

Framework Contract: PPRO 04/045/004

Research Project: UG637

# Review of Bridge Inspection Competence and Training

*Project Report: Final*

Report Prepared on behalf of:



Report Prepared by:

The logo for Atkins, consisting of the word "ATKINS" in a bold, blue, sans-serif font.

ATKINS

Asset Management Group  
Euston Tower  
286 Euston Road  
London, NW1 3AT

Tel: 020 7121 2435  
Fax: 020 7121 2301  
e-mail: [Garry.Sterritt@atkinsglobal.com](mailto:Garry.Sterritt@atkinsglobal.com)  
web: [www.atkinsglobal.com](http://www.atkinsglobal.com)

Version	Purpose Description	Originated	Checked	Authorised	Date
0	Internal discussion	Margot Mear			31/10/08
1	First Draft	Garry Sterritt	Margot Mear		07/11/08
2	Second Draft	Garry Sterritt	Megha Garia		04/12/08
3	Third Draft	Garry Sterritt	Megha Garia		26/01/08
4	Draft Final Report	Garry Sterritt	Megha Garia		29/01/09
Final	Final Report	Vicky Vassou	Megha Garia	Garry Sterritt	14/04/09
REF: BIC Project Report_final.doc			The Atkins logo, consisting of the word "ATKINS" in a bold, blue, sans-serif font.		

---

## Executive Summary

Bridges and other structures provide vital links and routes of passage on a wide range of infrastructure networks, e.g. road, rail and water. As such, they must be managed in a manner that minimises risk to public safety and disruption to service. The fundamental frontline activity at the disposal of bridge owners to ensure their assets are safe for use and fit for purpose is inspection.

At present, there are no formal training courses for bridge inspectors in the UK. The UK Bridges Board, through the DfT, commissioned this work to review current UK and International bridge inspection practices and to establish if there is a need and/or desire on the part of bridge owners/consultants/contractors, to introduce formal inspector training.

A literature review, questionnaire survey and in-depth interviews were conducted to compile data on current inspection practices and to gauge organisations' opinions on the need for formal inspector training. This indicates there is strong support from UK bridge owners for the development and implementation of a nationally consistent inspector training scheme. The consensus view of the industry is that the perceived benefits of inspector training significantly outweighed any concerns regarding its introduction.

A comparison of UK and international bridge inspection practices has been undertaken to confirm whether or not the UK has appropriate regimes in place, i.e. there would be limited value in developing nationally recognised inspector training if the underlying inspection regime was deficient. Through this comparison, it was evident that there are no major disagreements. As such, there are no areas of the current inspection regime (i.e. type and timing of inspections) that need to be addressed before training is introduced.

A review of international practices on inspector training demonstrated that many developed countries have already, or currently are, implementing formal training and certification for bridge inspectors.

Through appropriate professional bodies, more and more trades and professions are developing formal certification/registration schemes. There is no evidence to suggest that a scheme could not be developed for bridge inspection. Several options were considered as possible routes for developing an accredited qualification and/or certification programme for bridge inspectors and it was concluded that the most appropriate routes for developing a bridge inspector certification scheme is through either Construction Skills (the Sector Skills Council for the Construction and Civil Engineering Sector) or the Institution of Highways and Transportation.

The findings of this work strongly indicate that the UK Bridges Board should commission a second stage of work to develop a certification scheme for bridge inspectors.

---

## Contents

<i>Section</i>	<i>Page</i>
<b>1. Introduction</b>	<b>1</b>
1.1. General	1
1.2. Background	1
1.3. Objectives of Commission	2
1.4. Contents of Report	3
<b>2. Need for Formal Inspector Training</b>	<b>4</b>
2.1. General	4
2.2. Delivery of Organisational Duties	4
2.3. Quality Assurance	11
2.4. Career Recognition	11
2.5. Other Considerations	11
2.6. Conclusion	12
<b>3. Inspection Regimes</b>	<b>13</b>
3.1. General	13
3.2. Highway Structures in the UK	13
3.3. Structures Supporting Heavy Rail in the UK	15
3.4. Structures Supporting Light Rail in the UK	17
3.5. Structures owned by British Waterways	18
3.6. Highway Bridges outside the UK	19
3.7. Railway Bridges outside the UK	24
3.8. Other Structural Assets	25
3.9. Summary and Conclusion	25
<b>4. Inspector Training and Competence Requirements</b>	<b>27</b>
4.1. General	27
4.2. Highway Structures in the UK	27
4.3. Structures Supporting Heavy Rail in the UK	27
4.4. Structures Supporting Light Rail in the UK	29
4.5. Structures owned by British Waterways	29
4.6. Highway Bridges outside the UK	30
4.7. Other Assets	47
4.8. Conclusions	47
<b>5. Questionnaire Survey</b>	<b>48</b>
5.1. Overview	48

---

5.2.	UK Bridge Owners and Managers	48
5.3.	Responses from Overseas Bridge Owners	69
5.4.	Conclusions	76
<b>6.</b>	<b>In-depth Interviews</b>	<b>78</b>
6.1.	General	78
6.2.	Current Inspection Training and Competence Requirements	79
6.3.	Practical Training and Competence Arrangements	83
6.4.	Perceived Benefits of Accredited Inspector Training	84
6.5.	Concerns Regarding the Introduction of Formal Training	85
6.6.	Conclusions	87
<b>7.</b>	<b>Existing Training Courses for Bridge Inspectors</b>	<b>88</b>
7.1.	General	88
7.2.	Sheffield Hallam University	88
7.3.	Thomas Telford	89
7.4.	Symmons Madge	90
7.5.	Aston University	91
7.6.	Associated Training Courses	91
7.7.	Conclusions	91
<b>8.</b>	<b>Other Training Courses and Registration Schemes</b>	<b>93</b>
8.1.	General	93
8.2.	Highway Inspection	93
8.3.	Tree Inspection	95
8.4.	Registration Schemes	96
8.5.	Conclusions	99
<b>9.</b>	<b>Options for Formal Bridge Inspector Training Scheme</b>	<b>100</b>
9.1.	General	100
9.2.	Possible Routes for Developing an Accredited Qualification or Certification Programme	101
9.3.	The National Vocational Qualifications (NVQ) System	104
9.4.	Developing Accreditation Schemes	105
9.5.	Conclusions	107
<b>10.</b>	<b>Discussion</b>	<b>108</b>
10.1.	General	108
10.2.	Levels of Inspection Competence	108
10.3.	Inspection Modules	108
10.4.	Competence Requirements	109
10.5.	Training Material	110

---

10.6.	A Physically Demanding Job	110
10.7.	Visual Inspections	110
10.8.	Number of Inspectors	110
10.9.	Conclusions	111
<b>11.</b>	<b>Conclusions</b>	<b>112</b>
11.1.	General	112
11.2.	Need for Formal Training	112
11.3.	Inspection Regimes	112
11.4.	Inspector Training and Competence	112
11.5.	Questionnaire Survey	112
11.6.	In-depth Interviews	113
11.7.	Feasibility of a Certification Scheme	113
11.8.	Accreditation vs. Certification	113
11.9.	Viability of Providing Training	114

## Appendices

APPENDIX A: Department of Main Roads, Queensland, Australia: Inspector Accreditation Forms

APPENDIX B: Nuclear Inspection: Training and Development Record

APPENDIX C: Questionnaire

APPENDIX D: Review of Registration Schemes

APPENDIX E: Possible Routes for Developing an Accredited Qualification and/or a Recognised  
Certification Programme

APPENDIX F: Inspectors Certification Options 2 & 3

APPENDIX G: Proposed Content for Inspector Training Courses

APPENDIX H: Proposed Competence Requirements

APPENDIX I: Draft Competence Requirements Previously Developed by Transport for London

APPENDIX J: Project Specification: Phase 2

---

## List of Tables

Table 1: Content of Report	3
Table 2: Principal Standards for Civil Engineering Maintenance Activities	15
Table 3: Examination Intervals for Structures	16
Table 4: British Waterway Inspection Types	19
Table 5: Inspection Regimes on Railways Bridges outside the UK	24
Table 6: Summary of Inspection Regimes	25
Table 7: Network Rail Competence Standards Relevant to Examinations	27
Table 8: Extract from Network Rail Competence Standard	28
Table 9: Extract from the Department of Main Roads Bridge Inspection Manual	32
Table 10: DMRQ Bridge Inspectors Workshop (Level 1)	37
Table 11: DMRQ Bridge Inspectors Workshop (Level 2)	38
Table 12: VicRoads Bridge Inspection 'Accreditation' Course	40
Table 13: VicRoads Technical Training Course Details	41
Table 14: Summary of International Survey Findings – Mandatory Training	70
Table 15: Summary of International Survey Findings – Training	73
Table 16: Summary of International Survey Findings – No Training	75
Table 17: Organisations interviewed	78
Table 18: Selected Registration Schemes	96
Table 19: Possible Inspection Competence Levels	108
Table 20: Possible Core training Modules	109
Table 21: Estimate of the Number of UK bridge Inspectors	111

---

## Glossary

The following terminology has been adopted for this project:

<b>Accreditation</b>	Accreditation is a quality assurance process through which a regulator(s) evaluate an institution/organisation and the qualification awarded by the institution/organisation to ensure that they conform to the relevant regulatory criteria.
<b>Awarding Body</b>	An organisation recognised by a regulator(s) for the purpose of awarding accredited qualifications and/or certification.
<b>Certification</b>	A formal recognition/confirmation that an individual has proficiency within, and a comprehension of, a specified body of knowledge. This confirmation is often provided by some form of external review or assessment. <b>Note:</b> Accreditation may be obtained but is not required for a certification scheme/programme.
<b>Competence</b>	Ability to undertake an activity to the required standard without instruction or guidance from others (a competent person will know their limitations). This is a combination of practical and thinking skills, experience, knowledge and fitness.
<b>Education</b>	Formal academic learning and recognised associated qualifications, e.g. GCSEs and A-levels.
<b>Examine or Inspect</b>	To make an appraisal of the condition of an element/component based on a visual investigation.
<b>Experience</b>	Exposure to and direct personal participation in an activity
<b>Interpret</b>	To explain and assign meaning to (i) observations made during an inspection/test; and (ii) data and information recorded in the inspection/testing report
<b>National Occupational Standards</b>	Are statements of performance that describe what competent people in a particular occupation are expected to be able to do. They cover all the main aspects of an occupation, including current best practice, the ability to adapt to future requirements and the knowledge and understanding that underpin competent performance.
<b>National Vocational Qualifications</b>	Are work-based qualifications that assess the skills and knowledge people have and/or need to perform their job/role effectively.
<b>Qualification</b>	An award made by an awarding body to demonstrate a learner's level of achievement or competence.
<b>Record</b>	To document (in hard or electronic format) the evidence compiled during an inspection or test.

---

<b>Regulator for Qualifications</b>	Statutory organisations that are required to establish national standards for qualifications and ensure consistent compliance with them. The regulators for England, Wales, Northern Ireland and Scotland are respectively: Office of the Qualifications and Examinations Regulator (Ofqual), the Department for Children, Education, Lifelong Learning and Skills (DCELLS), the Council for the Curriculum, Examinations and Assessment (CCEA) and the Scottish Qualifications Authority (SQA).
<b>Report</b>	A formal written account (in hard or electronic format) of the results of an inspection or test.
<b>Test</b>	To investigate and/or analyse specific parameters (normally movement, or physical or chemical characteristics) of a material, element, component or structure.
<b>Training</b>	Formal, but not necessarily accredited, vocational learning that provides the skills and knowledge required to undertake an activity.
<b>Vocational Qualification</b>	An award made by an awarding body as a result of pursuing competence-based training at an approved centre in keeping with occupational standards of competence, assessment and certification.



## 1. Introduction

### 1.1. General

This report has been prepared for the UK Bridges Board by Atkins under the Department for Transport (DfT) Framework Contract PPRO 04/045/004 as part of Research Project UG637 (*Review of Bridge Inspection Competence and Training*).

### 1.2. Background

Bridges and other structures provide vital links and routes of passage on a wide range of infrastructure networks, e.g. road, rail and water. As such, they must be managed in a manner that minimises risk to public safety and disruption to service. Where organisations have failed in this duty, the result has been network disruption and, in some instances, injuries and fatalities to the travelling public.



Surrey CC

The fundamental frontline activity at the disposal of bridge owners to ensure their assets are safe for use and fit for purpose is inspection. Inspections assist organisations to check that bridges<sup>1</sup> are safe for use and fit for purpose and provide the data required to support effective maintenance management and planning. It is therefore critical that inspections provide organisations with information they can have full confidence in.

By in large, bridge inspection practices in the UK have been highly successful and helped ensure safe and serviceable networks, this being in no small measure due to the skill and experience of inspection staff. However, the changing face of infrastructure management, in particular outsourcing work on medium to long-term contracts and ever increasing pressures on finances, is placing greater onus on inspection activities. In particular, how can bridge owners have confidence in the competence of internal and external inspection staff and the information they provide.

At present, there are no formal training courses for bridge inspectors in the UK. The need for formal training has been widely discussed at various forums, including the CSS Bridges Group, UK Bridges Board and Bridge Owners Forum. All these forums have discussed the need for formalised inspector training, not only to address issues such as those mentioned above, but also to help raise the profile of inspections at a time when many organisations are seeing dwindling numbers of inspection staff.

The UK Bridges Board, through the DfT, commissioned this work to review current UK and International bridge inspection practices and to establish if there is a genuine need and desire, on the part of bridge owners, to introduce formal inspector training. If this is the

<sup>1</sup> Bridges – in the context of this report the term ‘bridges’ is taken to implicitly cover bridges, retaining walls, tunnels, sign/signal gantries, culverts etc.

case, then the DfT/UK Bridges Board will consider future phases of work to look at the development of this training.

### **1.3. Objectives of Commission**

The objectives of this commission are:

- To review and compare UK bridge inspection standards and practices, and bridge inspector competence and training requirements, together with relevant information from outside the UK;
- To determine whether there is a need or desire, on the part of bridge owners, to commission the production of a single national accredited qualification (or series of linked qualifications) or recognised certification aimed at providing competent bridge inspectors;
- To present initial options for providing formal inspector competence and training (i.e. form and content of training); and
- To make recommendations for future work on this topic.

## 1.4. Contents of Report

The content of this report is summarised in Table 1.

**Table 1: Content of Report**

Section	Content
2. Need for Formal Inspector Training	Provides a general discussion on the issues that are considered to be the key drivers for introducing formal inspector training.
3. Inspection Regimes	Provides a summary of current inspection regimes both (i) in the UK and (ii) for a sample of countries outside the UK.
4. Inspector Training and Competence Requirements	Provides a summary of current inspection training and competence requirements both (i) in the UK and (ii) for a sample of countries outside the UK.
5. Questionnaire Survey	Presents the findings from the Inspector Training survey (again covered organisations from the UK and overseas).
6. In-depth Interviews	Presents findings from in-depth interviews held with a sample of UK organisations. The interviews were used to discuss their current training practices in detail and to gauge their opinions on the need for inspector training and its format.
7. Existing Training Courses for Bridge Inspectors	Provides an overview of inspection training courses currently provided in the UK that cater for, to a greater or lesser degree, inspectors.
8. Other Training Courses and Registration Schemes	Provides an overview of some other training schemes, e.g. on highways, and provides a summary of existing registration schemes that are used to provide competence assurance for various trades and professions.
9. Options for Formal Bridge Inspector Training Scheme	Provides potential options for developing an accredited training or recognised certification scheme for bridge inspectors.
10. Discussion	Presents discussion on some issues that are pertinent to follow on work.
11. Conclusions	Presents key conclusions from the work.

---

## 2. Need for Formal Inspector Training

### 2.1. General

The need for formal inspector training, as perceived at the outset of this project, is discussed under the following headings:

- *Delivery of Organisational Duties* – ensuring inspection staff have the competence to deliver an organisation's duties to the required standard (see Section 2.2).
- *Quality Assurance* – providing bridge owners/managers with the confidence and assurance that inspections are being performed to the required standard (see Section 2.3).
- *Career Recognition* – ensuring that the role of inspection staff is duly recognised and paths for career progression are available (see Section 2.4).

Section 2.5 discusses some additional considerations that support the case for formal inspector training, for example, climate change, ageing infrastructure and making efficient use of resources.

### 2.2. Delivery of Organisational Duties

The primary purpose of any training is to provide individuals with the competence (skills, knowledge and experience) to perform their job/role to the required standard. The purpose of inspections, as described in *Management of Highway Structures: A Code of Practice (2005)*, are:

- To check that structures are *Safe for Use* and *Fit for Purpose* (see Section 2.2.1); and
- To provide the data required to support effective maintenance management and planning (see Section 2.2.2).

In delivering the above, there is an underlying requirement to provide data that is of sufficient quality, this is discussed in Section 2.2.3.

#### 2.2.1. Safe for Use and Fit for Purpose

Safe for use and fit for purpose encapsulate the core duties of infrastructure owners, namely to safeguard those who use or work on the assets and to ensure the assets are able to, and can continue to, provide their required function. The role of inspections is to provide the information that enables the asset owner to determine, given the current state/condition, if these requirements are being delivered. Fundamental to this is the ability of the inspection process, in particular the inspector, to provide the required information.

If these duties are not delivered appropriately, not only does it expose the public, and those working on or around the structures, to risk, it also exposes the organisation to potential liability claims (a practice that is becoming increasingly common and expensive for transport infrastructure organisations). That is, if any person is injured in some way due to a defect on a structure then two key questions likely to be raised in a court of law are (i) does your inspection regime comply with good practice; and (ii) have competent staff undertaken the inspections. Most organisations could readily demonstrate compliance with the former;

however, because there is currently no formal training for bridge inspectors, the latter would prove more problematic and may leave the organisation liable to claims. It is envisaged that formal training would minimise liability claims because (i) of increased likelihood of identifying potential hazards/safety issues; and (ii) when incidents occur, the organisation could demonstrate their practices comply with good practice.

When the inspection process does not perform its required function, there is the potential for unsafe structures and even structure collapses (see the case studies presented below). These types of event highlight the importance of inspections and the need for inspectors to have the necessary competence to perform their role.

#### Case Study 1: London Underground - Hammersmith

The pictures below show bridge D84 on the London Underground system. D84 is located close to Hammersmith Underground Station. It is a half-through longitudinally timbered railway bridge; this is an inherently problematical design but was used through necessity in order to maximise highway headroom and reduce deck construction depth at a point where the railway climbs from an underground configuration to an overground configuration. The construction form of cross girders incorporating steel deck plates just below the top flanges and the track timbers makes inspection difficult.



For reasons unknown to LUL and contrary to LUL standards, the bridge was inspected by an inspector (from the LU supply chain) who had insufficient experience in this form of structure. The inspector visually inspected the top of the flanges of the cross girder and had not inspected the underside of the top flanges. A few weeks later an experienced inspector, walking back from a night shift, noticed that a cross girder top flange had broken away from the rest of the cross girder and had been laid at the side of the track. The inspector immediately telephoned the *London Underground Bridges and Structures Engineer* who inspected the bridge. Every cross girder on the bridge was perforated just below top flange level. The line was immediately closed to rail traffic, the highway below was closed and the bridge propped as an interim measure. In due course, the bridge was replaced.



### Case Study 2: I-35W highway bridge, Minneapolis, Minnesota, US

I-35W bridge in Minneapolis was a 581m-long eight-lane highway bridge (steel truss arch) crossing the Mississippi River. The bridge experienced a catastrophic failure in the 305m-long main span of the deck truss on 1 August 2007. 111 vehicles were on the portion of the bridge that collapsed: there were 13 fatalities and 145 injuries



The following two paragraphs are extracted from the official report published by the US National Transportation Safety Board.

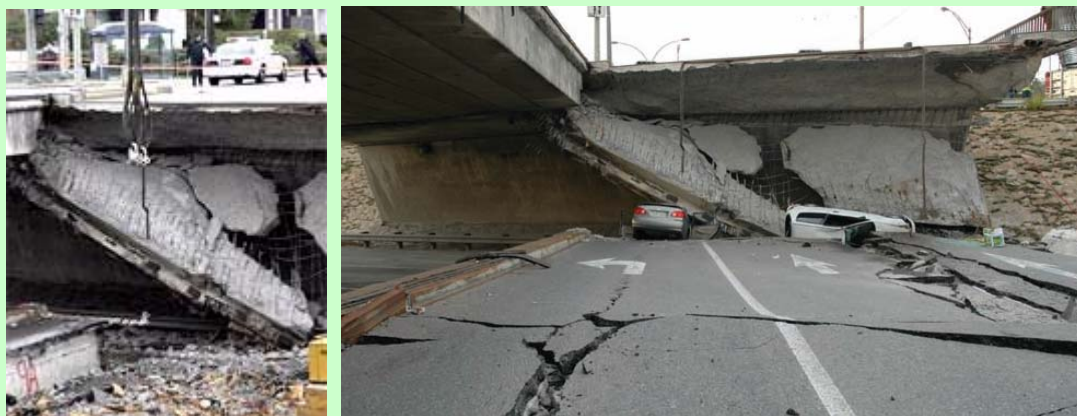
*The National Transportation Safety Board determines that the probable cause of the collapse of the I-35W bridge in Minneapolis, Minnesota, was the inadequate load capacity, due to a design error by Sverdrup & Parcel and Associates, Inc., of the gusset plates at the U10 nodes, which failed under a combination of (1) substantial increases in the weight of the bridge, which resulted from previous bridge modifications, and (2) the traffic and concentrated construction loads on the bridge on the day of the collapse. Contributing to the design error was the failure of Sverdrup & Parcel's quality control procedures to ensure that the appropriate main truss gusset plate calculations were performed for the I-35W bridge. Contributing to the accident was the generally accepted practice among Federal and State transportation officials of giving inadequate attention to gusset plates during inspections for conditions of distortion, such as bowing, and of excluding gusset plates in load rating analyses.*

*The lack of specific references to gusset plates in the Bridge Inspector's Reference Manual and in National Highway Institute bridge inspector training courses could cause State bridge inspectors during routine or fracture-critical bridge inspections to fail to give appropriate attention to distortions, such as bowing, in gusset plates.*

The key conclusion drawn was that the collapse was primarily design driven; however, the official report indicated that more tailored/appropriate training for bridge inspectors may have identified the issue. This illustrates the importance of ensuring that inspector training and inspection manuals are tailored to the nature of the structure stock, focusing on the issues that inspectors should appreciate.

### Case Study 3: De la Concorde overpass collapse, Laval (near Montreal), Canada

The De la Concorde overpass is a 40m span reinforced concrete cast insitu bridge built in 1970. The bridge suffered catastrophic collapse on 30 September 2006. There were five fatalities and six injuries.



A commission was set up to investigate the collapse, headed by former Quebec Premier Pierre Marc Johnson and supported by a panel of engineers. The commission report ([http://www.cevc.gouv.qc.ca/UserFiles/File/Rapport/report\\_eng.pdf](http://www.cevc.gouv.qc.ca/UserFiles/File/Rapport/report_eng.pdf)) highlights serious errors of engineering judgement throughout the structure's 36-year life, with investigations showing that it collapsed due to a shear failure of the south-east cantilever after 36 years of its 70-year design life.

The main causes of the collapse were considered to be (i) design, i.e. poor reinforcement detailing and concrete specification, although it complied with the standards of the time; (ii) during construction reinforcement was incorrectly placed; (iii) poor subsequent repair work that did not address the original deficiencies and in fact exacerbated the problem.

Although the commission placed the majority of the blame on the design, construction and repair, the report also 'deplores the incomplete inspection conducted by engineer Christian Mercier in 2004', clearly indicating the commission believes that appropriate inspection practices and competent staff could have provided sufficient pre-warning of this collapse. The commission report goes on to say:

*'...the inspections performed on the overpass were sometimes inadequate for the lack of reporting sufficient quantification of the damages, sometimes incomplete due to the short amount of time spent to perform the inspection work, or characterised by a lack of rigorously, as expressed by the absence of any attempts to identify the causes of the deterioration observed.'*

The commission provided four key recommendations, with one being directly relevant to inspection activities:

*'...the inspection and evaluation manuals dealing with the critical load carrying capacity of structures be updated, paying special attention to the recommended timing of interventions, to inspection surveys of cracking and their interpretation, to structural condition assessment...'*

This highlights the need for inspector training and inspection manuals to provide the appropriate skills and knowledge to inspection staff.

The above bridge failures in the US and Canada were primarily caused by poor design and/or construction. However, the official reports raised questions about the adequacy of the inspection staff and/or inspector training, and whether or not inspection performed its required function in ensuring the assets were safe for use.

High profile bridge collapses have been rare, in recent years, in the UK. This could be taken to mean that the inspection process, without formal training, is performing the required function. However, given the issues discussed in the following sections (e.g. data quality, resource pressures, ageing infrastructure and climate change) it is reasonable to assume that the role of the inspector will become ever more challenging and demanding.

### 2.2.2. Maintenance management and planning

With the advent of Asset Management and the increased use of computerised Decision Support Tools, inspections play an ever-increasing role in the justification of budgets, development of workbanks, planning of works and the drive for efficiencies. Recent guidance and standards highlight the importance of inspection to the overall management process, for example:

- *Management of Highway Structures: A Code of Practice* (2005) – emphasises the importance of inspections in ensuring safe structures and robust maintenance planning.
- *Inspection Manual for Highway Structures* (2007) – sets out a wide range of issues that inspection staff need to be aware of and encourages a formal approach to inspector training.
- *CSS/TAG Guidance Document for Highway Infrastructure Asset Valuation* (2005) – sets out the approach and information required for evaluating highway assets, where inspection information are key to informing depreciation.
- *Masonry arch bridges: condition appraisal and remedial treatment* (2006) – provides guidance on investigation, monitoring and interpreting inspection and investigation results; emphasising their importance to good maintenance and management.
- *Iron and steel bridges: condition appraisal and remedial treatment* (2008) - provides guidance on investigation, monitoring and interpreting inspection and investigation results; emphasising their importance to good maintenance and management.
- *Drystone retaining walls and their modifications: condition appraisal and remedial treatment* (publication expected in 2009) - provides guidance on investigation, monitoring and interpreting inspection and investigation results; emphasising their importance to good maintenance and management.
- *CSS Bridge Condition Indicator* (2002 and 2004) – provides a standardised inspection procedure and pro forma for highway structures that are now recognised as common practice by the majority of highway bridge owners.
- *LUL Standards* (I-051, G-051, I-053, G-053, I-057, G-057) – these standards and guidance documents set out good practice for bridge structures, station structures and other miscellaneous assets; all the documents emphasise the importance of inspections within the overall management process.
- *Network Rail Practices* – inspection information is used to produce Network Rail's Structures Condition Marking Index (SCMI), this is used to inform management practices and trend condition over time; inspection information also informs the



Structures Asset Management Process (STAMP) which is used to inform maintenance planning.

Given the increasing dependence on inspection data, it is vital that every effort is made to ensure inspection staff have the necessary competence to deliver it to the required standard. Better inspection information will also enable more effective targeting of follow-up activities, be it further inspection/investigation or maintenance works, for example, preventing unnecessary follow-up investigation work or adopting appropriate follow-up investigation work.

### 2.2.3. Data Quality

The previous two sub-sections highlight the vital role of inspections in the management of structures. In delivering these duties, it is important that good quality data are provided, in terms of its accuracy and consistency. The current subjective nature of structure inspections means it is difficult to define absolute standards for data quality; instead, the quality of the data is dependent upon those providing it, i.e. the inspectors. Recent studies by the CSS Bridges Group have highlighted the inconsistency in inspection reporting across a sample of inspectors.

#### Case Study: CSS South East Area Bridge Conference Inspection Trials

The introduction of the CSS inspection guidance in 2002, for the first time gave local highway authorities a consistent method of scoring and recording bridge condition. To assess the consistency of application, seven SE authorities partook in a bridge inspection trial in August 2005; the trial was repeated in August 2008 with seventeen authorities.

The trial involved each bridge inspector independently inspecting seven pre-selected bridges, following the approach they normally adopt when undertaking a CSS style inspection. The inspectors included professional engineers and artisans<sup>2</sup>, with experience ranging from a few months to many years. In the majority of cases, training had been on the job with no formal classroom training for inspectors.

The inspection reports were collated and analysed. The findings were fed back to the inspectors during specially organised days (one following each of the 2005 and 2008 trial). It should be noted that both trials gave similar results, indicating limited progress had been made against some of the findings during the intervening years. The key findings were:

- Bridge Classification – inspectors had little difficulty in correctly classifying common and relatively non-complex arrangements (e.g. reinforced concrete slab decks), however there was considerable inaccuracy when more complex arrangements were encountered, e.g. metal bridge decks with longitudinal primary members and transverse secondary members gave particular problems. This was considered to reflect (i) a lack of understanding of bridge types; and/or (ii) incorrect usage of the classification system.
- Material Type – in general, material types were accurately reported, with the understandable exception of distinguishing between steel and wrought iron.
- Multiple-span and Extended Structures – some reported as one structure (using one inspection pro-forma for the whole structure), while others broke them down into distinct spans/construction forms.

<sup>2</sup> artisan – meaning skilled workmen or craftsmen

- Element Identification – the number of elements identified and inspected was inconsistent, which in turn led to a wide variation in the Bridge Condition Indicator Score. The number of Very High Importance elements inspected was more consistent in the 2008 trial.
- Defect and Condition Type – the defect type was incorrectly identified in a small number of cases; more pronounced was the variation in Extent and Severity reporting. Combined with the above element identification issue, this gave a variation of 20% between the high and low BCI Average score. The BCI Critical score had a greater range with a variation of up to 50%. The scoring for the bridges in Good condition and particularly Poor condition tended to be more consistent.
- Dominant Defect – the concept of a ‘Dominant Defect’ was not well understood by a number of inspectors. Critical Elements were marked down because of a minor cosmetic defect therefore making the BCI scores for the bridge artificially low. For example, lichen growth over the complete soffit of the deck was scored above the more important localised impact damage causing structural damage.
- Interacting Defects – limited consideration was given to interacting defects.

The main conclusion drawn from the trials was that, in order to improve accuracy and consistency in inspection, there is a need for formal training of bridge inspectors, with the associated certification and/or accredited qualification if appropriate. It was considered that training should cover, at least at a basic level, areas such as structural mechanics, bridge construction, material and element types, how to inspect a bridge and how to record inspection data.

Similar findings have been identified from other studies, including:

- *Other UK consistency studies* – following the publication of the CSS Bridge Condition Indicator Guidance in 2002, a number of CSS area bridge groups (e.g. Yorkshire and Humberside) have undertaken an exercise similar to that described in the case study above. Findings from these studies were broadly similar to those above, i.e. identifying inconsistencies in element identification and condition (severity/extent) reporting.
- *Uncertainty Between Inspection Reporting and Material Quantities and Properties* (Lea and Middleton, 2004) – this research work included an analysis of a sample of UK highway bridge inspection reports and highlighted how the condition rating (severity/extent) of an element changed between inspections (improving and degrading) even if no physical changes to the elements were recorded. The recommendations from this work included introduction of formal training/on-going CPD for inspection staff, eye tests and physiological tests.
- *Reliability of visual inspection for highway bridges* (Moore et al 2001) – the work documents a trial in the US where 49 bridge inspections (representing 25 states and a range of experience and qualifications) were asked to carry out General Inspections on a sample of seven bridges. The trial identified inconsistencies in inspection information and attributed these to a number of key criteria including insufficient training (and the potential need to revise the Condition Rating system), eyesight (including colour deficiency), accessibility and location (e.g. working at height, working near traffic etc.).

A core objective of formal inspector training would be to improve, in general, the quality (accuracy and consistency) of inspection data.

---

## 2.3. Quality Assurance

Organisations are reliant on inspection staff, whether they be internal or external, to deliver their role to the required standard. However, the nature of the job can raise doubt in the bridge owners/managers mind regarding inspection activities, for example:

- *Inspection Contracts* – are there appropriate checks and balances in place to ensure an external contractor is using the appropriate staff on an inspection contract? Especially when the pricing structure of some contracts favour a minimalist approach on behalf of the contractor.
- *Inspection Staff* – are there recognised inspector qualifications a bridge owner can refer to when employing inspection staff? How do they know the individual has the competence to undertake inspections to the required standard?
- *Value for Money* – the annual inspection programme can constitute a significant proportion of the structures budget, it is therefore important that bridge owners/managers have a degree of assurance that they are getting value for money in terms of the staff used and the quality of the deliverable.

It is important that the above are not taken out of context. When queried many bridge owners believe they are receiving good quality deliverables from inspection contractors. However, the introduction of formal training would make it significantly easier for many bridge owners to hire staff and let contracts to external organisations.

## 2.4. Career Recognition

At present, there are limited formal qualifications for inspection staff in the way of professional certification, accredited qualification, etc. This has resulted, in some instances, in:

- Poor recognition of the important role of inspection staff;
- Difficult career progression for inspection staff; and
- Challenges relating to staff retention and recruitment.

With regard to the last point, it is widely recognised that the number of bridge inspectors in the UK is decreasing, with a number of organisations saying they will be facing shortages of inspection staff in the coming years. It is considered that formal inspector training would help raise the profile of inspections, encouraging more people to take it up as part of a formal technical profession with defined routes for career progression.

## 2.5. Other Considerations

The above discussion sets out some of the key drivers for accredited inspector training. However, these also need to be considered in the context of:

- *Financial Pressures* – organisations are under continuous pressure to identify efficiencies and provide best value for money. It is therefore important to safeguard the role of inspections (and inspection staff) by suitably establishing the skills and qualifications required for the role.

- *Climate change* – the impacts of climate change (e.g. increased flooding and greater temperature ranges) have already resulted in more rapid deterioration of some structures and this is likely to become more pronounced in the future. It is therefore essential to have competent inspection staff that are able to appreciate these issues and their potential impacts on safety and service.
- *Ageing infrastructure and Extending Life* – the bridge infrastructure is ageing while the demands placed on transport networks are continually increasing making any restrictions/closures highly undesirable (and in many circumstances unacceptable). In many instances this requires structures to be kept in service much longer than originally anticipated, therefore good quality information on changing condition/performance is vital. It is therefore essential that inspection staff are able to provide the quality of information that enables the asset base to be managed accordingly.
- *Inspection Manual* – while the publication of the Inspection Manual for Highway Structures (2007) is a significant step in the right direction, it is likely that many UK bridge owners will not develop formal/informal inspector training schemes due to resource constraints and the day-to-day pressures of bridge management. Better Value for Money can be provided by developing a standardised (common) approach to formal inspector training.
- *Sample Checking of Inspection Quality* – if the quality of inspections is to be checked within, or across, organisations, then it is necessary for those undertaking any sample checking to have the same training/understanding as those who did the inspections. Sample checking may be undertaken by internal or external staff, whereby the latter may become necessary if inspection data informs short to medium-term funding allocations between competing organisations.
- *New Information* – as highlighted by I-35W (see Section 2.2.1), situations can arise that identify shortcomings in the current inspector training regime. This is not just related to high profile events; it is required to keep inspectors up-to-date with new materials, new forms of deterioration/attack, and new inspection/testing techniques. This could be encapsulated within on-going (refresher) training requirements.

## 2.6. Conclusion

There is sound evidence and arguments that support the need for formal inspector training in the UK. This is widely supported by bridge managers, engineers and inspectors, with the proviso that practical, flexible and beneficial training arrangements can be developed.

---

## 3. Inspection Regimes

### 3.1. General

Recent high profile bridge collapses have raised questions about the appropriateness of inspection regimes (type and timing of inspections) and inspector training. This section presents a summary of current UK, and a sample of international, bridge inspection regimes with a view to determining:

- How UK inspection regimes compare with other countries; and
- How inspection regimes compare across sectors, e.g. road, rail and water.

The relevance of this review to formal inspector training is to confirm that the UK has appropriate inspection regimes in place. That is, there would be limited value in developing nationally recognised inspector training if the underlying inspection regime was deficient.

The review focused on regular/cyclic inspections, namely those that organisations undertake annually/biannually and at longer intervals (typical between 4 and 12 years). This section outlines the current inspection regimes for the following:

- highway structures in the UK (Section 3.2)
- structures supporting heavy rail in the UK (Section 3.3)
- structures supporting light rail in the UK (Section 3.4)
- structures crossing waterways (Section 3.5)
- highway bridges outside the UK (Section 3.6)
- rail bridges outside the UK (Section 3.7)
- other structural assets (Section 3.8)

The information presented in this section is based on the current documentation (e.g. standards and guidance) that describes the inspection regimes in these different sectors. It is important to bear in mind that inspections regimes may change, particularly in light of any major failures/incidents and/or new studies. As such, the following should only be taken as being representative of practices at the time of publication of this report.

### 3.2. Highway Structures in the UK

The inspection regimes followed by highway organisations (e.g. Local Authorities and Trunk Road Agencies) are described in:

- Inspection Manual for Highway Structures (2007)
- BD63: Inspection of Highway Structures (2007)
- Management of Highway Structures: A Code of Practice (2005)

- CSS Bridge Condition Indicators Volume 2: Guidance Note on Bridge Inspection Reporting (2002) and Addendum to CSS Bridge Condition Indicator Volume 2 (2004).

The above documentation describe two type of regular inspections, General Inspection and Principal Inspection, these are described in the following sections (drawing on the descriptions and definitions provided in the above documentation).

### 3.2.1. General Inspection

All highway structures should be subject to a regular General Inspection not more than two years following the previous General or Principal Inspection.

A General Inspection comprises a visual inspection of all parts of the structure that can be inspected without the need for special access equipment or traffic management arrangements. This includes adjacent earthworks and waterways where relevant to the behaviour or stability of the structure.

Typically, an inspection pro forma (either generic or structure specific) that lists the structure elements is used to record the severity, extent and type of defects.

### 3.2.2. Principal Inspection

All highway structures should be subject to a regular Principal Inspection not more than six years following the previous Principal Inspection (however the codes/standards permit this period to be reduced/extended if justified by a risk assessment).

Principal Inspections comprise a close examination, within touching distance, of all accessible parts of a structure, including, where relevant, underwater parts and adjacent earthworks and waterways, utilising suitable access and/or traffic management works as necessary. Closed circuit television may be used for areas of difficult or dangerous access, e.g. obscured parts of a structure, confined spaces and underwater inspections.

A Principal Inspection may include a modest programme of tests, e.g. hammer tapping to detect loose concrete cover or half-cell and chloride measurements to enable risk of reinforcement corrosion to be assessed, when considered necessary.

A Principal Inspection should be of sufficient scope and quality to determine:

1. The condition of all parts of the structure.
2. The extent of any significant change or deterioration since the last Principal Inspection.
3. Any information relevant to the stability of the structure.

A Principal Inspection should establish:

1. The scope and urgency of any remedial or other actions required before the next inspection.
2. The need for a Special Inspection and/or additional investigations.
3. The accuracy of the main information on the structure held in the inventory.

For simple structures that have easy access to all elements, there is frequently little difference between the information provided by a General and Principal Inspection.

### 3.3. Structures Supporting Heavy Rail in the UK

Structures supporting heavy rail in the UK are largely owned by Network Rail. The following discusses their inspection regime.

#### 3.3.1. Inspection Regime

There are a number of standards relating to the maintenance of Network Rail's civil assets. The following table lists those that are more relevant to the inspection of civil structures.

**Table 2: Principal Standards for Civil Engineering Maintenance Activities**

Doc Number	Title	Overview
NR/SP/CIV/017	Examination of Bridges and Culverts	Provides the requirements for the examination of Structures, recording and reporting the examination findings, and provision of information for Regulatory reporting.
NR/SP/CIV/083	Examination of Retaining Walls	Provides the requirements for the examination of retaining walls, such that there is no risk to safety as a result of their condition and for recording and reporting the examination findings, and provision of information for Regulatory reporting.
NR/SP/CIV/085	Examination of Tunnels	Provides the requirements for the examination of tunnels, such that there is no risk to safety as a result of their condition and for recording and reporting the examination findings, and provision of information for Regulatory reporting.
NR/SP/CIV/090	Examination of Coastal, Estuarine and River Defences	Provides the requirements for the examination of coastal, estuarine and river defences, such that there is no risk to safety as a result of their condition and for recording and reporting the examination findings.
NR/SP/CIV/092	Examination of Ancillary Structures	Provides the requirements for the examination of ancillary structures, such that there is no risk to safety as a result of their condition and for recording and reporting the examination findings.
NR/GN/CIV/041	Structures Condition Marking Index Handbook for Bridges	Provides advice on the application of a quantitative condition marking system for bridges and viaducts to be applied when undertaking detailed examinations.
NR/L3/CIV/305	Application of the Structures Condition Marking Index to Masonry Bridges	Defines the processes to improve consistency of condition ratings given to masonry bridges

The purpose of inspections (or examinations as they are referred to in the Network Rail documentation) has been defined (in NR/SP/CIV/017) as follows:

- To establish and record the condition of the structure;
- To identify defects and record any significant change in the condition, loading or environment that may indicate or cause deterioration;



- To provide sufficient information for the safe management of the structure and for any management action necessary to maintain the safety and serviceability of the structure;
- To provide information for regulatory reporting, where applicable.

The level of detail and format of the information provided, in accordance with the above purpose, depends on the type of examination. There are two main types of examinations for structures supporting heavy rail in the UK:

1. Visual Examinations – to identify defects which may have developed or worsened since the last examination; and
2. Detailed Examinations – to identify primary information needed for the safe management of structures.

The nominal intervals for examinations (excluding any examination requirements following works) are listed in Table 3.

