



National Highway Sector Scheme 31 for the Bridge Inspector Certification Scheme

Scheme Manual



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Foreword

This new certification scheme for Bridge Inspectors, entitled 'Bridge Inspector Certification Scheme', has been jointly developed by the UK Bridges Board, Transport Infrastructure Ireland and the Bridge Owners Forum.

The certification scheme has been developed using a modular approach so as to enable flexibility. Core modules, applicable to all sectors, have been developed but the structure is such that specific additional modules, to accommodate the requirements of different sectors and organisations, can be added, as and when required.

The benefits of this new scheme may include:

- An international scheme (UK and Ireland) which will be used by highways, waterways and railway asset owners;
- Proof of competence. This scheme will result in clarity of the experience and skills required by bridge inspectors, for Inspectors and Senior Inspectors. This will assist bridge owners with the specification of skills required, both internally and externally;
- Formalisation of knowledge and experience required by inspectors. This will result in effectively trained inspectors and hence improved levels of consistency in undertaking inspections, capturing defects, more informative and accurate inspection reports and interpretation of results;
- The ability to better prioritise limited maintenance budgets as a result of greater consistency in the recommendations from bridge inspections;
- An increase in the profile/standing of bridge inspectors via the introduction of a nationally recognised scheme. The different levels of competence would also provide a structured path for career progression, which would assist in staff retention and long-term capture of vital knowledge;
- Transferrable skills - Increased flexibility for organisations in moving inspection staff around and sharing them with other sectors;
- A structured approach to promote continued learning of bridge inspectors. Up to date developments and innovation within the industry can be identified where relevant for use in inspections.

Please note that where the term 'bridge' or 'bridges' appears in this manual that is deemed to cover highway structures within the boundaries of the highway or which otherwise materially affect it, and also structures within the domain of rail, light rail and waterway sectors. These typically include: bridges, footbridges, cycleway bridges, bridleway bridges, accommodation bridges, masts, post and columns, gantries and ancillary structures, subways, underpasses, culverts, retaining walls and cantilever road signs.

1. Introduction

This document should be read by the following:

- Bridge owners
- Trainee/uncertified inspectors
- Experienced inspectors wishing to become certified or renew their certification
- Mentors
- Assessors
- Anyone specifying or procuring inspections services
- Training providers

This document will help you to understand the Bridge Inspector Certification Scheme and will provide guidance on your role and responsibilities, as well as those who are available to support you through your journey to become a certified Bridge Inspector or to retain your certification. This document also contains useful reference material and templates to assist you in satisfying the required competencies.

Routes to Certification

The route to becoming a certified Bridge Inspector involves three key phases, which are:

- **Phase 1** - Achievement of the required knowledge and experience competences, as outlined in the Core Modules
- **Phase 2** - Successful demonstration of the required knowledge and experience competences including via external interview
- **Phase 3** - Continued consolidation/broadening of experience

There are two levels of certified Bridge Inspector which are:

- **Inspector (I)**
- **Senior Inspector (SI)**

The two roles have been developed to reflect the current roles and responsibilities commonly adopted within the bridge inspection community.

Both roles require certified inspectors to have the necessary competences to undertake both detailed inspections such as Principal Inspections as well as General Inspections. The primary differences between the two competence requirements for a Senior Inspector (SI) and Inspector (I) are that a SI must be able to demonstrate broader experience of the relevant areas and of having supervised others as well. This is reflected in the Achievement Rating definitions.

1.1. Competences

The Bridge Inspector Certification Scheme consists of seven Core Competencies, which themselves each comprise of a number of sub-competences. Outline descriptions of the subject material for each Core Competence are detailed below:

Unit C1 - Introduction to Inspections

This unit outlines the background to the importance of undertaking inspections. Fundamental to effective management is an inspection regime that provides timely, accurate and appropriately detailed information on asset condition and performance. The overall purpose of inspection, testing and monitoring is to check that structures are safe for use and fit for purpose and to provide the data required to support effective maintenance management and planning.

Unit C2 – Structures Types and Elements / Behaviour of Structures

This unit outlines common types of structures, their key elements and materials. It also covers background information and guidance on the fundamentals of structural behaviour, the basic principles of structural mechanics and material properties.

Unit C3 - Inspection Process

This unit outlines the fundamentals of the inspection process, including scheduling, planning, undertaking, reviewing and interpreting the results. It also includes consideration of environmental impacts, selection of appropriate access equipment and safe working practices. In addition, it highlights the importance of accurate, reliable data capture and storage post the inspection.

Unit C4 - Defects Descriptions and Causes

This unit outlines the importance and requirements for describing and categorising defects. Emphasis is placed on principal defects that are likely to be encountered in a variety of structural forms, material types and operating environments.

Unit C5 - Investigation and Testing

This unit outlines the background to the range of different testing techniques available. A candidate is required to understand the purpose of undertaking testing, what it involves, its limitation, the outputs and any other relevant considerations.

Unit C6 – Repair Techniques

This unit outlines the importance of understanding the range of repair techniques available for different structure types and materials and the significance of undertaking effective routine maintenance.

Unit C7 - General Aptitude

This unit outlines the general aptitude skills required by an inspector. In addition to the Core Competences, it is planned to develop a range of Specific Competences which will cover particular areas of expertise required by some sectors of the Bridge Community.

1.2 Existing Inspectors

It is anticipated that the majority of existing inspectors will be able to demonstrate adequate competence to meet the requirements of the Core Modules, utilising their experience to date, or may only need to supplement their skills in a number of targeted areas. The Core Modules have not been designed to 'catch you out' but to ensure that you have the necessary skills to undertake your role effectively and consistently.

1.3 People to Help You

People who can support you in achieving the skills and experience required to satisfy the Core Modules include your Mentor, who may be a colleague employed by the same Company or a different Company, if appropriate, as well as the Scheme Administrator.

Each of them fulfils a different role and they will support your review of your personal experience, as well as assisting you in the planning of your continuing professional development, so as to meet the necessary competence requirements.

