ADEPT

Association of Directors of
Environment, Economy, Planning & Transport

ADEPT National Bridges Group

Local Authority Bridge Inspector Competency Schemes

September 2024

Introduction

Several Bridge Inspector Competency Schemes have been developed by regional Bridges Groups, CSS Wales and SCOTS and are supported by the ADEPT National Bridges Group. Outlines of these schemes have been collated here to allow authorities to compare the different regional approaches.

Each scheme is supported by further documentation which may be available from the scheme custodians. This might include training presentations, test questions and model answers, and example defect photographs.

Contents

Cymdeithas Syrfewyr Sirol Cymru

County Surveyors' Society Wales

Highway Asset Management: Bridge Inspection Competency Scheme for Wales (BICSW)

Document Information

Title	CSSW Highways Asset Management Planning – Bridge Inspection Competency Scheme for Wales
Author	exp consulting
Description	This document contains details of the CSSW Bridge Inspection Competency Scheme for Wales. (Local Authorities).

Document Control

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5	Draft	Aug 2020	

Scheme Approved By

Version	Status	Date*	Approved By
			CSSW Bridges Group
			CSSW HAMPG Steering Committee
			CSSW Engineering Group
			CSSW Main Group

*see relevant committee meeting minutes

Standards and References

This scheme has been delivered with reference to:

- BD63 Inspection of Highway Structures, Chapter 9 DMRB 3.1.4, TSO
- Atkins BCI forms
- Inspection Manual for Highway Structures – Volume 1: Reference Manual, TSO, May 2007
- Inspection Manual for Highway Structures – Volume 1: Inspectors Handbook, TSO, May 2007
- Well Managed Highway Infrastructure – A Code of Practice October 2016

The scheme has referenced the documents above. They are the only available standards relating to bridge inspection nationally. It is appropriate that the scheme is built on the details in these documents. It is important however to note that the BD was developed for use on trunk roads and motorways. It does not apply as a standard that must be applied on local authority structures however it is recognised as good practice for other bridge owners.

The recording requirements for local authority structures during an inspection are documented in the Inspection Manual documents. The inspection manual documents are not referenced in the BD. The scheme has explicitly recognised that a large proportion of the national stock are smaller simpler structures compared to those found on trunk roads.

Although beyond the scope of this scheme the following further references are relevant as they apply to related activities:

- CS454 (inspection for assessment)
- BD79 (special Inspections)
- BD97 (Scour Assessment)
- CS 464 & BA35 (material testing),
- DC 127 (Cross sections & Head rooms)

Structure Defintions

The CSSW definition of a highway structure used in this scheme is:

- Highway Bridges
- A subway / cattle creep
- Highway Culvert
- Highway Retaining Wall, Reinforced / strengthened soil / fill structure with hard facing
- A high mast
- A traffic gantry
- Tunnel

1. Background

Competence Requirement

The Code of Practice "Well-Managed Highway Infrastructure" requires authorities to demonstrate competence as per the recommendation below:

RECOMMENDATION 15 – COMPETENCIES AND TRAINING

The appropriate competency required for asset management should be identified, and training should be provided where necessary.

CSSW Highway Asset Management Competency Scheme

To assist authorities to respond to this requirement CSSW is, via the CSSW HAMP project, developing a Highway Asset Management Competency scheme. The scheme covers all aspects of highway asset management. Bridge inspections are a critical component of the HAM Competency scheme.

Bridge Inspection Competency

Bridge inspections are an essential element of the management of the asset used for identifying and categorising defects, reporting condition, and informing the development of maintenance programmes. Being able to demonstrate the competency of bridge inspectors will assist authorities to have surety that this function is being undertaken by suitable competent personnel.

Existing Competence

Bridge inspection is not new. This scheme assumes that most authorities have inspectors capable of carrying out their roles to an acceptable standard. It is appropriate, however that authorities now, (in response to the code), undertake an exercise to check and confirm the competency of their inspectors.

Existing Inspector Competence Scheme

An existing scheme (LANTRA BICS) provides a comprehensive method of assessing the competencies of inspectors. The scheme is onerous in terms of the input required by inspectors to apply for certification. The scheme has existed for several years but very few authority inspectors have applied for it. CSSW bridges group believe the scheme will not be taken up by most local highway authorities in its present form. This scheme has been developed a practical alternative aimed at confirming the competence of inspectors who are already experienced in bridge inspection.

2. Bridge Inspection Competencies

Designations

The scheme will provide accreditation of competence for two designations: inspector and senior inspector. Accreditation will cover the main structure types and sizes on the local road network. Unusual structure types will be excluded where specialist skills are required for their inspection.

Specialist Inspection

The inspection of structures that require specialist inspection skills is beyond the scope of this scheme. It is expected that the authorities Bridges Manager will determine which structures require specialist inspection and arrange for it to be undertaken by suitably qualified and experience inspectors. It is expected that this will be required for structures with the following features

I. Unconventional or novel design aspects.
II. Moveable bridges.
III. Moveable inspection access gantries, gantry rail and gantry support systems.
IV. Suspension systems (e.g. cable stayed, or suspension bridges); and

Senior Inspector

Senior Inspectors will be accredited to carry out General and Principal inspections of highway structures except those identified by the bridges manager as requiring specialist inspection skills. The requirements of BD63/17 have been adopted to define the structures for which a certified Senior Inspector with the relevant competencies should lead and undertake the inspection. These are “for complex structures, where unusual elements or load paths exist, such structures are likely to have one or more of the following features

I. Skews greater than 25°.
II. Half-joints, hinge-joints, or post-tensioning.
III. Any individual span exceeding 50m.
IV. History of unresolved foundation problems, significant structural defects, or significant safety issues, weight restrictions, sub-standard assessed bridges*.
V. Scour susceptibility*.
VI. Retaining walls greater than 7.0m in height.

Inspector

Inspectors will be accredited to carry out General and Principal inspections of highway structures except those listed above.

[*An inspector may carry out inspections of sub-standard assessed and scour susceptible structures if a specification of the special issues/areas that the inspector needs to pay attention to and any measurement and observations that are to be captured is provided (by a senior inspector].

Competency by Function

The CSSW HAM Competence Confirmation Scheme defines competencies by function rather than role. Competence defined by function means that authorities can deliver those competencies using a range of staff. The following functions being defined:

- **Bridge Inspection**; the carrying out of inspections
- **Structure Management;** the management of the bridge stock including the inspection regime

Competencies

Each competence required is described in terms of Theory or (Practical) Application. In simple terms an inspector either needs to know about something (theory) or be able to do it (practice).

Rating		Description	Confirmed by:
T	**Theory**	Can demonstrate understanding of relevant theory.	Test and Interview
Pa	**Practical Application**	Can demonstrate ability to practice the activity to the standard required.	Actual inspection, statement of experience and interview

Areas of Competency

The competencies have been defined using the same topic areas as used in BD63 as follows:

i. **Introduction to Inspections:** understanding why inspections are important, what they are used for and understanding the concept of safe for use and fit for purpose.

ii. **Structures Types and Elements / Behaviour of Structures:** understanding of the common types of structures, their key elements and materials. It also requires a basic knowledge of structural behaviour, structural mechanics, and material properties.

iii. **Inspection Process:** understanding and the ability to identify defects types, to record their severity and extent and to recognise the importance of the defects to the functioning of the structure, and in particular to be able to report any safety concerns.

iv. **Defects Descriptions and Causes:** understanding of the importance of and the requirements for describing and categorising defects.

v. **Investigation and Testing:** understanding the purpose of undertaking testing and the range of testing that is available

vi. **Repair Techniques:** understanding the repair techniques available.

3. Scheme Overview

1. Entry on to Register	Authorities will propose suitably experienced personnel for entry onto the register of accredited bridge inspectors.
2. Theory Test	Nominated candidates will take a test of theoretical knowledge using questions based upon the competency requirements.
3. Nomination for Accreditation	Upon confirmation of passing the theory test authorities will nominate candidates for practical assessment.
4. Practical Assessment	Candidate's competence will be assessed by a practical assessment comprising of inspection of structures observed by an assessor.
5. Interview	Inspectors will be interviewed by 2 approved assessors. Based on 2, 3 and 4 the assessors will recommend candidates for accreditation
6. CSSW Accreditation	CSSW will issue inspectors with certificates confirming their competence. CSSW will maintain a register of accredited bridges inspectors.
7. Continued Accreditation	To retain accreditation registered inspectors will be required to confirm that they continue to carry out inspections and complete relevant CPD.
8. Re-Accreditation	Every 5 years inspectors will be required to complete a re-accreditation test via an online test.
9. Scheme Review	The CSSW Bridges Group will review the scheme annually and report on the scheme's performance to the CSSW Bridge Group, HAMPG and Engineering Group.

4. Scheme Details

1. Entry on to the Register

This scheme is intended for inspectors that are experienced in carrying out bridge inspections.

Inspectors who are new to bridge inspection shall have completed a period working alongside an experienced inspector and will typically not be able to meet the requirements of the scheme until they have gained an appropriate amount of experience.

The authority should be satisfied that personnel put forward for this assessment are sufficiently experienced that their competence can be confirmed using this method.

Candidates shall be registered as either Inspector or Senior Inspector.

CSSW Bridges Group will maintain the register.

2. Theory Test

Prior to undertaking the practical assessment day all inspectors shall complete a theory test.

The test can be undertaken in the authority's offices. It shall be completed without access to reference documents. It shall be supervised by an appropriate individual who will be required to confirm that the candidate completed the test within the prescribed timescale and without reference to documents. The test will be made available using an online portal.

3. Nomination for Accreditation

Upon confirmation of passing the theory test candidates can be nominated by the authority for accreditation. The authority shall submit:

a. An application for accreditation (as either Inspector or Senior Inspector)
b. A statement of experience (years of experience, approx. number of inspections, range of structures inspected)
c. Copies of 10 example inspection reports of varying condition which must include a range of structure types
d. Candidates applying for Senior Inspector accreditation shall submit 15 example inspection reports include at least 5 example reports of complex structures (BD63/17 Sect 9 2.6.D)

4. Practical Assessment

Competency of bridge inspectors shall be confirmed via attendance at a 1-day practical assessment as set out below. The purpose is to enable inspectors to confirm via a series of exercises that they are

competent at carrying out to an acceptable level of accuracy and to create inspection reports that are appropriately complete and correct.

Pre-Inspection/Course Preparation

Prior to the course a pre-inspection of a number of structures will be undertaken by the course assessors. During inspections defects will be noted, categorised, and photographed. These records will be used as a reference test of competence. It is expected that the structures inspected will be of masonry, metal, and concrete. Where senior inspectors are being assessed a complex structure will be included.

Prior to the course assessors will be matched to potential candidates i.e. the assessors will be experience in inspecting complex structures similar to those being used during the practical assessment when senior inspectors are being assessed. The assessors will be from different authorities to the candidates.

Practical Assessment

The 1-day assessment will comprise of:

1. Housekeeping

The day will commence with relevant housekeeping including checking that inspectors have appropriate PPE, confirming how the assessment will be undertaken, stating where the structures are, what method of recording is required, and what output has to be produced on the day by the candidates.

2. Defect Rating Test

Candidates will be asked to complete a test using photographs. The photos will illustrate a range of common defects for the structure types they are seeking accreditation for. Candidates will be required to identify the defect types and to record the severity and extent of each.

3. Inspections of Pre-Inspected Structures

For each structure to be inspected the candidates will be issued with a method statement for the inspection. The candidates will be required to review of the method statement and to record any comments and or amendments they would make to the statement.

Three separate inspections will be undertaken. The inspections will be designed to be representative of structures types that are common for concrete, masonry, and metal structures.

Inspectors will be asked to inspect the structure and to complete an inspection form. This may be completed using an appropriate data collection device or alternatively a hard copy form shall, be completed. Photographs shall form part of the report. The inspectors shall provide a pdf copy of a BCI

inspection report. The results of the inspections will be checked by the assessors against the pre-inspection undertaken to assist in assessing the delegate's competence.

The inspections will be observed by the assessors.

The method of data collection is not part of the assessment. It is however essential that the inspection reports are delivered to the assessors during the day and include photographs of all defects recorded.

5. Interview

Upon successful completion of the practical assessment the candidates will be invited to attend an interview. The interview will last approximately an hour and will be with the same two CSSW appointed Bridge Inspector Assessors that supervised the Practical Assessment.

A form is included in Appendix A that assessors will complete during the interview. The assessors will use their observations during the inspections, the result of the inspections and tests and the interview to form a view as to whether the inspector meets the competence standard.

Where the assessors are satisfied that the inspector meets the standard a recommendation will be provided to CSSW to accredit the inspector.

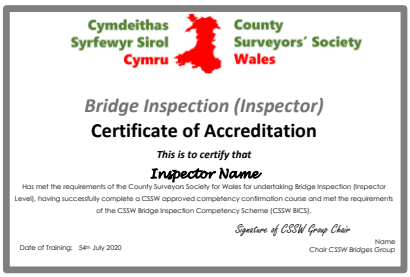
If an inspector does not meet the standard the assessor will report back to the inspector's authority. The report will state which area(s) of competency were not met and suggest how these areas could be improved upon.

6. CSSW Accreditation

Certificates

Following successful completion of the course the assessors will supply to CSSW confirmation of the inspector's competence.

Based upon this the CSSW Bridges Group will issue inspectors with certificates confirming their competence.


Cymdeithas Syrfewyr Sirol Cymru County Surveyors' Society Wales

Bridge Inspection (Inspector)

Certificate of Accreditation

This is to certify that

Inspector Name

Has met the requirements of the County Surveyors Society for Wales for undertaking Bridge Inspection (Inspector Level), having successfully complete a CSSW approved competency confirmation course and met the requirements of the CSSW Bridge Inspection Competency Scheme (CSSW BICS).

Signature of CSSW Group Chair

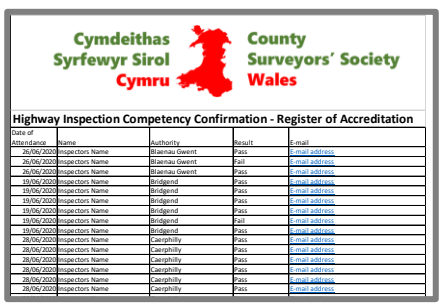
Date of Training: 54th July 2020

Name
Chair CSSW Bridges Group

CSSW Accredited Bridge Inspector Register

CSSW Bridges Group will maintain a register of bridge inspectors who are accredited as competent following their successful completion of the course.

