

- 1.8 For the purpose of examinations / inspections, a structure includes all its structural elements and components (such as foundations, parapets, safety fences, wing walls, handrails, access facilities, boundary walls, free-standing walls and minor retaining walls where the consequences of their failure could, in the opinion of Rail for London, be particularly serious), its permanent access equipment, its supports and connections to, for example, way-beams and transversely spanning timbers.
- 1.9 The scope shall include (but may not be limited to) Rail for London assets on the core route of the East London Line (ELL), Wembley Sidings and the 24 leased stations on the West Anglia Rail Routes as detailed in Appendix A. Should additional requirements be identified to cover assets on further routes during the contract term, the scope of the contract may span further locations.
- 1.10 Each examination undertaken by the Contractor will require deliverables in the form of written and electronic reports including commentary, findings and other output generated from the activity and defined elsewhere in this and other documents. In particular, data to be incorporated into Rail for London's asset management system will need to be in a suitable format to enable integration.
- 1.11 Certain activities are required to be carried out alongside the various examinations and inspections, the nature of which is described in this and other documents. Prior to undertaking an activity, the Contractor shall carry out all necessary preparation to enable the activity to be completed. Details and guidance of such preparation, including reconnaissance visits and review of asset record information held by Rail for London, is given in this document or will be made available to the Contractor. It is recommended the Contractor undertakes a site visit of the Rail for London Infrastructure prior to submitting the Tender Return.
- 1.12 Additional activities to those scheduled may be required during the term of this Contract, which will be instructed by Rail for London as necessary. Refer to Appendix D for an indicative list of "Call Off" activities which might be instructed.
2. STANDARDS
- 2.1 The Services shall be provided at all times in accordance with a regime that complies with all statutory requirements, legislation and regulations. It is the Contractors responsibility to ensure that they are compliant to all standards, statutory requirements, legislation, regulations and the like.

- 2.2 The Rail for London Standards Catalogue (LO-MS-103-26-0001) contains a list of all standards applicable to Rail for London Infrastructure and their Suppliers. It includes:
- Rail for London own standards
 - Rail for London own procedures that are mandated onto their suppliers and contracted users of their infrastructure
 - Railway Group Standards
 - Network Rail Company Standards
- 2.3 Rail for London adopts Network Rail Company Standards for the examinations of the Civil and Operational Property assets. The Contractor shall perform and report on all examinations in line with such Standards. This Scope has been prepared in conjunction with relevant standards and in particular the parts of NR/L3/CIV/006. Any anomalies between this Specification and Standards should be brought to the attention of Rail for London for resolution.
- 2.4 A high level overview of relevant standards are attached in Appendix C. Please note that this list is not exhaustive and details of all Network Rail standards can be located via HIS Standards expert <https://login.hisrc.com/> and the Rail for London Standards Catalogue (LO-MS-103-26-0001_1.33) can be found in the Data Room.
- 2.5 The Contractor is also required to carry out annual condition assessment of Stations in addition to the examination requirements of NR/L3/CIV/006 in order to comply with the Station Stewardship Measure required by the Office of Road and Rail.
- 2.6 Track Slab
- 2.6.1 Until such time as there is specific guidelines in Network Rail Standards, the following requirements of the examination of either the slab track in the form of Reinforced Concrete Track Trough (RCTT) or the Mass Spring System (MSS) employed on the elevated sections of the viaduct should be followed on both the up and down lines.
- 2.6.2 On the East London Line the concrete components making up the slab track comprises the pre-cast concrete blocks which provide direct support to the tracks, the infill concrete surrounding these blocks and the reinforced slab beneath it on the open sections and the actual bridge structure on the elevated sections of the Core Route. Reference should be made to asset plans and the slab track drawings for the locations of the different types of slab track on the Core Route.
- 2.6.3 As the slab track has a close interface with other disciplines such as the track, conductor rails and drainage, the examination should not be restricted to the slab track only even though the interfacing discipline assets may have their own examination regimes. The various other

elements to be considered in conjunction with the concrete elements of the slab track are considered in more detail below.

2.6.4 Unlike other assets, and taking into consideration the safety criticality of this particular class of asset, Rail for London has the policy of seeking Detailed Examination of the slab track on an annual basis:

2.6.4.1 Further to NR/L3/CIV/006 Part 1D

2.6.4.2 Shrinkage and Flexural Cracks including the spalling of concrete – Due to different phases of its construction and comprising both the pre-cast and in-situ concrete, the slab track is prone to exhibiting both the shrinkage flexural cracking. The crack length, its position and extent shall be recorded together with details of any changes since last the examination. For crack widths over 0.3mm wide, the depth of the cracks shall be recorded on the Excel spread sheet (included in the Data room) together with their photographs. The cracks shall be highlighted with orange paint. Typical slab track reports consisting of Excel spreadsheet and photos of the cracks are included in the Data room;

2.6.4.3 Slab Track Alignment- the examination of the slab track shall entail inspecting its longitudinal and transverse profiles to ensure there are no local dips or in general long term settlement issues. This is best accomplished by visually checking the track alignment from the 4 and 6 foot;

2.6.4.4 Track Slab Drainage Channels – Record any debris and standing water on the surface of the slab with recommendations for its clearance as persistent 'flooding' could compromise the stability of the slab track. In the open sections the extreme winter temperatures will lead to the expansion of trapped moisture within the cracks and within the tunnel sections, the standing water, permeating through the cracks and into the subgrade could potentially lead to the weakening of the subgrade. The importance of these observations cannot be over emphasised as the slab track, unlike other track supporting structures, cannot be examined under moving loads ;

2.6.4.5 Holding Down bolts - Whilst examining the slab, any apparent loose or missing holding down bolts of the conductor rails or the track shall be recorded;

2.6.4.6 Baseplates - Whilst examining the slab, inspection of any lateral movement of baseplates needs to be carried out;

2.6.4.7 Waterproofing and Acoustic/ anti-vibration membranes – A waterproofing membrane is employed between the infill concrete and the reinforced concrete slab in the open section and a 'sylvomer' membrane in the MSS over the elevate sections of the ELL Core Route. Any defects in the exposed parts of these membranes shall be recorded. The defects in the exposed parts of the neoprene membrane

sandwiched between the pre-cast concrete (the Low Vibration Track) and the infill concrete shall also be recorded;

2.6.4.8 Stray Current cables - In order to mitigate against corrosion due to stray currents, it is vitally important to ensure that any loose cable connections are reported in the examination reports.

2.6.4.9 Track Slab inspection needs to be coordinated with Track Inspection.

3. Examination Regime

3.1 Asset List and Programme

3.1.1 A copy of the latest asset list and programme for the planned examination / inspections requirement is provided in Appendix B, subject to allowable tolerances, and to be reflected into the Contractors Programme. Additional requirements will be identified as and when required throughout the contract term. The programme will be reviewed with Rail for London on a quarterly basis. Any movement in the programme must be agreed with Rail for London. Whenever necessary and reasonably practicable, Examinations / Inspections shall be carried out to take advantage of and utilise access arranged (by others if appropriate) for works to adjacent infrastructure or in the vicinity or along the Line of Route on which the Building and or Structure is located.

3.1.2 During the course of the Contract, the Contractor may propose programme efficiencies to support delivery, subject to agreement from Rail of London, which maintains compliance with Standard.

3.1.3 Due consideration shall be taken by the Contractor of the need to plan and progress the enabling actions / works that may be required to allow initiation and completion of each examination when developing the programme.

3.1.4 Rail for London reserves the right to alter the sequence of the programme in line with local requirements and priorities.

3.1.5 The Contractor shall submit an initial Construction Phase Plan (CPP) for acceptance by Rail for London. The CPP shall be reviewed alongside the programme on a quarterly basis and updated by the Contractor as necessary throughout the contract term. The Contractor will adhere to NR/L2/OHS/0044.

3.1.6 The Contractor shall also support the continuous update of the Rail for London Asset Management System.

3.1.7 The Contractor will be required to identify and examine unknown assets and provide details to Rail for London to enable recording in the Asset Management System and plan subsequent examinations. Asset

lists shall be refreshed and categorised in accordance with NR Standards by the Contractor as further/updated asset information is received.

