

DEED

Between

LONDON UNDERGROUND LIMITED

and

[]

Deed concerning the mitigation of the effects of settlement
arising from the construction works undertaken at [*Location*]

THIS DEED is made on the day of 20[] between London Underground Limited whose principal office is at Windsor House, 42-50 Victoria Street, London, SW1H 0TL ("the Company") of the one part and [] ("the Owner") of the other part

RECITALS

- (1) The Company wishes to undertake works in relation to the extension of the Northern Line from Kennington (Charing Cross Branch) to Battersea and has been authorised by the London Underground (Northern Line Extension) Order 20[] ("the Order") to carry out those works ("the Authorised Works")
- (2) The Owner satisfies certain qualifying conditions and has required that this Deed be entered into.

NOW THIS DEED WITNESSES AS FOLLOWS:

OPERATIVE PROVISIONS

1. DEFINITIONS

1.1 In this Deed:

"the Assessment" means the Assessment described in Clause 3.1;

"the Authorised Works" means the works authorised by the Order.

"Box" means an excavated structural box of a depth of 3 metres or more;

"the Building" means the building [*insert address and description of the building concerned*] together with any bridge, tunnel or water, sewerage, gas, electricity or other major service media connected thereto in which the Owner has a legal estate or legal interest

"the Company" means London Underground Limited and includes any subsidiary of the Company within the meaning of the Companies Act 2006;

"Conditions Precedent" means the conditions set out in Clause 2;

"the Notice" means the Notice described in Clause 3.6.2;

"the Opening Date" means the date of opening to the public of such of the Authorised Works that are intended for public use in the vicinity of the Building;

"the Order" means the London Underground (Northern Line Extension) Order 20[]

"the Owner" includes the Owner's successors in title to and assigns of the Protected Property;

"the Owner's Engineer" means the Engineer appointed in accordance with Clause 3.6.1;

"the Protected Property" means any part of the Building in which the Owner has a legal estate or in respect of which the Owner has repairing obligations;

"Protective Works" means works for the supporting or strengthening of the Building or its foundations undertaken to minimise damage to the Building arising as a result of the Relevant

Construction;

“the Relevant Construction” in relation to the Building, means any part of;

- (a) bored tunnels, comprised in the Authorised Works and which is within 30 metres on plan of the Building; or
- (b) excavations comprising a Shaft or Box [and retained cuttings], comprised in the Authorised Works and which is within 30 metres on plan of the Building;

“Relevant Protective Works” means the Protective Works described in the Report as necessary (whether as consulted on under Clause 3.5 or as agreed or deemed to have been agreed or as determined as mentioned in Clause 3.6 as the case may be);

“the Report” means the Report for the Building described in Clause 3.2;

[“the Retained Cutting” means a retained cutting of a depth of 3 metres or more];

“Sent” means (in relation to the sending to the Owner of the Report under Clause 3 and of the Notice transmitted by facsimile (and confirmed by transmission confirmation slip), delivered by hand or posted by ordinary first-class post or recorded delivery post addressed to the address referred to in Clause 10.1) and “send” shall be construed accordingly;

“Ground Movement” means movement of the ground in response to the Relevant Construction;

“the Surveyor” means the surveyor or engineer appointed by the Owner for the purposes of this Deed;

“the Secretary of State” means the Secretary of State for Transport or any successor Secretary of State or Minister holding the Transport portfolio and includes so far as relevant any person or body exercising powers or functions by virtue of an order under the Act;

“Shaft” means an excavated shaft of a depth of 3 metres or more; and

“Working Day” means a day other than a Saturday or Sunday or public Holiday in England.

- 1.2 Where in this Deed reference is made to any clause, paragraph or appendix or recital such reference (unless the context otherwise requires) is a reference to a clause, paragraph or appendix or recital in this Deed.
- 1.3 Words importing the singular meaning where the context so admits include the plural meaning and vice versa.
- 1.4 Words of the masculine gender include the feminine and neuter genders and words denoting actual persons include companies, corporations and firms and all such words shall be construed interchangeably in that manner.
- 1.5 The Company may appoint any of its contractors or sub-contractors for any of the Authorised Works as agent in relation to the exercise of any of its functions under this Deed (but without prejudice to any liability of the Company in the event of a failure to comply with the terms of this Deed).

2 **CONDITIONALITY**

- 2.1 The obligation on the Company to carry out the Assessment, the Relevant Protective Works and/or monitoring of the Building under this Deed is subject to:
- 2.1.1 the obtaining of any necessary consents, agreements or other approvals (which the Company shall use reasonable endeavours to obtain) required for the purpose, whether required under any provision having effect under statute, or under any undertaking or agreement given or entered into by the Secretary of State or the Company which governs the exercise of the powers given by the Order, or otherwise and the obligation to use reasonable endeavours to obtain such consents, agreements or other approvals includes (where applicable) the obligations at Clause 3.8; and
- 2.1.2 the Owner permitting the Company to enter the Protected Property at reasonable times and on the giving of reasonable notice to perform its obligations under this Deed.

3 GROUND MOVEMENT AND PROTECTIVE WORKS

Preparation of Assessment and Report

- 3.1 Before it commences the Relevant Construction the Company shall carry out an assessment (to be undertaken by a competent qualified person with appropriate experience) to predict any Ground Movement to the Building that may result from the Relevant Construction and any damage to the Building which may be caused by such movement.
- 3.2 The Assessment shall be carried out in accordance with the procedures in the Appendix to this Deed and following the Assessment the Company shall prepare a Report in respect of the Building which shall contain such of the following as may be applicable:-
- (a) an assessment of predicted Ground Movement to the Building caused by the Relevant Construction (Stage 1) and if Ground Movement is assessed at Stage 1 to be more than 1 mm, a Stage 2 assessment will be carried out;
 - (b) if the Building has been subject to a Stage 2 or Stage 3 assessment as described in the Appendix to this Deed, the assessed maximum tensile strain and an assessment of the predicted damage to the Building;
 - (c) the results of any structural inspection of the Building;
 - (d) any proposed monitoring specific to the Building;
 - (e) an assessment of whether Protective Works are required;
 - (f) details of any such Protective Works, including designs, method of working and programme of such Protective Works; and
 - (g) if the Building is a listed building, particulars of any such additional safeguarding measures as are referred to in paragraph [] of the Appendix to this Deed.
- 3.3 The Report shall be sent to the Owner before commencement of the Relevant Construction, following which the Company will (subject always to Clauses 3.5 and 3.6 in a case where those Clauses apply) be entitled to proceed with that construction without prejudice to any claim for compensation which the Owner may have.
- 3.4 Without prejudice to article 18 (Protective Works to Buildings) of the Order the Company may, as often as it may reasonably require and upon giving not less than 14 days' notice in writing to the Owner, enter the Protected Property at any reasonable time for the purposes of

carrying out the Assessment.

Cases in Risk Category 2 or below

- 3.5 Subject to Clause 3.6 below, if the assessment of the predicted damage to the Building concerned contained in the Report is that the Building falls into Risk Category 2 or below, the Company, if so requested by the Owner by notice given in writing to the Company not later than 20 working days after the day on which the Report is Sent to the Owner, shall seek to consult with the Owner regarding the Report following which the Company shall be entitled to proceed with the Relevant Construction without prejudice to any claim for compensation which the Owner may have.

Cases in Risk Category 3 or above

- 3.6 If following the carrying out of the Assessment the assessment of the predicted damage to the Building concerned contained in the Report assesses that the Building falls into Risk Category 3 or above or if the Report recommends that Protective Works should be carried out wholly or partly from within the Building:

- 3.6.1 The Owner shall be entitled to appoint an Engineer (at the Company's cost in accordance with Clause 3.6.9) save that:

- (a) in the event of the Company entering into a Deed with any other person or persons (whether on, before or after the date of this Deed) in relation to the whole or part of the Building containing provisions similar to this Clause 3 -

- (i) the Owner's Engineer shall be appointed jointly by the Owner and the other person or persons with a legal interest in the Building (or, failing agreement between them, by the President of the Institution of Civil Engineers on the written application of either or, as the case may be, any of them), and

- (ii) as regards any disputes concerning the Report and the appropriate protective works for the Building (if any), for the purpose of obtaining a consistent outcome with respect to the Building capable of implementation by the Company Clause 9.12 has effect;

- (b) where the Company enters (or is to enter) into such a Deed as is mentioned in Clause 3.6.1(a) above with any other person or persons, to enable the joint appointment to be made the Company shall either send a notice in writing to the Owner specifying the other person or persons before the beginning of the period of 15 working days ending with the day on which the Report is Sent to the Owner under Clause 3.3, or shall send that notice at some later time before the Report is Sent (in which case the Report shall be deemed to have been sent for the purposes of paragraphs 3.6.3 on the day 15 working days after the day on which that notice is Sent).

- 3.6.2 Where the Owner decides not to appoint an engineer in accordance with Clause 3.6.1 the Company, if so requested by the Owner by Notice given in writing to the Company not later than 20 working days after the day on which the Report is Sent to the Owner, shall seek to consult with the Owner regarding the Report following which the Company shall be entitled to proceed with the Relevant Construction without prejudice to any claim for compensation which the Owner may have.

- 3.6.3 Where an engineer is appointed in accordance with Clause 3.6.1 the Owner's Engineer may, not later than 20 working days after the day on which the Report was sent to the Owner, give written Notice to the Company stating whether or not the Report is agreed.

- 3.6.4 If the Owner's Engineer does not agree the Report the Notice shall contain detailed reasons for the objections to it.
- 3.6.5 If in the Company's opinion (the Company acting reasonably) the Notice contains reasonable objections:
- (a) the Company and the Owner's Engineer shall seek to agree such amendments to the Report as are reasonably necessary to address those objections; and
 - (b) in the event that the Company and the Owner's Engineer fail to agree the Report within 20 working days of the giving of the Notice the dispute shall be referred to dispute resolution in accordance with the provisions in Clause 9.
- 3.6.6 If in the Company's opinion (the Company acting reasonably) the Notice contains unreasonable objections the Company shall consult with the Owner's Engineer regarding the Report following which the Company shall be entitled to proceed with the Relevant Construction without prejudice to any claim for compensation which the Owner may have and the right of the Owner to refer the dispute as to the reasonableness of the objections to dispute resolution in accordance with Clause 9.
- 3.6.7 In the event that no Notice is served within the period specified in Clause 3.6.3 the Report shall be deemed to have been agreed.
- 3.6.8 Upon the Report being agreed or deemed to be agreed or upon determination of the dispute (as the case may be) the Company shall be entitled to proceed with the Relevant Construction and the Relevant Protective Works in accordance with the Report as so agreed or determined; but if the Notice contains objections to the Report and the Report has not been agreed or finally determined within the period of 75 working days after the day on which the Report was Sent to the Owner then provided that the Company has used its reasonable endeavours to agree the Report and facilitate the determination of the adjudicator the Company shall be entitled to proceed with the Relevant Construction and the Relevant Protective Works specified in the Report in accordance with its terms without prejudice to any claim for compensation which the Owner may have.
- 3.6.9 The Company shall, within 20 working days of being called on to do so, repay to the Owner all reasonable costs, charges and expenses properly incurred by the Owner, including VAT thereon insofar as the same is not recoverable by the Owner (whether as a deduction against output tax or as a VAT credit or otherwise), in connection with:-
- (a) the services of the Owner's Engineer under Clauses 3.6.2 to 3.6.4; and
 - (b) the services of architects, surveyors, engineers and other technical advisers to whom the Owner's Engineer finds it reasonably necessary to refer in connection with Clause 3.6.5(a).
- 3.7 Subject to the Conditions Precedent and Clause 3.8 if the Company carries out the Relevant Construction it shall also carry out the Relevant Protective Works (including the method of working and programme therefore).
- 3.8 The duty to carry out Protective Works under Clause 3.7 has effect subject to the obtaining of any necessary consents, agreements or other approvals (which the Company shall use reasonable endeavours to obtain) required for the purpose, whether required under any provision having effect under statute, or under any undertaking or agreement given or entered into by the Secretary of State or the Company which governs the exercise of the powers given

by the Order, or otherwise and the obligation to use reasonable endeavours to obtain such consents, agreements or other approvals includes an obligation -

- 3.8.1 Where the Report in the form sent to the Owner identifies Protective Works as necessary, the Company shall also serve notice under article 18 paragraph 5 to the Order not later than 10 working days after the day on which the Report is so sent to the Owner on all persons who have not entered into a Deed in relation to the whole or part of the Building containing provisions similar to Clause 3 and 4 of this Deed and who after reasonable inquiry by the Company are (as at that time) found eligible to receive such notice in relation to the Building and the Protective Works so identified; and
- 3.8.2 after the sending of the Report to the Owner, to do what else is reasonable under article 18 to the Order to enable the Relevant Protective Works to be carried out at a time consistent with the Company's construction timetable including, if a person gives notice of dispute under paragraph 6 of article 18 in relation to the Building (whether in consequence of a notice by the Company given pursuant to paragraph 5 of article 18 of the Order or subsequently)-
- (a) to pursue the arbitration with all due despatch; and
 - (b) to do all that is reasonable to argue the case in the arbitration in favour of the Relevant Protective Works in consultation with the Owner.
- 3.9 For the avoidance of doubt:
- (a) for the purposes of Clause 3.8 the circumstances in which the Company shall be treated as not being able to carry out any protective works under article 18 to the Order includes a case where the decision of an arbitrator under paragraph 6 of article 18 to the Order precludes those works being carried out, or makes the carrying out of those works impractical; and
 - (b) if the Company has done the things required by Clause 3.8.2(a) and (b) but, on an arbitration under paragraphs of article 18 to the Order relating to the Building, a decision of the arbitrator has not been obtained by the time that would be required in order to maintain the Company's construction timetable for the Relevant Construction (or for the Relevant Protective Works), the Company may carry out the Relevant Construction in accordance with its construction timetable without carrying out such of the Relevant Protective Works as it could not or cannot lawfully or practicably carry out in accordance with that timetable because the decision has not been obtained.
- 3.10 Protective Works carried out in accordance with this Deed shall be treated as carried out under the powers conferred by article 18 to the Order, save that the Owner agrees that paragraph 6 of article 18 shall not apply to the Owner.

4 MONITORING OF PROTECTED PROPERTY

- 4.1 If the Report prepared under Clause 3.2 above recommends that monitoring specific to the Building should be carried out, subject to Clause 4.6 the Company shall, if it proceeds with the construction of the Authorised Works, undertake monitoring of the Building.
- 4.2 Except so far as further or different times or methods of monitoring are recommended in that Report, monitoring shall consist of precise surveying of studs and targets on the outside of the Building, and shall begin prior to the commencement of the carrying out of the Relevant Construction and continue during the period of the Relevant Construction and shall end at the later of (a) six months from the Opening Date (the "end date") and (b) (if prior to the end date

the monitoring has established any movement of the Building arising in consequence of the Relevant Construction) the date on which the monitoring indicates that such movement has reduced to a rate of 2mm per annum or less.

4.3 As soon as practicable after monitoring results have been obtained, whether interim or final, the Company shall:

- (a) in the case of final results, make them available for inspection by the Owner for a period of three months commencing on the date on which the Company notifies the Owner that the monitoring has ceased; and
- (b) in the case of both interim and final results, inform the Owner that the Company will send to the Owner a copy of such of those results as the Owner may request.

4.4 Such monitoring will be recommenced at the written request of the Owner if:

- (a) the Owner can show reasonable grounds for concluding that building movement arising in consequence of the Relevant Construction of a rate greater than 2mm per annum has started again after the monitoring period specified in Clause 4.2 or a monitoring period under this Clause 4.4 has elapsed, and
- (b) that request is made within two years from the Opening Date; and

any such recommenced monitoring shall continue until the monitoring indicates that building movement arising in consequence of the Relevant Construction has reduced to a rate of 2mm per annum or less.

4.5 The Owner hereby agrees that prior to and during the construction of the Authorised Works the Company may as often as it may reasonably require, upon giving not less than 7 days' notice in writing to the Owner, enter the Protected Property to monitor the effect of the Authorised Works (including entering to place and maintain studs and targets for the purposes of monitoring referred to above): Provided always that such inspection, entering, placing and maintaining shall be conducted with a duly authorised representative of the Owner and at reasonable hours and that before placing such studs and targets on any of the Protected Property the Company shall consult with the Owner on their positioning.

4.6 The obligations of the Company to carry out monitoring under this Clause 4 are subject to the obtaining of any other necessary consents, which the Company shall use its reasonable endeavours to obtain.

5 SCHEDULES OF DEFECTS

5.1 Before it commences construction of so much of the Authorised Works as will or may affect the Building, the Company shall at its own expense appoint in the joint names of the Company and the Owner (and such other persons as the Company may determine so that the Company shall not be obliged to prepare more than one such schedule for the Protected Property) a reputable firm of chartered building surveyors or chartered engineers to prepare a schedule of defects existing in the Protected Property (including, so far as relevant and can be established from the visual inspection normally conducted in relation to the preparation of such schedules, a description of the apparent magnitude of any defect) and that firm shall submit a copy of the schedule of defects ("the original schedule") to the Company and the Owner.