**Table 3: Examination Intervals for Structures**

Structures Group	Examination Interval	
	Detailed	Visual
Tunnels (excluding shafts and earthworks associated with tunnel portals)	12 months	12 months
Tunnels (excluding earthworks associated with tunnel portals) where the track is closed, disused or removed and routine observation does not take place.	-	6 months
Cut and cover structures required by the Structures Manager to be examined as Tunnels	12 months	-
Shafts	6 years	12 months
Parts of bridges, retaining walls and coastal, estuarine and river defences (except Culverts) which are under water in a watercourse, and where the depth of water prevents a visual examination	3 years	12 months
Bridges, Culverts (excluding those whose primary method of support is by arching action) and structures supporting buildings over operational lines	6 years	12 months
Retaining Walls (other than minor retaining walls)	6 years	12 months
Coastal, Estuarine & River Defences (except parts of defences which are underwater in a watercourse and where the depth prevents a visual examination)	12 months	12 months
Ancillary structures (e.g. signal gantries and water retaining structures)	6 years	12 months
Outside party buildings and station structures spanning the railway	-	12 months
Boundary or freestanding walls	6 years	12 months
Various supporting structures identified within standard RT/CE/S/092 such as advertising hoardings, cable bridges, CCTV supports, customer information screen supports, lighting support structures, straight signal posts etc.	-	12 months

**Note:** The maximum permitted increase to normal intervals for detailed examinations is contained in the relevant standards listed in Table 2.



The specific requirements for Detailed and Visual Examinations are defined as follows:

- *Visual Examination* – this is undertaken from a safe observation location with the aim of detecting and recording any significant visible changes or evidence of impending changes in the condition of a structure since the last examination. This information is used to determine any factors that may pose a risk to safety or service and identify any work that needs to be undertaken before the next examination.
- *Detailed Examination* – all parts of the structure are examined (except hidden, obscured or buried parts) in sufficient detail to examine, determine and record:
  - the condition of all parts of the structure;
  - the usage of the structure;
  - the extent of any significant deterioration since the last examination; and
  - any other facts relevant to the safety of the structure.

The examination should be sufficient to enable recommendations of work (including its urgency), need for any additional examinations, and consideration of changes to the examination interval.

There is considerable similarity between the inspection/examination regime on the UK Heavy Rail Network and the UK Highway network, with the rail Visual Examinations being equivalent to highway General Inspections and rail Detailed Examinations being equivalent to highway Principal Inspections.

### **3.4. Structures Supporting Light Rail in the UK**

A range of organisations including London Underground, Docklands Light Rail and various local tram networks, e.g. Metrolink, own structures supporting light rail in the UK. London Underground is the largest light rail organisation in the UK and as such was used for this exercise (the majority of the smaller organisations follow either the highway, Network Rail or LUL standards).

There are two main inspection types, which are described in London Underground's standard Civil Engineering – Bridge Structures, Reference Number 1-051, Version A1 (2007). The relevant text is replicated in Sections 3.4.1 and 3.4.2.

Further guidance on inspections can be found in London Underground's Civil Engineering – Bridge Structures, Manual of Good Practice, Reference Number G1-051, Version A2 (2008).

#### **3.4.1. General Inspection**

A General Inspection should be carried out not more than one year following the previous General or Principal Inspection.

General Inspections should be carried out to obtain and record a visual check on those parts of the asset that are readily accessible without the aid of access equipment. General Inspections should bring to notice deterioration in condition or visible development of defects.

General Inspections should be of sufficient quality to detect and report any visual changes since the last inspection or evidence of circumstances which may impact on the condition of the asset before the next scheduled inspection.

The General Inspection report should:

- confirm that the inspection has been completed
- list any significant defects which have occurred or worsened, or changes which have occurred since the last inspection
- identify whether there is a need for further investigations or other action

A standard list of inspection elements is defined for the different asset types.

### 3.4.2. Principal Inspection

Earth retaining structures and pipes with a diameter less than 600mm that cross under tracks should be subject to a regular Principal Inspection not more than eight years following the previous Principal Inspection. Other civils assets should be subject to a regular Principal Inspection not more than four years following the previous Principal Inspection.

A Principal Inspection comprises a close inspection of all inspectable parts of the asset carried out within touching distance giving detailed visual information on condition necessary for the management of the assets. Principal Inspections should bring to notice deterioration in condition or visible development of defects and appraise their effect on the asset.

The Principal Inspection report should:

- confirm that all inspectable parts of the asset have been examined
- record the extent and severity of any defects found
- identify the extent and severity of any changes in condition, use or environment since the last inspection
- draw attention to any observed factors which may affect the safety of the asset
- identify where further investigation is needed
- for assets supporting transient loading, identify whether the asset was observed under such loads and if any unsatisfactory performance was observed
- make recommendations for maintenance or strengthening and renewal works

### 3.5. Structures owned by British Waterways

A significant proportion of the structures crossing navigable waterways in the UK are owned by British Waterways (BW). The BW inspection regime is described in the *BW Direction: Asset Inspection procedures (AIP 2008)*. Statutory, Safety and Special Inspection are additional to those defined in the AIP, but are co-ordinated with AIP inspection to ensure a comprehensive and efficient inspection process. The AIP sets out four types of inspection, these are summarised in Table 4.

**Table 4: British Waterway Inspection Types**

Inspection Name	Inspection Frequency	Description
Reservoir Surveillance Inspection	Weekly (or sometimes twice weekly) for Reservoirs under the Reservoirs Act	A competent individual undertakes a visual examination of the dam structure and outlet arrangements. A hand written report is produced; if the inspector identifies anything they consider serious then the supervising Water Engineer is contacted immediately.
Length Inspection	Monthly or three monthly	Consists of walking the 'track', noting and reporting on a mobile device any change in the condition of specific assets, towing paths and bank protection, or to the network or waterway corridor itself as a result of wear and tear, accidental damage, natural occurrences, vandalism, etc. Documentary evidence of these inspections and follow-up actions are vital in the event of complaints, enquiries, investigations or claims.
Annual Inspection	Annually	<p>Detailed observation of the asset and its constituent parts (using pre-defined prompt-lists) to record readily identifiable defects. They seek to provide assurance that no significant deterioration is taking place between Principal Inspections and that the waterway as a whole is in a satisfactory working condition for customers.</p> <p>The Annual Inspection (AI), which is more detailed than a Length Inspection (LI), is undertaken by a certified AI inspector. It is undertaken with the LI inspector dedicated to that length. A boat is in attendance to allow access to all offside locations and to allow a full functional check to be carried out on all operable assets. The asset condition is recorded on an A (Very Good) to E (Bad) scale.</p>
Principal Inspection	3 to 20 years based on risk (low risk cuttings are 50 years); Maximum of 10 year cycle for public road bridges.	<p>A visual and tactile inspection of all accessible parts of the asset. It consists of a qualitative assessment of the whole asset and of each of its elements, providing a detailed record of the condition (at element and structure level). Dimensional checks are carried out as required. The asset condition is recorded on an A (Very Good) to E (Bad) scale.</p> <p>Those undertaking Principal Inspections should be Chartered, or a Graduate or Technician assessed as competent to undertake them.</p>

In addition to the above, AIP2008 defines specific inspection regimes for Lock Gates and Mechanical and Electrical Assets.

### 3.6. Highway Bridges outside the UK

In general, many of the European countries have a similar inspection regime to that in the UK. There are usually two distinct types of inspection: (i) a visual-only inspection typically

carried out on an annual to three yearly basis; and (ii) a more detailed inspection with testing which is typically carried out every five to ten years.

The following sections provide an overview of inspection regimes for a selection of countries outside the UK. The information presented in this section is based on:

- Information received, in the form of completed questionnaires and supplementary information, from bridge owners outside the UK;
- *Bridge Evaluation Quality Assurance in Europe* (2008) - a recent survey undertaken by the US Federal Highway Administration;
- *Bridge Management in Europe*, BRIME, March 2004;
- *Methods used in the European States to inspect and assess the condition of highway structures*, COST 345: Working Groups 2 and 3, 2001.
- Literature and internet search to collate information on bridge inspection practices.

As in the UK, the responsibility for highway structures is split between different organisations, e.g. trunk and local road. Much of the following is based on trunk road inspection regime because information on these was more readily attainable. However, like in the UK, it is reasonable to assume there is a high degree of similarity between trunk and local road inspection regimes.

### **3.6.1. Australia**

Australia's inspection regime includes Routine, Comprehensive and Detailed Inspections. This regime is adopted nationally in Australia with slight differences between different States and Territories.

#### **3.6.1.1. Routine Maintenance Inspections (Level 1)**

Routine maintenance inspections are carried out in conjunction with routine pavement maintenance to check the general serviceability of the structure for road users. The inspections are normally carried out on a six monthly basis.

#### **3.6.1.2. Comprehensive Visual Inspections (Level 2)**

Comprehensive visual inspections carried out by an experienced bridge inspector on an annual or two yearly basis, or even longer, depending on the risk rating of the bridge. The inspections involve detecting significant defects in structural members above ground level and rating the condition of each component.

#### **3.6.1.3. Detailed Inspections (Level 3)**

Detailed engineering inspections are undertaken when issues requiring further investigation are identified during comprehensive visual inspections, and are carried out by qualified engineers.

### **3.6.2. Denmark**

Denmark's bridge inspection regime, as defined by the Danish Roads Directorate, includes Routine, Principal and Special Inspections.

---

### **3.6.2.1. Routine Maintenance Inspection**

A routine maintenance inspection is a visual inspection and is performed at least annually. This type of inspection is performed when damage is estimated to be less than £10,000. Repairs are handled as routine maintenance.

### **3.6.2.2. Principal Inspection**

A principal inspection is mainly a visual inspection and is conducted every few months to every six years, depending on condition and the inspector's knowledge of the bridge. On an average, these inspections occur every five-and-a-half years. Notes on condition, a description of damage found, and cost estimates are recorded. This type of inspection is performed when damage is estimated to be more than £10,000. As a result of a principal inspection, a special inspection may be ordered.

### **3.6.2.3. Special Inspection**

A special inspection is a detailed inspection conducted to study a structure's condition in more detail. Physical testing may be carried out as part of the inspection, including sampling of concrete and core drilling. Special inspection reports typically provide two to four strategies to address structural needs.

## **3.6.3. Finland**

In Finland, three main kinds of inspections are carried out on bridges, as defined by Finnra (Finnish Roads Administration).

### **3.6.3.1. Annual Safety Inspection**

Annual inspections are carried out to ensure the safety of the bridge. Items of concern are immediately reported to the appropriate bridge engineer.

### **3.6.3.2. General Inspection**

General inspections are the primary inspections of the bridge. Typically, a general inspection is conducted every five years, with large bridges inspected every eight years, depending on the bridge condition.

### **3.6.3.3. Basic Inspection**

A basic inspection is a general inspection supplemented with a variety of tests. The test results are used to improve bridge age behaviour models for the use and quality control of the bridge management system. The basic inspection is used for the reference structure group and for large and long bridges. The inspection interval is typically five years. The inspectors are certified bridge inspectors with Bachelor or Master of Science degrees or higher examinations.

## **3.6.4. France**

In France, the inspection regime for structures on public roads includes the following cyclic inspections.

---

#### **3.6.4.1. Annual Inspection**

Annual inspections are cursory, visual inspections intended to identify new, significant defects in structures and to programme routine maintenance.

#### **3.6.4.2. Image de la Qualité des Ouvrages Evaluation Inspection**

Image de la Qualité des Ouvrages evaluation inspections, performed every three years, are more detailed visual inspections of structures. These inspections are used to classify the condition of bridges by Image de la Qualité des Ouvrages class. The classification is used to make decisions on capital investments to correct deficiencies identified by the inspector.

#### **3.6.4.3. Detailed Inspection**

Detailed inspections occur every three to nine years, but typically every six years, based on the inspector's recommendations. These are thorough visual inspections of bridges where all defects are noted. The detailed inspection is a brand-new inspection. It is often performed without reference to previous inspections, which establish a bridge condition baseline to be used for inspections performed until the next detailed inspection is done.

### **3.6.5. Germany**

Germany's bridge inspection regime is comprised of cyclic Major, Minor and Superficial Inspections.

#### **3.6.5.1. Superficial Inspection**

Superficial inspections are performed by maintenance personnel. This type of inspection requires no special knowledge of highway structures. The objectives are to detect major visible faults, visually check the functionality of components on a quarterly basis, and perform an annual inspection of all accessible parts.

#### **3.6.5.2. Minor Inspection**

Minor inspections, conducted every three years, are visual inspections and are carried out by engineers.

#### **3.6.5.3. Major Inspection**

Major inspections involve visual inspection and testing of all parts of a structure by engineers. Generally, they are conducted every six years. The first major inspection is performed before the structure is opened to traffic and the second major inspection is done before the end of the guarantee period.

### **3.6.6. Sweden**

In Sweden, two main kinds of inspection are performed for bridges.

#### **3.6.6.1. Major Inspection**

The purpose of a major inspection is to identify and estimate damage that could affect the function or safety of a structure within 10 years. Major inspections are also used to determine damage that may lead to increased costs if not repaired or maintained within 10

years. Major inspections are performed for all structural components, including those components underwater in daylight or equivalently lit conditions and from a distance of an arm's length. A major inspection is performed at least every six years. The inspector decides at the site when the next inspection should be performed. The condition of the bridge determines the frequency of inspections so that deteriorating bridges are inspected more frequently.

### **3.6.6.2. General Inspection**

The purpose of a general inspection is to follow up on damage identified during the last major inspection that has since been repaired. General inspections are also used to identify and estimate new damage that could lead to insufficient load capacity, traffic safety issues, or increased maintenance costs if not addressed until the next major inspection.

### **3.6.7. Norway**

Highway structures in Norway are owned by the Norwegian Public Roads Administration. The two forms of regular inspection are General Inspections and Major Inspections, these are defined as follows.

#### **3.6.7.1. General Inspection**

A visual check of the structure is undertaken annually, although this interval may be increased/decreased by the bridge manager. The inspection excludes any testing or the use of special equipment. The purpose of the inspection is to check for any defects/damage that may adversely affect safety, capacity, function, service, the environment or aesthetics. This information is used to identify any defects or damage that requires attention before the next inspection.

#### **3.6.7.2. Major Inspection**

A visual check of the structure every five years, although this interval may be increased/decreased by the bridge manager. The inspection includes testing, investigations and the use of special equipment as appropriate to determine condition. The purpose of the inspection is to check the bridge is safe and functional and to determine the need for maintenance work, and where this is the case to make recommendations and provide cost estimates.

### **3.6.8. United States**

The following inspection regime must be adhered to, under Federal Law, for all bridges over 6.1m (20 feet) long. Bridges of less than 6.1m (20 feet) in length are classified as 'short-spans' and are excluded from the National Bridge Inventory system and the inspection programme.

#### **3.6.8.1. Routine Inspection**

A Routine Inspection is undertaken every 24 months to determine the physical and functional condition of a bridge and to identify any changes since previous inspections. Routine Inspections are intended to ensure that a bridge continues to satisfy all applicable serviceability requirements. These inspections are generally conducted from deck level, ground or water levels, or from permanent-access structures.

Routine Inspections must satisfy all requirements of the National Bridge Inspection Standards (NBIS) with respect to frequency and inspector qualifications.

### 3.6.8.2. Detailed Inspection

An In-Depth Inspection is a close-up, hands-on inspection of one or more members to identify deficiencies not normally detected during Routine Inspections. These type of inspections are generally undertaken at longer intervals (typically between 24 to 60 months) than Routine Inspections and may include the use of more advanced NDE techniques.

## 3.7. Railway Bridges outside the UK

The following table presents an overview of inspection regimes on European railway bridges (this information was provided by Network Rail and was collated under the *Sustainable Bridges* project undertaken in 2003/04); UK Network Rail intervals have also been included for comparison purposes.

**Table 5: Inspection Regimes on Railways Bridges outside the UK**

Country	Inspection Interval (years)		
	Visual	Detailed	Are variable intervals permitted?
Austria	1	4	Y
Czech Republic	1	3	N
Denmark	0.5	6	Y
Ireland	n/a	2	Y
Finland	1	10/12	-
France	1	5	N
Germany	1	3/6	N
Hong Kong	2/3	3/6	N
Hungary	1	10	Y
Italy	1	6	Y
Poland	1	5	N
Portugal	1.25	5	N
Slovakia	1	2	N
Sweden	1	3/6	Y
Switzerland	1	6	Y
United Kingdom	1	6	Y

The above table illustrates that, in general, there is good agreement between the inspection regimes used by European railway organisations.



### 3.8. Other Structural Assets

The following presents an overview of the inspection regimes for other types of structural assets.

#### 3.8.1. Offshore Oil Platforms

The inspection and maintenance regime for offshore oil platforms is generally dependent on the operators and the asset itself. A risk-based approach is normally adopted to determine the type and frequency of inspections. However, operators must demonstrate that their chosen regime satisfies the Health and Safety Executive requirements.

#### 3.8.2. Nuclear Installations (structural aspects)

The inspection and maintenance regime for the structural aspects of nuclear installations is generally dependent on the owners and the asset itself. A risk-based approach is normally adopted to determine the type and frequency of inspections. However, operators must ensure that their chosen regime satisfies the Health and Safety Executive requirements.

#### 3.8.3. Reservoirs and Dams

The Reservoirs Act (1975) mandates that all reservoirs holding or capable of holding more than 25,000 m<sup>3</sup> of water be inspected every 10 years by a civil engineer from a special panel (Section 4.7.2 describes the panel set-up). However, the law does not specify the type of inspection that needs to be carried out. They also receive regular (annually or more frequently) visual inspections, but these can be undertaken by non-specialist staff.

Reservoirs holding less than 25,000 m<sup>3</sup> of water are inspected in accordance with the Health and Safety (Enforcing Authority) Regulations 1998. Thus, small reservoirs are usually inspected by the Health and Safety Executive.

### 3.9. Summary and Conclusion

The following table provides a summary of the inspection regimes documented above.

**Table 6: Summary of Inspection Regimes**

Country	Sector	Organisation	Inspection Interval (yrs)	
			General*	Principal*
UK	Highway	Trunk and Local Road Authorities	2	6
UK	Heavy Rail	Network Rail (bridges & culverts)	1	6
UK	Light Rail	London Underground	1	4
UK	Water	British Waterways (bridges)	1	10
Denmark	Highway	Danish Roads Directorate	1	6
Finland	Highway	Finnra	1	5 to 8
France	Highway	All those responsible for public roads	3	6
Germany	Highway	Road Administrations	3	6

Country	Sector	Organisation	Inspection Interval (yrs)	
			General*	Principal*
Norway	Highway	Norwegian Public Roads Administration	1	5
United States	Highway	All those responsible for public highways	2	2 to 5
Austria	Heavy Rail	OBB Austrian State Railways	1	4
Czech Republic	Heavy Rail	CD Czech Railways	1	3
Denmark	Heavy Rail	Banedanmark	0.5	6
Ireland	Heavy Rail	IE Irish Rail	n/a	2
Finland	Heavy Rail	RHK Finnish Railways	1	10/12
France	Heavy Rail	SNCF	1	5
Germany	Heavy Rail	DB HE	1	3/6
Hong Kong	Heavy Rail	HK Railway Corporation	2/3	3/6
Hungary	Heavy Rail	MAV Hungarian Railways	1	10
Italy	Heavy Rail	RFI SpA	1	6
Poland	Heavy Rail	PKP Polish Railway Lines	1	5
Portugal	Heavy Rail	REFER	1.25	5
Slovakia	Heavy Rail	Railways of the Slovak Republic	1	2
Sweden	Heavy Rail	Banverket	1	3/6
Switzerland	Heavy Rail	SBB-CFF-FFS	1	6
UK	Oil & Gas	Offshore Platforms	Risk based regime	
UK	Nuclear	Nuclear Installations	Risk based regime	
UK	Water	Dams and Reservoirs	1	10

\* or those deemed to be equivalent to General and Principal Inspections

The above indicates that UK bridge inspection practices are in close alignment with each other and with international practices. The general trends are:

- *General Inspection* – a visual inspection to check for any signs of significant deterioration/damage since the last inspection that poses a danger to safety, function, service, etc. These are undertaken every 1 to 3 years;
- *Principal Inspection* – a detailed close visual examination, supplemented by investigations and special equipment as appropriate, to determine the condition of the structure and inform maintenance planning. These are undertaken, on average, every 5 to 6 years.

As such, there do not appear to be any fundamental disagreements with, or deficiencies in, the existing UK inspection regimes that need to be addressed before formal inspector training is progressed.

## 4. Inspector Training and Competence Requirements

### 4.1. General

This section presents a summary of current inspector training practices and competence requirements. This summary is based on documented information that was available/provided at the time of this study.

It should be noted that the following descriptions focus on the more formalised ‘classroom’ training. However, in general, organisations require an appropriate mix of classroom training and site (vocational) experience before an individual can be certified or is deemed competent; in some instances training is only comprised of site experience.

### 4.2. Highway Structures in the UK

At present, there are no common set of competence requirements for inspections, although some organisations have (or are starting to) define these. The *Inspection Manual for Highway Structures* (2007) is being used by a number of organisations as the basis for these requirements.

### 4.3. Structures Supporting Heavy Rail in the UK

Network Rail have defined the competence requirements for those staff undertaking examinations, the relevant standards are shown in Table 7.

**Table 7: Network Rail Competence Standards Relevant to Examinations**

Document Number	Document Title	Document Synopsis
NR/SP/CTM/001	Competence Management	Defines the requirements for managing competence of employees involved in work that may affect the operational safety or performance of infrastructure.
NR/SP/CTM/017	Competence and Training in Civil Engineering	Sets out the minimum requirements for the training and assessment of people who undertake Civil Engineering work. In particular, it applies to the training and proof of competence of personnel managing and undertaking examinations of Structures, Earthworks and of a Bridge following a Bridge Strike.
NR/SP/CTM/021	Competence and Training in Track Safety	Sets out the minimum requirements for the training and assessment of people who undertake Track safety duties.

NR/SP/CTM/017 “Competence and Training in Civil Engineering” provides detailed guidance on what is required from inspectors in terms of experience, scope and knowledge. An extract from this standard is shown in the table below.

Table 8: Extract from Network Rail Competence Standard

<b>STE 4 Examine the Condition of Structures</b>	
<b>Element 4.1: Prepare for the examination activity</b>	
<p><b>Performance statements</b></p> <p>a. Examination requirements are determined accurately, prior to commencement of work.</p> <p>b. Work sites are accessed safely, within any agreed timescales and in accordance with site access procedures.</p> <p>c. Tools and equipment required are available, serviceable and fit for purpose.</p> <p>d. Technical instructions, drawings and company standards that are required for the work are accessible.</p> <p>e. Reports and recording documentation obtained are sufficient to carry out the examination and comply with company requirements.</p> <p>f. Sufficient information is obtained to confirm that the weather conditions are suitable, the site is ready for the examination and that a safe system of work has been established.</p> <p>g. Where documentation, equipment, materials or tools are not available the deficiency is dealt with in accordance with company procedures.</p> <p>h. Communication with colleagues, superiors and staff in other departments is clear, unambiguous and in accordance with relevant current instructions.</p>	<p><b>Knowledge statements</b></p> <p><i>You must have knowledge and understanding of:</i></p> <ol style="list-style-type: none"> <li>1. Where to locate and access information relating to the examination requirements;</li> <li>2. How to interpret any information used to identify work locations and safe access points;</li> <li>3. What the site access procedures are when accessing sites in each of the locations;</li> <li>4. What type of access equipment is required for each of the locations;</li> <li>5. How to confirm that access equipment is fit for use;</li> <li>6. What additional preparation is required when examinations are in darkness and where examinations are on Structures affected by tides;</li> <li>7. What type of examination tools and monitoring equipment are required and how to recognise that they are fit for purpose;</li> <li>8. What type of information and factors to check to confirm that the site is ready for examination;</li> <li>9. How the weather and seasonal conditions can effect the examination and the preparation required prior to examination;</li> <li>10. Which reports and documentation relating to the Structure must be obtained;</li> <li>11. How to confirm that a safe system of work is in effect and what action to take where it is not;</li> <li>12. What the procedures are for dealing with a lack of documentation, equipment, materials or tools.</li> </ol>
<p><b>Scope Statements</b></p> <ol style="list-style-type: none"> <li>1. Work locations are: <ul style="list-style-type: none"> <li>• Confined spaces</li> <li>• Over water</li> <li>• Public highways</li> <li>• At heights</li> <li>• On or near the line</li> <li>• Tenanted arches</li> </ul> </li> <li>2. Conditions are: <ul style="list-style-type: none"> <li>• Daylight</li> <li>• Darkness</li> <li>• Tidal</li> <li>• Seasonal weather</li> <li>• Artificial light</li> </ul> </li> <li>3. Traction is: <ul style="list-style-type: none"> <li>• Overhead line</li> <li>• Conductor rail</li> <li>• Non electrified</li> </ul> </li> <li>4. Tools and equipment is: <ul style="list-style-type: none"> <li>• Hand tools</li> <li>• Access equipment</li> <li>• Safety gear</li> <li>• Monitoring equipment</li> </ul> </li> </ol>	<p><b>Evidence Requirements</b></p> <p>Performance evidence must be provided from at least three separate occasions.</p> <p>The Candidate shall be directly observed in the workplace on at least one occasion.</p> <p>The performance evidence taken as a whole must prove that the Candidate can consistently meet Performance Statements a), b), c) e) and f) when varied by the Scope Statements:</p> <ul style="list-style-type: none"> <li>• Work locations: confined spaces, over water, public highways, at heights, on or near the line, tenanted arches</li> <li>• Conditions are: daylight, darkness</li> </ul> <p>Assessors should note that this element deals exclusively with the planning and preparation for work, and does not encroach upon the Candidate's ability to use any of the equipment mentioned.</p>

The standard does not set down the specifics of the training required; instead, the information provided (such as the table above) is intended to act as guidance for the supply chain when setting up their training regime. The supply chain then needs to provide evidence that demonstrates that their inspection staff satisfy the assessment criteria.

Other competencies for examiners include:

1. medical fitness and alcohol and drugs screening (defined within standard NR/SP/OHS/018 “Safety requirements for Track medical & alcohol & drugs screening & certification”),
2. those necessary to work on or near the track (defined within standard NR/SP/OHS/019 “Safety of People Working on or Near the Line”),
3. those required to operate any plant or equipment needed to undertake the works specified (e.g. CAT scan operator),
4. those required to undertake the work activity specified (e.g. scaffolding erection).

The inspection competence documentation produced by Network Rail is detailed and should be considered as a sound starting point for the development of any UK wide inspector competence requirements.

#### 4.4. Structures Supporting Light Rail in the UK

Guidance on competence and assurance requirements is provided in London Underground’s Civil Engineering – Common Requirements, Reference Number 1-050 and G-050 Version A1 (2007).

Through the Public Private Partnership (PPP) contracts, London Underground requires the Infracos to employ competent staff to undertake their activities, including inspections. For example, Metronet have developed a *Competency Assurance Management System* whereby individuals are assessed for different inspection asset categories such as: - Bridges and Structures Inspector, Deep Tube Tunnel Inspector, Earth Structures Inspector and Pumps and Drainage inspector. Each discipline is accredited to its own competency certificate and is linked to a safety critical license. The Competency assessments conform to Railways and Other Guided Transport Systems (Safety) Regulations (ROGS).

#### 4.5. Structures owned by British Waterways

The *British Waterways: Asset Inspection Procedure 2008* (AIP2008) does not define in detail the competence requirements for inspectors. Instead, the AIP places the responsibility of the BW Technical Director to define inspector competencies with respect to qualifications, experience, and skills. The AIP also sets out the following responsibilities with regard to inspector competence and training:

- BW Technical Director certifies inspectors for Principal Inspections with regard to experience, training, qualifications and ability;
- BW Head of Asset Management maintains a database of inspectors;
- BW Asset and Programme Manager assesses and certifies, with regard to their experience, qualifications, training and ability, inspectors for Length and Annual Inspections, and makes recommendations for inspectors for Principal Inspections.

BW runs an in-house certification scheme, whereby the certificate is signed off by the appropriate member of staff (as detailed above) and the inspector's relevant qualifications, training and experience are recorded on the certificate. Certificates have a five-year reassessment/renewal cycle.

#### 4.6. Highway Bridges outside the UK

The following information has been compiled from available information and information provided by the organisations. The recent surveys undertaken by the US Department of Transportation:

- *Bridge Inspection Practices: Synthesis Report 375* (National Cooperative Highway Research Programme, 2007)
- *Bridge Evaluation Quality Assurance in Europe* (Federal Highway Administration, 2008);

These reports provided valuable insight into European practices outside the UK and an overview of their findings have been presented in the appropriate sections below.

##### 4.6.1. Australia

The following Australian road authorities were contacted:

- Department of Main Roads, Queensland
- Main Roads, Western Australia
- Transport, Department of Infrastructure, Energy and Resources, Tasmania
- VicRoads, Victoria
- ARRB Group Ltd, Victoria

Each of the States and Territories of Australia operate independently with regard to providing formal training for bridge inspectors. The majority of the above organisations provided information, a summary of this is provided below.

##### 4.6.1.1. Department of Main Roads, Queensland

The policies and procedures of the Department of Main Roads, Queensland (DMRQ), pertaining to bridge inspection are encapsulated in the DMRQ Bridge Inspection Manual and the 'Inspector Accreditation Appraisal Procedure' is contained therein. The objectives of the 'Inspector Accreditation Appraisal Procedure' are:

1. To establish the minimum standard of knowledge an inspector should possess to ensure uniform and accurate assessment of the condition of bridges.
2. To provide a standard appraisal system for inspectors applying for;
  - Level 1 – Routine Maintenance Inspection Accreditation, and;
  - Level 2 – Bridge Condition Inspection Accreditation.



---

The inspector competence requirements contained in the DMRQ 'Inspector Accreditation Appraisal Procedure' are as follows.

Appraisal System – Level 1

Applicants for Level 1 – Routine Maintenance Inspection Accreditation must be able to demonstrate that they have attained the necessary knowledge and proficiency. Form 'A3 - Bridge Inspector Accreditation – Level 1' has been devised in order to ensure a uniform approach (See Appendix A).

The applicant is required to demonstrate:-

1. Extensive practical experience in road and bridge routine maintenance. They shall be competent to judge the visual condition of structures and the road approaches for visual defects.
2. Satisfactory completion of an approved briefing session on Level 1 Bridge Inspection procedures and be familiar with the Bridge Condition Ratings in the Bridge Inspection Manual

Appraisal System – Level 2

Applicants for 'Level 2 - Bridge Condition Inspection Accreditation' must be able to demonstrate that they have attained the necessary knowledge and proficiency. Forms 'A1 - Bridge Inspector Accreditation' and 'A2 - Bridge Inspection Accreditation/Report Assessment' have been devised in order to ensure a uniform approach (See Appendix A).

The applicant is required to demonstrate:-

1. Extensive experience in the inspection, construction, design or maintenance of bridges. Generally a minimum of 5 years experience in a position of responsibility will be required.
2. Satisfactory completion of the Level 2 Training Course for Bridge Inspectors.
3. Technical knowledge and competency with respect to bridge structures and construction materials. The applicant must have the ability to correctly identify and interpret the severity and nature of structural and material defects, assess their criticality and make the appropriate recommendations with respect to required action. Applicants should submit inspection reports covering a range of structure types which include a number of defective components. General accreditation is preferred, however accreditation in a specific bridge category, such as timber, concrete or steel is permissible. Inspectors shall specify which type of accreditation they are applying for with their initial submission.
4. Conversance with the bridge inspection methodology defined in the Main Roads Bridge Inspection Manual. This will be appraised by the evaluation of at least five bridge inspections carried out and submitted by the applicant to Bridge Asset Management. The Inspections must be completed and reports submitted for appraisal within four months of attendance at the Level 2 Training Course. This appraisal will generally include a field audit of the applicant's submission. Standard forms A1 and A2 shall be used by an assessor from Bridge Asset Management to conduct the appraisal and record the findings. It is recommended that an inspector initially submits a single inspection and awaits feedback from the review prior to making further submissions, as it has been found previously that inspectors tend to make the same mistakes throughout

their first series of inspections. Ensuring that all subsequent inspections are corrected accordingly will reduce both the time and cost involved in the accreditation process.

The minimum requirements of the DMRQ 'Inspector Accreditation Appraisal Procedure' are shown in the table below which was extracted from the DMRQ Bridge Inspection Manual.

**Table 9: Extract from the Department of Main Roads Bridge Inspection Manual**

Measure	Minimum Requirements
<p><b>1. Safety Plan</b></p>	<p>A comprehensive safety plan which correctly identifies hazards defined in the workplace health and safety legislation and the measures taken to mitigate these hazards must be compiled prior to each and every bridge inspection. Inspectors should ensure that hazards are added to the BIS.</p> <p><b>Rating Guidelines</b></p> <p>Safety is regarded as the responsibility of local management and as such shall not be considered in the course of an assessment.</p>
<p><b>2. Inventory</b></p>	<p><b>General</b></p> <p>The inspection inventories must be compiled in accordance with the bridge inspection methodology defined in the DMRQ Bridge Inspection Manual as itemised below. <b>Note:</b> The references quoted hereafter in this Table relate to the <i>DMRQ Bridge Inspection Manual</i>.</p> <p><b>Bridge Component Designation</b></p> <p>Components must be correctly designated by status (if widened), group, component and standard component in accordance with Section 1.3. Standard components must be compiled in accordance with Section 3.8.2 and Appendix C: Standard Component Identification Guidelines.</p> <p><b>Exposure Classification</b></p> <p>The appropriate exposure classification must be correctly interpreted from the Table in Section 3.8.7.</p> <p><b>Data Recording</b></p> <p>The inventory must be compiled on Forms 2/1 &amp; 2: Bridge Condition Inspection Report.</p> <p><b>Rating Guidelines</b></p> <ul style="list-style-type: none"> <li>◆ <i>Satisfactory</i>: &gt; 90% of items correctly identified.</li> <li>◆ <i>Improvement Required</i>: 80-90% of items correctly identified.</li> <li>◆ <i>Unsatisfactory</i>: &lt; 80% of items correctly identified.</li> </ul>
<p><b>3. Structure Rating</b></p>	<p>The condition of the overall structure and any associated widening <u>must be correctly assessed</u> in accordance with the guidelines given in Sections 3.8.3 and 3.8.6.</p> <p><b>Rating Guidelines</b></p> <ul style="list-style-type: none"> <li>◆ <i>Satisfactory</i>: Correct structure rating</li> <li>◆ <i>Improvement Required</i>: Not applicable</li> <li>◆ <i>Unsatisfactory</i>: Incorrect structure rating. In particular failure to correctly identify major deficiencies which significantly affect safety, load capacity or serviceability.</li> </ul>



Measure	Minimum Requirements
<p><b>4. Condition Rating</b></p>	<p><b>General</b></p> <p>The current condition of each component in the inspection inventory must be ascertained in accordance with Section 3.8.4 and Appendix D: Standard Component Condition State Guidelines. It is imperative that the proportion of the component in each condition state is correctly rated in order that the criticality of the defects can be accurately determined. In particular, deficient structural (load bearing) members must be correctly identified. Further guidelines to assist the identification of Condition State 4 defects are given in Section 3.8.5.</p> <p><b>Commentary</b></p> <p>The inspector must be able to demonstrate the ability to accurately and concisely record salient descriptions and measurements to supplement the numerical rating of defective members. Guidelines for such commentary are given in Section 3.8.5.</p> <p>In addition references to any photographs, sketches or testing (e.g. timber drilling) relating to a component must be recorded in the comments box and Form B2/6: Photographic and Sketches Record.</p> <p><b>Timber Drilling</b></p> <p>Timber drilling will normally be carried out as part of a Level 2 inspection of timber bridges in order that the current condition state of timber members may be determined. Details of the testing should be recorded on Form B2/5: Timber Drilling Survey Report and tests on individual members referenced in the comments field Form B2/1 &amp; 2: Bridge Condition Inspection Report. Inspectors must be able to interpret the correct condition state of a member from the drilling records.</p> <p><b>Rating Guidelines</b></p> <ul style="list-style-type: none"> <li>◆ <u>Satisfactory:</u> <ul style="list-style-type: none"> <li>○ &gt; 80% of components in state 1 or 2 correctly rated.</li> <li>○ &gt; 90% of components in state 3 correctly rated.</li> <li>○ 100% of components in state 4 correctly rated.</li> </ul> </li> <li>◆ <u>Improvement Required:</u> <ul style="list-style-type: none"> <li>○ &gt; 70% of components in state 1 or 2 correctly rated.</li> <li>○ &gt; 80% of components in state 3 correctly rated.</li> <li>○ 100% of components in state 4 correctly rated.</li> </ul> </li> <li>◆ <u>Unsatisfactory:</u> <ul style="list-style-type: none"> <li>○ &lt; 70% of components in state 1 or 2 correctly rated.</li> <li>○ &lt; 80% of components in state 3 correctly rated.</li> <li>○ &lt; 100% of components in state 4 correctly rated.</li> </ul> </li> </ul>
<p><b>5. Defective Components</b></p>	<p><b>General</b></p> <p>Defective components in condition states 3 and 4 must be correctly identified (in accordance with the guidelines given in Sections 3.8.4 and 3.8.5 and Appendix D: Standard Component Condition State Guidelines) and recorded on Form B2/3: Defective Components</p>

Measure	Minimum Requirements
	<p>Report. The inspector is required to assess the criticality of the defects and recommend the appropriate actions. Details of the defects must be described in the comments box and supplemented with photographs, sketches or test results as appropriate. This field should also record details of recommended actions other than monitoring or level 3 inspection. The inspector must be able to demonstrate the ability to consistently identify defective components and the appropriate remedial actions. In addition, he must have the ability to accurately communicate the extent, severity and criticality of member defects through photograph, sketch and written records.</p> <p><b>Rating Guidelines</b></p> <ul style="list-style-type: none"> <li>◆ <u>Satisfactory</u>: <ul style="list-style-type: none"> <li>(i) Clear and accurate recording of defects.</li> <li>(ii) Appropriate actions recommended.</li> <li>(iii) Criticality of defects accurately and clearly communicated.</li> </ul> </li> <li>◆ <u>Improvement Required</u>: Minor departures from (i) - (iii)</li> <li>◆ <u>Unsatisfactory</u>: <ul style="list-style-type: none"> <li>(i) Inability to record extent, severity or criticality of defects.</li> <li>(ii) Failure to define the appropriate actions.</li> </ul> </li> </ul>
<p><b>6. Procedure Exceptions</b></p>	<p><b>General</b></p> <p>It is expected that inspectors will carry out inspections fully in accordance with the methodology defined in the Bridge Inspection Manual. However, it is recognised that physical or operational restraints may restrict the extent of the inspection or perhaps components are detected that cannot be identified from the standard list of components. Inspectors must complete Form B2/4: Standard Procedure Exceptions Report if there is any departure from the standard methodology.</p> <p><b>Undefined Component</b></p> <p>The appropriate box should be ticked and a detailed description of the component together with sketches and/or photographs references must be entered in the comments fields.</p> <p><b>Partial Inspections</b></p> <p>The appropriate box should be ticked and the reasons why the inspection is incomplete must be recorded in the comments field.</p> <p><b>Rating Guidelines</b></p> <ul style="list-style-type: none"> <li>◆ <u>Satisfactory</u>: <ul style="list-style-type: none"> <li>(i) All exceptions must be recorded on Form B2/4.</li> <li>(ii) Reasons for partial inspections must be defined.</li> <li>(iii) Undefined components must be accurately described and supplemented with photographs and/or sketches as appropriate.</li> </ul> </li> <li>◆ <u>Improvements Required</u>: Minor departures from the satisfactory rating with respect to comments. All exceptions must be recorded.</li> </ul>

Measure	Minimum Requirements
	<ul style="list-style-type: none"> <li>◆ <u>Unsatisfactory</u>: Failure to record exceptions or incorrect exceptions recorded. Inadequate or incorrect description of exceptions.</li> </ul>
<p><b>7. Photographic and Sketch Record</b></p>	<p>An appropriate photographic and sketch record must be compiled for each inspection covering:-</p> <ul style="list-style-type: none"> <li>(i) Mandatory inventory photographs. (Deck surface, side view and underside).</li> <li>(ii) Deficient components and major defects.</li> <li>(iii) Undefined Components.</li> </ul> <p>All photographs and sketches must be given a reference and details of the subject matter recorded on form B2/6. These references should also be recorded against the relevant component and included in the following forms as appropriate:</p> <p>B2/1 &amp; 2: Bridge Condition Inspection Report            B2/5: Timber Drilling Survey Report            B2/3: Defective Components Report            B2/4: Standard Procedure Exceptions Report</p> <p>Rating Guidelines</p> <ul style="list-style-type: none"> <li>◆ <u>Satisfactory</u>: Appropriate photographic and sketch record has been compiled and cross-referenced on the appropriate forms.</li> <li>◆ <u>Improvement Required</u>: Minor departure from satisfactory rating.</li> <li>◆ <u>Unsatisfactory</u>: Failure to compile mandatory photographic record or to document records correctly.</li> </ul>
<p><b>8. Technical Competency</b></p>	<p>Technical competency is a fundamental requirement for accreditation at this level. Inspectors must have a minimum of five years experience in at least one aspect of bridge engineering to be considered for Level 2 accreditation and must have an extensive knowledge of bridge structures and construction materials.</p> <p>An applicant must be able to demonstrate an ability to identify structural and material defects, causal mechanisms, the criticality of the defect and the appropriate corrective action. Implicit in this is the ability to communicate this information to supervisors by means of commentary, sketches and photographs to ensure remedial works are prioritised accordingly.</p> <p>For example, with respect to concrete elements, the inspector must be able to distinguish the structural mechanisms causing cracks in members and quantify the severity and criticality of these defects. In addition, the inspector must record the date, crack widths and crack terminations in permanent ink on the structure.</p> <p>Rating Guidelines</p> <ul style="list-style-type: none"> <li>◆ <u>Satisfactory</u>: The inspector must demonstrate the ability to consistently:               <ul style="list-style-type: none"> <li>(i) Identify defect mechanisms.</li> <li>(ii) Quantify and record defects accurately.</li> </ul> </li> </ul>

Measure	Minimum Requirements
	<p>(iii) Determine the criticality of defects.</p> <p>(iv) Recommend the appropriate corrective action.</p> <ul style="list-style-type: none"> <li>◆ <u>Improvement Required</u>: Marginal departure from the satisfactory standard.</li> <li>◆ <u>Unsatisfactory</u>: Significant departure from the satisfactory standard or any incorrect finding or interpretation that places road users at risk.</li> </ul>
<p><b>9. Field Assessment</b></p>	<p>Field audit of items 1 – 8 above. At least one of the submitted inspections should be subject to a field review. An assessor may use existing Level 3 reports as the basis for review.</p>
<p><b>10. Overall Assessment</b></p>	<ul style="list-style-type: none"> <li>◆ <u>Satisfactory</u>: A satisfactory rating must be achieved for six of the eight categories and must include items (5). “Defective Components” and (8) “Technical Competency”. The remaining two categories must be rated as Improvement Required.</li> <li>◆ <u>Unsatisfactory</u>: An “unsatisfactory” rating on any category or an “improvements required” rating for (5) “Defective Components” or (8) “Technical Competency”.</li> </ul> <p><b>Award or Denial of Accreditation</b></p> <p>The result of the assessment should be documented on Form A1: “Bridge Inspector Accreditation Appraisal” and forwarded to the applicant and their direct supervisor.</p> <p>If the submission has been found to be satisfactory a memorandum or letter acknowledging the same shall be despatched with the form. The individual's details shall be added to the relevant inspector's register with Bridge Asset Management and updated accordingly on the BIS.</p> <p>In the event of an unsatisfactory rating this letter should include detailed feedback with respect to deficiencies detected in the submission and constructive advice as to how these deficiencies might be addressed.</p>

DMRQ provide ‘Level 1 - Routine Maintenance Inspections’ and ‘Level 2 - Comprehensive Visual Inspections’ training for bridge inspection only in Queensland (see Table 10 and Table 11).

