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Level 3

Handbook for the examination of Structures Part 2A: Bridges

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1 Purpose

The purpose of this part of the handbook is to define the particular requirements and recommendations for examination of Bridges.

2 Scope

This part of the handbook applies to all Network Rail owned or managed Bridges, Shared Bridges, Outside Party Bridges and other Structures assigned to Structure Category A in accordance with NR/L1/CIV/032: *Managing existing Structures*[1]. Such Bridges may be assigned as Structure Category A1.

This part of the handbook does not apply to:

1. Longitudinal Timbers[2], but it does apply to the fixings which attach such Timbers to their supporting structural elements.

2. continuously supported track slabs except where an integral part of a Bridge.

Particular requirements and recommendations for examination of Tenanted Spans of Bridges are given in **Part 2B**.

3 Preparations for Detailed Examinations

3.1 General requirements

In addition to the requirements for preparation for a Detailed Examination in **Part 1D**, the following requirements and recommendations may apply:

- the presence or otherwise of a post-tensioning system shall be investigated by the Examiner and if applicable the details of the installation, e.g. type, number and size of tendons and their anchorage locations obtained;

- the accuracy of the existing BCMI reference sketch and the element breakdown used in the previous Detailed Examination shall be checked by the Examiner (See Clause **3.2**).

3.2 BCMI reference sketch and element breakdown

A revised BCMI reference sketch and element breakdown in accordance with **Part 2C** shall be prepared if since the previous Detailed Examination:

- the structural form has changed;

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1 This provides information on managing Structures for all Structure Categories.

2 Examination of these is covered in NR/SP/TRK/038: *Longitudinal Timbers - design, installation and maintenance*.

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- significant repairs have been carried out with introduced strengthening.

In all other cases the existing BCMI reference sketch shall be considered suitable for use in the Detailed Examination.

3.3 Planning requirements

Further to the planning requirements for Detailed Examinations in **Part 1D**, consideration shall additionally be given as to whether or not the depth of a Watercourse will necessitate an Underwater Examination to be carried out, and whether any silt or blockages will be required to be removed for the examination.

4 Detailed Examination

4.1 Scope

Further to the scope of Detailed Examinations specified in **Part 1B**, all Network Rail owned or managed, and Shared Bridges shall be subject to Detailed Examinations.

This is to include Structures which both support Buildings and span across the operational railway.

A Detailed Examination of a Bridge shall include observations along both the top and foot of the wing walls for ground movement.

Detailed Examinations of Bridges shall generally be carried out within touching distance of the part being examined, except:

- masonry arch bridges unless required otherwise by the Structure Manager in accordance with Clause **4.7.2**;
- when CCTV equipment is used for an Underwater Examination.

Where reasonably practicable, Bridges shall be observed under moving loads, in accordance with Clause **4.8**.

4.2 Content

In addition to the requirements for the content of a Detailed Examination in **Part 1B** and **Part 1D**, a Detailed Examination of a Bridge shall include:

- the additional requirements in Clauses **4.3** – **4.6** inclusive;
- the particular requirements in Clauses **4.7** – **4.14** inclusive according to type of Bridge;

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- determining the BCMI for the Bridge in accordance with Clause **4.15**;
- the additional requirements in Clause **4.16** inclusive as applicable to the Structure form.

Where not previously recorded, the Detailed Examination of a Bridge is to include measuring and recording:

- the maximum height of the soffit above the road, rail, Watercourse or land under each span of the Bridge; for masonry arches the height at the crown is to be recorded;
- span lengths parallel to the parapets or handrailing and perpendicular to the abutments or piers;
- span width perpendicular to the parapets;
- number of spans in the Examination Group.

4.3 Concrete elements

Further to **Part 1D**, the following shall be brought to the attention of the Structure Manager immediately:

- 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.

4.4 Timber elements

The condition of timber decking, including that on Footbridges, or flooring shall be recorded. The examination and making good shall be as required in **Part 1D**.

The Structure Manager shall determine if ballast is to be excavated to permit sample areas of a timber deck to be examined.

4.5 Hollow Structures

Where provision is made for access, the inside of hollow parts of Bridges such as Bridge box girders, spandrel chambers or hollow piers shall be examined.

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4.6 Identification plates and other signs

In addition to **Part 1D**, for a Low Headroom Bridge, and for a Bridge with restricted headroom over a navigable Watercourse, checks shall be made that:

- two signs clearly visible at road or waterway level are fixed securely to the Bridge, and provide the correct bridge identity and a telephone number with 24 hour availability for reporting Incidents;
- Bridge identification plates are provided at track level which, so far as it is reasonably practicable to determine, are visible to train drivers from either direction.

Detailed Examinations shall include cleaning of Bridge identification plates.

4.7 Underline Bridges

4.7.1 General requirements

The presence of holes through the deck of an underline Bridge due to spalling, corrosion or timber deterioration shall be reported to the Structure Manager immediately.

4.7.2 Masonry arch Bridges

The Detailed Examination of a masonry arch Bridge shall be carried out within touching distance or using hand tools such as sounding poles when the Structure Manager considers that insufficient information will be obtained to enable the safety of the Bridge to be evaluated by visually examining the barrel of the arch from ground or road level.

Insufficient information is likely to be obtained when any of the following defects or changes irrespective of their apparent age identified in previous examination reports or from other sources are present:

- separation of the spandrel wall from the arch barrel;
- ring separation or drumminess in the arch barrel;
- bulges in or other changes in the arch barrel profile;
- Significant water penetration thorough the arch barrel;
- dropped stones or bricks from the arch barrel;
- spalling;
- cracks in the arch barrel or spandrel;

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