3.1.8 Where there is doubt about the location, identification or extent of an asset to be examined, a check shall be made of plans, maps and other records.

3.1.9 The Contractor shall also check that assets have correct and undamaged asset ID plates and advise Rail for London in the respective examination report where this is not the case to enable Rail for London to record the details and rectify as and when appropriate.

3.2 Interfaces

3.2.1 There are a variety of interfaces that are critical to operations and will require interface management when undertaking examinations (see section 7 'Access'). The Contractor shall identify asset interfaces requiring management as part of their planning process for each examination and manage accordingly.

3.2.2 It should be noted that should the Contractor require to access / work within areas under the control of any 3rd parties, then those organisations may require the right of acceptance of the Contractor Work Package Plan and risk assessment.

3.2.3 Examples of 3rd party interfaces are:

- a) London Underground
- b) Network Rail
- c) Train Operating Company
- d) Transport for London Commercial Development
- e) Local Authorities
- f) Utility / Statutory Undertakers, such as EDF.
- g) Tenanted Arches – Access Process contained in Appendix E.

3.2.4 The Contractor shall make all necessary access arrangements for undertaking a Reconnaissance. Inspection / Examination including any works such as implementing road closures, erection of scaffolding, removal of access covers etc.

3.2.5 The permission of Landowners, Tenants or Asset Managers shall be obtained before accessing their property (See Appendix E for Access Process for Tenanted Arches). The Contractor will have to adhere to the notice period required for the achieving permission. Where previously unrecorded Tenants or private owners occupy part of the

Structure, instructions shall be obtained from Rail for London regarding access.

3.2.6 The Contractor should note that access arrangements such as possessions provided for carrying out the Inspection / Examination may be used by others for works of a minor nature and the Contractor shall afford them all reasonable facilities and shall co-operate with all parties concerned so that all works progress with the minimum of interruption.

3.2.7 Requirements for access to areas normally locked or where access is restricted due to safety, security or operational reasons shall be identified. Where necessary, arrangements shall be made by the Contractor for a key holder to be present.

3.2.8 The Contractor shall be responsible for identifying and complying with the local safe systems of work in use and all health and safety requirements imposed by the relevant Manager.

3.2.9 Particular competencies may be required for access to Buildings.

4. Examinations

Planning & Preparation

4.1 The Contractor shall give due consideration when planning the examinations / inspections to access requirements (see section 7 'Access'), equipment requirements and vegetation or debris that may restrict access to the asset/structure.

4.2 Wherever reasonably practicable, examinations / inspections should be carried out in daylight hours.

4.3 Examinations / Inspections shall include all necessary preparations and arrangements for access to the Asset, the examination itself and any associated physical works (instructed or otherwise required), the production and issue of a report, and uploading/ adding data to populate the Rail for London Asset Management System.

4.4 In making arrangements to carry out examinations / inspections, the Contractor shall refer to all available information relevant to the Asset held by Rail for London. This could include previous examination reports, assessment reports, details of defects and any repairs, drawings, survey reports (eg, asbestos, drainage), monitoring observations, test results, potential hazards, site access arrangements (particularly via Outside Party land or within Tenanted Station and Arches) and any other relevant information. These should be used to establish the basis for identifying changes in asset condition. The Contractor should bring to the attention of Rail for London if any

information is unavailable which is considered necessary to undertake an examination / inspection, as soon as reasonably practicable.

4.4.1 Additional preparations for Inspections / Examinations of Operational Property Structures and Buildings

4.4.1.1 All information held by Rail for London and its Suppliers shall be reviewed, and the Operational Property Structures to be Examined and Buildings and Building Services to be Inspected at the site shall be identified.

4.4.1.2 Records, inspection and survey reports, test data and other information available for the Inspection / Examination shall be determined.

4.4.1.3 Prior to carrying out each Inspection / Examination, the Contractor shall request Rail for London to make available any records, inspection and survey reports, test data and other information not previously collected by them (but which may reasonably be expected to be retained on site) and which have been identified as requiring review.

4.4.1.4 Details of any defects in an Operational Property Structure or Building including lighting columns, or evidence that there may be a defect, that has been notified to Rail for London shall also be requested.

4.4.1.5 The Contractor will be accountable to ensure all data required to undertake the Inspection / Examination is collated, reviewed and analysed.

4.4.1.6 Such information as necessary that needs to be taken to site for the Inspection / Examination such as records, reports, drawings, and previous monitoring observation data shall be identified. Authorisation shall also be requested from Rail for London and the relevant TOC or SFO to view any drawings, manuals or data sheets necessary to ascertain the correct operation and maintenance of plant or services. When documentation is not available for review the data collected during the Inspection / Examination shall be used to assess the asset condition and the absence of these documents shall be recorded within the asset management system.

4.4.1.7 The scope of the data gathering includes all blocks, locations and elements, features and attributes as identified in Network Rail documents;

- Building Fabric Method of Measurement
- M & E Method of Measurement.
- Handbook for the examination of Structures Part 11B

4.4.1.8 Prior to undertaking an Inspection / Examination of Operational Property Structures and or Buildings, the Contractor shall:

- consider the impact of the Inspection / Examination on business operations at the location and where reasonably practicable plan the Inspection / Examination work to minimise any disruption caused;
- arrange any signs, notices, permits or permissions required and the payment of any fees in respect of road closures, possessions and isolations of other parties' railways or access across Outside Party Land.

4.4.1.9 Rail for London shall be advised and instructions requested when the planning of the Inspection / Examination or Pre-detailed Inspection by the Contractor has identified or considers that:

- the condition, age and type of any Building or part of Building is such that provision of temporary access to enable inspection within touching distance will not enhance the Inspection quality, the identification of defects or the accuracy of condition assessments;
- safe access to examine the external face of roof coverings, glazing, gutters, flashings, rainwater goods, fascias and other high level non structural elements on Buildings, Canopies and Train Sheds is not reasonable practicable.

4.4.1.10 Rail for London shall be advised when instructions are required:

- to cause "damage" to the fabric or services to enable the inspection to take place and where reinstatement will require repair works (e.g. the removal of thermal insulation material);
- to facilitate a forced entry to be made by a suitable tradesman (i.e. Locksmith or Carpenter) to gain access to rooms and other areas due to the absence of keys or access codes;
- to carry out partial dismantling to enable the Inspection / Examination to be carried out, e.g. the removal of masonry, timber flooring or other Obstructions etc.

In such cases, a photographic record of the existing condition shall be made and Rail for London approval obtained to the method of work prior to carrying out the Inspection / Examination work. Any damage caused shall be made good. Should a new lock be installed, four keys shall be supplied to Rail for London. When the attendance of the Maintenance Contractor is required to provide safe access, the Inspection / Examination shall be programmed to coincide with the Maintenance Contractor's schedule of visits to the site as advised by Rail for London. Where operation, isolation, testing or sampling of

services or equipment is required the consent of Rail for London shall be obtained and prior to carrying out the activity. On completion of the Inspection / Examination, the written acceptance shall be obtained from Rail for London that the services or equipment have been returned in a satisfactory operational state.

4.5

The Contractor shall also carry out an advance reconnaissance visit to identify the physical work considered necessary to enable the examination / inspection to be carried out and to provide information to enable adequate preparations to be made such as when previous examination / inspection reports are incomplete. This should be sufficient to permit further consideration of suitable access to and at the site, clearing of obstructions and vegetation or other opening up, in order to carry out the requirements of the planned examination / inspection.

4.6

The timing of a reconnaissance visit shall be arranged by the Contractor to allow sufficient time for any subsequent enabling works to be carried out without delaying completion of the planned examination itself. Any enabling works proposed shall be submitted to Rail for London with any supporting documentation (eg, photographs) for agreement and action as required under the Contract. Notice to Rail for London shall be a minimum 6 months before the examination / inspection date or as agreed with Rail for London, and may need to be longer if track possessions are required and/or some enabling works are to be carried out by Rail for London.