The register will be stored on the CSSW Bridge Khub and made available to authorities and to CSSW.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Highway Inspection Competency Confirmation - Register of Accreditation

Date of Attendance	Name	Authority	Result	E-mail
26/06/2020	Inspectors Name	Blaenau Gwent	Pass	E-mail address
26/06/2020	Inspectors Name	Blaenau Gwent	Fail	E-mail address
26/06/2020	Inspectors Name	Blaenau Gwent	Pass	E-mail address
19/06/2020	Inspectors Name	Bridgend	Pass	E-mail address
19/06/2020	Inspectors Name	Bridgend	Pass	E-mail address
19/06/2020	Inspectors Name	Bridgend	Pass	E-mail address
19/06/2020	Inspectors Name	Bridgend	Pass	E-mail address
19/06/2020	Inspectors Name	Bridgend	Fail	E-mail address
19/06/2020	Inspectors Name	Bridgend	Pass	E-mail address
28/06/2020	Inspectors Name	Caerphilly	Pass	E-mail address
28/06/2020	Inspectors Name	Caerphilly	Pass	E-mail address
28/06/2020	Inspectors Name	Caerphilly	Pass	E-mail address
28/06/2020	Inspectors Name	Caerphilly	Pass	E-mail address
28/06/2020	Inspectors Name	Caerphilly	Pass	E-mail address
28/06/2020	Inspectors Name	Caerphilly	Pass	E-mail address

7. Continued Accreditation

Continued accreditation will be achieved from continuing to complete inspections and the completion of relevant continued professional development (CPD). Inspectors shall maintain a record of the inspections they undertake. This can be recorded in most bridge management systems. Where requested inspectors shall supply to CSSW Bridge Group a record of inspections they have undertaken to demonstrate continued practice.

CSSW Bridges Group will monitor the requirement for inspections and where there are changes or an identified need for a change in practice specifically recommend CPD that is required to maintain accreditation. It should be noted that it is the intention of CSSW Bridges and CSSW HAMPG to create and deliver CPD relevant to this requirement when such is possible. This may be in the form of an online tutorial and test or for more extensive changes to requirements via delivery of a workshop.

8. Re-Accreditation

Following completion of the bridge inspection competency confirmation courses an online resource will be provided such that inspectors can reconfirm their competence every 5 years.

The competency reconfirmation will comprise of a test of continued competency using a series of pre-rated photographs and some relevant theory questions.

Inspectors who pass the test will be issued with a new accreditation certificate.

The authority will be notified of anyone who does not meet the pass mark and it will be recommended that they complete additional refresher training (either via the CSSW HAMP project or through guidance within their authority). They will be offered an opportunity to re-sit the online test on confirmation that this training has been undertaken,

9. Scheme Review

The CSSW Bridges Group will review the scheme annually and report upon the scheme's performance to the CSSW HAMPG & Engineering Group.

Appendix A: Bridge Inspection Competencies

The following competencies are required for accreditation as a bridge inspector or senior inspector.

Ref.	Outcome/Skill	CSSW Inspection
1 – Introduction to Inspections		
1.1	**Purpose of Inspections**	**<**
1.1.1	● be able to outline the importance of undertaking inspections	**T**
1.1.2	● be able to explain the terms 'safe for use' and 'fit for purpose'	**T**
1.2	**Inspection types**	**<**
1.2.1	● be able to explain the different inspection types	**T**
1.2.2	● demonstrate the importance of having an appropriate inspection regime	**T**
1.2.3	● demonstrate awareness of the range of different Special Inspections, their function and which factors typically initiate their use.	**T**
1.3	**Codes of Practice and guidance**	**<**
1.3.1	● demonstrate appropriate knowledge and use of the relevant structure inspection codes of practice and guidance e.g. Inspection Manual for Highway Structures, etc.	**T**

2 – Structures Types and Elements / Behaviour of Structures		
2.1	**Bridges**	**<**
2.1.1	● Demonstrate knowledge of the major bridge elements: Superstructure, Substructure, Safety Elements, Durability Elements and Ancillary Elements.	**T**
2.1.2	● Demonstrate knowledge of typical Primary and Secondary deck element types.	**T**
2.1.3	● Demonstrate knowledge of bridge types using span form, construction form and construction material.	**T**
2.1.4	● Demonstrate knowledge of water management systems, their function and importance.	**T**
2.1.5	● Demonstrate knowledge of utilities, private services, signs and lighting.	**T**
2.2	**Other Structure Types**	**-**
2.2.1	● Demonstrate knowledge of the definition of a culvert and the different types	**T**
2.2.2	● Demonstrate knowledge of the definition of a subway / cattle creep and the different types	**T**
2.2.3	● Demonstrate knowledge of a retaining wall and the different forms.	**T**
2.2.4	● Demonstrate knowledge of ancillary structures, function and type.	**T**
2.3	**Structural Mechanics**	**<**
2.3.1	● Be able to describe the loadings to which bridges are subjected	**T**
2.3.2	● Be able to demonstrate knowledge of the load path for a structure	**T**
2.3.3	● Be able to demonstrate knowledge of modes of failure	**T**
2.3.4	● Demonstrate an understanding of materials' responses to loadings	**T**
2.3.5	● Demonstrate an understanding of structures' responses to loadings	**T**

2.4	**Properties of Common Construction Materials**	**<**
2.4.1	● 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: - concrete; reinforced concrete; pre-stressed concrete (pre-tensioned and post-tensioned); steel; masonry; timber	**T**
2.4.2	● Demonstrate an understanding of the following secondary materials: - asphalt; asbestos	**T**
2.5	**Properties of Specialist Construction Materials**	**<**
2.5.1	● ● Demonstrate an understanding of the properties of the following materials and how they influence the safety, durability and functionality of a specific component and the whole structure: - wrought iron; cast iron; aluminium and its alloys; advanced composites	**T**

3 – Inspection Process		
3.1	**Scheduling Groups of Inspections**	**<**
3.1.3	● Explain the objectives of a General Inspection, Principal Inspection & Special Inspections	**T**
3.2	**Planning and Preparing for an Inspection**	**<**
3.2.1	● Explain the function and importance of existing records	**T**
3.2.2	● Demonstrate awareness of the importance of the structures current assessed capacity	**T**
3.2.4	● Demonstrate an appreciation of the importance of method statements, health and safety considerations and risk assessments in undertaking inspections.	**Pa**
3.2.5	● 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, traffic management requirements and routes to be used to and from the site	**T**
3.2.6	● Explain the types of notifications which may be required prior to gaining access.	**T**
3.2.7	● Demonstrate an understanding of the range of equipment which may be utilised to undertake an inspection. Range to include access equipment; PPE; data recording equipment; measuring or inspection equipment	**T**
3.2.8	● Demonstrate an understanding of the environmental considerations to be taken into account, for example, asbestos, bats, badgers etc.	**T**
3.2.10	● Demonstrate an understanding of the need to evaluate the appropriateness of the risk assessment/method statement based upon site specific conditions.	**Pa**
3.2.11	● Demonstrate basic knowledge of traffic management practices and relevant reference material, e.g. Chapter 8 of Traffic Signs Manual	**T**
3.2.12	● Be able to interpret drawings and reports	**Pa**
3.2.13	● Be able to draw clear sketches	**Pa**
3.2.14	● Be able to write inspection reports	**Pa**

3.3	**Performing Inspections**	**<**
3.3.1	● Explain the reasons why 'good housekeeping' whilst on site is imperative and what does it involve.	**Pa**
3.3.2	● Demonstrate an understanding of the need to escalate potential safety critical defects	**Pa**
3.4	**Recording Inspection Findings**	**<**
3.4.1	● Demonstrate understanding of the importance of recording defects accurately in terms of type, location, extent, severity and cause.	**Pa**
3.4.3	● Demonstrate knowledge of the defect codes used in the element condition rating process.	**T**
3.4.4	● Demonstrate ability to assign the correct defect codes during the inspection.	**Pa**
3.4.5	● Demonstrate knowledge of the defect extent ratings used in the element condition rating process.	**T**
3.4.6	● Demonstrate the ability to accurately record defect extent ratings used in the element condition rating process.	**Pa**
3.4.7	● Demonstrate knowledge of the defect severity ratings used in the element condition rating process.	**T**
3.4.8	● Demonstrate the ability to accurately record defect severity ratings used in the element condition rating process.	**Pa**
3.4.9	● Demonstrate knowledge of how to complete the "work required" element of an inspection report	**T**
3.4.10	● Demonstrate the ability to record work required during an inspection	**Pa**
3.4.11	● Demonstrate knowledge of how to assign priorities to the works required identified during an inspection.	**T**
3.4.12	● Demonstrate the ability to assign a priority to the work required during an inspection	**Pa**
3.4.13	● Understand how the accuracy of recording/rating can affect overall structure condition performance indicators (BCIs), as well as element condition rating.	**T**
3.5	**Interpreting Inspection Findings**	**<**
3.5.1	● Demonstrate knowledge of how external factors may affect whether a structure is safe for use and/or fit for purpose.	**Pa**
3.5.2	● Be able to identify possible safety critical defects which could indicate whether the structure is safe for use and/or fit for purpose	**Pa**
3.5.3	● Understanding of the need to utilise existing records to help interpret defects	**T**
3.5.4	● Demonstrate the ability to utilise existing records to help interpret defects	**Pa**
3.6	**Communication skills**	**<**
3.6.1	● Demonstrate understanding of knowing one's limitations	**Pa**

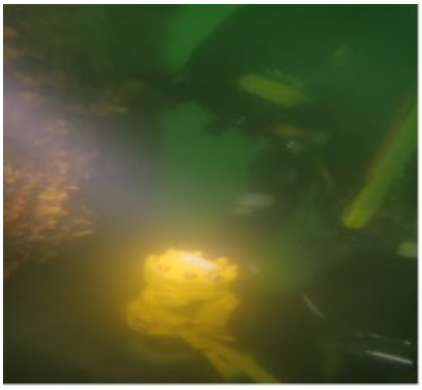
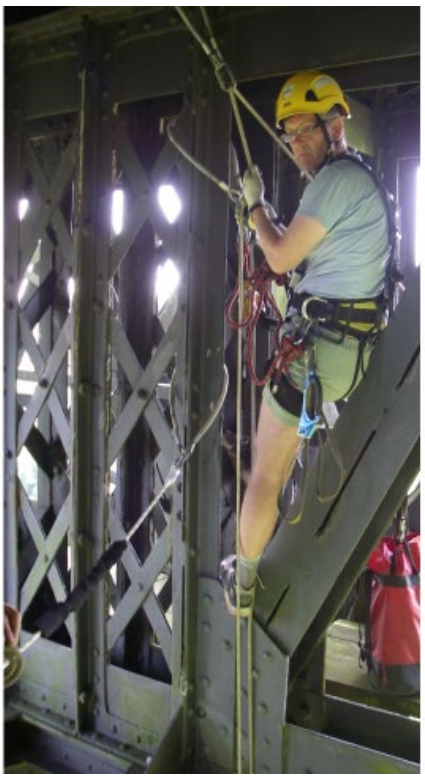
4 – Defects Descriptions and Causes		
4.1	**Understanding Principal Defects**	**<**
4.1.1	● Demonstrate understanding of the principal causes of defects, including: Inadequate structural capacity; substandard clearance, etc.; naturally occurring damage e.g. scour; accidental or deliberate damage; structural materials deterioration; structural elements functionality e.g. bearings, drainage, expansion joints, etc.; failure of water management systems; adequacy and function of parapets & vehicle restraint systems.	**T**
4.1.2	● Demonstrate understanding of the implications of deterioration	**T**
4.1.3	● Demonstrate understanding of issues that cause collapses or structure closures, for example, erosion, scour, bridge strikes etc.	**T**
4.1.4	● Demonstrate knowledge of bridge specific defects	**T**
4.1.5	● Demonstrate knowledge of culvert specific defects	**T**
4.1.6	● Demonstrate knowledge of retaining wall specific defects	**T**
4.2	**Concrete Defects**	**<**
4.2.1	● Demonstrate knowledge of defects caused by structural distress	**T**
4.2.2	● Demonstrate knowledge of defects arising due to material nature	**T**
4.2.3	● Demonstrate knowledge of defects caused by external agents e.g. reinforcement corrosion, thaumasite sulphate attack (TSA), etc.	**T**
4.2.4	● Demonstrate knowledge of defects caused by accidental or deliberate damage	**T**
4.2.5	● Demonstrate knowledge of defects caused due to construction or detailing errors	**T**
4.2.6	● Demonstrate knowledge of defects associated with protective coatings and repair systems	**T**
4.2.7	● Demonstrate knowledge of minor defects e.g. defects which generally only affect the visual appearance of the concrete	**T**
4.2.8	● Demonstrate knowledge of defects that can occur in prestressed concrete	**T**
4.2.9	● Demonstrate knowledge of defects that can occur in post-tensioning systems	**T**

4.3	**Steel Defects**	**<**
4.3.1	● Demonstrate knowledge of defects caused by structural distress	**T**
4.3.2	● Demonstrate knowledge of defects arising due to material nature	**T**
4.3.3	● Demonstrate knowledge of defects instigated by external agents e.g. bimetallic corrosion	**T**
4.3.4	● Demonstrate knowledge of defects caused by accidental or deliberate damage	**T**
4.3.5	● Demonstrate knowledge of defects arising due to fabrication errors e.g. poor welds	**T**
4.3.6	● Demonstrate knowledge of defects associated with protective systems	**T**
4.3.7	● Demonstrate knowledge of defects associated with closed members	**T**
4.3.8	● Demonstrate knowledge of defects associated with corrugated steel buried structures	**T**
4.3.9	● Demonstrate knowledge of defects which affect the whole system, for example, beams with jack arches	**T**
4.4	**Masonry Defects**	**<**
4.4.1	● Demonstrate knowledge of defects caused by structural distress	**T**
4.4.2	● Demonstrate knowledge of defects arising due to material nature	**T**
4.4.3	● Demonstrate knowledge of defects instigated by external agents e.g. frost, vegetation	**T**
4.4.4	● Demonstrate knowledge of defects caused by accidental or deliberate damage	**T**
4.4.5	● Demonstrate knowledge of defects arising due to alterations to masonry structures e.g. concrete saddle, etc.	**T**
4.5	**Defects in Miscellaneous Material**	
4.5.1	● Demonstrate appropriate level of awareness of defects which can occur in other materials: cast iron; wrought iron; aluminium; timber (problems including fixings and preservation against rotting)	**T**

5 – Investigation and Testing		
5.1	**The Testing Process**	**<**
5.1.1	● Demonstrate an understanding of the need and purpose of testing, and when it is appropriate	**T**
5.2	**Common Testing Techniques**	**<**
5.2.1	● Demonstrate knowledge of common testing techniques, such as: delamination survey; cover surveys; half-cell potential surveys, strain gauges; carbonation test; chloride / sulphate / alkali content; ultrasonic testing; coring; paint film thickness measurements.	**T**