2. Scheme Parties

2.1. Different Roles

The Bridge Inspector Certification Scheme has a number of different parties who undertake complementary roles. These roles include:

- Trainee/Uncertified Inspector
- Mentor
- Employer
- Assessor
- Scheme Administrator

2.2. Roles and Responsibilities

2.2.1. Trainee/Uncertified Inspector

Role

The role of the trainee/uncertified Inspector is to ensure that he/she fully understands and is able to demonstrate the competence requirements of the Core Modules and maintains the required competence levels, whilst continuing to undertake bridge inspections under supervision.

Responsibilities

The responsibilities of a trainee/uncertified Inspector are to:

- Familiarise him/herself with the competences laid down in the Core Modules
- Understand the achievement ratings required to satisfy the Core Modules
- Have an overview of the operation of the **Bridge Inspection Certification Scheme**
- Complete **Bridge Inspection Certification Scheme** e-portfolio
- Identify Competences requiring further knowledge/experience
- In conjunction with a Mentor(if assigned by the employer), outline development action plan to achieve the outstanding competences
- Organise regular meetings with Mentor(if assigned by the employer) to review progress
- Submit e-portfolio and accompanying evidence to Lantra
- Undertake appropriate advance preparation and attend external **Bridge Inspection Certification Scheme** interview (arranged by Lantra)
- Undertake relevant continuing professional development and record it accordingly
- Undertake reassessment at appropriate time to maintain certified inspector status

2.2.2. Employer / Mentor

Role

The role of the Employer is to proactively support a trainee/uncertified Inspector and to facilitate the opportunities for him to gain the knowledge and experience necessary to achieve the required competence levels. It is assumed that a trainee/uncertified Inspector's Mentor will usually be an experienced colleague from the same organisation. Although the role of Mentor is encouraged it is not a mandatory requirement.

Responsibilities

The responsibilities of an Employer are:

- Appoint (internally or externally) an appropriate Mentor for the trainee/uncertified Inspector

The responsibilities of a Mentor are:

- Undertake an initial meeting with Inspector to provide an overview of the **Bridge Inspection Certification Scheme**
- Assist trainee/uncertified Inspector with completing the e-portfolio
- Review trainee/uncertified Inspector's initial evidence of knowledge/experience to date
- Support trainee/uncertified Inspector with the drafting of an outline development action plan to achieve the outstanding competences
- Attend regular review meetings with trainee/uncertified Inspector to check on progress
- Undertake internal review of trainee/uncertified Inspector's completed e-portfolio
- Support trainee/uncertified Inspector with advance preparation for external interview
- Provide on-going support/guidance to Inspector post certification.

2.2.3. Assessor

Role

The role of the Assessor is to review and verify whether a trainee/uncertified Inspector can demonstrate the competences laid down in the Core Modules. This will be undertaken through a review of the evidence presented in the candidate's submitted e-portfolio and the external interview.

Responsibilities

The responsibilities of an Assessor are:

- Review submitted e-portfolio and verify whether sufficient evidence has been provided to satisfy the competences laid down in the Core Modules
- Undertake an interview with the candidate
- Confirm whether a candidate has met the requirements to achieve certified Inspector status. (Inspector or Senior Inspector, as appropriate)
- To draft feedback summary to unsuccessful candidates, outlining areas where they have failed to demonstrate adequate competence
- Undertake appeals and re-examination interviews, if required.

2.2.4. Scheme Administrator

Role

The role of the Administrator is to maintain the **Bridge Inspector Certification Scheme** and to advise and support the candidates through the certification process.

Responsibilities

The responsibilities of the Administrator are to:

- Maintain website for the scheme
- Maintain scheme templates and update as necessary
- Process submitted completed e-portfolios and allocate Assessor

- Arrange external interviews
- Issue SMART cards to successful candidates
- Forward feedback to unsuccessful candidates
- Arrange re-examination/appeals, as required
- Maintain database
- Liaise with selected stakeholders and undertake 6 monthly reviews as required and report recommendations to UKRLG /UKBB.

3. Inspector Levels and Competences

3.1. Inspector Levels

Certification via the Bridge Inspector Certification Scheme can be awarded at one of two levels (see definitions):

- Inspector
- Senior Inspector

There are different attributes for each level which need to be demonstrated through the capture of evidence and an external interview. Deciding which level is most appropriate for you will depend upon your experience to date and your current role. This decision will most likely be taken following discussions with your Employer/Mentor. He/she should be able to advise you on the most suitable route, in light of your current experience and the experience you will realistically be able to gain in the near future.

3.2. Competences

As outlined in Section 1.2 earlier, the scheme consists of seven Core Modules containing the competences and associated sub-competences required for achieving inspector certification. These are shown in Table 1 overleaf. Details of the assessment criteria for each sub-competence and both Inspector levels are detailed in Volume 2: Scheme Unit Guidance. The required achievement rating to satisfy the competence adequately depends upon the inspector level you wish to attain. Further details on the achievement ratings are given in the following section.

3.3. Achievement Ratings

The achievement rating describes the level of knowledge and experience required for a specific level. There are four ratings, which are listed below:

- **A** – Awareness
- **K** – Knowledge
- **E** – Experience
- **P** – Proficiency

The first two ratings demonstrate the level of **knowledge** which you require in order to satisfy the adequate competence, whilst the latter two require a candidate to have had **practical experience**, in conjunction to the theoretical knowledge, in order to satisfy the competence requirements.

Detailed descriptions of the nature of the skills required to satisfy each of the achievement ratings are detailed overleaf in Table 2.

Table 1 – Achievement Ratings

Achievement Rating		Description	
A	Awareness	General understanding of the competence, including an appreciation of its relevance.	<i>These apply to theory only</i>
K	Knowledge	Knowledge and understanding of the competence with an ability to demonstrate its relevance/application.	
E	Experience	Knowledge, understanding and experience of undertaking the competence.	<i>These apply to practical application, as well as theory</i>
P	Proficiency	Knowledge, understanding and experience of undertaking the competence and competent to advise others .	