4.7

Details of Hazards identified during the planning of an examination / inspection shall be issued to Rail for London for updating their Hazard Directory, and included in the examination / inspection report.

4.8

The Contractor shall be expected to undertake reasonable clearance of vegetation and/or litter at the time of the examination to enable it to be completed. As such, it is suggested the Contractor allows time for this activity and carries suitable tools for the task.

4.9

The Contractor shall be expected to undertake reasonable removal and reinstatement of any cladding or Obstructions at the time of the examination to enable it to be completed. As such, it is suggested the Contractor allows time for this activity and carries suitable tools for the task.

4.10

The need for measuring devices should be identified by the Contractor whilst planning the Examination and, if agreed, will be instructed by Rail for London for fitting during the course of the Examination.

4.11

Where obstructions prevent completing the Visual Examination of part of a Structure, dimensions, photographs and observations should be taken and recorded for the extent of the obstruction. For Detailed Examinations, any such obstructions shall be identified beforehand and included within the schedule of enabling works submitted to Rail

for London prior to the Examination (see 4.6). Regardless of the type of Examination, the Contractor shall be expected to undertake reasonable clearance of vegetation and/or litter at the time of the Examination to enable it to be completed.

4.12

Where there is doubt about the location, identification or extent of an Asset to be Examined / Inspected, a check shall be made of plans, maps and other records. In the event of an Asset not being located during an examination / inspection, the Contractor shall make every effort to do so within the surrounding area, clearing vegetation and other minor obstructions accordingly. Where it is reasonably practicable and lawful to do so, the search shall extend outside Rail for London's boundary. Built up ground or developments that could conceal the Asset shall be noted. If the Asset is found, the examination shall proceed in the normal way. Rail for London shall be informed and when necessary, a correction shall be made to the recorded location of the Asset. If an Asset listed in the Schedule is not able to be located, a report describing details of the search, including a sketch and photographs of the area around the recorded location, shall be submitted. The notification shall clearly be endorsed "UN-LOCATED STRUCTURE". Similarly, any unrecorded (and normally examinable) Structures identified during Examinations shall be noted (including OS / GPS co-ordinates). Both scenarios shall be reported to Rail for London, following the requirements of Standard.

4.13

During Detailed Examinations, certain physical works (other than for access) will need to be carried out by the Contractor as listed in standard NR/L3/CIV/006 Part 1B, including cleaning of signs and safety works such as adjustment of wedges. Other tasks may also be required to be undertaken by the Contractor during the Examination, examples of which are also listed in the same standard. Wherever possible all tasks shall be confirmed with Rail for London prior to attending site to enable them to be carried out by the Contractor during the Examination.

4.14

Pre-detailed Inspection (PDI) - A PDI for a 5 Yearly Inspection / Examination may be carried out simultaneously with the Annual Inspection / Examination prior to the 5 yearly Inspection / Examination. The PDI shall be undertaken sufficiently in advance of the 5 Yearly Inspection / Examination to allow for:

- Rail for London to give instructions for work to be undertaken which the Contractor cannot reasonably carry out as discussed in Para 4.8 and 4.9, and any work agreed as necessary for the 5 Yearly Inspection / Examination such as removal of vegetation, debris, rubbish or obstructions, trial holes and exposure of hidden detail etc. to be carried out in advance of or during the Inspection / Examination;
- the preparation and approval of a work package plan and task briefing document;

- arrangements to be made for access, road closures, track possessions, isolations etc, or the suitability of pre-planned arrangements to be confirmed;
- relevant records or other information to be obtained.

For Operational Property, the programme of PDI visits shall be agreed with Rail for London.

4.15 Inspections and Examinations of Operational Property – The dates for the Inspection / Examination of Operational Property Structures and Buildings shall be agreed with Rail for London, and recorded as target dates within the Asset Management System. Due consideration shall be taken by the Contractor of the need to plan and progress the enabling works which may be required to allow initiation and completion of the Inspection / Examination requested on the Schedule to meet the target date and any incorporated tolerances.

4.16 The frequency and matrix table in the Standard represents the Asset Management overall tolerance matrix. For Asset Management compliance issues relating to Operational Property, the interval, and therefore the associated tolerance, relates to the 5 Yearly and the 1 Yearly inspection / examination regime and is not specifically related to whether the methodology of inspection / examination is defined as Detailed and or Visual.

Types of Examinations

4.17 The general types of Examination are as follows. The mandatory Examinations shall be carried out within the required timescales for compliance. Rail for London may decide to either carry out one Examination type or a number of Examination types within one visit to the Structure. During the course of the contract, the Contractor will investigate possible efficiencies by grouping examination of assets at the same time. Such grouping and programming adjustments to be agreed with Rail for London.

4.18 Detailed Examinations are mandatory and planned, carried out at specific intervals determined by Rail for London. They are primarily to gain information on condition and defects of all accessible parts of a Structure generally from within touching distance (unless agreed otherwise with RfL, eg. for CCTV surveys) using temporary access as required. A Detailed Examination may also include Hidden Critical Elements and other Examinations that are required to establish the condition of all parts of a Structure.

4.19 Visual Examinations are mandatory and planned, carried out annually from all available positions of safety, generally without special access equipment. Line blockages or a possession of the line may be required to safely gain access to the vicinity of the structure. A Visual Examination records change in condition from the last Detailed Examination and any subsequent examinations. It may be omitted, by agreement with Rail for London, if a Detailed Examination of the same Asset is due to be undertaken at a similar time.

4.20 Additional Examinations are conditional and planned, carried out to provide supplementary information to address risk items normally identified during a Visual or Detailed Examination. They may cover the whole Asset or be targeted to specific areas and include monitoring using reference marks/points or reading equipment.

4.21 Emergency Examinations are "ad hoc" and unplanned, carried out as a result of a situation arising from an incident affecting the Asset. Rapid Response is the term used for a specific Emergency Examination following certain incidents (eg. bridge strike, extreme weather, urgent, third party assets (upon report of a defect that may affect Rail for London Infrastructure) and as deemed necessary by Rail for London.

4.22 Targeted Examinations are conditional and planned, carried out to provide information on specific minor element(s) of a Structure. This would typically be carried out as part of the Visual Examination.

4.23 Hidden Critical Element Examination. Activity to identify and expose structural elements to determine their condition. Works are to be in accordance with Network Rail Standards.

4.24 RVI Risk Assessment: The collection and review of data stipulated in NR/GN/CIV/00012 to assess the risks of Road Vehicle Incursion on an Asset and Neighbouring Sites.

4.25 CMI Re-Score. An activity carried out on completion of intervention(s) to a Structure to determine the resulting change in the CMI score. This will allow Rail for London to demonstrate the benefit of works to a Structure in advance of the next Detailed Examination. The activity is applicable for all Structures asset types where a Condition Marking Index is currently used or will be introduced during the Contract. This activity may be instructed to be undertaken as part of a Visual Examination.

4.26 Unique (instructed as required) – Voided Structure, other intrusive examination and remote monitoring, etc

4.27 Examinations / Inspections Operational Property & Buildings
Annual Inspection / Examination

- 4.27.1 An Annual Inspection / Examination regime within Operational Property Structures and Buildings is conducted using a Visual Methodology. Copies of the previous Detailed and subsequent Visual Examination reports and any additional / special reports shall be reviewed to identify reported defects and, thereby, to establish the basis for identifying changes in these defects and the rate of deterioration of the property Structures subject to the Annual Inspection / Examination regime.
- 4.27.2 A review shall be undertaken of the information provided by Rail for London on, for example, defects reported and work undertaken, underway or planned since the previous Inspection / Examination.
- 4.27.3 Recommendations for the removal of Obstructions shall be provided to Rail for London prior to carrying out the inspection / examination.
- 4.27.4 For the Visual Inspection / Examination of Ancillary Structures that are not normally subject to Detailed Examination, the sample Structures for which the interface between buried metal supports and the surrounding material is to be exposed and reinstated shall be agreed with Rail for London.
- 4.27.5 Arrangements shall be made for gaining access to a safe observation location(s) and to permanent access facilities at the Structure or Building to carry out the Inspection / Examination.
- 4.27.6 An Annual Inspection / Examination shall be sufficient to identify or determine the following:
- any significant visible changes in the condition of the Building or Structure since the previous 5 yearly Inspection / Examination, or previous Annual Inspection / Examination if the Building or Structure is not subject to Detailed Examinations;
 - any significant defects that were not identified in previous Inspections / Examinations;
 - the worsening of previously reported defects benchmarked against the previous 5 yearly Inspection / Examination, or previous Annual Inspection / Examination if the Building or Structure is not subject to Detailed Examinations;
- and from this to assess whether the rate of deterioration has changed;
- action or work which needs to be carried out before the next Inspection / Examination (even where previously reported);
 - changes in the readings of monitoring points, where it is reasonably practicable to do so and access is available;
 - Other factors that might place the safety of the Building or Structure, operational railway, people, equipment or property at risk.