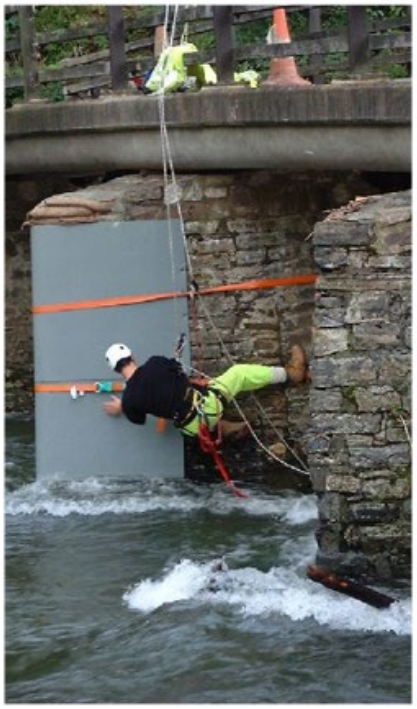
6 – Repair Techniques		
6.1	**Repair techniques for concrete structures**	**<**
6.1.1	● Demonstrate knowledge of the basic repair techniques for concrete structures.	**T**
6.2	**Repair techniques for metal structures**	**<**
6.2.1	● Demonstrate knowledge of the basic repair techniques for metal structures.	**T**
6.3	**Repair techniques for masonry structures**	**<**
6.3.1	● Demonstrate knowledge of the basic repair techniques for masonry structures.	**T**
6.4	**Repair techniques for "other" structures e.g. timber**	**<**
6.4.1	● Demonstrate knowledge of the principal repair techniques for other materials	**T**
6.6	**Recommending appropriate repairs**	**<**
6.6.1	● Demonstrate experience of recommending repairs appropriate to the identified defects.	**T**

Bridge Inspector Competency Scheme







Document Name	**Bridge Inspector Competency Scheme**
Local Authority	**Devon County Council**
In-House Provider Name	**Engineering Design Group**
External Provider Name	**WSP**
Document Author (name and position)	**Kevin Dentith Chief Engineer (Bridges & Structures)**
Document Owner	**Engineering Design Group**
Document Version & Date	**Version 1.0 March 2021**
Document Checked by & Date:	
Document Reviewed by & Date:	
Document Review Date	**March 2022**

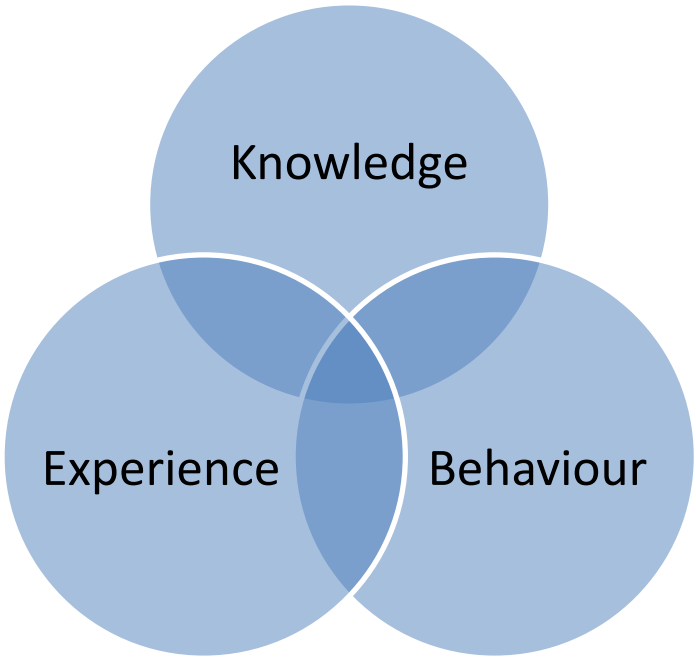
Contents **Page**

Introduction

Local Highway Authorities across the UK are responsible for managing over 76000 road bridges which are distributed across 200 local council areas. These councils vary from large rural County Councils (such as Devon) with thousands of bridges to small Unitary or Borough Councils with only a few bridges to manage. Irrespective of the size of the authority all bridge owners have a responsibility to undertake regular inspections to ensure the asset is fit for purpose and safe to use. Bridge inspections are carried out either by in-house staff, external providers, or a combination of both. To ascertain the competence of the personnel undertaking bridge inspections several schemes have been developed including this one by Devon County Council (DCC) which is supported by the ADEPT National Bridges Group (ref 1).

This scheme has been written specifically for Devon County Council by its Chief Bridge Engineer (ref 2); other Local Authorities are free to use it but they will need to satisfy themselves that the questions in the **knowledge paper** are both appropriate for their bridge stock and expectations of their bridge inspectors. Other Local Authorities adopting this scheme will need to remove references to Devon County Council and its ISO9001 Quality Management mark. The ADEPT logo can be used by those authorities who are paid up members of ADEPT.

How this scheme assesses competence?
Competence can be illustrated by the following Venn diagram:



Assessment of knowledge will be through a question paper completed in a closed book environment.

Assessment of Experience will be through reviewing of three Inspection Reports and interview

Assessment of Behaviour will be provided by the candidate's team leader

The Procedure

1. The candidate will complete a question paper which has been based on the competences described in BD63/17 (since superseded but questions remains relevant). Devon County Council approach is for this to be undertaken in a closed book environment and is expected to take between 8 and 10 hours to complete

2. A senior Bridge Inspector who is likely to undertake Principal Inspections will complete all the questions unless the Authority considers some are inappropriate for their requirements/asset type.

3. Questions have not been weighted; this may happen as the scheme develops. Pass mark is 75% BI and 90% SBI – with a caveat that examiner can deduct marks if safety critical elements are missed

4. The questions will be marked by an experienced senior member of the organisation with extensive inspection experience (in DCC this will be the Capital Maintenance or Bridge Maintenance Principal Engineers), no model answers have been prepared.

5. Candidates will submit three inspection reports of different structural forms which will be reviewed by one of the Principal Engineers

6. A review of the question paper and inspection reports will take place in a meeting between the candidate and the two Principal Engineers

7. Feedback will be provided to either:

   a) confirm no additional training is required and the candidate is deemed competent at Bridge Inspector or Senior Bridge Inspector level for the Local Authority delivering the scheme.

   b) consider what additional training or experience is required and how this will be achieved

8. The Chief Engineer (Bridges & Structures) will review and, if satisfied, approve the certificate

9. The questions are specifically for Devon County Council (DCC) and may not all be applicable for other Authorities where their inspectors, for instance, do not plan and manage works programmes.

10. If an Authority removes questions from the DCC list to consider their Inspector's level of activity, responsibility and job remit, an explanation should be provided to demonstrate the scheme remains adequate to assess competency.

.

Stage 2. Behaviours

This stage will be marked by the candidate's team leader (with reference to other senior members of the group if the candidate is new to the team). The marking system will be Pass / Fail using the following requirements:

E = Essential
D = Desirable

C7.1	Practical Aptitude	Required BI	Required SBI	Pass/Fail
	a) Ability to make sound and prudent judgements	**D**	**E**	
	b) Attention to detail	**E**	**E**	
	c) Ability to work to deadlines	**D**	**E**	
	d) Ability to adhere to inspection programme	**E**	**D**	
	e) Ability to work on own initiative	**E**	**E**	
C7.2	Working with people			
	a) contractors	**E**	**D**	
	b) team members	**D**	**E**	
	c) members of public	**E**	**D**	
	d) press	**D**	**E**	
	e) wider HIDW members (NHOs etc)	**E**	**D**	
C7.3	Communication Skills			
	a) Ability to interpret drawings and specifications	**D**	**E**	
	b) Report writing	**D**	**E**	
	c) Verbal communication with other technical people	**E**	**E**	
	d) Ability to explain technical problems	**E**	**E**	
C7.4	Personal Skills			
	a) Self-Motivation	**E**	**E**	
	b) Using own initiative	**E**	**E**	
	c) Ability to decide and set priorities	**E**	**E**	
	d) Determination to achieve targets	**E**	**D**	
	e) Communicates well with team leader	**E**	**E**	
	f) Confidence to take decisions in challenging situations	**E**	**E**	
	g) Smart appearance when in public eye	**D**	**D**	

Stage 3. Experience

This stage involves the candidate submitting three inspection reports; the bridges will be selected in agreement with one of the reviewers

Structure Name	Structural Form	Inspection Type	Reviewer	Pass / Fail

Stage 4.

This stage will involve an interview between the candidate and the two reviewers to discuss the submission documents and provide an opportunity to identify any weak areas and need for further training.

Reviewers' Comments
Recommendation PASS / FAIL
Reviewer 1 to sign and date
Reviewer 2 to sign and date

Bridge Inspector Competency Scheme

This is to Certify that

……..

undertook the assessment for the above scheme
and is deemed competent to undertake
Bridge and Retaining Wall Inspections
for Devon County Council in the capacity of:

Bridge Inspector

Senior Bridge Inspector

Signed (Reviewer):

Date

Print name:

Signed (Assessor):

Date

Print name:

References

1) ADEPT National Bridges Group minute, 9th February 2021 item 11.4

2) This alternative scheme to assess the competency of bridge inspectors has been developed by the Chief Engineer of Devon County Council who is the Bridge Group Manager with the Engineering Design Group (EDG), he is also Chairman of the ADEPT Regional & National Bridge Groups, a member of UK Bridges Board and the Bridge Owners Forum.

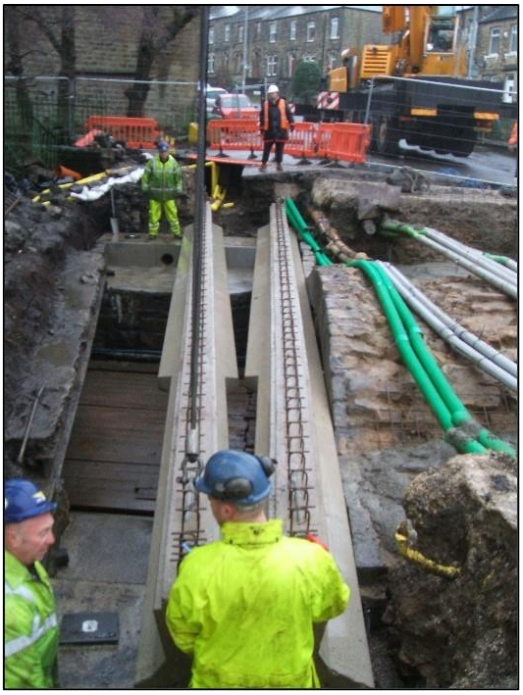
   The EDG is an in-house engineering consultancy with a permanent staff of 85 engineers and technicians with a bridge office accounting for 38 of those staff who are responsible for 3200 bridges with an asset value of £1.2 billion and a wide variety of asset types ranging from single span arch bridges to large multi-span post tensioned viaducts. The inspection team consists of 5 full-time Bridge Inspectors who each undertake over 500 inspections per year (including retaining walls), and up to 10 Chartered and Incorporated Engineers who support the bridge inspectors and undertake Principal Inspections as well as supporting the confined space and difficult access teams. The EDG Bridge Group is also responsible for:

   - design of new bridges and structures
   - bridge assessments and strengthening
   - asset management of £1.2 billion stock of structures
   - managing the £10m + capital budget (correct at financial year 2020/2021)

   The Chief Engineer has 30 years' experience in bridge design, maintenance and asset management and has personally undertaken over 2000 bridge inspections including General, Principal, Confined Space, Roped Access and Dive inspections.

ADEPT Yorkshire & Humber Area Bridges Group:
Bridge Inspector Competency Scheme

Version 1: November 2023



ADEPT Yorkshire & Humber Area Bridges Group: Bridge Inspector Competency Scheme

Contents

Abbreviations used within this document

ADEPT - Association of Directors of Environment, Economy, Planning & Transport
ABG – Area Bridges Group
BICS – Bridge Inspector competence scheme
DMRB – Design Manual for Roads and Bridges
SE - Supervising Engineer
TAA – Technical Approval Authority
Y&H – Yorkshire and Humber
PI – Principal Inspection
GI – General Inspection
SI – Special Inspection
HOI – Handover Inspection
PTSI – Post tensioned special inspection
LHA – Local Highway Authority

ADEPT Yorkshire & Humber Area Bridges Group: Bridge Inspector Competency Scheme

Document control

Version 1: November 2023

This document is owned by the ADEPT Y&H Area Bridges Group:

Barnsley MBC
Bradford MBC
Calderdale MBC
City of Doncaster Council
East Riding of Yorkshire Council
Kingston Upon Hull City Council
Kirklees MDC
Leeds City Council
NE Lincolnshire Council
North Lincolnshire Council
North Yorkshire Council
Sheffield City Council
Wakefield MDC
City of York Council

This document is supported by ADEPT National Bridges Group.

Version	Status	Date	Approved By
Draft 07	To finalise	September 2023	Mark Watson (on behalf of ADEPT Y&H Area Bridges Group)
v01	Final	November 2023	Mark Watson (on behalf of ADEPT Y&H Area Bridges Group)

1. Introduction

1.1 Maintenance and management of the highway network is a national priority due to its essential role in the economy and its impact on society, and the Highways Act imposes a statutory obligation on Highway Authorities to maintain the public highway. Highway bridges, as key parts of the network, must be both fit for purpose and safe to use, to fulfil economic potential and meet the expectations and demands of a wide range of stakeholders, taking into account public safety, resilience, and reliability of the highway network.

1.2 Bridge Managers take account of both effects of and effects on the environment. This means adapting to climate change by considering a resilient network, and reducing the carbon footprint and financial cost of maintenance by making the right intervention at the right time, optimising the whole life cost of the bridge stock.

1.3 The principles of asset management for highway bridges in the UK rely on a risk-based approach, as defined in the Highway Infrastructure Asset Management Guide (HIAMG) with the support of Well-managed Highway Infrastructure (WMHI), where structural inspection plays a key role.

1.4 Local highway authorities across the UK are responsible for managing over 70,000 highway bridges distributed across over 200 local council areas which require regular monitoring and maintenance to ensure a safe and long service life.

1.5 A series of structural inspections are carried out regularly to identify and minimise risks to public safety. Inspections are carried out by either by in-house staff, external providers, or a combination of both. To ascertain the competence of the personnel undertaking bridge inspections several schemes have been developed including this one by the ADEPT Yorkshire and Humber Bridges Group.

1.6 The scheme is based upon the testing of knowledge, experience and behaviour as the Bridge Inspector is required to understand how various materials (such as reinforced concrete, steel, cast iron, and masonry) perform under different conditions, and also have a high level of competence to keep their structures safely in-service.