5.2 In a case where Clause 5.1 applies, after the Company has constructed the Authorised Works in the vicinity of the Building and either at the written request of the Owner or on the

initiative of the Company, a schedule shall be prepared at the expense of the Company by the firm appointed under Clause 5.1 (or a similar firm if the original firm is unable to act for whatever reason) similar to (and with similar inspection techniques as) the original schedule setting out what changes appear to have occurred in respect of the defects identified in the original schedule prepared pursuant to Clause 5.1 (as amended pursuant to any procedure under Clause 9), provided such request is made before the end of the period of 2 years from the Opening Date or if later (and building-specific monitoring of the Building is carried out under Clause 4) the end of the period of three months from the day on which the Company notifies the Owner that monitoring has ceased, and provided further that the Company will not be obliged to commission more than one such schedule for the Protected Property.

6 COMPENSATION FOR DAMAGE

- 6.1 In addition to any claim which the Owner may make under the provisions of any enactments incorporated with or applied by the Order with respect to compensation for lands taken or injuriously affected, the Owner may (subject to Clause 6.2, 6.3 and 6.5) make a separate claim upon the Company for compensation for the reasonable and proper cost properly incurred by the Owner in remedying any material physical damage caused to the Protected Property by Ground Movement arising from the construction of the Authorised Works, provided that the claim is made before the end of the period of two years from the Opening Date, or if later (and building-specific monitoring of the Building is carried out under Clause 4) the end of the period of six months from the day on which the Company notifies the Owner that monitoring has ceased.
- 6.2 For the avoidance of doubt, if the Building or the Protected Property suffers from a pre-existing defect or defects which are worsened by the construction of the Authorised Works, the compensation payable under Clause 6.1 is limited to the additional costs of repair of the Protected Property which go beyond those that would be incurred upon remedying the pre-existing defect or defects (assuming the Authorised Works had not been constructed), provided always that the Company may not assert any pre-existing defect that is not recorded in a schedule of defects prepared in accordance with Clause 5 or otherwise specifically agreed in writing by the Company and the Owner, in each case subject always to the outcome of any dispute determined in accordance with the procedure set out in Clause 9.
- 6.3 Before carrying out any work in respect of which a claim may be made under Clause 6.1, the Owner shall give not less than 28 days' notice in writing to the Company, specifying the material physical damage concerned and the proposed remedial work; and if within the period of 28 days after the giving of such notice -
- (a) the Company elects by notice in writing to the Owner to remedy all or part of that damage, then no claim may be made under that paragraph in respect of the damage or part, but the Company shall be under a duty to remedy the damage or part to the reasonable satisfaction of the Owner as soon as reasonably practicable thereafter in accordance with a specification agreed with the Owner or in default of such agreement, determined under Clause 9 below; and/or
 - (b) the Company by notice in writing to the Owner requires the Owner to obtain competitive quotes for all or any of the remedial work, then before entering into a contract for or arranging for the carrying out of the work concerned the Owner shall
 - (i) take reasonable steps to obtain not less than 3 competitive prices for the work and
 - (ii) obtain the consent of the Company to the quote to be accepted, such consent not to be unreasonably withheld.
- 6.4 If it appears to the Owner or the Company that any damage in respect of which notice is given

by the Owner under Clause 6.3 is likely to be of a recurring nature by reason of the programme for or the nature of the Authorised Works, either of them may, in the relevant notice, require a timetable for the carrying out of the remedial work relating to the damage (including a timetable and specification of any interim repairs reasonably necessary in consequence of the damage) to be agreed or, in default of agreement, determined under Clause 9; and for this purpose "the relevant notice" means -

- (a) where the requirement is made by the Owner, the notice given by him under Clause 6.3;
- (b) where the requirement is made by the Company, and the Company gives a notice of election under Clause 6.3(a), the notice of election;
- (c) where the requirement is made by the Company, and the Company gives notice requiring competitive quotes under Clause 6.3(b), the notice requiring competitive quotes;
- (d) where the requirement is made by the Company and the Company gives no such notice of election or notice requiring competitive quotes, a separate notice in writing stating the requirement, which is given within the period of 28 days after the giving of the notice by the Owner under Clause 6.3.
- (e) The Owner hereby agrees that the Company may as often as it may reasonably require and upon giving not less than 14 days' notice in writing to the Owner, enter the Protected Property at any reasonable time to carry out works in compliance with any duty under Clause 6.3 or 6.4 but in doing so the Company agrees that it will have due regard to any activities carried out by those with an interest in the Building.

6.5 For the avoidance of doubt, the Owner shall not be entitled to (and hereby accepts the fulfilment of the obligations of the Company under this clause in satisfaction of any right to) compensation under any enactment as regards any damage or claim in respect of which the Owner is entitled to payment under Clause 6.1 or which the Company is under a duty to remedy under Clause 6.3 or 6.4.

6.6 In Clause 6.5 reference to "any enactment" includes reference to the Order.

7 COSTS

7.1 The Company shall repay to the Owner all reasonable costs charges and expenses properly incurred by the Owner, including VAT thereon insofar as the same is not recoverable by the Owner (whether as a deduction against output tax or as a VAT credit or otherwise), in connection with:-

- (a) the services of the Surveyor under Clause 5.2 of this Deed;
- (b) the services of the Surveyor in connection with the successful proving of a claim under Clause 6.1 of this Deed; and
- (c) the services of architects, surveyors, engineers and other technical advisers to whom the Surveyor finds it reasonably necessary to refer in connection with the successful proving of a claim under Clause 7.1 (b).

7.2 Before any services in respect of which repayment may be claimed under Clause 7.1(b) and (c) above are undertaken, the Owner or the Surveyor shall give the Company not less than 28 days' notice in writing of the services proposed to be undertaken, the basis on which any costs

charges or expenses are to be calculated, and an estimate of the total amount of those costs charges and expenses.

- 7.3 Any amount payable under Clause 7.1 shall be paid by the Company within 30 days of that amount being agreed between the Company and the Owner or being determined in accordance with Clause 9.

8 AS TO THE COMPANY'S LIABILITY IN CERTAIN CASES

The fact that any work or thing has been executed or done in accordance with a Report prepared or agreed under Clause 3 above or in accordance with any decision of an adjudicator shall not relieve the Company from any liability for damage caused to the Protected Property or affect any claim by the Owner in respect of such damage.

9 DISPUTES

- 9.1 Any dispute or-difference arising between the parties hereto as to their respective rights duties and obligations under this Deed or as to any matters arising out of or in connection with the subject matter of this Deed shall be determined by adjudication in accordance with the provisions of this clause.
- 9.2 Either party may give notice in writing to the other referring the dispute to adjudication under this clause, and that notice shall briefly state the matter which is in dispute between them.
- 9.3 Unless the dispute in question is one that falls to be consolidated under Clause 9.12 below with other disputes relating to the Building and an adjudicator has already been appointed for any of the disputes (under a provision in another Deed similar to this Clause 9) which fall to be so consolidated (in which case that adjudicator shall act on the consolidated proceedings), the party giving notice under Clause 9.2 shall upon giving that notice forthwith request the appointing body to nominate an independent person to act as adjudicator, who shall be a person professionally qualified for not less than 10 years and who is also a specialist in relation to the subject matter of the dispute, and the request shall ask the appointing body to nominate the adjudicator within 7 days of the notice being given with a view to the matter being referred to the adjudicator within that period.
- 9.4 The appointing body for the purposes of Clause 9.3 shall be the President, Vice-President or other duly authorised officer of the Institution of Civil Engineers, except in the case of a dispute or difference with regard to the meaning or construction of this Deed, when the appointing body shall be the President, Vice-President or other duly authorised officer of the Law Society.
- 9.5 The terms of reference of the adjudicator shall be as follows - .
- (a) the adjudicator is to reach a decision within 28-days of the dispute being referred to him or within such longer period (if any) as may be agreed by the parties after the dispute has been referred to him;
 - (b) the adjudicator may extend that period of 28 days by up to 14 days without the agreement of the parties to the dispute if the party referring the dispute consents;
 - (c) the adjudicator must act impartially;
 - (d) the adjudicator may take the initiative in ascertaining the facts and the law.

- 9.6 In reaching his decision, the adjudicator shall act as an expert and not an arbitrator and he shall accordingly take into account his expert knowledge and judgement.
- 9.7 The parties hereto agree that the decision of the adjudicator shall be final and binding except in a case of manifest error.
- 9.8 In a case of manifest error the decision shall (so far as consistent with the terms of this deed) be binding until the matter is finally determined by legal proceedings or by agreement between the parties.
- 9.9 The adjudicator shall not be liable for anything done or omitted in the discharge or purported discharge of his functions as adjudicator unless the act or omission is in bad faith, and any employee or agent of the adjudicator shall be similarly protected from liability,
- 9.10 The incidence of the adjudicator's reasonable costs and fees in the adjudication shall lie (as between the parties to the dispute) at the award of the adjudicator.
- 9.11 This clause 9 shall apply to disputes falling both within and outside section 108 of the Housing Grants, Construction and Regeneration Act 1996, and (in the case of a dispute falling within that section) if there is any inconsistency between the provisions of this Deed and the requirements of subsections (1) to (4) of that section the inconsistency shall be resolved in favour of those subsections and those subsections shall to the extent of such inconsistency be deemed to be incorporated in this Deed and have effect accordingly (so that amongst other matters the Scheme for Construction Contracts is not intended to apply).
- 9.12 In the event of the Company entering into a Deed with any person or persons other than the Owner (whether on, before or after the date of this Deed) in relation to the whole or part of the Building containing provisions similar to Clause 3 above, then-
- (a) all disputes of the land mentioned in Clause 3.6.6 relating to the Building shall be consolidated into a single proceeding with a single adjudicator for all of them and this Clause 9 shall have effect accordingly; and
 - (b) the finding of the adjudicator shall have effect with respect to the Building for the purposes of Clause 3 with respect to the Owner even if the Owner did not become or did not remain a party to the adjudication.

10 SERVICE OF NOTICES

- 10.1 Any notice in writing that is to be given by the Company to the Owner shall be deemed effectively given if let at, or despatched by a postal service in which receipt is recorded addressed to, [*specify address within United Kingdom*] or such other address within the United Kingdom as the Owner notifies to the Company in writing, and in the case of the documents referred to in the definition of "sent" in clause 2(1) above, the documents shall be deemed effectively given if posted by ordinary first class post to that address (whether or not received).
- 10.2 Any notice in writing that is to be given by the Owner to the Company shall be deemed effectively given if left at, or sent by a postal service in which receipt is recorded addressed to, the address as set out in this Deed or at such other address within the United Kingdom as is notified in writing by the Company to the Owner.

11 RIGHTS OF THIRD PARTIES

- 11.1 This Deed may be varied determined or supplemented without the consent of any third party.

11.2 This Deed does not and is not intended (save where this clause is in any other clause expressly (or by express reference) excluded) intended to confer any rights whatsoever on any person who is not a party to this Agreement pursuant to the Contracts (Rights of Third Parties) Act 1999.

IN WITNESS of which the parties have executed this document as a Deed on the day and year first before written

Appendix 1

Section 3-6 of London Underground's Category 1 standard S1050



Category 1 Standard

S1050 Civil Engineering - Common Requirements

Issue No.: A7

Issue date: November 2013

Review date: November 2018



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1 Purpose

- 1.1 This standard sets out the generic requirements that apply to civil engineering assets, and is to be read in conjunction with LU Standard S1538 and the appropriate LU Civil Engineering Standards as shown below:

Number	Title
S1051	Civil Engineering – Bridge Structures
S1052	Civil Engineering – Gravity Drainage Systems
S1053	Civil Engineering – Building and Station Structures
1-054	Civil Engineering – Earth Structures
S1055	Civil Engineering – Deep Tube Tunnels and Shafts
S1056	Civil Engineering – Pumping Systems
S1057	Civil Engineering – Miscellaneous Assets

- 1.2 A supporting Manual of Good Practice [G050](#) gives guidance and explanation of the requirements given in this Standard.

2 Scope

- 2.1 This Standard applies to all civil engineering assets and sets out the following generic requirements:

- a) Competence;
- b) Technical approval, processes and assurance;
- c) Design of service fixings and connections for new structures;
- d) Ground investigations;
- e) Management of sub-standard assets;
- f) Ground movement impact on railway and adjacent structures;
- g) Use of tall plant on or near the railway;
- h) Use of temporary works, scaffolding and hoardings near the railway;
- i) Piling and similar processes;
- j) Adjacent structures;
- k) Asset and structure identification;
- l) Condition assessment and certification;
- m) Structural materials;
- n) Cutting, grinding, drilling, fixing to and supporting from existing structures and inspection access;
- o) Decommissioning, demolition and site clearance;
- p) Access covers;



- q) Service crossings;
- r) Evidence of compliance;
- s) Risk.

2.2 This standard does not cover works by Outside Parties undertaking work on their own land other than when referred to in the Infrastructure Protection standard (S1023).

2.3 There are references within this document to the LU process for Temporary Works and Asset Condition Assessment and Certification. It is however acceptable for other companies within TfL to follow their own equivalent approved process.

3 Requirements

3.1 Competence

3.1.1 All staff and suppliers carrying out works in civil engineering asset areas shall be competent to undertake these tasks.

3.1.2 Suppliers shall have a Competence Assurance System in accordance with the published guidance on developing and maintaining staff competence for use in the railway industry – Developing and Maintaining Staff Competence. Railway Safety Publication 1. ORR 2007.

3.1.3 A Safety Critical Work licensing system in accordance with the requirements of LU Standard S1548 (Safety Critical Work) shall be in place for all ‘Safety Critical’ civil engineering activities as defined by The Railways and Other Guided Transport Systems (Safety) Regulations 2006.

3.1.4 Only a Civil Engineering Safety Critical Licensed person shall be permitted to certify the return to use of civil engineering assets to passenger service.

Note: This activity may not necessarily involve the civil engineering Safety Critical Licensed person carrying out any maintenance or repair work personally but the level of supervision or the ability to check the work done must be such that the Civil Engineering Safety Critical Licensed person can confidently return to use the civil engineering assets to passenger service.

3.1.5 Inspections of civil engineering assets shall be carried out by suitably experienced and qualified staff. The note below clarifies by what is meant by “qualified staff”.

Note: A minimum of Technician Member of the Institution of Civil Engineers, or equivalent, with suitable and current civil engineering asset inspection experience is required and experience with working in the LU railway environment is preferable.

3.2 Technical approval, processes and assurance

3.2.1 General

3.2.1.1 Conceptual Design Statements (CDS), in accordance with LU Standard S1538, shall be developed for the design of all new, strengthened or renewed civil engineering assets. The requirements for a CDS relating to temporary works are given in LU Standard S1062.

Note: Guidance on the production, submission and approval in principle (AIP) of civil engineering related CDS in support of the specific requirements of S1538 is given in LU Manual of Good Practice G050.

3.2.1.3 Proposed amendment to a CDS that has been “approved in principle” will require technical justification and the approval of the LU Profession Head or an accredited Civil Engineer.

3.2.1.4 As part of the design for new works, including Strengthening and Renewal, a design compliance submission shall be prepared that describes and quantifies future management and maintenance required to achieve the Design Life of the relevant civil engineering asset.

3.2.1.5 The design compliance submission shall describe any requirements for instrumentation and monitoring including full details of purpose, installation requirements and frequency of readings.

3.2.1.6 The design compliance submission shall describe and quantify the interfaces with the track assets and other elements of the operating railway, existing services and drainage, adjacent works and adjacent planned works, including predictions of ground movements and assessment of potential damage to the railway and adjacent properties, facilities and structures, both in the short and long term and either directly or through the influence of groundwater.

3.2.1.7 The design compliance submission shall identify any constraints imposed by the design, plant restrictions or any other special conditions and factors.

Note: Other items may be required in the design compliance submission on a case-by-case basis.

3.2.1.8 The design shall be presented in construction documents as a set of drawings, specifications and related documents containing all information necessary for:

- a) construction;
- b) operations;
- c) maintenance; and
- d) decommissioning.

3.2.1.9 All drawings shall include a Safety Health & Environmental (SHE) box. This box shall list residual risks from the design of structures or components which remain in the design. An example of a SHE box is shown in Attachment 7.5.

3.2.1.10 Copies of all reports, drawings, calculations and proforma produced as part of the civil engineering activities described in LU Civil Engineering Standards shall be recorded into a document management system in accordance with LU Standard 1-691 and in the CDM Health and Safety File.

3.2.1.11 All reports, drawings, calculations and proforma shall be retained for the life of the asset.

3.2.2 Analytical assessments

3.2.2.1 An Analytical Assessment AIP document describing the proposed structural assessment methodology shall be approved by a LU accredited Civil Engineer prior to any Analytical Assessment of a civil asset. The AIP document shall describe the structural details, assessment criteria and proposed method of structural analysis.

Note: Guidance on the required format of the approval in principle document (AIP) for the analytical assessment of bridges, structures and deep tube tunnel assets is given in LU Manual of Good Practice G050.

An AIP document is not required for the Analytical Assessment of Earth Structure, Pumping Systems or Gravity Drainage Systems assets. The assessment requirements and methodology for these assets is comprehensively described in the relevant LU standards.

3.2.3 Ground investigations

3.2.3.1 The scope of a Ground Investigation shall be approved by a LU Civil Engineer using a Ground Investigation AIP document.

Note: Guidance on the required format of the AIP for a Ground Investigation is given in LU Manual of Good Practice G050.