5 Yearly Inspection / Examination

- 4.27.7 A 5 Yearly Inspection / Examination regime within Operational Property Structures and Buildings is conducted using a Detailed Methodology for the Operational Property Structures assets and a Visual methodology for the Buildings Fabric and Mechanical & Electrical Equipment.
- 4.27.8 Copies of pertinent information, including previous Inspection / Examination reports and any Structure-specific examination and/or maintenance manuals or Major Structure management strategies, shall be reviewed to identify any defect, problem or feature that needs to be Inspected / Examined specifically.
- 4.27.9 If it is known or suspected that part of a Structure is hollow and no obvious provision is made for access, Rail for London shall be notified.
- 4.27.10 The necessity or otherwise for the partial dismantling or exposure of parts of the Structure: examples include suspension bolts, hollow sections without any visible access, and the removal of brickwork, concrete, timber flooring, timber retainers, and Obstructions shall be determined. The likelihood of damage arising to the Structure, as a result of dismantling or exposing parts, shall be taken into account in deciding whether or not the part should be dismantled or exposed. Such work shall only be undertaken when instructed by Rail for London (see Additional requirements for buried and hidden parts of a Structure which may not necessarily contain an identified HCE).
- 4.28 A 5 Yearly Inspection / Examination shall be sufficient to identify or determine the following:
- to determine and record information relating to the safety and performance of the railway;
 - changes required to Rail for London's asset database, and other Structure records;
 - the condition of all accessible parts of the Structure, and any significant change in the condition since the last examination;
 - any loss of functionality;
 - the nature, number, extent and severity of defects and any significant changes since the last examination;
 - the rate of deterioration of the Structure;

- the uses to which the Structure is being put;
- the scope, extent, and urgency of actions and remedial works;
- the need for an Additional Examination;
- any other factor that may affect the safety or performance of the Structure.

Examination Requirements

4.29 The common requirements for Examinations of Civils Structures are typically found in standard NR/L3/CIV/006, Parts 1B and 1D, notwithstanding which, the requirements within this Scope are to be incorporated for this Contract. The frequency of Examinations shall be as defined by Rail for London and will be determined taking account of various factors of the Asset including usage, criticality, condition and capability.

4.30 Should during the examination of an asset an incident occur which may affect the safe operation of the infrastructure; the Contractor is to follow the Fault Reporting Procedure and inform the Fault Reporting Centre. A detailed Incident Report should be prepared with recommendations of lessons learnt and issued to Rail for London.

4.31 Rail for London Assets have not been previously scored with the Condition Marking Index (CMI) and on the first occasion an examination is conducted the CMI recording/ reporting process is to be used. Rail for London may also request the Contractor carry out "Back analysis" of a Detailed Examinations to generate Asset CMI scoring.

4.32 Examination reports shall fully describe the Asset location, properties and condition, severity and extent of defects, and give recommendations for remedial works & cost and/or further investigations. Such works or investigations should be those considered necessary by the Contractor for the continued safe use of the Asset. The format of Examination reports shall be agreed with Rail for London prior to Examinations taking place, following formats appropriate to NR/L3/CIV/006 and currently adopted by Network Rail. Following update to Standards or RAIB reports, Rail for London may add some additional requirements to the template and will need to be collected by the Contractor.

4.33 The Examination report shall clearly identify the parts of a Structure that are examinable. It shall also clearly identify the non-examined parts. A complete Examination is one where all examinable elements are examined to the standard required.

4.34 For Visual Examinations it will be necessary to view the Asset from several vantage points and include suitable photographs within the

Examination report. The Asset shall be viewed from all directions including from beneath and above the Asset. For Bridges and Culverts where man access is possible, this shall include viewing the underside and topside for the full length. The Visual Examination is intended to be carried out without special access equipment, but if this is insufficient to properly view the Asset, then the requirement for equipment to facilitate access into other areas shall be brought to the attention of Rail for London who will instruct the Contractor accordingly. Where a Visual Examination is intended to be carried out from outside positions of safety the Contractor shall make the necessary safety & Access arrangements. Where the safety arrangements require a possession of the line this shall be brought to the attention of Rail for London.

4.35 Both Detailed and Visual Examinations of Tunnels shall include any Equipment Support Structures (ESS) attached to the Tunnel Structure, unless agreed otherwise with Rail for London. The Examination will include cable supports (brackets and posts).

4.35.1 Where an ESS is attached to a Structure, including posts less than 1 metre long which are fixed to the crown of a Tunnel to support GSM-R aerials at Tunnel portals, the connection and interface of the ESS shall be included in the examination of the Structure or ESS as applicable. The examination shall identify any detrimental effect of the ESS on the Structure, and vice versa.

4.36 A particular requirement for "metallic members" is the need to measure the depth of corrosion, thickness of metallic parts and determine the loss of section and protective coating, measure dimensions of the thickness of webs of fabricated members and deck plates. Measurements shall be targeted to capture the likely presence of joints or features where the dimensions may change.

4.37 Wing walls and platform walls shall be included within the bridge or platform structures respectively and are not classed as retaining walls.

4.38 Examinations of Retaining Walls shall identify any evidence of buried services adjacent to the wall and highlight the potential risk of water concentration and change to soil properties or loading conditions. Such information shall be recorded at each side of the wall and for areas both within and outside the railway boundary. Minor retaining walls, boundary walls and free standing walls have different management regime than other retaining walls (see 4.42.3).

4.39 The use of CCTV (including any associated enabling works), shall only be with the agreement of, and when instructed by, Rail for London. Such Examination methodology shall be identified by the Contractor during preparations and agreed beforehand to allow the Examination (including the CCTV survey) to be completed when undertaken. An Examiner shall be present to direct the examination and to record data as necessary for reporting.

- 4.40 Any significant change of function or usage of the Asset (from the last examination) should also be noted. It is also of particular importance that the Examination identifies and records any features within the vicinity of the Asset which could potentially affect the condition and integrity of the Asset, either by the presence or deterioration of that feature. Such features could include highway drainage within third party land, which could cause damage to the Asset if it failed and resulted in local flooding
- 4.41 The Contractor shall prepare an emergency procedure to deal with any "urgent" defect or incident which arises during the course of work carried out under the Contract and may affect the safety of the Structure, operational railway, people equipment or property. Such a procedure shall bring the defect or incident to the attention of Rail for London as soon as practicably possible. (See section Emergency Procedure / Rapid Response).
- 4.42 Guidance as to process to be used to identify and expose hidden parts in an Operational Property Structure or Building refer Hidden Elements (HCE) in Appendix F.
- 4.43 Annual Examinations / Inspections of Operational Property Structures and Buildings
- 4.43.1 The following Operational Property assets will be Annually Examined
- Buildings, including their basements and under crofts.
 - Concourse at Stations
 - Train Shed Roofs
 - Footbridges and Other Bridges
 - Retaining Walls
 - Platform Canopies
 - Undercrofts
 - All Platforms and Supporting Structures (An Annual Inspection / Examination of a Platform shall include the safety aspects of finishes that could cause Hazards to people, such as tripping or slipping.)
 - Elevated vehicle Forecourts, Ramps and Multi-storey and Sub-surface Car Parks
 - Metallic Lattice Tower Structures or columns.
 - Subways including internal panelling/cladding/ceilings/furniture etc.