1.7 Although this scheme has been written specifically for the Yorkshire and Humber Group, other Local Authorities are free to use it, however they will need to satisfy themselves

that the questions in the knowledge paper are appropriate for both their bridge stock and their expectations of their bridge inspectors.

2. Standards and References

2.1 This scheme has been developed with reference to:

- CS 450 Inspection of highway structures, Highways England, April 2021.
- Bridge Condition Indicators; County Surveyor's Society, July 2002 and Aug 2004 addendum.
- Inspection Manual for Highway Structures- Volume 1 Reference Manual, TSO, May 2007
- Inspection Manual for Highway Structures- Volume 2 Inspectors Handbook, TSO, May 2007
- Well Managed Highway Infrastructure- A Code of Practice October 2016, UK Roads Liaison Group

2.2 The scheme has referenced the documents listed. They are the standards relating to bridge inspection nationally. CS450 was developed for Trunk Roads and Motorways but it is accepted as good practice to apply these standards on local authority structures where it is appropriate and practical to do so.

2.3 Beyond the scope of this scheme the following references are relevant as they apply to the related activities

- CS 454 (Inspection for assessment)
- CS 127 (Cross sections and Head rooms)
- BD97/12 (The Assessment of Scour and Other Hydraulic Actions at Highway Structures)

3. Definition of a highway structure

3.1 The definition of a highway structure for the purpose of this scheme is in line with table 2.1 of CS450, and can be summarised as:

- Highway bridge, culvert, subway, cattle creep, with a span greater than 0.9m;
- Highway retaining wall, soil reinforced embankment, filled structure with a hard facing, with an effective retained height of 1.5m or greater;

- High mast of 20m or more;
- Traffic sign gantry
- Tunnel

4. Purpose of this document

- To satisfy the competency requirement of CS450 as modified by the requirements of the participating Y&H ABG members.
- To gain the acceptance of the scheme from the national ADEPT bridges group in order to further validate it as an acceptable method of proving bridge inspector competence.
- To ensure that across borders within Yorkshire and Humber there is a consistent standard of inspection and examination of highway structures which will satisfy the insurers of the authorities who use it.

5. Competence Requirement

5.1 The Code of Practice Well-Managed Highway Infrastructure indicates that it is good practice to identify the appropriate competency required for asset management and training should be provided were necessary.

5.2 For the purposes of this scheme, competence has been defined as having an ability to undertake the inspection of a Highway Structure to a safe and proficient standard through the application of a combination of knowledge, skill and experience, in line with the following achievement levels.

Achievement Level Descriptions

A	Awareness	General understanding of the competence, including an appreciation of its relevance.
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.
P	Proficiency	Knowledge, understanding and experience of undertaking the competence and competent to advise others.

5.3 This scheme will be used to certify inspectors across a range of organisations to a broadly similar set of competencies.

6. Bridge Inspections Competencies

6.1 The scheme will provide accreditation for two designations: inspector and senior inspector, as set out in Table 1 below. The competency will cover the main structure types and structures on the local road network; both grades of inspector will have the attributes as listed in CS 450. Other scheme roles are also given in Table 1.

6.2 The following structure types are excluded as they require specialist skills not covered here. The inspection of these structures will be delivered by those qualified to do so at the Bridge Managers discretion or by arranging for suitably qualified professionals.

- Unconventional or novel design aspects
- Moveable Bridges.
- Moveable inspection access gantries, gantry rails and gantry rail support systems.
- Suspension systems (cable stayed, or suspension bridges)

6.3 Senior Inspectors will be accredited to carry out general, principal and special inspections of highway structures. As required by CS 450 a certified Senior Inspector with the relevant competencies should lead and undertake the inspection. of complex structures, where unusual elements or load paths exist. Such structures are listed below:

- Skews greater than 25 degrees
- Half joints, or post tensioning
- Any individual span exceeding 50m
- History of unresolved foundation problems, significant structural defects or significant safety issues, weight restrictions and sub-standard assessed bridges.
- Scour susceptibility, unless scour is managed separately.
- Retaining wall greater than 7.0 m in height

6.4 Inspectors will be accredited to carry out general, principal and special inspection of non-complex structures.

6.5 If either an inspector or senior inspector is not required or is unable to demonstrate competency in a particular subject (e.g painted steelwork), an endorsement may be

applied to the competency certificate (see Appendix 2), at the discretion of the Supervising Engineer.

7. Areas of Competency

7.1 Areas of competency broadly follow the topics defined in CS 450 as follows:

- Introduction to inspections: understanding why they are important, their use, and the concept of fit for purpose and safe to use.
- Structures types and Elements / Behaviour of Structures: understanding of the common types of structures, their key elements and materials. It also suggest that they should have a basic understanding structural behaviour, structural mechanics, and material properties.
- Inspection Process: understanding and the ability to identify types, to record their severity and extent and to recognise the importance of the defects to the action of the structure and in particular to report any safety concerns.
- Defects Description and Causes: understanding of the importance of and the requirements for describing and categorising defects.
- Repair techniques: experience and understanding of different repair techniques (for Senior Bridge Inspectors).

8. The Procedure

8.1 The candidate will complete a declaration (template in Appendix 1) of their adherence to the rules of the scheme.

8.2 The candidate shall submit an experience report (limited to approximately 500 words) to demonstrate that they have suitable experience of inspection of different bridge forms. Candidates for Senior Bridge Inspector shall also demonstrate experience of maintenance and repair techniques for different bridge forms.

8.3 Candidates will submit three inspection reports of different structural forms which will be reviewed by the Supervising Engineer.

- Senior Bridge Inspector: all 3 reports shall be Principal Bridge Inspections. The structures shall be agreed as suitable with the Supervising Engineer prior to submission.

Note: For a new Senior Bridge Inspector, it will be beneficial to have assisted another Senior Inspector in carrying out the inspections of complex bridges (see 6.3) and prepared the report under supervision of Senior Bridge Inspector. They must be able to discuss the reports and answer any questions from the Supervising Engineer.

- Bridge Inspector: Two General Inspection reports and one Principal Inspection report shall be submitted. The structures shall be agreed with the Supervising Engineer as suitable prior to submission.

  Note: For a new inspector this will be difficult to achieve, it would be acceptable to have assisted another Bridge Inspector in carrying out the inspections and been heavily involved in the write-up. They must be able to discuss the report and answer any questions from the Supervising Engineer.

8.4 The candidate will complete a question paper which has been based on the competencies described in CS 450. This exam will be undertaken in a closed-book environment and is expected to take between 2 and 4 hours to complete.

8.5 Questions have not been weighted (a weighting system may be developed in future as the scheme is tested). The pass mark is 75% for Bridge Inspector and 90% for Senior Bridge Inspector.

8.6 The questions will be marked by the Supervising Engineer of the organisation with extensive inspection experience. (No model answers have been prepared.)

8.7 A practical test of up to an hour will be set by the Supervising Engineer.

8.8 A review of the question paper, experience report, inspection reports and practical test will take place in a meeting between the candidate and the Supervising Engineer.

8.9 Feedback on the competency assessment will be provided to either:

- Confirm no additional training is required and the candidate is deemed competent at the appropriate level; or
- Consider what additional training or experience is required and how this will be achieved.

8.10 The person authorised for each authority (normally Supervising Engineer) will review and, if satisfied, approve the certificate.

8.11 The competency assessment process is set out in Figure 1 below.

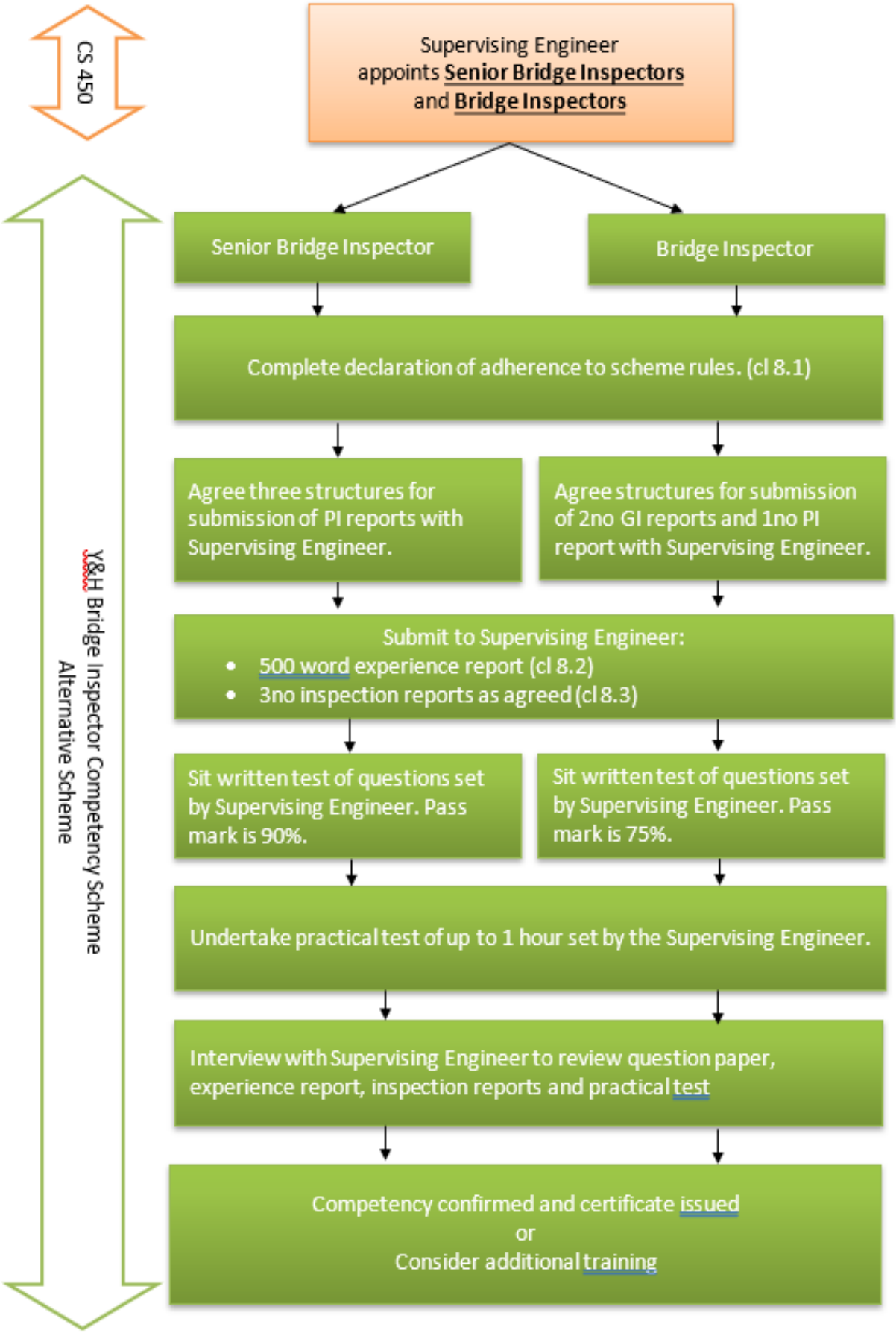


Figure 1: Competency Assessment process

Table 1: Roles, Functions and Expected Experience and Qualifications

Role	Function	Expected qualifications and experience	Competency requirements
Bridge Inspector	Accredited to undertake and prepare reports for: GI, PI, and SI of all highway structures, excluding complex structures (see 6.3).	Qualification not specified Experience of general inspections and assisting in principal inspections and special inspections.	Successful completion of Inspector grade test. Submit 3 recent reports of different structure types for review. Assessment in line with Fig 1.
Senior Bridge Inspector	Appointed by Supervising Engineer. Accredited to undertake and approve reports for: GI, PI, and SI of all highway structures, including complex structures (see 6.3.	Civils degree or equivalent qualification, or HNC or HND. Experience of completing principal inspections and BCIs, and reviewed general inspections on all forms of bridge in own authority stock. Bridge design, maintenance and repair experience, bridge construction experience Also able to demonstrate broader experience and proficiency of the relevant areas and has evidence of having advised others	Successful completion of Senior Inspector grade test. Submit 3 recent reports of different structure types for review. Assessment in line with Fig 1.
Supervising Engineer (in accordance with CS450)	Responsible for assessing and certifying the competence of Inspectors and Senior Inspectors via this scheme.	Ideally a bridge engineer with degree, chartered, MICE, MIStructE or similar EU qualification. Subject to TAA approval a suitably experienced, bridge engineer can be appointed, however it is noted that a Chartered or Incorporated Bridge Engineer is preferable for this role. The following indicative experience is recommended: • Minimum 10 years post-graduate experience in bridge engineering. • Completed and reviewed inspection reports for all forms of bridge in own authority stock. • Extensive bridge design experience, bridge construction experience, asset management experience.	Appointed by Local Authority
Regional Independent Assessor	To assist neighbouring Y&H authorities with the assessment process to certify Inspectors and Senior Inspectors.	Experienced bridge manager from Y&H ABG, with experience commensurate with Supervising Engineer above.. To be engaged as required, by agreement between authorities.	Competence agreed by Y&H ABG as required.

9. Retesting

9.1 Retesting should take place every 3 years or earlier if there is a major update to either this document or CS450.

10. Inspectors Register

10.1 The candidate will be recorded in the LHA and ABG register.

10.2 A certificate will be issued to the candidate jointly validated by the candidate's own LHA and Y&H ABG. External candidates will receive the same certificates.

10.3 If a particular LHA has modified the testing and attribute requirements to exclude particular structural forms or material types, these exclusions should be detailed in the register and on the inspector's certificate.

10.4 A register of certified inspectors will be maintained (by the Y&H ABG secretary) It will be the responsibility of each participating authority (or external organisation) to notify the Y&H ABG of current details and information.

10.5 Each managing Y&H highway authority will also maintain a register of their own inspectors as well as the external organisations and their inspectors that the Supervising Engineer has certified.

10.6 The register will include the following information:

- Inspector name
- Testing local authority
- Grading of inspector
- Date of test
- Revision number of the test
- Name of external organisation (if applicable)
- Supervising Civil Engineer certifying the test
- Test mark attained
- Attributes excluded
- Passed or did not meet the required standard

10.7 Unsuccessful candidate shall be informed of the areas needing improvement before resitting the test.

10.8 Inspectors may be directly employed LHA staff or they may be employed by organisations external to the LHA and Y&H ABG.

11. Examination of candidates from external organisations

11.1 Candidates from external organisations will be examined in the same manner as local authority candidates.

12. Governance of documents

12.1 The documents and procedures laid out as the Y&H BICS will be reviewed and updated as follows;

- Documentation and procedures will be updated to reflect changes in legislation at the earliest opportunity
- Documentation and procedures will be updated to reflect changes in working practices at the earliest opportunity.
- Documents and procedures will be discussed and reviewed at least every three years by the Y&H ABG.