**Table 10: DMRQ Bridge Inspectors Workshop (Level 1)**

<b>Course Title:</b>	Bridge Inspectors Workshop (Level 1)
<b>Duration:</b>	1.5 days
<b>Course Aim:</b>	To provide Level 1 bridge inspectors with sufficient knowledge and skills to enable them to complete Level 1 bridge inspections in accordance with DMRQ Bridge Inspection Manual requirements.
<b>Prerequisites:</b>	Literacy and numeracy skills will be expected to be at grade 8 standards. Experience in bridge construction or maintenance would be desirable.
<b>Target Group:</b>	Maintenance staff from DMRQ, RoadTek, Local Government and Private Contractors who will be required to carry out level 1 inspection of any bridge or large culvert.
<b>Content:</b>	<ol style="list-style-type: none"> <li>1. A broad overview of the DMRQ Bridge Inspection Manual.</li> <li>2. An overview of the roles of Level 1 Inspector managers and Level 2 Inspectors.</li> <li>3. Roles and responsibilities of a Level 1 Inspector.</li> <li>4. Descriptions of various bridge types and their components and their coding.</li> <li>5. What are Level 1 Inspectors looking for.</li> <li>6. Access and equipment used for inspections.</li> <li>7. Information required before an inspection.</li> <li>8. Inspection Forms and records.</li> <li>9. Recording inspection information.</li> <li>10. Completion of inspection Forms and records, including visual records based on a site inspection.</li> <li>11. The inspection process</li> <li>12. Inspection follow-up and feedback.</li> </ol>
<b>Expected Outcomes:</b>	<p>On successful completion of this course the participants will be able to:</p> <ol style="list-style-type: none"> <li>1. Have a broad understanding of the DMRQ Bridge Inspection Manual and the roles of those they report to.</li> <li>2. Know their roles and responsibilities within the DMRQ Bridge Inspection Manual.</li> <li>3. Prepare a plan to undertake a Level 1 inspection.</li> <li>4. Complete all recording and reporting as required by the DMRQ Bridge Inspection Manual.</li> <li>5. Describe follow-up and feedback requirements and procedures.</li> </ol>
<b>Maximum Number:</b>	16
<b>Course Cost:</b>	\$350.00

**Table 11: DMRQ Bridge Inspectors Workshop (Level 2)**

<b>Course Title:</b>	Bridge Inspectors Workshop (Level 2)
<b>Duration:</b>	3 days
<b>Course Aim:</b>	To provide Level 2 bridge inspectors with sufficient knowledge and skills to enable them complete Level 2 bridge inspections in accordance with Main Roads Bridge Inspection Manual (BIM) requirements.
<b>Prerequisites:</b>	Literacy and numeracy skills will be expected to be at grade 8 standards. Experience in bridge construction or maintenance would be desirable and is required for full 'accreditation'.
<b>Target Group:</b>	Maintenance staff from DMRQ, RoadTek, Local Government and Private Contractors who will be required to carry out level 2 inspections of any bridge or large culvert.
<b>Content:</b>	<ol style="list-style-type: none"> <li>1. A broad overview of the DMRQ Bridge Inspection Manual.</li> <li>2. An overview of the roles of Level 2 Inspector managers, DMRQ Bridge Inspection Manual data entry staff and Level 3 Inspectors.</li> <li>3. Roles and responsibilities of a Level 2 Inspector.</li> <li>4. Descriptions of various bridge types and their components.</li> <li>5. What are Level 2 Inspectors looking for?</li> <li>6. Access and equipment used for inspections.</li> <li>7. Information required before an inspection.</li> <li>8. Inspection Forms and records</li> <li>9. Recording inspection information.</li> <li>10. Completion of inspection Forms and records, including visual records based on a site inspection.</li> <li>11. The inspection process.</li> <li>12. Inspection follow-up and feedback.</li> </ol>
<b>Expected Outcomes:</b>	<p>On successful completion of this course the participants will be able to:</p> <ol style="list-style-type: none"> <li>1. Have a broad understanding of the DMRQ Bridge Inspection Manual and the roles of those they report to.</li> <li>2. Know their roles and responsibilities within the DMRQ Bridge Inspection Manual.</li> <li>3. Prepare a plan to undertake a level 2 inspection.</li> <li>4. Undertake a Level 2 inspection.</li> <li>5. Complete all recording and reporting as required by the DMRQ Bridge Inspection Manual.</li> <li>6. Describe follow-up and feedback requirements and procedures.</li> </ol>
<b>Maximum Number:</b>	16
<b>Course Cost:</b>	\$500.00

DMRQ have robust information on inspection competence requirements and an 'Inspector Accreditation Appraisal Procedure', supported by appropriate training courses. This should be considered as a sound starting point for the development of any UK wide formal inspector training programme and competence requirements.

#### **4.6.1.2. Main Roads, Western Australia**

Main Roads Western Australia (MRWA) does not have an accredited qualification or certification scheme for bridge inspectors although it is currently considering the development of an appropriate system.

The MRWA condition inspection consists of two bridge categories, timber bridges and the rest (i.e. concrete and steel). Timber inspection is a special category and as such is not dealt with here. Steel and concrete bridge inspection needs are considered in the context of the MRWA stock characteristics. That is, from the inspection point of view MRWA's task is considerably simplified because the age profile is still quite good, the designs are largely standardised and are generally simple in nature and accessible and the number of structures is modest compared to other Australian States or Territories.

To date, additional external resources targeted for inspection have been sourced from bridge design consultancies, which provide MMRWA with an element of pre-qualification.

MRWA has a comprehensive set of standard inspection forms, checklists and guidance notes to prompt and assist the inspector. It is now MRWA's practice to run a field training or practice day. That is, the inexperienced inspector(s) are asked to complete a full inspection of a selected structure, complete the MRWA inspection forms and then the results are reviewed and critiqued. In due course MRWA intend to extend this training day into a more systemic certification programme.

#### **4.6.1.3. ARRB Group Ltd, Victoria**

In Victoria, it is mandatory for inspectors to have full knowledge and understanding of the VicRoads Bridge Inspection Manual, which was published in 1997 and subsequently updated in 1999 and 2001. Inspectors are required to attend a one day course which relates to the implementation of the manual, i.e. explains how to use the manual, recognise components and defects, undertake measurements, report urgent safety issues and familiarises inspectors with selected regulations.

To successfully complete the course (see Table 12) and obtain 'Level 2 - Comprehensive Visual Inspections' certification, attendees are required to inspect 5 pre-selected bridges and formally report their findings. The quality of the submitted bridge inspection reports is then reviewed and their consistency is checked against VicRoads Bridge Inspection Manual prior to certification being granted, if considered appropriate.



**Table 12: VicRoads Bridge Inspection 'Accreditation' Course**

<b>Course Title:</b>	Bridge Inspection Accreditation Course
<b>Date:</b>	Friday 14 September 2007
<b>COURSE CONTENTS</b>	
Session 1	VicRoads Policy
Session 2	Introduction to Level 2 Inspections
Session 3	Bridge Inspection Procedures
Session 4	Component tables, types and data sheets
Session 5	Individual component types and drawings
Session 6	Bridge types and problems to look for during inspections
Session 7	Example of inspection rating
Session 8	Treatments
Session 9	Demonstration of Bridge Inspection Software
Session 10	Hand out assignments and explain requirements

'Level 1 - Routine Maintenance Inspections' do not require certification because they are normally carried out on a 6 monthly frequency, and immediately after floods and other natural disasters (e.g. hurricane/cyclone, fire, earthquake, landslide), accident and overload, to check the general serviceability of the structure for the safety of road users. 'Level 3 - Comprehensive Visual Inspections' do not require certification either but require expertise as they often take the form of a detailed structural or material investigation which may include load testing, concrete coring, half cell potential measurements, etc. However, VicRoads provide 'Level 1 - Routine Maintenance Inspections', 'Level 2 - Comprehensive Visual Inspections' and 'Level 3 - Comprehensive Visual Inspections' training for bridge inspection only in Victoria (See Table 13).

ARRB also provide a two-day training workshop for those involved with the Level 1 routine maintenance inspection of structures. The workshop aims to assist practitioners conduct a Level 1 inspection and provide completed condition reports on which to base routine maintenance requirements. The workshop also enables delegates to recognise and assess bridge condition problems essential for Level 2 inspections.

Day 1 of the workshop is in the classroom explaining in detail the purpose and basis of Level 1 inspections, common problems and defects in structures, and worked examples on how to undertake inspections, procedures, equipment requirements and completion of inspection reports.

Day 2 of the workshop covers field inspections of various structures where delegates are required to practise Level 1 inspections and complete the inspection reports. Completed Inspection forms are marked and delegates are provided with feedback on the assessments made to ensure satisfactory understanding and competence in conducting Level 1 inspections.

Included in the training is a general description of common problems and defects in timber, steel and concrete structures to provide a better understanding of how best to report on general structural serviceability.

**Table 13: VicRoads Technical Training Course Details**

<b>Course Title:</b>	Bridge Inspections (Level 1/ 2 & 3)
<b>Course Type:</b>	Structures
<b>Duration:</b>	0.5 day
<b>Time:</b>	9.00 am - 1.30 pm
<b>Date:</b>	23/02/2009
<b>Venue:</b>	Technical Consulting, 1st Floor Conference Room, 3 Prospect Hill Rd, Camberwell
<b>Presenters:</b>	Caroline Grech, David Kimpton, Vince Colosimo, Mal Thomas, Roy Fisher
<b>Equipment to Bring:</b>	Pen/Pencil, Notebook
<b>Cost:</b>	\$330
<b>Participants Limit:</b>	-
<b>COURSE DETAILS</b>	
<b>BRIDGE INSPECTION (Level 1,2 &amp; 3) – 23 February 2009</b>	
<b>Course Classification:</b>	
CORE / Open to internal & external participants	
<ul style="list-style-type: none"> <li>◆ Persons undertaking bridge inspections</li> <li>◆ Persons processing information from bridge inspections</li> <li>◆ Persons commissioning bridge inspections</li> </ul>	
<ol style="list-style-type: none"> <li>1. Level 1 Bridge Inspections – Overview of the Level 1 bridge inspection process</li> <li>2. Level 2 Bridge Inspections – Overview of the Level 2 bridge inspection process</li> <li>3. Level 3 Bridge Inspections: Design Aspects – Overview of the Level 3 bridge design check processes</li> <li>4. Level 3 Bridge Inspections: Field Aspects – What to look for when undertaking a Level 3 bridge inspection in the field; provide examples</li> <li>5. Bridge Inspections: Field Trip – Drive out to bridge nearby, point out what would be looked at during a typical bridge inspection; allow 2 hours.</li> </ol>	

#### 4.6.2. Denmark

All Danish inspection personnel, apart from those who undertake underwater inspections, are required to be formally educated engineers. The Danish Road Directorate does not certify inspectors but does conduct annual refresher training for all bridge inspectors. There are no other inspector training requirements.

#### 4.6.3. Finland

Finland uses 106 bridges and 26 steel culverts as a set of reference structures. This pool of structures is statistically chosen as a representative sample of Finland's structure inventory. Baseline data is gathered for these structures by experienced in-house bridge inspection staff to provide consistency. Data gathered is used to fulfil a variety of needs, which include:

- provision of data on bridge serviceability and durability over time,
- trend analysis of data gathered on similar bridges and updating of deterioration models in the bridge management system,
- quality control of inspection data from non-reference bridges by providing baseline data for comparison,
- training and refresher training of inspectors and evaluation of inspector condition ratings against condition ratings provided by in-house staff and the mean of all inspectors.

Bridge inspector training and certification is organised by the Finnish Road Administration. The training is based on a three to four day theoretical course with one day of onsite training. The training culminates in a one-day performance evaluation involving inspection of a bridge and a written test. There is also a two-day course on usage of the bridge register that must be completed before an inspector is granted rights to update data.

Those seeking inspector certification must have at least 2 years experience as a member of a bridge inspection team. A bridge inspection team leader must have (i) attained a master of science degree in bridge or civil engineering; and (ii) be experienced in the design of load-bearing structures or bridge maintenance.

Inspectors are required to undergo an annual reassessment (or 'calibration'). A one-day calibration involves a general inspection of two bridges. To retain their certification, inspectors must pass the bridge inspection (their reports are assessed by an examiner) and a consistency check (their inspection findings are compared with two other inspectors). Points are awarded to inspectors and used in the procurement process. Inspectors who repeatedly have weak test results can lose their certification.

#### 4.6.4. France

In France, inspection staff are required to attain qualification by attending and passing a six module training course. The goals of the training course and qualification process are:

- To ensure a quality level of inspections
- To set a system of qualification for the inspection staff
- To complement the initial education of new inspectors
- To serve as a reference for the private profession

The first five modules of the course are designed for bridge inspectors and the sixth is required for project manager certification:

- Module 1: a 6-day course on basic knowledge (covers aspects such as strength of materials, reinforced concrete bridges, common steel bridges, common prestressed concrete bridges, masonry bridges, culverts, common retaining walls)
- Module 2: a 1-day course on large prestressed concrete bridges
- Module 3: a 3-day course on uncommon retaining walls
- Module 4: a 2-day course on large steel bridges and cable bridges

- Module 5: a 3-day course on tunnels and underground structures
- Module 6: a 3-day project manager's course that includes the following:
  - Methodology of detailed inspection
  - Investigation techniques
  - Monitoring and surveillance techniques
  - Repair and strengthening techniques
  - Actions to be proposed after an inspection

#### 4.6.5. Germany

Germany does not have mandatory training requirements for staff undertaking bridge inspections. The relevant standard (DIN 1076) requires an experienced engineer to carry out the inspection, whereby the minimum requirements for the engineer are (i) to have successfully completed study at a university or (bachelor or master of civil engineering or science degree); and (ii) have experience in bridge building or construction engineering.

However, in 2000 the *German Federal Ministry of Transport* and the *Road Administrations of the Federal States* began an initiative to set up a professional development seminar for bridge inspectors. The purpose of the seminar was to establish a forum for the exchange of knowledge and experience among practicing bridge inspectors. This initiative has proven highly successful and a number of organisations now provide these seminars. The following is a typical example of a one-week seminar that is provided by Bochum University of Applied Science:

- Day 1 – Introduction
  - Introductory video on bridge inspection
  - Judicial and technical rules
  - Causes of damage
  - Vulnerable details in special construction
- Day 2 – Organisation and costs of inspection
  - Rules for accident prevention
  - Personal protective equipment
  - Acquisition of damage data with SIB-Bauwerke
  - Inspection vehicle and equipment management
- Day 3 – Assessment of damage data of buildings—examples
  - Inspection of road signs for bridges
  - Inspection by special rules

- Various topics (e.g. reconditioning of orthotropic decks)
- Day 4 – Assessment of damage data of bridge equipment
  - Detailed damage analysis (theory, methods)
  - Causes of damage-test methods
  - Causes of damage-technical, physical, and chemical
- Day 5 – Practical training
  - State of knowledge (test)
  - Presentation of certificate
  - Open discussion

At present the above seminars do not include an examination element, instead attendees are given a certificate on completing the seminar. However, there are plans to develop an exam in the future.

#### **4.6.6. Norway**

There are no formalised training/competence requirements for highway bridge inspectors in Norway. The situation is largely similar to the UK, whereby organisations determine the education and experience required to undertake specific inspection types (e.g. General vs. Principal) on structural forms of varying complexity.

#### **4.6.7. Sweden**

The Swedish Road Administration has defined requirements for inspection staff on education and knowledge, but there are no formal requirements for certification or accredited qualifications for inspectors. With regard to procuring/recruiting inspection staff, the approach is similar to the UK, whereby selection is based on the information provided. However, there are a number of common minimum requirements defined for inspectors, these are:

- An appropriate engineering based education/qualifications;
- Experience of the inspection methodology or education in inspections;
- Experience in measuring and assessing physical and functional condition;
- Knowledge of durability and deterioration processes affecting structures;
- Knowledge and experience in predicting damage development;
- Knowledge and experience in developing and producing maintenance recommendations;

It should be noted that the Swedish Road Administration defines the requirements for inspections on the national (trunk) road network. Other bridge owners in Sweden generally comply with these requirements but may amend at their discretion.

---

#### 4.6.8. United States

The training and competence standards for bridge inspectors in the US are mandated under Federal Law. The National Bridge Inspection Standards (which are designed to support implementation and full compliance with the Federal Law) define:

- The qualifications and experience required for inspection staff;
- What is meant by 'inspection experience';
- How to evaluate experience.

For example, the federal regulations identify four staff positions, which are: **(i) Programme Manager** – in charge of bridge inspection, reporting and inventory, **(ii) Team Leader** – in charge of an inspection team and responsible for planning, performing and reporting field inspections, **(iii) Load Rater** – holds the overall responsibility of bridge load rating and **(iv) Underwater Bridge Inspector** – performs inspections, by diving, of submerged components of bridge.

The following is used as guidance, which represents minimum criteria, when evaluating an individual's experience for compliance that is required for a (Inspection) Team Leader:

- The relevance of the individual's experience, i.e. has the experience enabled the individual to develop the skills needed to properly lead a bridge safety inspection.
- Exposure to the problems or deficiencies common in the types of bridges being inspected by the individual.
- Complexity of the structures being inspected in comparison to the knowledge and skills of the individual gained through their prior experience.
- The individual's understanding of the specific data collection needs and requirements.
- Demonstrated ability, through some type of a formal certification program, to lead bridge safety inspections.
- The level of oversight and supervision of the individual.

To support the competence requirements, Federal Highway Administration (FHWA) has developed a number of Bridge Inspection Courses; these typically take the following form:

- *Course 1: Bridge Inspector's Training Course, Part I - Engineering Concepts for Bridge Inspectors* – a one-week course that presents engineering concepts relevant to inspectors, including inspection procedures and information about bridge types, bridge components, and bridge materials. The course is intended for new inspectors who have little or no practical bridge inspection experience.
- *Course 2: Bridge Inspector's Training Course, Part II - Safety Inspection of In-Service Bridges* – a two-week course for experienced inspectors or engineers who perform or manage bridge inspections. Emphasis is on inspection applications and procedures. The uniform coding and rating of bridge elements and components is also an objective of the two-week course. A unique feature of this course allows for customization of the course content by the host agency. Some states use component rating based on National Bridge Inspection Standards (NBIS) while some states use element condition level based on PONTIS. Optional topics can be scheduled, and their level of coverage

can be selected. These topics include identification and inspection of fracture critical members (FCM's), underwater inspection, culverts, field trips, case studies, and coatings. Several special bridge types may also be discussed at the host agency's request.

- *Course 3: Fracture Critical Inspection Techniques for Steel Bridges* – This three-day course provides an understanding of fracture critical members (FCM's), FCM identification, failure mechanics and fatigue in metal. Emphasis is placed on inspection procedures and reporting of common FCM's and non-destructive testing (NDT) methods most often associated with steel highway bridges.
- *Course 4: Stream Stability and Scour at Highway Bridges for Bridge Inspectors* – a one-day course concentrating on visual signs for detecting scour and stream instability problems. The course emphasizes inspection guidelines to complete the hydraulic and scour-related coding requirements of the National Bridge Inspection Standards (NBIS).
- *Course 5: Bridge Coatings Inspection* – a four-day course providing information on the inspection of surface preparation and application of protective coating systems for bridge and highway structures. The course provides a basic overview of the theory of corrosion and its control and the characteristics of various bridge coating types.
- *Course 6: Inspection and Maintenance of Ancillary Highway Structures* – a two-day course providing training on the inspection and maintenance of ancillary structures, such as structural supports for highway signs, luminaries, and traffic signals. Its goal is to provide agencies with information to aid in establishing and conducting an inspection program in accordance with the FHWA "Guidelines for the Installation, Inspection, Maintenance, and Repair of Structural Supports for Highway Signs, Luminaries, and Traffic Signals".
- *Course 7: Underwater Bridge Inspection* – a three-day course providing an overview of diving operations that will be useful to agency personnel responsible for managing underwater bridge inspections. The course also fulfils the requirement due to the latest changes of the National Bridge Inspection Standards, which require bridge inspection training for all divers conducting underwater inspections.
- *Course 8: Bridge Inspector Refresher Training* – a three-day course designed to refresh the skills of practicing bridge inspectors. The course includes a revision of the basics (from Course 1) and the Bridge Inspectors reference Manual (from Course 2).

There is robust information on inspection competence requirements and training in the US and this should be considered as a sound starting point for the development of any UK wide inspector training and competence requirements. Two of the documents that provide relevant information are:

- *Bridge Inspectors Reference Manual, Volume 1 and 2*, U.S. Department of Transportation, National Highway Institute, FHWA NHI 03-001, December 2006.
- *Bridge Inspection Practices: NCHRP Synthesis 375 – A synthesis of Highway practice*, Transportation Research Board of the National Academies, 2007.



---

## 4.7. Other Assets

### 4.7.1. Nuclear Installations (structural aspects)

The Health and Safety Executive (HSE) provides a training scheme for inspectors. The competence requirements can be found at the HSE website, and a copy is included in Appendix B:

<http://www.hse.gov.uk/foi/internalops/nsd/hrm/bsshrm030/table3-1.pdf>

The competence requirements cover aspects such as:

- Analytical skills derived from a sound education and training in relevant science or technical subject;
- Experience in the application of analytical skills in practice;
- Understanding the application of discipline technological knowledge and subject skill in the nuclear sector;
- Understanding of relevant good industry practice and what constitutes ALARP within discipline, etc.

### 4.7.2. Dams and Reservoirs

Civil engineers can only become a member of the special panel if they are considered to be well qualified and experienced in reservoir safety matters. They need not be members of the Institution of Civil Engineers or of any other professional body. However, they should be able to demonstrate that their general experience of civil engineering would be sufficient to gain them Chartered Civil Engineer or equivalent status if they were to apply for that. For the All Reservoirs Panel and Non-Impounding Reservoirs Panel, engineers would normally be expected to have the experience and seniority that would be expected of a Fellow of the Institution of Civil Engineers or equivalent.

Under the Reservoirs Act (1975), reservoir owners are also required to employ suitably qualified civil engineers to make regular checks on safety between the Panel Engineers' inspections.

## 4.8. Conclusions

The above summary of UK and international inspector certification practices illustrates that a number of organisations (within and outside the UK) have sound inspector training and/or competence requirements in place. Within these, there are areas of good practice that could be readily adopted and tailored for the UK.

---

## 5. Questionnaire Survey

### 5.1. Overview

A questionnaire was developed to compile data on current inspection and training practices in the UK and overseas. The following sections present the findings from the survey as follows:

- UK bridge owners/managers (Section 5.2)
- Overseas bridge owners/managers (Section 5.3)

A full copy of the questionnaire is presented in Appendix C. The questionnaire sought to capture details of current regular inspection regimes and the associated training requirements. Training practices were classified under the headings of:

- **Mandatory Training** – Inspector training is a mandatory requirement (e.g. standards/competence are defined and formal training programme exists which are strictly adhered to).
- **Training** – Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency).
- **No Training** – Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed suitably experienced/qualified to undertake inspections).

Throughout the following the term “General Inspection” is used to describe inspections undertaken at regular intervals of 1 to 3 years, while “Principal Inspection” is used for inspections undertaken at regular intervals longer than 3 years.

### 5.2. UK Bridge Owners and Managers

Seventy-three responses were received to the questionnaire survey from UK bridge owners and managers, the responses comprised:

- 50 asset owners
- 23 consultants/contractors that carry out inspections on behalf of the asset owner.

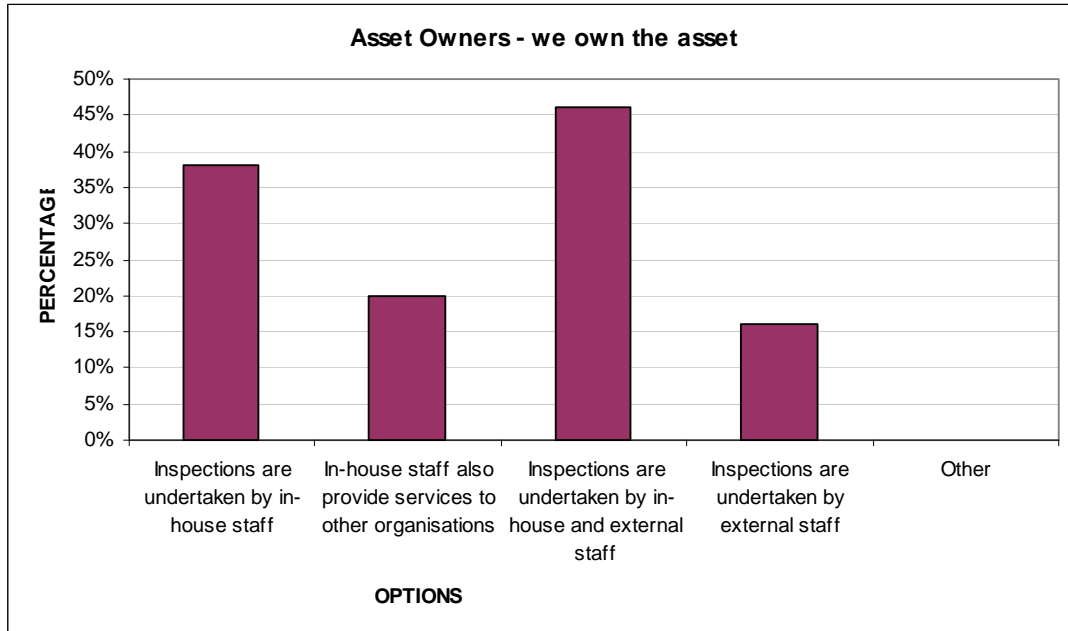
The following sections present the survey findings under the following headings:

- Organisational Information
- Training – GI/PI responses combined because arrangements are largely the same.
- No Training - GI/PI responses combined because arrangements are largely the same

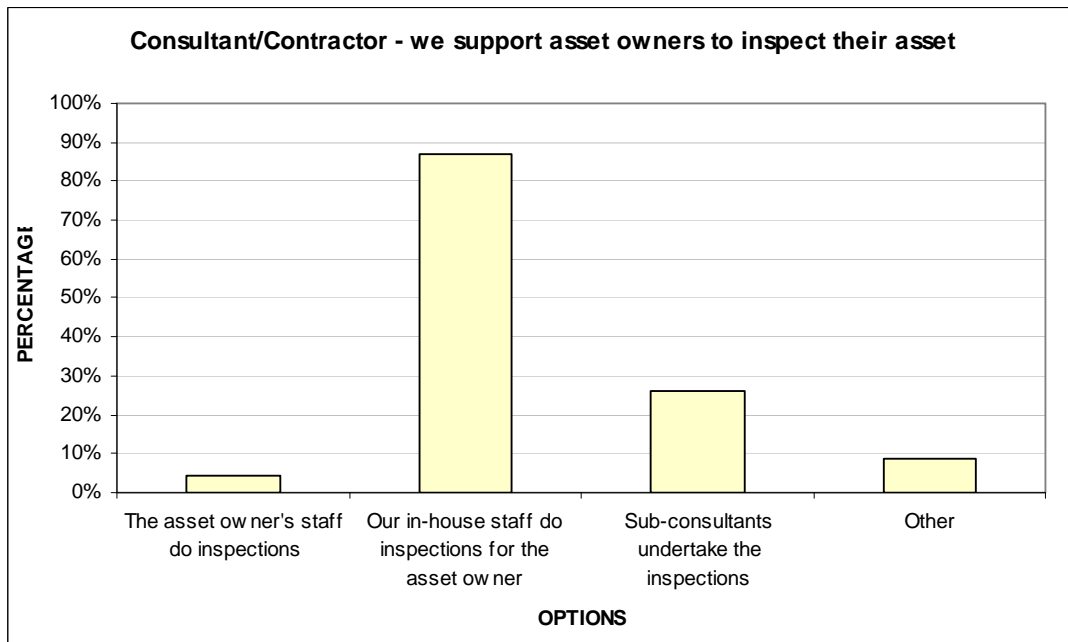
No organisations in the UK described their current inspection training practices as “Mandatory Training”. Where the percentages in the following graphs do not sum to 100% this is due to some of the respondents not completing these questions.

**5.2.1. Organisational Information**

**5.2.1.1. What type of organisation are you?**

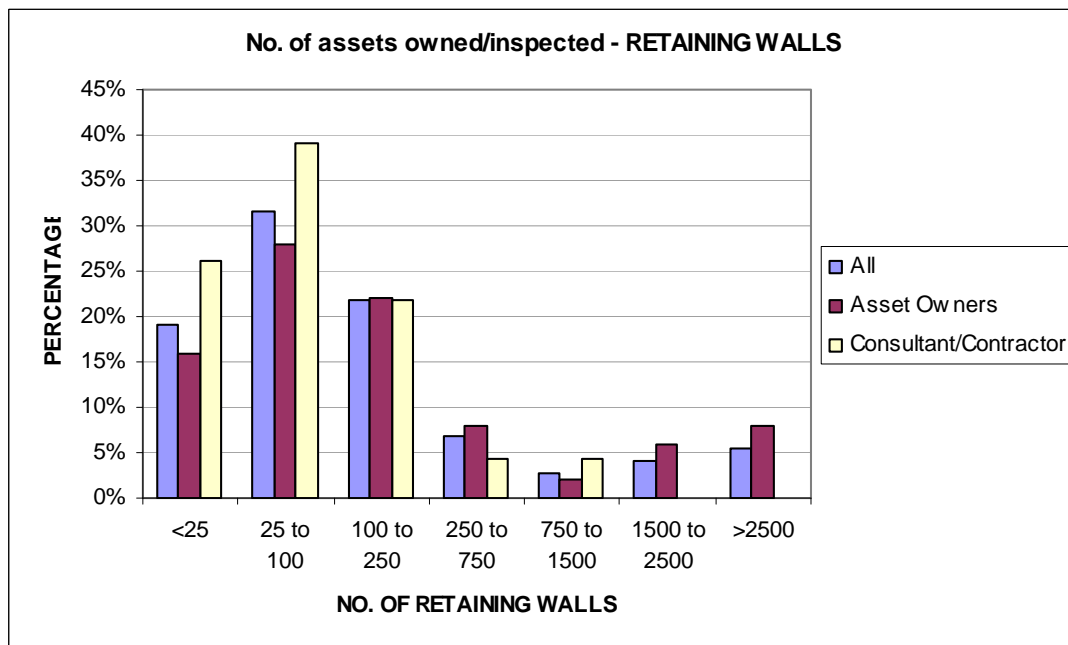
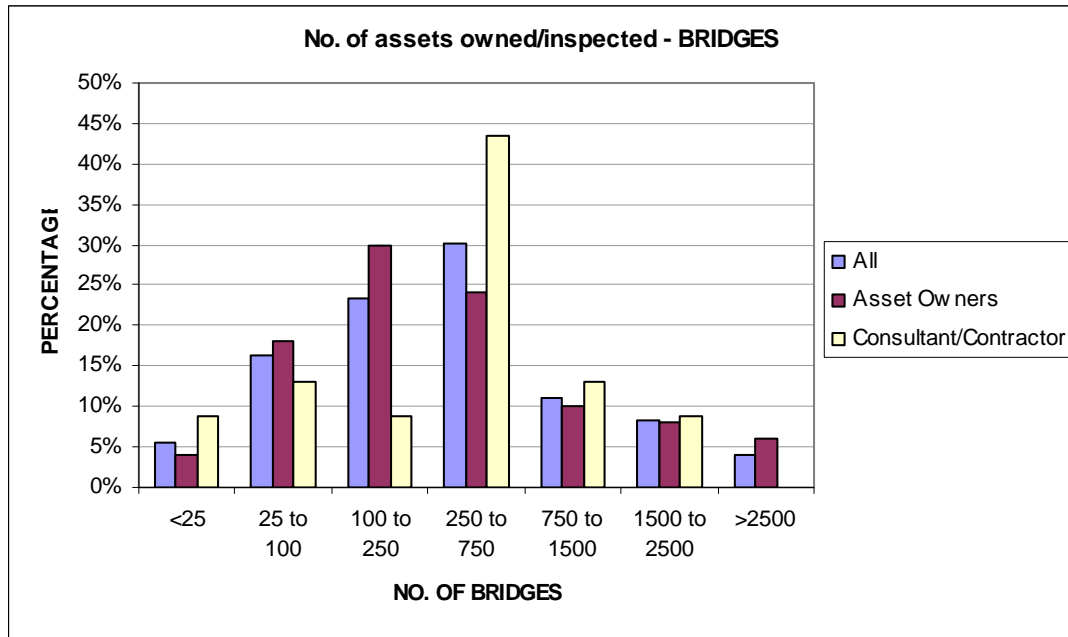


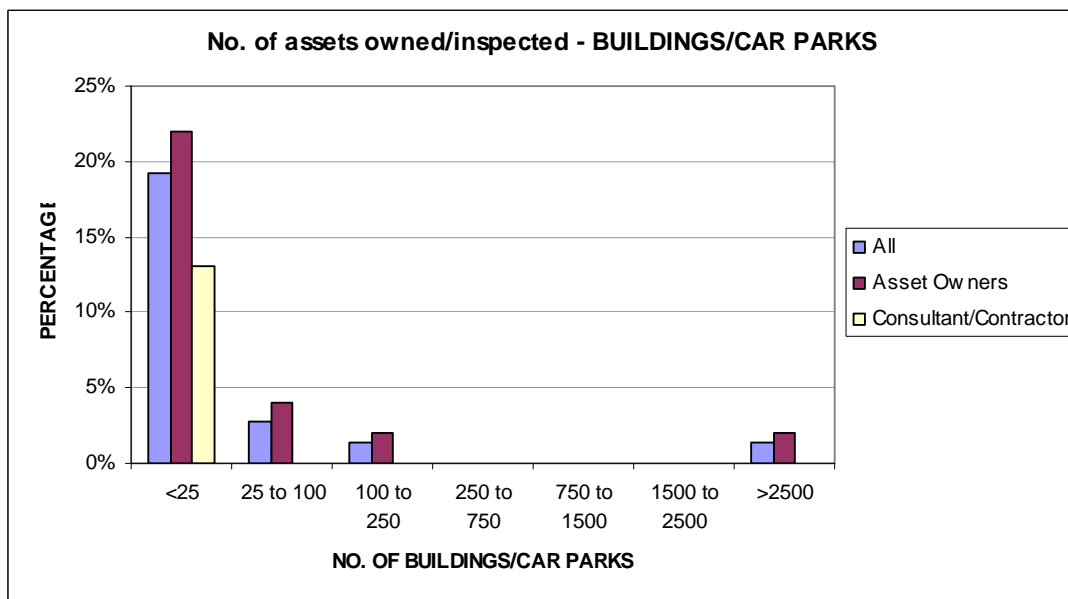
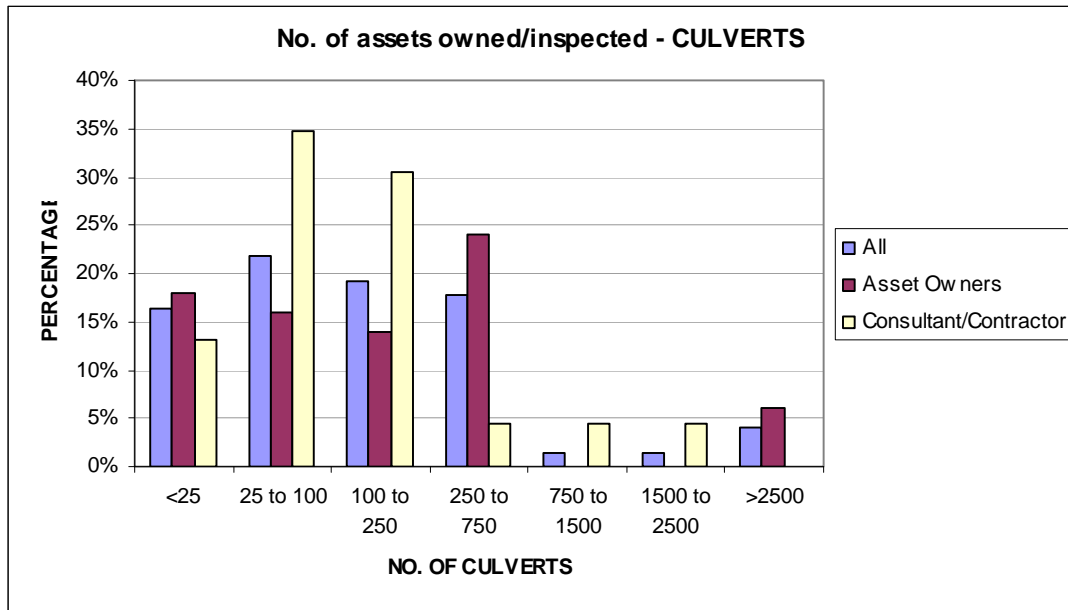
The above responses total to more than 100% because organisations could tick more than one option. The responses show that the majority of asset owners use a combination of internal and external inspection staff.

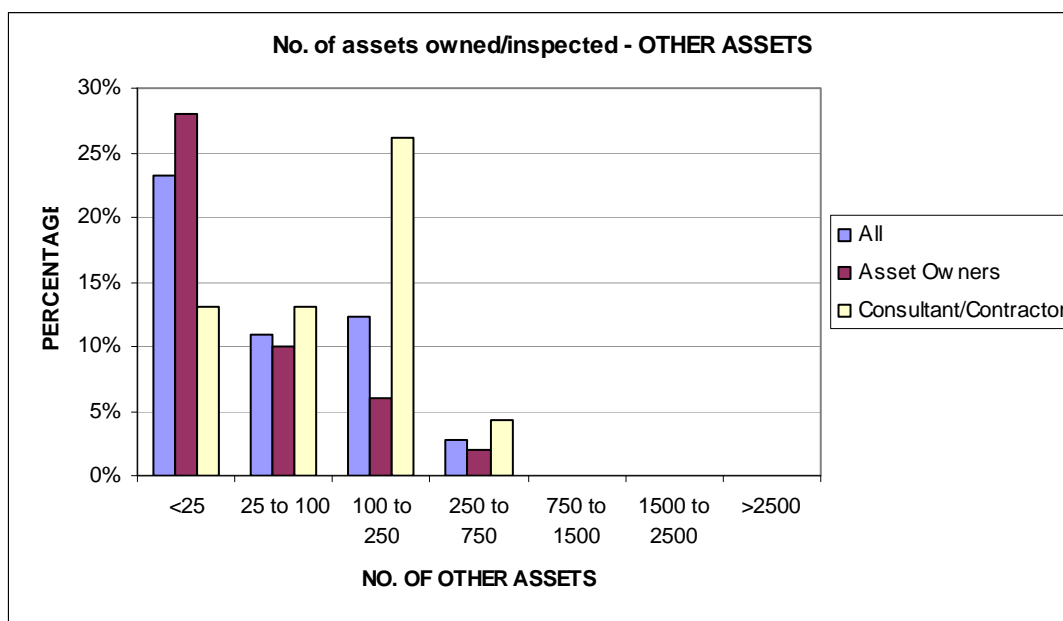


**5.2.1.2. How many assets do you own and/or inspect?**

The following graphs indicate the number of structures (bridges, retaining walls, culverts, buildings/car parks and other assets) that each organisation is responsible for inspecting. A small number of organisations (about 5%) have less than 25 bridges to inspect and about 16% inspect 25 to 100 bridges; these organisations are typically small urban local authorities. The majority of organisations (79%) inspect more than 100 bridges.