3.2.4 Completion and handover of maintenance and strengthening and renewal work

3.2.4.1 The completion of Maintenance and Strengthening and Renewal works shall be controlled to ensure:

- a) a competent person has certified that the works have been completed satisfactorily;
- b) compliance with LU Standards is confirmed;
- c) safety has not been impaired;
- d) the reported Condition of the asset is updated in the ACAC/ACR process and Asset Register;
- e) the functioning of the asset, or any other asset, is not impaired; and
- f) asset management systems (i.e. databases) are updated.

Note: A schedule of typical Maintenance activities for civil engineering assets is given in LU Manual of Good Practice G050.

- 3.2.4.2 Maintenance Work Listings shall be produced annually, no later than 30 June, for Maintenance work carried out on each asset from the previous period 1 April to 31 March.
- 3.2.4.3 A Maintenance Work Annual Completion Certificate shall be produced and signed by a competent person in respect of specific asset groupings to confirm that the Maintenance works have been completed.
- 3.2.4.4 The following details in respect of each Item of Work shall be recorded:
- a) full description of the asset, each Item of Work undertaken and identifying asset references;
 - b) precise asset location, including full Location Coding System (LCS), asset control numbers and room numbers, as appropriate;
 - c) list of all concessions and written notices;
 - d) a list of references to any CDS and AIP, required by LU Standard S1538;
 - e) any as-constructed drawings and calculations including any changes made to the design during construction;
 - f) update to CDM Health and Safety File (to include preventative maintenance recommendations, warranty and maintenance specifications, schedules, training manuals, manpower requirements, servicing, repair and support arrangements, as appropriate to the activity);
 - g) emergency equipment recommended or provided;
 - h) confirmation that, where maintenance works have resulted in a change in the asset inspection rating, an inspection has been carried out in accordance with S1060 - Civil Engineering – Bridges and Structures Inspection Standard or other appropriate LU Civil Engineering standard.
 - j) where work has been subject to The Railway and Other Guided Transport Systems (Safety) Regulations 2006; and
 - k) work which requires the agreement of the London Fire Emergency Planning Authority (LFEPA) or where LU Standard 1-085 is applicable.
- 3.2.4.5 If the completion of works is not final but is partial or substantial, precise information shall be recorded in the CDM Health and Safety File, together with details of the work outstanding. All outstanding or qualified work shall be scheduled for completion or rectification.

3.3 Design of service fixings and connections for new structures

- 3.3.1 The design of new civil assets shall accommodate all other asset discipline needs and requirements, particularly the provision for fixing services to structures.
- 3.3.2 Designs shall ensure that predictable structural movements are not detrimental to services, utilities or finishes.



- 3.3.3 Provision shall be made for the attachment of services to structures without damage or impairment to functionality.
- 3.3.4 Design of fixings shall include precautions to prevent vibration induced loosening or failure.
- 3.3.5 The design shall be coordinated with the design of earthing of electrical equipment and stray current protection in accordance with LU Standard 1-106.
- 3.3.6 Structures shall be protected from bimetallic corrosion.
- 3.3.7 Where relevant structures shall be checked for fatigue failure conditions.
- 3.3.8 Where false ceilings are to be attached to civil structures, their fixings shall comply with the recommendations set down in the Association of Interior Specialists Construction Fixings Association Best Practice Guide – Selection and installation of top fixings for suspended ceilings

3.4 Ground investigations

- 3.4.1 Ground Investigation information shall be obtained which is sufficient in scope and sophistication to provide the engineering characterisation of soils and groundwater conditions necessary for the inception, design and construction of new works and for the Strengthening and Renewal and Analytical Assessment of existing structures.
- 3.4.2 All Ground Investigations shall be undertaken in accordance with BS EN 1997-2.
- 3.4.3 Ground Investigation design shall be controlled and assured in accordance with Section 3.2 of this Standard.

Note: Guidance on the content of a typical Ground Investigation is given in LU Manual of Good Practice G050.

3.5 Management of sub-standard assets

- 3.5.1 Immediate measures shall be taken to restrict the use and prevent access to Sub-Standard Assets.

Note: Immediate steps include notification to the asset owner/steward, mitigation and removal from service.

- 3.5.2 Structure load restriction plates shall be fixed to each structure where loading is restricted to pedestrians and where plant and materials are prohibited (S1004 - Signage for Operational Purposes).
- 3.5.3 A “Do Not Use” sign shall be fixed to identify structures that have been removed from service and access is prohibited (S1004 - Signage for Operational Purposes).

3.6 Ground Movement Impact on Railway and Other Structures

3.6.1 Assessment and Mitigation Process

3.6.1.1 The Designer shall investigate the potential for ground movement associated with the design and possible construction methods using the process defined in cl. 3.6.1.2 for the following purposes:

- a) To assess risk of building damage by identifying those zones where the implementation of the design is likely to cause ground movements which will result in risk of Damage Category 2 'Slight' being exceeded (see Table 1). To assess the risks of such degrees of damage occurring and either investigate alternative designs or advise interfacing Designers that alternatives need to be considered and modify the design as necessary. To undertake an assessment of the potential consequences where there is a significant likelihood that Risk of Damage Category 2 'Slight' will be exceeded and identify specifically what the risks are. Design protective measures where necessary to mitigate against the risk of damage exceeding Risk of Damage Category 2
- b) To demonstrate that the environmental effects of excavation induced ground movements have been considered and taken account of in the design.
- c) To assess the risk of damage to utilities and to design mitigation measures in agreement with the utility owner.
- d) To assess the effects of excavation to existing above-ground and underground infrastructure and to design suitable mitigation measures.
- e) To indicate where property may require demolition or structural modification.
- f) To enable the preparation of contingency plans to deal with residual risks.

3.6.1.2 A staged assessment process shall be followed to identify the risk and impact of construction activities on London Underground and third parties. Five stages have been identified to assess the impact and risk from project inception to completion. The initial stages are aimed at maximising the benefit from assessments, whilst the latter are about managing and recording the impact of construction. The five stages are:

3.6.2 Stage 1 – Scoping

3.6.2.1 Schedules and plans shall be prepared to identify all LU and Outside Party assets assessed to experience ground movement exceeding 1mm using conservative parameters.

Note: Case studies validating the parameters appropriate for the assessment process may be found in the London Underground database of Core Asset Information.

3.6.3 Stage 2 – Initial Assessment

3.6.3.1 The designer shall carry out initial assessment calculations using simple empirically calibrated, methods and moderately conservative parameters to classify the risk of damage to assets. For building structures the risk should be classified in accordance with Table 1. For non-building infrastructure the level of risk should be determined by ensuring that deformations do not exceed tolerable values determined in consultation with the asset owner. These calculations shall be based on record drawings, where



available and an inspection for assessment. Assets estimated to be a risk of damage greater than Category 2 –Slight or where damage exceeds the agreed tolerable limits require further detailed assessment at Stage 3. A schedule and plans of predicted damage shall be prepared.

Building damage classification				
Damage Category	Description of degree of damage⁺	Description of typical and likely forms of repair for typical masonry buildings	Approx. crack width⁺ (mm)	Max. tensile strain %
0	Negligible	Hairline cracks		<0.05
1	Very slight	Fine cracks easily treated during normal redecoration. Perhaps isolated slight fracture in building. Cracks in exterior visible upon close inspection	0.1 to 1.0	0.05 to 0.075
2	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures inside building. Exterior cracks visible; some repainting may be required for weather-tightness. Doors and windows may stick slightly	1 to 5	0.075 to 0.15
3	Moderate	Cracks may require cutting out and patching. Recurrent cracks can be masked by suitable linings. Tuck pointing and possible replacement of a small amount of exterior brickwork may be required. Doors and windows sticking. Utility services may be interrupted. Weather tightness often impaired	5 to 15 or a number of cracks greater than 3	0.15 to 0.3
4	Severe	Extensive repair involving removal and replacement of walls especially over door and windows required. Window and door frames distorted. Floor slopes noticeably. Walls lean or bulge noticeably. Some loss of bearing in beams. Utility services disrupted.	15 to 25 but also depends on number of cracks	> 0.3
5	Very severe	Major repair required involving partial or complete reconstruction. Beams lose bearing, walls lean badly and required shoring. Windows broken by distortion. Danger of instability	Usually > 25 but depends on No. of cracks	

Building damage classification				
Damage Category	Description of degree of damage⁺	Description of typical and likely forms of repair for typical masonry buildings	Approx. crack width⁺ (mm)	Max. tensile strain %
⁺ In assessing the degree of damage, account must be taken of its location in the building or structure. [*] Crack width is only one aspect of damage and should not be used on its own as a direct measure of it. Burland, J.P. and Wroth, C.P., Settlement of Buildings and Associated Damage, Proceedings of a Conference on the Settlement of Structures, Cambridge, 1974, pp 611 – 54 and 764 – 810;				

Table 1: Building Damage Classification

3.6.3.2 The heritage value of a Listed Building should be considered during the initial assessment by reviewing the sensitivity of the building structure and of any particular features together with the initial assessment calculations. The heritage assessment examines the following:

- a. The sensitivity of the building / structure to ground movements and its ability to tolerate movement without significant distress. The potential for interaction with adjacent buildings / structures is also considered. A score within the range of 0-2 should be allocated to the building/structure in accordance with the criteria set out in Table 2.
- b. The sensitivity to movement of particular features within the building / structure and how they might respond to ground movements. A score within the range of 0-2 should be allocated to the building in accordance with the criteria set out in Table 2.

The scores for each of the two categories a) and b) should be added to the category determined in 3.6.1.4.1 to inform the decision making process. In general, Listed Buildings which score a total of 3 or higher should be subject to further assessment as part of the Stage 3 – Detailed Assessment. Buildings that score a total of 2 or less are predicted to suffer a degree of damage which may be easily repairable using standard conservation based techniques and hence no protective measures for the building's particular features should be required. However, ultimately the professional judgement of engineering and historic building specialists should be used to determine whether additional analysis is required.

Score	Criteria	
	Sensitivity of the structure to ground movements and interaction with adjacent buildings	Sensitivity to movement of particular features within the building
0	Masonry building with lime mortar not surrounded by other buildings. Uniform facades with no particular large openings.	No particular sensitive features

1	Buildings of delicate structural form or buildings sandwiched between modern framed buildings which are much stiffer, perhaps with one or more significant openings.	Brittle finishes, e.g. tight-jointed masonry, which are susceptible to small movements and difficult to repair.
2	Buildings which, by their structural form, will tend to concentrate all their movements in one location.	Finishes which if damaged will have a significant effect on the heritage of the building, e.g. cracks through frescos.

Table 2: Scoring for Sensitivity Assessment of Listed Buildings

3.6.4 Stage 3 - Detailed Assessment and Mitigation Design

3.6.4.1 The Designer shall carry out detailed assessments of structures that will be affected by the works so that any monitoring works and mitigation works can be designed and implemented.

3.6.4.2 For structures at risk of exceeding Damage Risk Category 2 (Slight) the designer shall undertake a detailed assessment (more rigorous) to determine:

- a) The influence of the structure and its foundations on the predicted ground movements.
- b) The volume loss at which the risk of damage to the structure (or any sensitive finishes/features) is 'slight' or better.
- c) Whether this volume loss may be achieved by the proposed excavation design/control measures.
- d) Any special control measures required to reduce the predicted damage to acceptable levels (i.e. Risk Category 2 'slight' damage category or below) such as significantly higher face pressures with EPBM tunnelling and the practicality of these.
- e) The amount of ground movement that the structure (and or any sensitive finishes/features) can accommodate without exceeding Damage Risk Category 2 or any other agreed damage level.
- f) The level of residual risk if intrusive mitigation measures are not implemented.

3.6.4.3 The detailed assessments should include a number of iterations to determine how the risk of damage to a building may be reduced. Asset-specific empirical models shall be prepared successively using moderately conservative and best estimate parameters. If after these iterations the use of empirical methods do not reduce the risk of building damage to acceptable levels (i.e. Damage Category 2 'slight' damage category and below), the damage assessment shall be refined by increasing the sophistication of the analysis with the aim of reducing the risk of asset damage to acceptable levels and to eliminate the asset from further assessment.

3.6.4.4 If the risk of damage cannot be shown to be reduced by detailed assessment to acceptable levels, then mitigation measures shall be designed.

3.6.4.5 The primary means of settlement mitigation shall be practical measures to control ground movement by good design and construction practice. This could include staged

excavation sequences within sprayed concrete lining (SCL) works, ground treatment, face stabilisation, spiling / face dowels, increasing face pressure when using an tunnel boring machine (TBM), adopting stiffer walls/propping for rectangular shafts etc.

- 3.6.4.6 In the event that physical mitigation measures are still required (i.e. to control building damage to Damage Category 2 or less or to meet the Asset Owners requirements), the Designer shall seek to obtain the Asset Owners approval.
- 3.6.4.7 The Designer shall also undertake a comparative risk assessment to demonstrate that the risks associated with installation/implementation of any intrusive mitigation measures (such as compensation grouting) are no worse than the risks associated with the base case.
- 3.6.4.8 The relevant Local Authority and English Heritage shall be consulted on the results of the Listed Building assessment reports and the proposals for protective measures, if any are required. English Heritage shall also be consulted in relation to Listed Buildings where they would normally be notified or consulted on planning applications or listed building consent applications.
- 3.6.4.9 When considering the need and type of protective measures for Listed Buildings, due regard should be given to the sensitivity of the particular features of the building which are of architectural or historic interest and the sensitivity of the structure of the building to ground movement. Where the assessment highlights potential damage to the features of the building which it will be difficult or impossible to repair and/or if that damage will have a significant effect on its heritage value, the assessment may recommend appropriate measures to safeguard those features either in-situ or by temporary removal and storage off-site if those with relevant interest(s) in the building consent.
- 3.6.4.10 The form of monitoring of Listed Buildings should be determined based on the results of the assessment process.
- 3.6.4.11 Where repair works are necessary they will require the consent of those with relevant interest(s) in the building.
- 3.6.4.12 For railway track and track support structures the designer shall:
- a) Review the track surveys (including specifying additional surveys if required) and establish that ground movement can be accommodated without exceeding track standard operational tolerance in conjunction with the relevant Infrastructure Manager.
 - b) Identify locations where fettling of the track is required pre construction and /or during construction to ensure the track geometry and clearances are acceptable.
- 3.6.4.13 The designer shall prepare plans and sections showing the zone of influence of the works that is defined by ground movements exceeding 1mm.
- 3.6.4.14 The designer shall develop an instrumentation and monitoring plan to validate that ground movements within the zone of influence are in accordance with design assumptions and that the infrastructure remains within acceptable limits. The designer shall ensure that there is a clear distinction between parameters measured to confirm the change in any parameter is in accordance with the design and parameters measured to limit damage to the assets. This plan shall identify the minimum period of time required to obtain base line data for each monitoring point. Instrumentation adjacent to the railway, which will remain in place during traffic hours, shall conform to



LU Standards S1156 (Gauging and Clearances), 1-193 (EMC with LU Signalling System Assets) and 1-085 (Fire Safety Performance of Materials).

Note: A competent engineer responsible for the works shall consider those factors which may influence the monitoring data and shall determine an appropriate period and frequency for baseline monitoring. This decision making process will include an element of engineering judgement to account for the possible effects of any underlying environmental trends in the assets under consideration.

3.6.4.15 The designer shall demonstrate that the monitoring system complies with the British Tunnelling Society Monitoring Underground Construction best practice guide.

Note: A review of the monitoring system against the checklists provided in Appendix B of the BTS Monitoring Underground Construction best practice guide may be used as a tool to demonstrate compliance.

3.6.4.16 The detailed assessments shall define the control limits that need to be imposed on the TBM/SCL excavation in the zone of influence. The designer shall state these control measures on drawings and specifications.

3.6.4.17 The designer shall identify the critical parameters to be monitored and define the Asset Control Limits based on:

- a) the ability of the asset or structure to withstand ground movement investigated during the assessments carried out in Stage 2 and 3.
- b) the risk to London Underground and third party operations

3.6.4.18 The designer shall link the Asset Control Limits to actions within the Emergency Preparedness Plan.

3.6.4.19 The Instrumentation and Monitoring Plan and Emergency preparedness Plan shall be agreed with the relevant Asset Owner.

3.6.5 Stage 4 – Construction

3.6.5.1 Contingency plans shall be developed and agreed with Outside Parties to cover the risks posed to LU and the Outside Parties before commencement of the construction activity.

3.6.5.2 Contingency plans shall be implemented where the results of monitoring or inspection so indicate.

3.6.5.3 Ground movement and construction progress records shall be maintained and reported in regular reviews when construction processes are taking place within the zone of influence.

3.6.5.4 Predictions and assumptions made during design in respect of both ground movement and the effects which such ground movement will have on LU and adjacent assets shall be verified by measurement during construction.

3.6.6 Stage 5 – Completion and Close-out

- 3.6.6.1 After ground movement has stopped as confirmed by instrumentation the designer shall prepare a "Completion Report". This shall include the following:
- a) Details of any modifications/mitigation measures to the existing structure.
 - b) Graphs that show the ground movement and construction progress over time with at least 3 months duration of readings which show no change.
 - c) A schedule showing actual movement compared to predicted movement.
 - d) A schedule of defects recording only the exceptions (changes) identified during the post construction defects survey.
 - e) Details of any remedial works undertaken.
 - f) As-built records (including any temporary works remaining in situ).

3.6.7 Schedule of Defects

- 3.6.7.1 A schedule of defects shall be recorded for all buildings, structures, utilities and facilities and Outside Party assets predicted to experience ground movement exceeding 1mm prior to the start of construction.