12.2 Y&H ABG would welcome written notification of any errors or omissions within the documentation, or other comments, to allow the improvement and development of the scheme.

Appendix 1: Candidate Declaration of Compliance

ADEPT Yorkshire & Humber Area Bridges Group:
Bridge Inspector Competency Scheme

Candidate Declaration of Compliance

Competency assessment being undertaken (delete as applicable):

Bridge Inspector Senior Bridge Inspector

I, the, undersigned have read and agree to abide by the following conditions for undertaking the Y&H BICS:

I) Written tests will be “closed book” with no reference to verbal, written, electronic or other forms of assistance during the test.
II) Each test will be undertaken and completed as one continuous session.
III) The time allowed for the written test is 4 hours
IV) The content of the competency assessment should not be copied, shared or discussed with other people in order to maintain the integrity of the Yorkshire and Humber Area Bridges Group Bridge Inspector Competency Scheme.

Candidate Name (Print):

Candidate Name (Signature):

Company:

Supervising Engineer Name (Print):

Supervising Engineer (Signature):

Company:

Date of test:

Appendix 2: Certificate of Competence

ADEPT Yorkshire & Humber Area Bridges Group:
Bridge Inspector Competency Scheme

Certificate of Competence

This is to Certify that

……..

undertook the assessment for the above scheme and is deemed competent to undertake inspections of highway structures in line with the scheme, in the Yorkshire and Humber Area in the capacity of: *Strike through that which does not apply below*.

Bridge Inspector

Senior Bridge Inspector

Any endorsements under cl 10 of the scheme:

Signed (Supervising Engineer): Date:

Print name:
Company/Organisation:

ADEPT NORTH WEST

BRIDGE INSPECTOR COMPETENCY SCHEME

Document Name	**Bridge Inspector Competency Scheme**
Local Authorities	**ADEPT NW**
Document Author (name and position)	**Andrew Strang** **Structures & Flooding Manager, Perth and Kinross Council** **Modified by Jonathan Reeves, One Trafford Partnership, Trafford Council for ADEPT NW**
Document Owner	**Jonathan Reeves**
Document Version & Date	**Rev. 000 – July 2023**
Rev. 000 Details	**1.** **2.**
Document Checked by & Date:	**Stuart Molyneux, Technical Services, Salford City Council 17th July 2023**
Document Reviewed by & Date:	**Colin Jenkins, Infrastructure Delivery, Highways and Engineering** **Environment & Transport Directorate, Warrington Borough Council 17th July 2023**
Document Review Date	**July 2024**

CONTENTS

1. Background

1.1 ADEPT NW strive to operate best practice and co-operation. In order to embrace recommendation 15 of the Well Managed Highway Infrastructure Action Plan, and Section 9.1 note 4 of CS450, Inspection of Highway Structures (which supersedes BD63) this scheme has been developed in conjunction with The Greater Manchester Bridges Group (GMBG) as a suitable Bridge Inspector Certification Scheme (BICS). CS 450 was updated in April 2021 and since then four additional schemes have been approved by ADEPT; this scheme uses one of these additional four schemes, the Perth and Kinross Council Scheme (PKC). The PKC scheme states that it is “suitable to be adopted by members, as long as they are amended to suit an individual local authority’s specific requirements” including their engineering judgement, which is the intention of this document.

1.2 Local Authorities across the UK are responsible for managing over 76,000 road bridges which are distributed across 333 local authorities in England (see appendix 3) of which 152 appear to be Highway Authorities (see appendix 3) These councils vary from large urban and/or rural authorities with thousands of bridges to smaller councils with only a few bridges to manage. Irrespective of the size of the authority all bridge owners have a responsibility to undertake regular inspections to ensure the asset is fit for purpose and safe to use. Bridge inspections are carried out either by in-house staff, external providers, or a combination of both. To ascertain the competence of the personnel undertaking bridge inspections several schemes have been developed including this one by Perth & Kinross Council (PKC) which is supported by SCOTS (the Society of Chief Officers of Transportation in Scotland) modified by the Greater Manchester Bridges Group.

1.3 There are other local authority developed schemes that have been produced in England and Wales by ADEPT (Association of Directors of Environment, Economy, Planning and Transport) and CSS (County Surveyor’s Society) Wales respectively. Along with the SCOTS scheme, these schemes have been mutually accepted as suitable to be adopted by members, as long as they are amended to suit an individual local authority’s specific requirements.

1.4 The PKC scheme was originally written specifically for Perth & Kinross Council by its Structures & Flooding Manager; other Local Authorities are free to use it but they will need to satisfy themselves that the competency questions and levels set out in Section 6 are both appropriate for their bridge stock and expectations of their bridge inspectors. Other Local Authorities adopting this scheme will need to remove references to GMBG as appropriate and insert their own Council’s details.

1.5 This scheme has been produced with reference to the following documents, which are to be reviewed every ten years:

a) CS 450 - Inspection of Highway Structures, Version 0.1.0, DMRB (Design Manual for Roads and Bridges)
b) CM 431 Maintenance painting of steelwork
c) CM 432 Maintenance of buried concrete box structures
d) CS 432 Inspection of buried concrete box structures
e) CS 450 Inspection of highway structures
f) CS 460 Management of corrugated steel buried structures
g) CS 462 Repair and management of deteriorated concrete highway structures
h) CS 470 Management of sub-standard highway structures
i) Well-Managed Highway Infrastructure – A Code of Practice, October 2016 – UK Roads Liaison Group
j) County Surveyors's Society Bridge Condition Indicators, Volumes 1, 2 and 3 July 2002
k) Addendums to Volumes 2 and 3 of the County Surveyors's Society Bridge Condition Indicators, Aug 2004
l) Guidance Document for Performance Measurement of Highway Structures, 2007 - Atkins.
m) Inspection Manual for Highway Structures – Volumes 1 & 2, May 2007 Highways Agency

1.6 It is important however to note that the documents contained within the DMRB were developed for use on trunk roads and motorways. The DMRB does not apply as a standard that must be applied on local authority structures, however it is recognised as a basis of good practice for other bridge owners.

2. Introduction

2.1 This procedure sets out the competencies that bridge inspectors shall demonstrate achievement of, and situations (management of the highway asset: Safety Inspection, General Inspection, Principal Inspection, Special Inspection, Acceptance Inspection, Inspection for Assessment, Inspection for Adoption and Superficial Inspection) to which the different categories of inspector shall apply.

3. Action

3.1 Personnel planning to undertake inspections on roads structures shall demonstrate the level of competence for the role which they are proposing to undertake. Two categories of inspector have been developed:

Inspector (I) and Senior Inspector (SI)

These categories recognise different skills and experience of existing inspectors and requirements for the future. Different levels of competencies are prescribed for Inspectors and Senior Inspectors and Section 6 describes the requirements in detail. The primary differences between the two competence requirements are that a Senior

Inspector must be able to demonstrate broader experience and proficiency of the relevant areas and have evidence of having advised others.

3.2 The ADEPT NW Bridge Inspector Competency Scheme (BICS) requires each Inspector (I or SI, depending on their required status) to undertake the Structures Bridge Inspector Training package (produced as part of the GMBG Asset Management Project) which consists of the following:

7.1.1 Introduction to Inspection of Structures (PowerPoint presentation).

7.1.2 Identifying Structure Types and Components (Structures Elements PowerPoint presentation)

7.1.3 Explanation of the Severity and Extent ratings (PowerPoint presentation)

7.1.4 Photographic Assessment – Test (at least 85% in agreement with the Assessor) post discussion.

3.3 Subject to successful completion of the above and the Photographic Assessment Test the candidate shall be assessed against the requirements of the Core Competences set out in Section 6. This will take the form of questions, currently test parts 2 and 3, and a face-to-face interview, known as the test part 4, shall be undertaken with an assessor who shall be a senior member of the relevant ADEPT NW Council's Highway Structures Team (the assessor) to confirm that the candidate is suitable, and they would become an ADEPT NW 'certified' Inspector or Senior Inspector. Once assessed, a further review of experience and knowledge would be undertaken at regular intervals of 4 years. Whilst working towards the examination by the assessor, the inspector will be regarded as a 'trainee inspector' and from 2024 their role should be limited as set out in paragraph 3.6.

3.4 The assessor shall assess the suitability of the level of certification and experience of prospective inspectors before engaging them for particular structure's inspections.

3.5 The assessor shall be a person who has the necessary competencies and experience gained to carry out the assessment and the certification shall be issued by, or on behalf of, ADEPT NW. The individual authorities of the ADEPT NW will each keep a register of Inspectors and Special Inspectors and officers.

3.6 Both inspector roles require Inspectors to have the necessary competencies to undertake Principal Inspections, General Inspections, Superficial, Safety and Acceptance Inspections. Inspections for Assessment, Inspection for Adoption, Special Inspections and Monitoring Inspections should be undertaken by personnel with the specialist expertise and experience relevant to the purpose of the inspection and it is expected that these personnel will be accompanied by a certified Inspector or certified Senior Inspector.

3.7 The following are the requirements for the suitability of personnel undertaking inspections:

a) Personnel undertaking inspections shall have achieved the competencies required as set out in Section 6 and achieved certification, except as in b) below;
b) Trainee Inspectors may assist certified Inspectors or certified Senior Inspectors however their numbers and role shall be limited. For a small or medium structure which requires a one- or two-person inspection team to complete the inspection a Trainee Inspector may accompany a certified Inspector or Chief Inspector but cannot undertake an inspection on his/her own unless authorised to do so by a senior member of the Council's Structures Team.
c) It is recognised that junior engineers/technicians can gain useful experience by being involved on bridge inspections, although this may form a small part of their workload. This experience can be gained by observing the work being undertaken by the Senior Inspector(s) or Inspector(s) and possibly assisting with access;
d) For complex structures, where unusual elements or load paths exist, a certified Senior Inspector with the relevant competencies should lead and undertake the inspection. Such structures are likely to have one or more of the following features:
    i. Skews greater than 25°;
    ii. Unconventional or novel design aspects;
    iii. Half-joints, hinge-joints or post-tensioning;
    iv. Any individual span exceeding 50m;
    v. History of unresolved foundation problems, significant structural defects, or significant safety issues, or subject to CS 470 interim measures;
    vi. Moveable bridges;
    vii. Scour susceptibility;
    viii. Moveable inspection access gantries, gantry rail and gantry support systems;
    ix. Suspension systems (e.g., cable stayed, or suspension bridges); and
    x. Retaining walls greater than 7.0 m in height.
e) For structures which incorporate uncommon materials, such as laminated timber or fibre composite materials, certified inspectors with knowledge and experience of those materials and the mechanisms of deterioration shall only be used. Alternatively, a certified inspector shall undertake a joint inspection with a specialist with knowledge and experience of those materials and the mechanisms of deterioration who shall be accompanied on the inspection and provide their written advice to the inspector.

3.8 Applications for review and examination of evidence of competencies should be made in sufficient time, with the aim that continuous certification is achieved.

4 Bridge Inspector Certification Scheme (BICS) - Lantra

4.1 In order to streamline the process of reviewing and examining the competencies of prospective inspectors there is a certification scheme for Bridge Inspectors, entitled 'Bridge Inspector Certification Scheme' which is administered by Lantra.

This is an alternative (nationally recognised) route which could be undertaken by individuals should they wish to do so. This would be seen as an acceptable alternative to the GMBG – Bridge Inspector Certification Scheme (this scheme).

4.2 Within the Lantra BICS scheme the route to becoming a certified Inspector or Senior Inspector involves four key stages:

Stage 1 – Enrolment on the BICS

Stage 2 - Achievement of the required level

Stage 3 - Successful review of completed evidence and external interview to achieve Certification

Stage 4 - Continued consolidation and broadening of experience for additional competencies and to maintain registration.

4.3 The Bridge Inspector Certification Scheme has the Administrator as detailed below:

Lantra Awards,
Lantra
Stoneleigh Park
Coventry
Warwickshire
CV8 2LG

4.4 Further details of how these competencies can be certified via the Lantra BICS, and registration of interest in the scheme can be found at:

http://www.bridge-inspectors.com

5. Existing Structures Inspectors

5.1 There are a significant number of people currently undertaking inspections who have been doing so for a large number of years and have extensive knowledge and experience. They are highly valued and it is critical to the bridge community that these people are not 'lost' through the introduction of the requirement for review and examination of competencies. With their knowledge and experience, it is expected that the demonstration of meeting the required competencies should be readily achievable.

5.2 Where there are shortcomings in the awareness, knowledge, experience or proficiency in some of the modules this may require some targeted additional experience or training. There are training courses currently available which can be used to supplement a Trainee Inspector's knowledge and assist in meeting the competence requirements however participation in formal learning courses is not mandatory.

6. Core Competence Requirements

The competencies are set out as six 'headline' competencies and sub-competencies together with the level of competency in terms of Awareness (A), Knowledge (K), Experience (E), and Proficiency (P).

Achievement Rating		**Description**	
A	**Awareness**	General **understanding** of the competence, including an **appreciation** of its relevance.	*These apply to **theory** only*
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.	*These apply to **practical application**, as well as theory*
P	**Proficiency**	Knowledge, understanding and **experience** of undertaking the competence and **competent to advise others.**	

6.1 – Introduction to Inspections

Certified inspectors are expected to demonstrate the following competencies.

Ref.	**Outcome/Skill**	**I**	**SI**
6.1.1	Purpose of Inspections		
	● be able to outline the importance of undertaking inspections	K	K
	● be able to explain the terms 'safe for use' and 'fit for purpose'	K	K
6.1.2	Inspection types		
	● be able to explain the different inspection types	K	K

	● 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	K K
6.1.3	Codes of Practice and guidance ● 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

6.2 – Structures Types and Elements / Behaviour of Structures

Certified inspectors are expected to demonstrate competency of common types of structures, their key elements and materials. The competency includes background information and guidance on the fundamentals of structural behaviour, the basic principles of structural mechanics and material properties.