- electrical control rooms;
- integrated electrical control centres (IECCs);
- operational control rooms;
- relay rooms;
- re-locatable equipment buildings;
- signal structures, including support frames
- station accommodation and facilities;
- substations
- noise barriers

In all cases however, a part of a Building which supports another Structure shall receive an Annual Inspection / Examination as required for the supported Structure.

Particular requirements of Equipment Support Structures (ESS)

- 4.43.2 When instructed by Rail for London, loose material covering a baseplate or other buried tubular metal supports to ESS shall be excavated to expose sufficient of the support for examination. Such excavation shall be undertaken on a sample of not less than 5% related to the type of support, surrounding material and location, or at specified individual Structures.
- 4.43.3 A recommendation for Additional Examinations with further excavation or additional samples to be examined shall be included in the examination report if significant defects are identified for a particular type of support, surrounding material and location.
- 4.43.4 Visual Examinations of ESS shall include the security and fixing of equipment attached to the Structures, but not the condition, insulation, operation or effectiveness of such equipment.
- 4.43.5 So far as is practicable, the examination of an ESS shall include:
- guy ropes, anchorage stays, strainers, tighteners, turn buckles etc., and their anchorages; where reasonably practicable to detect, any slackness, deformation or lack of effectiveness in such items shall be recorded;
 - the security and condition of steps, access ladders, hoops, fastenings, fittings;

- visible foundations and connections to the ESS;

- bases or platforms constructed on Embankments, to check for movement and that the apparatus cases are vertical;

- walkways that are on, or are provided specifically for access to the ESS, including slip or trip Hazards on those around location cases, and signs of rot, corrosion or wear;

- so far as is reasonably practicable, observation of the response of the Structure to passing trains where an ESS is adjacent to or spans over the operational railway;

- excessive movement shall be recorded.

4.43.6 The examination of timber elements of an ESS shall include an examination for signs of decay. Attention shall be paid to the section at ground level and, if evidence of rot or decay is found, sufficient ground shall be excavated to confirm the defect and determine its extent, providing the stability of the Structure is not affected. Excavated material shall be reinstated and compacted. Examination shall include checking for decay at locations where the ESS has been notched to accommodate cross arms, etc. Deterioration or absence of the capping on the pole or post shall be recorded.

Particular Requirements for Annual Inspection / Examinations of GSM-R masts and other Lattice Towers

4.43.7 Annual Inspections / Examinations of the GSM-R masts and lattice towers shall include:

- a check of the condition of the foundations and the ground around the foundation for visible signs of movement, erosion or subsidence, and any evidence of drainage or surface water problems in the vicinity of the foundation;
- an inspection to identify any obvious signs of missing, loose or damaged bolts, bent or misaligned members and signs of excessive corrosion, including whether any components or its fittings has fallen from the Structure;
- a ground inspection (pre-climb check) of the fall arrest system, if present.

4.44 5 Yearly Inspection / Examination of Property Structures and Buildings

4.44.1 All Property Structures as listed in section 4.43.1 and those identified on the Schedule shall receive Detailed Examinations.

4.44.2 Other Ancillary Structures may be required by Rail for London to have Detailed Examinations due to the size of the Structure, location,

construction details, potential defects, difficulty in carrying out effective Visual Examinations, or other reason.

4.44.3 Minor Retaining Walls, boundary and free-standing walls shall only receive Detailed Examinations when instructed by Rail for London.

4.44.4 The requirements for Detailed Examinations do not apply to Structures owned and managed by an Outside Party, unless instructed otherwise.

4.44.5 Detailed Examination shall generally be carried out within touching distance of the part being examined, except when CCTV equipment, with agreement from Rail for London, is used for examining parts of a Structure obscured by an Obstruction.

4.44.6 Where OHLE is attached to the Structure, the examination of the Structure shall include any protective screening.

4.44.7 Handrails or other safety balustrades provided on the Structure shall be examined and the type, height and length, or absence of handrails or other safety balustrades shall be recorded.

4.44.8 An examination shall apply to any parts of an adjacent Structure which provide support or bracing to the Structure being examined.

4.44.9 Where reasonably practicable, a Structure subject to railway, highway or pedestrian loads shall be observed under moving loads.

4.44.10 Where fire protection or other protection is to be removed to expose a part for examination, the removal, implementation of mitigating measures, and reinstatement of the protection shall be in accordance with the method and programme accepted by Rail for London. Fire protection shall be reinstated without delay following the examination.

4.44.11 Defects in an Earthwork above, below or immediately adjacent to a Structure that are observed during the examination, and which could affect the safety or performance of the Structure shall be recorded.

4.44.12 A defect, which in the opinion of the Examiner gives rise to immediate concern for the continuing safety of a Structure, the operational railway, people, equipment or property, shall be reported to Rail for London immediately.

Particular Requirements for a Detailed Examination

4.44.13 Detailed Examinations shall include:

- physical works to provide access to enable the Detailed Examination to be carried out;
- e.g. erection of scaffolding, implementation of a road closure, removal and reinstatement of access covers etc.;

- physical works when instructed by Rail for London;
- cleaning of identification plates or other Structure identification signs.

4.44.14 Further to Clause 'Emergency Procedure / Rapid Response', physical works to maintain the safety of the operational railway shall be carried out by the Contractor when such works may reasonably be carried out by the Examiner during the Detailed Examination. Such works may include but not be limited to:

- wedging of individual loose bricks (by placing wedges in the perpendicular joint, not bed joints);
- the area of brickwork requiring wedging and the position on the Structure shall be clearly stated in the examination report;
- tightening of existing wedges or other temporary supports.

4.44.15 Each Detailed Examination shall identify and record if present:

- any overall deformation of the Structure;
- parts of the Structure that are out of plumb, bent, sagging, misaligned, buckled, bulging or otherwise distorted;
- cracks, tears or splits in elements of the Structure;
- parts of the Structure that are missing;
- movement, distortion and the condition of connections between elements;
- condition of paintwork, galvanising or other protective coatings;
- corrosion of base plates and holding down bolts, security of fixing and cracking of welds (taped nuts and bolts shall not be disturbed unless the tape has become damaged);
- condition of Substructures visible above ground;
- signs of subsidence, heave, misalignment, cracking or movement of the ground, track or adjacent Structures;
- evidence of movement of foundations, for example settlement, rotation, sliding, fractures in masonry;
- evidence of defects in waterproofing systems, or other water penetration;
- movement at construction joints;
- deterioration of materials;

- excessive weathering or wear;
- signs of loose, displaced or fallen ballast, or of other material or equipment;
- defects in the attachment of equipment to the Structure;
- unsafe maintenance access facilities;
- Significant accidental damage, including that due to Bridge Strikes;
- presence of vegetation which might detrimentally affect the Structure if not removed in the examination;
- flooding or evidence of flooding;
- signs of overloading from material stored on or behind the Structure, or equipment attached to the Structure;
- risks to the Structure from accumulated rubbish, stored combustible or hazardous materials;
- obstructed refuges;
- missing or defective signs indicating limited clearance along trackside walkways and Significant vandalism, graffiti, or evidence of trespass;
- type and extent of maintenance, repair or renewal work carried out since the last Detailed Examination or otherwise not shown on examination records;
- any work in progress or change of construction not previously identified;
- changes in the nature or extent of use of the Structure;
- evidence of building or other development works adjacent to the Structure;
- Significant changes in the environment around the Structure;
- work required to be undertaken, the urgency of such work, and sufficient measurements to enable the work to be quantified, estimated and scoped;
- other factors that might place at risk the safety of the Structure, traffic on the railway, road, equipment, people or property prior to the next Detailed Examination.

4.44.16 Each Detailed Examination shall include reading and measuring changes from previously recorded measurements at monitoring points including mortar "tabs" over cracks and other fixed reference or plumbing points, or movement gauges. The report shall record changes compared to the datum set of readings and the previous reading if appropriate.

4.44.17 Defects shall be quantified and photographed; where appropriate, sketches shall be used to amplify and describe these defects. Where a defect occurs repeatedly on a Structure, a photograph may be taken of a representative defect rather than of each one.