Table 2 –Core Competences

Ref	Core Module Description
Unit C1	Introduction to Inspections
C1.1	Purpose of Inspections
C1.2	Inspector Roles, Responsibilities and Competences
C1.3	Inspection types
C1.4	Codes of Practice
Unit C2	Structures Types and Elements / Behaviour of Structures
C2.1	Bridges
C2.2	Other Structure Types
C2.3	Structural Mechanics
C2.4	Properties of Common Construction Materials
C2.5	Properties of Specialist Construction Materials
Unit C3	Inspection Process
C3.1	Scheduling Inspections
C3.2	Planning and Preparing for Inspections
C3.3	Performing Inspections
C3.4	Recording Inspection Findings

C3.5	Interpreting Inspection Findings
C3.6	Maintenance Planning Process
C3.7	Obligations of Current Health and Safety Legislation
C3.8	Other Skills
Unit C4	Defects Descriptions and Causes
C4.1	Principal Causes of Defects
C4.2	Concrete Defects
C4.3	Steel Defects
C4.4	Masonry Defects
C4.5	Defects in Miscellaneous Materials
Unit C5	Investigation and Testing
C5.1	The Testing Process
C5.2	Common Testing Techniques
Unit C6	Repair Techniques
C6.1	Repair techniques for concrete structures
C6.2	Repair techniques for metal structures
C6.3	Repair techniques for masonry structures
C6.4	Repair techniques for 'other' structures e.g. timber
C6.5	Importance of Routine Maintenance
Unit C7	General Aptitude
C7.1	Practical Aptitude
C7.2	Working with people
C7.3	Communication skills
C7.4	Personal skills
C7.5	Obligations of Current Health and Safety Legislation
C7.6	Management / Supervision

3.4. Theoretical v Experience

It is appreciated that a number of the competences can be achieved solely through background reading and/or courses. These are the areas where it is felt that the skill required does not necessitate practical experience but is adequately achieved by a candidate extending his theoretical knowledge. However, there are areas where practical experience is deemed to be necessary to successfully achieving the required level of competence. Consequently, competences requiring achievement ratings of 'E' or 'P' compel a candidate to demonstrate practical experience in order to satisfy the competence

3.5. Specialist Modules

In addition to the Core Modules, some bridge owners may require Inspectors to satisfy the competence requirements of a number of specialist assets. These have yet to be fully developed but could be grouped into a number of areas which may include:

- Materials
- Industry Specific
- Health and Safety
- Structure Type Specific

A number of suggested possible Specialist Modules are listed below in Table 3:

Table 3 – Example Specialist Modules

Materials	Industry Specific	Structure Type Specific
Tests on concrete	Network Rail Access	PTSI's
Tests on metal	British Waterways structures	Moveable Structures
Tests on masonry	Scour Critical Structures	
Tests on timber	PROW Experience	
Tests on advanced composites	M&E Experience	

4. Scheme Operation Trainee/Uncertified Inspector

4.1. Getting Started

The Bridge Inspector Certification Scheme requires the trainee/uncertified inspector to provide proof of competence against each core module by completing their e-portfolio and supplying the relevant evidence.

It is expected that your employer will be committed to providing support, expanding your knowledge and expertise through enabling you to undertake suitable work experience, appropriate training, as well as providing you with Mentor(s) support on an individual basis. Similarly, you will be committed to work to the best of your abilities, through planning and capturing your competence records, arranging regular meetings with your Mentor and ensuring that your continuing professional development (CPD) is maintained.

It is not a requirement to attend training courses however these may be of some use for a new trainee to gain knowledge. You should learn through direct experience of working in teams, both in the office and on site. You will also have the opportunity to develop your knowledge and understanding in discussion with your colleagues and in regular reviews with your Mentor (if allocated by employer).

The achievement of becoming a Certified Inspector through the Bridge Inspector Certification Scheme can be broken down into three phases. These phases are now outlined in more detail below:

4.2. Phase 1 – Achievement of Competences

4.2.1. Initial Administration

The initial tasks involved in embarking on a Bridge Inspector Certification Scheme include the following activities:

- Agreement with your Employer
- Registration with the Scheme Administrator (Lantra)
- Allocation of Mentor (optional)
- Review of experience to date
- Decision as to which Certification Route is most appropriate (i.e. Inspector or Senior Inspector)
- Completion of e-portfolio
- Submission of e-portfolio to Scheme Administrator (Lantra).

4.2.2. Previous Relevant Experience

Relevant experience gained prior to embarking on the Bridge Inspector Certification Scheme can be recorded as evidence towards achievement of the Core Modules. This may be particularly relevant to many of those who have been carrying out inspections for some time. As a priority, it is prudent to familiarise yourself with the content of the Core Modules in order that you can decide where you may need additional support and further learning.

Once you have undertaken an initial review of the competences contained in the Core Modules and the assessment criteria, the next step is to record the relevant evidence from your experience in the e-portfolio, in order that it can be reviewed by your Mentor (if required). It is envisaged that your Mentor (optional) will assist you in undertaking this task.

4.2.3. Completion of E-Portfolio

In order to demonstrate adequate evidence that you have the necessary competences to undertake the skills outlined in each core module it is essential to record this within your e-portfolio. Guidance is contained within the e-portfolio which can be assigned to you by Lantra and accessible on receipt of payment (see www.bridge-inspectors.com).

Once you have completed your e-portfolio in the core modules, and they have been checked by your Mentor (optional) as demonstrating the required competence level, you and your mentor will agree whether you are ready to submit your e-portfolio to Lantra for review. On submission of the e-portfolio Lantra will appoint an Assessor to undertake a review of the completed e-portfolio.

4.3. Phase 2 – External Review

4.3.1. E-Portfolio Sign-Off

In order for the Assessor to be able to sign you off as competent, he/she needs to see evidence that you have the necessary skills listed in the assessment criteria and also at the required achievement rating. As explained earlier in section 3.3, achievement rating levels 'A' and 'K' only require theoretical knowledge, which can be achieved through background reading or through courses etc., whereas achievement rating levels 'E' and 'P', require you to have had practical experience. Successful completion and sign off of the e-portfolio by an assessor is mandatory in order to progress to external review.

4.3.2. External Interview

All candidates who wish to become certified via the Bridge Inspector Certification Scheme will be required to have an external interview with a Lantra approved Assessor. An interview will only be offered on achieving successful sign off of the e-portfolio. The interview will consist of a range of questions in order that the Assessor can satisfy him/herself that you have the necessary competences. The level of competence required will depend upon which certification level (i.e. either Inspector or Senior Inspector) you have submitted your application for.