Ref.	Outcome/Skill	I	SI
6.2.1	Bridges ● 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 E E E E	 P P P P P
6.2.2	Other Structure Types ● Demonstrate knowledge of the definition of a culvert and the different types ● Demonstrate knowledge of the definition of a subway and the different types	 E E E	 P P P

Ref.	Outcome/Skill	I	SI
	● Demonstrate knowledge of the definition of a retaining wall and the different forms. ● Demonstrate knowledge of ancillary structures, function and type.	E	P
6.2.3	Structural Mechanics ● Be able to describe the loadings to which bridges are subjected. ● Be able to demonstrate knowledge/experience of the load path for a structure. ● Be able to demonstrate knowledge of modes of failure. ● Demonstrate an understanding of a materials responses to loading. ● Demonstrate an understanding of a structures responses to loading.	K K K K K	E E E E E
6.2.4	Properties of Common Construction Materials ● 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: - concrete; reinforced concrete; pre-stressed concrete (pre-tensioned and post-tensioned); steel; masonry; timber ● Demonstrate an understanding of the following secondary materials: - asphalt;	K K	E E
6.2.5	Properties of Specialist Construction Materials ● Demonstrate an understanding of the properties of the following materials and how they influence the safety, durability and functionality of a specific component and the whole structure: - wrought iron; cast iron; aluminium and its alloys;	A	K

6.3 – Inspection Process

Certified inspectors are expected to demonstrate competency of the fundamentals of the inspection process, including scheduling, planning, undertaking, reviewing, and interpreting the results. The competency 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	I	SI
6.3.1	Scheduling Groups of Inspections		
	● Demonstrate knowledge of relevant documentation which outlines details regarding the frequency of inspections	E	P
	● Demonstrate understanding of criteria which can constrain or influence a schedule, for example, confined spaces, use of MEWPs, etc.	E	P
	● Explain the objectives of each cyclical inspection type	E	P
	● Demonstrate ability to monitor progress of inspections against schedules	E	P
	● Demonstrate experience of access requirements, for example, road space booking, track possessions, waterways access, major events, etc.	A	K
	● Demonstrate knowledge of the ability to vary frequency of inspections based on a risk-based approach, including special inspections		

Ref.	Outcome/Skill	I	SI
6.3.2	Planning and Preparing for an Inspection		
	● Explain the function and importance of existing records	E	P
	● Demonstrate ability to challenge validity of existing structures records.	E	P
	● Demonstrate awareness of the importance of the structures current assessed capacity.	E	P
	● Explain what further information may need to be determined from a pre-inspection visit.	E	P
	● Demonstrate experience of and an appreciation of the importance of method statements, health and safety considerations and risk assessments in undertaking inspections.	E	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, traffic management requirements, and routes to be used to and from the site.	E	P
	● Explain the types of notifications which may be required prior to gaining access.	E	P
	● Demonstrate an understanding of the range of equipment which may be utilised to undertake an inspection. Range to include: access equipment; PPE; data recording equipment; measuring or inspection equipment.	E	P
	● Demonstrate an understanding of the environmental considerations to be taken into account, for example asbestos, bats, badgers, etc.	E	P
	● Outline the key aspects for an inspection method statement.		

Ref.	Outcome/Skill	I	SI
6.3.3	Performing Inspections		
	● Describe a practical approach of undertaking an inspection, highlighting the key aspects.	E	P
	● Explain the reasons and implications of restricted working hours on the process of undertaking an inspection.	E	P
	● Explain the reasons why 'good housekeeping' whilst on site is imperative and what does it involve.	E	P
	● Demonstrate an understanding of the need to escalate potential safety critical defects.	E	P
	● Demonstrate an understanding of substandard parapets & road restraint systems.	E	P
	● Demonstrate an understanding of communication protocols (for example, who is the Principal Contractor, etc.) and how to set one up.	E	P
6.3.4	Recording Inspection Findings		
	● Demonstrate understanding of the importance of recording defects accurately in terms of type, location, extent, severity and cause.	E	P
	● Outline different methods used for recording defects.	E	P
	● Demonstrate knowledge of the prerequisites of a data capture and inspection pro forma.	E	P
	● Be able to explain the importance of 'signing off' an inspection.	E	P
	● Demonstrate knowledge of the principals of an element condition rating process.	E	P
	● Explain the level of detail to be recorded depending upon the type of inspection.	K	E
	● Understand how the accuracy of reporting can affect overall structure condition performance indicators, as well as element condition rating.		

Ref.	Outcome/Skill	I	SI
6.3.5	Interpreting Inspection Findings		
	● Demonstrate knowledge of factors which affect whether a structure is safe for use and/or fit for purpose.	K	E
	● Be able to identify possible safety critical defects and report them within the prescribed timescales.	K	E
	● Understanding of the need to utilise existing records to help interpret defects.	E	E
	● Demonstrate knowledge of the range of maintenance works which are commonly recommended following an inspection	E	E
	● Demonstrate an awareness of how defects are managed to identify future maintenance works, based on priority and cost	K	E
6.3.6	Maintenance Planning Process		
	● Demonstrate understanding of how the data captured from inspections complements other information held for a structure.	K	E
	● Explain the importance of up-to-date and comprehensive data on the condition of a structure with respect to its input to maintenance planning.	K	E
	● Demonstrate knowledge of a bridge management system	K	E

Ref.	Outcome/Skill	I	SI
6.3.7	Obligations of Current Health, Safety and Environment Legislation		
	● Demonstrate understanding of the need to minimise health and safety risks to the public and others who may be affected by the work activities.	E	P
	● Demonstrate understanding of the need to minimise health and safety risks to those actually carrying out the works.	E	P
	● Demonstrate understanding of the need and breadth of personal protective equipment (PPE) utilised for undertaking inspections for safe working.	E	P
	● Demonstrate understanding and practical experience of managing and applying safe systems of work.	E	P
	● Demonstrate knowledge of relevant legislation and sources of guidance.	E	P
	● 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 methods.	E	P
	● Experience of having dealt with: - 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, e.g., lead in paint; lone working; night work; confined spaces.		
6.3.8	Other Skills		
	● Demonstrate basic knowledge of traffic management practices and relevant reference material, e.g., Chapter 8 of the Traffic Signs Manual.	K	K

6.4 – Defects Descriptions and Causes

Certified inspectors are expected to demonstrate competency of the importance and requirements for describing and categorising defects. Emphasis is placed on principal defects 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	I	SI
6.4.1	Understanding Principal Defects		
	● Demonstrate understanding of the principal causes of defects, including:		
	inadequate structural capacity; substandard clearance; 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; adequacy and function of parapets and vehicle restraint systems.	E E K	P P K
	● Demonstrate understanding of the implications of deterioration.		
	● Demonstrate understanding of issues that cause collapses or structure closures, for example, erosion, scour, bridge strikes, etc.	E E	P P
	● Demonstrate knowledge of bridge specific defects.	E	P
	● Demonstrate knowledge of culvert specific defects.		
	● Demonstrate knowledge of retaining wall specific defects.		
6.4.2	Concrete Defects		
	● Demonstrate knowledge of defects caused by structural distress.	E E	P P
	● Demonstrate knowledge of defects arising due to material nature.	E	P
	● Demonstrate knowledge of defects caused by external agents, e.g., reinforcement corrosion, Alkali Silica Reaction (ASR) etc.	E	P
	● Demonstrate knowledge of defects caused by accidental or deliberate damage.	E	P
	● Demonstrate knowledge of defects associated with protective coatings and repair systems.	E E	P P

Ref.	Outcome/Skill	I	SI
	● Demonstrate knowledge of minor defects, e.g., defects which generally only affect the visual appearance of the concrete.	K	E
	● Demonstrate knowledge of defects that can occur in pre-stressed concrete.		
	● Demonstrate knowledge of defects that can occur in post-tensioning systems.		
6.4.3	Steel Defects		
	● Demonstrate knowledge of defects caused by structural distress.	E	P
	● Demonstrate knowledge of defects arising due to material nature.	E	P
	● Demonstrate knowledge of defects instigated by external agents, e.g. bimetallic corrosion.	E	P
	● Demonstrate knowledge of defects caused by accidental or deliberate damage.	E	P
	● Demonstrate knowledge of defects arising due to fabrication errors, e.g. poor welds.	E	P
	● Demonstrate knowledge of defects associated with protective systems.	E	P
	● Demonstrate knowledge of defects associated with closed members.	E	P
	● Demonstrate knowledge of defects associated with corrugated steel buried structures.	E	P
	● Demonstrate knowledge of defects which affect the whole system, e.g. beams with jack arches.		
6.4.4	Masonry Defects		
	● Demonstrate knowledge of defects caused by structural distress.	E	P
	● Demonstrate knowledge of defects arising due to material nature.	E	P
	● Demonstrate knowledge of defects instigated by external agents, e.g. frost, vegetation.	E	P
	● Demonstrate knowledge of defects caused by accidental or deliberate damage.	E	P

Ref.	Outcome/Skill	I	SI
	● Demonstrate knowledge of defects arising due to alterations to masonry structures, e.g., concrete saddle, etc.		
6.4.5	Defects in Miscellaneous Materials ● Demonstrate appropriate level of awareness of defects which can occur in other materials, including: cast iron; wrought iron; aluminium; timber.	K	K

6.5 – Repair Techniques

Certified inspectors are expected to demonstrate competency of the importance of understanding the range of repair techniques available.

Ref.	Outcome/Skill	I	SI
6.5.1	Importance of Routine Maintenance		
	● Demonstrate knowledge of the importance of undertaking Routine Maintenance.	K	K
	● Demonstrate an understanding of the importance of balancing essential preventative maintenance works.	K	K
6.5.2	Recommending appropriate repairs ● Demonstrate experience of recommending repairs appropriate to the identified defects.	E	P

6.6 – General Aptitude

Certified inspectors are expected to demonstrate competency of the general aptitude skills required by an inspector.

Ref.	Outcome/Skill	I	SI
6.6.1	Practical Aptitude		
	● Be able to demonstrate ability to make sound and prudent judgements.	P	P
	● Demonstrate excellent attention to detail.	P	P
	● Be able to work to deadlines.	P	P
	● Be able to appreciate one's own capability and scope of knowledge.	P	P
6.6.2	Working with people ● Demonstrate experience of having worked successfully in a team.	P	P

Ref.	Outcome/Skill	I	SI
	● Demonstrate experience of having engaged successfully with third parties and public.	P	P
6.6.3	Communication skills		
	● Be able to interpret drawings and reports.	P	P
	● Be able to draw clear sketches.	P	P
	● Be able to write reports.	P	P
	● Be able to communicate verbally in a clear and comprehensive way.	P	P
	● Be able to demonstrate proficiency in communicating findings from an inspection.	P	P
	● Demonstrate range of IT skills.	E	P
6.6.4	Personal skills		
	● Demonstrate self-motivation.	P	P
	● Be able to decide and set priorities.	P	P
	● Be able to take decisions and have confidence to challenge a situation/decision if necessary.	P	P
	● Demonstrate understanding of knowing one's limitations.	P	P
6.6.5	Obligations of Current Health and Safety Legislation		
	● Demonstrate knowledge and understanding of current health and safety legislation obligations.	P	P
	● Demonstrate a positive attitude towards health and safety.	P	P
	● Demonstrate ability to develop working practices that promote safety and secure the compliance of subordinates.	P	P
	● Demonstrate knowledge and understanding of the importance of method statements and risk assessments.	P	P
6.6.6	Management / Supervision skills		
	● Demonstrate ability to advise and present recommendations to others.	K	P
	● Identify resources required for an inspection.	E	P

7. Summary of the ADEPT NW Bridge Inspector Competency Scheme (BICS) Requirements

7.1 The NW ADEPT BICS requires each Inspector (I or SI, depending on their required status) to undertake the Structures Bridge Inspector Training package (produced as part of the GMBG Asset Management Project which is a development of the SCOTS Asset Management Project) which consists of the following:

7.1.1 Introduction to Inspection of Structures (PowerPoint presentation).

7.1.2 Identifying Structure Types and Components (Structures Elements PowerPoint presentation)

7.1.3 Explanation of the Severity and Extent ratings (PowerPoint presentation)

7.1.4 Photographic Assessment – Test (at least 85% in agreement with the Assessor) post discussion. This is the test part 1.

7.2 Subject to successful completion of the above including the Photographic Assessment Test the candidate shall be assessed against other requirements of the Core Competences set out in Section 6. This will take the form of questions, currently test parts 2 and 3, and a one-to-one interview between the assessor and the candidate, known as the test part 4.

7.3 The assessor will determine whether the candidate has satisfied the competences and the level at which the assessor considers the Inspector should be certified to (Inspector or Senior Inspector).

7.4 Continued Consolidation / Broadening of Experience.

7.4.1 Continuing Professional Development (CPD). In order to demonstrate that the Inspector / Senior Inspector is keeping up to date with and maintaining their level of competence they are required to maintain a record of their CPD (minimum hours per annum to be agreed with an ADEPT NW Assessor).

7.4.2 A review of the CPD of the Inspector / Senior Inspector should be carried out every 4 years to ensure that the candidate is continuing to keep up with the changing nature of the industry. This shall take the form of the submission of the Inspector / Senior Inspector’s CPD and/or a short interview from an ADEPT NW Assessor (or similarly qualified person).

7.4.3 Subject to the successful completion of the above the date and outcome of this review shall be recorded in the candidates file with appropriate comments.

7.5 Options for the General Inspection/Principal Inspection part of the assessment, known as the test part 3, are as follows:

Option 1 – Complete the Model Inspection.

Option 2 – Complete an inspection on site with the Bridge Manager (who may give guidance as he/she judges to be appropriate)

Option 3 – Submit previous inspections, nominally three, demonstrating suitable complexity and understanding of the bridge inspection process.

The choice of option is to be determined by the assessor.

ADEPT NW

BRIDGE INSPECTOR CERTIFICATE

This is to certify that ……..…

has been assessed in accordance with the requirements set out in the BRIDGE INSPECTOR COMPETENCY SCHEME, version Rev. 000, dated July 2023, and has been considered to be at a level consistent with an Inspector* / Special Inspector* (delete as appropriate).

Signed ……

Name ……

Position held ……

Engineering Qualifications ……

Date ……

Appendix 1

Assessors

Each council shall appoint its own assessor which would nominally be a senior member of their bridges or highway structures team.

Each assessor shall be recorded as a certified ADEPT NW BICS SI.

Each assessor is to occasionally be accompanied by an external assessor to ensure consistency of appraisal.

An external assessor is defined as someone from another council in GMBG or the ADEPT NW region.

Appendix 2

The review, known as the test part 4

The aim of the process is to prove the competency of existing and future bridge inspectors.

The candidates' answers to the test parts 1, 2 and 3 are to be discussed with him/her. Any answer which varies from the model answer sheet is to be justified. A variation greater than one (number or letter) would normally be considered to be incorrect unless an alternative interpretation can be justified.

(Note that if a variation of two were to be allowed then answering C3 to everything would potentially have the possibility of passing.)

The review is to include an assessment of the core competencies mentioned in appendix 3 to be assessed in the test part 4.