Particular requirements for an Inspection of a Building

4.44.18 The Inspection of a Building shall include inspection as applicable of:

- load bearing parts whose condition could affect the safe operation of the railway or the safety of people, such as support walls, floors, roofs, other supporting elements, and exposed Substructures;
- lift shafts, and structural elements that support escalators, lifting apparatus, hoists,
- structural parts of stairs, treads and risers, landings, stringers and balustrades;
- safety aspects of finishes that could cause a Hazard, including slipping or tripping, to passengers, staff, occupiers or the public;
- external cladding in accordance with Clause 'Additional requirements for Buildings with external cladding'
- roof voids when specifically instructed by Rail for London or where there is evidence of potential failure of ceilings or suspended ceilings or if evidence of problems associated with hidden roof trusses.

4.44.19 The inspection shall include identifying and recording:

- the location of blocked drains, and the condition of down-pipes and gutters, displaced flashings, damaged cladding or glazing, and evidence of water penetration;
- the location and extent of rubbish or other materials likely to cause overloading of the roof.

4.44.20 For occupied Buildings, the occupants shall be asked to identify defects of which they are aware.

4.44.21 Where a surface is rendered or plastered, defects in such surfacing, for example cracking or spalling, which are or may be linked to an underlying structural defect, shall be recorded.

Additional requirements for Buildings with external cladding

4.44.22 For a Building with external cladding, the inspection shall be sufficient to establish the condition and safety of the cladding, and the integrity of the attachment of the cladding to the load-bearing Structure.

4.44.23 Cladding shall be examined from ground level and reasonably accessible positions. Where available, a maintenance cradle may be used for the examination. Where the arrangement of the cladding does not facilitate examination of the attachment to the Structure, indirect methods of examination, for example endoscopes (with agreement from Rail for London), shall be used.

4.44.24 When a defect to the attachments to the cladding is suspected, a recommendation shall be included for an Additional Examination in which a sample of cladding panels is to be removed.

Metallic Elements

4.44.25 Metallic elements shall be examined for corrosion. Loss of metal due to corrosion shall be measured or, where this is not reasonably practicable, the loss in thickness and/or the reduced dimensions of metallic elements shall be estimated.

4.44.26 Loose or missing bolts or rivets, cracked welds, fractured plates, distortion or other defects shall be identified at intersections of bracing members, splices in members and other joints or connections.

4.44.27 The condition of any protective coatings shall be examined and recorded, including any damage caused during the examination. When instructed by Rail for London, samples of the protective coatings shall be taken.

4.44.28 When instructed by Rail for London, where a metal column or other part of a Structure is below ground, loose material, the surfacing such as in a Car Park, Platform etc or ground shall be excavated to examine the metallic parts below the surface or ground level for corrosion, and subsequently reinstated.

4.44.29 The length and orientation of cracks in a metal element shall be determined and reported. New or developing cracks in cast iron members shall be reported to Rail for London immediately. Cast iron elements shall not be struck to check their integrity. Where suspension bolts or tension flats are the sole means of supporting a load-carrying member, their existence and any defect in such bolts or flats shall be reported to Rail for London.

Brickwork, blockwork and masonry

4.44.30 Brickwork, blockwork and masonry shall be examined for the presence of open joints, looseness, cracks, spalling, crushing, deterioration of pointing, leaching and staining. Brickwork, etc. shall be sounded to identify the presence and extent of internal voids when:

- defects in an arch barrel
- voids are suspected in Platform walls or retaining Walls.

4.44.31 The position, extent, width, depth, orientation and total area of defects shall be measured and recorded.

Concrete Elements

4.44.32 For concrete elements the following shall be examined, measured and recorded as applicable:

- the condition of the element and any protective coating;
- staining - from corroding reinforcement or leachate;
- the area, depth and location of spalling;
- the sizes and extent of exposed reinforcement bars and the severity of corrosion on them;
- the length and width of cracks;
- areas of crazing and honeycombing;
- evidence of softening, crumbling or deterioration;
- loose or damaged infill mortar or grout to base plates or holding-down bolt sockets.

4.44.33 Concrete surfaces shall be sounded with a hammer to identify the presence and extent of delamination from the reinforcement, and any such de-lamination shall be reported.

4.44.34 The following shall be recorded and brought to the attention of Rail for London:

- visible movement indicating excessive deflection, cracking, water penetration and rust stains, around the location of stressing anchorages;
- loose or damaged infilling concrete at stressing pockets, and at the ends of transverse pre-stressing bars or wires;
- missing transverse bars, and indications that transversely stressed beams may be moving relative to one another under load.

Timber Elements

4.44.35 Timber elements shall be examined for evidence of internal rot and/or infestation by inserting a probe or when instructed by Rail for London by coring, or alternative method approved by Rail for London. In choosing the position and number of cores taken to check for decay, care shall be taken to avoid unnecessary damage or weakening of the timber or allowing entry of water.

4.44.36 The location and depth of all cores, probes etc. and associated section depth shall be recorded. Holes made during the examination shall be made good with timber dowels, expanding foam filler (only where the compressive strength is not an issue), or an alternative method approved by Rail for London.

4.44.37 A loss of section generated by organisms (both internal and external to the timber) shall be measured and recorded, and in such cases samples shall be recovered for inspection and testing.

4.44.38 The condition of timber decking, including that on Footbridges, or flooring shall be recorded. When instructed by Rail for London, material shall be excavated to permit sample areas of a timber deck to be examined.

4.44.39 When instructed by Rail for London, hidden or inaccessible parts and metal components in contact with timber shall be exposed and examined.

Fatigue susceptible elements

4.44.40 Elements that are particularly susceptible to fatigue shall be closely examined for cracking.

4.44.41 Where a crack is found, its extent shall be measured and recorded, and a dimensioned sketch and photographs of it shall be provided in the examination report. Particular attention shall be given to composite Structures; with these, vertical deflection or longitudinal shear movements under dead or live loads, or water seepage, may indicate a fatigue defect. Examples of details susceptible to fatigue are given in Network Rail Standard NR/GN/CIV/025: The Structural Assessment of Underbridges.

4.44.42 Rail for London shall be advised immediately when a fatigue crack is found or suspected.

Additional requirements for hollow Structures

4.44.43 Where provision is made for access, the inside of hollow parts of Structures shall be examined. Where these spaces constitute a "confined space" a safe method shall be used for the examination.

Structure drain systems and seepage

4.44.44 The condition and effectiveness of drains, down pipes, gutters, valleys, weep holes or catch pits from Structures shall be checked, and any which are damaged, blocked or not freely draining shall be recorded.

4.44.45 Other than water draining through weep holes, evidence of the seepage or leakage of water (or any other substances such as petrol, oil, gas or sewage) through a Structure shall be recorded, and if possible the cause of the seepage or leakage shall be identified.

Movement joints and bearings

4.44.46 Each Detailed Examination shall be sufficient to record:

- evidence of deterioration, distortion and malfunctioning of movement joints and bearings;
- displaced or pumping bearings;
- inadequate provision for accommodating the horizontal movement of bearings;
- local settlement or distress at supports;
- evidence of insufficient space for an movement joint to function effectively;
- displacement of one part of a Structure relative to another;
- percolation of water through a joint;
- loss or deterioration of filler or sealant.

Vegetation, debris and ballast

4.44.47 The presence of the following shall be recorded:

- areas where vegetation is growing out of the Structure;
- areas where rubbish, leaves, other debris or ballast collected on the Structure;
- areas where there is evidence of ballast loss.
- The number, size and girth of trees and the extent of bushes growing on the Structure, or adjacent and likely to damage the Structure, shall be recorded.
- Physical works (removal of vegetation, loose rubbish, ballast, debris and leaves etc.) shall be carried out when instructed by Rail for London, subject to clause 4.8.

Additional requirements for parts obscured by Obstructions (excepting Tenanted Spans)

4.44.48 When instructed by Rail for London, a sufficient area of an Obstruction shall be removed to facilitate examination. The extent of the removal shall take into account:

- the possibility of defects having arisen from a change in use of the Structure or in traffic loading since the previous examination;
- an apparent change in the condition of the Structure;
- The extent and method of removal shall be recorded.