4.3.3. Certification

If you successfully demonstrate that you have the required competences for your chosen certification level, you will then be awarded certified inspector status. Each candidate will receive a Lantra SMART card clearly stating the achieved inspector status (i.e. either Inspector or Senior Inspector) and the time period for which it is valid.

If you are unsuccessful in satisfying the requirements of the external Assessor at interview stage, there is the opportunity of appealing or applying to be re-interviewed at a later date. Appeals can be made on an administration basis only and not on technical content.

4.4. Phase 3 – Continued Consolidation/Broadening of Experience

4.4.1. CPD

Achievement of Certified Inspector status is not the end of your journey. You are required to maintain a record of your Continuing Professional Development (CPD) in order to demonstrate how you are keeping up-to-date and maintaining your levels of competence.

4.4.2. Renewal Process

Annual Re-Registration

There is a requirement for the Certified Inspector/Senior Inspector to renew their registration annually. On or before annual re-registration, in April, Lantra will request evidence of up to date CPD and the annual registration fee will be applied.

Term of Certification

Certification will last for a period of 3 years at which point your SMART card will expire. Certified Inspectors/Senior Inspectors must renew their certification via Lantra by;

- Providing up to date CPD
- Submitting updated e-portfolio for re-assessment
- Re-assessment interview (if required)

Inspectors/Senior Inspectors must re-new their expired cards within the 6 months prior to the card expiry date.

5. Scheme Operation - Employer

5.1. Mentor Assignment

The role of an Employer is to proactively support a trainee/uncertified Inspector and to facilitate opportunities for him/her to satisfy the required competences and hence achieve certified status. The primary means by which this may be implemented is through the allocation of an appropriate Mentor to the trainee/uncertified Inspector.

Initial responsibilities of a Mentor are to assist a trainee/uncertified with the completion of their e-portfolio, undertake a review and capture their experience to date and subsequently draft an outline action plan to assist the trainee with understanding how they can achieve the outstanding competences.

5.2. Progress Monitoring

The role of the Mentor is to attend regular meetings arranged by the trainee/uncertified to review progress. Progress will be monitored through discussions with the trainee in conjunction with reviews of their e-portfolio. The Mentor will be responsible for providing constructive feedback on the trainee's submitted material, so as to guide them for e-portfolio submission and interview.

5.3. Mentor Review

A Mentor will provide feedback to the trainee/uncertified for the competences at the appropriate level and confirm that the trainee is ready to undertake an external review with a Lantra approved Assessor.

5.4. Post Certification Support

A Mentor's role does not finish once the candidate successfully achieves certified status since, if they have achieved Certified Inspector status, they may wish to progress to Senior Inspector in due course. Even those who you have achieved Senior Inspector status still require on-going support to ensure that they are regularly challenged to question their own on-going competence levels. The past bridge collapses clearly highlight that the industry cannot afford to become complacent with regards to the competence of bridge inspectors.

6. Scheme Operation - Assessor

6.1 The Role of an Assessor

The main role of the Assessor is to assess the suitability of candidates to become Certified Inspectors. They will fulfil this role through undertaking a review of the evidence presented to them in the candidate's e-portfolio, submitted for review prior to a 'face-to-face' interview with the candidate.

Assessors must meet the requirements of the Scheme Administrator (Lantra) and the technical standard requirements as set by the Bridge Inspector Certification Scheme (BICS).

Assessor Registration

Note: All assessors must be registered with Lantra

Stage 1:

Submit competence evidence record to Lantra, to include the following;

Approval criteria	Evidence requirement
Industry experience for the scheme	Provide a competency based Curriculum Vitae showing that the applicant has the relevant industry experience and knowledge. Provide a written statement evidencing a high level of proficiency for the Core Modules C1 to C7 (no more than 350 words per unit). See Appendix E : written statement pro forma
Assessor	A recognised Lantra Bridge Inspector Assessor will successfully achieve: <ul style="list-style-type: none">• Bespoke Lantra Bridge Inspector Assessor Training This training is delivered through a 1 day assessor standardisation event.

Stage 2:

Suitable applicants will attend a one day Assessor Standard Setting Event organised by Lantra. These events will be supported by technical experts from the BICS Committee and Lantra appointed Lead Assessors.

All Assessors will be expected to attend a refresher training seminar every three years in order to maintain their competence and their status as a Lantra appointed Assessor ensuring there is consistency across all assessor decisions.

Responsibilities

The responsibilities of a Bridge Inspector Assessor include the following key tasks:

- Review submitted Competence Evidence Records for candidates and verify whether sufficient evidence has been provided to satisfy the competences laid down in the Core Modules
- Ensure that all evidence is clearly documented and precise
- Undertake an interview with the candidate (see Lantra QA process)
- Confirm whether a candidate has met the requirements to achieve registered Inspector status. (Inspector or Senior Inspector, as appropriate)
- Provide a written report on the outcome of the assessment (see Lantra QA process)
- Lantra to feedback report outcomes to candidates. Where candidates have been unsuccessful report will identify where they have failed to demonstrate adequate competence and advise next steps
- Participate in Appeals, if required.

All assessment records must be retained by Lantra for 7 years. Lead Assessors and Lantra retain the right to review and counter check any assessment reviews.

Additional responsibilities of a Bridge Inspector Assessor:

- Maintain up to date knowledge of the industry
- Provide evidence of updated CPD at annual re-registration.

Guidelines

Examples of suitable and unsuitable Assessor reports have been drafted which are designed to steer and advise Assessors on the most effective way of report writing. These reports are part of the Assessor Guidance document which is issued to all Assessors as part of the Standardisation Event.

6.2 The Role of the Lead Assessor

The role of the Lead Assessor in addition to the above criteria is to support Lantra in the following activities:

- Appointing Assessors
- Ensuring Assessors are meeting the required standards
- Assisting in Assessor Standardisation Events

7. Scheme Operation – Scheme Administrator

7.1. Administration

The role of the Scheme Administrator is to maintain the Bridge Inspection Certification Scheme and to ensure that all parties fulfil their roles and are provided with the necessary tools to do so. The role is currently undertaken by **Lantra**. To summarise, the Scheme Administrator is responsible for the administrative tasks involved in ensuring the smooth running of the scheme.