Appendix 3

Assessment of Core Competencies

6.1 Introduction to inspections

Test part 4 (interview)

6.2 Structure: types, elements, behaviours

Test part 2 (general knowledge)

6.3 Inspection Process

6.3.1 test part 4 (interview)
6.3.2 test part 4 (interview)
6.3.3 test part 4 (interview)
6.3.4 test part 3 (PI)
6.3.5 test part 3 (PI)
6.3.6 test part 4 (interview)
6.3.7 test part 4 (interview)
6.3.8 test part 4 (interview)

6.4 Defects and causes

Test part 1 (photographic assessment)

6.5 Repair techniques

6.5.1 test part 4 (interview)
6.5.2 test part 3 (PI)

6.6 General aptitude

6.6.1 test part 3 (PI) and part 4 (interview)
6.6.2 test part 4 (interview)
6.6.3 test part 3 (PI) and part 4 (interview)
6.6.4 test part 4 (interview)
6.6.5 test part 4 (interview)
6.6.6 test part 3 (PI) and part 4 (interview)

Appendix 4

References

References used:

333 local authorities in England (https://www.gov.uk/guidance/local-government-structure-and-elections) of which 152 appear to be Highway Authorities (https://lgiu.org/local-government-facts-and-figures-england/#:~:text=There%20are%20currently%209%20combined,and%20Peterborough%E2%80%93%20Mayor%20James%20Palmer).

Appendix 5

Record of inspectors

Two lists are to be kept: one for inspectors (I) and one for special inspectors (SI). The holding of a register of certified inspectors and their certification date is to be done by each individual authority.

SCOTS BRIDGES GROUP

**** COUNCIL

STRUCTURES INSPECTORS COMPETENCIES AND CERTIFICATION SCHEME

10th October 2018

CONTENTS

1. Introduction

1.1 This procedure sets out the competencies that bridge inspectors shall demonstrate achievement of, and situations that the different categories of inspector shall apply to.

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Inspector (I) and Senior Inspector (SI)

These categories recognise different skills and experience of existing inspectors and requirements for the future. Different levels of competencies are prescribed for Inspectors and Senior Inspectors and section 5 describes the requirements in detail. The primary differences between the two competence requirements are that a Senior Inspector must be able to demonstrate broader experience and proficiency of the relevant areas and have evidence of having advised others.

2.2 The **** Council Bridge Inspectors Competency Scheme (BICS) requires each Inspector (I or SI, depending on their required status) to undertake the Structures Bridge Inspector Training package (produced as part of the SCOTS Asset Management Project) which consists of the following;

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6.1.4 Photographic Assessment – Test (at least 60% in agreement with the Assessor)

2.3 Subject to successful completion of the above and the Photographic Assessment Test the candidate shall be assessed against the requirements of the Core Competences set out in Section 5. A face to face interview shall be undertaken with a senior member of the Council's Structures Team (the assessor) to confirm that the candidate is suitable and they would become a **** Council 'certified' Inspector or Senior Inspector. Once assessed a further review of experience and knowledge would be undertaken at regular intervals of approximately 5 years. Whilst working towards the examination by the assessor the inspector will be regarded as a 'trainee inspector' and their role will be limited as set out in paragraph 2.6.

2.3 The assessor shall assess the suitability of the level of certification and experience of prospective inspectors before engaging them for particular structures inspections.

2.4 The assessor shall be a person who has the necessary competencies and experience gained to carry out the assessment and the certification shall be issued by, or on behalf of, **** Council.

2.5 Both inspector roles require Inspectors to have the necessary competencies to undertake Principal Inspections, General Inspections, and Acceptance Inspections. Inspections for Assessment, Special Inspections and Monitoring Inspections should be undertaken by personnel with the specialist expertise and experience relevant to the purpose of the inspection and it is expected that these personnel will be accompanied by a certified Inspector or certified Senior Inspector.

2.6 The following are the requirements for the suitability of personnel undertaking inspections:

a) Personnel undertaking inspections shall have achieved the competencies required as set out in section 5 and achieved certification, except as in b) below;
b) Trainee Inspectors may assist certified Inspectors or certified Senior Inspectors; however their numbers and role shall be limited. For a small or medium structure which requires a 1 or 2 person inspection team to complete the inspection a Trainee Inspector may accompany a certified Inspector or Senior Inspector but cannot undertake an inspection on his/her own unless authorised to do so by a senior member of the Council's Structures Team.

c) It is recognised that junior engineers/technicians can gain useful experience by being involved on bridge inspections, although this may form a small part of their workload. This experience can be gained by observing the work being undertaken by the Inspector(s) and possibly assisting with access;
d) For complex structures, where unusual elements or load paths exist, a certified Senior Inspector with the relevant competencies should lead and undertake the inspection. Such structures are likely to have one or more of the following features :
    i. Skews greater than 25°;
    ii. Unconventional or novel design aspects;
    iii. Half-joints, hinge-joints or post-tensioning;
    iv. Any individual span exceeding 50m;
    v. History of unresolved foundation problems, significant structural defects, or significant safety issues, or subject to BD79 interim measures;
    vi. Moveable bridges;
    vii. Scour susceptibility;
    viii. Moveable inspection access gantries, gantry rail and gantry support systems;
    ix. Suspension systems (e.g. cable stayed, or suspension bridges); and
    x. Retaining walls greater than 7.0 m in height.
e) For structures which incorporate uncommon materials, such as laminated timber or fibre composite materials, certified inspectors with knowledge and experience of those materials and the mechanisms of deterioration shall only be used. Alternatively a certified inspector shall undertake a joint inspection with a specialist with knowledge and experience of those materials and the mechanisms of deterioration who shall be accompanied on the inspection and provide their written advice to the inspector.

2.7 Applications for review and examination of evidence of competencies should be made in sufficient time, with the aim that continuous certification is achieved.

3 Bridge Inspector Certification Scheme (BICS) - Lantra

3.1 In order to streamline the process of reviewing and examining the competencies of prospective inspectors there is a certification scheme for Bridge Inspectors, entitled ‘Bridge Inspector Certification Scheme’ which is administered by Lantra.

This is an alternative (nationally recognised) route which could be undertaken by individuals should they wish to do so. This would be seen as an acceptable alternative to the **** Council – Structures Inspectors Competencies and Certification Scheme (this Scheme).

3.2 Within the Lantra BICS scheme the route to becoming a certified Inspector or Senior Inspector involves four key stages:

Stage 1 – Enrolment on the BICS

Stage 2 - Achievement of the required level

Stage 3 - Successful review of completed evidence and external interview to achieve Certification

Stage 4 - Continued consolidation and broadening of experience for additional competencies and to maintain registration.

3.3 The Bridge Inspector Certification Scheme has the Administrator as detailed below:

Lantra Awards,
Lantra
Stoneleigh Park
Coventry
Warwickshire
CV8 2LG

3.4 Further details of how these competencies can be certified via the BICS, and registration of interest in the scheme can be found at:

http://www.bridge-inspectors.com

4. Existing Structures Inspectors

4.1 There are a significant number of people currently undertaking inspections who have been doing so for a large number of years and have extensive knowledge and experience. They are highly valued and it is critical to the bridge community that these people are not 'lost' through the introduction of the requirement for review and examination of competencies. With their knowledge and experience, it is expected that the demonstration of meeting the required competencies should be readily achievable.

4.2 Where there are shortcomings in the awareness, knowledge, experience or proficiency in some of the modules this may require some targeted additional experience or training. There are training courses currently available which can be used to supplement a Trainee Inspector's knowledge and assist in meeting the competence requirements; however participation in formal learning courses is not mandatory.

5. Core Competence Requirements

The competencies are set out as six 'headline' competencies and sub-competencies together with the level of competency in terms of Awareness (A), Knowledge (K), Experience (E), and Proficiency (P).

Achievement Rating		**Description**	
A	**Awareness**	General **understanding** of the competence, including an **appreciation** of its relevance.	*These apply to **theory** only*
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.	*These apply to **practical application**, as well as theory*
P	**Proficiency**	Knowledge, understanding and **experience** of undertaking the competence and **competent to advise others.**	

5.1 – Introduction to Inspections

This skill set 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**	**I**	**SI**
5.1.1	Purpose of Inspections		
	● be able to outline the importance of undertaking inspections	K	K
	● be able to explain the terms 'safe for use' and 'fit for purpose'	K	K
5.1.2	Inspection types		

	● be able to explain the different inspection types	K	K
	● demonstrate the importance of having an appropriate inspection regime	K	K
	● demonstrate awareness of the range of different Special Inspections, their function and which factors typically initiate their use.	K	K
5.1.3	Codes of Practice and guidance		
	● 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

5.2 – Structures Types and Elements / Behaviour of Structures

This skill set 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**	**I**	**SI**
5.2.1	Bridges		
	● Demonstrate knowledge of the major bridge elements: Superstructure, Substructure, Safety Elements, Durability Elements and Ancillary Elements.	E	P
	● Demonstrate knowledge of typical Primary and Secondary deck element types.	E	P
	● Demonstrate knowledge of bridge types using: span form, construction form and construction material.	E	P
	● Demonstrate knowledge of water management systems, their function and importance.	E	P
	● Demonstrate knowledge of utilities, private services, signs and lighting.		
5.2.2	Other Structure Types		
	● Demonstrate knowledge of the definition of a culvert and the different types	E	P
	● Demonstrate knowledge of the definition of a subway and the different types	E	P
	● Demonstrate knowledge of the definition of a retaining wall and the different forms.	E	P
	● Demonstrate knowledge of ancillary structures, function and type.	E	P
5.2.3	Structural Mechanics		
	● Be able to describe the loadings to which bridges are subjected	K	E
	● Be able to demonstrate knowledge/experience of the loadpath for a structure	K	E
	● Be able to demonstrate knowledge of modes of failure	K	E
	● Demonstrate an understanding of materials' responses to loadings	K	E

Ref.	Outcome/Skill	I	SI
	● Demonstrate an understanding of structures' responses to loadings	K	E
5.2.4	Properties of Common Construction Materials ● 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: - concrete; reinforced concrete; pre-stressed concrete (pre-tensioned and post-tensioned); steel; masonry; timber ● Demonstrate an understanding of the following secondary materials: - asphalt; asbestos	K K	E E
5.2.5	Properties of Specialist Construction Materials ● Demonstrate an understanding of the properties of the following materials and how they influence the safety, durability and functionality of a specific component and the whole structure: - wrought iron; cast iron; aluminium and its alloys; advanced composites	A	K

5.3 – Inspection Process

This skill set 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	I	SI
5.3.1	Scheduling Groups of Inspections ● Demonstrate knowledge of relevant documentation which outlines details regarding the frequency of inspections ● Demonstrate understanding of criteria which can constrain or influence a 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, including special inspections	 E E E E E A	 P P P P P K

Ref.	Outcome/Skill	I	SI
5.3.2	Planning and Preparing for an Inspection		
	● Explain the function and importance of existing records	E	P
	● Demonstrate ability to challenge validity of existing structures records.	E	P
	● Demonstrate awareness of the importance of the structures current assessed capacity	E	P
	● Explain what further information may need to be determined from pre-inspection visit	E	P
	● Demonstrate experience of and an appreciation of the importance of method statements, health and safety considerations and risk assessments in undertaking inspections.	E	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, traffic management requirements and routes to be used to and from the site	E	P
	● Explain the types of notifications which may be required prior to gaining access.	E	P
	● Demonstrate an understanding of the range of equipment which may be utilised to undertake an inspection. Range to include: access equipment; PPE; data recording equipment; measuring or inspection equipment	E	P
	● Demonstrate an understanding of the environmental considerations to be taken into account, for example, asbestos, bats, badgers etc.	E	P
	● Outline the key aspects for an inspection method statement.	E	P
5.3.3	Performing Inspections		
	● Describe a practical approach of undertaking an inspection, highlighting the key aspects.	E	P
	● Explain the reasons and implications of restricted working hours on the process of undertaking an inspection.	E	P
	● Explain the reasons why 'good housekeeping' whilst on site is imperative and what does it involve.	E	P
	● Demonstrate an understanding of the need to escalate potential safety critical defects	E	P
	● Demonstrate an understanding of substandard parapets & road restraint systems	E	P
	● Demonstrate an understanding of communication protocols (for example, who is the Principal Contractor, etc.) and how to set one up	E	P

Ref.	Outcome/Skill	I	SI
5.3.4	Recording Inspection Findings		
	● Demonstrate understanding of the importance of recording defects accurately in terms of type, location, extent, severity and cause.	E	P
	● Outline different methods used for recording defects.	E	P
	● Demonstrate knowledge of the prerequisites of a data capture and inspection proforma.	E	P
	● Be able to explain the importance of 'signing off' an inspection.	E	P
	● Demonstrate knowledge of the principals of an element condition rating process.	E	P
	● Explain the level of detail to be recorded depending upon the type of inspection.	E	P
	● Understand how the accuracy of reporting can affect overall structure condition performance indicators, as well as element condition rating.	K	E
5.3.5	Interpreting Inspection Findings		
	● Demonstrate knowledge of factors which affect whether a structure is safe for use and/or fit for purpose.	K	E
	● Be able to identify possible safety critical defects and report them within the prescribed timescales.	K	E
	● Understanding of the need to utilise existing records to help interpret defects	E	E
	● Demonstrate knowledge of the range of maintenance works which are commonly recommended following an inspection	E	E
	● Demonstrate an awareness of how defects are managed to identify future maintenance works, based on priority and cost	K	E
5.3.6	Maintenance Planning Process		
	● Demonstrate understanding of how the data captured from inspections complements other information held for a structure.	K	E
	● Explain the importance of up-to-date and comprehensive data on the condition of a structure with respect to its input to maintenance planning.	K	E
	● Demonstrate knowledge of a bridge management system	K	E

Ref.	Outcome/Skill	I	SI
5.3.7	Obligations of Current Health and Safety & Environment Legislation		
	● Demonstrate understanding of the need to minimise health and safety risks to the public and others who may be affected by the work activities	E	P
	● Demonstrate understanding of the need to minimise health and safety risks to those actually carrying out the works	E	P
	● Demonstrate understanding of the need and breadth of personal protective equipment (PPE) utilised for undertaking inspections for safe working.	E	P
	● Demonstrate understanding and practical experience of managing and applying safe systems of work.	E	P
	● Demonstrate knowledge of relevant legislation and sources of guidance.	E	P
	● Experience of having dealt with:	E	P
	- 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, e.g. lead in paint; lone working; night work; confined spaces		
5.3.8	Other Skills		
	● Demonstrate basic knowledge of traffic management practices and relevant reference material, e.g. Chapter 8 of Traffic Signs Manual.	K	K