Note: Guidance on the content of a typical defects survey is given in LU Manual of Good Practice G050.

3.7 The use of tall plant on or near the railway

- 3.7.1 The Supplier shall control and ensure the safe operation of cranes and other tall plant on or near the railway. Piling rigs which are less than 3.5m in height when drilling are not classified as tall plant with respect to this clause.

Note: Requirements for tall plant being operated by Outside Parties are given in LU Standard S1023 (Infrastructure Protection).

- 3.7.2 The design and operation of cranes and other tall plant shall comply with BS EN 13001-2:2011 and BS 7121
- 3.7.3 During traffic hours the use of any cranes or other tall plant adjacent to the railway must be approved to enable the risks to the operating railway to be properly managed. Approval must be sought from the Profession Head - Civil Engineering to permit any tall plant to be set up or to lift or carry loads in such a way that any part of the tall plant, equipment or loads carried could enter or adversely affect any zone in which LU has a concern, as identified by the Critical Boundary. This applies to tall plant in normal operation and in any abnormal state which is deemed to include, but is not limited to, mechanical failure, collapse, toppling or failure of supporting ground.

Note: Examples of the Critical Boundary and Critical Boundary diagrams for typical types of crane and other tall plant on or near the railway are shown in Attachment 7.1 and 7.2 respectively.

3.7.4 An Application for Approval to use Tall Plant shall be made to the Profession Head - Civil Engineering on the form shown in Attachment 7.4. The applicant must provide all the information requested, including details of the plant, the method of use, an assessment of the risks to railway assets and operations, and the proposed control and mitigation of those risks. Drawings to illustrate the position of the plant showing the zones of potential interaction in relation to railway assets and the Critical Boundary are also required. The risks from plant assembly, rigging, de-rigging and removal must be considered separately from plant operation.

3.7.5 Where lifting or carrying loads is proposed during traffic hours over sections of the railway which are nominally protected by a bridge, covered way, near surface tunnel or other structure, that structure shall be assessed by the Supplier for its capability to withstand the load or the crane falling on the structure, or both. The assessment shall identify all risks, giving details of proposed mitigating measures and operational methodology. If the structure has insufficient capacity an Application for Approval to use Tall Plant shall be made.

3.7.6 The use of other plant on or near the railway

3.7.6.1 Rail vehicle cranes (on-track Plant) operating on the LU railway shall be subject to LU Standards 1-172 (Plant, Tools and Equipment – Performance and Design) and 1-173 (Plant, Tools and Equipment – Inspection and Maintenance).

3.7.6.2 Plant, including lifting appliances, operating within the Critical Boundary shall require Plant approval as defined in LU Standard 1-172 (Plant, Tools and Equipment – Performance and Design).

3.7.6.3 Where tall plant is proposed for use outside the Critical Boundary but with the potential to affect railway operations in normal use or an abnormal state, the need for Plant Approval shall be considered. The potential risks involved must be assessed and included in the Application for Approval to use Tall Plant. The assessment must include but not be limited to consideration of the following risks to LU;

- Increased emissions
- Increased fire risk
- Noise and nuisance
- Hazardous substances
- Detrimental effects on LUs Power, signalling and communications systems
- Additional hazards in the event of adverse weather conditions

A clear indication of the intention to apply for Plant Approval must be given on the Application for Approval to use Tall Plant, in the area indicated.

3.8 The use of temporary works, scaffolding and hoardings near the railway

3.8.1 The Supplier shall control and ensure the safe erection, use and dismantling of temporary works, scaffolding, and hoardings, in, on or around the railway by

complying with the requirements contained in S1062 Temporary Works and 1-027 Site Hoarding, Fencing and Barriers.

- 3.8.2 Temporary works and scaffolding adjacent to the railway, which will remain in place during traffic hours, shall conform to LU Standard S1156 (Gauging and Clearances).

3.9 Piling and similar processes

- 3.9.1 Driven piling shall be no closer than 15m from an LU substructure or tunnel. Piles which are installed by a non-percussive push in process shall be treated as bored piles.
- 3.9.2 Bored piles, diaphragm wall construction, jet grouting, ground investigation boring and similar processes shall not be constructed within the piling exclusion zone shown in Figure 1.
- 3.9.3 Bored piles shall not be under-reamed such that under-reaming encroaches into the exclusion zone defined in 3.6.11.2.

Note: Information on studies carried out by LU on the impact of piling on adjacent infrastructure is given in LU Manual of Good Practice G050.

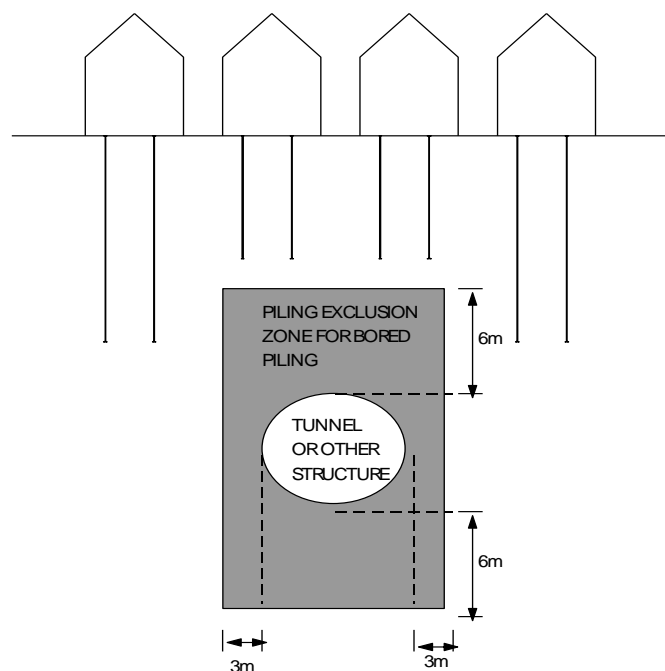


Figure 1 - Piling exclusion zone

3.10 Adjacent structures

- 3.10.1 When an LU asset is to be constructed adjacent to an Outside Party asset (including buildings, structures, foundations, utilities and facilities), structural arrangements shall be made such that the LU asset and the Outside Party asset are kept structurally

independent of each other to allow the assets to be independently maintained, repaired, modified, refurbished, demolished, rebuilt and replaced.

- 3.10.2 Where new LU infrastructure is specifically required to support an outside party development, the LU structures shall be designed to support a viable development design and the load capacity of the LU structure and transfer points between the LU structure and the development shall be clearly identified on drawings, which shall be used in the final design of the development by the outside party.

Note: In the case of new lines or stations, there may be a development partner (normally the original land owner) who will be responsible for designing the development above the station and providing LU with the applied loads and position of these loads on the LU structure, which are to be included in the LU design of the station.

3.11 Asset and structure identification

- 3.11.1 All structures shall be identified and categorised in accordance with LU Standard S1041.
- 3.11.2 New and existing structures shall have structure identification plates in accordance with LU Standard S1004 (Signage for Operational Purposes).
- 3.11.3 Fixing of structure identification plates shall be undertaken in accordance with Section 3.10 of this Standard.
- 3.11.4 Structure identification plates and fixings shall be weather resistant and have the same life as the asset to which they are fixed.

3.12 Condition assessment and certification/reporting

3.12.1 General

- 3.12.1.1 An Asset Condition Assessment shall be undertaken on an annual basis for the following purposes;
- to provide information necessary to support the civil engineering asset management strategy;
 - to provide information necessary to enable LU to assess the Asset Condition Classification in a consistent and accurate manner;
 - to provide information to support the maintenance of the Asset Register;
 - to provide information for the creation of the Asset Condition Assessment and Certification (ACAC) and Asset Condition Reporting (ACR) documents;
 - to provide LU with such data in respect of the Condition Classification of the civil engineering assets to enable the Condition of the totality of the assets across the network to be monitored.
- 3.12.1.2 The principles of the ACAC process are set out in LU Standard 1-031 (Asset condition assessment and certification) and the Asset Condition Reporting (ACR) process in S1042.

Note: The Asset Definition list and Generic Concerns list are contained in S1042.

The overall ACAC process for civil engineering assets is given in Attachment 7.3.

Additional details of the ACAC requirements for the range of civil engineering assets are given in the relevant LU Civil Engineering Standard.

- 3.12.1.3 The pre-defined Condition Classification for each Generic Concern is the highest Condition Classification (nearest to A) that shall be used when applying that Generic Concern to an asset, unless justified by engineering judgement which shall be auditable and verifiable by LU.
- 3.12.1.4 Justification for raising a Condition Classification shall either be recorded on the Inspection for Analytical Assessment report for the asset, with an auditable cross reference in the ACAC report, or shall be recorded in the ACAC report.
- 3.12.1.5 When applying Generic Concerns to an individual asset, a lower Condition Classification (nearer to E1) than the pre-defined Classification shall be used where justified by the extent, severity or consequences of the Specific Concern affecting the asset, which shall be auditable and verifiable by LU.
- 3.12.1.6 The justification for lowering the Condition Classification shall either be recorded on the Inspection for Analytical Assessment report for the asset, with an auditable cross reference in the ACAC report, or shall be recorded in the ACAC report.
- 3.12.1.7 The Condition Classification of any particular civil asset, or the allocation of the Modern Equivalent Asset Value (MEAV), shall not be upgraded in a subsequent ACAC (towards class A) unless it can be demonstrated in an auditable manner that the Condition of the asset has been improved since the previous ACAC.
- 3.12.1.8 Where a Specific Concern presents a safety risk, the ACAC/ACR shall include cross references to the safety risk assessment which demonstrates that these risks are ALARP.

Note: This includes arrangements for mitigation measures, maintenance required, operation restrictions and corrective action proposals, where appropriate.

3.12.2 Classification of civil assets

- 3.12.2.1 The Condition Classification of the asset shall be the lowest Condition Classification (closest to E1) for any of the Generic Concerns which relate to the Specific Concerns identified against the asset, subject to the provisions of clauses 3.8.1.3 to 3.8.1.6 of this Standard.
- 3.12.2.2 An asset can only be Condition Classification A (and not Grey) if all of the following apply:
- the Condition Assessment and Condition Classification process has been completed for the asset;
 - the asset is able to meet its Required Duty and complies with the definition of Condition Classification A as given in LU Standard 1-031;



- c) no current Generic Concerns are applicable;
- d) no new Generic Concerns need to be proposed in relation to any Specific Concerns about the asset.

3.12.2.4 Engineering asset definition shall be as defined in the Foundation Documents.

3.12.2.5 Engineering asset classification shall be as defined in LU Standard 1-041.

3.12.3 Classification of Grey civil assets

3.12.3.1 Individual civil assets where an analytical Condition Assessment has yet to be completed and no Specific Concerns have been identified shall be classified as Grey A.

3.12.3.2 Where the analytical Assessment for an asset has yet to be completed and Specific Concerns are known to exist, then the asset shall be defined as Grey with a Condition Classification based on the worst applicable Generic Concern known at the time of the ACAC (nearest to Grey E1).

3.12.3.3 On completion of the Condition Assessment the asset shall no longer be classified as Grey.

3.12.4 Allocation of MEAV/RAV for civil assets

3.12.4.1 Where MEAV/RAV values or rates have not been provided for a particular asset type, a value or rate shall be established in accordance with the procedures for changing the Foundation Documents in S1042.

3.12.4.2 Where assets are divided into sub-assets for ACAC/ACR reporting and the MEAV/RAV values for the sub-assets cannot be calculated from the pre-defined values or rates provided in the Foundation Documents, MEAV/RAV values shall be established in accordance with the procedures for changing the Foundation Documents in S1042.

3.12.4.3 A consistent approach shall be used year on year for deriving and allocating the MEAV/RAV in the ACAC reports.

Note: Rules for the percentage allocation of MEAV to Generic Concerns and associated Condition Classifications are given in the Generic Concerns in the Foundation Documents in S1042.

3.12.4.4 Any changes to the basis of MEAV/RAV of an asset, or to the percentage allocation of the MEAV/RAV against each Generic Concern, shall be established in accordance with the procedures for changing the Foundation Documents.

3.12.5 Analytical assessments

3.12.5.1 Analytical Assessments for civil assets shall be carried out in accordance with the relevant LU Civil Engineering standard.

3.12.5.2 Where there has been deterioration, damage, a change in loading or Required Duty, or there is a concern about the ability of an asset to meet its Required Duty, consideration shall be given and recorded to determine whether any previous Analytical Assessment remains valid or a new Analytical Assessment is required.

- 3.12.5.3 Where assets which do not normally require Analytical Assessment, suffer deterioration, damage, a change in loading or Required Duty, or there is a concern about the ability of an asset to meet its Required Duty, they shall be given similar consideration to that set out in Clause 3.8.5.2 to determine if the asset should undergo an Analytical Assessment with the results of the deliberations recorded.
- 3.12.5.4 When an initial Analytical Assessment indicates that an asset fails to meet the assessment requirements or Required Duty, consideration shall be given as to whether the analysis is unjustifiably conservative. Where a significant improvement in the result of the Analytical Assessment may be achieved, an iteration shall be undertaken using less conservative assumptions, more refined analysis, more realistic data, etc. as appropriate. The asset shall not be allocated a Generic Concern or Condition Classification for failing to satisfy the requirements of the Analytical Assessment until any such iterative process has been completed and failure to meet the assessment requirements or Required Duty has been established.

3.13 Structural materials

Note: This section defines the specific requirements for concrete, steelwork, brickwork and blockwork and structural timber over and above those given in the relevant LU Civil Engineering Standards.

3.13.1 General

- 3.13.1.1 Material specifications shall be prepared in accordance with relevant European Standards (ENs) and with due regard to the specific requirements of this Standard.
- 3.13.1.2 The LU process for the Approval of Products introduced for use on the network shall be followed in all cases.

3.13.2 Concrete

- 3.13.2.1 New structural concrete shall be capable of meeting the design life and durability requirements as defined in the relevant LU Civil Engineering Standard.
- 3.13.2.2 The Supplier shall comply with the relevant LU Civil Engineering asset specific Standard for the design requirements for structural concrete and the additional requirements of this Standard.
- 3.13.2.3 Structural concrete which is partly or fully below ground level shall be protected against attack from both aggressive soil and ground water as defined in BS EN 206-1 and BS EN 8500-1.
- 3.13.2.4 For concrete below ground the minimum cover to all reinforcement shall be as follows:
- external faces in members greater than 450mm thick exposed to water, soil or concrete blinding: 75mm;
 - external faces in members less than 450mm thick exposed to water, soil or concrete blinding: 40mm; (except cable posts)
 - internal faces exposed to air only: 25mm;

- d) walls cast by Tremie techniques and cast-in-place piles with diameters greater than 350mm: 75mm;
- e) mini or micro-piles of 120 - 350mm diameter: 40mm;
- f) micro-piles less than 120mm diameter: 25mm;

Note: Where precast concrete construction is utilised the above requirements may be relaxed if post construction reporting is in place so that a robust review of the issues and the full implications relating to the relaxation of this cover requirement can be assessed.

- g) prestressed concrete members where fixings may be required: 100mm;
- h) external faces of precast concrete tunnel linings: 35mm;
- i) internal faces of precast concrete tunnel linings: 20mm.

3.13.2.5 For concrete below ground the following minimum reinforcement shall be provided in each face and in each direction:

- a) walls less than 600mm thick: 0.14% of the gross cross sectional area of the concrete;
- b) walls greater than 600mm thick: 840mm² per metre width;
- c) slabs less than 600mm thick: 0.16% of the gross cross sectional area of the concrete;
- d) slabs greater than 600mm thick: 960mm² per metre width.

3.13.2.6 For shrinkage and early thermal movement in concrete in contact with the soil below ground where the structure itself is the water barrier, crack widths shall be limited to a maximum of 0.2mm.

3.13.2.7 Constituent materials for structural concrete (cementitious materials, aggregates, admixtures and water) shall comply with the relevant European Standards (ENs) and the additional requirements of this Standard.

3.13.2.8 High alumina cement shall not be used.

3.13.2.9 Reinforcement bar shall be used to provide an earth-electrode, when it is more economic than the alternative of using a dedicated earth-electrode, in accordance with BS 7430 and BS EN 62305, provided that:

- a) Any heating that will occur during electrical faults does not significantly affect the integrity or the design life of the Civil Engineering asset. To limit temperature rise to an acceptable level, it will be necessary to use connectors or welding to join reinforcement bars where the current passing is significant. The Profession Head – Power Engineering will provide on request advice on the magnitudes of currents to be expected. Where the current is significant, joining by lapping will not be satisfactory. The electrical design contractor shall be responsible for determining where low resistance joints are required and the maximum acceptable resistance values. The civil designer shall be responsible for determining the length and diameter of reinforcement, and hence the location and size of joints. Collaboration between the two parties will be necessary, and it is recommended that such collaboration commences at the earliest possible stage in the design process.