Note: other assets included sign/signal gantries, service crossings, vaults and cellars, building components (e.g. within tenanted structures) and roadside ‘monuments’ deemed to be the responsibility of the bridges department due to structural features.

**5.2.1.3. How many staff are involved in inspections?**

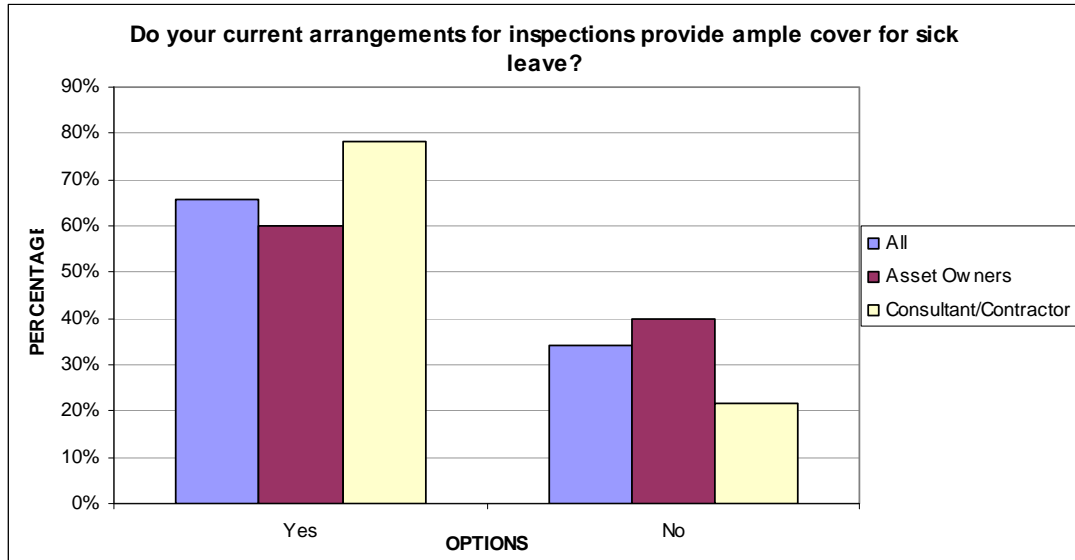
The question asked how many staff were involved in inspection activities (including planning inspections, undertaking inspections and reviewing inspections). Responses show that some 34% of organisations have three or less inspection staff. These responses generally align with those organisations with less than 100 bridges but also include organisations with more than 100 bridges.



The small number of bridges and structures owned/managed by some organisations does not merit or justify a large number of inspection staff. An important consideration is therefore the ability of organisations with small numbers of inspection staff to support more formalised inspector training and development.

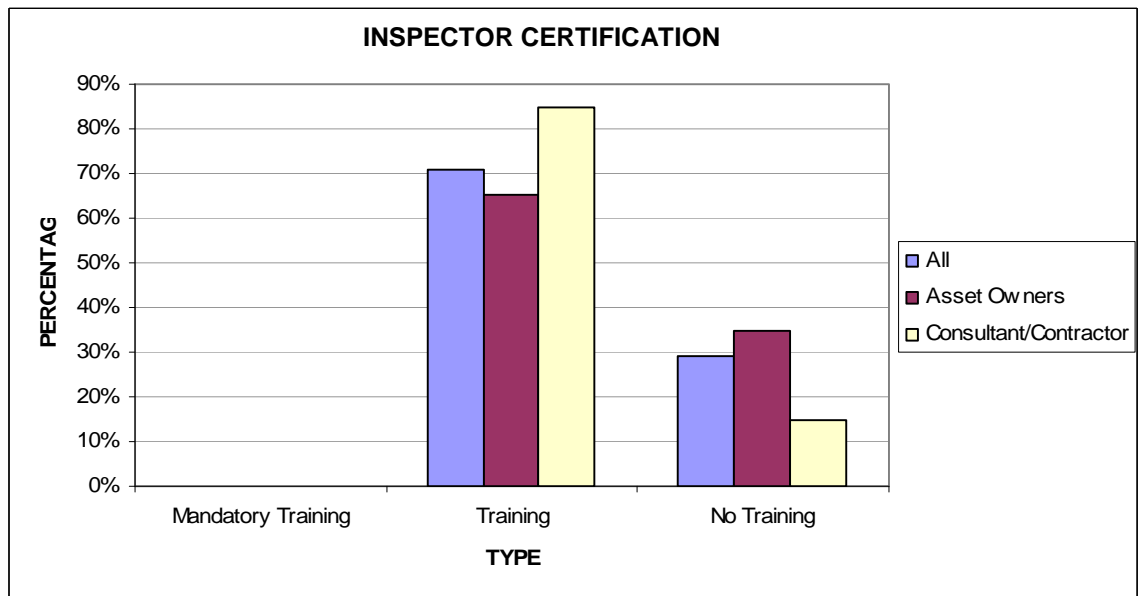
**5.2.1.4. Do your current arrangements for inspections provide ample cover for sick leave?**

A considerable percentage (40%) of asset owners do not believe their current arrangements provide adequate cover for sick leave.



**5.2.1.5. What kind of inspector certification do you require and/or provide?**

At present, no UK bridge owners have mandatory inspector training practices in place; this is largely because no such requirements are currently mandated, either on bridge owners or on the supply chain. A larger percentage of bridge owners (34%) said they have no training in place compared to 14% of contractors/consultants.



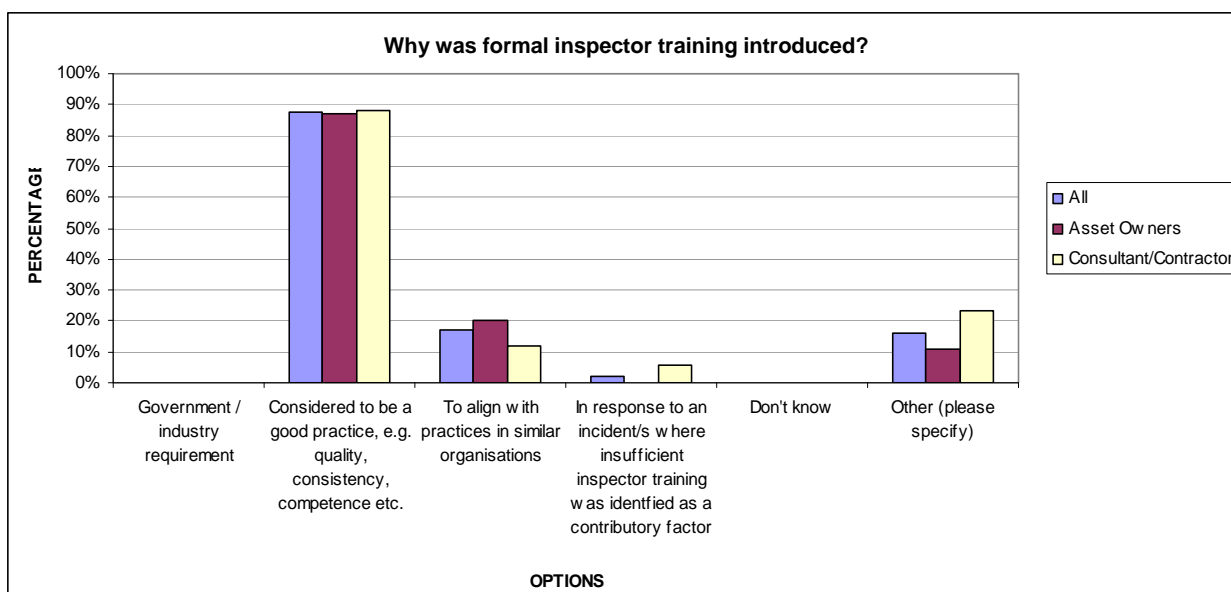


## 5.2.2. Responses from Organisations who provide Training

The following organisations consider their existing procedures to constitute formal “Training” of inspectors. However, a number of those organisations that responded as “No Training” appear to have similar procedures to a number of those that responded as having “Training”. As such, there appears to be a degree of uncertainty regarding what organisations consider formal “training” to constitute.

### 5.2.2.1. Why was inspector training introduced?

The majority of organisations (almost 90%) say they have introduced inspector training because it is considered to represent good practice.

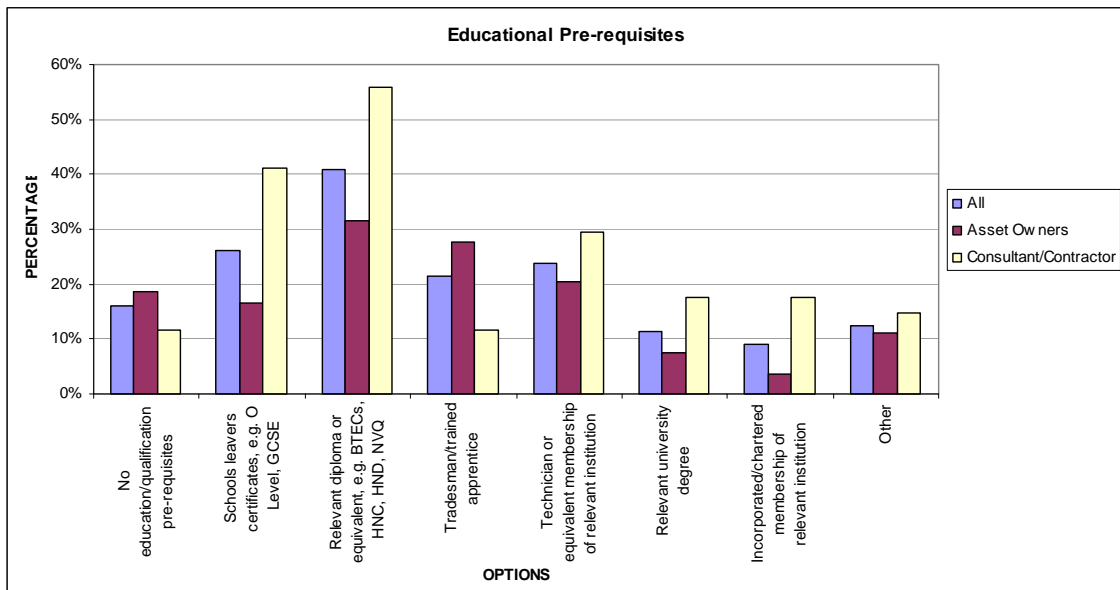


‘Other’ reasons provided for introducing inspector training included:

- To comply with the Health and Safety requirements, i.e. hazard identification, risk assessments and safe methods of working.
- Local training to focus on issues specific to certain structure/component types, for example, specialist knowledge required for multi-element expansion joints.

### 5.2.2.2. What are the educational pre-requisites to inspector training?

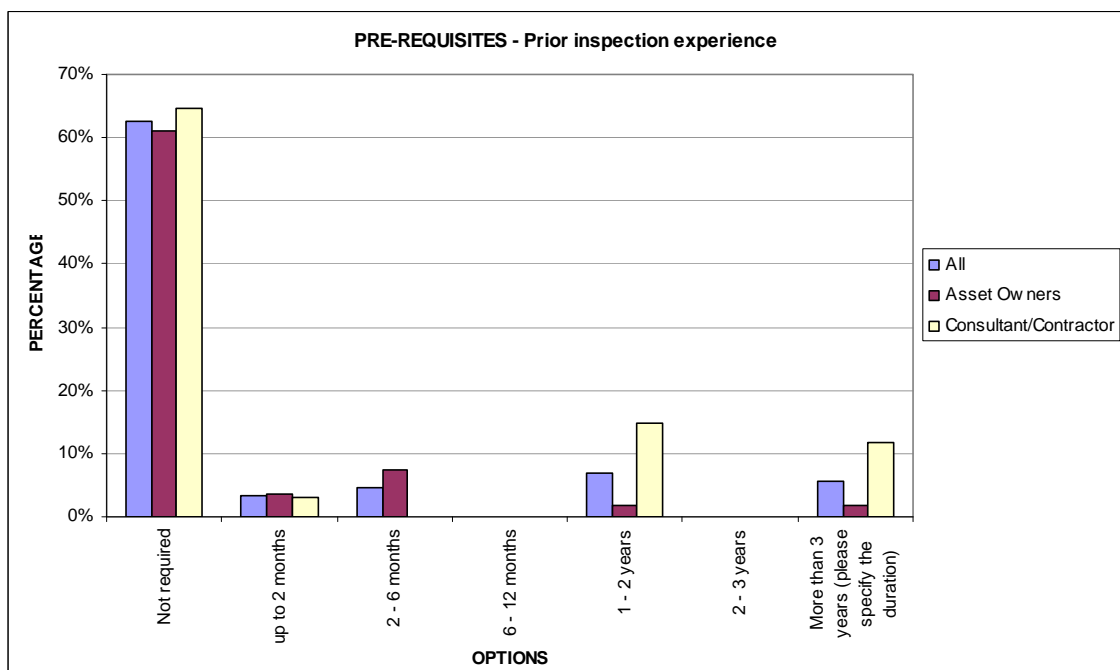
Organisations were asked to define the minimum education pre-requisites required for recruiting new staff to enter into their inspection-training regime. The requirements varied considerably, from 16% saying that none was required to 41% saying that a relevant diploma was required and 9% requiring incorporated/chartered membership, with the latter normally specified in relation to Principal Inspection activities.

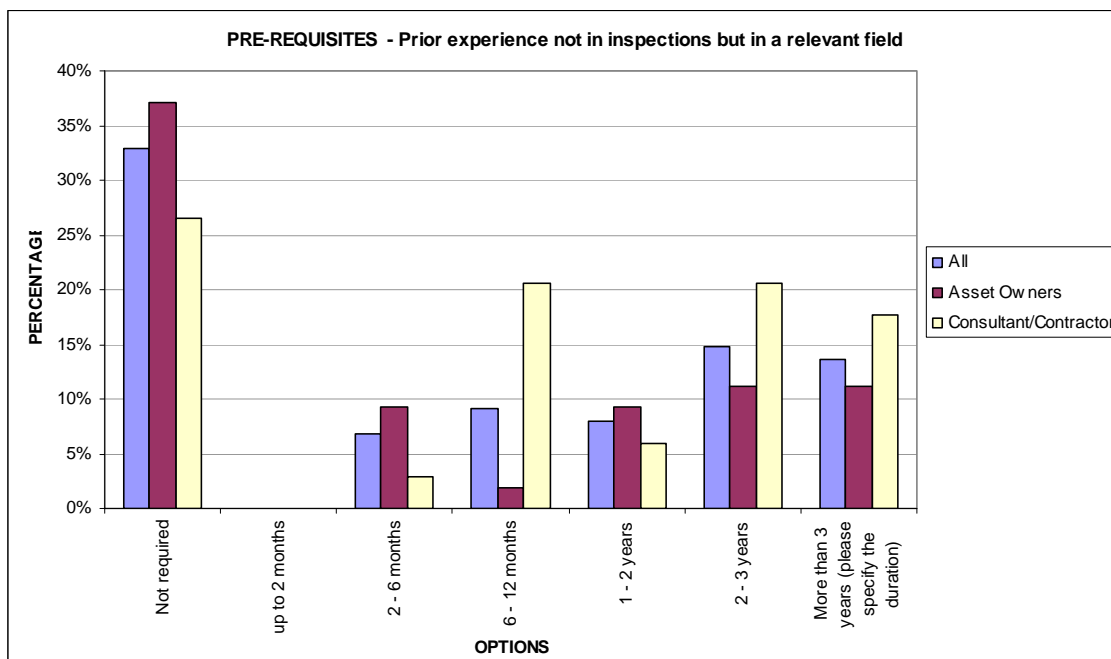


Organisations were also asked to define any minimum experience requirements, in terms of:

- Previous inspection experience; and
- Experience not in inspections but in a relevant area.

The following graphs show that the majority of organisations (63%) require no prior inspection experience and 33% require no experience in a relevant area.

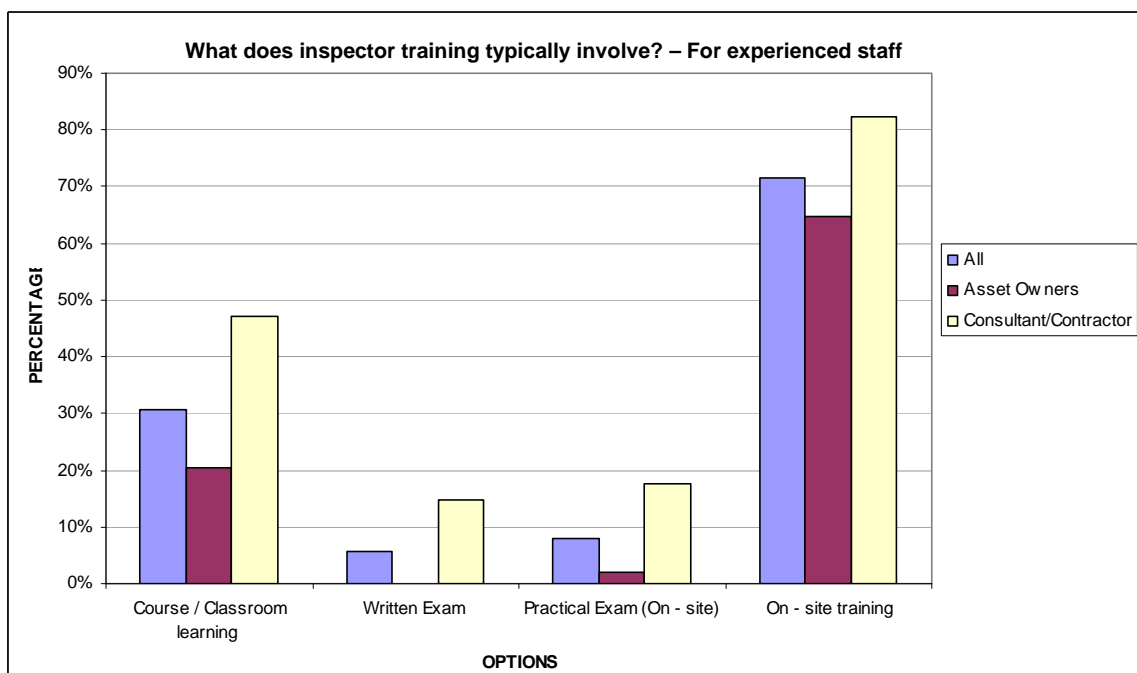
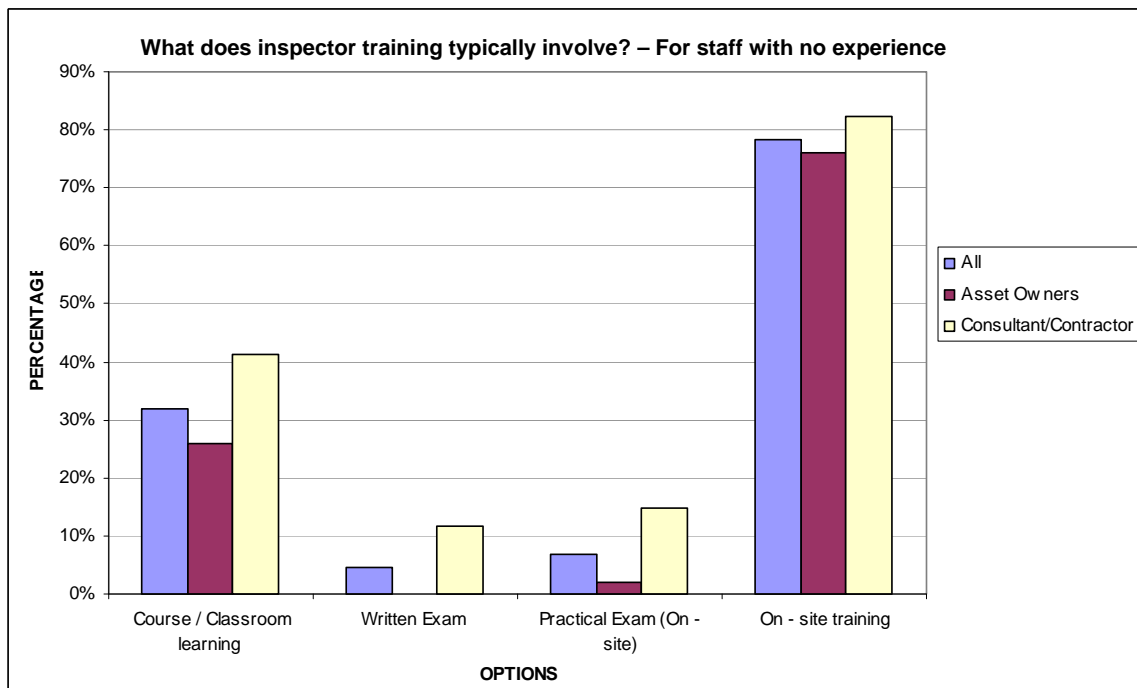




The above graphs are also considered, in part, to be a reflection of market conditions and the difficulty many organisations face when recruiting inspection staff. That is, if an organisation specifies too many pre-requisites (any in some circumstances) on inspection staff then they may severely restrict their potential pool of applicants. As such, 'prior inspection experience' and 'experience in a relevant field' are defined by the majority of organisations as *desirable* rather than *essential*.

**5.2.2.3. What does inspector training typically involve?**

Respondents were asked to describe their training requirements for experienced and non-experienced inspection staff, see graphs below. There is little difference between the two as most organisations adopt the same training practices for experienced and non-experienced staff, what varies most is the duration of the on-site training required (see following section). The majority of organisations use on-site training, but a significantly lower percentage (around 30%) supplement this with formal classroom training sessions. Around 5% of organisations use a written exam while around 8% use practical (on site) examinations to test the competence of inspectors.

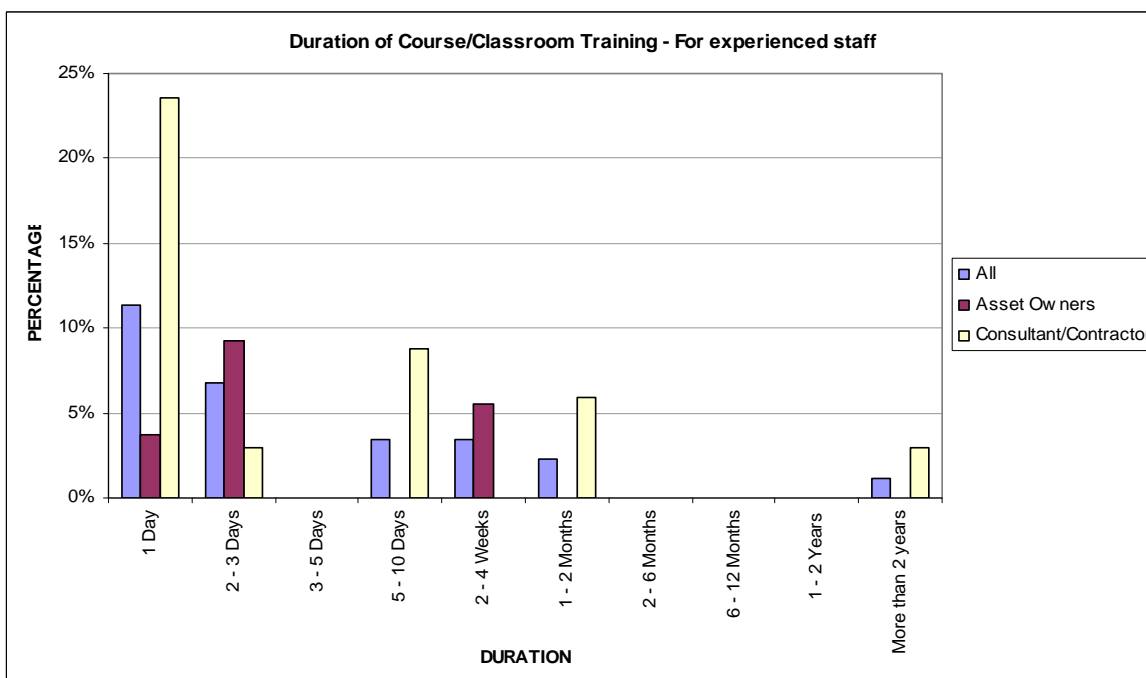
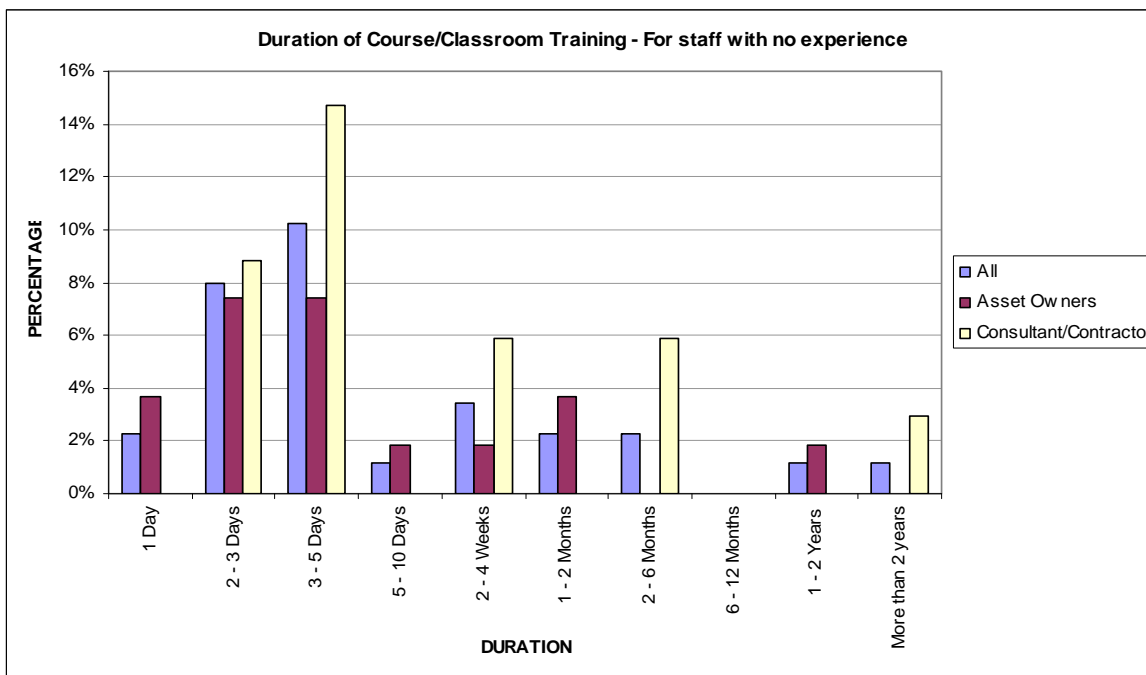


The questionnaire asked respondents to provide a definition of ‘experienced staff’, however, none of the respondents provided a definition. Therefore, the in-depth interviews (presented in Section 6) were used to capture definitions/views in relation to ‘experienced staff’.

**5.2.2.4. What is the duration of inspector training?**

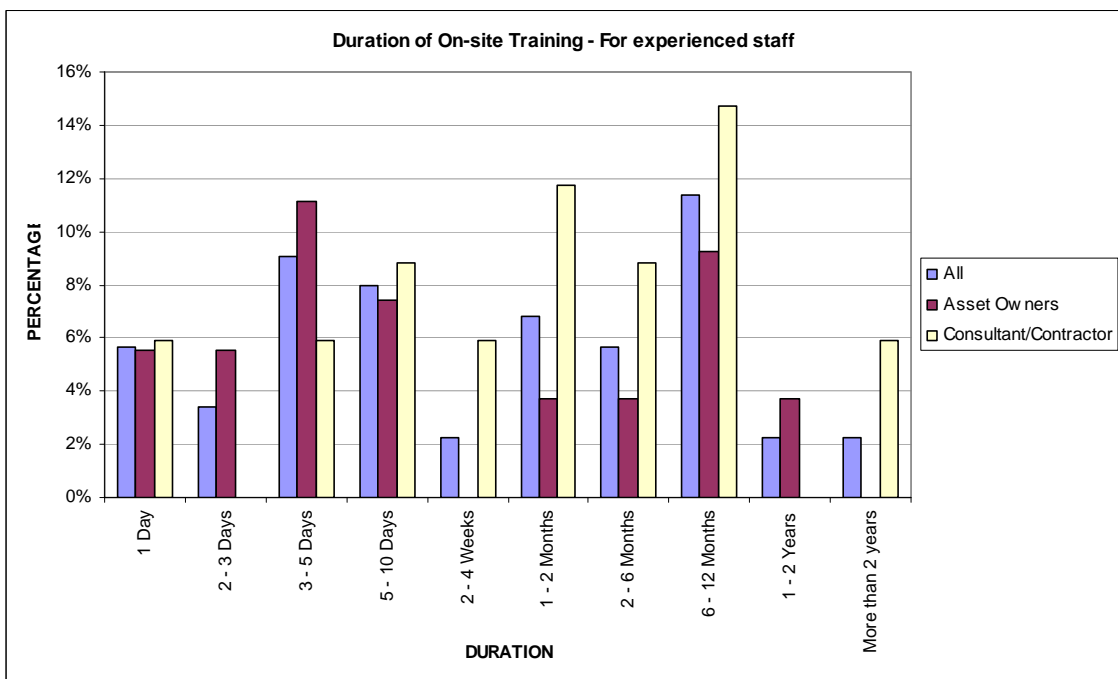
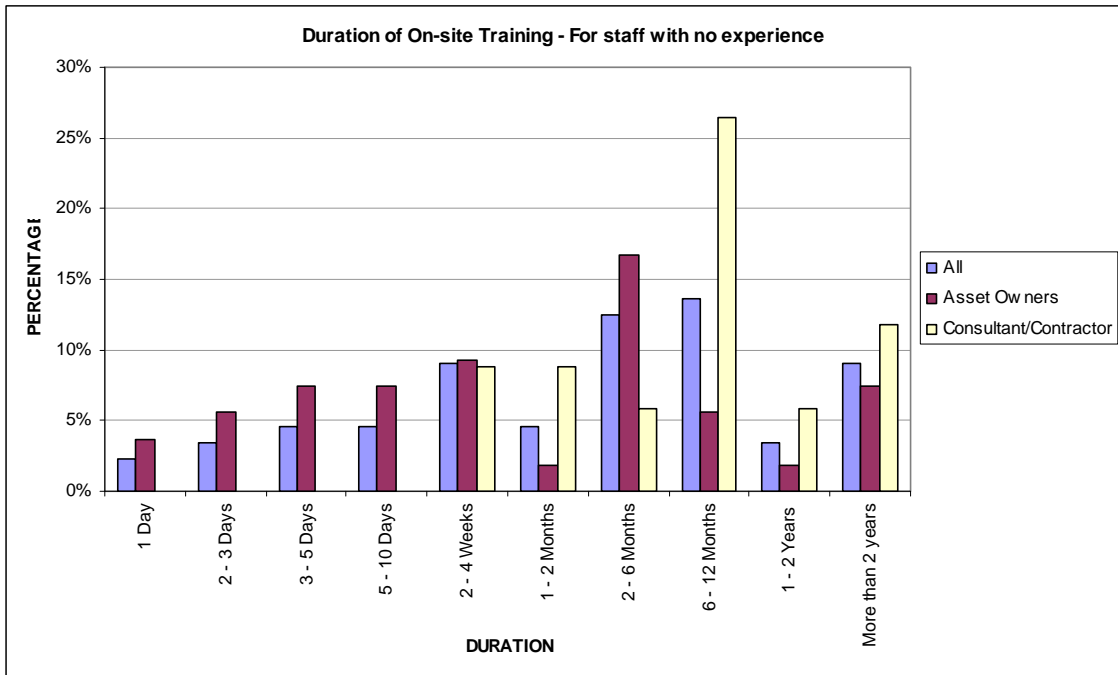
This question asked organisations to define the duration of (i) classroom training; and (ii) on-site training for both experienced and non-experienced staff. The following graphs indicate

that in general, as expected, the training requirements placed on non-experienced staff are more onerous than those for experienced staff.



This question sought to capture the amount of time, spent in a classroom environment, once an individual has been recruited as an inspector, thus excluding any classroom training (e.g. diploma or degree) obtained prior to employment. The above graphs show a wide variability in responses to this question, ranging from 1 day to over 2 years of classroom training. The latter, although in a minority, represents those organisations that require inspection staff, recruited with school leaver's certificates and/or GCSEs, to embark on part-time education in engineering (e.g. HND or HNC). Therefore, although this training would serve wider

engineering requirements, it can also be interpreted as providing appropriate training for inspection.

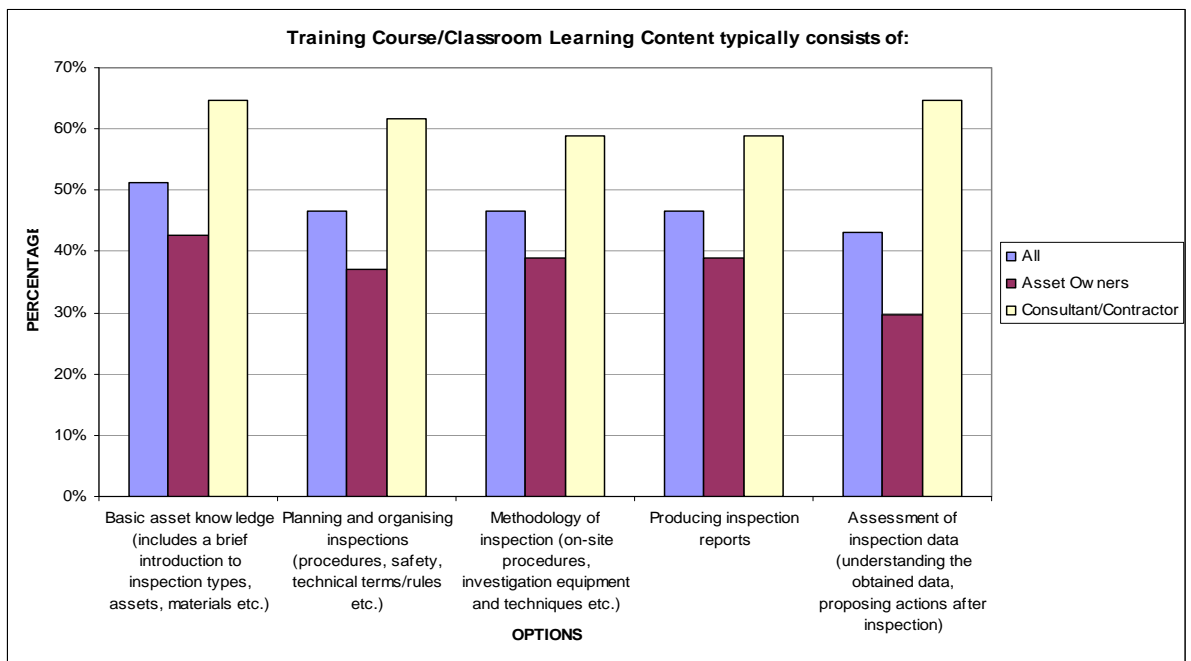


There is only a slight difference in the duration of on-site training for staff with/without inspection experience, with the former having a slightly lower duration.

**5.2.2.5. What is the typical content of the training course / classroom learning?**

The responses in the following graph total to more than 100% because the question allowed multiple choices. The responses show that the majority of training courses cover all five options. The five options given were:

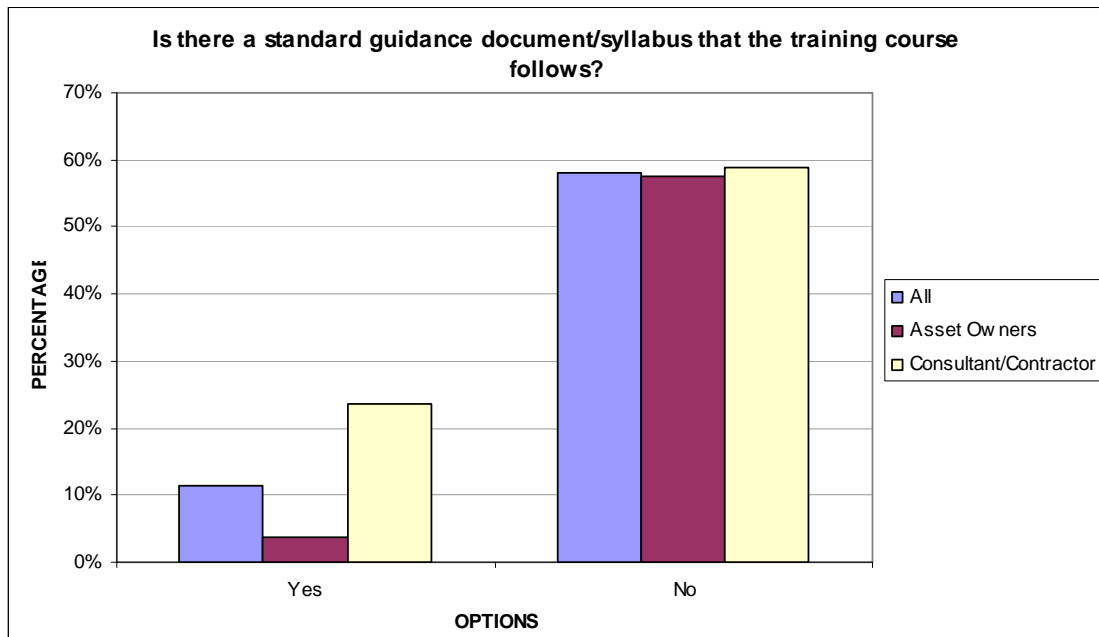
- Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.);
- Planning and organising inspections (procedures, safety, technical terms/rules etc.);
- Methodology of inspection (on-site procedures, investigation equipment and techniques etc.);
- Producing inspection reports; and
- Assessment of inspection data (understanding the obtained data, proposing actions after inspection)



**5.2.2.6. Is there a standard guidance document/syllabus that the training course follows?**

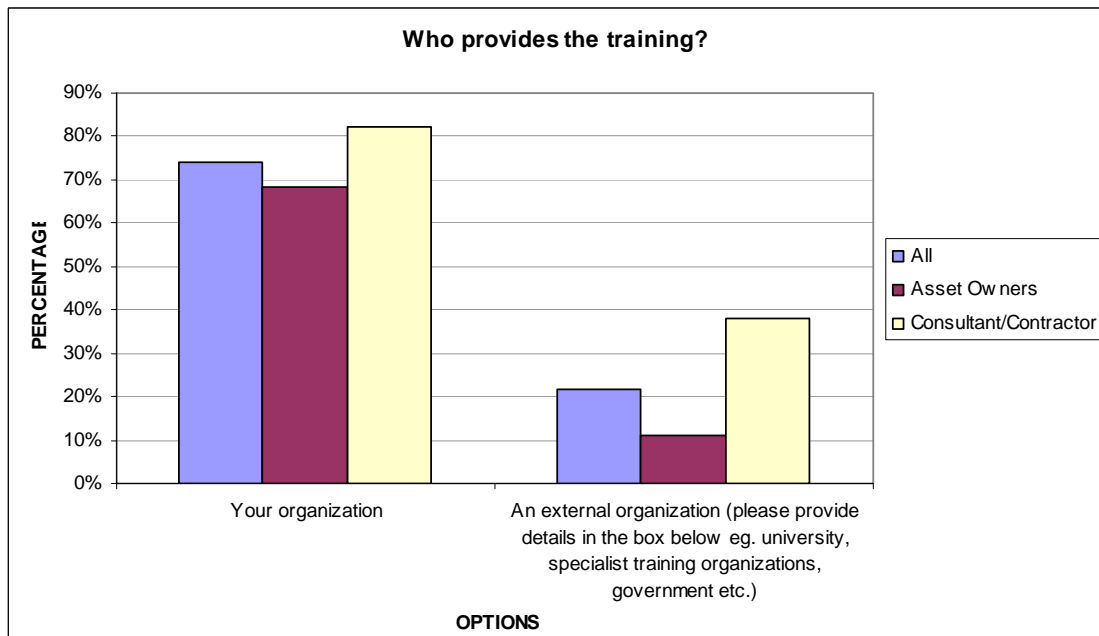
The majority of organisations do not have formal guidance documents/syllabus. Of those who do have some form of guidance/syllabus in place, significantly more contractors/consultants have these than asset owners.





**5.2.2.7. Who provides the training?**

The majority of inspection training (over 70%) is provided by the organisation, however some organisations make use of external training courses such as those provided by Thomas Telford, e.g. Bridge Maintenance and Inspection Course.



