functional Requirements**
- o) **Maintenance requirements**
- p) **Materials:** state the materials to be used in the temporary works, and the European/British Standards applicable to them.
- q) **Use of proprietary systems;** state any proprietary systems to be used and include manufacturers safe load tables etc.
- r) **Erection sequence and means of achieving stability** (including factors of safety) limitations on deflection or settlement of the supported permanent works.
- s) **Obstruction to safety and railway equipment;** state what provision has been made for access to safety and railway equipment, and make a statement that no signal or other railway equipment will be obstructed.
- t) **Fixings;** state the use of, or need for, fixings or elements built into existing structures or permanent works and any consequent effect on the performance or durability of existing structures or the permanent works;
- u) **Construction period and time available for erection and dismantling,** state the time the temporary works will be in position and how long it will take to erect and dismantle the temporary works.
- v) **Noise and other environmental considerations;** state what measures are to be taken to reduce noise due to the works to acceptable levels and where waste materials etc will be disposed off.
- w) **Effect on existing drainage and flooding risk;**
- state what measures are to be taken to avoid damage to existing drainage, and if required describe any diversions, overpumping etc (refer to clause 3.8.4).
 - state what affects the TW will have on the existing asset in terms of flood risk (e.g. water mains, existing flood defence changes, redirection of flooding caused by TW) at each stage of construction.
- x) **Ventilation;** state what checks will be made to ensure that existing ventilation will be maintained.
- y) **Avoidance of concealed areas for terrorist or vandals action;** a statement must be made that the design will be checked for possible areas which could conceal terrorist or vandal action, and that all such areas if found will be eliminated.



- z) **Design Check Category:** state the category of checking proposed for the temporary works design. Temporary works designed by the contractor responsible for their implementation shall receive a Cat 3 check; however, this requirement does not apply to temporary works designed by a consultant or specialist firm appointed by the contractor to undertake the temporary works design on their behalf.

8 Current written notices attached to this document

Written Notice No	Issue date	Written Notice Title
LU-WN-01460	25/01/2017	Temporary Works Design Check Category

Written Notice		LU Ref. No.: LU-WN-01460
		Suppliers Ref. No.:

1	Written Notice Completed By	
	Person Accountable	Brian McGinnity- Profession Head Civil Engineering
	Directorate	CPD
	Date Issued	25/01/2017
2	Details of the Standard Requiring Clarification or Correction	
	Title:	Temporary Works
	Standard Reference No.	S1062
	Issue No.	A4
	Clause/Paragraph No.	7.1 Attachment 1 – Conceptual Design Statement requirements for Temporary works Paragraph 7.1.1 z) Design Check Category:
3	Details of Clarification or Correction	
	Title of Written Notice	Temporary Works Design Check Category
<p>This Written Notice has been prepared as a clarification in response to a supplier query regarding the design check category required for temporary works.</p> <p>In order to clarify this the text in Paragraph 7.1.1 (z) Design Check Category is amended to read as follows:</p> <p>z) Design Check Category: state the category of checking proposed for the temporary works design.</p> <p>Note: Temporary Works Design Checks should be undertaken in accordance with LU Standard S1538 'Assurance' utilising the applicable Category given in BS 5975:2008+A1:2011, Table 1.</p> <p>Where Temporary works are designed by the Contractor responsible for their implementation a Category 3 Design Check should be provided, as described in LU Standard S1538. However, where the temporary works are designed by a consultant or specialist firm appointed by the Contractor responsible for their implementation the Design Check should be undertaken in accordance with the applicable Category given in BS 5975:2008+A1:2011, Table 1.</p> <p>In accordance with LU Standard S1055 'Civil Engineering – Deep Tube Tunnels and Shafts' <u>all</u> Temporary Works that support the ground require a Category 3 Design Check as described in LU Standard S1538.</p>		