- b) Where reinforcing bar at a site is required to provide two or more separate earth-electrodes to facilitate testing, there shall be no metallic connection between the separate electrodes. There shall be at least 1 metre free of metal between the adjacent lengths of reinforcing bar forming the separate electrodes.
- c) A 50x6 mm copper tape or a 300 mm² copper cable shall be securely fixed to the reinforcing, to make a low resistance electrical connection. To avoid corrosion, the joint between the copper and the steel shall be entirely within the concrete, and the joint shall have the cover specified in 3.9.2.4, above. The tape or cable shall be brought outside the concrete and fixed to the surface, so as to provide an accessible point for connection to the earthing system

3.13.3 Structural steelwork

3.13.3.1 General

- a) Steelwork for structures shall comply with the relevant European Standards (ENs), LU Standard S1051 and the additional requirements of this Standard;
- b) All steel shall comply with BS EN 10025-1 to -6 as appropriate, except that rimming steel shall not be used;
- c) Steelwork shall be to BS EN 10025-1 to -6 and options selected shall be appropriate for the scope of works proposed;
- d) For structures other than bridges, the particular grade of steel used shall be determined in accordance with BS EN 1993-1-1 table 3.1;
- e) Parent metal for welded joints that cause high tensile through thickness strains to occur shall be fabricated from steel that meets the quality level Z35 of BS EN 10164. In addition, all steel plates and sections involved shall be tested to ensure that the affected zones are free from lamination and inclusions. The acceptance level for these tests shall be the same as for the welds;
- f) Structural hollow sections of quality JR and JO shall have option 1.6 of BS EN 10210 clause 5.2 invoked when the steel is ordered;
- g) Only new steel and fastenings shall be used.
- h) Architectural finishes around critical structural joints or connections shall be such that they can be easily removed to enable regular inspection of the joint.

3.13.3.2 Protection of metal structures against corrosion

All metal structures NOT in Sub-surface railway stations nor in tunnels nor in covered ways shall be completely repainted either at 15 year intervals or when the condition rating for the paint carried out in accordance with the extent and severity rating system set down in LU standards S1051, S1053 and S1057 is B2 or worse, whichever is the sooner, unless a rigorous whole life costing exercise demonstrates that an alternative approach is more appropriate.

3.13.3.3 Protective treatment of metal structures against corrosion

- a) Metal structures shall be maintained and painted to protect them from deterioration;

Note: Guidance on the preparation and painting of structures can be obtained from LU Technical Specification T0005, Bridges and Structures – Materials and Workmanship.

- b) Any paint systems used to protect LU structures shall not contain more than 0.5% of lead as PbO or more than 0.15% total lead;
- c) At the time of repainting, all cast iron spanning structures that are not in stations shall be painted white;
- d) The following types of Paintwork Inspections shall be carried out:
- I) General Paintwork Inspections;
 - II) Detailed Paintwork Inspections.
- e) General Paintwork Inspections shall ensure that at least 75% of the elements of the structures are examined;

Note: General Paintwork Inspections may be carried out in conjunction with General and Principal Inspections as set out in the asset specific LU Civil Engineering Standards.

- f) A General Paintwork Inspection report shall be prepared detailing locations and degree of paint defects, together with recommendations of whether a Detailed Paintwork Inspection is required and the time interval until the next General Inspection;
- g) Reasons for recommending a Detailed Paintwork Inspection include:
- I) severe corrosion of significant parts of the structure;
 - II) flaking, cracking or blistering to bare metal;
 - III) flaking, cracking or blistering on 5% or more of the structure.
- h) Detailed Paintwork Inspections shall be undertaken at maximum 8 yearly intervals or when the need is indicated by General Paintwork Inspections;
- j) Detailed Paintwork Inspections shall be carried out by professionally qualified paint technologists;
- k) Detailed Paintwork Inspections shall include:
- I) an inspection of all external surfaces of the structure visually and any internal accessible surfaces non-destructively;
 - II) measurement of total paint thickness on at least 75% of the different members of the structure;
 - III) photographs of significant defects or features of the structure.
- m) A Detailed Paintwork Inspection report shall be prepared detailing locations and degree of paint defects, together with recommendations of the time interval until the next inspection and time scale for repainting the structure.

3.13.3.4 Avoidance of Corrosion Caused by Stray Electric Currents



Measures shall be taken to avoid unacceptable corrosion of buried metal structures, including the steel in reinforced concrete due to stray electrical currents. These measures may include the measurement or monitoring of current, or of the electrode potential of the structure. This may necessitate the installation of hardware to enable such measurement or monitoring to take place during the life of the structure. The Profession Head - Power Engineering should be requested to provide advice on such matters at an early stage in the design process.

3.13.4 Brickwork and blockwork

- 3.13.4.1 Reference shall be made to LU Standard S1053 for the general requirements for brickwork and blockwork.
- 3.13.4.2 Reference shall be made to LU Standard S1057 for the design requirements of free standing walls in brickwork and blockwork.
- 3.13.4.3 Lightweight blocks (less than 1200 kg/m³) shall not be used in public areas.
- 3.13.4.4 Components and materials that make up brickwork and blockwork shall comply with the relevant British Standards.

3.13.5 Structural timber

Note: This section defines the general requirements for structural timber for civil engineering works. It does not cover the design of timber in track formation. For longitudinal bridge timbers and packings, reference should be made to LU Standard **S1157**.

- 3.13.5.1 Reference shall be made to LU Standard S1053 for the general requirements for structural timber.
- 3.13.5.2 The selection of timber species and preservatives shall take due regard of the design life requirement for structural timber and the environment to which it is exposed.
- 3.13.5.3 Steelwork used in association with timber construction shall, where applicable, comply with the requirements of Section 3.9.3 of this Standard and shall be protected from corrosion.

Note: Species of timber that produce resins could have a corrosive effect on steel and should be separated from the steelwork.

3.14 Cutting, grinding, drilling, fixing to and supporting from existing structures and inspection access

- 3.14.1 Existing structures shall not be adversely affected by cutting, grinding, drilling, fixing to and supporting from existing structures. To this effect the requirements contained

within S1063 Civil Engineering – Cutting, grinding, drilling, fixing to and supporting from existing structures, shall be followed at all times.

- 3.14.2 Where opening up of structures is required to investigate the structural condition within enclosed voids, suitable openings and access covers shall be incorporated in any making good to enable inspection in the future.

3.15 Decommissioning, demolition and site clearance

- 3.15.1 The Supplier shall ensure that the effects of civil decommissioning works on operational railway, adjacent buildings, structures, utilities and facilities and Outside Party assets are assessed and mitigations incorporated into the works as appropriate.
- 3.15.2 Demolition and site clearance works shall comply with all statutory requirements, the relevant British Standards and LU Standards.
- 3.15.3 The impact that demolition and site clearance works have on the operational railway and the environment, particularly with respect to dust and noise shall be minimised.

3.16 Access covers

Note: This Section deals with the general requirements for access covers associated with civil assets. The specific requirements for track drainage catchpits are given in LU Standard S1052.

- 3.16.1 Access covers and frames shall have the same design life as the asset being accessed or a minimum design life of 20 years, whichever is greater.
- 3.16.2 Where the cover will be subject to wear, wear resistance shall be the same as the surrounding area.
- 3.16.3 Covers shall be designed for ease of maintenance and shall not require the regular application of grease or similar lubricants.
- 3.16.4 Proprietary covers shall be Kitemarked to BS EN 124 and be manufactured by an ISO 9000 registered company.
- 3.16.5 Cover and frames for use in areas subjected to vehicle and pedestrian loading shall comply with the relevant parts of BS EN 124 and:
- be Class A for carriageways and car parks or Class B in areas of light traffic and slow moving heavy traffic;
 - steel fabrications shall be zinc sprayed or galvanised;
 - be designed for easy removal.
- 3.16.6 Infill type steel covers and frames shall not be used.
- 3.16.7 The following specific requirements shall apply to access covers:
- 60 minute fire resistance in compartmented areas;

- b) slip resistant finish that matches the slip resistance of the surrounding flooring to comply with the requirements of LUL Standard 1-135;
- c) sufficient strength to match the design loading as defined in Clause 3.12.5 and LU Standard S1051;
- d) shall not present a trip hazard;
- e) shall have a minimum clear opening of 600mm x 600mm;
- f) shall in all areas to which the public have access prevent unauthorised access by being lockable or by other means;
- g) shall be non rocking.

3.16.8 For fire safety reasons:

- a) the spacing of covers designed to provide egress shall not exceed 60m;
- b) each separate compartment shall have a minimum of one cover or two covers where the maximum distance from the single cover exceeds 30m.
- c) covers shall be capable of being opened from below by one person in the event of an emergency.

3.16.9 In shallow chambers, where maintenance work is to be undertaken from above, the cover size shall be increased to a minimum of 600mm x 900mm but shall match the chamber size wherever possible.

3.17 Service crossings

3.17.1 Service Authorities shall refer to LU Standard S1023 for requirements relating to the laying of Service Crossings.

3.18 Grouting to control seepage in existing tunnels and structures

3.18.1 Design

3.18.1.1 Grouting works to control seepage in tunnels or structures shall follow an engineering design process to ensure a specified output is produced. The standard engineering practice of; designed, checked and approved shall apply to the design of all grouting works. However the scope of the design documentation produced shall be commensurate to the size, scale, complexity and risk of the grouting works.

3.18.1.2 The design process shall ensure the Grouting Designer establishes the purpose and extent of the works and determines the most appropriate material and grouting technique for all seepage control works. A CDS shall be prepared as described in 3.2.1.

3.18.1.3 Civil Engineering Guidance Document G1417 – Grouting to control seepage in tunnels and structures provides direction to the Designer on the factors to be considered in designing the control measures.

3.18.1.4 Grouting works shall be undertaken in accordance with Civil Engineering technical specifications T-0005 – Bridges and Structures Materials and workmanship and T-0006 – Deep Tube Tunnels materials and workmanship.



3.18.1.5 No grouting works shall be undertaken to expanded pre-cast concrete or flexible cast iron tunnel linings. These linings are readily identified by the absence of bolts connecting the segments together.

3.18.1.6 If the tunnel/structure to be grouted is found to be damaged following a visual Inspection/defect survey, advice shall be sought from the relevant LU Profession Head before any physical works take place.

3.18.2 Materials

3.18.2.1 Grouting must only be undertaken using materials on London Underground's Approved Product Register (www.lu-apr.co.uk). Where there is a case for using a material which is not on the Approved Product Register an application must be made to add the material to the register.

3.18.2.2 For grouting works, all grouting products must be approved prior to use.

3.18.2.3 All grout materials shall be used in accordance with manufacturer's guidelines and instructions and must have a certificate of conformity.

3.18.3 Plant and Material

3.18.3.1 All apparatus to be used shall meet the requirements of LU standards 1-172 Plant, Tools and Equipment – Performance and design and 1-173 Plant, Tools and Equipment – Inspection and maintenance. Calibration certificate and maintenance records will be required for the apparatus to be used for the works.

3.19 Evidence of compliance

Compliance with the requirements of this standard shall be demonstrated to LU by each party contracted to LU. Additionally LU may audit compliance as part of its surveillance regime.

3.20 Risk

3.20.1 Civil Engineering Risk Assessment

Identification, recording assessment and management of risk to safety and to service loss is an essential requirement in all aspect of managing civil engineering assets. LU operates linked processes to manage all aspects of risk including:

- a) Safety
- b) Environmental
- c) Commercial
- d) Asset Management
- e) Outside/Third Parties
- f) Project management

A common requirement for managing civil assets is that the risk owner understands and accepts their responsibilities for managing risk (within the terms of reference of their ownership, custody or engagement); and operates auditable process to

demonstrate that aspects of risk for which they are responsible are adequately managed.

Risk owners shall ensure that process is in place and operated (to the degree of detail justified by the potential conditions, environment and uncertainty) to identify and assess risk arising from any civil asset related activity; and to develop and implement suitable controls and mitigations that manage the risk to tolerable/acceptable levels. In terms of safety risk the over riding requirement is that the risk is managed as low as is reasonably practicable (ALARP) as set out in LU Standard S1521- Safety Decision Making. Risk management process shall consider all aspects of risk presented by the asset or activity specifically including (but not limited to) items a) to f) above.

4 Responsibilities

- 4.1 The Profession Head - Civil Engineering shall be responsible for ensuring that a co-ordinated programme of audit and inspection is implemented to ensure compliance with this and other related standards.
- 4.2 The Profession Head - Civil Engineering shall have sole responsibility for this standard.
- 4.3 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 Profession Head - Civil Engineering.
- 4.4 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.

5 Supporting information

5.1 Background

- 5.1.1 This Standard is one of a suite of eight (8) 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 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
1-054	Civil Engineering – Earth Structures
S1055	Civil Engineering – Deep Tube Tunnels and Shafts
S1056	Civil Engineering – Pumping Systems



S1057	Civil Engineering – Miscellaneous Assets
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- 5.1.3 The following Manuals for Good Practice have also been prepared to give guidance and explanation for each of the above Standards.

Number	Title
G-050	Civil Engineering – Common Requirements
G0051	Civil Engineering – Bridge Structures
G-052	Civil Engineering – Gravity Drainage Systems
G0053	Civil Engineering – Building and Station Structures
G-054	Civil Engineering – Earth Structures
G055	Civil Engineering – Deep Tube Tunnels and Shafts
G-056	Civil Engineering – Pumping Systems
G0057	Civil Engineering – Miscellaneous Assets
G0058	Civil Engineering - Technical Advice Notes
G1417	Civil Engineering – Grouting to control seepage in tunnels and structures

5.2 Safety considerations

- 5.2.1 Safety aspects shall be considered throughout all civil engineering activities and due account shall be taken of the Construction (Design and Management) Regulations 2007.

5.3 Environmental considerations

- 5.3.1 All activities 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 literature issued by relevant statutory bodies.
- 5.3.2 The operational noise and vibration effects of any new infrastructure on adjacent properties shall be considered at the design stage. See guidance document G1323 – Noise and Vibration Asset Design Guidance, for more information.
- 5.3.3 The Supplier shall consider whether the proposed works has the risk of increasing the environmental impact on LU, for example increased surface water run-off from the development; changes in ground water levels; stability of earth structures or reduced tunnel ventilation.

5.4 Customer considerations

- 5.4.1 Civil assets shall provide effective support to the track formation, service posts, etc, and maintain the structure gauge requirements, as described in this Standard, so as to allow uninterrupted and smooth operation of the railway to meet the needs of Customers.



- 5.4.2 Consideration shall be given to customer facing requirements in the design of both permanent and temporary works for Civil engineering assets.

6 References

6.1 References

6.1.1 Statutory documents

Document no.	Title
	The Railways and Other Guided Transport Systems (Safety) Regulations 2006
	Construction (Design and Management) Regulations, 2007

6.1.2 British Standards

Document no.	Title
BS EN 13001-2:2004	Cranes: General design principles and requirements.
EN 1991: Eurocode 1	Actions on structures
BS 5930: 1999	Code of practice for site investigations
EN 1993: Eurocode 3	Design of Steel structures
BS EN 1993-1-1:2005	Design of steel structures. General rules and rules for buildings.
EN 1994: Eurocode 4	Design of composite steel and concrete structures
BS 5974: 1990	Temporarily installed suspended scaffolds and access equipment
BS 7121-1: 1989	Code of practice for safe use of cranes – Part 1: General
BS 7121-2: 2003	Code of practice for safe use of cranes – Part 2: Inspection, testing and examination
BS 7121-3: 2000	Code of practice for safe use of cranes – Part 3: Mobile cranes
BS 7121-4: 1997	Code of practice for safe use of cranes – Part 4: Lorry loaders
BS 7121-5: 1997	Code of practice for safe use of cranes – Part 5: Tower cranes
BS 7430: 1998	Code of practice for earthing
BS EN 8500-1: 2002	Complementary British Standard to BS EN 206-1 - Part 1: Method of specifying and guidance for the specifier
BS EN 8500-2: 2002	Complementary British Standard to BS EN 206-1 - Part 2: Specification for constituent materials and concrete
BS EN 124: 1994	Design requirements, type testing, marking and quality control for gully tops and manhole tops for vehicular and pedestrian access
BS EN 10025-1: 2004	Hot rolled products of structural steels. General technical delivery conditions
BS EN 10025-2: 2004	Hot rolled products of structural steels. Technical delivery conditions for non-alloy structural steels
BS EN 10025-3: 2004	Hot rolled products of structural steels. Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels
BS EN 10025-4: 2004	Hot rolled products of structural steels. Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels



Document no.	Title
BS EN 10025-5: 2004	Hot rolled products of structural steels. Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
BS EN 10025-6: 2004	Hot rolled products of structural steels. Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition
BS EN 10164: 2004	Steel products with improved deformation properties perpendicular to the surface of the product — Technical delivery conditions
BS EN 10210-1:1994	Hot finished structural hollow sections of non-alloy and fine grain structural steels — Part 1: Technical delivery requirements
BS EN 10210 -2:1997	Hot finished structural hollow sections of non-alloy and fine grain structural steels Part 2. Tolerances, dimensions and sectional properties
BS EN 12620: 2002	Aggregates for concrete
BS EN 12811-1:2003	Temporary works equipment. Scaffolds – performance requirements and general design

6.1.3 Other national standards

Document no.	Title
RT/CE/S/039	Specification R.T. 98 – Protective Treatment for Railtrack Infrastructure
RT/CE/C/002 issue 4	Application and Re-Application of Protective Treatment to Railtrack Infrastructure
ISO 9000	Quality management systems
BD 37/01	Highways Agency DMRB Loads for Highway Bridges

6.1.4 LU company documents

Document no.	Title
1-691	Information
1-085	Fire Safety Performance of Materials
S1004	Signage for Operational Purposes
1-027	Site Hoarding, Fencing and Barriers
1-031	Asset Condition Assessment And Certification
S1023	Infrastructure Protection
1-135	Premises – Finishes
S1156	Gauging and Clearances
S1157	Track – Performance, Design and Configuration
1-172	Plant, Tools and Equipment – Performance and design
1-173	Plant, Tools and Equipment – Inspection and Maintenance
1-106	Earthing and Bonding
S1371	Station Planning
1-334	Customer Facing Aspects of Temporary Works at Stations
1-552	Contract QUENSH Conditions
S1548	Safety Critical Work
S1642	Temporary Approved Non-Compliance



Document no.	Title
S1622	Glossary of terms and abbreviations
S1538	Assurance
S1041	Provision of Engineering Asset Information
S1060	Civil Engineering – Bridges and Structures Inspection Standard

6.1.5 Other

Document no.	Title
	Burland, J.P. and Wroth, C.P., Settlement of Buildings and Associated Damage, Proceedings of a Conference on the Settlement of Structures, Cambridge, 1974, pp 611 – 54 and 764 – 810.
ISBN 9780727741189 Details at www.britishtunnelling.org.uk	Monitoring underground construction: A best practice guide (BTS)
Association of Interior Specialists Construction Fixings Association	Best Practice Guide – Selection and installation of top fixings for suspended ceilings

6.2 Abbreviations

The following abbreviations are created:

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

Abbreviation	Definition	Source
ACAC	Asset Condition Assessment and Certification	a
ALARP	As Low As Reasonably Practical	a
AIP	Approval in Principle	a
ASCE	American Society of Civil Engineers	a
BD	Bridges Directive	a
BS	British Standard	a
CDM	Construction (Design and Management) Regulations	a
CDS	Conceptual Design Statement	a
CIRIA	Construction Industry Research and Innovation Association	a
EC	European Commission	a
EN	European Norm	a
ISO	International Standards Organisation	a
LFEP	London Fire Emergency Planning Authority	a
LCS	Location Coding System	a
LU	London Underground	a
MEAV	Modern Equivalent Asset Value	a

Abbreviation	Definition	Source
RAV	Relative Asset Value	a
SCL	Sprayed Concrete Lining	a
TANC	Temporary Approved Non-Compliance	a
TBM	Tunnel Boring Machine	a

6.3 Definitions

The following topic specific definitions are created:

- a) within the engineering function and are listed in S1622;
- b) from published sources.