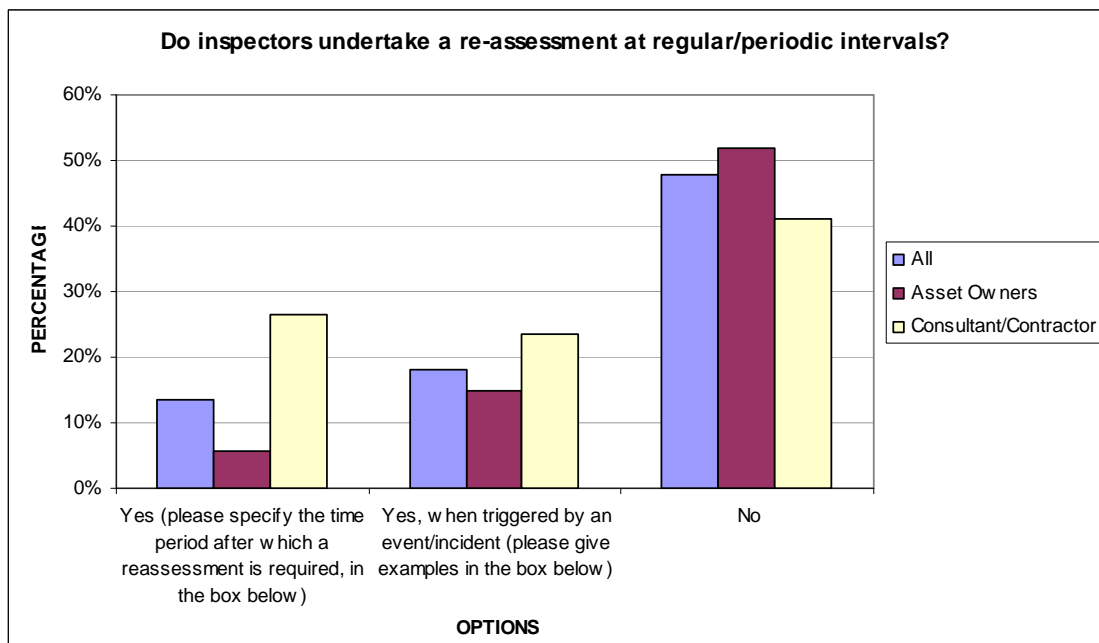
**5.2.2.8. Who pays for the training?**

Of those who completed the survey, just over 70% responded to this question. All respondents indicated that their organisation pays for the training.



**5.2.2.9. Do inspectors undertake a re-assessment at regular/periodic intervals?**

Around 50% of organisations do not undertake periodic re-assessment of inspectors. 13% of organisations undertake re-assessments while a further 18% do so when triggered by an event/incident.



According to some of the survey responses, re-assessment of inspectors takes place:

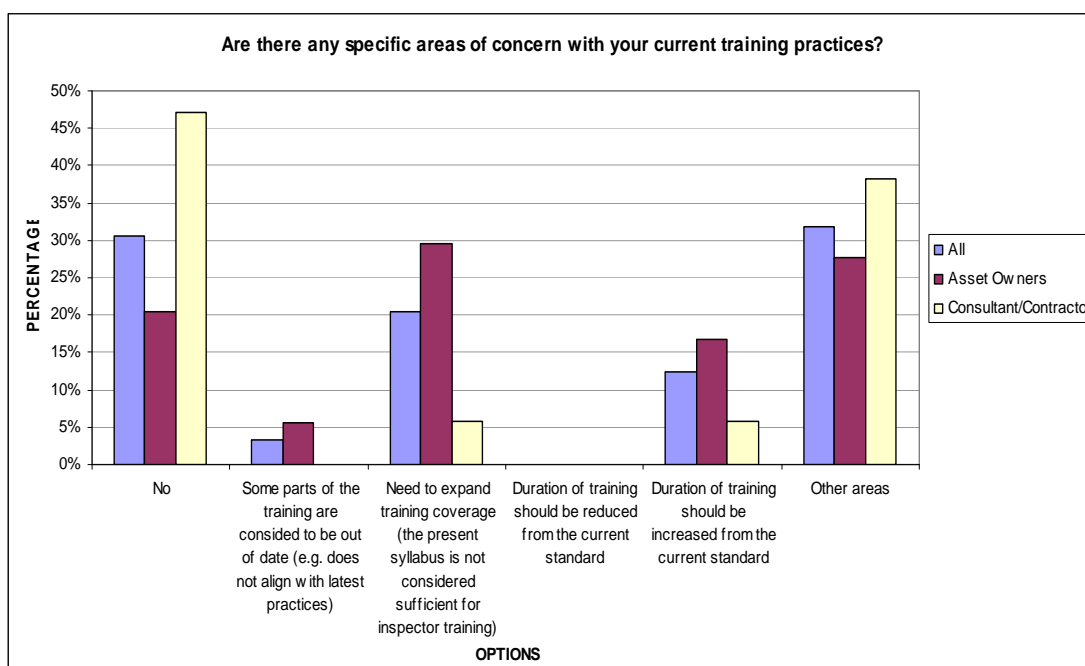
- Every 5 years
- Every 2 years

- Annually
- If control/audit inspection findings are significantly different from inspector's findings

**5.2.2.10. Are there any specific areas of concern with your current training practices?**

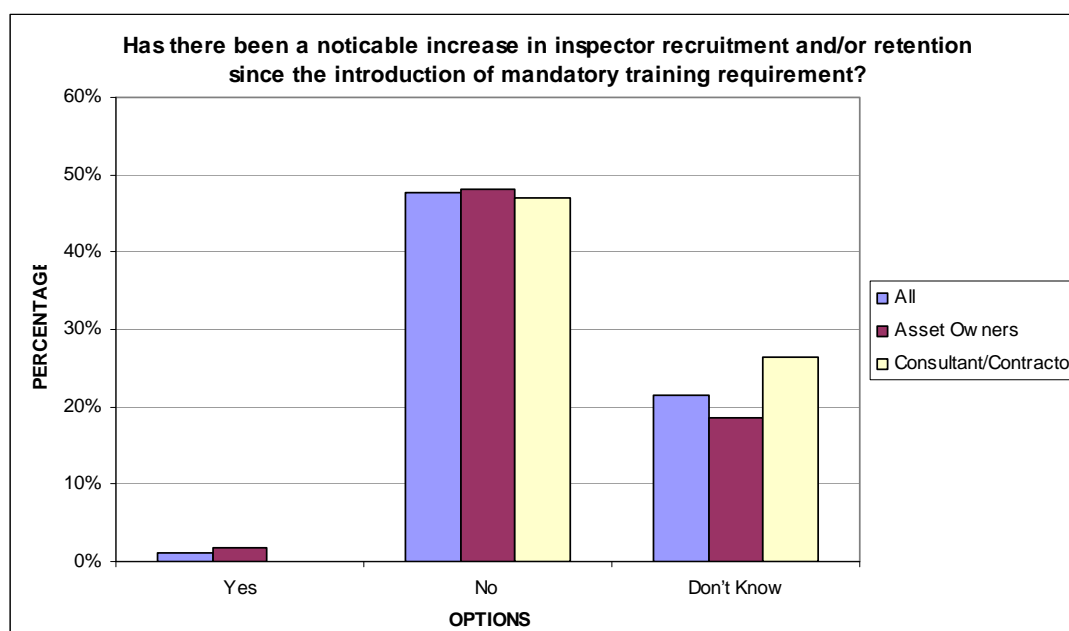
About 30% of respondents do not have any concerns with existing training, however some 20% feel the scope of the training needs to be expanded and 14% believe the duration needs to be extended. Areas of concern for some of the organisations were absence of:

- A formal training programme for bridge inspectors, and
- Particular standards or rules governing the requirements or level of training an inspector should have.



**5.2.2.11. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of training requirement?**

The majority of organisations do not feel their current training arrangements have resulted in a noticeable increase in the recruitment and retention of inspection staff. However, the current training arrangements do not constitute a nationally recognised and consistent approach. As such, these figures should not be taken to reflect the potential positive impact that a nationally recognised formal certification scheme/accredited qualification would have.



#### 5.2.2.12. Are there any indicators to measure the success of the training programme?

Some 37% of organisations do not have any indicators/measures in place; however, 14% do regular QA checks while 23% regularly audit a selection of inspection reports. Some of the other measures include:

- Chartered engineers processing all inspection reports; it is assumed they should be able to detect fluctuations in reporting standards and feedback any issues to the inspectors either individually or in groups;
- Undertaking inspections with other authorities in which; each authority inspects the same batch of bridges and compares results;
- Introduction of feedback loop to inspectors; providing regular feedback is considered necessary to maintain the level of quality.



### 5.2.2.13. Improvements noticed since the introduction of the training

The majority of the organisations believe there has been an improvement in the overall quality of reporting and approach to inspecting following the introduction of training, including health and safety aspects. Some of the other improvements noticed by the organisations were:

- Compliance with current best practice, i.e. Inspection Manual, Management of Highway Structures: Code of Practice;
- Ease of utilisation of information by engineers to identify forward work programme;
- Removal of uncertainty regarding quality and experience of Team Leaders.

### 5.2.3. Responses from Organisations who do not provide Training

#### 5.2.3.1. Why is inspector training not required?

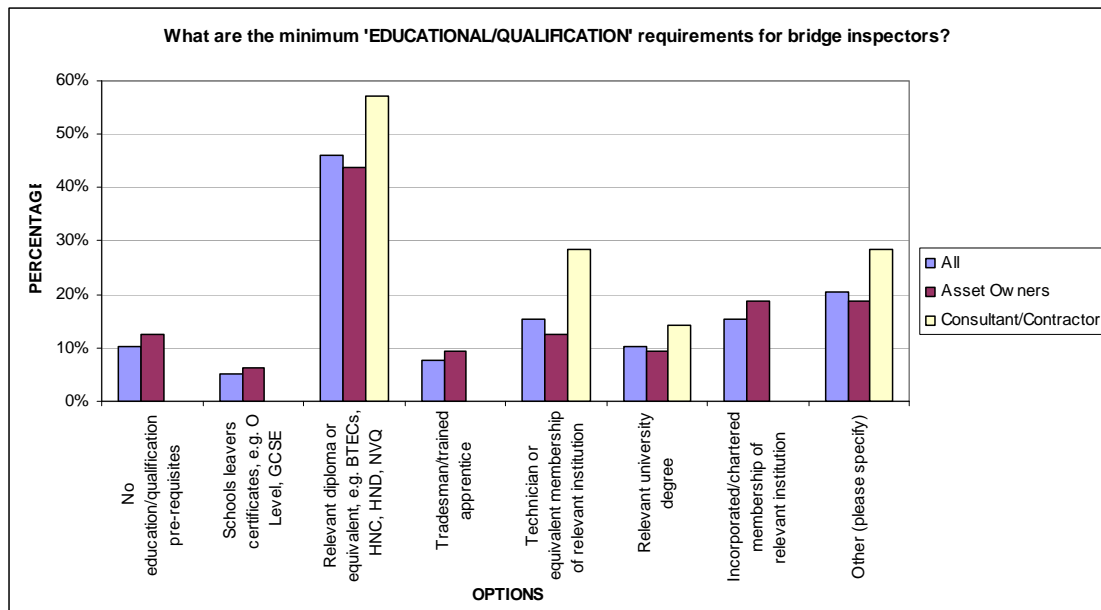
The following are a selection of responses explaining why inspector training was not required/provided:

- External Consultants undertake inspections so no in-house training is required (this response was given three times).
- No formal training/qualification exists for highway bridge inspectors. The competence/experience is assessed at interview. In-house training was given when new BCI inspection regime was brought in and the authority participates in BCI comparison workshops.
- No formal training provided, but experienced staff are used and inspection reports compared against previous standard reports for compliance.

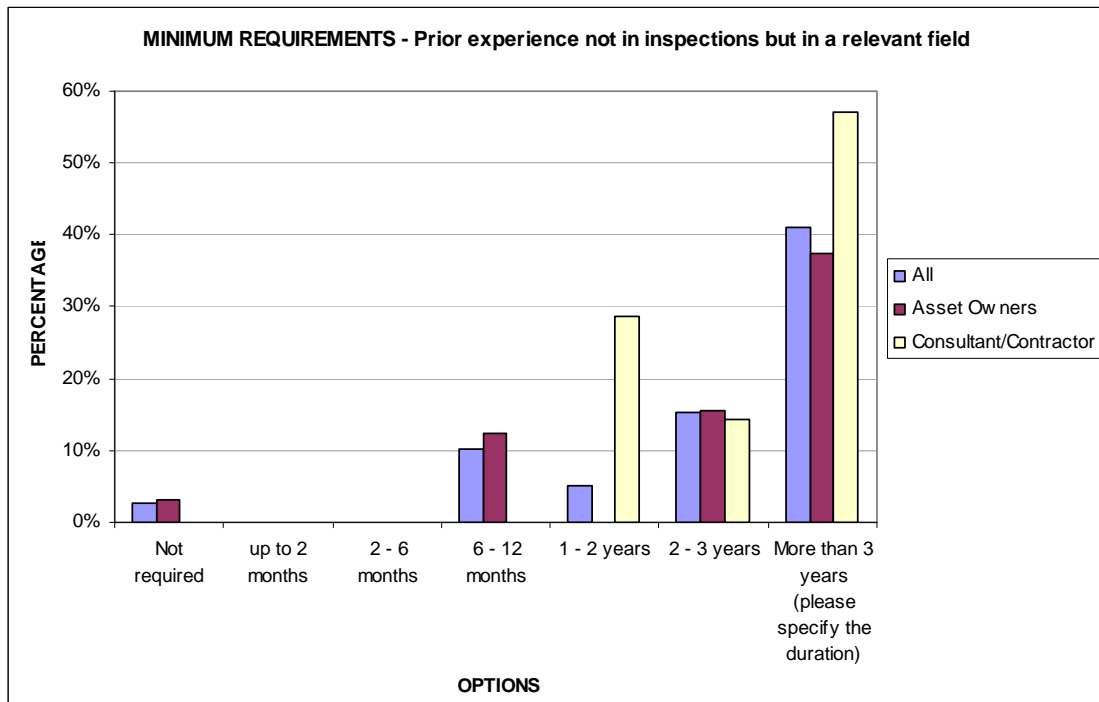
- No formal training is currently provided but it is considered necessary that inspectors are competent; as such the training requirements are being reviewed.
- A chartered engineer assesses an inspector's work prior to completion.
- No national training programme is available for highway bridge inspectors; also there are no senior staff within the organisation with relevant experience to offer in-house training.
- No national training for highway bridge inspectors is available.
- No recognised courses/accredited qualification/certification scheme available for highway bridge inspectors. In-house "guidance" provided to try and provide some consistency of approach.
- Informal training given by the Senior Engineer who line manages the inspector. Accompany Principal Inspector when they need assistance or safety practices require multi staffing. Generally, they learn as they go along and are advised by the managing engineer as whether they are reporting correctly.
- Current Bridge Inspector has suitable previous engineering experience, previous inspectors were in the post for 20+ years, no reason to think otherwise for this one!
- Formal training was not considered necessary; basic training is provided but there is no "programme" or "enrolment".
- Judgement of suitability of individual to undertake inspections based upon informal assessment of knowledge and experience. If we were advertising for new inspectors post we would require a minimum level of qualification, e.g. BTEC, IEng or equivalent
- Use of experienced ex-construction site staff is considered adequate.
- There is no recognised inspector training course/accredited course qualification available for bridge inspectors to attend. If such a course was available both the bridge inspector and the rest of our organisation would sign up to it.
- No formal training process available in the council. Training obtained onsite and through shadowing consultants and external inspectors and carrying out inspections in accordance with the "Inspection Manual for Highways Structures".

#### **5.2.3.2. What are the minimum 'Educational/Qualification' requirements for bridge inspectors?**

Although there are no formal inspector training requirements, some 46% of organisations still have a minimum educational requirement of a relevant diploma and require the member of staff to have six months plus of relevant experience.

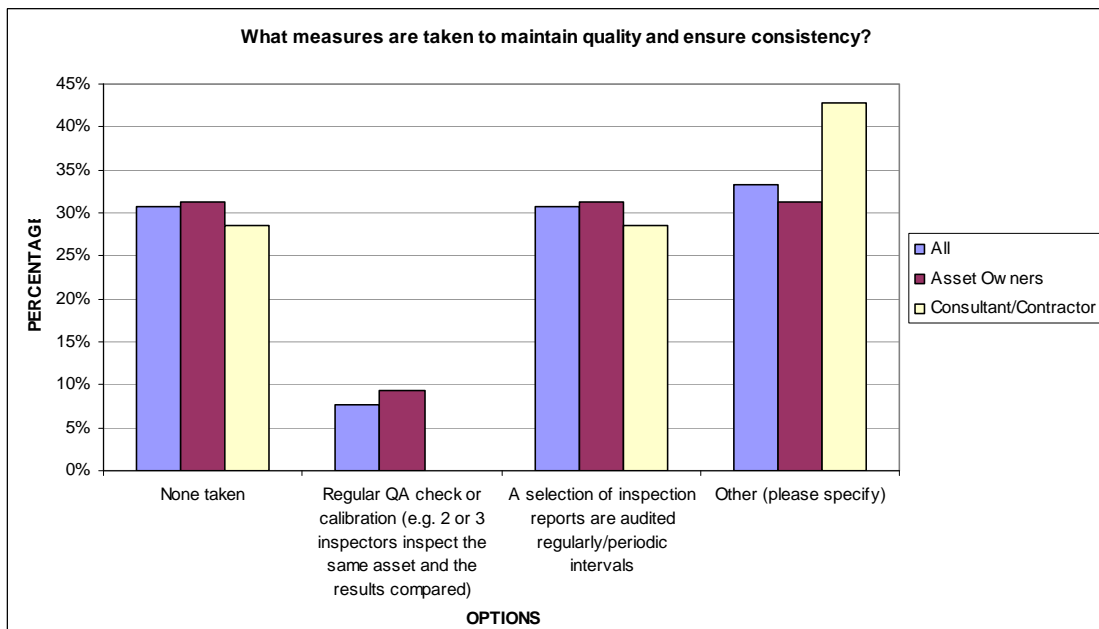






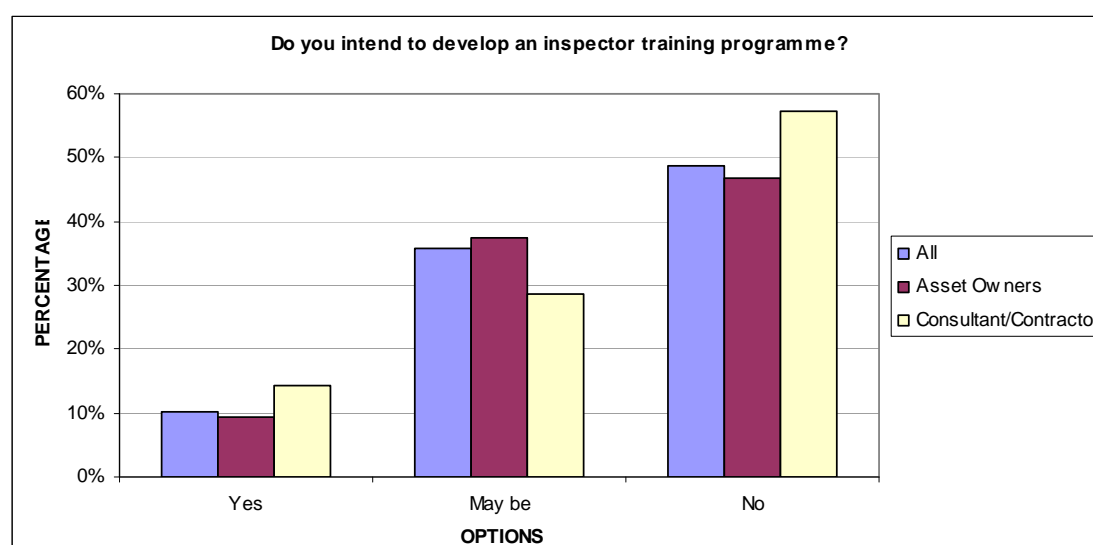
**5.2.3.3. What measures are taken to maintain quality and ensure consistency?**

31% of organisations take no measures while another 31% undertake a regular/periodic audit of a selection of inspection reports.



**5.2.3.4. Do you intend to develop an inspector training programme?**

Only 10% of organisations replied “yes” when asked if they intend to develop an inspector training programme, however 36% replied “maybe”.



### 5.3. Responses from Overseas Bridge Owners

Fifteen responses were received to the international questionnaire survey, the organisations that responded were:

- Estonia – Technical Centre of Estonian Roads Ltd.
- France – SNCF, Engineering Headquarters, Bridge and Tunnel Department
- Germany – Federal Highway Research Institute (BAST)
- Ireland – National Roads Administration, NRA
- Latvia – State Joint Stock Company, Latvian State Roads
- New Zealand – Opus International Consultants, on behalf of New Zealand Transport Agency; formerly Transit NZ
- Norway – Norwegian Public Roads Administration
- Serbia and Montenegro – The Highway Institute
- Slovenia – Slovenian National Building and Civil Engineering Institute
- Sweden – Swedish National Rail Administration
- Sweden – Swedish Road Administration, Road Maintenance and Operations
- Switzerland – DTEE / Service routes et cours d'eau / Valais / Suisse
- United States – Collins Engineers, Inc. Chicago

The responses comprised:

- Seven asset owners, and

- Eight consultants/contractors that carry out inspections on behalf of the asset owner.

Some 36 different inspection types (that are equivalent to General and Principal Inspections in the UK) were identified. For the 36 inspection types, the following training requirements were observed:

- Mandatory – 36%
- Training – 50%
- No Training – 14%

The majority of the organisations therefore consider their existing procedures to constitute formal “Training” of inspectors.

### 5.3.1. Mandatory Training

The following table summarises the survey findings for the overseas organisations that have a ‘Mandatory’ training requirement.

**Table 14: Summary of International Survey Findings – Mandatory Training**

ID	Question	Response
1	When was the mandatory requirement introduced?	40% in the period 1985 to 1990; 30% in the period 1990 to 1995; and 10% in 1970 to 1975, 2000 to 2005 and "Don't Know"
2	Why was mandatory inspector training introduced?	In 50% of cases mandatory inspector training was: <i>'Considered to be a good practice e.g. quality, consistency, competence etc.'</i> , in 15% it is a Government requirement.
3	Educational pre-requisites	27% of organisations accept Tradesmen/Trained apprentice and 27% accept Incorporated /Chartered member of a relevant institution. 18% of organisations accept relevant university degree and 18% accept relevant diploma or equivalent e.g. recognised vocational qualifications. 9% accept school leaver certificates.
4	Prior Experience:	
	<i>Prior inspection experience</i>	60% of the organisations require prior inspection experience of 1 – 3 years. 20% require experience of more than 3 years The remaining 20% require no prior experience
	<i>Prior experience not in inspections but in a relevant field</i>	78% of the organisations do not require any prior experience in a relevant area.
5	What does inspector certification typically involve?	

ID	Question	Response
	<i>For staff with no experience</i>	Inspector certification typically involves a combination of all four options: classroom learning (26%), written exam (33%), on-site training (22%) and practical exam on-site (19%).
	<i>For experienced staff</i>	For experienced staff a practical exam on-site holds a lower percentage (13%) as compared to staff with no experience. Experienced staff are mainly required to undertake classroom learning (31%), written examination (27.5%) and on-site training (27.5%).
6	Duration of Training:	The following results indicate that staff with no experience are required to undergo a longer duration of training compared to experienced staff.  One organisation provided the following definition for experienced staff: "Registration as a professional engineer".
	Course / Classroom learning	<b>For staff with no experience:</b> 43% responded 2 to 6 months, and 29% responded 2 to 4 weeks;  <b>For experienced staff:</b> 56% responded 2 to 3 days, 44% responded 4 to 10 days.
	On-site Training	<b>For staff with no experience:</b> 50% responded 2 to 6 months  <b>For experienced staff:</b> 25% responded 2 to 3 days, 38% responded 4 to 10 days
7	What certification is received from the training?	43% responded 'Other' which included exam with approved results and specific certification.  36% responded 'Industry recognised qualification'  21% responded 'Technical membership of an organisation'
8	Training Course/Classroom Learning Content typically consists of:	Around 80% of training courses cover all five options presented in the questionnaire: <ul style="list-style-type: none"> <li>• Basic asset knowledge (includes a brief introduction to inspection types, assets, materials, etc.)</li> <li>• Planning and organising inspections (procedures, safety, technical terms/rules, etc.)</li> <li>• Methodology of inspection (on-site procedures, investigation equipment and techniques, etc.)</li> <li>• Producing inspection reports</li> <li>• Assessment of inspection data (understanding the obtained data, proposing actions after inspection)</li> </ul>
9	Is there a standard guidance document/syllabus that the training course follows?	54% of the organisations do not follow a standard guidance document.

ID	Question	Response
10	Who provides the training?	Your organisation – 58% External organisation – 42% Three of the external organisations that provide training are: <ul style="list-style-type: none"> <li>• Federal Highway Administration (FHWA) – U.S.A</li> <li>• Swedish National Road Administration</li> <li>• University</li> </ul>
11	Typical Cost of the course	The typical cost of the training course ranges from £300 - £1600
12	Who pays for the training?	54% of the organisations pay for an individual's training as opposed to 46% of the organisations where the individuals pay for their own training.
13	Do inspectors undertake a re-assessment at regular/periodic intervals?	The majority (69%) of the organisations do not conduct a re-assessment of inspectors. The remaining 31% have suggested a re-assessment period of 3 years or a refresher course every 5 years.
14	Are there any specific areas of concern with your current training practices?	47% of the organisations have no areas of concern with their current training practices. 17% feel the need for expanding the training coverage. 12% feel that the duration of training should be increased from the current standard. A few of the reasons given by the remaining 24% are: <ul style="list-style-type: none"> <li>• Introduction of a practical training course to complement the theoretical course</li> <li>• Introduction of an advanced refresher course</li> </ul>
15	Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of mandatory training requirement?	54% of the organisations have observed no improvement in inspector recruitment or retention, 38% don't know, while 8% responded yes.
16	Are there any indicators to measure the success of the training programme?	39% of the organisations audit a selection of reports regularly/at periodic intervals. Of the 44% that responded 'Other', their measures include: <ul style="list-style-type: none"> <li>• Federal Highway Administration runs numerous tests to improve consistency of results</li> <li>• Road administration regularly checks the result of the inspections</li> <li>• QA programme in place</li> <li>• Bridge managers review results and spot-checks of the data are undertaken nationally.</li> </ul>

ID	Question	Response
17	Please provide details of any improvements that have been noticed since the introduction of the training	One organisation provided the following: Inspection reports show a consistency of Condition rating with a variation no more than 5%.

### 5.3.2. Training

The following table summarises the survey findings for the overseas organisations that consider their existing procedures to constitute formal “Training” of inspectors.

**Table 15: Summary of International Survey Findings –Training**

ID	Question	Responses
1	Why was inspector training introduced?	For 87% of the organisations the reason for introducing inspector training was: ‘ <i>considered to be a good practice e.g. quality, consistency, competence etc.</i> ’
2	Educational pre-requisites	24% of the organisations accept ‘technician or equivalent membership of a relevant institution’. 19% do not require any educational qualification Equal percentages (14%) of organisations accept a school leavers certificate and relevant diploma or equivalent. 10% of organisations accept relevant university degree
3	Prior Experience:	
	<i>Prior inspection experience</i>	64% of the organisations require no prior experience in the field of inspections.
	<i>Prior experience not in inspections but in a relevant field</i>	50% of the organisations do not require prior experience in a field different to inspection. 40% of the organisations require 2 – 3 years of prior experience in a field different to inspection
4	What does inspector training typically involve?	
	<i>For staff with no experience</i>	For most of the organisations, inspector certification typically involves a combination of classroom learning (46%) and on-site training (41%).
	<i>For experienced staff</i>	For experienced staff, inspector certification typically involves a combination of classroom learning (44%) and on-site training (56%).
5	Duration of Training:	
	Course / Classroom learning	<b>For staff with no experience:</b> 50% responded 2 to 3 days, 21% responded 4 to 10 days; 21% responded 2 to 6 months.

ID	Question	Responses
		<b>For experienced staff:</b> 83% responded 2 to 3 days
	On-site Training	<b>For staff with no experience:</b> 44% responded 2 to 3 days, 33% responded 2 to 6 months. <b>For experienced staff:</b> 67% responded 2 to 3 days
6	Training Course/Classroom Learning Content typically consists of:	Around 75% of training courses cover all five options presented in the questionnaire: <ul style="list-style-type: none"> <li>• Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)</li> <li>• Planning and organising inspections (procedures, safety, technical terms/rules etc.)</li> <li>• Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)</li> <li>• Producing inspection reports</li> <li>• Assessment of inspection data (understanding the obtained data, proposing actions after inspection)</li> </ul>
7	Is there a standard guidance document/syllabus that the training course follows?	55% of the organisations follow a standard guidance document.
8	Who provides the training?	Your organisation – 64% External organisation – 36% Two of the external organisations quoted that provide training are: <ul style="list-style-type: none"> <li>• NZ Institute of Highway Management</li> <li>• University</li> </ul>
9	Typical Cost of the course	The typical cost of the training course ranges from £300 - £1600
10	Who pays for the training?	64% of the organisations pay for an individual's training as opposed to 36% of the organisations where the individuals pay for their own training.
11	Do inspectors undertake a re-assessment at regular/periodic intervals?	64% of the organisations do not conduct a re-assessment of inspectors. The remaining 36% have suggested a re-assessment period of 5 years.
12	Are there any specific areas of concern with your current training practices?	25% of the organisations have no areas of concern with their current training practices. 25% feel the need for expanding the training coverage. 21% feel that the duration of training should be increased from the current standard. 8% feel that some parts of the training are out of date. A few of the reasons given by the remaining 21% are: <ul style="list-style-type: none"> <li>• The training attempts to cover too much in a short time. It is not sufficiently in-depth to cover the</li> </ul>

ID	Question	Responses
		majority of structures. Additionally there is no formal testing of participants. It provides only a general background to inspection. <ul style="list-style-type: none"><li>After training, there should be a kind of formalized program for doing inspections with guidance from experienced staff members.</li></ul>
13	Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of formal training?	79% of the organisations have observed no improvement in the inspector recruitment or retention, the remaining 21% responded as 'Don't Know'
14	Are there any indicators to measure the success of the training programme?	43% of the organisations have no indicators to measure the success of the training programme. 21.5% carry out a regular QA check 14% audit a selection of reports regularly/at periodic intervals. Of the 21.5% that responded with 'Other', their measures include: <ul style="list-style-type: none"><li>Audits by the safety board</li></ul>
15	Please provide details of any improvements that have been noticed since the introduction of the training	None provided

### 5.3.3. No Training

The following table summarises the survey findings for the overseas organisations that consider their existing procedures to constitute "No Training" of inspectors.

**Table 16: Summary of International Survey Findings – No Training**

ID	Question	Responses
1	Why is inspector training not required?	All of the organisations selected the option 'Other'. Only one organisation provided the following reason: <i>Training is not regulated yet. Only formal education in civil engineering is required.</i>
2	What are the minimum 'Educational/Qualification' requirements for bridge inspectors?	All the organisations require a 'relevant university degree'.
3	Prior Experience:	
	<i>Prior inspection experience</i>	20% of the organisations require no prior experience in the field of inspections. The remaining 80% require one or more years of inspection experience.



ID	Question	Responses
	<i>Prior experience not in inspections but in a relevant field</i>	No responses
4	What measures are taken to maintain quality and ensure consistency?	75% of the organisations do not have any indicators or measures to review/maintain the quality and consistency of inspections. 25% audit a selection of reports regularly/at periodic intervals.
5	Do you intend to develop an inspector training programme?	75% responded as 'May be', 25% responded 'yes'.
6	Approximate timeframe in which you plan to introduce your training programme	One organisation intends to introduce a training programme for internal staff within 2 years.

## 5.4. Conclusions

The key conclusions drawn from the UK and international questionnaire survey are:

- The majority of organisations in the UK (over 65%) consider themselves to have formal inspector training in place, compared to 76% internationally (where the latter includes *Mandatory Training and Training*).
- Within the UK, there appears to be a degree of uncertainty regarding what constitutes formal training for inspectors. Organisations with similar training arrangements in place answered the questionnaire in markedly different manner, with some claiming to have "Training" and others claiming to have "No Training".
- The educational prerequisites required for inspection staff vary considerably, from none, to relevant diplomas, degrees and incorporated/chartered status.
- Most organisations do not require prior inspection experience when recruiting inspectors, although it is desirable. This requirement appears to be linked to the small number of experienced inspections available, thus stipulating prior inspection experience as essential would severely limit an organisation's chances of recruitment, i.e. there is a difference between what an organisation ideally wants and what they place in an advertisement.
- There is evidence to suggest that the need for mandatory training and the duration of inspector training (both classroom and on-site) decreases as the level of educational prerequisites and/or prior inspection experience increases.
- There is good consistency in the areas covered by classroom training.
- Around one third of the international organisations surveyed have mandatory inspector training practices in place.
- There are variable practices on formal re-assessment of inspectors, with over 40% not re-assessing. However, many organisations indicated that they audit inspection reports to assess quality and consistency.

- There is some limited evidence that suggests mandatory inspector training has improved the recruitment and retention of inspection staff.
- Of those organisations that do not have *Mandatory Training* or *Training* in place, only a small percentage said they intend to develop training courses.
- For the majority of the organisations in the UK, the absence of a nationally recognised training programme or accredited qualification for bridge inspectors was the core reason for not having more robust inspector training in place.

In general, the findings from the questionnaire survey indicate that a nationally recognised inspector-training programme in the UK would bring much needed consistency to current practices. Given the wide variability in current practices, there is a significant risk that bridge owners are being exposed to undue liability that could be mitigated through the introduction of appropriate inspector training.

## 6. In-depth Interviews

### 6.1. General

In-depth interviews (either face-to-face or over the telephone) were conducted with the organisations listed in Table 17. These organisations were considered to provide a reasonable cross-section of organisations in the UK that have bridge inspection responsibilities.

**Table 17: Organisations interviewed**

Organisation	Contact
AM Scott - term maintenance contractors on Highways Agency trunk road network	Peter Hemsley and Tom Dean
Atkins - term inspection contractor to Network Rail	Edmund Kirby
British Waterways	Rod Howe
Gateshead Metropolitan Borough Council	Nigel Burn
Hull City Council	Andrew Taylor
Metronet - supply chain contractors to London Underground	Morris Flaum
Mouchel - term inspection contractor to Network Rail	Ian Dodgson
Rotherham Metropolitan Borough Council	Peter Dixon
Surrey County Council	Graham Cole and Maureen Robson
Wigan Metropolitan Borough Council	Bob Speight

The interviews sought to capture further details, beyond the questionnaire survey, on current inspector training practices and to gauge the organisation's opinions on the need for formal inspector training. The general areas of discussion were:

1. Current inspector training and competence practices;
2. The perceived benefits of formal inspector training for the organisation, including discussion on why is it needed and what must it address;
3. Practical inspector training/competence arrangements;
4. Any concerns regarding the introduction of formal training.

Time was allocated at the end of the interview for open discussion on inspection training. The interview lengths varied from 30 minutes to over two hours. The following sections present the key findings by topic and provide a discussion on the issues any formal training programme should seek to address.

---

## 6.2. Current Inspection Training and Competence Requirements

### 6.2.1. Inspection Arrangements

The organisations interviewed ranged from those with small structure stocks (less than 100 bridges) to those with large stocks (more than 1000 bridges). Some did all of their inspections in-house, whereas others were employed by the asset owner to undertake inspections. Some did a proportion of inspections in-house and contracted out the remaining, while others contracted out General Inspections and/or Principal Inspections.

The majority of organisations did not specify (or have specified to them) formal or detailed competence requirements for inspection staff. Competence requirements, where specified, typically adopted one of the following forms:

- *Competent staff will be used for inspections* – but ‘competent’ is not defined in detail, e.g. qualifications and experience;
- *A chartered engineer will undertake the inspections* – this is normally specified in relation to Principal Inspections;
- *CVs of consultant/contractor staff proposed for inspections are provided to the asset owner* – it is then the responsibility of the asset owner to determine if the proposed individuals are competent.

Although there is considerable variability in existing practices, it appears that all organisations would benefit from a consistent and industry wide recognised definition for a ‘competent inspector’.

### 6.2.2. Recruiting Inspectors

Inspectors in a number of the organisations interviewed have been in their position for a long time, up to 20 years in some instances. As such, these organisations have limited/no-recent experience of recruiting inspectors and voiced concerns about the difficulties they expect to face in the near future when seeking to replace inspectors who move on or retire.

Organisations that recruit inspectors on a more regular basis indicated that there is a limited pool from which to recruit experienced bridge inspectors. This has resulted in a number of different approaches to recruitment, including:

- *Lowering Expectations* – lower experience and education requirements, but through interviews seek to establish that the individual has the necessary attributes that indicate, given appropriate on-the-job training, they will be a competent inspector.
- *Engineering Technician Career* – inspection is one of the activities within a technical engineering career path; therefore, potential employees are not put off by a career of only doing inspections (this is discussed further in Section 6.2.3).
- *Improved Remuneration Packages* – offer improved remuneration packages to encourage the best/most-experienced inspection staff. Due to the package on offer, this approach necessitates the organisation to undertake more rigorous interviews than the above options (e.g. question the candidates on specific topics such as Health and Safety, Inspection Methodology and Environmental Considerations); in some instances the interview also includes formal assessment techniques (e.g. multiple choice questionnaire);

A common theme that arose under this topic of discussion was the need for inspectors to be *trustworthy*. This was expressed in different ways, including, the bridge manager/engineer must be confident that:

- The inspector has actually done the work and not completed the inspection form while sitting in the car.
- The inspector is accurately reporting what they see.

This line of questioning indicated that the current shortage of experienced bridge inspectors is causing difficulties in the industry and, at present, there is not a coordinated approach to addressing this issue. Instead, many bridge owners are adopting strategies that best meet their immediate needs. While this may deliver short-term success, it is unlikely to deliver long-term success because it is fragmenting the industry's approach to inspector recruitment and training, thus reducing the opportunity for sharing resources and practices. A nationally recognised bridge inspector-training programme or accredited qualification would help bring organisations together under a common approach/framework to inspector training.

### 6.2.3. Inspection Career vs. Engineering Career

A number of views were expressed, they can be broadly categorised as follows:

- *Inspection Career* – inspection is a full time career for the relevant staff; this approach is only viable for larger organisations and consultants (although not all large organisations adopt this approach). In these instances, considerable resources are expended on the recruitment and training of inspection staff, as such the organisations wish to retain these staff solely in an inspection role. However, the inspector's, where appropriate and where they seek to, are able to progress their career within the inspection domain, e.g. gaining experience with more complex structures or more specialist inspection techniques, developing inspection planning/supervising techniques, etc.
- *Inspection as Part of an Engineering Career* – inspection forms one component of the engineering career development path, both for those progressing towards Technician or Chartered status. The level of involvement in inspections differs between organisations, with some making it a major component of a Technical career path and others making it a minor component of a Chartered career path. In all instances, inspections are seen as one part of an engineer's required skill set, however the importance of inspection experience was stressed by many organisations because it is considered invaluable to a career in bridge maintenance/management.
- *Inspection as a Part-time Activity* – similar to the above point, inspection only forms one of the engineer's role. However, in this instance, it does not form part of the training and development; instead, the engineers within the 'Bridges Department' collectively deliver the inspection programme. This approach is primarily used because (i) there is normally insufficient inspection work to keep one member of staff fully occupied; and (ii) the organisation does not wish to have a "dedicated" inspection resource.

Bullet points two and three were found to be operating in parallel in a number of organisations, however in some cases (due to low staff turnover/recruitment) only bullet point three was in evidence. It should also be noted that while some staff wish to develop an engineering career others wish to develop an inspection career.

The implications of the above career options/paths need to be carefully considered when developing any formal training, for example:

- Can formal training be structured to accommodate meaningful career progression for those who wish to focus on inspections and associated activities, e.g. inspection planning and supervising?
- Can courses be offered at reasonable costs that enable all staff within the 'Bridge Department' to be trained (if not, organisations may be placed in a position where they can only afford to train one or two individuals and who would then be required to dedicate more of their time to inspections)?
- Can formal training requirements be readily aligned with, and contribute towards, Technician, Incorporated and Chartered career paths?

Effectively addressing the above issues (through appropriately priced and structured courses) is likely to be one of the biggest challenges for formal inspector training.

#### 6.2.4. Inspect vs. Interpret

Two approaches are used for reporting inspection information:

- *Inspect* – the primary role of the inspector is to 'report what they see', although they can, if they wish, provide information on cause and treatment. It is the role of the reviewing engineer to identify cause/s and determine priority, treatment and cost.
- *Inspect and Interpret* – inspectors are required to 'report what they see' and provide their interpretation, e.g. cause, priority, treatment and outline cost. These are reviewed by the engineer and amended accordingly.

Both approaches have their benefits and drawbacks, e.g. is the former making best use of the pair of eyes on the ground, is the latter introducing inconsistency because condition scores are "interpreted" before they are recorded, thus influencing the condition recorded?

An important consideration is whether one nationally recognised training programme can be set up that supports both approaches. The consensus was that this is achievable by setting up the course to cater for varying levels of competence, with a higher level of competence being required to provide an interpretation of inspection information.

#### 6.2.5. Education

Organisations were asked what level of formal education they would seek if they were recruiting an inspector now (this was to enable those who have not recruited an inspector in a number of years to take a view on education requirements). The level of formal education sought by the organisations included:

- *None* – some felt formal education was not relevant when the individual can demonstrate appropriate experience.
- *School leavers certificates/GCSE* – some organisations seeking GCSE Grade C or above in English, Maths and possibly Science, however this was normally associated with recruits that would also be trained in wider bridge maintenance activities.
- *HNC/HND in a relevant engineering field* – or demonstrate that they are currently progressing towards these qualifications; again, this was normally associated with recruits that would also be trained in wider bridge maintenance activities.

Generally, when the role is solely inspection oriented there is less emphasis on formal education qualifications and more emphasis on experience. However, when the role includes inspections as part of a wider engineering technician role, then organisations seek more formal education qualifications as a means of assessing competence and capability.