The primary day-to-day tasks include:

- Maintenance of website for the scheme
- Maintenance of scheme templates
- Processing of submitted e-portfolios
- Appointment of Assessors
- Allocation of Assessor activity
- Arranging of external interviews
- Production and forwarding of Inspector and Senior Inspector SMART cards to successful candidates
- Forwarding feedback to unsuccessful candidates
- Arranging re-examination/appeals, as required
- Maintenance of BICS database
- Maintenance of scheme manuals and sector scheme document
- Secretariat for BICS Committee

7.2. Continuous Improvement

In conjunction with those tasks listed in Section 7.1 above, the Administrator and the BICS Committee are responsible for regularly challenging the processes involved in running the scheme to ensure that any necessary improvements are acted upon. The Administrator is responsible for implementing any improvements/amendments and for ensuring that any associated documentation is updated accordingly.

7.3. Liaison with the UK Bridges Board (UKBB)

A further role for the Administrator involves liaison with selected stakeholders and the organisation of periodic reviews, as required, to report recommendations to the UKBB. These may lead to subsequent updates needing to be published. It is the role of the Administrator to ensure that these are undertaken.

7.4. Assessors Register Owner

In order to allocate suitable Assessors to candidates the Scheme Administrator shall own and maintain the Assessors Register. The information which shall be recorded includes:

- Names of individuals who have completed the Assessor Standardisation Event successfully

- Details of the number of 'shadowed' interviews which an individual has undertaken
- Notification from Lead Assessor of a trainee Assessor having successfully completed his 'trial period'. This will be the individual's registration date.
- Date of refresher training required for each registered Assessor.

7.5. Inspectors Database

The Scheme Administrator shall ensure that the Certified Inspector Database is maintained at all times.

8. Background Information

- Management of Highway Structures: Code of Practice, TSO, 2005
- Inspection Manual for Highway Structures – Volume 1: Reference Manual, TSO, May 2007
- Inspection Manual for Highway Structures – Volume 2: Inspector's Handbook, TSO, May 2007
- Guidance Document for Performance Measurement of Highway Structures: Part B1: Condition Performance Indicator, 2007
- BD 63 Inspection of Highway Structures, DMRB 3.1.4, TSO
- BD 27 Materials for The Repair of Concrete Highway Structures, DMRB 3.2.2, TSO
- BA 35 Inspection and Repair of Concrete Highway Structures, DMRB 3.2.2, TSO
- Manual of Bridge Engineering, The Institution of Civil Engineers, Thomas Telford Publishing, 2000
- EIRSPAN, The Irish Structure Management System, System Manual No.2 – Inventory, Revision C, January 2008
- British Waterways Direction: Asset Inspection Procedures (AIP 2008), June 2008
- Network Rail - NR/L3/CIV/006 – 1D – Level 3 Handbook for the examination of structures – Part 1D: Competency, preparation for examinations and other common requirements, September 2009
- Network Rail - NR/SP/CTM/017 – Specification – Competence & Training in Civil Engineering, June 2006
- London Underground - Category 1 Standard – 1-050 – Civil Engineering – Common Requirements, Issue No: A3, July 2010
- London Underground - Manual of Good Practice – G-050 - Civil Engineering – Common Requirements, Issue No: A3, December 2009
- London Underground Guidance Note – G1056 – Unit 6 - Inspect the condition of Bridges and Structures (Knowledge, Understanding and Observation) Assessment Checklist for Bridges and Structures Inspectors, Issue: A1, May 2011]

9. Definitions

Achievement Rating	This is the level of knowledge (and experience, if appropriate), required to satisfy a defined competence.
Administrator	This is the body which is responsible for the day-to-day running and maintenance of the Bridge Inspection Certification Scheme.
Assessor	This is the individual who verifies whether a Trainee Inspector can demonstrate the required competence levels, through a review of their submitted e-portfolio and an external interview.
Competence	This is the attainment of knowledge skills and abilities at a level of expertise sufficient to be able to perform in an appropriate work setting.
Core Competence	These are the Competences which are deemed to be fundamental to attaining Bridge Inspector Certification.
Employer	This is the person or company who commits to supporting a Trainee Inspector, both technically and financially through the process for becoming certified under the Bridge Inspection Certification Scheme.
E-Portfolio	This is the tool used to capture details of the knowledge and experience attained in order to satisfy the required Achievement Rating.
Lead Assessor	This is the individual who oversees or 'shadows' an Assessor during their 'trial period', before they become registered.
Inspector	Both certified Inspectors and Senior Inspectors are expected to demonstrate the necessary competencies to undertake Principal Inspections, General Inspections, and Acceptance Inspections
Mentor	This is the individual who supports a Trainee Inspector on a 'one-to-one' basis.
Senior Inspector	Senior Inspectors are expected to have more experience and have inspected a broader range of structures; they are also expected to have advised others on the inspection process, recording of findings, causes of defects and recommendations for repairs.
Specialist Competence	These are Competences which are deemed not to be mandatory in order to become a Certified Inspector but which may be required by some bridge owners. They include, typically, industry specific knowledge, specialist material knowledge and/or experience and specialised access requirements.
Trainee/Uncertified Inspector	This is the title given to an inspector prior to attaining certification.

10. Abbreviations

ACoP	Approved Code of Practice
ADEPT	Association of Directors of Environment, Economy, Planning and Transport
CPD	Continuing Professional Development
DfT	Department for Transport
I	Inspector
LoBEG	London Bridges Engineering Group
MEWP	Mobile Elevated Working Platform
NRA	National Roads Authority (Irish)
PPE	Personal Protective Equipment
SI	Senior Inspector
TfL	Transport for London
TI	Trainee Inspector
TRL	Transport Research Laboratory
TSA	Thaumasite Sulphate Attack
UKBB	UK Bridges Board
UKRLG	UK Roads Liaison Group

Achievement Ratings

Achievement Rating		Description	
A	Awareness	General understanding of the competence, including an appreciation of its relevance.	<i>These apply to theory only</i>
K	Knowledge	Knowledge and understanding of the competence with an ability to demonstrate its relevance/application.	
E	Experience	Knowledge, understanding and experience of undertaking the competence.	<i>These apply to practical application, as well as theory</i>
P	Proficiency	Knowledge, understanding and experience of undertaking the competence and competent to advise others .	