Term	Definition	Source
ACAC	the process through which the overall Condition of the total population of Operational Assets is determined and recorded; and provides evidence that they have been managed to an agreed Asset Management Regime.	a
Analytical Assessment	the numerical evaluation of an asset(s) through a formally defined and industry recognised analytical process to assess whether an asset meets its Required Duty as set out in LU Standards or, where no LU Standards exist, through compliance with British Standards or standard industry practices, accepted by LU. Analytical Assessments include structural and hydraulic analysis.	a
Asset Control Limits	the predefined values, based on assessment, relating to safety and serviceability considerations that instigate a review of risk to the operational railway and third party assets.	b
Asset Definition	an hierarchical listing of the Elements which make up the ACAC asset types. The Asset Definition does not necessarily include a listing of specific assets; however the sum total of Elements in the Asset Definition must cover every individual asset within the ACAC asset type. The Asset Definition must be consistent with LU Standard 1-038 (Asset Classification and Certification). This is classified as Controlled Type 1 Information.	a
Asset Register	a group of information sources, which in combination, permit a maintaining Supplier to identify its engineering asset base and the attendant safety, legal and commercial risks over the whole life of the assets.	a
Assurance	the extent that defined requirements have been complied with and that controlled processes have been followed in achieving the deliverables.	a



Term	Definition	Source
Assurance Processes	the processes employed by a Supplier to provide independent Assurance of the extent of compliance with requirements and effectiveness of the Assurance process.	a
Condition	the state of an asset in terms of its ability to meet its Required Duty on account of its physical or other attributes.	a
Condition Assessment	the evaluation of the Condition of an asset(s) through a formally defined and controlled process. The process shall include all relevant information, site inspection surveys and Analytical Assessments where required by this or any other LU Standard.	a
Condition Classification	the grading of a Generic Concern, ranging from E1/2 to A Condition Classification as defined in LU Standard 1-031. For the avoidance of doubt, the completed Condition Classification must include the analytically assessed capacity.	a
Critical Boundary	the edge of the zone or area of land in respect of which LU has concern regarding the operation of tall Plant and equipment, including cranes. Each case is to be considered on its merits to determine the appropriate Critical Boundary for the site in relation to the nature of the LU asset to be protected and the type of equipment and operations planned.	a
Detailed Paintwork Inspection	detailed visual inspection of paintwork including measurement of paintwork thickness and adhesion.	a
Element	the summation of the Items inspected and scored in accordance with Section 3.3 of the relevant asset-specific Civil Engineering standard.	a
Foundation Documents	a set of Controlled Type 1 Information issued periodically by LU, which comprise the Asset Definition, Required Duty, Generic Concern List, the Basis of MEAV Calculation and Specific Concern List.	a
General Inspection	a visual check of those parts of the structure which are readily accessible.	a
General Paintwork Inspection	visual inspection of paintwork	a
Generic Concern	a concern (expressed in terms of failure to meet Required Duty) which acts as a basic prompt for Suppliers to develop Specific Concerns for the Operational Assets for which they shall be responsible. Generic Concerns lists are circulated to all Suppliers as part of the process to assure the ACAC is complete, as Controlled Type 1 Information.	a
Grey Asset	means those Assets which have a grey assets condition category (as described in Category 1 Standard E1501) as categorised in the Asset Condition Assessment 2000/01;	a
Grey Civil Asset	Operational Asset or Operational Asset parts which do not have a completed Condition Assessment, which includes a full asset Analytical Assessment.	a
Ground Investigation	exploration and recording of the location and characteristics of soil, rock and ground conditions.	a



Term	Definition	Source
Inspection for Analytical Assessment report	a report that sets out the numerical evaluation of an asset(s) through a formally defined and industry recognised analytical process as set out in LU Standards or, where no LU Standards exist, through compliance with British Standards or standard industry practices, accepted by LU. Analytical assessments include structural and hydraulic analysis.	a
Item	part of a structure that is inspected and scored in accordance with Section 3.3 of the relevant asset-specific Civil Engineering standard. Examples of Items are given in the Inspection Proformas of the relevant asset-specific Civil Engineering Manual of Good Practice.	a
Item of Work	a single Item defined separately, or a group of Items of the same or similar nature defined together, comprising a separately ordered work package within a contract.	a
Listed Building	A building on the Statutory List of Buildings of Special Architectural or Historical Interest.	b
Maintenance	the undertaking of preventative or corrective action, or both, including repairs, to ensure that the condition of the asset continues to meet the Required Duty over the service life of the asset.	a
Maintenance Work Annual Completion Certificate	the certificate issued in respect of the Annual Maintenance Work.	a
Maintenance Work Listing	the listing of the total amount of maintenance work on each asset completed in a financial year by an individual Supplier.	a
MEAV	to enable the proportion of each asset type with a particular condition to be classified and recorded, a common currency is required. This is the Modern Equivalent Asset Value, which is the current estimated cost of an asset, or part of an asset, on the basis of replacement or renewal with an asset that meets all mandatory Standards and legislative and/or statutory requirements, and will perform the Required Duty. The basis for calculating MEAVs for all Operational Assets is classified as Controlled Type 1 Information. The MEAVs for all Operational Assets will vary dependent on the quantity and type of assets within each Supplier; hence this is classified as Controlled Type 2 Information.	a
Operational Asset	An asset that is used or in existence for the delivery of, or direct support to, the railway service. This includes a fixed asset that is not currently used for the railway service.	a
Outside Party	An individual, organisation or company whose assets or business could be affected by LU works or who is proposing works on his own land or as part of his business which may have an affect on LU assets or services. The definition does not include those working as suppliers (or within the supply chain of a supplier) to London Underground.	a
Plant	equipment or machinery used for construction or maintenance purposes or for transportation of materials	a



Term	Definition	Source
Required Duty	a statement of the requirements placed on an Operational Asset type in order to deliver satisfactory service to the railway and supporting services and is classified as Controlled Type 1 Information. The Required Duty is prepared in accordance with a generic guidance list and includes the full range of functions and interactions with other ACAC Operational Asset types. The Required Duty is not limited to engineering aspects of performance.	a
Safety Critical Civil Engineering Activity	a particular type of Safety Critical Work related to civil engineering activities	a
Safety Critical Work	the general name given to any work which comes under the scope of the Railways (Safety Critical Work) Regulations 1994.	a
Service Authority	any party external to LU, providing public or private gas, water, communications, power or other services. This shall include bodies more generally known as statutory undertakers.	a
Service Crossing	a sewer, water or gas pipe or power, electrical or communication cable or any other similar conduit or service which is the property or responsibility of others and which crosses under or over the railway and includes any extensions thereof under or over LU land.	a
Specific Concern	a concern developed by a Supplier as a statement of how a particular Operational Asset type, Operational Asset type Element or individual Operational Asset fails to meet its Required Duty. Each Specific Concern shall be linked to a Generic Concern as part of the process to assure the ACAC is complete.	a
Strengthening and Renewal	corrective action to address life-expired assets or elements in accordance with the Supplier's programme for lifecycle management or a change in use, function or duty of the asset or element.	a
Sub-Standard Asset	a structure for which actions to restore or enhance the safety of the structure are required following completion of an assessment.	b – RT/CE/P/01 6
Supplier	Supplier to London Underground, the primary organisation or individual that is selected to deliver a product, service or facility to London Underground and contracting directly to London Underground. This includes Consultants, Contractors, Infracos and PFI Contractors and excludes organisations or individuals selected by and contracting directly to them.	a

6.4 Person accountable for the document

Person accountable for the document
Brian McGinnity - Profession Head – Civil Engineering

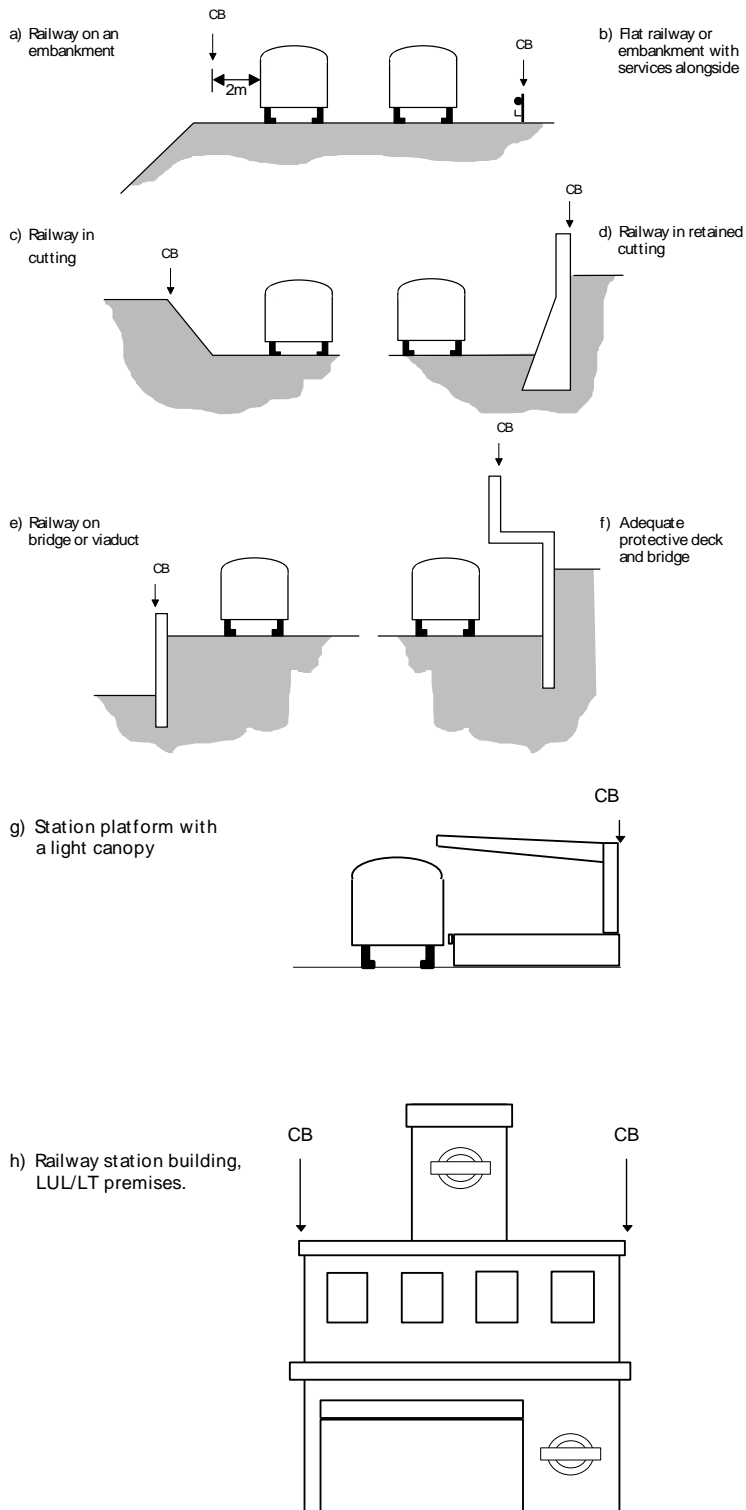


6.5 Document history

Issue no	Date	Changes	Author
1-050 A1	October 2007	Standard 2-01304-001 re formatted and re-numbered to 1-050, no technical changes have been made to the content other than changing references to other Standards where their numbers have changed. Authorised for use. Previous authorisation is valid	
1-050 A2	January 2009	Clause 3.9.3.2 d) added, ref PSC M1-01167. Authorised for use	
1-050 A3	July 2010	PSC S1-01282 Standard updated to include Written Notices WN/00771, WN/00809, WN/00735, WN/00538, WN/00602 PSC M1-01168 revised clause 3.5.1 PSC S1-01207 revised clause 3.9.3.2 and added 3.9.3.3 PSC S1-01334 inclusion of European Standards (ENs) Reformatted to new template	Graham Bessant
S1050 A4	October 2012	As per DRACCT No. 01088 Standard updated to include Written Notices WN-00682, WN-00736, WN-00815, WN-00983 and WN-01030. Many sections have been revised to reflect current engineering practice and align with other related standard updates. A new approval process to control the risk of tall plant working adjacent to the railway has been introduced.	Brian Seller
S1050 A5	March 2013	As per DRACCT No. 01749 Standard is updated to include requirements for grouting to control seepage in existing tunnels and structures.	Farid Achha
S1050 A6	October 2013	As per DRACCT 02094, Clauses 3 amended and reference to false ceiling fixings made.	Graham Bessant
S1050 A7	November 2013	As per DRACCT 02143, requirement added to include a Safety, Health and Environmental (SHE) box on all drawings.	Graham Bessant