### **6.2.6. Experience**

All organisations stated their preferred position, when recruiting inspectors, is to recruit those with relevant experience. However, the reality is that there is a severe shortage of experienced inspectors in the industry, and all of these are already employed. Therefore, to recruit an inspector it normally means enticing them away from their current inspection role.

As such, those recruiting dedicated inspectors (as opposed to those recruiting engineering technicians who do inspections as part of their job) normally look for tradesmen and clerks of work who have experience in a relevant area. When interviewing potential inspectors the organisation is looking for someone who comes across as responsible, trustworthy and is aware of their own limitations.

### **6.2.7. Classroom Training**

Most organisations provide limited classroom training (typically a half-day to one-day session) and provide the inspector with the relevant background documentation, e.g. Inspection Manual. Others provide more extensive training, covering two to five days (maybe several weeks when background reading and discussion are taken into account). The majority of training is provided internally although some make use of external training courses (the latter are discussed in Section 7).

### **6.2.8. Vocational Training**

All the organisations interviewed make use of vocational training, i.e. a Buddy System whereby the new/inexperienced inspector is teamed up with an experienced inspector to learn the job. The length of this period varies considerably between organisations (from extremes of one day to 18 months); with the Rail sector generally having the longer and more formally structured periods. However, it is important to recognise that the length of the period is also dependant on the type of role the inspector is being trained for, i.e. much shorter period required for simple structures than complex structures.

As the inspector progresses from one level of complexity to the next, they would receive a Buddy for an appropriate period. Generally, the Buddy approach would involve a gradual change from the 'trainee' watching to actually doing the inspection. Some organisations would seek to cover as wide a range of structure types and forms as possible during the Buddy period.

Other points made included (i) the inspector goes out with an engineer so they understand what the engineer wants; and (ii) staff that are not dedicated inspectors are required to undertake a certain number of inspections each year in order to maintain the level of ability/competence.

### **6.2.9. Assessing Competence**

Competence of the inspector to undertake unsupervised inspections is normally assessed by the Supervising Engineer, either through review of the quality of inspection reports and/or going on-site with the inspector to observe them at work. Several organisations have formal



processes in place for the on-going review of inspection reports, using this to identify areas where more training is required.

### **6.3. Practical Training and Competence Arrangements**

The discussion focused on education prerequisites, classroom training, vocational training and experience, and on-going review/reassessment

#### **6.3.1. Education Prerequisites**

The following views were expressed:

- Education prerequisites should be desirable rather than mandatory, e.g. GCSEs, school leaver's certificate.
- There should be experience equivalents defined, i.e. so many years experience in a suitable area is equivalent to certain grades at GCSEs, etc.
- Experienced inspectors, who can provide evidence of their experience, would be able to enter at higher levels of competence (if a multi-tiered inspection competence scheme is developed).
- Consideration should be given to general aptitude and technical abilities, possibly with the former being relevant to those new to inspections while the latter is relevant to those with prior inspection experience.

It was suggested that a simple, e.g. multiple choice, entrance exam could be adopted. This could be used to determine those suitable for entering the training scheme and at what level they should enter the scheme.

#### **6.3.2. Classroom**

All agreed that some form of classroom training (likely to be delivered by an external training organisation) was required. Opinions varied on the duration of classroom training, with a number feeling 2 to 4 day courses were appropriate, while others feeling a limit of several days a year was more appropriate. There was consensus that more than one training course would be required, ranging from beginners/basic course to advanced/seniors course.

There was a consensus view that well structured and interactive courses were required in order to sustain concentration levels. It was suggested that courses should be structured, where appropriate, to include practical/on-site sessions, where the delegates could apply the techniques they have been introduced to on the course. It was felt that this approach would be more successful and help consolidate learning through practical application.

Training courses should cover the contents of the Inspection manual and other recognised standards/documents, e.g. Network Rail. Topics suggested included: why we inspect, structural forms, mechanics of structures, defect types, H&S, materials, reporting and access.

Opinions varied on the need for and type of exam/assessment that should accompany classroom training. Some felt a simple multiple-choice exam was appropriate; while others felt, practical/verbal exams would be more appropriate.



It was suggested that consideration should be given to web based training and how this could be utilised to reduce time spent away from the office.

### 6.3.3. Vocational

Opinions varied considerably regarding the length of vocational training and how much of this should include Buddy training. Suggestions, linked to structure types and complexity, ranged from one week to nine months.

There was consensus that a logbook should be maintained by inspectors, or their supervisor, to record and sign-off their activities. The logbook would then form part of assessment evidence when moving from one inspection competence level to the next. There was also consensus that vocational training should be inter-spliced by classroom training at the appropriate times, e.g. when the inspector can use a combination of vocation experience/training and classroom training to demonstrate they are ready to progress to the next level of competence.

From the opinions expressed, it appears this is an area that will require considerable debate before national agreement can be reached; it is suggested that this is a key area that the next phase of the project should address (in particular the differing needs of the highway and rail environments). A key issue that will need to be considered is what is the minimum number of structures that need to be inspected to demonstrate competence in an appropriate range of structure types/forms, material, and defects?

### 6.3.4. On-going Assessment and Review

The following views were expressed:

- It will be necessary to define the number and type of inspections that need to be conducted each year to maintain competence;
- The Supervising Engineer should review their inspectors on an on-going basis, seeking to identify areas where quality can be improved and specific training (classroom or vocational) may be required;
- A five-year reassessment/refresher period was considered appropriate.

## 6.4. Perceived Benefits of Accredited Inspector Training

A significant number of benefits were identified. There was a high degree of consistency between the organisations on the perceived benefits (or expectations) of formal inspector training. The benefits identified were:

- Job Profile and Career Progression – formal qualifications would raise the profile of the job and different levels of competence would provide a structured path for career progression.
- Reduce Liability – from two aspects:
  - Improve the likelihood that inspectors identify and report all relevant defects (especially serious defects) thereby reducing the potential for an incident; and
  - Enable the bridge owner to demonstrate that they comply with industry standard practice and competent staff are employed.

- Proof of Competence - will provide formal evidence (proof) of the competence of inspection staff giving the organisation confidence (trust) that they are appropriate for the role:
  - Internal – know who is competent for different inspection roles, e.g. General Inspection, Principal Inspection, simple structures, complex structures, etc.
  - External – will be able to ask for formal evidence that demonstrates the competence of staff from a consultant/contractor.
  - Contractor/Consultant View – will enable them to demonstrate to potential clients that their staff have the relevant competence; thereby it can support the marketing of services.
  - Recruitment – will enable organisations to ask for formal evidence when recruiting new inspection staff.
- Consistency – would improve consistency within and between organisations and ensure that inspection activities are undertaken to a common standard, i.e. the inspections are being done correctly, that improves the quality of the information:
  - Reporting – would improve consistency in how authorities are reporting bridge elements and condition (severity/extent).
  - Bridge Management – provide improved quality of information for maintenance planning (better targeting of resources) and other bridge management functions.
  - Government Funding – consistency was considered vital by Local Authorities if the Bridge Condition Indicator and Transport Asset Management Plans are to inform funding allocations.
- Flexibility – would provide organisations with greater flexibility in moving inspection staff around and sharing them with other organisations.
- Streamline Recruitment – will spend up and streamline the recruitment process for experienced inspectors because evidence of certification would form one of the requirements for the position.
- Efficient use of Public Resources – a nationally developed and coordinated training course would provide better value for money than separate bridge owners, or groups of bridge owners, developing their own bespoke courses.

## 6.5. Concerns Regarding the Introduction of Formal Training

The following table list concerns raised regarding the introduction of formal inspector training, the table also presents how these would be addressed.

Concern	How it would be addressed
<u>Grandfather Rights</u> – formal training must appropriately recognise the experience and skills of existing inspection staff.	Where experience and training can be adequately demonstrated there may not be a need to undertake the full range of training that a new starter would undergo.
<u>Take-up</u> – there may be slow/limited take-up by organisations and inspectors.	Every effort will be made to nationally promote the training and to demonstrate it is

Concern	How it would be addressed
	in their best interest; many large organisations are already on-board and it is envisaged this will encourage others to do the same.
<u>Value for Money</u> – the training must be Value for Money.	This is not be confused with “cheap”. This work indicates that organisations are willing to pay for better quality inspections but the cost of the training must be in proportion to the benefits gained, thereby demonstrating Value for Money. It will be necessary for the benefits to be clearly articulated and, if possible, quantified.
<u>Staff Retention</u> – consideration will need to be given to training investment verses staff retention. It would be difficult for smaller organisations if it is costly to train staff and then loose them to other organisations.	The training programme will give due consideration to organisation size and needs during Phase 2. In addition, the training is seeking to give all organisations access to a wide pool of competent staff therefore sharing of inspectors is likely to become more viable for small organisations.
<u>Reduce the Number of Inspectors</u> – there is a concern that it may reduce the number of capable inspectors within an office because the organisation can only afford to have one or two trained inspectors (compared to situations now where everyone in the office does a little bit of inspection work).	The format of the training developed under Phase 2 will seek to address the needs of those who do inspection activities full time and only as part of their activities. In addition, the training is seeking to give all organisations access to a wide pool of competent staff therefore sharing of inspectors is likely to become more viable for small organisations.
<u>Practical and Workable</u> – the training arrangements should be practical and workable within the wide diversity of bridge owners that exist (i.e. size and requirements). It should not place an undue additional burden on bridge engineers/managers to manage and deliver training.	This will be a core theme of Phase 2 and wide consultation and debate is planned in order to develop a training format that meets the requirements of all organisations.
<u>Flexible</u> – the training scheme should not be unnecessarily rigid, it should offer organisations sufficient flexibility to align the timing of activities with other cycles/activities in their office.	As above, this will be a key consideration under Phase 2. It is envisaged that the training would have considerable flexibility (both in content and timing) to meet varying needs.

Although the above concerns were raised, none of them were considered to be ‘show-stoppers’. All organisations were in strong support of introducing a nationally recognised inspector training scheme.

## **6.6. Conclusions**

The in-depth interviews were highly beneficial in gaining further insight into current practices and aspirations for training. While many of the inspector training practices varied considerably, their principles aligned well, i.e. small amount of classroom training while the majority is vocational/site based training and experience. All the organisations agreed that formal inspector training should adopt this format.

In general, the perceived benefits of inspector training significantly outweighed the concerns regarding its introduction.

## 7. Existing Training Courses for Bridge Inspectors

### 7.1. General

The following provides details of a sample of UK training courses that, to a greater or lesser degree, provide training for bridge inspectors. The courses presented below are provided by Sheffield Hallam University, Thomas Telford, Symmons Madge and Aston University.

In general, these organisations conduct short one or two-day courses covering topics associated with bridge inspections e.g. planning and preparing, defects associated with different materials, defect reporting, assessing condition data etc.

**Important:** other organisations in the UK provide courses relevant to bridge inspectors; the following are only a sample. Some examples of associated training (e.g. Heath and Safety, and Confined Spaces) are listed in Section 7.6.

### 7.2. Sheffield Hallam University

TRAINING ORGANISATION	SHEFFIELD HALLAM UNIVERSITY
COURSE	Bridge Inspection and Condition Assessment Procedures
COURSE DETAILS	<p><b><u>COURSE OBJECTIVES:</u></b></p> <p>The event provides information on:</p> <ul style="list-style-type: none"> <li>• Bridge Inspection Codes of Practice</li> <li>• Bridge Inspection Procedures</li> <li>• BCI Assessment of Inspection Data</li> <li>• Bridge Management Software</li> <li>• Site Visit to Bridges</li> </ul> <p><b><u>PROGRAMME OUTLINE:</u></b></p> <p>Introduction to Bridge Inspection Codes of Practice</p> <ul style="list-style-type: none"> <li>• Bridge Inspection Procedures <ul style="list-style-type: none"> <li>• site practice</li> <li>• data collection and input</li> <li>• severity descriptions</li> <li>• introduction to inspection proforma</li> </ul> </li> <li>• Site Visits to Bridges</li> <li>• Inspection Data Input into Database for BCI Assessment</li> <li>• Inspection Data Input to Bridge Management Software</li> <li>• BCI Assessment</li> <li>• BCI Assessment with Software</li> </ul>
COURSE DURATION	1 Day
COURSE FEE	£240 (excl. VAT)

### 7.3. Thomas Telford

TRAINING ORGANISATION	THOMAS TELFORD
COURSE	Bridge Assessment and Maintenance
COURSE DETAILS	<p>A two-day course that provides guidance on the assessment and maintenance of bridges and is intended to provide attendees with an understanding of the problems associated with bridge performance and enable them to develop appropriate assessment, maintenance and repair strategies.</p> <p>Day one looks at the deterioration of common bridge materials - concrete, masonry and steel - and provides guidance in developing strategies for testing, repair and replacement programmes.</p> <p>Day two considers Highways Agency guidance and requirements and utilises a number of case studies to develop assessment and maintenance procedures. In addition, problem areas such as joints, bearings and waterproofing are considered and the overall management of maintenance programmes discussed.</p> <p><b><u>COURSE OBJECTIVES:</u></b></p> <p>The course enables delegates to:</p> <ul style="list-style-type: none"> <li>• Recognise the common cause of defects in bridges</li> <li>• Plan a survey and interpret the results</li> <li>• Carry out a design assessment to Highways Agency requirements</li> <li>• Select appropriate maintenance and repair systems</li> <li>• Specify a cost-effective repair programme</li> </ul> <p><b><u>PROGRAMME OUTLINE:</u></b></p> <ul style="list-style-type: none"> <li>• Deterioration of concrete</li> <li>• Testing of concrete</li> <li>• Deterioration and testing of masonry</li> <li>• Deterioration and testing of steelwork</li> <li>• Steelwork repairs</li> <li>• Aspects of repair/replacement options</li> <li>• Current Highways Agency requirements</li> <li>• Planning an inspection and preparing for an assessment to Highways Agency requirements</li> <li>• Problems with joints/bearings and waterproofing</li> <li>• Management for maintenance and cost-effective repair programmes</li> </ul>
COURSE DURATION	2 Days
COURSE FEE	£545 (excl. VAT)

## 7.4. Symmons Madge

TRAINING ORGANISATION	SYMMONS MADGE
COURSE	Bridge Assessment and Maintenance and Repair
COURSE DETAILS	<p>The course examines the principal causes of deterioration in concrete, steel and masonry bridges. Methods of inspection and testing are discussed for these principal materials. The current approach to performing an assessment to UK Highway Agency requirements are outlined and illustrated through case studies.</p> <p>Repair methods are presented for concrete and steel bridge elements, and the special problems associated with bridge components (e.g. joints, bearings, waterproofing and parapets) are reviewed.</p> <p><b><u>COURSE OBJECTIVES:</u></b></p> <p>The course enables delegates:</p> <ul style="list-style-type: none"> <li>• Recognize common causes of defects in concrete/steel/masonry bridges.</li> <li>• Plan an inspection/testing program, and interpret the results.</li> <li>• Carry out an assessment (with supervision) to HA requirements.</li> <li>• Appreciate various repair/maintenance options.</li> <li>• Improve their appreciation of the avoidance of deterioration problems in the design of new bridge works and the repair of existing bridgeworks.</li> </ul> <p><b><u>PROGRAMME OUTLINE:</u></b></p> <p><b>Day 1</b></p> <ul style="list-style-type: none"> <li>• Introduction (UK Bridge Stock/ Assessment Program /Principal Problems)</li> <li>• Deterioration and Testing of Concrete (Deterioration Mechanisms)</li> <li>• Video (Consolidates early sessions)</li> <li>• Deterioration and Testing of Masonry and Steelwork</li> <li>• Steelwork Repairs</li> </ul> <p><b>Day 2</b></p> <ul style="list-style-type: none"> <li>• Current Highways Agency Requirements for Assessment</li> <li>• Planning an Inspection</li> <li>• Preparing for an Assessment</li> <li>• Case Studies</li> <li>• Problems with Joints, Bearings, Waterproofing, Parapets</li> <li>• Repair of Concrete Structures including video on Repairs</li> </ul>
COURSE DURATION	2 Days
COURSE FEE	£410 (excl. VAT)

## 7.5. Aston University

TRAINING ORGANISATION	Aston University, School of Engineering & Applied Science, Birmingham
COURSE	Post-tensioned Bridges – Determining condition and future solutions
COURSE DETAILS	Based on case studies from Europe and the United States, the course presents difficulties encountered in determining the condition of Post-Tensioned structures. A three-phase approach to Special Inspections is outlined and certain methods of investigating the in-situ condition of post-tensioning systems presented.  The findings of site investigations are discussed together with the implications for bridge owners and managers. A process of reviewing reports on Special Inspections of post-tensioned bridges is presented together with a case study. A workshop session enables attendees to apply the process to a post-tensioned bridge.
COURSE DURATION	1 day
COURSE FEE	£229 (excl. VAT)

## 7.6. Associated Training Courses

A number of organisations (e.g. Skills Training Council, Lantra Awards) provide courses (and certification) in a range of fields that are relevant to bridge inspectors. These are typically short one/two day courses, examples include:

- Health and Safety Training – with courses dedicated to different aspects such as general H&S awareness, working at height, working on the highway, etc.
- Signing and guarding and Traffic Management;
- Operation of and working on mobile towers;
- Removal of Pigeon Waste (Guano);
- Confined Space Training – with separate courses covering specific areas such as Awareness and Risk Assessment, Safe Entry and Escape, Oxygen Resuscitation, etc.

The above courses could, along with formal bridge inspector training courses, form a framework of modules that are appropriate for inspectors. Within this framework it would be possible to identify Core and Desirable training with respect to different areas (or levels) of inspector competence. This is discussed further in Section 10.

## 7.7. Conclusions

Formal classroom style training is likely to be a vital component of any inspection certification scheme. The above sections show that a number of organisations are providing short courses that, at least in part, cover some aspects relevant to bridge inspection. The majority of these courses have been running for a number of years, demonstrating there is a demand for this form of training/education in the UK.



Classroom training, as demonstrated by the Sheffield Hallam course, does not have to be totally classroom based. Part of their course involves a site visit to a bridge. This is an aspect that was mentioned many times during the in-depth interviews (Section 6), that is, there was consensus that training would prove more beneficial (and be more digestible) if classroom training included application of new knowledge during the course, e.g. morning in the classroom learning about a specific aspect and the afternoon on-site applying it.

The courses reviewed are limited in duration, content and detail, especially when compared to some of the courses provided by other countries (see Section 4) and the previously run British Rail training course. It is likely that the current content of these courses would not fully meet the requirements of the envisaged accredited inspector training. However, the content of and material used in these, and other, courses should be taken as a relevant consideration if accredited UK bridge inspection is to be introduced, e.g. in developing an outline syllabus. If this is progressed then it will be important to consider issues such as:

- Feasibility/Relevance to the Industry: to what degree can a course emphasize the importance (raise the profile) of inspection within the industry and thereby help to bring about a culture change with regard to inspections?
- Industry Expectations: how will bridge owners and consultants align classroom-training courses with vocation (on the job) training, i.e. at what frequency does classroom training courses need to be available? For example, should short two/three days courses at, say, six month intervals seek to complement and consolidate site training and provide preparation for the next period of site training?
- Complement other learning: to what degree can the course be set up to complement and align with other existing bridge/civil engineering courses, thereby possibly forming one part (module) of a wider civil engineering qualification.

With regard to developing a more comprehensive course, Prof Mangat of Sheffield Hallam University made the following observations:

- *Access* – gaining access to a number of structures may be difficult. At present, the site visit on their course is arranged by gaining approval from the relevant organisations. There is no formal procedure for gaining approval since the University maintains good relationships with these organisations and thus everything is arranged verbally.
- *Health and Safety* – PPE would be required if longer courses (3 to 5 day) are formulated with say 50% site work. This could be arranged by (i) the university and in-built into the course fee; or (ii) the inspector, this may be possible since most of the employers provide their inspectors with PPE.

The development of the classroom training also needs to take onboard the relevant concerns presented in Section 6.4, for example, cost, duration, location and including on-site activities during classroom training.

## 8. Other Training Courses and Registration Schemes

### 8.1. General

This section provides details of training courses and registration schemes that support other professions and sectors. These courses and schemes were reviewed with a view to determine what is current practice in other professions and if there are any apparent trends, or examples of good practice, that a bridge inspector training scheme should take into consideration.

In the context of the following a *Course* is a specific training (normally classroom/training centre) event with a typical duration of 1 day and 1 week (which may or may not provide certification). *Registration Schemes* certify individuals (be it through courses, vocational training, assessment, etc.) as competent for a particular discipline.

The contents of this section are:

- Highway Inspection (Section 8.2) – provides details of a training course devised to support certification of highway inspectors;
- Tree Inspection (Section 8.3) provides details of the accredited training courses that have been developed for the inspection of trees.
- Registration Schemes (Section 8.4) – provides a list of registration schemes reviewed and summarises key findings from the review (the detail of the review is provided in Appendix D).
- Conclusions (Section 8.5) – draws some conclusions from this review, in particular the review of the registration schemes, and suggests key aspects that an inspection training/registration scheme should take into consideration.

### 8.2. Highway Inspection

The following table provides details of a five-day highway inspection-training course provided by the Skills Training Centre. The objectives and topics included, although not fully aligned with the requirements of a bridge inspection course, provide a reasonable check for the type of areas that should be considered.

TRAINING ORGANISATION	Skills Training Centre ( <a href="http://www.skillstrainingcentre.co.uk">www.skillstrainingcentre.co.uk</a> )
COURSE	Highway Inspection – Technical
COURSE DETAILS	<p>This course is intended for those carrying out Highway Inspections in their first year of appointment and as a useful refresher for more experienced Highway Inspectors. The course provides a basic knowledge of all areas of Highways Maintenance and Inspection in which they might be involved. The course includes a site visit at which an inspection will be undertaken.</p> <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• To provide basic knowledge of key legal considerations that affect highways and the duties of the Highway Authority</li> </ul>

	<ul style="list-style-type: none"> <li>• To provide a basic knowledge of the materials, components and techniques used in construction and maintenance of the highway</li> <li>• To be able to recognise common failures of highway construction and understand the possible causes</li> <li>• To appreciate the importance of effective communication both between individuals and within organisations</li> <li>• To highlight health and safety aspects and the importance of safe working practice associated with work on the highway</li> <li>• To appreciate the importance of records in making an effective legal defence.</li> </ul> <p><b>Topics covered include:</b></p> <ul style="list-style-type: none"> <li>• Adoption &amp; Responsibilities of Highway Authorities</li> <li>• Road Construction Types</li> <li>• Materials for Construction</li> <li>• Standards for New Build</li> <li>• Standards for Maintenance Work</li> <li>• Work near – Trees &amp; Verges</li> <li>• Types of Maintenance Regimes</li> <li>• Legislation &amp; Associated Codes of Practice including NRASWA</li> <li>• Signing &amp; Guarding for Works</li> <li>• Function of the Highway Inspector</li> <li>• Legal matters relating to Inspection</li> <li>• Inspection documentation types</li> <li>• NRASWA</li> <li>• Routine</li> <li>• Safety Inspections</li> <li>• Practical Inspection</li> <li>• Defect Recognition</li> </ul>
COURSE DURATION	5 days
COURSE FEE	£650 (excl. VAT)

The course includes classroom sessions and site visits and, for a five day course, is reasonably priced (although organisations would need to pay additional costs for travel and accommodation if required). The course is aimed at those undertaking inspections in their first year of appointment, or looking to refresh. A similar course, for trainee bridge inspectors or as a refresher for those who have not done inspections recently, may have merit.

In addition to the above course, the *Skills Training Centre* also provides the course *Highway Inspection and Monitoring*, which includes a Health and Safety and a Highway Inspection

components that, when taken and passed, provide the individual with a City and Guilds Qualification. For non-experienced inspectors, the above course (*Highway Inspection – Technical*) is a prerequisite for the *Highway Inspection and Monitoring*.

### 8.3. Tree Inspection

The following describes two courses for Tree Inspection, both are recognised by Lantra, the Sector Skills Council (SSC) for the environmental and land-based sector; SSCs are discussed in Section 9.

TRAINING ORGANISATION	Lantra Awards (certification awarded by Lantra Awards)
COURSE	Basic Tree Survey and Inspection
COURSE DETAILS	<p>A one day course aiming to provide specific tree survey and inspection training at a basic level for contractors, highway engineers, tree wardens, ground maintenance staff, rangers and other persons of a non-arboricultural background or with limited arboricultural knowledge, to allow them to identify obvious defects from ground level and then to report their findings to a line manager.</p> <p>The course is for any person employed as a tree warden, local authority highway inspector, golf courses, forestry, woodland or arboricultural employee, estate or park rangers, farmers and other landowners or their employees who may have a responsibility for trees in the course of their work. Additionally, this course may be useful for those who work with trees in a voluntary capacity.</p>
COURSE DURATION	1 day
COURSE FEE	£125 (excl. VAT)

TRAINING ORGANISATION	Lantra Awards (certification awarded by Lantra Awards)
COURSE	Professional Tree Inspection
COURSE DETAILS	<p>A three day course aiming to provide specific tree inspection training at an advanced level for competent arboriculturists to enable them to identify defects from ground level, from a climbed inspection or inspection aided by the use of a Mobile Elevated Working Platform.</p> <p>The course provides training in how to specify the necessary remedial works and record the inspection process. This would then form a part of a defensible system. At the end of the course candidates undertake a competence based assessment directly related to tree inspection.</p> <p>This is the same course as is currently run by the Arboricultural Association.</p>
COURSE DURATION	3 days
COURSE FEE	£395 (excl. VAT)

The above courses provide two recognised certification levels of inspectors for trees. The training provided, while not extensive, is more formalised than much of the existing training for bridge inspectors. The advanced tree inspection course includes a competence assessment that is used to determine if an individual should be certified. The Tree Inspection courses have made full use of the Sector Skills Council and this is investigated further in Section 9 to determine if it is a viable option for formal bridge inspection training.

## 8.4. Registration Schemes

### 8.4.1. Selected Registration Schemes

There is a wide variety of registration schemes, across all business sectors, available in the UK. A selection of the schemes, considered more pertinent to this project, were reviewed. The schemes selected are listed in Table 18.

**Note:** The most common registration scheme in the construction sector is the Construction Skills Certification Scheme (CSCS), which is listed below. Due to the widespread use of this scheme a number of other schemes are affiliated to CSCS, where this is the case they have been identified below.

**Table 18: Selected Registration Schemes**

Registration Scheme / Organisation	General Description
Asbestos Control; and Abatement Division (ACAD)	ACAD is a Trade Association representing persons in the asbestos and asbestos removal industry, providing training in accordance with the asbestos standards.
Association of Industrial Truck Trainers (AITT)	AITT covers all sectors of industry that use industrial trucks. It is an accredited body approved and listed by the Health and Safety Commission (HSC) in the Approved Code of Practice (ACoP) for Fork Truck Operator Training.
Assuring Competence in Engineering Construction (ACE)	ACE is the UK engineering construction industry scheme designed to ensure the competence of engineering construction workers is validated against National Occupation Standards.
Building Engineering Services (BES)	BES is the division of CITB Construction Skills that provides training, assessment and certification for people who work with, electrics, gas, water, steam and refrigerants.
Certificate of Competence of Demolition Operatives (CCDO)	The CCDO scheme is for persons who work in on-site demolition.
Certification Scheme for Welding and Inspection Personnel (CSWIP)	CSWIP is accredited by the United Kingdom Accreditation Service on behalf of the UK Department of Trade and Industry in accordance with EN ISO 17024 'Criteria for certification bodies operating certification of personnel'. CSWIP training is provided by The Welding Institute (TWI).

Registration Scheme / Organisation	General Description
Client Contractor National Safety Group (CCNSG)	CCNSG Nationally Accredited Safety Passport Scheme is to provide a standard for general health and safety training of contractors in construction and related industries.
Construction Industry Scaffolders Record Scheme (CISRS)	CISRS is for scaffolding operatives and is affiliated to the CSCS.
Construction Skills Certification Scheme (CSCS)	<p>The CSCS scheme was designed to improve quality and reduce accidents in the UK construction industry.</p> <p>CSCS Cards list the holder's qualifications and are valid for either three or five years. All cardholders have to pass the appropriate CITB-Construction Skills Health and Safety Test. This is the construction industry's largest scheme</p>
Construction Skills Register (CSR)	The CSR is a register of construction workers living in Northern Ireland who have completed the industry approved CSR health and safety training course. The card is affiliated with CSCS.
Electrotechnical Certification Scheme (ECS)	The Joint Industry Board (JIB) ECS cards are for electrical, electronic, installation engineering and building services personnel.
International Powered Access Federation (IPAF)	IPAF is an operative record scheme, for users of all forms of powered access equipment. The scheme is approved by the Major Contractors Group (MCG)
National Competency Control Agency (NCCA) Sentinel track safety card	The Sentinel card is a Network Rail Scheme to ensure that the people who work within the Network Rail infrastructure are competent and medically fit. It is mandatory to hold the card if working on or near the line.
New Roads and Street Works Act (NRSWA) Card	The NRSWA card is for both supervisors and operatives working in a gang, and is affiliated to CSCS.
Plumbers, Mechanical Engineering Services (PMES)	The JIB PMES scheme is the standard measure of skills, knowledge, competency and health and safety awareness for the UK plumbing industry.
SKILLcard	The engineering services 'SKILLcard' provides a register of the skills and competence of people working throughout the heating, ventilating, air conditioning and refrigeration sector of building services engineering industry. Engineering Services SKILLcard is affiliated to CSCS. The terms of affiliation ensure that Engineering Services SKILLcard complies with the requirements and standards of CSCS. There is no need, therefore, for separate registration with CSCS.

---

## 8.4.2. Review of Registration Schemes

The table in Appendix D provides further details on each of the above registration schemes under the following column headings:

- **Scheme** – the name of the scheme;
- **General** – some general details about the scheme;
- **Courses** – the courses available under, or that support, a particular scheme;
- **Course Information** – details of the courses and the various ‘levels’ of qualification and competence;
- **Requirements** – the requirements for enrolling on each level of a scheme or participating in the assessment process;
- **Course Duration** – the duration of the training course and where possible the associated vocational experience;
- **Assessment** – the type/form of assessment, e.g. exam, logbook, assessor;
- **Proof** – the proof provided to demonstrate that an individual has been certified (normally a certificate, ID card or both);
- **Validity** – the period that the certification is valid for (typically between 1 and 5 years).

## 8.4.3. Summary of Findings

There is a wide range of registration schemes currently available, with the construction sector having well-established schemes such as CSCS. Many schemes have a range of different categories (or competence/skill levels) at which individuals can be trained, assessed and registered. In some cases these competence/skill levels are unrelated and at the same ‘level’. In other cases, the categories represent different levels of training in the same field/area and an individual is required to obtain one level before progressing to the next, i.e. Level 1 is a prerequisite for undertaking training/assessment at Level 2.

The majority of the schemes involve a short period of dedicated training (ranging from one to 10 days), followed by a written examination (e.g. multiple choice) and/or practical assessment. Some schemes assess competence in the workplace while others require a portfolio of experience to be submitted to an assessor. With regard to the latter, the required experience (e.g. days, months or years of working in an environment) is normally stipulated and the experience portfolio needs to be signed off by a supervisor. Most schemes include some form of Health and Safety training.

Some of the higher skill/competence levels require the individual to have certain accredited qualifications, for example, attainment of appropriate NVQ Level 3.

All of the schemes reviewed offer a combination of a certificate and/or ID card as proof of an individual’s registration and certification. A card generally includes a photo of the individual, details of the certification/competence level and the dates of validity. Some cards include a holographic logo to prevent misuse.



---

To remain as a registered member of a scheme an individual must typically repeat their training, or take a refresher course, every 3 to 5 years. In most instances, the repeat or refresher training can be conducted in a shorter period than the original training.

A large number of the schemes make use of the Sector Skills Councils (SSC) to support registration, certification and award. SSCs are discussed in Section 9.2.1.

## 8.5. Conclusions

Registration schemes are well established for many trades and professions, and the construction sector (especially through Construction Skills, see [www.cskills.org](http://www.cskills.org)) and environmental and land-based sector (especially through Lantra, [www.lantra.co.uk](http://www.lantra.co.uk)) are at the forefront of training, registration and awarding of competence certificates/cards. It is advisable, as well as prudent and practical, to make use of these organisations for developing formal bridge inspector training/certification programme(s).

A significant number of the schemes reviewed provide a range of competence certification levels. A similar approach for bridge inspectors may be appropriate, whereby certificates and photo ID cards could be issued for different levels of competence.

If bridge inspector training/certification progresses then a number of the schemes reviewed should be selected for closer investigation. In particular, to identify areas of good practice and to assess what is involved in setting down the competence requirements for potentially different levels of inspector certification, i.e. setting down the competence requirements that an individual is assessed against will enable the associated experience, training and assessment regime to be developed by training organisations.

Due consideration should be given to the progress made on tree inspections, where two levels of inspection competence (and associated training) have been developed and are formally certified. This clearly indicates, along with other evidence compiled in this review, that developing nationally recognised inspector training for bridge inspectors that meets the needs of all bridge owners, while challenging, is an achievable goal.



---

## 9. Options for Formal Bridge Inspector Training Scheme

### 9.1. General

This section presents some options and alternatives that should be considered when determining an appropriate route for providing an accredited qualification or certification scheme for inspectors. The information was compiled through a literature/web review and telephone discussions with selected organisations, including:

- Pauline Pattinson – Construction Skills, Card Schemes Manager
- David Cracknell – Construction Industry Council, Director of Lifelong Learning
- Sue Stevens – Institution of Highways and Transportation, Director of Education & Membership;
- Peter Symmons – Symmons Madge, Director
- Professor Pal Mangat - Sheffield Hallam University;
- Gareth Jones – Institution of Civil Engineers, Professional Development Senior Manager

In the following sections, the terms ‘accredited qualification’ and ‘certification scheme’ are used. The reader should bear in mind the following definitions, which are considered relevant:

**Accreditation** – Accreditation is a quality assurance process through which regulator(s) evaluate an institution/organisation and the qualification awarded by the institution/organisation to ensure that they conform to the relevant regulatory criteria.

**Awarding Body** – An organisation recognised by a regulator(s) for the purpose of awarding accredited qualifications and/or certification.

**Certification** – A formal recognition/confirmation that an individual has proficiency within, and a comprehension of, a specified body of knowledge. This confirmation is often provided by some form of external review or assessment.

Awarding bodies, e.g. Universities, Edexcel, etc. may approach the Office of Qualifications and Examinations Regulator, to get their qualification accredited. This provides additional weight and recognition of the qualifications awarded by the awarding bodies as accredited qualification(s) are listed in the national database of qualifications. Certification schemes on the other hand are administered by professional organisations, such as Construction Skills, the Institution of Civil Engineers, the Institution of Highways and Transportation, etc., which are accredited by the Government, the Engineering Council UK, or other relevant bodies and are widely recognised by the industry. Therefore, accreditation for the certification, that may be, provided by these professional organizations is not necessarily required.

## 9.2. Possible Routes for Developing an Accredited Qualification or Certification Programme

Four possible options were considered for developing an accredited bridge inspector qualification/certification programme, namely:

- Option 1: National Vocational Qualification (NVQ) for Bridge Inspectors
- Option 2: Construction Skills Bridge Inspector Certification Card Scheme
- Option 3: The Institution of Highways and Transportation (IHT) Bridge Inspector Certification Scheme; and
- Option 4: Qualifications and Credit Framework (QCF) Qualification For Bridge Inspectors (Table 4)

These are contained in Appendix E. Figure 1 in Appendix E provides a flowchart that presents an outline of the overall process. The subsequent tables in Appendix E provide a detailed description of the process that should be followed for the development of an accredited qualification or certification scheme for bridge inspectors. These tables are arranged using the following headings:

- The process – Provides a step-by-step description of the approach to be followed for developing an accredited qualification or certification scheme for bridge inspectors.
- Feasibility/Viability – Discusses the likelihood of the option being achievable.
- Accreditation/Recognition/Industry Acceptance – Discusses the potential status of the accredited qualification/certification scheme in the industry.
- Future considerations – Provides details on future updates that may need to be carried out to the qualification/certification scheme.
- Organisation Contacts – Provides contact details of specific individuals within the relevant organisation.
- Notes – Contain additional information and definitions.
- Reference material – Contains documents that may provide relevant information regarding the qualification/certification.

The role, responsibilities and where appropriate relevant experience of the organisation contacted in relation to the above options and for developing an accredited bridge inspector qualification(s)/certification are presented in the following sections.

### 9.2.1. Construction Skills

Construction Skills ([www.cskills.org](http://www.cskills.org)) is the Sector Skills Council for the construction and civil engineering sector. They represent every part of the construction industry, from architects to bricklayers, in every part of the UK. Currently, there are 25 *Sector Skills Councils* covering approximately 85% of the UK workforce.

The Sector Skills Councils (SSCs) were set up to ensure that UK has a highly skilled and trained workforce that is able to compete effectively within a global market. SSCs are

independent, employer-led organisations that actively involve trade unions, professional bodies and other key stakeholders, i.e. they are the voice of the industry not the Government. However, SSCs are licensed by the government and are answerable to the Government for meeting their targets through their Sector Skills Agreement (SSA).

The review of registration schemes presented in Section 8.4 illustrates that a considerable number of registration (competence assessment) schemes are affiliated in some form with Construction Skills.

The potential for developing a certification scheme for bridge inspectors was discussed with Construction Skills. They expressed an interest and indicated they would be able to provide services ranging from producing certificates and ID cards to processing/reviewing applications and awarding certification.

### 9.2.2. Construction Industry Council

Construction Industry Council (CIC) is a partner body of Construction Skills, which is responsible for setting up and/or designing National Occupational Standards (NOS). The NOS form the basis for a National Vocational Qualification (NVQ), details of which are presented in Section 9.3.

The CIC was approached to discuss their interest in setting up NOS for bridge inspectors. According to the CIC, the nature of the sector's National Occupational Standards (NOS) is such that, job functions are described in reasonably broad terms so that these can be used by a range of related occupations. This approach enables a wider audience to be encompassed by specific NOS.

Thus CIC has suggested a review of some of the existing sector NVQ/SVQs which could be relevant to the project, such as 'Surveying, Property and Maintenance' at levels 3, 4 and 5, 'Site Inspection' level 3, 'Senior Site Inspection' level 4, and 'Transportation Technical Support' level 3. For a description of the different levels of NVQs see Section 9.3. These suites have been reviewed and although they are wide ranging it is considered that the modules relating to inspections are not detailed or specific enough to provide appropriate training for bridge inspectors.

Furthermore, the CIC maintain that unless there are substantial departures in terms of the function of bridge inspectors from the existing suites, and there are significant numbers of people that fall into this category, it is unlikely that a completely new suite will be developed. However, if any gaps are identified in existing coverage these can be considered for review with National Working groups as minor incremental changes to existing NOS, or qualification structures.

### 9.2.3. Institution of Highways and Transportation (IHT)

The IHT is currently developing a certification scheme for Road Safety Auditors<sup>3</sup> for the DfT which is linked to new EU legislation<sup>4</sup> that is about to come into effect. This is likely to have similarities with the training/certification required for bridge inspectors. Certification for Road Safety Auditors will be at three levels (i) observer (ii) auditor (iii) team leader, depending on the responsibility held by an individual. The IHT is currently investigating the possibility of using some form of electronic assessment.

<sup>3</sup> Road Safety Audit means a systematic independent safety analysis of the design characteristics of a road project, either new or rehabilitation, at different *stages of planning, design and early operation*

<sup>4</sup> Road safety auditors will be required to hold a certificate. In turn, this implies having defined, at national level, training curricula as well as having provisions for regularly offering training courses.

A similar approach could be adopted for bridge inspector certification, whereby IHT could be involved as an awarding body. The IHT expressed their interest in bridge inspector certification scheme, both in terms of participating in the development of the scheme and awarding it.

#### **9.2.4. Qualifications and Curriculum Authority (QCA)**

The Qualifications and Curriculum Authority (QCA) is a public body, sponsored by the Department for Children, Schools and Families (DCSF), which plays a vital role in the development, delivery and reform of the education and training framework for England. During 2009-10, QCA will evolve into the Qualifications and Curriculum Development Agency (QCDA), a new agency that will create, develop and deliver the Government's programs for the management and reform of qualifications, curriculum and assessment, to promote quality and coherence in education and training in England.

The potential for developing a Qualifications and Credit Framework (QCF) qualification was discussed with QCA. The QCA indicated that it is possible to set up a flexible QCF qualification, provided the Sector Skills Council (see Section 9.2.1) approves the qualification. One such project for developing a more flexible QCF qualification for the automotive sector is currently being undertaken. The purpose is to create a qualification in vehicle maintenance and repair that develops skills and knowledge, assesses competence and gives employers an opportunity to train their workforce through a flexible route.

This indicates that it may be possible to set up a similar QCF qualification development programme for bridge inspectors with the sector skills councils' (Construction Industry Council) approval.

#### **9.2.5. Symmons Madge and Sheffield Hallam University**

Additionally, Symmons Madge and Sheffield Hallam University, who are established training providers, have expressed interest in supporting the development of inspector training classroom courses.

#### **9.2.6. Institution of Civil Engineers (ICE)**

The ICE expressed interest in further discussions regarding certification of bridge inspectors if the work progresses to a next stage. However, ICE believes that the development process for the certification may be lengthy (months even over a year) and the cost may be significant. Even after its launch, the scheme - while 'bedding down' - may only slowly build up credibility amongst potential applicants. It could therefore be a while before applicants become convinced that putting effort into obtaining the certification would be worthwhile.