5.4 – Defects Descriptions and Causes

This skill set outlines the importance and requirements for describing and categorising defects. Emphasis is placed on principal defects 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	I	SI
5.4.1	Understanding Principal Defects		
	● Demonstrate understanding of the principal causes of defects, including:	E	P
	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; adequacy and function of parapets & vehicle restraint systems.		
	● Demonstrate understanding of the implications of deterioration	E	P
	● Demonstrate understanding of issues that cause collapses or structure closures, for example, erosion, scour, bridge strikes etc.	K	K
	● Demonstrate knowledge of bridge specific defects	E	P
	● Demonstrate knowledge of culvert specific defects	E	P
	● Demonstrate knowledge of retaining wall specific defects	E	P

Ref.	Outcome/Skill	I	SI
	• Demonstrate knowledge of any defects specific to any other structure types relevant to your industry	E	P
5.4.2	Concrete Defects		
	● Demonstrate knowledge of defects caused by structural distress	E	P
	● Demonstrate knowledge of defects arising due to material nature	E	P
	● Demonstrate knowledge of defects caused by external agents e.g. reinforcement corrosion, thaumasite sulphate attack (TSA), etc.	E	P
	● Demonstrate knowledge of defects caused by accidental or deliberate damage	E	P
	● Demonstrate knowledge of defects associated with protective coatings and repair systems	E	P
	● Demonstrate knowledge of minor defects e.g. defects which generally only affect the visual appearance of the concrete	E	P
	● Demonstrate knowledge of defects that can occur in prestressed concrete	E	P
	● Demonstrate knowledge of defects that can occur in post-tensioning systems	K	E
5.4.3	Steel Defects		
	● Demonstrate knowledge of defects caused by structural distress	E	P
	● Demonstrate knowledge of defects arising due to material nature	E	P
	● Demonstrate knowledge of defects instigated by external agents e.g. bimetallic corrosion	E	P
	● Demonstrate knowledge of defects caused by accidental or deliberate damage	E	P
	● Demonstrate knowledge of defects arising due to fabrication errors e.g. poor welds	E	P
	● Demonstrate knowledge of defects associated with protective systems	E	P
	● Demonstrate knowledge of defects associated with closed members	E	P
	● Demonstrate knowledge of defects associated with corrugated steel buried structures	E	P
	● Demonstrate knowledge of defects which affect the whole system, for example, beams with jack arches	E	P
5.4.4	Masonry Defects		
	● Demonstrate knowledge of defects caused by structural distress	E	P
	● Demonstrate knowledge of defects arising due to material nature	E	P
	● Demonstrate knowledge of defects instigated by external agents e.g. frost, vegetation	E	P

Ref.	Outcome/Skill	I	SI
	● Demonstrate knowledge of defects caused by accidental or deliberate damage ● Demonstrate knowledge of defects arising due to alterations to masonry structures e.g. concrete saddle, etc.	E E	P P
5.4.5	Defects in Miscellaneous Materials ● Demonstrate appropriate level of awareness of defects which can occur in other materials: cast iron; wrought iron; aluminium; timber (problems including fixings and preservation against rotting)	K	K

5.5 – Repair Techniques

This skill set outlines the importance of understanding the range of repair techniques available.

Ref.	Outcome/Skill	I	SI
5.5.1	Importance of Routine Maintenance ● Demonstrate knowledge of the importance of undertaking Routine Maintenance ● Demonstrate an understanding of the importance of balancing essential preventative maintenance works	K K	K K
5.5.2	Recommending appropriate repairs ● Demonstrate experience of recommending repairs appropriate to the identified defects	E	P

5.6 – General Aptitude

This skill set outlines the general aptitude skills required by an inspector.

Ref.	Outcome/Skill	I	SI
5.6.1	Practical Aptitude ● 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 P P	P P P P
5.6.2	Working with people ● Demonstrate experience of having worked successfully in a team ● Demonstrate experience of having engaged successfully with 3rd parties and public	P P	P P
5.6.3	Communication skills ● Be able to interpret drawings and reports	P	P

Ref.	Outcome/Skill	I	SI
	● Be able to draw clear sketches	P	P
	● Be able to write reports	P	P
	● Be able to communicate verbally in a clear and comprehensive way.	P	P
	● Be able to demonstrate proficiency in communicating findings from an inspection	P	P
	● Demonstrate range of IT skills	E	P
5.6.4	Personal skills		
	● Demonstrate self-motivation	P	P
	● Be able to decide and set priorities.	P	P
	● Be able to take decisions and have confidence to challenge a situation/decision if necessary.	P	P
	● Demonstrate understanding of knowing one's limitations	P	P
5.6.5	Obligations of Current Health and Safety Legislation		
	● Demonstrate knowledge and understanding of current health and safety legislation obligations.	P	P
	● Demonstrate a positive attitude towards health and safety	P	P
	● Demonstrate ability to develop working practices that promote safety and secure the compliance of subordinates.	P	P
	● Demonstrate knowledge and understanding of the importance of method statements and risk assessments	P	P
5.6.6	Management / Supervision skills		
	● Demonstrate ability to advise and present recommendations to others.	K	P
	● Identify resources required for an inspection	E	P

6. Summary of SBG Bridge Inspector Certification Scheme (BICS) Requirements

6.1 The SBG BICS requires each Inspector (I or SI, depending on their required status) to undertake the Structures Bridge Inspector Training package (produced as part of the SCOTS Asset Management Project) which consists of the following;

6.1.1 Introduction to Inspection of Structures (Powerpoint presentation).

6.1.2 Identifying Structure Types and Components (Structures Elements Powerpoint presentation)

6.1.3 Explanation of the Severity and Extent ratings (Powerpoint presentation)

6.1.4 Photographic Assessment – Test (at least 60% in agreement with the Assessor)

6.2 Subject to successful completion of the above and the Photographic Assessment Test the candidate shall be assessed against the requirements of the Core Competences set out in Section 5. This will take the form of a one to one interview between the assessor and the candidate.

6.3 The assessor will determine whether the candidate has satisfied the competences and the level at which the assessor considers the Inspector should be certified to (Inspector or Senior Inspector).

6.4 Continued Consolidation / Broadening of Experience.

6.4.1 Continuing Professional Development (CPD). In order to demonstrate that the Inspector / Senior Inspector is keeping up-to-date with and maintaining their level of competence they are required to maintain a record of their CPD (minimum 35 hours per year).

6.4.2 A review of the CPD of the Inspector / Senior Inspector should be carried out every 5 years to ensure that the candidate is continuing to keep up with the changing nature of the industry. This shall take the form of the submission of the Inspector / Senior Inspector's CPD and a short interview from the original assessor (or similarly qualified person).

6.4.3 Subject to the successful completion of the above the date and outcome of this review shall be recorded in the candidates file with appropriate comments.

SCOTS BRIDGES GROUP

BRIDGE INSPECTOR CERTIFICATE

This is to certify that ……..…

has been assessed in accordance with the requirements set out in the STRUCTURES INSPECTORS COMPETENCIES AND CERTIFICATION SCHEME, version dated 10th October 2018, and has been considered to be at a level consistent with an Inspector* / Senior Inspector* (delete as appropriate).

Signed	…….
Name	…….
Position held	…….
Engineering Qualifications	…….
Date	…….

ADEPT

Association of Directors of
Environment, Economy, Planning & Transport

Hampshire County Council

SOUTH EAST AREA BRIDGES GROUP

BRIDGE INSPECTOR CERTIFICATION SCHEME

Document Name	**SEABG Bridge Inspector Certification Scheme**
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Introduction

Local authorities have a responsibility as bridge owners to maintain their structures stock in a safe for use and fit for purpose condition. A major part of this is a robust inspection programme carried out by competent staff whether these be in house local authority employees or external suppliers.

It is essential that inspection providers can demonstrate the competency of their staff and it is generally agreed that this shall be by some form of formal assessment. There are several bridge inspector competency schemes in development and this one has been produced by Hampshire County Council, with assistance from other authorities, with a view to it being rolled out across the South East Area Bridges Group as a standard method for demonstrating inspector competence.

This scheme has been written with Hampshire County Council working methods in mind and whilst it is expected that this will form the basis of a competency assessment standard for other authorities in the region it is accepted that individual authorities may wish to make minor changes to suit their own methods or structure stock.

This scheme has been developed to be in accordance with the following national guidance:

- CS 450 - Inspection of Highway structures. Updated from BD 63/17
- Well Managed Highway Infrastructure – A Code of Practice (Oct 2016)
- Inspection Manual for Highway Structures: Vol 1 and 2 (May 2007)
- CSS Guidance note on Bridge Condition Indicators.

Competency Assessment Method

1) Training material has been produced in the form of PowerPoint slides. It will be mandatory for all inexperienced staff to undertake the in-house training and optional for experienced staff.

2) A written assessment will be undertaken. This assessment has been developed to demonstrate a level of understanding based on the core competencies within CS 450 – Inspection of Highway Structures

3) The written assessment shall be marked by 2 experienced competent Engineers from an internal review panel. Each authority shall assign it's own review Panel. Inspectors shall be marked against the grade they are applying for (Inspector or Senior Inspector). Pass mark shall be 80%. Model answers have purposely been omitted as it's very possible that a candidate gives a perfectly reasonable answer that has not been modelled. It is possible for an inspector to miss a particular section as regards to defect i.e. Concrete defects but they will then not be permitted to inspect structures of this construction.

4) 3 Inspection reports from the last 12 months shall be reviewed by members of the review panel. Individual authorities can decide if these are to be submitted by an individual or selected at random by the panel.

   Senior Inspectors shall be asked to submit 5 inspection reports, of which at least 3 shall be Principal inspections.

5) A face-to-face review between the candidate and the 2 review panel members shall then take place. There will be a series of photographs showing defects from SEABG structures and candidates will be asked to answer questions on each scenario including providing a severity and extent score, a priority for the work and proposed repair method. This is to be done face to face so that the candidate can ask questions regarding the scenario if they wish. Severity and extent scores shall be predetermined by a SEABG panel as will a scoring matrix and pass mark.

   The face-to-face review also gives the reviewers the opportunity to explore any areas of weakness identified from the written assessment or inspection reports, and an opportunity to ask questions and seek evidence for scoring section C7. In particular it will give the opportunity to probe further for Senior Inspectors in order for them to show proficiency.

6) The reviewers will, based on the scoring from all 3 sections, make a recommendation to the Chief Bridges Engineer (or equivalent within each authority).

7) If the recommendation is pass, then the Chief Bridge Engineer signs off the candidate as competent at the appropriate level. If the candidate is unsuccessful then only the failed sections of the written assessment, or resubmission of the inspection reports need to take place. It is not deemed appropriate for a candidate to retake sections where they have already demonstrated competence.

8) A full reassessment of competency shall take place within 3 years but the review panel shall undertake random, on site checks, of inspections not more than every 2 years. This shall take the form of viewing a structure that an inspector has been to within the last month and checking comments and scores.

Training Material

Training material has been produced to cover each of the sections within the written assessment and links can be found below

1) Introduction to Inspections

   TRAINING UNDER REVIEW

2) Structure Types and elements /Structural behaviour
   TRAINING UNDER REVIEW

3) The Inspection Process

   TRAINING UNDER REVIEW

4) Defect Descriptions and Causes
   TRAINING UNDER REVIEW

Written Assessment

The written assessment will be used to demonstrate an understanding of all the levels of competency within CS 450. The description below is taken from CS 450:

Competency is assessed in terms of awareness (A), knowledge (K), experience (E) and proficiency (P) against seven headline competencies and their associated sub-competencies.

Table B.1 Level of competency

Achievement rating		Description	
A	Awareness	General understanding of the competence, including an appreciation of its relevance.	These apply to theory only
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.	These apply to practical application, as well as theory
P	Proficiency	Knowledge, understanding and experience of undertaking the competence and competent to advise others.	

Questions for the written assessment have been derived to show level of competency for the seven headline competencies and the associated sub competencies. The exception to this is the headline competency of B1.6: Investigation and Testing. It is not deemed appropriate to assess this in a written assessment as the inspector will be able to refer this to senior staff or consultants.

Reference	Question	Inspector Competency Level	Senior Inspector Competency Level
	INTRODUCTION TO INSPECTIONS		
C1.1	PURPOSE OF INSPECTIONS		
C1.3	INSPECTION TYPES		
C1.4	CODES OF PRACTICE AND GUIDANCE		
	STRUCTURE TYPES – 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		
	INSPECTION PROCESS		
C3.1	SCHEDULING INSPECTIONS		
C3.2	PLANNING AND PREPARING FOR AN INSPECTION		
C3.3	PERFORMING INSPECTIONS		
C3.4	RECORDING INSPECTION FINDINGS		
C3.5	INTERPRETING INSPECTION FINDINGS		
C3.6	MAINTENANCE PLANNING PROCESS		
C3.7	HEALTH AND SAFETY		

	DEFECTS DESCRIPTIONS AND CAUSES		
C4.1	UNDERSTANDING PRINCIPAL DEFECTS		
C4.2	CONCRETE DEFECTS		
C4.3	STEEL DEFECTS		
C4.4	MASONRY DEFECTS		
C4.5	MISCELLANEOUS MATERIALS		
C5	**INVESTIGATION AND TESTING**		
C6	**REPAIR TECHNIQUES**		
C6.1	REPAIR TECHNIQUES FOR CONCRETE		
C6.2	REPAIR TECHNIQUES FOR STEEL		
C6.3	REPAIR TECHNIQUES FOR MASONRY		
	GENERAL APPTITUDE – TO BE SCORED BY PANEL BASED ON PREVIOUS WORK. ANSWERS TO QUESTIONS AND SUBMITTED INSPECTION FORMS		
C7.1	PRACTICAL APPTITUDE		
C7.2	WORKING WITH PEOPLE		
C7.3	COMMUNICATION SKILLS		
C7.4	PERSONAL SKILLS		
C7.5	HEALTH AND SAFETY		
C7.6	MANAGEMENT AND SUPERVISION		

VISUAL ASSESSMENT (SEVERITY AND EXTENT CONSISTENCY)

Each candidate will attend a review with 2 members of the review panel. During this review a series of photographs will be shown and the candidates will answer questions based on these. They will be asked to answer the following

- Give a description of the defect
- What element should this be scored under
- What severity score would you give this defect
- What extent score would you give this defect
- What works priority would you give this defect.
- What remedial works would you suggest

Severities and extents of the photos shall be agreed beforehand by the South East area working group and candidates will be scored on a sliding scale as to where they are in relation to the standard score. This is designed to provide consistency across the area.

This review will also be used to probe the suitability of an Inspector to be classed as a Senior Inspector if appropriate

See Separate question and model answer sheet. The model answer sheet gives scoring guidance.

REVIEW OF 3 (or 5) INSPECTION REPORTS

Bridge Name and Number	Inspection Type	Structural Form	Reviewed by	Outcome