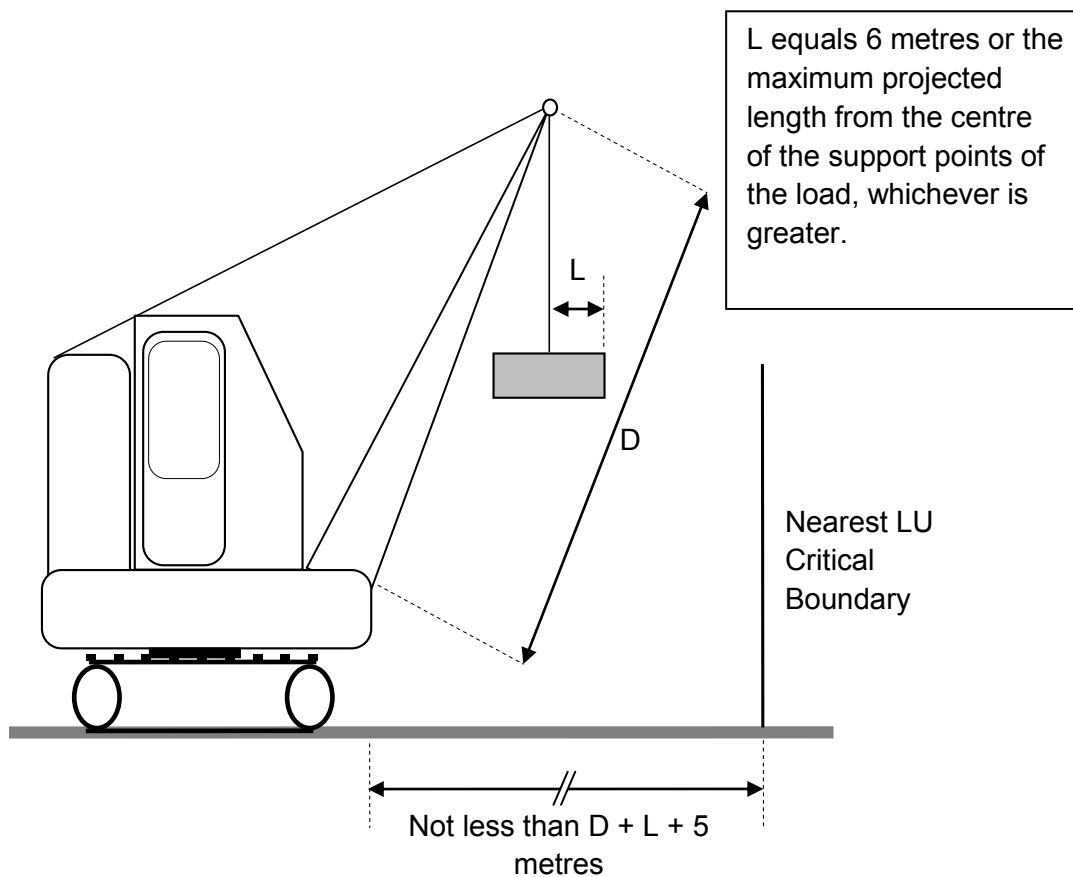
7 Attachments

7.1 Attachment 1 – Examples of the Critical Boundary (CB) (not to scale)



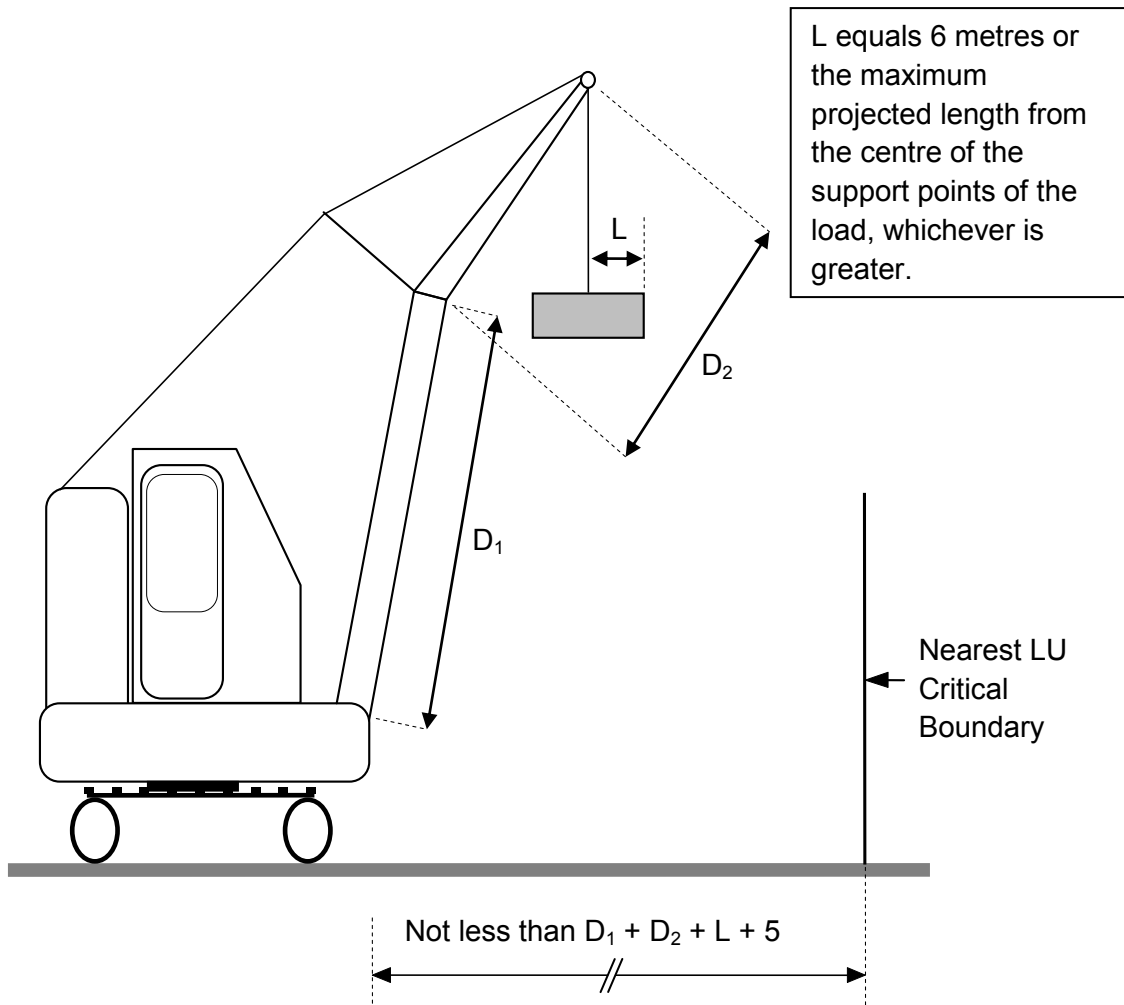
7.2 Attachment 2 - Typical critical boundary diagrams for cranes and other tall plant on or near the railway

Mobile crane



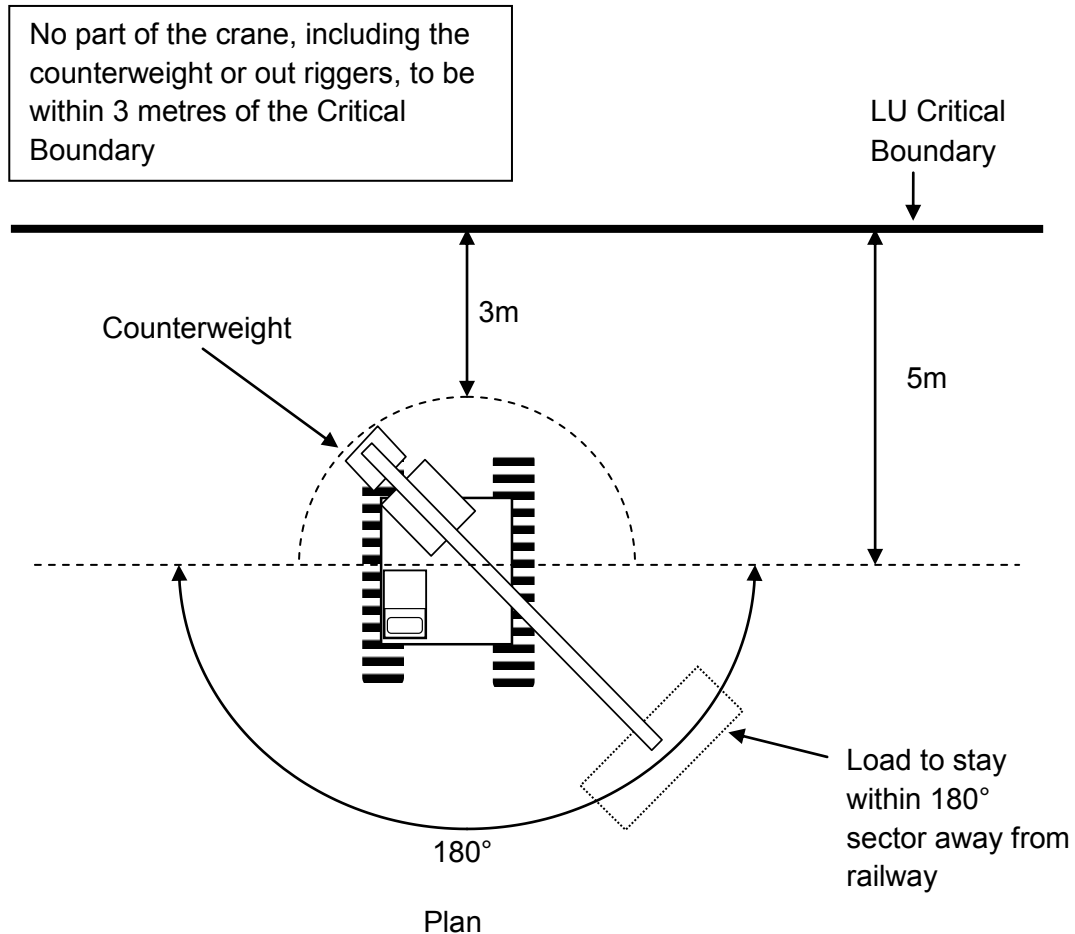
Not to scale or proportion

Mobile crane with fly jib



Not to scale or proportion

Mobile crane restricted to slewing within 180° arc facing away from the critical boundary

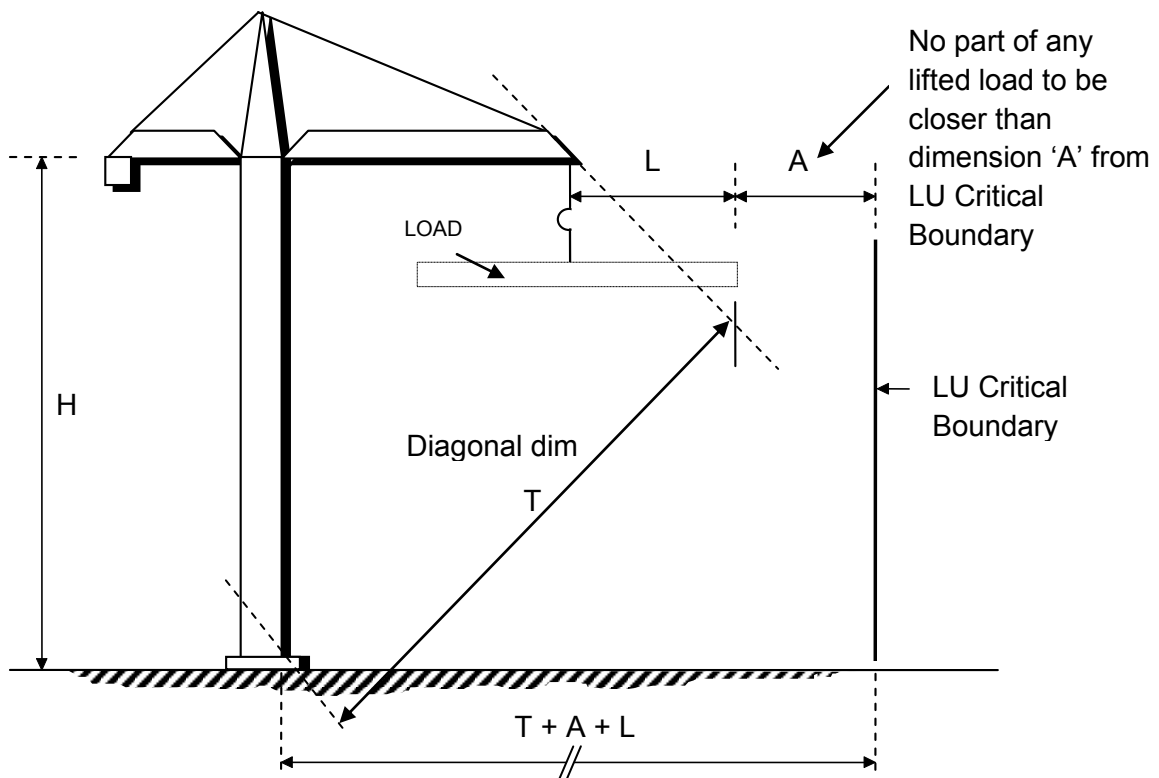


Not to scale or proportion

Free standing tower crane

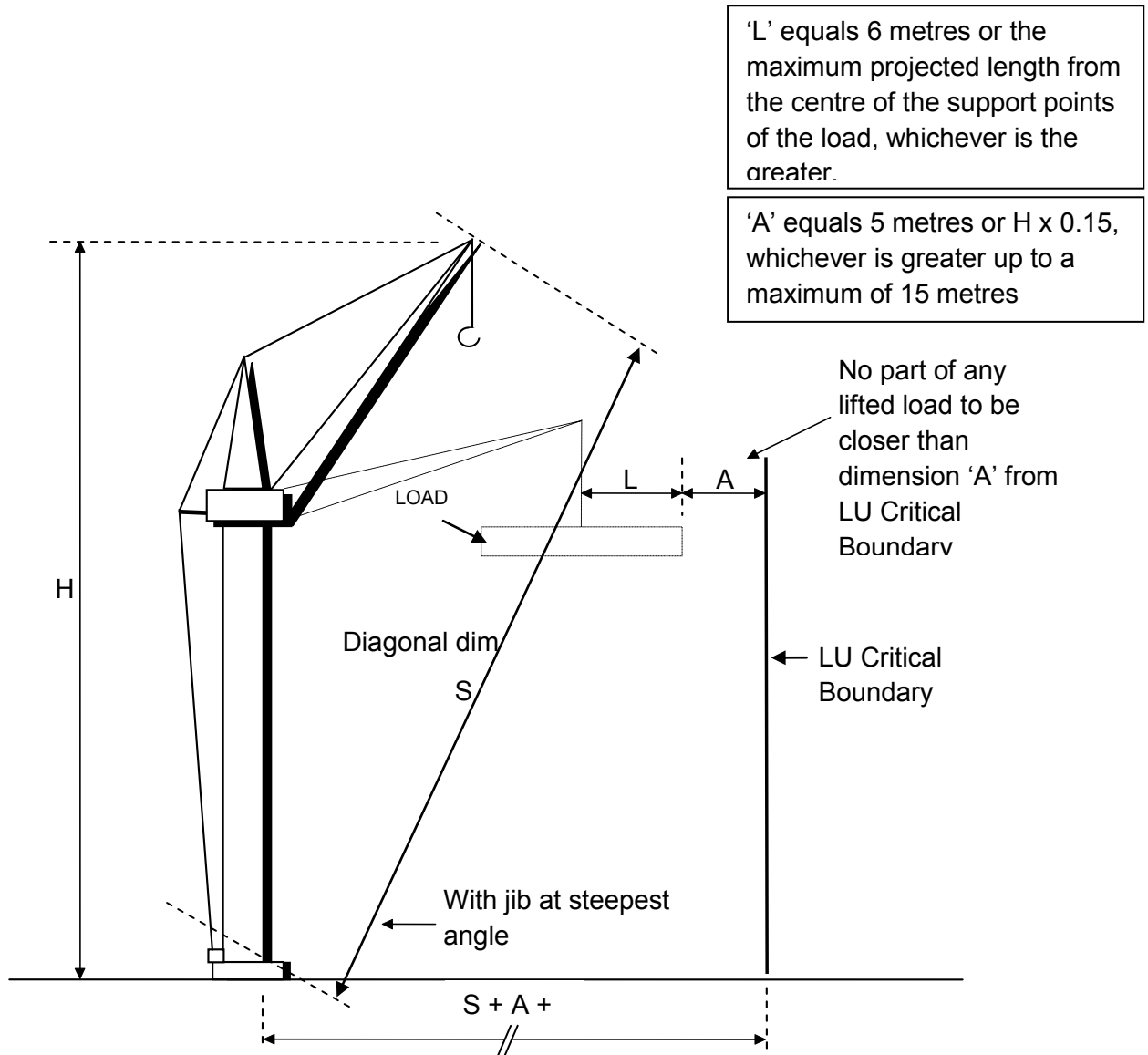
'L' equals 6 metres or the maximum projected length from the centre of the support points of the load, whichever is the greater.

'A' equals 5 metres or $H \times 0.15$, whichever is the greater up to a maximum of 15 metres