The ICE felt it was highly unlikely, and unnecessary, to introduce a new title for bridge inspectors. To introduce a new title, approval is required from the Privy Council (PC). The PCs current policy is to discourage additional titles as it considers there are already too many in Engineering, so any application at this time is likely to be a long and expensive process with a limited chance of success. Introducing certification was considered a better way of introducing inspector training in the industry.

#### **9.2.7. Summary**

The organisations discussed in the preceding sections, to a greater or lesser degree, would offer services to develop accredited bridge inspector qualification(s) or a certification scheme and then also assess and award qualification(s)/certification. However, it would be

the responsibility of the industry, with advice and support from these organisations, to define the roles and their associated competence requirements.

However, the presence of organisations that would be able to accredit qualification(s) on behalf of the DfT/UK Bridges Board is a significant benefit when consideration is given to the typical activities that need to be undertaken (see Section 9.3 and 9.4).

Setting up accredited qualifications can take a considerable amount of time (up to a year to set up the NOS alone) and effort with very few benefits over a certification scheme. In addition, unless accredited qualifications are made mandatory, DfT/UKBB's will have to extensively promote the qualification before it can gain industry wide acceptance by asset owners/consultants/contractors and in particular inspectors. On the other hand, if either Construction Skills and/or IHT support a certification scheme, will offer a significant weight/recognition to the scheme.

As such, it is recommended that a certification scheme be developed for bridge inspectors, i.e. either option 2 or 3 should be explored further. Appendix F provides examples of different certification structures and levels of competence through a certification scheme e.g. Trainee Inspector, Inspector, Senior Inspector and Lead Inspector. Appendix G provides examples of classroom based training courses and, in particular, their possible contents that inspectors applying for different levels of competence certification may be required to attend.

### 9.3. The National Vocational Qualifications (NVQ) System

National Vocational Qualifications (NVQ's) are work-related, competence-based qualifications. They reflect the skills and knowledge needed to do a job effectively, and show that a candidate is competent in the area of work the NVQ framework represents.

NVQs are based on National Occupational Standards (NOS). These standards, normally defined by/through the Sector Skills Councils, are statements of performance that describe what competent people in a particular occupation are expected to be able to do. They cover all the main aspects of an occupation, including current best practice, the ability to adapt to future requirements and the knowledge and understanding that underpin competent performance.

#### 9.3.1. NVQ Levels

Currently there are five different levels of NVQs, which are defined as follows:

- **Level 1** – Competence that involves the application of knowledge and skills in the performance of a range of varied work activities, most of which may be routine or predictable.
- **Level 2** – Competence that involves the application of knowledge and skills in a significant range of varied work activities, performed in a variety of contexts. Some of the activities are complex or non-routine, and there is some individual responsibility and autonomy. Collaboration with others, perhaps through membership of a work group or team, may often be a requirement.
- **Level 3** – Competence that involves the application of knowledge and skills in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy, and control or guidance of others is often required.

- **Level 4** – Competence that involves the application of knowledge and skills in a broad range of complex, technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and the allocation of resources is often present.
- **Level 5** – Competence that involves the application of skills and a significant range of fundamental principles across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources feature strongly, as do personal accountabilities for analysis and diagnosis, design, planning, execution and evaluation.

The following links provide general and specific guidance on the structure for a Level 4 NVQ in *Site Inspection*, which is offered by the Joint Award Body partnership of Edexcel, The Chartered Institute of Building (CIOB) and the Institution of Civil Engineers (ICE):

[www.edexcel.com/migrationdocuments/NVQ/220480\\_N014304\\_Site\\_Inspection\\_L4.pdf](http://www.edexcel.com/migrationdocuments/NVQ/220480_N014304_Site_Inspection_L4.pdf)

[www.edexcel.com/migrationdocuments/NVQ/215481\\_Site\\_Inspect\\_L4\\_Accredited\\_NVQ\\_Structure.pdf](http://www.edexcel.com/migrationdocuments/NVQ/215481_Site_Inspect_L4_Accredited_NVQ_Structure.pdf)

## 9.4. Developing Accreditation Schemes

The Office of Qualifications and Examinations Regulator [Ofqual], Department for Children, Education, Lifelong Learning and Skills [DCELLS] and Council for Curriculum Examinations and Assessment [CCEA] are the regulators of external qualifications in England, Wales and Northern Ireland respectively. They regulate by:

- developing and publishing criteria for the accreditation of qualifications
- accrediting qualifications against those criteria
- keeping qualifications under review
- publishing and sharing information relating to accredited qualifications.

The body most relevant to inspector accreditation is Ofqual, additional information on Ofqual can be found at:

[www.ofqual.gov.uk](http://www.ofqual.gov.uk)

[www.ofqual.gov.uk/files/3558\\_accreditation\\_handbook\\_version2.pdf](http://www.ofqual.gov.uk/files/3558_accreditation_handbook_version2.pdf)

### 9.4.1. Office of Qualifications and Examinations Regulator [Ofqual]

#### **Statutory regulations**

All qualifications are accredited against the criteria laid out in “*The statutory regulation of external qualifications in England, Wales and Northern Ireland (2004)*”. This document outlines the principles and approaches to statutory regulation, the criteria for awarding bodies' procedures and the common criteria for all qualifications in the National Qualifications Framework (NQF)<sup>5</sup>.

---

<sup>5</sup> Once a qualification meets the regulatory criteria, it will enter the NQF as an accredited qualification



The *NVQ code of practice* supplements the requirements of the aforementioned document by specifying the additional quality assurance and control requirements that apply to, and reflect the distinctive character of, National Vocational Qualifications (NVQs). This code of practice was published by the Qualifications and Curriculum Authority (QCA). The regulatory function of QCA is now the responsibility of the Office of the Qualifications and Examinations Regulator (Ofqual).

For further information see [www.ofqual.gov.uk/59.aspx](http://www.ofqual.gov.uk/59.aspx)

### **Accreditation process**

Once an awarding body has been recognised<sup>6</sup>, it submits qualification proposals for accreditation in accordance with its agreed plan of provision. Two processes for the accreditation of qualifications are:

- **Standard accreditation** - all awarding bodies are recognised to develop qualifications via the standard accreditation process, and qualifications should be accredited within a maximum of three weeks.
- **Five-day accreditation** - all awarding bodies may apply for access to five-day accreditation. In doing so, they must prove that they have robust qualification development processes and have a good track record of developing qualifications.

On submission of a proposal, awarding bodies must agree to all terms of accreditation. After the decision is taken to accredit a qualification, an email is sent to the awarding body confirming the final terms of accreditation (including the accreditation schedule, which confirms the accredited qualification number, structure and unit titles). Failure by an awarding body to abide by the terms of accreditation could result in sanctions being applied.

### **Web-based accreditation**

The standard and five-day accreditation processes are underpinned by a web-based accreditation system to which awarding organisations are able to submit proposals for new qualifications, as well as amendment, extension, withdrawal or pilot qualification proposals.

### **Database of accredited qualifications**

Once qualifications have been accredited, details will appear on the National Database of Accredited Qualifications (NDAQ) - QCA's free, fully searchable database of accredited qualifications.

For more information see [www.accreditedqualifications.org.uk/index.aspx](http://www.accreditedqualifications.org.uk/index.aspx)

This database includes details of units and elements for each qualification, reference numbers for qualifications and units, and accreditation start and end dates.

---

<sup>6</sup> In order to offer accredited qualifications awarding bodies must be recognised by the regulators of external qualifications. The regulators check that the awarding body has the necessary systems in place to deliver national qualifications effectively and to appropriate standards.

## 9.5. Conclusions

There are mechanisms and organisations in place to support the development of accredited qualifications and certification schemes. Full use should be made of these if formal bridge inspector training is to be developed.

Particular note should be made of Construction Skills, the Sector Skills Council for construction and civil engineering and the Institution of Highways and Transportation (IHT). These organisations are widely used for producing and awarding certification. It is suggested that further discussions are held with both organisations under Phase 2.

It is considered that setting up accredited qualifications can take a considerable amount of time (up to a year) and effort with very few benefits over a certification scheme. As such, it is recommended that a certification scheme be developed for bridge inspectors rather than accredited qualification(s).



## 10. Discussion

### 10.1. General

The following discusses a number of specific issues that have been raised in relation to formal inspector training. Where possible, comments have been provided on how these issues/concerns could be addressed or how they should be catered for going forward.

### 10.2. Levels of Inspection Competence

Training should enable inspectors to obtain/progress to different levels of competence. From the surveys and interviews, there was no fixed view on what these levels should be. Based on the work to date the competence levels shown in Table 19 are put forward as a starting position for Phase 2, but it is recognised that considerable discussion and development work is required to in this area (also see Appendix F).

**Table 19: Possible Inspection Competence Levels**

Competence Level	Description
1. Trainee Inspector	Able to plan and undertake General Inspections on simple structure types and forms under appropriate supervision
2. Inspector	Able to plan and undertake General Inspections on majority of structure types and Principal Inspections on simple structure types and forms
3. Senior Inspector	Able to plan and undertake General and Principal Inspections on all structure types/forms and also trained in undertaking some Special Inspection/testing activities
4. Lead Inspector	Satisfies Level 3 requirements and able to interpret inspection information, and coordinate and lead on the overall inspection programme.

This type of arrangement (with four levels of competence) is similar to a number of the existing inspector training programmes that were reviewed (see Section 4).

### 10.3. Inspection Modules

Based on the survey and interview findings, there appears to be good agreement on the core activities that should be included in inspector training. Table 20 provides a list of potential Core and Improvement training modules that could be linked back to the four competence levels presented in Table 19. For example, it may be necessary to do all the core modules to reach Competence Level 2, however additional improvement modules would be required to progress to Levels 3 and 4.

**Table 20: Possible Core training Modules**

Module Type	Modules
Core Modules – required for Competence Level 1	The importance of inspection Site safety/lone working (safety permit for rail working would be separate to this); Introduction to structure, material and element types; Introduction to basic structure mechanics; Introduction to defect types for simple structure types/forms; Introduction to treatment options; Introduction to General Inspection procedure; Drawing/sketching and IT skills; NRSWA (Signing and Guarding).
Core Modules – required for Competence Level 2	Build on the introductory courses from Level 1, i.e. further training on defects, treatments, etc. Introduction to special structure forms, e.g. cable stayed; Introduction to special inspections/testing techniques; Introduction to Principal Inspection procedure.
Improvement Modules – Competence Level 3	Training in a selection of testing techniques/Special Inspection techniques; Further training on assessment of defects/priority rating; Mentoring/training inspectors; Confined spaces training.
Improvement Modules – Competence Level 4	Managing the inspection programme; Running a competent inspection team; Maintaining inspection records.

## 10.4. Competence Requirements

An important activity for the next stage will be to define the requirements for different levels of inspector competence and/or the specific competence to be attained through specific training activities (be they classroom or vocational). The work should set out detailed competence requirements for each inspection level (such as those shown in Table 19) and associated responsibilities and activities; these should include, as a minimum, detailed competence statements/requirements on the following:

- Education, e.g. training modules/courses completed, diploma, degree, etc.
- Knowledge, i.e. what the inspector must have knowledge and understanding of.
- Experience and skills, e.g. work locations, conditions of working, tools and equipment, sketching skills, IT skills etc.

- Evidence, e.g. the type and quantity of evidence that must be provided.

Appendix H contains proposed competence requirements for the levels of inspection competence outlined in Section 10.2. In addition, Appendix I contains draft inspector competence requirements previously developed by the Transport for London.

## **10.5. Training Material**

Given competence requirements are clearly defined then it will be possible for training organisations to develop appropriate training material. It may be appropriate for the UK Bridges Board to define a list of agreed reference documents that the training syllabus/course should be based on or account for.

## **10.6. A Physically Demanding Job**

Inspections are a physically demanding job, requiring inspectors to work alone, work in a range of environments, many with difficulty access, and to work in all forms of weather. Training should therefore give due consideration to assessing a candidates ability to undertake these physically demanding activities.

## **10.7. Visual Inspections**

Fundamental to inspection is the ability to view bridge components and any defects/issues. In some instances, elements are difficult to see due to obstructions and location, this is to be expected, however, the inspector themselves should not have visual impairments that reduce the accuracy and credibility of the reporting. It is suggested that training should give consideration to (i) colour blindness; and (ii) eye tests, whereby the latter is used to ensure inspectors have the appropriate level of vision (aided by spectacles/contact lenses where necessary).

## **10.8. Number of Inspectors**

The following table provides an estimate of the number of inspectors that the training course would serve (based on consideration of in-house and external staff and General and Principal Inspections). This demonstrates that there are large number of individuals that would require training and periodic reassessment.

**Table 21: Estimate of the Number of UK bridge Inspectors**

Sector/Organisation	Estimated Number of Inspectors
Local Authority (England and Wales)	Approximately 250 Local Authorities, considered to be around 2000 individuals and 1000 full time equivalents
Network Rail	The follow represent full time equivalents: <ul style="list-style-type: none"> <li>• Lead examiner/senior/examiner or team coordinator or assistant area examination manager – 7</li> <li>• Examiner – 164</li> <li>• Assistant examiner – 17</li> <li>• Trainee examiner - 13</li> </ul>
Highways Agency	14 Areas = over 100 staff, 50 full time equivalents
Scotland, Wales and Northern Ireland (LA and Trunk Road)	100 staff, 50 full time equivalents
British Waterways, National Trust and others	100 staff, 50 full time equivalents
London Underground and Infracos	100 staff, 50 full time equivalents
Other Light Rail, e.g. Croydon tram, MetroLink	100 staff, 50 full time equivalents
Private	100 staff, 50 full time equivalents
<b>Total Estimate</b>	<b>Over 3000 staff</b>

## 10.9. Conclusions

The above discussion provides some high level thinking on how inspector competence levels could be defined and illustrates that there are sufficient numbers of inspection staff in the UK to make training provision financially viable for training organisations.

---

## 11. Conclusions

### 11.1. General

This section draws together the key conclusions of this work, they cover a wide range of issues, however in summary, the key conclusion of this work is:

***There is a genuine need and desire from UK bridge owners, managers, engineers and inspectors for formal bridge inspector training to be provided. The training must be practical, flexible and offer value for money. The training should be provided as a certification scheme supported by an appropriate awarding body.***

### 11.2. Need for Formal Training

There is sound evidence and arguments that support the need for formal inspector training in the UK, for example, delivery of organisation duties, data quality, quality assurance and career recognition (a full discussion is provided in Section 2). This is widely supported by bridge managers, engineers and inspectors, with the proviso that practical, flexible and beneficial training arrangements can be developed.

### 11.3. Inspection Regimes

A review of current inspection practices in the UK and overseas, for bridges and similar assets, was undertaken (see Section 3). The review demonstrates that there do not appear to be any fundamental disagreements between current UK bridge inspection regimes and other countries/similar asset. As such, there are no aspects of the current UK inspection regime (i.e. type and timing of inspections) to be addressed before training is introduced.

### 11.4. Inspector Training and Competence

A review of current inspector training and competence requirements in the UK and overseas, for bridges and similar assets, was undertaken (details are provided in Section 4). The review illustrates that a number of organisations (within and outside the UK) have sound inspector training and/or competence requirements in place. Within these, there are areas of good practice that could be readily adopted and tailored for the UK.

### 11.5. Questionnaire Survey

An online questionnaire survey was developed (and used in the UK and overseas) to compile information on current practices and views on the need for inspector training (full results from the survey are presented in Section 5). In the UK, the questionnaire was completed by bridge owners, bridge managers, engineers and inspectors. The findings illustrated wide variability in current UK practices, indicating that:

- Some bridge owners may be exposed to significant risk and undue liability that could be mitigated through the introduction of appropriate inspector training; and
- A nationally recognised inspector-training programme in the UK would bring much needed consistency to current practices.

---

## 11.6. In-depth Interviews

All the organisations interviewed (see Section 6) agreed that formal inspector training should adopt a format of a small amount of classroom training while the majority is vocational/site based training and experience.

Issues/concerns were raised about the practicality of developing a scheme that caters for the wide diversity of bridge owners in the UK. Given a degree of flexibility is embedded within the training, and a modular structure to courses/competences is adopted, then this does not appear to present a significant barrier to progress.

The consensus view from the in-depth interviews was that the perceived benefits of inspector training significantly outweighed any concerns regarding its introduction; and that the concerns arising could be adequately dealt with through the development of an appropriate training scheme.

## 11.7. Feasibility of a Certification Scheme

Sections 7 and 8 present a review of current bridge inspector courses and courses/registration schemes for other professions. The findings presented demonstrate that, through appropriate professional bodies, more and more trades and professions are developing formal certification/registration schemes. It is reasonable to say that many less demanding trades/professions already have these in place, as well as trades/professions that are more complex. There is no evidence to suggest that a scheme could not be developed for bridge inspection.

Many certification/registration schemes are operated through the Sector Skills Council, where Construction Skills would be the appropriate council for a bridge inspection scheme. It is recommended that any further work should investigate this route for setting up a certified bridge inspector scheme.

## 11.8. Accreditation vs. Certification

Section 9 presents and discusses options for developing formal bridge inspector training, looking at accreditation and certification options. It is considered that setting up accredited qualifications (i.e. NVQs) can take a considerable amount of time (up to a year to set up the National Occupational Standards (NOS) alone) and effort with very few benefits over a certification scheme. As such, it is recommended that a certification scheme be developed for bridge inspectors rather than accredited qualification(s). It should also be noted that under the NVQ route, the nature of existing and/or currently under development NOS is such that, job functions are described in reasonably broad terms so that these can be used by a range of related occupations. This approach enables a wider audience to be encompassed by specific NOS and therefore there is currently no desire to develop a NOS for bridge inspection. The relevant existing NVQs have been reviewed and although it was found that they are wide ranging it is considered that the modules relating to inspections are not detailed or specific enough to provide appropriate training for bridge inspectors.

The findings of this study indicate that the most appropriate routes for developing a bridge inspector certification scheme is through either Construction Skills (the Sector Skills Council for the Construction and Civil Engineering Sector) or the Institution of Highways and Transportation.

A project specification outlining the objectives and scope of work required should the work progress to the next stage is included in Appendix J.

### **11.9. Viability of Providing Training**

Provisional estimates indicate that there are sufficient numbers of inspection staff in the UK to make training provision financially viable for training organisations.

## **APPENDIX [A]**

### **Department of Main Roads, Queensland, Australia: Inspector Accreditation Forms**



<b>Inspector Name</b>	<b>Inspection Authority</b> (Consultant, District, Bridge Engineer, RTCS)
<b>Contact Address</b>	<b>Phone No.</b>
<b>Mandatory Training</b> (Awareness Session)  Location	Date
<b>Qualifications</b> (e.g., Foreman, Bridge Inspector, Engineer)	
<b>Bridge Construction/Routine Maintenance Experience</b> ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... .....	

<b>Head Office Use</b>	
<b>Accreditation Awarded</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Assessor</b>	<b>Position</b>
<b>Signature</b>	<b>Date</b>
<b>Assessor Comments</b> ..... ..... ..... ..... ..... .....	

<b>Details updated in BIS ?</b>	Yes <input type="checkbox"/>	<b>Date</b>
---------------------------------	------------------------------	-------------





## **APPENDIX [B]**

### **Nuclear Inspection: Training and Development Record**

## Nuclear Inspection -Training and development record (Table 3.1)

The training and development provisions in this table are abstracted from the relevant Training Needs Analysis set out to provide the basis for professional development for new Inspectors in or designated for nuclear inspection posts. It is aimed at Inspectors who join ND at Band 3 level. Items marked M are mandatory. Items marked D are discretionary. Demonstration of the identified competence is a pre-requisite for gaining nuclear equivalence. The T&D provisions are intended to help develop the associated competence but applicants for equivalence can use alternative means to develop and demonstrate the relevant competence. This Table can be used as the basis for the necessary business case. The judgement on nuclear equivalence will be made against the competence requirements in [Table 3.2](#). In addition, a revised set of nuclear TIMS have been developed for direct recruitment of Nuclear Inspectors. These are reproduced at Training and Development Requirements to complement [Table 3.2](#) when judging applicants for nuclear equivalence, to promote a common approach to direct recruits and those who may join from other parts of HSE/OGDs.

T&D PROVISION	STATUS	CONFIRMATION (line manager)	DATE	NOTES
<b>Competence:</b>				
<b>Analytical skills derived from a sound education and training in relevant science or technical subject, plus experience of application of those skills in practice (apart from the need to be able to analyse often complex proposals, these competences are also relevant to the need to secure credibility and influencing capability with licensee staff who are subject to legal arrangements to demonstrate their own competence).</b>				
1 Agreed enhancements to academic qualifications.	M (if identified)			The need for this will be agreed with the NTL, in conjunction with Line Manager. NB it is a recruitment/entry requirement for nuclear inspectors to possess generally a good honours degree (agreed at the June 2007 NDMB).
2 Agreed enhancements to professional discipline understanding.	M (if identified)			Agreed enhancements to discipline capabilities as required for likely discipline applications with the NII, agreed with NTL in conjunction with Line Manager. NB it is a recruitment/entry requirement for nuclear inspectors generally to be a member of the relevant professional institution (Chartered status for engineers, equivalent for scientists). This was agreed at the June 2007 NDMB. These enhancements are not aimed specifically at nuclear applications, but at any additional capabilities that may be required within the discipline. For example, a mechanical engineer from the high hazard industry with significant structural integrity expertise may need to develop understanding of lifting applications.

<b>Competence:</b>				
<b>Understanding of application of discipline technological knowledge and subject skill in the nuclear sector.</b>				
3 As established by NTL/line manager.	M (if identified)			See also OJT 1-9.
<b>Competence:</b>				
<b>Understanding of nuclear and radiological hazards and appreciation of the way in which safety functional requirements of structures systems and components are derived for their control.</b>				
4 Nuclear Safety Course.	M			New course.  Attendance at this course will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD.  All new joiners should attend this course to establish a baseline for future development against this competence.
5 Completion of post-course development.	M			This course will include a formal evaluation process (test) from which any need for further development will be identified.  Completion of post-course development will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD. For inspectors recruited as nuclear inspectors, completion of this will be achieved via the performance management system.
<b>Competence:</b>				
<b>Understanding of the way in which safety cases should be used to demonstrate the control of nuclear and radiological hazards. This should cover all the likely elements of a safety case as well as the way in which demonstrations are put together (claim, argument, evidence) and expectations for defence in depth and the application of the relevant SAPs.</b>				
6 Safety Assessment Course.	M			Attendance at this course will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD.
7 OJT 1. Assessment of hazard analysis techniques.	M/D			Items marked M/D are mandatory for those recruited from other parts of HSE/OGD, discretionary for direct recruits depending on previous experience. Line manager will agree requirements.
8 OJT 2. Assessment of design basis analysis.	M/D			See note for item 7.
9 OJT 3. Assessment of methodology for determination of adequacy of safety systems, functions and controls.	M/D			See note for item 7.

10 OJT 4. Assessment of ALARP process.	M/D			See note for item 7.
11 OJT 5. Assessment of severe accident analysis.	M/D			See note for item 7.
12 OJT 6. Assessment of PSA and related analytical techniques.				See note for item 7.
13 OJT 7. Assessment of engineering or design substantiation processes.	M/D			See note for item 7.
14 OJT 8. Use of SAPs.	M			
15 OJT 9. Assessment of derivation of safe operating envelop.	M/D			See note for item 7.
16 OJT 10. Verification Inspection (ie check that adequate safety case provisions are properly implemented in practice).	M			
<b>Competence:</b>				
<b>Understanding of relevant good industry practice and what constitutes ALARP within discipline.</b>				
17 Safety Assessment Course.	M			
18 OJT 11a. ALARP.	M			
19 OJT 11b. ALARP.	M			
<b>Competence:</b>				
<b>Understanding of the way in which a safe operating envelope (Operating Rules and Safety Mechanisms) is derived from the safety case and ND expectations with regard to engineered and managerial defence-in-depth provisions.</b>				
20 Safety Assessment Course.	M			Attendance at this course will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD.
21 Site Inspection for Assessors Course.	M			Mandatory for Inspectors who carry out a significant amount of site work. Attendance at this course will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD.

22 OJT 12a. LC23/27 Inspection.	M			
23 OJT 12b. Presentation on inspection at 12a.	M			
<b>Competence:</b>				
<b>Ability to carry out balanced assessment through reference to key plant hazards and previous licensee/plant performance.</b>				
24 Safety Assessment Course.	M			Attendance at this course will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD.
25 Site Inspection for Assessors Course.	M			Mandatory for Inspectors who carry out a significant amount of site work. Attendance at this course will be counted towards nuclear equivalence only for those recruited from other parts of HSE/OGD.
26 OJT 13. Plant visit and presentation.	M			



## Nuclear Inspection –Competence Record (Table 3.2)

COMPETENCE REQUIREMENT	EVIDENCE	ASSESSOR <sup>1</sup>	LEVEL <sup>2</sup>	DATE	NOTES
<p>1 Analytical skills derived from a sound education and training in relevant science or technical subject, plus experience of application of those skills in practice (apart from the need to be able to analyse often complex proposals, these competences are also relevant to the need to secure credibility and influencing capability with licensee staff who are subject to legal arrangements to demonstrate their own competence).</p>	<p>Agreed enhancements to academic qualifications.</p>				<p>It is a recruitment requirement that nuclear inspectors generally possess a good honours degree, agreed at the June 2007 NDMB. There may be occasions when it is necessary, post recruitment, to consider whether academic enhancements are necessary to ensure that learning fully meets ND expectations. An example would be a master's degree in a particular sub-discipline. The NTL will advice and judge satisfactory completion.</p>
	<p>Agreed enhancements to professional discipline understanding.</p>				<p>Need determined in conjunction with NTL and satisfactory completion judged by the NTL.</p> <p>It is a recruitment/entry requirement for nuclear inspectors generally to be a member of the relevant professional institution (Chartered status for engineers, equivalent for scientists). This was agreed at the June 2007 NDMB.</p>
<p>2 Understanding of application of discipline technological knowledge and subject skill in the nuclear sector.</p>	<p>Agreed enhancements to discipline capabilities as required for nuclear applications.</p>				<p>If an inspector is recruited into HSE as a nuclear inspector then this requirement is satisfied initially in the recruitment process but will be subject to a training needs analysis as part of routine performance management activity.</p> <p>If an inspector joins ND from other parts of HSE/OGD, then the judgement of satisfactory attainment of this competence requirement will be made by the NTL against appropriate discipline standards.</p> <p>NB: The depth and breadth of nuclear enhancement may vary between disciplines.</p>
<p>3 Understanding of nuclear and radiological hazards and appreciation of the way in which safety functional requirements of structures</p>	<p>Evaluation of attendance at Nuclear Safety Course.</p>				

COMPETENCE REQUIREMENT	EVIDENCE	ASSESSOR <sup>1</sup>	LEVEL <sup>2</sup>	DATE	NOTES
systems and components are derived for their control.	Completion of post-course development.				
4 Understanding of the way in which safety cases should be used to demonstrate the control of nuclear and radiological hazards. This should cover all the likely elements of a safety case as well as the way in which demonstrations are put together (claim, argument, evidence) and expectations for defence in depth and the application of the relevant SAPs.	Evaluation of attendance at Safety Assessment Course.				
	OJT 1. Assessment of hazard analysis techniques.				
	OJT 2. Assessment of design basis analysis.				
	OJT 3. Assessment of methodology for determination of adequacy of safety systems, functions and controls.				
	OJT 4. Assessment of ALARP process.				
	OJT 5. Assessment of severe accident analysis.				
	OJT 6. Assessment of PSA and related analytical techniques.				
	OJT 7. Assessment of engineering or design substantiation processes.				
	OJT 8. Use of SAPs.				
	OJT 9. Derivation of safe operating envelope.				
5 Understanding of relevant good industry practice and what constitutes ALARP within discipline.	Evaluation of Attendance at Safety Assessment Course.				
	OJT 11a. ALARP.				

COMPETENCE REQUIREMENT	EVIDENCE	ASSESSOR <sup>1</sup>	LEVEL <sup>2</sup>	DATE	NOTES
	OJT 11b. ALARP.				
6 Understanding of the way in which a safe operating envelope (operating rules and safety mechanisms) is derived from the safety case and ND expectations with regard to engineered and managerial defence-in-depth provisions.	Evaluation of attendance at Safety Assessment Course.				
	Evaluation of attendance at Site Inspection for Assessors Course.				
	OJT 12a. LC23/27 inspection.				
	OJT 12b. Presentation on inspection at 12a.				
7 Ability to carry out balanced assessment through reference to key plant hazards and previous licensee/plant safety performance.	Evaluation of attendance at Safety Assessment Course.				
	Evaluation of attendance at Site Inspection for Assessors Course.				
	OJT 13. Plant visit and presentation.				

NOTE

1 Normally Line Manager (with NTL as appropriate).

2 Assessed on a scale of 1 - 3. 1 = more development required, 2 = competent, 3 = suitable to act as mentor.

**APPENDIX [C]**  
**Questionnaire**

# Bridge Inspection Training and Competence Survey

## INTRODUCTION

### GENERAL

The Department for Transport (DfT) and the UK Bridges Board (UKBB) fully recognise the need for a robust and consistent approach to the inspection and management of highway structures.

Considerable advances have been made in the UK in the last five years with the development of standardised inspection practices for highway structures and the publication of:

- (i) a Code of Practice for the Management of Highway Structures (2005); and
- (ii) an Inspection Manual for Highway Structures (2007).

However, the UK does not have formal/accredited training courses for highway bridge inspectors, therefore one of the next pieces of work for the DfT/UKBB is to look at the need for, and if appropriate scope and content of, accredited inspector training.

### INSPECTOR TRAINING SURVEY

The DfT/UKBB has commissioned a survey of inspector training practices currently used by:

- i) UK highway bridge owners;
- ii) Other bridge owners in the UK, e.g. light and heavy rail, watercourse owner;
- iii) Highway bridge owners outside the UK; and
- iv) Owners of similar/comparable asset types, e.g. roads, railway track, dams etc.

NOTE: This Survey only applies to regular/cyclic inspections; training for specialist inspections is outside the scope of this survey.

### SURVEY FINDINGS

The findings from this survey will be used to inform the way forward for training of highway bridge inspectors in the UK.

The findings from this survey will be summarised and circulated to all those who took part. The summary report will list the organisations that took part but it will not attribute responses to a specific organisation. Survey responses will only be used for this project and will be treated in strictest confidence.

### COMPLETING THE SURVEY

We have designed the survey to be as brief and as user friendly as possible and we greatly appreciate you taking the time to complete the survey. The survey will take approximately 15 to 45 minutes to complete depending on your inspector training arrangements.

If you wish to exit the survey at any stage and return later please click 'Exit this survey' link (top right hand corner). This will automatically save your responses.

NOTE 1: The survey has been set up to accept ONE response per computer. This allows you to exit and return to the survey and any questions previously completed will be saved. If you use a different computer you will need to restart the survey from the beginning.

Note 2: Questions that start with a \* before the number are mandatory and must be completed before you can progress to the next section of the survey.

### CONTACT DETAILS

If you have any comments/queries regarding this survey please contact:

# Bridge Inspection Training and Competence Survey

Garry Sterritt

Telephone: +44 (0)207 121 2435

E-mail: [Garry.Sterritt@atkinsglobal.com](mailto:Garry.Sterritt@atkinsglobal.com)

# Bridge Inspection Training and Competence Survey

## PERSONAL/ORGANIZATION DETAILS

\* 1. Full Name (First Name, Surname)

\* 2. Organization

3. Job Title

4. Email Address

5. Telephone Number

6. Are you willing to participate in a follow-up telephone call, if required?

Yes

No

7. Is your organization:

The Asset Owner - you own the assets? (Go to Q8)

A Consultant/Contractor - you support asset owners to inspect their assets? (Go to Q9)

Other? (Please Specify):

8. Answer this question if your organisation is an Asset Owner, i.e. you own the asset (then go to Q10)

Inspections are undertaken by in-house staff

In-house staff also provide services to other organisations

Inspections are undertaken by in-house and external staff

Inspections are undertaken by external staff

Other (please specify)

# Bridge Inspection Training and Competence Survey

9. Answer this question if your organisation is a Consultant/Contractor, i.e. you support asset owners to inspect their assets (then go to Q10)

- The asset owner's staff do inspections
- Our in-house staff do inspections for the asset owner
- Sub-consultants undertake the inspections
- Other (please specify)

10. Please answer this question as follows:

i) Asset Owner - how many assets do you own?

ii) Consultant/Contractor - how many assets do you typically inspect per year?

	<25	25 to 100	100 to 250	250 to 750	750 to 1500	1500 to 2500	> 2500
Bridges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retaining Walls	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Culverts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Buildings/Car parks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other Assets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you inspect other asset types please describe them, and if required the number/quantity, below:

11. How many staff are involved in inspections in your organization; exclude any staff from an external organization/sub-consultant; inspection staff includes those involved in supervising, undertaking and reviewing.

- 1
- 2 - 3
- 3 - 5
- 5 - 10
- 10 - 25
- More than 25



# Bridge Inspection Training and Competence Survey

12. Do your current arrangements for inspections provide ample cover for sick leave?

Yes

No

Any additional comments

# Bridge Inspection Training and Competence Survey

## Inspection Types

Please describe the regular/cyclic inspection types used for your assets; please provide the inspection name, frequency and description for each type (up to three different types can be recorded below)

NOTE: This Survey only applies to regular/cyclic inspections, training for specialist inspections are outside the scope of this survey.

\* 1. INSPECTION TYPE 1: Name

\* 2. INSPECTION TYPE 1: Frequency

\* 3. INSPECTION TYPE 1: Description

4. INSPECTION TYPE 2: Name

5. INSPECTION TYPE 2: Frequency

6. INSPECTION TYPE 2: Description

7. INSPECTION TYPE 3: Name

8. INSPECTION TYPE 3: Frequency

# Bridge Inspection Training and Competence Survey

## 9. INSPECTION TYPE 3: Description



NOTE: The following set of questions are linked to the three inspection types defined on this page. Thus it is advisable to print this page for your reference, before proceeding to the next part of the survey.

# Bridge Inspection Training and Competence Survey

## Inspection Type 1

### INSPECTOR TRAINING / INSPECTOR ACCREDITATION IN YOUR ORGANIZATION

Definitions of inspector training arrangement:

[A]. Mandatory Training - Inspector training is a mandatory requirement (e.g. standards/competence are defined and formal/accredited training programme exists which are strictly adhered to)

[B]. Training - Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency)

[C]. No Training - Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed to be suitably experienced/qualified to undertake inspections)

The questionnaire has three standard sets of questions, one for Mandatory Training (MT), one for Training (T) and one for No Training (NT). Please answer the question below to define the training arrangement in your organisation for inspection type 1 (the selected option will direct you to the relevant part of the questionnaire).

### \* 1. Inspector Training/ Inspector Accreditation in your organization for: INSPECTION TYPE 1

Mandatory Training

Training

No Training

### 2. These inspections are undertaken by:

In-house staff

In-house and external staff

External staff

Other (please specify)

# Bridge Inspection Training and Competence Survey

## Inspection Type 2

### INSPECTOR TRAINING / INSPECTOR ACCREDITATION IN YOUR ORGANIZATION

Definitions of inspector training arrangement:

- [A]. Mandatory Training - Inspector training is a mandatory requirement (e.g. standards/competence are defined and formal/accredited training programme exists which are strictly adhered to)
- [B]. Training - Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency)
- [C]. No Training - Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed to be suitably experienced/qualified to undertake inspections)

Please answer the question below to define the training arrangement in your organisation for inspection type 2 (the selected option will direct you to the relevant part of the questionnaire). Please read the following guidance before answering the following question.

#### GUIDANCE:

1. The questionnaire has three standard sets of questions, one for Mandatory Training (MT), one for Training (T) and one for No Training (NT)

- If the training arrangement for inspection type 2 is the same as inspection type 1 and the specifics of the training are the same (i.e. same training pre-requisites and modules) then:

Tick the option 'Same as Inspection Type 1'. By selecting this option you will not be required to fill the questionnaire for inspection type 2 and you will automatically be directed to inspection type 3.

-Alternatively, if the training arrangement is the same but the specifics of the training differ (e.g. different training pre-requisites and modules etc.), then:

Tick one of the other three options 'Mandatory Training' or 'Training' or 'No Training'

### 1. Inspector Training/ Inspector Accreditation in your organization for: INSPECTION TYPE 2

- Same as Inspection Type 1
- Mandatory Training
- Training
- No Training
- Not Relevant (i.e. you have not defined an inspection type 2)

### 2. These inspections are undertaken by:

- In-house staff
- In-house and external staff
- External staff

Other (please specify)



# Bridge Inspection Training and Competence Survey

## Inspection Type 3

### INSPECTOR TRAINING / INSPECTOR ACCREDITATION IN YOUR ORGANIZATION

Definitions of inspector training arrangement:

[A]. Mandatory Training - Inspector training is a mandatory requirement (e.g. standards/competence are defined and formal/accredited training programme exists which are strictly adhered to)

[B]. Training - Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency)

[C]. No Training - Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed to be suitably experienced/qualified to undertake inspections)

Please answer the question below to define the training arrangement in your organisation for inspection type 3 (the selected option will direct you to the relevant part of the questionnaire). Please read the following guidance before answering the following question.

**GUIDANCE:**

1. The questionnaire has three standard sets of questions, one for Mandatory Training (MT), one for Training (T) and one for No Training (NT)

- If the training arrangement for inspection type 3 is the same as inspection type 1 or 2 and the specifics of the training are the same (i.e. same training pre-requisites and modules) then:

Tick the option 'Same as Inspection Type 1' or 'Same as Inspection Type 2'. By selecting this option you will not be required to fill the questionnaire for inspection type 3 and you will automatically be directed to the end of this survey.

-Alternatively, if the training arrangement is the same but the specifics of the training differ (e.g. different training pre-requisites and modules etc.), then:

Tick one of the other three options 'Mandatory Training' or 'Training' or 'No Training'

### 1. Inspector Training/ Inspector Accreditation in your organization for: INSPECTION TYPE 3

Same as Inspection Type 1

Same as Inspection Type 2

Mandatory Training

Training

No Training

Not Relevant (i.e. you have not defined an inspection type 3)

# Bridge Inspection Training and Competence Survey

2. These inspections are undertaken by:

In-house staff

In-house and external staff

External staff

Other (please specify)



# Bridge Inspection Training and Competence Survey

## Inspection Type 1 - MT

You selected the option which states that inspector training/accreditation for inspection type 1 is:  
A mandatory requirement (e.g. standards/competence are defined and formal/accredited training programme exists which are strictly adhered to)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

1. When was the mandatory/accredited training requirement introduced in your organization?

Before 1970

1970 - 1975

1975 - 1980

1980 - 1985

1985 - 1990

1990 - 1995

1995 - 2000

2000 - 2005

After 2005

Don't know

2. Why was mandatory inspector training / accreditation introduced?

Government / industry requirement

Considered to be a good practice, e.g. quality, consistency, competence etc.

To align with practices in similar organisations

In response to an incident/s where insufficient inspector training was identified as a contributory factor

Don't know

Other (please specify)

# Bridge Inspection Training and Competence Survey

3. What are the 'EDUCATIONAL/QUALIFICATION' pre-requisites for enrolling on the training programme?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

4. What are the pre-requisites for enrolling on the training programme in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience

Prior experience not in inspections but in a relevant field

Please select from the drop down menu



Please provide any other specific background experience

5. What does inspector accreditation typically involve?

For staff with no / limited experience

For experienced staff

	For staff with no / limited experience	For experienced staff
Course / Classroom learning	€	€
Written Exam	€	€
Practical Exam (On - site)	€	€
On - site training	€	€

If relevant, please provide a definition in the space below that your organisation adopts for 'Experienced Staff', e.g. someone who can demonstrate more than 5 years inspection experience.

# Bridge Inspection Training and Competence Survey

## 6. Duration of training

With reference to the previous question please specify the duration e.g. 2 - 3 days, 1 week, 1 month, 1 year etc, for:

Course / Classroom Learning: For staff with no / limited experience	Course / Classroom Learning: For experienced staff	On - site training: For staff with no / limited experience	On - site training: For experienced staff
--	--	--	--

Please select from the drop down menu

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

## 7. What accreditation is received from the training?

- Technical Membership of an organization (please specify organization in the box below)
- Incorporated / Chartered membership of an organization (please specify organization in the box below)
- Industry recognized qualification
- Other (please specify in the box below)

Organization / Other

## 8. Training Course/Classroom Learning Content typically consists of:

- Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)
- Planning and organising inspections (procedures, safety, technical terms/rules etc.)
- Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)
- Producing inspection reports
- Assessment of inspection data (understanding the obtained data, proposing actions after inspection)

## 9. Is there a standard guidance document/syllabus that the training course follows?

- Yes
- No
- Other (please specify)

## 10. Are you able to provide a copy of the guidance document?

- Yes (Please e-mail or post a copy of the guidance to the questionnaire contact)
- No
- Not Relevant

# Bridge Inspection Training and Competence Survey

11. Who provides the training?

Your organization

An external organization (please provide details in the box below eg. university, specialist training organizations, government etc.)