Core Modules – Unit Guidance

Unit C1 Introduction to Inspections

Introduction

This unit outlines the background to the importance of undertaking inspections. Fundamental to effective management is an inspection regime that provides timely, accurate and appropriately detailed information on asset condition and performance. The overall purpose of inspection, testing and monitoring is to check that structures are safe for use and fit for purpose and to provide the data required to support effective maintenance management and planning.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to:</i>			
C1.1	Explain the Purpose of Inspections	<ul style="list-style-type: none"> be able to outline the importance of undertaking inspections be able to explain the terms 'safe for use' and 'fit for purpose' 	K	K
C1.2	Describe the two Inspector Roles, Responsibilities and Competences	<ul style="list-style-type: none"> be able to describe the two inspector roles and their associated responsibilities. demonstrate appropriate level of knowledge of the competencies for the different inspector roles be able to explain the certification process 	K	K
C1.3	Describe the different Inspection Types	<ul style="list-style-type: none"> be able to explain the different inspection types applicable to the relevant industry demonstrate the importance of having an appropriate inspection regime demonstrate awareness of the range of different Special Inspections, their function and which factors typically initiate their use. 	K	K
C1.4	Demonstrate knowledge of the relevant structure inspection Codes of Practice	<ul style="list-style-type: none"> demonstrate appropriate knowledge and use of the relevant structure inspection codes of practice and guidance e.g. Inspection Manual for Highway Structures etc. 	E	P

Unit C2 Structures Types and Elements / Behaviour of Structures

Introduction

This unit outlines common types of structures, their key elements and materials. It also covers background information and guidance on the fundamentals of structural behaviour, the basic principles of structural mechanics and material properties.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to demonstrate an appropriate knowledge level of:</i>			
C2.1	Bridges	<ul style="list-style-type: none"> • Demonstrate knowledge of the major bridge elements: Superstructure, Substructure, Safety Elements, Durability Elements and Ancillary Elements. • Demonstrate knowledge of typical Primary and Secondary deck element types. • Demonstrate knowledge of bridge types using: span form, construction form and construction material. • Demonstrate knowledge of water management systems, their function and importance. • Demonstrate knowledge of utilities, private services, signs and lighting. 	E	P
C2.2	Other Structure Types	<ul style="list-style-type: none"> • Demonstrate knowledge of the definition of a culvert and the different types • Demonstrate knowledge of the definition of a subway and the different types • Demonstrate knowledge of the definition of a retaining wall and the different forms. • Demonstrate knowledge of sign/signal gantries and the different types. • Demonstrate knowledge of the different mast types and functions. • Demonstrate knowledge of ancillary structures, function and type. 	E	P

C2.3	Structural Mechanics	<ul style="list-style-type: none"> ● Be able to describe the loadings bridges are subjected to. ● Be able to demonstrate knowledge/experience of the loadpath for a structure ● Be able to demonstrate knowledge of modes of failure ● Demonstrate an understanding of materials' responses to loadings ● Demonstrate an understanding of structures' responses to loadings
C2.4	Properties of Common Construction Materials	<ul style="list-style-type: none"> ● Demonstrate an understanding of the properties of the following common primary materials and how they influence the safety, durability and functionality of a specific component and the whole structure: <ul style="list-style-type: none"> - concrete - reinforced concrete - pre-stressed concrete (pre-tensioned and post-tensioned) - steel - masonry - timber ● Demonstrate an understanding of the following secondary materials: <ul style="list-style-type: none"> - asphalt - asbestos
C2.5	Properties of Specialist Construction Materials	<ul style="list-style-type: none"> ● Demonstrate an awareness of the properties of the following materials and how they influence the safety, durability and functionality of a specific component and the whole structure: <ul style="list-style-type: none"> - wrought iron - cast iron - aluminium and its alloys - advanced composites

K	E
K	E
A	A

Introduction

This unit outlines the fundamentals of the inspection process, including scheduling, planning, undertaking, reviewing and interpreting the results. It also includes consideration of environmental impacts, selection of appropriate access equipment and safe working practices. In addition, it highlights the importance of accurate, reliable data capture and storage post the inspection.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to demonstrate an appropriate level of knowledge and practical application of:</i>			
C3.1	Scheduling Groups of Inspections	<ul style="list-style-type: none"> ● Demonstrate knowledge of relevant documentation which outlines details regarding the frequency of inspections ● Demonstrate understanding of criteria which can constrain or influence schedule, for example, confined spaces, use of MEWPs etc. ● Explain the objectives of each cyclical inspection type ● Demonstrate ability to monitor progress of inspections against schedules ● Demonstrate experience of access requirements, for example, roadspace booking, track possessions, waterways access, major events, etc ● Demonstrate knowledge of the ability to vary frequency of inspections based on a risk based approach 	E	P
C3.2	Planning and Preparing for an Inspection	<ul style="list-style-type: none"> ● Explain the function and importance of existing structures records and in particular the previous inspection report. ● Demonstrate ability to challenge validity of existing structures records. ● Demonstrate awareness of the importance of the structures current assessed capacity ● Explain what further information may need to be determined from site visit. ● Demonstrate experience of and an appreciation of the importance of method statements, health and safety considerations and risk assessments in relation to undertaking inspections. ● traffic management requirements and routes to be used to and from the site. 		