4.44.49 The examination shall generally be carried out within touching distance of those parts where:

- defects have been reported previously or have otherwise been notified to Rail for London;
- new defects are suspected or have been observed during the examination;
- a Significant alteration or repair has been made to the Structure since the previous examination, including any structural alteration undertaken without the agreement of Rail for London.
- Obscured parts to which the above criteria do not apply, may be examined by indirect or remote means where the Obstruction is not removed; that is, not necessarily within touching distance.

Particular requirements for Detailed Examinations of Over-line Bridges

4.44.50 The trafficked surface of an over-line Bridge shall be examined for signs of cracking, potholes, recent excavation, resurfacing and an increase in the depth of the surfacing.

4.44.51 The presence, condition, or absence of weight or width restriction signs on an Over-line Bridge, and Locomotive Act notices on an Accommodation Bridge or Occupation Bridge, and the restrictions quoted, shall be recorded. Evidence that vehicles crossing an Over-line Bridge may exceed the weight restriction indicated on warning signs shall be recorded.

4.44.52 A significant change in the positions of highway traffic lanes or in the permitted traffic speed shall be recorded.

4.44.53 Evidence of Bridge Strikes by road vehicles or impacts by rail vehicles shall be recorded.

4.44.54 Dimensioned sketches and photographs shall be provided to show the extent and location of the damage.

4.44.55 The examination of over-line Bridges shall include observation of changes to Approach Earthworks greater than 3m in height (except where owned by a Highway Authority, Road Authority or other competent examining Authority) that might affect the safety of the Structure or road.

Parapets, Vehicle Safety Fences and Handrails

4.44.56 In addition to the Detailed Examination of parapets and handrails, the examination of an overline Bridge shall include measuring the minimum height of the parapets relative to the adjacent road or pavement, and recording sufficient information to enable a sketch to be included in the examination report showing the parapet profiles along both sides of the Bridge on each Span over the track. Defects and damage to a parapet shall also be recorded.

4.44.57 Any Vehicle Safety Fence provided within 50 metres of the start or end of a parapet to an overline Bridge including those in front of the parapet shall be inspected. The absence of a Vehicle Safety Fence within the 50 metre limits of an overline Bridge parapet shall be recorded.

4.44.58 In addition to the examination of parapets and handrails on Structures, if the Structure carries highway vehicles, the examination shall include Vehicle Safety Fences.

4.44.59 The examination shall be sufficient to identify and record the type and lengths, position and condition of the parapets and Vehicle Safety Fences, and attachments (or otherwise) of a fence to the parapet.

4.44.60 Handrails or other safety balustrades shall be examined, and their type, condition, position, height and length recorded.

4.44.61 The absence of parapets, handrails or Vehicle Safety Fences from locations where they are considered appropriate shall be recorded.

Observations under moving load

4.44.62 The absence of parapets, handrails or Vehicle Safety Fences from locations where they are considered appropriate shall be recorded.

4.44.63 Whenever practicable, the behaviour of Bridges and Culverts under normal traffic shall be observed to identify and record:

- abnormal movement or evidence of settlement of bedstones, bearings, trestles, etc;
- excessive deflection, lateral sway, twisting, looseness or vibration;
- separation or differential vertical or horizontal movement of parts of a Structure;
- the lifting, and "hammering", of a girder off its bearings;
- other relevant observations.

4.44.64 Movement under load that is considered to be abnormal shall be quantified (where reasonably practicable).

4.44.65 The parts of the Structure that were observed under load shall be recorded, as shall the type of load(s) observed; such as light traffic, heavy goods vehicle(s), passenger and/or goods train(s).

Particular requirements for Detailed Examinations of Footbridges

4.44.66 The Detailed Examination of a Footbridge shall include but not be limited to:

- the condition of stairs, treads, risers, landings, stringers and balustrades;
- surface features that pose a Hazard, such as missing or damaged anti-slip surfacing, and tripping Hazards;
- glazing and cladding, which shall be examined for security and condition;

- Canopies and their supporting elements, where these are attached to or form an integral part of the Footbridge;
- the condition of lift shafts and escalator supports, where these are structurally integral with the Footbridge, but not the lifts and escalators themselves.

Detailed Examination of Train Sheds, Canopies and other Operational Property Structures

4.44.67 The examination of a Train Shed, Canopy and other Operational Property Structures shall include as applicable:

- parts of Buildings which are load bearing or provide bracing or stability to the Train Shed or Canopy, and whose condition could affect the safe operation of the railway or the safety of people;
- the security and condition of glazing and supporting elements;
- recording the presence, type, extent and general condition of safety netting under glazing;
- identifying and recording the location and extent of rubbish or other materials likely to cause overloading of the roof;
- the presence of lifting apparatus, hoists, runway cranes or ladders etc. which are attached to the Structure shall be recorded and photographed, and the condition of the structural elements that support such items shall be examined.
- The examination of a concourse shall include safety aspects of finishes that could cause a Hazard, including slipping or tripping, to passengers, staff, occupiers or the public;

Additional requirements for Detailed Examinations of Platforms

4.44.68 The examination of a Platform shall include:

- trestles and other elements that support the Platform;
- pre-cast concrete units and their joints, connections, and bearing or seating areas;

- copings and surfacing to the Platform, and whether there are any Hazards that may cause passengers, staff or the public to slip or trip;
- balustrades and handrails;
- the structural safety aspects of fences or railings at the rear or ends of the Platform;
- any associated Retaining Wall which is not examined as a separate Structure.

4.44.69 The front wall of a Platform shall be examined for verticality, instability and other defects or movement. Masonry walls shall be examined in accordance with Clause Brickwork, blockwork and masonry.

4.44.70 Platform copings shall be examined for bed separation and movement under pedestrian load.

Particular requirements for Detailed Examinations of Retaining Walls

4.44.71 A Retaining Wall that is integral with a Structure shall be examined as part of the Structure.

4.44.72 In addition to the requirements of Clause 'Particular Requirements for a Detailed Examination', any evidence of bed joint Failure or retained material falling over the top of the wall shall be reported.

Particular requirements for Detailed Examination of Equipment Support Structures (ESS)

4.44.73 The Detailed Examination of ESS shall include as applicable:

- the verticality, and the horizontal alignment of the Structure and any changes since the last Detailed Examination shall be quantified and recorded;
- walkways and decking, including checks for slip and trip Hazards, and signs of rot, corrosion or wear;
- the security and condition of steps, access ladders, hoops, fastenings and fittings;
- guy ropes, anchorage stays, strainers, tighteners, turn buckles etc., and their anchorages, where reasonably practicable to

detect, any slackness, deformation or lack of effectiveness in such items shall be recorded;

- recording the presence and condition of protective mesh screens to overhead electrical equipment;
- the security and fixing of equipment attached to the Structure, but not the condition, insulation, operation or effectiveness of such equipment.

4.44.74 Where observed or suspected defects to metalwork underneath walkways cannot be adequately quantified, sufficient walkway timber or plating shall be removed to examine the metalwork underneath, providing it is reasonably practicable to do so and only where the safety of the operational railway or people will not be compromised. Removed items shall be replaced on completion of the examination.

4.44.75 When instructed by Rail for London, loose material covering a baseplate or other buried tubular metal supports to ESS shall be excavated to expose the support for examination and subsequently reinstated.

4.44.76 So far as is reasonably practicable, the response of the ESS to passing trains shall be observed, and any excessive movement shall be recorded.

4.44.77 Any loose bonds found at an OHLE Structure shall be reported to Network Rail Control and no examination is to take place until the bond(s) has(ve) been reinstated.

Particular requirements for Detailed Examination of lattice Equipment Support Structures (ESS)

4.44.78 Detailed Examinations of lattice and tower ESS shall include a Visual Examination at ground level and check of the mast in accordance with Clause 'Particular Requirements for Annual Inspection / Examinations of GSM-R masts and other Lattice Towers'

4.44.79 Should the Visual Examination at ground level and check of the mast be found to be satisfactory, the Examiner shall ascend the tower to:

- inspect all members and connections of the tower for corrosion; loss of protective treatment and for any signs of distortion or distress.