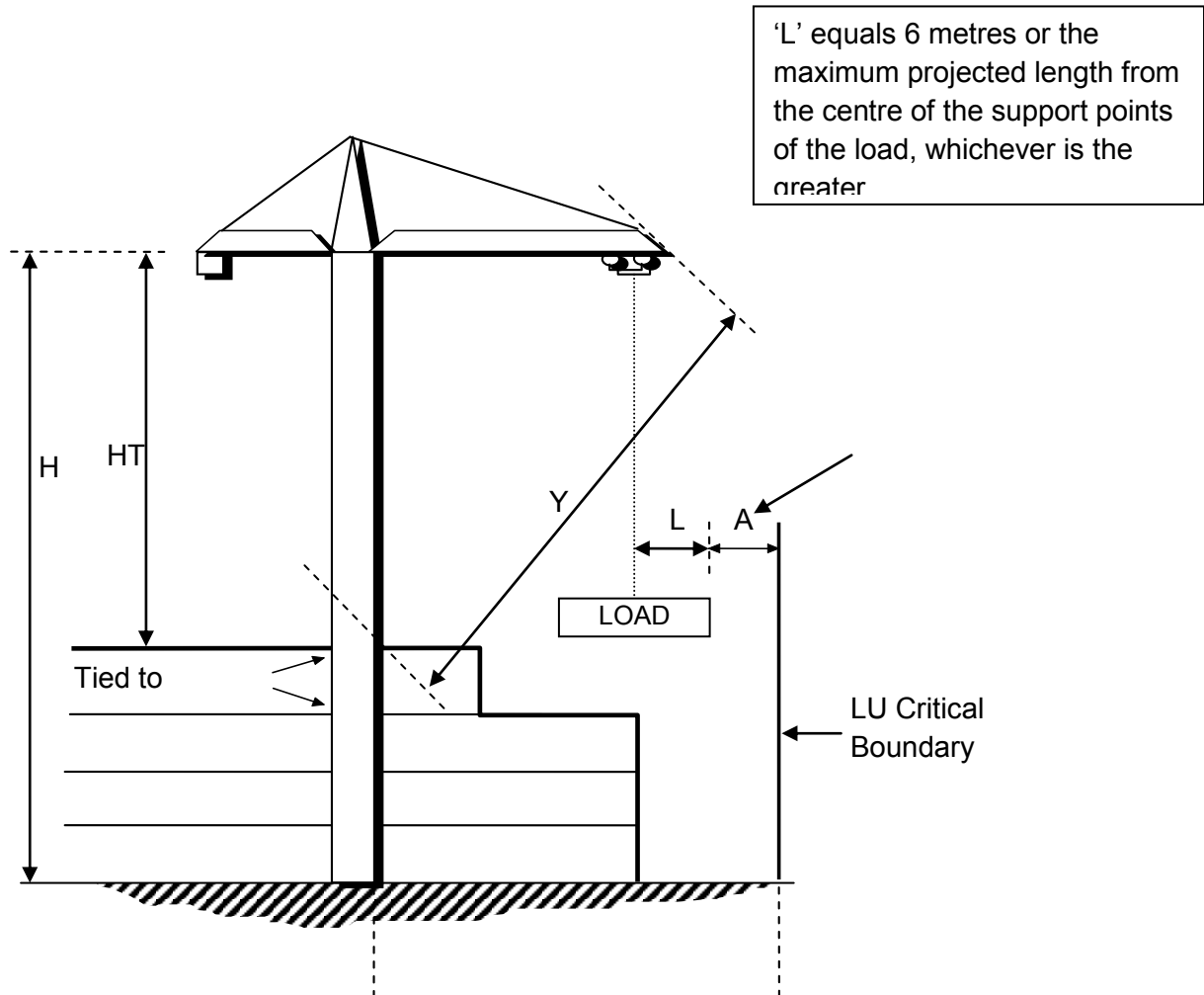
Not to scale or proportion

Luffing jib tower crane



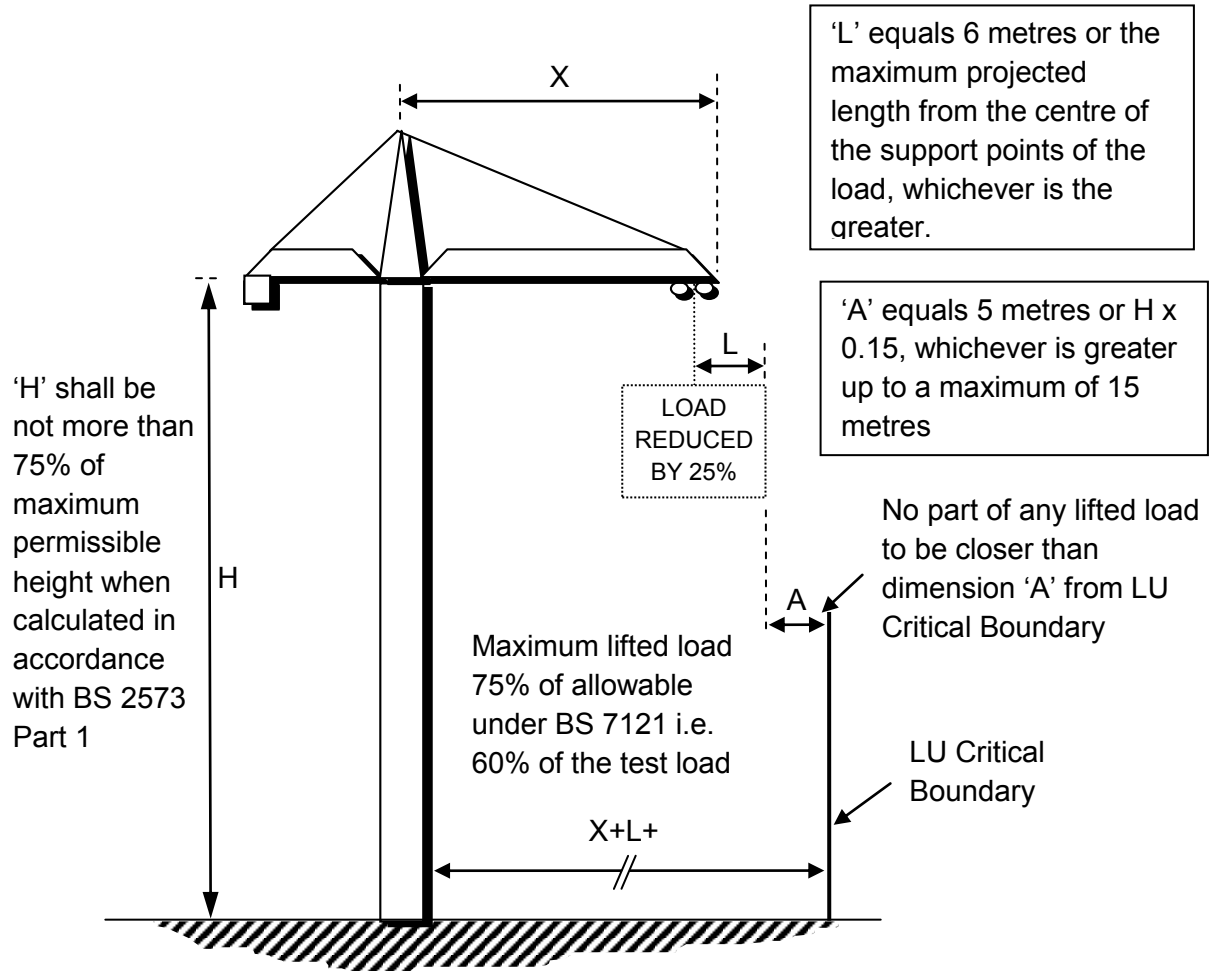
Not to scale or proportion

Tower crane tied to permanent structure



Not to scale or proportion

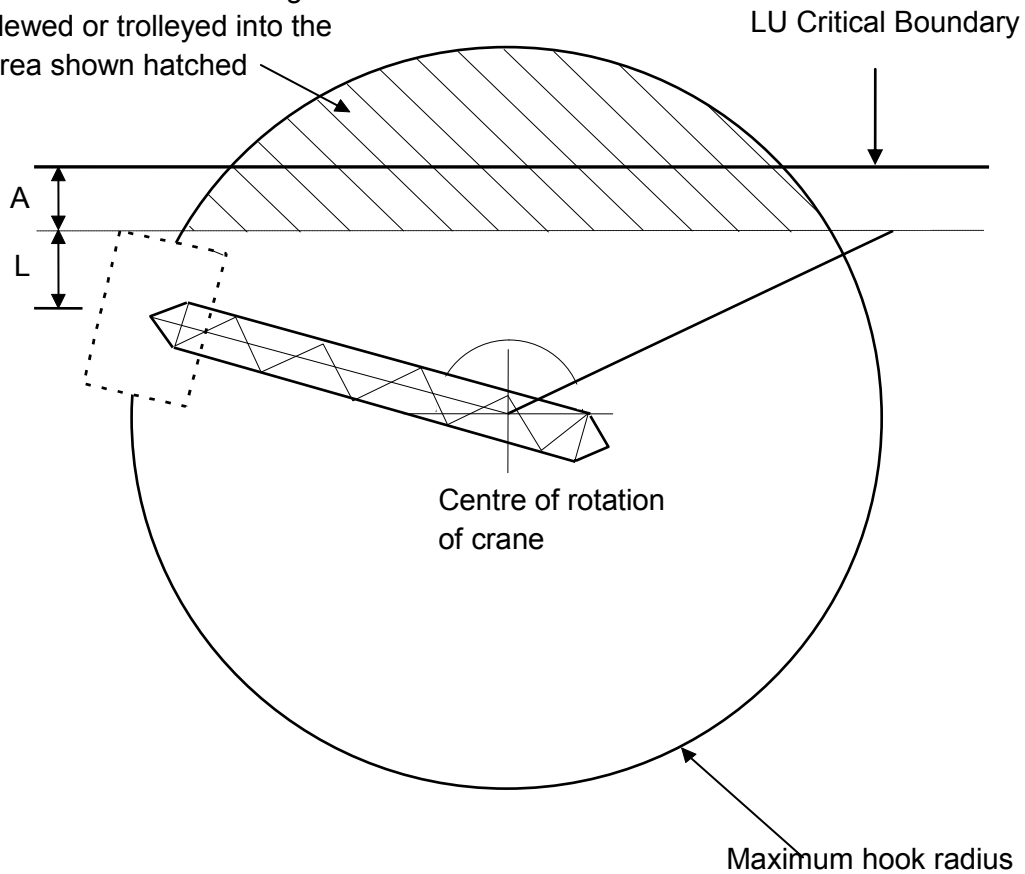
Free standing tower crane - down graded load



Not to scale or proportion

Limit switch requirements

Load physically prevented by limit switches from being slewed or trolleyed into the area shown hatched

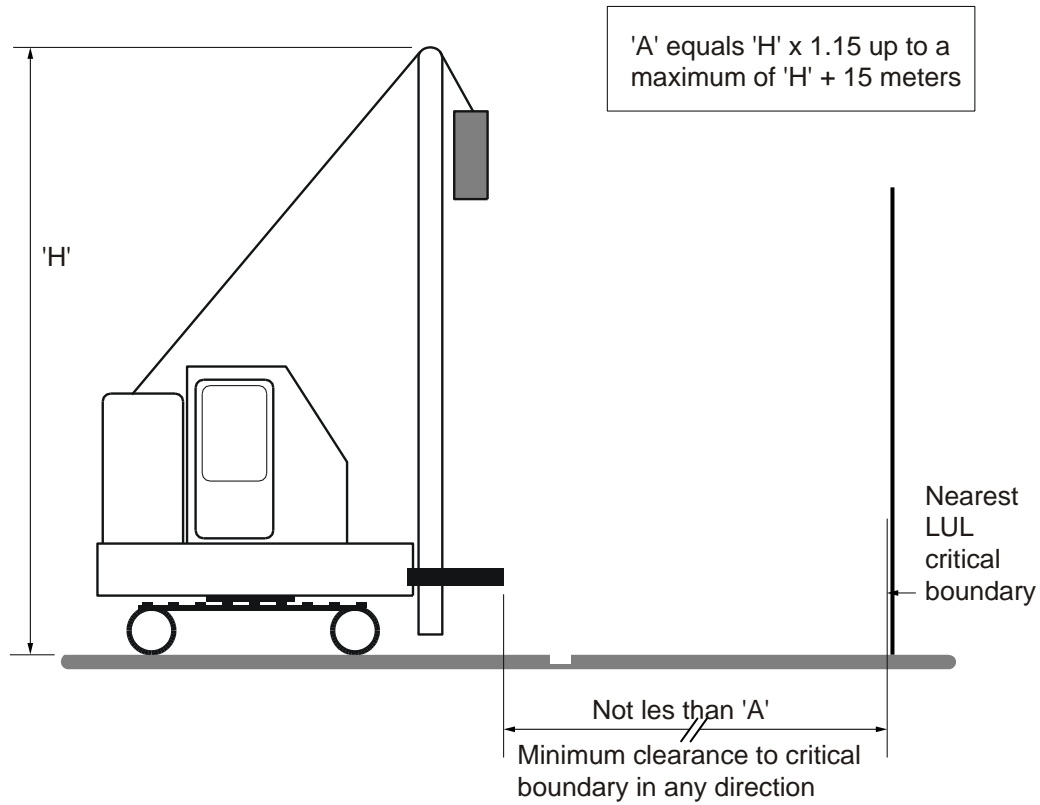


'L' equals 6 metres or the maximum projected length from the centre of the support points of the load, whichever is the greater.

'A' equals 5 metres or $H \times 0.15$, whichever is the greater up to a maximum of 15 metres

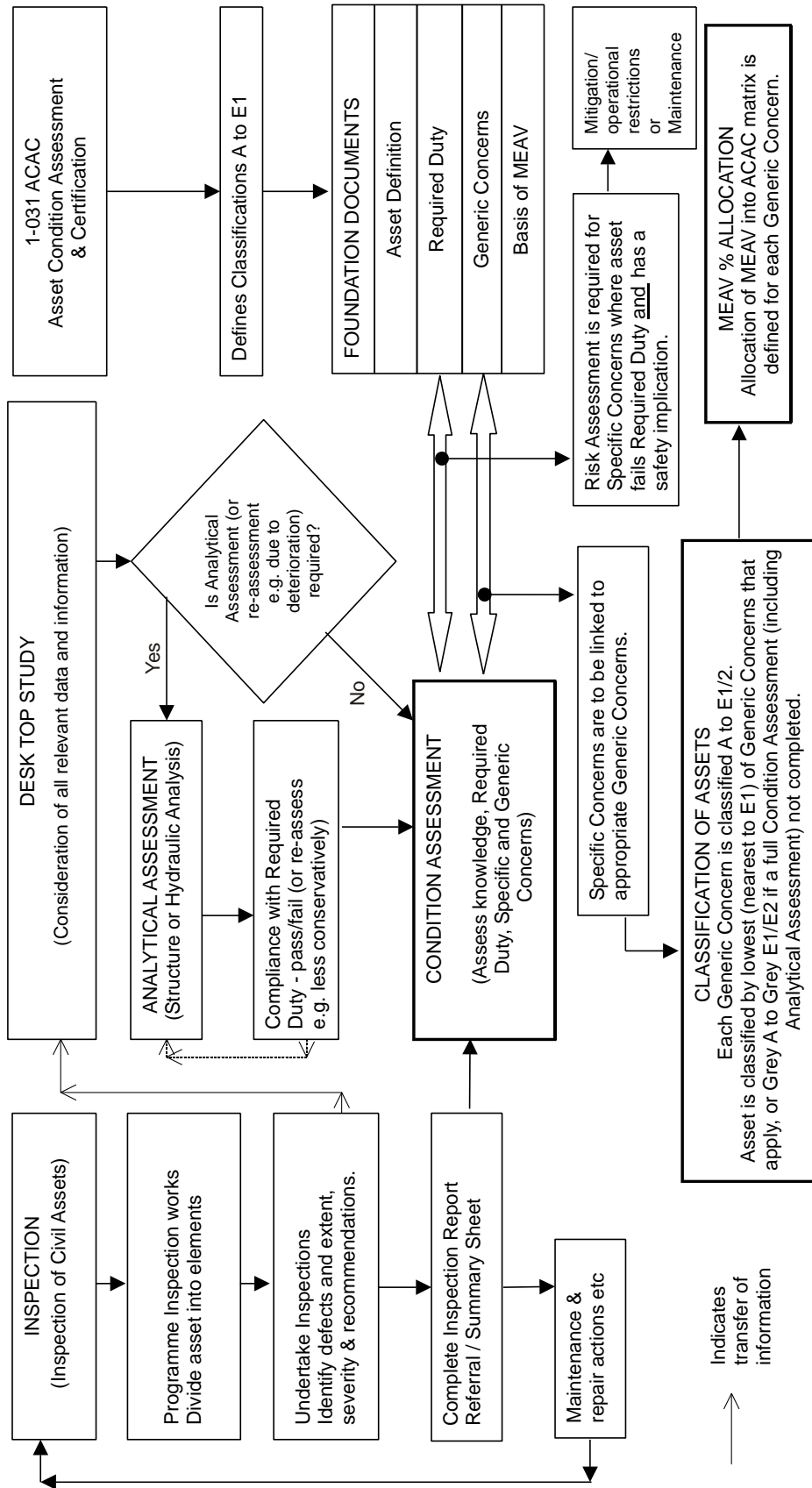
Not to scale or proportion

Piling rig



Not to scale or proportion

7.3 Attachment 3 - Summary of ACAC process for civil assets





7.4 Attachment 4 – Application for Approval to Use Tall Plant Adjacent to the Railway

APPLICATION FOR APPROVAL TO USE TALL PLANT ADJACENT TO THE RAILWAY

(IN ACCORDANCE WITH S1050)

Completed applications should be Emailed to: TallPlantApplication@tube.tfl.gov.uk

This form is available from the above address and must not be altered. This address should only be used for formal applications.

PART 1 – APPLICANT AND PROJECT DETAILS			
Name		Project Name	
Position		Contract / Job No.	
Organisation		Location	
Address		Brief Description of Project Scope	
Tel no.		Application Ref No.	
Email.			



PART 2 – SUMMARY OF THE NEED FOR A REQUEST

Brief overview of request.

Start Date		Finish Date	
LU Assets at Risk within Critical Boundary			

PART 3 – CONSULTATION LOG

	Date	Name	Title & Organisation	Outcome
Consultation Log				

**PART 4 – DETAILS OF REQUEST**

Please describe the circumstances, need, risks involved, risk controls and mitigations proposed.

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PART 5 – LIST OF ATTACHED INFORMATION AND DRAWINGS

Item	Type	Qty	Document Title	Document Reference

PART 6 – PLANT APPROVAL

TO BE COMPLETED BY APPLICANT

(Based on an assessment of risks highlighted in LU Standard S1050 clause 3.6.3.4)

Formal Application for Plant Approval made?

(As Defined in LU Standard 1-172)

YES

NO



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PART 7 – LONDON UNDERGROUND RESPONSE

TO BE COMPLETED BY LONDON UNDERGROUND REVIEWER ONLY

APPROVED	<input type="checkbox"/>	APPROVED WITH CONDITIONS	<input type="checkbox"/>	REJECTED	<input type="checkbox"/>
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COMMENTS/ CONDITIONS

--	--

LONDON UNDERGROUND REVIEWER

Name		Title	
Signature		Date	
		Telephone	



7.5 Attachment 5 – Example of a Safety, Health and Environmental (SHE) box.

<h3>SAFETY HEALTH AND ENVIRONMENTAL INFORMATION</h3>
<p>In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following risks and information.</p>
<p>Risks listed here are not exhaustive. Refer to the CDM Risk Assessment Register No M054/CDM/RAR-03</p>
<p>CONSTRUCTION</p> <p>M054.012 Contaminated Land</p> <p>M054.015 Disturbance or striking of services including live uncharted services</p> <p>M054.031 High Water Table - Risk of Flooding</p>
<p>For information relating to Use, Cleaning and Maintenance see the Health & Safety File.</p>
<p>All works must be carried out by competent persons</p>



working where appropriate to an approved Method Statement.