		<p>Demonstrate understanding of aspects to be considered in deciding method of access. This may include: consideration of types of access equipment, restrictions/obstructions caused by equipment, lone working,</p> <ul style="list-style-type: none"> ● Explain the different type of notifications which may be required prior to gaining access. ● Demonstrate an understanding of the range of equipment which may be utilised to undertake an inspection. Range to include: <ul style="list-style-type: none"> i) access equipment ii) PPE iii) data recording equipment iv) measuring or inspection equipment ● Demonstrate an understanding of the environmental considerations to be taken into account, for example, asbestos, bats, badgers etc. ● Explain the process for planning any testing which may be required as part of an inspection. ● Outline the key aspects for an inspection method statement. ● Demonstrate knowledge of how to cost undertaking inspections, the procurement of 3rd party support and budgetary constraints.
C3.3	Performing Inspections	<ul style="list-style-type: none"> ● Be able to talk through the practical approach of undertaking an inspection, highlighting the key aspects. ● Explain the reasons and implications of restricted working hours on the process of undertaking an inspection. ● Explain the reasons why 'good housekeeping' whilst on site is imperative and what does it involve. ● Demonstrate knowledge of a range of 'typical' defects for different structure types, e.g. concrete, steel, masonry, cast iron, wrought iron, timber, composites, culverts, retaining walls, gantries etc. ● Demonstrate an understanding of the need to escalate potential safety critical defects ● Demonstrate an understanding of substandard road restraint systems ● Demonstrate an understanding of communication protocols (for example, who is the Principal Contractor etc) and how to set one up

E	P
E	P

C3.4	Recording Inspection Findings	<ul style="list-style-type: none"> ● Explain the importance of recording the defect accurately in terms of type, location, extent severity and cause. ● Outline different methods used for recording defects. ● Demonstrate knowledge of the prerequisites of a data capture and inspection proforma. ● Be able to explain the importance of 'signing off' an inspection. ● Demonstrate knowledge of the principals of an element condition rating process. ● Explain the level of detail to be recorded depending upon the type of inspection. ● Understand how the accuracy of reporting can affect overall structure condition performance indicators, as well as element condition rating. 	E	P
C3.5	Interpret Inspection Findings	<ul style="list-style-type: none"> ● Demonstrate knowledge of factors which affect whether a structure is safe for use and/or fit for purpose. ● Be able to identify possible safety critical defects and report them within the prescribed timescales. ● Understanding of the need to utilise existing records to help interpret defects ● Demonstrate knowledge of a the range of maintenance works which are commonly recommended following a detailed inspection ● Demonstrate an awareness of how defects are managed to identify future maintenance works, based on priority and cost. 	K	E
C3.6	Maintenance Planning Process	<ul style="list-style-type: none"> ● Demonstrate understanding of how the data captured from inspections complements other information held for a structure. ● Explain the importance of up-to-date and comprehensive data on the condition of a structure with respect to its input to maintenance planning. ● Demonstrate an overview of the process (for your relevant industry) for obtaining funding for future maintenance works and how it is value managed. ● Demonstrate knowledge of a bridge management system 	K	E
C3.7	Current Health & Safety and Environmental Obligations	<ul style="list-style-type: none"> ● Demonstrate understanding of the need to minimise health and safety risks to the public and others who may be affected by the work activities (effective use of method statements and risk assessments) ● Demonstrate understanding of the need to minimise health and safety risks to those actually carrying out the works (effective use of method statements and risk assessments) 		

		<ul style="list-style-type: none"> ● Demonstrate understanding of the need and breadth of personal protective equipment (PPE) utilised for undertaking inspections for safe working. ● Demonstrate understanding and practical experience of managing and applying safe systems of work. ● Demonstrate knowledge of relevant legislation, guidance and ACoPs ● Demonstrate understanding of the need to minimise the impact on the environment, seeking expert advice if necessary to identify and implement appropriate working practices and/or mitigation measures. ● Experience of having dealt with: <ul style="list-style-type: none"> - utilising access equipment - moving on foot alongside live carriageways - accessing and exiting from traffic management - working at height - working in, on or adjacent to water, railways etc - toxic substances, for example, lead in paint - lone working - night work - confined spaces
C3.8	Other Skills	<ul style="list-style-type: none"> ● Demonstrate basic knowledge of traffic management and relevant reference material, for example, Chapter 8.

E	P
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Introduction

This unit outlines the importance and requirements for describing and categorising defects. Emphasis is placed on principal defects are that are likely to be encountered in concrete structures, steel and steel/concrete composite structures, masonry structures and structures built of other materials.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to demonstrate an appropriate knowledge level of:</i>			
C4.1	Principal Causes of Defects	<ul style="list-style-type: none"> ● Demonstrate understanding of the principal causes of defects, including: <ul style="list-style-type: none"> - inadequate structural capacity - substandard clearance etc - naturally occurring damage e.g. scour - accidental or deliberate damage - structural materials deterioration - structural elements functionality e.g. bearings, drainage, expansion joints etc. - failure of water management systems ● Demonstrate understanding of the implications of deterioration ● Demonstrate understanding of issues that cause collapses or structure closures, for example, erosion, scour, bridge strikes etc. ● Demonstrate knowledge of bridge specific defects ● Demonstrate knowledge of culvert specific defects ● Demonstrate knowledge of retaining wall specific defects ● Demonstrate knowledge of sign/sign gantry and mast specific defects ● Demonstrate knowledge of any defects specific to any other structure types relevant to your industry 	E	P
C4.2	Concrete Defects	Demonstrate knowledge of defects caused by structural distress <ul style="list-style-type: none"> ● Demonstrate knowledge of defects arising due to material nature ● Demonstrate knowledge of defects caused by external agents e.g. reinforcement corrosion, thaumasite sulphate attack (TSA) etc. 		

		<ul style="list-style-type: none"> ● Demonstrate knowledge of defects caused by accidental damage or deliberate damage ● Demonstrate knowledge of defects caused by construction or detailing errors ● Demonstrate knowledge of defects associated with protective coatings and repair systems ● Demonstrate knowledge of minor defects e.g. defects which generally only affect the visual appearance of the concrete ● Demonstrate knowledge of defects that can occur in prestressed concrete ● Demonstrate knowledge of defects that can occur in post-tensioning systems 	E	P
C4.3	Steel Defects	<ul style="list-style-type: none"> ● Demonstrate knowledge of defects caused by structural distress ● Demonstrate knowledge of defects arising due to material nature ● Demonstrate knowledge of defects instigated by external agents e.g. bimetallic corrosion ● Demonstrate knowledge of defects caused by accidental damage or deliberate damage ● Demonstrate knowledge of defects arising due to fabrication errors e.g. welds of poor quality etc. ● Demonstrate knowledge of defects associated with protective systems ● Demonstrate knowledge of defects associated with closed members ● Demonstrate knowledge of defects associated with corrugated steel buried structures ● Demonstrate knowledge of defects which affect the whole system, for example, steel beams with jack arches 	E	P
C4.4	Masonry Defects	<ul style="list-style-type: none"> ● Demonstrate knowledge of defects caused by structural distress ● Demonstrate knowledge of defects arising due to material nature ● Demonstrate knowledge of defects instigated by external agents e.g. frost attack, vegetation, erosion ● Demonstrate knowledge of defects caused by accidental damage or deliberate damage ● Demonstrate knowledge of defects arising due to alterations to masonry structures e.g. concrete saddle etc. 	E	P