- check a 5% representative sample of all bolts in lattice masts for tightness against the appropriate torques settings, and if any bolts are found to be loose, a check of a further 5% shall be undertaken.

- The details of all bolts checked shall be recorded measuring any rotation by the extent of turn found. Should any loose bolts be found in the second representative sample Rail for London shall be advised promptly.

- undertake a general inspection of component fixings where secured to the tower.

4.44.80 If the Examiner identifies a defect, e.g. a missing bolt or a misaligned structural member, the examination shall be terminated at the level of the defect.

4.44.81 When a structural member or component is hanging loose to the extent that it is a Hazard or the structural integrity of the tower is suspect, the Examiner shall refer the situation to Rail for London for instruction. In this situation the Examiner shall not climb the tower without the approval of Rail for London.

4.44.82 The examination excludes any checks of antennas, feeders, electrical installations earth testing.

Additional requirements for buried and hidden parts of a Structure which may not necessarily contain an identified HCE

4.44.83 The examination shall be sufficient to identify whether partially or completely buried parts of a Structure are likely to be suffering distress, and whether further investigation of these parts is required; for example, by monitoring, exposing parts for examination or in an Additional Examination.

4.44.84 Access covers, grills, and the like shall be removed and replaced as necessary for the examination.

4.44.85 Where a load bearing part of a Structure, other than a foundation, is buried or hidden, and the condition of that part is crucial to the safety of the Structure, the examination shall be sufficient to enable the condition of the part to be verified, unless one or more of the following applies:

- the safety of the Structure can be ascertained by other means, which shall be recorded in the examination report;

- the part is encased in material which is known to preserve the condition of the part; such instances shall be recorded, and anything which could affect the effectiveness of the preservation shall be examined and recorded.

4.44.86 Such parts of a structure which are identified to contain 'primary structural members' shall be identified by the Contractor and reported to Rail for London.

- Operational Property Structures such as but not limited to train shed roofs, footbridges, canopies and suspended platforms shall be inspected/examined to identify potential HCE. Potential HCEs will be reported to Rail for London as a 'defect' with supplementary comments.
- Rail for London will organise a sufficiently qualified resource to analyse and review HCE component to confirm and classify as 'Critical' and select whether to organise and initiate the exposure of the HCE element for further inspection/examination
- The Contractor will be instructed by Rail for London to inspect/examine the HCE following the organisation and exposure of the buried or hidden parts of the Structure. The inspection / examination may form part of the 5 yearly schedule or form part of an additionally instructed inspection/examination and this will be instructed by Rail for London as follows:
Exposure works responsibility, scope and method to be employed for exposure, the HCE will then be inspected / examined per detailed methodology and any urgent defect issues will follow the urgent defect reporting methodology.
- The details, dimensions, and condition of any exposed part shall be confirmed as far as is reasonably practicable. Photographs shall be taken to show the general condition and any deterioration of the exposed part.

4.44.87 Where reasonably practicable, and the risk of damaging the Structure during exposure or reinstatement is acceptable to Rail for London, when instructed by Rail for London, hidden or inaccessible metallic parts that are in contact with timber shall be exposed and examined.

Particular requirements for Detailed Examination of post-tensioned Structures

4.44.88 The Detailed Examination of the post-tensioned Structures shall identify any areas showing signs of distress or deterioration that may be indicative of underlying corrosion of tendons or of loss of post tension. Evidence of distress or deterioration shall be recorded, such as evidence of rust staining, cracking, spalling, or water penetration at an anchorage, joint or tendon positions. The signs of distress or deterioration may include:

- cracking of concrete slab or beams (even small cracks) parallel to the line of the

tendons indicating that (partially) grouted tendons may have fractured and re-anchored;

- cracking of concrete in the vicinity of anchorages and/or cross-sections of high shear indicating possible tendon failure and routes for ingress of water, chlorides etc that may induce tendon corrosion;
- cracking and/or spalling of concrete cover – particularly if widespread – to reinforcement caused by corrosion of reinforcement indicating possible corrosive conditions around embedded tendons;
- cracking of concrete slabs or beams transverse to the direction of tendons at cross sections of high bending moment, perhaps also accompanied by vertical deflection, indicating possible loss of post-tensioning force due to failure of tendons or anchorages;
- differential vertical deflections of parallel longitudinally post-tensioned concrete beams possibly indicating loss of post-tensioning of individual beams or loss of transverse post-tensioning (if present);
- water leakage (and staining) through segmental joints indicating Failure of deck waterproofing or drain fittings and possible corrosion of tendons passing through the joint;
- water leakage (and staining) through longitudinal joints between parallel longitudinal (post-tensioned or reinforced) beams indicating failure of deck waterproofing or drain fittings and possible corrosion of embedded reinforcing steel (including corrosion of transverse post-tensioned tendons if present);
- water leakage (and staining) through cracks in the vicinity of anchorages and cross sections of high shear indicating potential for corrosion of embedded steel;
- breakdown of bearings indicating substantial changes of loads on bearings possibly caused by loss of post tension;

- loose or lost tendons/anchors, or disruption/cracking of capping concrete or anchorage end caps.

Structure movement

4.44.89 A change in vertical or horizontal alignment, rotation, settlement or distortion (for example, on abutments, piers, columns, walls, arches, spandrels or girders) shall be recorded.

4.44.90 Readings shall be taken from existing monitoring points. The date the readings were taken shall be recorded, and a graph or other means of presentation provided to show the trend of movements.

4.44.91 Where required or approved by Rail for London, monitoring points, tell-tales, gauges, measurement markers etc. shall be installed at cracks or other locations as identified.

4.44.92 The position, orientation and datum of existing and newly installed monitoring points shall be identified on a sketch; the datum shall be referenced to a salient permanent feature on or near the Structure.

Identification plates and other signs

4.44.93 The presence, legibility, condition, or absence of Structure identification plates shall be recorded. The signs shall be checked for accuracy for the following:

- the unique identity of the Structure;
- the local name of the Structure as given in records provided for the examination;
- visibility to, and if readable by drivers of trains;
- the length of the Tunnel.

4.44.94 Structure identification plates provided at track level shall be checked, so far as it is reasonably practicable to confirm visibility to train drivers from either direction.

4.44.95 The presence, legibility, condition, or absence of signs within Tunnels shall be checked, and any deficiencies recorded. Signs shall be checked for the following: distance signs are suitable for relating the longitudinal track position to the Tunnel.

4.44.96 The presence, legibility, condition, or absence of signs within a Tunnel marking the position and identification of all open, blind, and known or proven Hidden Shafts shall be checked. Where the location of a Shaft is known to be within a range along the Tunnel, this range shall be marked. Any ambiguity between the identification on site and the records provided for the examination shall be recorded.

4.44.97 The examination shall include checking that 'Prohibition', 'No Refuge' and 'Limited Clearance' signs are provided when required by, and comply with Network Rail Standard NR/SP/OHS/069: Line side Facilities for Personal Safety.

4.44.98 Deficiencies or inaccuracies on the signs or plates shall be recorded.

4.44.99 When instructed by Rail for London, the signs shall be cleaned. The Contractor will be expected to clean signs which are reasonable to do so during the Examination / Inspection.

Particular requirements for Inspection / Examination of Buildings and Building Services (M&E Equipment)

4.44.100 An inspection of Building Fabric shall be sufficient to identify or determine defects that might affect the structural integrity or use of a Building, and to provide information to enable data in RfL Asset Databases to be maintained and updated as necessary. Typically this shall be a Visual Examination in accordance with 4.27 & 4.43, unless instructed otherwise by Rail for London.

4.44.101 The scope of inspection of Buildings includes both structural elements and any non structural and/or ornate additions and embellishments.

4.44.102 An inspection of Building Services shall be sufficient to:

- identify or determine defects that might affect the serviceability of Building services;
- inspect and test elements of mechanical and electrical plant and equipment to confirm their ability to continue operation;
- identify maintenance work items;
- enable the condition of Building services and results of tests to be recorded in Rail for London's Asset Management System.