C4.5	Defects in Miscellaneous Materials	<ul style="list-style-type: none"> ● Demonstrate appropriate level of awareness of defects which can occur in other materials, as listed below: - cast iron - wrought iron - aluminium - timber (problems include fixings and preservation against rotting) - advanced composites - wire rope
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Unit C5 Investigation and Testing

Introduction

This unit outlines the background to the range of different testing techniques available. A candidate is required to understand the purpose of undertaking testing, what it involves, the outputs and any other relevant considerations.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to demonstrate an appropriate knowledge level of:</i>			
C5.1	The Testing Process	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need and purpose of testing, and when does it become appropriate. ● Demonstrate an understanding of the different testing technique categories: <ul style="list-style-type: none"> - structural arrangement and hidden defects - distortion and movement - material properties - deterioration activity - deterioration rate - deterioration cause or potential ● Explain what is required in developing an effective testing programme. <ul style="list-style-type: none"> - setting objectives of testing - identification of testing options - appraisal of testing options - monitor and supervise testing - evaluate results and make recommendations for corrective action ● Demonstrate knowledge of investigation processes, for example, trial holes etc. ● Demonstrate awareness of the procurement processes for engaging specialist services 	K	K

<p>C5.2</p>	<p>Common Testing Techniques</p>	<ul style="list-style-type: none"> • Demonstrate knowledge of common testing techniques, such as: <ul style="list-style-type: none"> - delamination survey - cover surveys - half cell potential surveys - strain gauges - carbonation test - chloride / sulfate / alkali content - ultrasonic testing - coring - paint film thickness measurements • Demonstrate knowledge of limitations 	<p>K</p>	<p>K</p>
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Unit C6 Repair Techniques

Introduction

This unit outlines the importance on understanding the range of repair techniques available.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to demonstrate an appropriate knowledge level of:</i>			
C6.1	Repair Techniques for Concrete Structures	<ul style="list-style-type: none"> • Demonstrate knowledge of the principal repair techniques for concrete structures. Knowledge to include (but not limited to): <ul style="list-style-type: none"> - materials used for repairs (e.g. sprayed concrete, hand-applied cementitious mortars, epoxy resins etc) - methods for inhibiting corrosion (e.g. cathodic protection, impregnation surface treatments etc) - strengthening methods (e.g. plate bonding, composite column wrapping etc) 	K	K
C6.2	Repair Techniques for Metal Structures	<ul style="list-style-type: none"> • Demonstrate knowledge of the principal repair techniques for metal structures. Knowledge to include (but not limited to): <ul style="list-style-type: none"> - repairs by plating - member replacement - protective coatings and paints, such as epoxy resins and polyurethanes - heat straightening 	K	K
C6.3	Repair Techniques for Masonry Structures	<ul style="list-style-type: none"> • Demonstrate knowledge of the principal repair techniques for masonry structures. Knowledge to include (but not limited to): <ul style="list-style-type: none"> - repointing/brickwork repairs - sprayed concrete to soffit - retrofitting of reinforcement - anchors (e.g. grouted, radial etc) - concrete saddle / relieving slabs - stitch (short tie bars spanning the crack) 	K	K

C6.4	Repair Techniques for 'Other' Structures e.g. timber	<ul style="list-style-type: none"> • Demonstrate knowledge of the principal repair techniques for 'other' materials.. 	K	K
C6.5	Importance of Routine Maintenance	<ul style="list-style-type: none"> • Demonstrate knowledge of the importance of undertaking Routine Maintenance • Demonstrate an understanding of the importance of balancing essential preventative maintenance works. 	K	K

Unit C7 General Aptitude

Introduction

This unit outlines the general aptitude skills required by an inspector.

Ref	Outcome / Skill	Assessment Criteria	I	SI
	<i>The candidate will be able to demonstrate ability for:</i>			
C7.1	Practical Aptitude	<ul style="list-style-type: none"> ● Be able to demonstrate ability to make sound and prudent judgements ● Demonstrate excellent attention to detail. ● Be able to work to deadlines ● Be able to appreciate one's own capability and scope of knowledge 	P	P
C7.2	Working with people	<ul style="list-style-type: none"> ● Demonstrate experience of having worked successfully in a team ● Demonstrate experience of having engaged successfully with 3rd parties and general public. 	P	P
C7.3	Communication skills	<ul style="list-style-type: none"> ● Be able to interpret drawings and reports ● Be able to draw clear sketches ● Be able to write reports ● Be able to communicate verbally in a clear and comprehensive way. ● Be able to demonstrate proficiency in communicating findings from an inspection ● Demonstrate proficiency of IT skills 	P	P
C7.4	Personal skills	<ul style="list-style-type: none"> ● Demonstrate self-motivation ● Be able to decide and set priorities. ● Be able to take decisions and have confidence to challenge a situation/decision if necessary. ● Demonstrate understanding of knowing one's limitations. 	P	P
C7.5	Obligations of Current Health and Safety Legislation	<ul style="list-style-type: none"> ● Demonstrate knowledge and understanding of current health and safety legislation obligations. ● Demonstrate a positive attitude towards health and safety ● Demonstrate ability to develop working practices that promote safety and secure the compliance of subordinates. ● Demonstrate knowledge and understanding of the importance of method statements and risk assessments. 	P	P

C7.6	Management / Supervision skills	<ul style="list-style-type: none"> ● Demonstrate ability to manage and motivate teams. ● Demonstrate ability to advise and present recommendations to Others. ● Identify resources required for an inspection ● Ensure that inspection activity complies with the appropriate contractual and legal requirements.
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