Details of external organizations

12. What is the typical cost of the training course?

13. Who pays for the training?

Your organization

Individual himself/herself

Partly the organization and partly the individual

Other (please specify)

14. Do inspectors undertake a re-assessment at regular/periodic intervals?

Yes (please specify the time period after which a reassessment is required, in the box below)

Yes, when triggered by an event/incident (please give examples in the box below)

No

Time period / Event

# Bridge Inspection Training and Competence Survey

15. Are there any specific areas of concern with your current training practices?  
(Please include any additional comments in the box provided)

- No
- Some parts of the training are considered to be out of date (e.g. does not align with latest practices)
- Need to expand training coverage (the present syllabus is not considered sufficient for inspector training)
- Duration of training should be reduced from the current standard
- Duration of training should be increased from the current standard

Other areas of concern (please specify)

16. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of mandatory training requirement?

- Yes
- No
- Don't Know

Additional comments

17. Are there any indicators to measure the success of the training programme?  
(Success implies improvement in the consistency and quality of inspection information)

- No
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/at periodic intervals.
- Other (please specify)

18. Please provide details of any improvements that have been noticed since the introduction of the training

# Bridge Inspection Training and Competence Survey

## Inspection Type 1 - T

You selected the option which states that inspector training/accreditation for inspection type 1 is:  
Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

### 1. Why was inspector training introduced?

- Considered to be a good practice, e.g. quality, consistency, competence etc.
- To align with practices in similar organisations
- In response to an incident/s where insufficient inspector training was identified as a contributory factor
- Don't know
- Other (please specify)

### 2. What are the 'EDUCATIONAL/QUALIFICATION' pre-requisites for enrolling on the training programme?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

# Bridge Inspection Training and Competence Survey

3. What are the pre-requisites for enrolling on the training programme in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience	Prior experience not in inspections but in a relevant field
Please select from the drop down menu	Please select from the drop down menu
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
Please provide any other specific background experience	
<input style="width: 100%; height: 50px;" type="text"/>	

4. What does inspector training typically involve?

	For staff with no / limited experience	For experienced staff
Course / Classroom learning	€	€
Written Exam	€	€
Practical Exam (On - site)	€	€
On - site training	€	€

If relevant, please provide a definition in the space below that your organisation adopts for 'Experienced Staff', e.g. someone who can demonstrate more than 5 years inspection experience.

5. Duration of training

With reference to the previous question please specify the duration e.g. 2 - 3 days, 1 week, 1 month, 1 year etc, for:

	Course / Classroom Learning: For staff with no / limited experience	Course / Classroom Learning: For experienced staff	On - site training: For staff with no / limited experience	On - site training: For experienced staff
Please select from the drop down menu	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>

6. Training Course/Classroom Learning Content typically consists of:

- € Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)
- € Planning and organising inspections (procedures, safety, technical terms/rules etc.)
- € Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)
- € Producing inspection reports
- € Assessment of inspection data (understanding the obtained data, proposing actions after inspection)

# Bridge Inspection Training and Competence Survey

7. Is there a standard guidance document/syllabus that the training course follows?

Yes

No

Other (please specify)

8. Are you able to provide a copy of the guidance document?

Yes (Please e-mail or post a copy of the guidance to the questionnaire contact)

No

Not Relevant

9. Who provides the training?

Your organization

An external organization (please provide details in the box below, e.g. university, specialist training organizations, government etc.)

Details of external organization

10. What is the typical cost of the training course?

11. Who pays for the training?

Your organization

Individual himself/herself

Partly the organization and partly the individual

Other (please specify)



# Bridge Inspection Training and Competence Survey

12. Do inspectors undertake a re-assessment at regular/periodic intervals?

- Yes (please specify the time period after which a reassessment is required, in the box below)
- Yes, when triggered by an event/incident (please give examples in the box below)
- No

Time period / Event

13. Are there any specific areas of concern with your current training practices?  
(Please include any additional comments in the boxes provided)

- No
- Some parts of the training are considered to be out of date (e.g. does not align with latest practices)
- Need to expand training coverage (the present syllabus is not considered sufficient for inspector training)
- Duration of training should be reduced from the current standard
- Duration of training should be increased from the current standard
- Other areas of concern (please specify)

14. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of inspector training?

- Yes
- No
- Don't Know

## Bridge Inspection Training and Competence Survey

15. Are there any indicators to measure the success of the training programme?  
(Success implies improvement in the consistency and quality of inspection information)

- No
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/at periodic intervals.
- Other (please specify)

16. Please provide details of any improvements that have been noticed since the introduction of the training

# Bridge Inspection Training and Competence Survey

## Inspection Type 1 - NT

You selected the option which states that inspector training/accreditation for inspection type 1 is:  
Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed to be suitably experienced/qualified can undertake inspections)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

### 1. Why is inspector training not required?

- Not considered necessary (please give your reasons in the box below)
- Other (please specify in the box below)

Reasons / Other

### 2. What are the minimum 'EDUCATIONAL/QUALIFICATION' requirements for bridge inspectors?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

### 3. What are the minimum requirements for bridge inspectors in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience

Prior experience not in inspections but in a relevant field

Please select from the drop down menu

Please provide any other specific background experience

# Bridge Inspection Training and Competence Survey

4. What measures are taken to maintain quality and ensure consistency?

- None taken
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/periodic intervals
- Other (please specify)

5. Do you intend to develop an inspector training programme?

- Yes
- Maybe
- No

Please specify the approximate timeframe in which you plan to introduce the training programme

# Bridge Inspection Training and Competence Survey

## Inspection Type 2 - 1

You selected the option which states that inspector training/accreditation for inspection type 2 is:

Same as inspection type 1

This implies that the training arrangement is the same as inspection type 1 and the specifics of the training are the same (i.e. same training pre-requisites and modules). Therefore you do not need to refill the questionnaire for inspection type 2.

If you have selected the wrong option please click on the 'Prev' button to return to the original question and select an alternative option, otherwise please proceed with the remaining questionnaire by clicking the 'Next' button.

# Bridge Inspection Training and Competence Survey

## Inspection Type 2 - MT

You selected the option which states that inspector training/accreditation for inspection type 2 is:  
A mandatory requirement (e.g. standards/competence are defined and formal/accredited training programme exists which are strictly adhered to)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

1. When was the mandatory/accredited training requirement introduced in your organization?

Before 1970

1970 - 1975

1975 - 1980

1980 - 1985

1985 - 1990

1990 - 1995

1995 - 2000

2000 - 2005

After 2005

Don't know

2. Why was mandatory inspector training / accreditation introduced?

Government / industry requirement

Considered to be a good practice, e.g. quality, consistency, competence etc.

To align with practices in similar organisations

In response to an incident/s where insufficient inspector training was identified as a contributory factor

Don't know

Other (please specify)

# Bridge Inspection Training and Competence Survey

3. What are the 'EDUCATIONAL/QUALIFICATION' pre-requisites for enrolling on the training programme?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

4. What are the pre-requisites for enrolling on the training programme in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience

Prior experience not in inspections but in a relevant field

Please select from the drop down menu



Please provide any other specific background experience

5. What does inspector accreditation typically involve?

For staff with no / limited experience

For experienced staff

	For staff with no / limited experience	For experienced staff
Course / Classroom learning	€	€
Written Exam	€	€
Practical Exam (On - site)	€	€
On - site training	€	€

If relevant, please provide a definition in the space below that your organisation adopts for 'Experienced Staff', e.g. someone who can demonstrate more than 5 years inspection experience.

# Bridge Inspection Training and Competence Survey

## 6. Duration of training

With reference to the previous question please specify the duration e.g. 2 - 3 days, 1 week, 1 month, 1 year etc, for:

Course / Classroom Learning: For staff with no / limited experience	Course / Classroom Learning: For experienced staff	On - site training: For staff with no / limited experience	On - site training: For experienced staff
--	--	--	--

Please select from the drop down menu

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

## 7. What accreditation is received from the training?

- Technical Membership of an organization (please specify organization in the box below)
- Incorporated / Chartered membership of an organization (please specify organization in the box below)
- Industry recognized qualification
- Other (please specify in the box below)

Organization / Other

## 8. Training Course/Classroom Learning Content typically consists of:

- Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)
- Planning and organising inspections (procedures, safety, technical terms/rules etc.)
- Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)
- Producing inspection reports
- Assessment of inspection data (understanding the obtained data, proposing actions after inspection)

## 9. Is there a standard guidance document/syllabus that the training course follows?

- Yes
- No
- Other (please specify)

## 10. Are you able to provide a copy of the guidance document?

- Yes (Please e-mail or post a copy of the guidance to the questionnaire contact)
- No
- Not Relevant



# Bridge Inspection Training and Competence Survey

11. Who provides the training?

Your organization

An external organization (please provide details in the box below eg. university, specialist training organizations, government etc.)

Details of external organizations

12. What is the typical cost of the training course?

13. Who pays for the training?

Your organization

Individual himself/herself

Partly the organization and partly the individual

Other (please specify)

14. Do inspectors undertake a re-assessment at regular/periodic intervals?

Yes (please specify the time period after which a reassessment is required, in the box below)

Yes, when triggered by an event/incident (please give examples in the box below)

No

Time period / Event

# Bridge Inspection Training and Competence Survey

15. Are there any specific areas of concern with your current training practices?  
(Please include any additional comments in the box provided)

- No
- Some parts of the training are considered to be out of date (e.g. does not align with latest practices)
- Need to expand training coverage (the present syllabus is not considered sufficient for inspector training)
- Duration of training should be reduced from the current standard
- Duration of training should be increased from the current standard

Other areas of concern (please specify)

16. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of mandatory training requirement?

- Yes
- No
- Don't Know

Additional comments

17. Are there any indicators to measure the success of the training program?  
(Success implies improvement in the consistency and quality of inspection information)

- No
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/at periodic intervals.
- Other (please specify)

18. Please provide details of any improvements that have been noticed since the introduction of the training

# Bridge Inspection Training and Competence Survey

## Inspection Type 2 - T

You selected the option which states that inspector training/accreditation for inspection type 2 is:  
Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

### 1. Why was inspector training introduced?

- Considered to be a good practice, e.g. quality, consistency, competence etc.
- To align with practices in similar organisations
- In response to an incident/s where insufficient inspector training was identified as a contributory factor
- Don't know
- Other (please specify)

### 2. What are the 'EDUCATIONAL/QUALIFICATION' pre-requisites for enrolling on the training programme?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

# Bridge Inspection Training and Competence Survey

3. What are the pre-requisites for enrolling on the training programme in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience	Prior experience not in inspections but in a relevant field
Please select from the drop down menu	Please select from the drop down menu
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
Please provide any other specific background experience	
<input style="width: 100%; height: 50px;" type="text"/>	

4. What does inspector training typically involve?

	For staff with no / limited experience	For experienced staff
Course / Classroom learning	€	€
Written Exam	€	€
Practical Exam (On - site)	€	€
On - site training	€	€

If relevant, please provide a definition in the space below that your organisation adopts for 'Experienced Staff', e.g. someone who can demonstrate more than 5 years inspection experience.

5. Duration of training

With reference to the previous question please specify the duration e.g. 2 - 3 days, 1 week, 1 month, 1 year etc, for:

	Course / Classroom Learning: For staff with no / limited experience	Course / Classroom Learning: For experienced staff	On - site training: For staff with no / limited experience	On - site training: For experienced staff
Please select from the drop down menu	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>

6. Training Course/Classroom Learning Content typically consists of:

- € Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)
- € Planning and organising inspections (procedures, safety, technical terms/rules etc.)
- € Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)
- € Producing inspection reports
- € Assessment of inspection data (understanding the obtained data, proposing actions after inspection)

# Bridge Inspection Training and Competence Survey

7. Is there a standard guidance document/syllabus that the training course follows?

Yes

No

Other (please specify)

8. Are you able to provide a copy of the guidance document?

Yes (Please e-mail or post a copy of the guidance to the questionnaire contact)

No

Not Relevant

9. Who provides the training?

Your organization

An external organization (please provide details in the box below, e.g. university, specialist training organizations, government etc.)

Details of external organization

10. What is the typical cost of the training course?

11. Who pays for the training?

Your organization

Individual himself/herself

Partly the organization and partly the individual

Other (please specify)

# Bridge Inspection Training and Competence Survey

12. Do inspectors undertake a re-assessment at regular/periodic intervals?

- Yes (please specify the time period after which a reassessment is required, in the box below)
- Yes, when triggered by an event/incident (please give examples in the box below)
- No

Time period / Event

13. Are there any specific areas of concern with your current training practices?  
(Please include any additional comments in the boxes provided)

- No
- Some parts of the training are considered to be out of date (e.g. does not align with latest practices)
- Need to expand training coverage (the present syllabus is not considered sufficient for inspector training)
- Duration of training should be reduced from the current standard
- Duration of training should be increased from the current standard
- Other areas of concern (please specify)

14. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of inspector training?

- Yes
- No
- Don't Know

## Bridge Inspection Training and Competence Survey

15. Are there any indicators to measure the success of the training programme?  
(Success implies improvement in the consistency and quality of inspection information)

- No
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/at periodic intervals.
- Other (please specify)

16. Please provide details of any improvements that have been noticed since the introduction of the training

# Bridge Inspection Training and Competence Survey

## Inspection Type 2 - NT

You selected the option which states that inspector training/accreditation for inspection type 2 is:  
Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed to be suitably experienced/qualified can undertake inspections)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

### 1. Why is inspector training not required?

- Not considered necessary (please give your reasons in the box below)
- Other (please specify in the box below)

Reasons / Other

### 2. What are the minimum 'EDUCATIONAL/QUALIFICATION' requirements for bridge inspectors?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

### 3. What are the minimum requirements for bridge inspectors in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience

Prior experience not in inspections but in a relevant field

Please select from the drop down menu

Please provide any other specific background experience



# Bridge Inspection Training and Competence Survey

4. What measures are taken to maintain quality and ensure consistency?

- None taken
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/periodic intervals
- Other (please specify)

5. Do you intend to develop an inspector training programme?

- Yes
- Maybe
- No

Please specify the approximate timeframe in which you plan to introduce the training programme

# Bridge Inspection Training and Competence Survey

## Inspection Type 3 - 1

You selected the option which states that inspector training/accreditation for inspection type 3 is:

Same as inspection type 1

This implies that the training arrangement is the same as inspection type 1 and the specifics of the training are the same (i.e. same training pre-requisites and modules). Therefore you do not need to refill the questionnaire for inspection type 3.

If you have selected the wrong option please click on the 'Prev' button to return to the original question and select an alternative option, otherwise please click the 'Next' button to go to the end of this survey.

# Bridge Inspection Training and Competence Survey

## Inspection Type 3 - 2

You selected the option which states that inspector training/accreditation for inspection type 3 is:

Same as inspection type 2

This implies that the training arrangement is the same as inspection type 2 and the specifics of the training are the same (i.e. same training pre-requisites and modules). Therefore you do not need to refill the questionnaire for inspection type 3.

If you have selected the wrong option please click on the 'Prev' button to return to the original question and select an alternative option, otherwise please click the 'Next' button to go to the end of this survey.

# Bridge Inspection Training and Competence Survey

## Inspection Type 3 - MT

You selected the option which states that inspector training/accreditation for inspection type 3 is:  
A mandatory requirement (e.g. standards/competence are defined and formal/accredited training programme exists which are strictly adhered to)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

1. When was the mandatory/accredited training requirement introduced in your organization?

Before 1970

1970 - 1975

1975 - 1980

1980 - 1985

1985 - 1990

1990 - 1995

1995 - 2000

2000 - 2005

After 2005

Don't know

2. Why was mandatory inspector training / accreditation introduced?

Government / industry requirement

Considered to be a good practice, e.g. quality, consistency, competence etc.

To align with practices in similar organisations

In response to an incident/s where insufficient inspector training was identified as a contributory factor

Don't know

Other (please specify)

# Bridge Inspection Training and Competence Survey

3. What are the 'EDUCATIONAL/QUALIFICATION' pre-requisites for enrolling on the training programme?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

4. What are the pre-requisites for enrolling on the training programme in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience

Prior experience not in inspections but in a relevant field

Please select from the drop down menu



Please provide any other specific background experience

5. What does inspector accreditation typically involve?

For staff with no / limited experience

For experienced staff

	For staff with no / limited experience	For experienced staff
Course / Classroom learning	€	€
Written Exam	€	€
Practical Exam (On - site)	€	€
On - site training	€	€

If relevant, please provide a definition in the space below that your organisation adopts for 'Experienced Staff', e.g. someone who can demonstrate more than 5 years inspection experience.

# Bridge Inspection Training and Competence Survey

## 6. Duration of training

With reference to the previous question please specify the duration e.g. 2 - 3 days, 1 week, 1 month, 1 year etc, for:

Course / Classroom Learning: For staff with no / limited experience	Course / Classroom Learning: For experienced staff	On - site training: For staff with no / limited experience	On - site training: For experienced staff
--	--	--	--

Please select from the drop down menu

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

## 7. What accreditation is received from the training?

- Technical Membership of an organization (please specify organization in the box below)
- Incorporated / Chartered membership of an organization (please specify organization in the box below)
- Industry recognized qualification
- Other (please specify in the box below)

Organization / Other

## 8. Training Course/Classroom Learning Content typically consists of:

- Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)
- Planning and organising inspections (procedures, safety, technical terms/rules etc.)
- Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)
- Producing inspection reports
- Assessment of inspection data (understanding the obtained data, proposing actions after inspection)

## 9. Is there a standard guidance document/syllabus that the training course follows?

- Yes
- No
- Other (please specify)

## 10. Are you able to provide a copy of the guidance document?

- Yes (Please e-mail or post a copy of the guidance to the questionnaire contact)
- No
- Not Relevant

# Bridge Inspection Training and Competence Survey

11. Who provides the training?

Your organization

An external organization (please provide details in the box below eg. university, specialist training organizations, government etc.)

Details of external organizations

12. What is the typical cost of the training course?

13. Who pays for the training?

Your organization

Individual himself/herself

Partly the organization and partly the individual

Other (please specify)

14. Do inspectors undertake a re-assessment at regular/periodic intervals?

Yes (please specify the time period after which a reassessment is required, in the box below)

Yes, when triggered by an event/incident (please give examples in the box below)

No

Time period / Event

# Bridge Inspection Training and Competence Survey

15. Are there any specific areas of concern with your current training practices?  
(Please include any additional comments in the box provided)

- No
- Some parts of the training are considered to be out of date (e.g. does not align with latest practices)
- Need to expand training coverage (the present syllabus is not considered sufficient for inspector training)
- Duration of training should be reduced from the current standard
- Duration of training should be increased from the current standard

Other areas of concern (please specify)

16. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of mandatory training requirement?

- Yes
- No
- Don't Know

Additional comments

17. Are there any indicators to measure the success of the training program?  
(Success implies improvement in the consistency and quality of inspection information)

- No
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/at periodic intervals.
- Other (please specify)

18. Please provide details of any improvements that have been noticed since the introduction of the training



# Bridge Inspection Training and Competence Survey

## Inspection Type 3 - T

You selected the option which states that inspector training/accreditation for inspection type 3 is:  
Not a mandatory requirement but formal or informal training is provided (e.g. standards/competence unlikely to be defined, but training of some nature is provided to achieve a basic level of competence, quality and consistency)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

### 1. Why was inspector training introduced?

- Considered to be a good practice, e.g. quality, consistency, competence etc.
- To align with practices in similar organisations
- In response to an incident/s where insufficient inspector training was identified as a contributory factor
- Don't know
- Other (please specify)

### 2. What are the 'EDUCATIONAL/QUALIFICATION' pre-requisites for enrolling on the training programme?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

# Bridge Inspection Training and Competence Survey

3. What are the pre-requisites for enrolling on the training programme in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience	Prior experience not in inspections but in a relevant field
Please select from the drop down menu	Please select from the drop down menu
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
Please provide any other specific background experience	
<input style="width: 100%; height: 50px;" type="text"/>	

4. What does inspector training typically involve?

	For staff with no / limited experience	For experienced staff
Course / Classroom learning	€	€
Written Exam	€	€
Practical Exam (On - site)	€	€
On - site training	€	€

If relevant, please provide a definition in the space below that your organisation adopts for 'Experienced Staff', e.g. someone who can demonstrate more than 5 years inspection experience.

5. Duration of training

With reference to the previous question please specify the duration e.g. 2 - 3 days, 1 week, 1 month, 1 year etc, for:

	Course / Classroom Learning: For staff with no / limited experience	Course / Classroom Learning: For experienced staff	On - site training: For staff with no / limited experience	On - site training: For experienced staff
Please select from the drop down menu	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>

6. Training Course/Classroom Learning Content typically consists of:

- € Basic asset knowledge (includes a brief introduction to inspection types, assets, materials etc.)
- € Planning and organising inspections (procedures, safety, technical terms/rules etc.)
- € Methodology of inspection (on-site procedures, investigation equipment and techniques etc.)
- € Producing inspection reports
- € Assessment of inspection data (understanding the obtained data, proposing actions after inspection)

# Bridge Inspection Training and Competence Survey

7. Is there a standard guidance document/syllabus that the training course follows?

Yes

No

Other (please specify)

8. Are you able to provide a copy of the guidance document?

Yes (Please e-mail or post a copy of the guidance to the questionnaire contact)

No

Not Relevant

9. Who provides the training?

Your organization

An external organization (please provide details in the box below, e.g. university, specialist training organizations, government etc.)

Details of external organization

10. What is the typical cost of the training course?

11. Who pays for the training?

Your organization

Individual himself/herself

Partly the organization and partly the individual

Other (please specify)

# Bridge Inspection Training and Competence Survey

12. Do inspectors undertake a re-assessment at regular/periodic intervals?

- Yes (please specify the time period after which a reassessment is required, in the box below)
- Yes, when triggered by an event/incident (please give examples in the box below)
- No

Time period / Event

13. Are there any specific areas of concern with your current training practices?  
(Please include any additional comments in the boxes provided)

- No
- Some parts of the training are considered to be out of date (e.g. does not align with latest practices)
- Need to expand training coverage (the present syllabus is not considered sufficient for inspector training)
- Duration of training should be reduced from the current standard
- Duration of training should be increased from the current standard
- Other areas of concern (please specify)

14. Has there been a noticeable increase in inspector recruitment and/or retention since the introduction of inspector training?

- Yes
- No
- Don't Know

## Bridge Inspection Training and Competence Survey

15. Are there any indicators to measure the success of the training programme?  
(Success implies improvement in the consistency and quality of inspection information)

- No
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/at periodic intervals.
- Other (please specify)

16. Please provide details of any improvements that have been noticed since the introduction of the training

# Bridge Inspection Training and Competence Survey

## Inspection Type 3 - NT

You selected the option which states that inspector training/accreditation for inspection type 3 is:  
Not a mandatory requirement and no formal or informal training is provided (e.g. anyone deemed to be suitably experienced/qualified can undertake inspections)

If you have selected the wrong option then click on the 'Prev' button at the bottom of the page to return to the original question and select an alternative option, otherwise proceed with the following questions.

### 1. Why is inspector training not required?

- Not considered necessary (please give your reasons in the box below)
- Other (please specify in the box below)

Reasons / Other

### 2. What are the minimum 'EDUCATIONAL/QUALIFICATION' requirements for bridge inspectors?

- No education/qualification pre-requisites
- Schools leavers certificates, e.g. O Level, GCSE
- Relevant diploma or equivalent, e.g. BTECs, HNC, HND, NVQ
- Tradesman/trained apprentice
- Technician or equivalent membership of relevant institution
- Relevant university degree
- Incorporated/chartered membership of relevant institution
- Other (please specify)

### 3. What are the minimum requirements for bridge inspectors in terms of 'PRIOR EXPERIENCE'?

Prior inspection experience

Prior experience not in inspections but in a relevant field

Please select from the drop down menu

Please provide any other specific background experience

# Bridge Inspection Training and Competence Survey

4. What measures are taken to maintain quality and ensure consistency?

- None taken
- Regular QA check or calibration (e.g. 2 or 3 inspectors inspect the same asset and the results compared)
- A selection of inspection reports are audited regularly/periodic intervals
- Other (please specify)

5. Do you intend to develop an inspector training programme?

- Yes
- Maybe
- No

Please specify the approximate timeframe in which you plan to introduce the training programme

# Bridge Inspection Training and Competence Survey

## End of Survey

Thank you for completing the survey.

REMINDER: If you have agreed to provide a copy of the training guidance document/syllabus for inspection types 1, 2 or 3, please e-mail a copy to: [Garry.Sterritt@atkinsglobal.com](mailto:Garry.Sterritt@atkinsglobal.com)

If you have completed the survey please click on 'Submit' to submit your responses.



**APPENDIX [D]**  
**Review of Registration Schemes**

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
<b>Asbestos Control; and Abatement Division (ACAD)</b> <a href="http://www.tica-acad.co.uk">www.tica-acad.co.uk</a>	ACAD is a Trade Association representing persons in the Asbestos and Asbestos removal Industry, providing training in accordance with the asbestos standards  Over 10 courses provided, a sample are summarised opposite	Supervisor Licence Holder Refresher	This course is for Managers, Directors and Supervisory Licence Holders who are responsible for managing asbestos removal contracts and contractors. The training meets the requirements of HSE legislation regarding the infrastructure and management responsibilities of Asbestos Removal Contracts. The course provides candidates with a sound knowledge base with which to manage contracts and contractors, after undergoing a comprehensive programme of study covering Asbestos Awareness, the principle of asbestos removal and management responsibilities.	A background in and sound working knowledge of the asbestos removal industry.	1 day	N/A	Certificate	
		New Supervisor Licence Holder.	This Course is for managers, directors and supervisory licence holders who are responsible for managing asbestos removal contracts and contractors. The training meets the requirements of HSE legislation regarding the infrastructure and management responsibilities of Asbestos Removal Contracts. The courses provide candidates with a sound knowledge base with which to manage contracts and contractors, after undergoing a comprehensive programme of study covering asbestos awareness, the principles of asbestos removal and management responsibilities.	A background in, and a sound working knowledge of the asbestos removal industry is preferred.	3 Days	2 * Multiple-choice exams	Certificate	1 year
		AA for Scaffolders, Operatives and Supervisors	Asbestos Awareness Training is for Scaffolding Trade candidates requiring a basic, general awareness of the dangers associated with asbestos and the necessary protective measures taken to ensure safe working when in an area where asbestos containing materials are present. - Module 20 - Health risks and avoidance of exposure - Module 21 - R.P.E., P.P.E. and Emergency Decontamination Procedures - Module 22 - Roles and responsibilities - Module 23 - Management systems - Module 24 - Decontamination and transit procedures		1 Day	Multiple-choice exam paper	Certificate	1 Year
		PASMA Testing	This course is for candidates whose work comprises either installing or erecting Mobile Access Towers.  Health, Safety and Welfare Regulations 1996, require that the installation or erection of Mobile Access Towers should only be carried out by, or under the supervision of a qualified trained person, with both technical knowledge and experience. The course is based on a format and content agreed by all PASMA members and draws upon their collective, first-hand experience. Widely recognised and recommended by safety professionals. The PASMA Standard Course Covers Introduction to Mobile Access Towers Tower Assembly Stability Safe Use of Towers Repositioning Towers Tower Inspection Care and Maintenance Tower Dismantle Regulations and Standards	Candidates are required to have a sound knowledge of the 3T method.	1 Day	Written and practical test	Certificate and ID card	
		Supervisor Refresher	The course involves a revision of the theory component of supervisor training designed to refresh candidates' knowledge about asbestos removal supervision. Candidates obtain updates on any new legislation and any changes to working procedures. Training covers: <ul style="list-style-type: none"> <li>• Training Needs Analysis</li> <li>• New Working Procedures</li> <li>• Role of the Supervisor</li> <li>• Health Records and Medical Surveillance</li> <li>• Legislation</li> <li>• Record Keeping and Inspections</li> <li>• Site Procedures</li> <li>• RPE and PPE</li> <li>• Hygiene and Decontamination Procedures</li> <li>• Enclosures and Associate Plant</li> <li>• Asbestos Waste</li> <li>• Accidents, Incidents and Emergencies</li> <li>• Plan of Work – Notification</li> <li>• Fault Finding and Audit Checklist</li> <li>• Site Clearance and the Analyst</li> <li>• Air Monitoring</li> <li>• Training Programme</li> </ul>	This course is for asbestos removal supervisors who hold a current training record card and certificate and are due for their annual refresher training.	1 day	Multiple-choice exam	Certificate and ID card	1 year

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
		New Supervisor	<p>The course involves a combination of quality theory and practical training, providing candidates with the necessary knowledge and skills required for supervising asbestos removal projects and operatives.</p> <p>THEORY TRAINING COVERS:</p> <ul style="list-style-type: none"> <li>• Module 1 - Asbestos Types, Uses and Risks of ACM's</li> <li>• Module 2 - Health Hazards of Asbestos</li> <li>• Module 3 - Legislation</li> <li>• Module 4 and 17 - Site Set up and Dismantling + Management Systems and Monitoring (Enclosures/Air Extraction)</li> <li>• Module 5 - Controlled Stripping Techniques</li> <li>• Module 6 and 7 - PPE and RPE</li> <li>• Module 8 - Decontamination and Transit Procedures</li> <li>• Module 9 - Site Clearance and Air Testing</li> <li>• Module 10 - Plant and Equipment Types and Uses</li> <li>• Module 11 - Waste management, Legislation and Disposal</li> <li>• Module 12 - Emergency Procedures</li> <li>• Module 13 - Non asbestos hazards</li> <li>• Module 14 - Fault Finding</li> <li>• Module 15 and 18 - Roles and Responsibilities, RA's and POW</li> <li>• Module 16 Site Inspection and Record Keeping</li> <li>• Module 19 Information, instruction and training</li> </ul> <p>PRACTICAL TRAINING COVERS:</p> <ul style="list-style-type: none"> <li>• Module 10 - Plant and Equipment (use and maintenance demonstration)</li> <li>• Module 14 - Fault Finding</li> <li>• Module 24 - Decontamination and Transit Procedures including full showering</li> <li>• Module 25 - Use and Maintenance of RPE</li> <li>• Module 26 - Enclosures and airlock construction, NPU attachment, Smoke testing and Waste removal</li> <li>• Module 27 - Use of Controlled Stripping Techniques (injection, shadow vacuuming, etc.)</li> </ul>	This course is for experienced and trained asbestos removal operatives considered capable of becoming asbestos removal supervisors. The code of conduct suggests that candidates should have a minimum of 2 yrs experience.	3 Days (2 Days Theory, 1 Day Practical)	Multiple-choice exam	Certificate and ID card	1 year
		Operative refresher	<p>The course involves a revision of the theory component of operative training, designed to refresh candidate's knowledge about asbestos removal. Candidates obtain updates on any new legislation and any changes to working practices.</p> <p>Training Needs Analysis (TNA) - T N A's must be undertaken, considering areas where the delegate needs revision. A form should be completed by the delegate's line manager prior to course commencement and this should be forwarded to ACAD by the company's training coordinator at the time of the original booking.</p> <p>Training covers:</p> <ul style="list-style-type: none"> <li>• New Working Practices</li> <li>• Health Records and Medical Surveillance</li> <li>• Hygiene and Decontamination Procedures</li> <li>• RPE and PPE</li> <li>• Enclosures and Associate Plant</li> <li>• Plan of Work</li> <li>• Accidents, Incidents and Emergencies</li> <li>• Controlled Stripping</li> <li>• Asbestos Waste</li> <li>• Site Clearance and Air Monitoring</li> </ul>	This course is for asbestos removal operatives who hold a current training record card and certificate and are due for their annual refresher training.	1 day	Multiple-choice exam	Certificate and card	1 year
		New Operative	<p>The course involves a combination of quality theory and practical training, providing candidates with the necessary knowledge and skills required for undertaking asbestos removal.</p> <p>THEORY TRAINING COVERS:</p> <ul style="list-style-type: none"> <li>• Module 1 - Asbestos Types, Uses and Risks of ACM's</li> <li>• Module 2 - Health Hazards of Asbestos</li> <li>• Module 3 - Legislation</li> <li>• Module 4 and 17 - Site Set up and Dismantling + Management Systems and Monitoring (Enclosures/Air Extraction)</li> <li>• Module 5 - Controlled Stripping Techniques</li> <li>• Module 6 and 7 - PPE and RPE</li> <li>• Module 8 - Decontamination and Transit Procedures</li> <li>• Module 9 - Site Clearance and Air Testing</li> <li>• Module 10 - Plant and Equipment Types and Uses</li> <li>• Module 11 - Waste management, Legislation and Disposal</li> <li>• Module 12 - Emergency Procedures</li> <li>• Module 13 - Non asbestos hazards</li> <li>• Module 14 - Fault finding</li> <li>• Module 15 and 18 - Roles and Responsibilities, RA's and POW</li> <li>• Module 16 Site Inspection and Record Keeping</li> </ul> <p>PRACTICAL TRAINING COVERS:</p> <ul style="list-style-type: none"> <li>• Module 10 - Plant and Equipment (use and maintenance demonstration)</li> <li>• Module 14 - Fault Finding (During Practical Session)</li> <li>• Module 24 - Decontamination and Transit Procedures in full including</li> </ul>	This course is for candidates intending to work as asbestos removal operatives who have had no previous experience of asbestos removal.	3 Days (2 Days Theory, 1 Day Practical)	Multiple-choice exam	Certificate and ID card	1 year

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
			<p>showering</p> <ul style="list-style-type: none"> <li>• Module 25 - Use and Maintenance of RPE</li> <li>• Module 26 - Enclosures and airlock construction, NPU attachment, Smoke testing and Waste removal</li> <li>• Module 27 - Use of Controlled Stripping Techniques (injection, shadow vacuuming, etc.)</li> </ul>					
		Asbestos Awareness.	<p>Asbestos Awareness Training is for candidates requiring a basic, general awareness of the dangers associated with asbestos and protective measures taken to ensure safety against it. Training involves the study of nine core theory components with additional specialist course components available, depending upon your company needs. The basic components provide information that is applicable to all personnel requiring asbestos awareness. The specialist components are specific to trade and work situations.</p> <p>Basic Course Components:</p> <ul style="list-style-type: none"> <li>• What is Asbestos?</li> <li>• Occurrences and Uses of Asbestos</li> <li>• Health and Medical Surveillance</li> <li>• Legislation</li> <li>• Personal Protective Equipment</li> <li>• Health Hazards and Emergencies</li> <li>• Personal Hygiene</li> <li>• Asbestos Waste</li> <li>• Instruction and Training</li> </ul> <p>Additional Specialist Course Components:</p> <ul style="list-style-type: none"> <li>• Air Monitoring</li> <li>• Records, Inspections and Site Procedures</li> <li>• Work Methods - Maintenance Personnel</li> <li>• Scaffold Erection Asbestos Awareness</li> <li>• Scaffold Supervisor / Manager</li> <li>• Asbestos Removal (Basic Requirements and Procedures)</li> <li>• Asbestos Removal -Plan of Work and Notification</li> <li>• Client - Management of Contract</li> </ul>	None	1/2 to 1 day	Multiple-choice exam	Certificate	1 year
<b>Association of Industrial Truck Trainers (AITT)</b> <a href="http://www.aitt.co.uk">www.aitt.co.uk</a>	AITT covers all sectors of industry which use industrial trucks. AITT is an accredited body approved and listed by the Health and Safety Commission (HSC) in the Approved Code of Practice (ACoP) for Fork Truck Operator Training.		<p>Category 1:Registered Instructor Employed or subcontracting only (not accredited as per Category 2)</p> <p>Category 2: Accredited Operator Training Organisation</p> <p>Category 3: Accredited Instructor and Operator Training Organisation</p> <p>Category 4: Registered Tutor</p> <p>Category 5: Examiner</p> <p>Category 6: Instructor Site Safety Awareness Register</p>				Certificate and Photo ID Card	
<b>Assuring Competence in Engineering Construction (ACE)</b> <a href="http://www.ace.uk.net">www.ace.uk.net</a>	ACE is the UK engineering construction industry scheme designed to ensure the competence of engineering construction workers is validated against National Occupation Standards.	<p>Eligible courses for gaining an ACE card include:</p> <ul style="list-style-type: none"> <li>- Welding</li> <li>- Plating</li> <li>- Erecting</li> <li>- Mechanical Fitting (including Maintenance)</li> <li>- Pipefitting (including Instrument)</li> <li>- Electricians (including Maintenance)</li> <li>- Rigging</li> </ul>	The courses are Engineering Construction Industry Training Board approved N/SVQ Level 3 qualifications	Relevant N/SVQ	On the job training	<p>Assessment is carried out on site whilst an individual is doing their everyday job; the process is assessor-led and non-intrusive.</p> <p>The Assessor has an initial meeting with the employee to go through the assessment procedure. Each individual has a N/SVQ portfolio that the Assessor compiles and looks after, minimising candidate input. This contains all the evidence of competence in the specific trade.</p> <p>Most assessment is observation in the workplace; the assessor takes the strain. Assessment on average takes approximately 25-35 hours.</p> <p>There is an option to use your own company Assessors working with a third party Approved Centre. Assessor training is available free of charge to ECITB in-scope companies.</p> <p>The use of Expert Witness Advisers (EWAs) helps reduce Assessor time on site and hence costs for your company. An EWA is a company employee who observes candidates doing certain tasks towards the N/SVQ when the Assessor is not</p>	Photo ID Card	The ACE card is valid for 5 years.

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
						<p>present. The EWA must be competent in the trade they are observing and be registered through the Approved Centre.</p> <p>When the Assessor is satisfied that they have sufficient evidence of competence, the candidate's portfolio is submitted to an Internal Verifier (IV). Once the IV is satisfied that correct procedures have been followed, the Approved Centre sends the certificate application form to the ECITB and this is further validated by an External Verifier (EV). Providing the EV is satisfied with the portfolio, the N/SVQ certificate is issued.</p>		
<b>Building Engineering Services (BES)</b> <a href="http://www.cskills.org">www.cskills.org</a>	BES is the division of CITB Construction Skills that provides training, assessment and certification for people who work with, electrics, gas, water, steam and refrigerants. Not affiliated to CSCS	Gas	<p>A ConstructionSkills certificate from an approved centre will form part of the requirements of registration on to the Council of Registered Gas Installers (CORGI) database.</p> <p>There are three categories based upon knowledge and experience:</p> <p><b>Category 1</b></p> <p>Applicants are experienced gas fitting operatives seeking certificate renewal and/or assessment and certification to extend their work range. An expired or expiring Approved Code of Practice (ACoP) / ACS certificate is required as evidence for assessment.</p> <p><b>Category 2</b></p> <p>Applicants must provide evidence of qualifications relevant to the area of gas work they are seeking certification in.</p> <p>Examples of appropriate qualifications include:</p> <ul style="list-style-type: none"> <li>• plumbing craft qualification or National/Scottish Vocational Qualification (N/SVQ) (oil and/or solid fuel options) - suitable initially for domestic or commercial central, water heating or pipework installation</li> <li>• pipefitter/welder craft qualification or N/SVQ - suitable initially for commercial pipework, pipework commissioning and meter installation</li> <li>• heating and ventilation craft qualification or N/SVQ - suitable initially for commercial pipework and appliance installation</li> <li>• refrigeration engineer/fitter craft qualification or N/SVQ - suitable initially for commercial appliance and pipework installation</li> <li>• Written evidence from the employer of 'on-the-job' gas installation and/or maintenance gas work, carried out under direct supervision of competent operatives employed by a CORGI registered business, must be provided.</li> </ul> <p><b>Category 3</b></p> <p>Applicants unable to provide a relevant related qualification and/or experience, have a number of options. New entrants are advised to seek training and experience which will result in attainment of a N/SVQ in Gas Services, at Level II or III. Career changers need to seek training and experience which will result in attainment of a N/SVQ in Gas Services.</p> <p>Alternatively applicants should obtain employment or extended placement with a CORGI registered business who is willing to provide an audited 'in-company' extended period of gas training and experience. This can be linked to the ConstructionSkills 'Intermediate Certificate' which will help to collate the evidence in a portfolio and provide the 'off-the-job' training record. Training prior to undertaking assessment is not mandatory. However, it is recommended to ensure knowledge of changes to legislation, British Standards and industry best practice. Attendance on training courses will not influence independent impartial assessment testing.</p>	<p>You must provide information to the assessment centre regarding your gas industry experience and qualifications on the Construction Skills 'Application for Assessment' form.</p>		<p>Training and assessment provided by approved centres, typically Technical Colleges and Training Centres</p>	<p>Certificate and ID card</p>	<p>All Construction Skills cards are valid for five years.</p>
		Electric	<p>Training and assessment will be based upon safe work, installation, commissioning, fault diagnostics and exchange of electrically operated equipment and components. There are two entry categories based upon knowledge and experience:</p> <p><b>Category 1</b></p> <p>Applicants must have a recognised qualifications and/or experience from the following industry sectors:</p> <ul style="list-style-type: none"> <li>• Electrical</li> <li>• Gas</li> <li>• Plumbing</li> <li>• Refrigeration</li> </ul> <p><b>Category 2</b></p> <ul style="list-style-type: none"> <li>• Applicants from relevant allied trade experience, such as:</li> </ul>			<p>Training centres</p>	<p>Certificate and ID card</p>	

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
			<ul style="list-style-type: none"> <li>• Plumbing</li> <li>• Heating and ventilating</li> <li>• Gas</li> <li>• Refrigeration</li> </ul> <p>The Essential Electricians scheme is split into six modules:</p> <ul style="list-style-type: none"> <li>• Essential Electricians (pre-requisite to all modules below)</li> <li>• Central Heating Controls Fault Finding</li> <li>• Central Heating Controls Wiring</li> <li>• Combination Boiler Basic Fault Finding</li> <li>• Combination Boiler Advanced Fault Finding</li> <li>• Basic Refrigeration System Electricians</li> </ul> <p>BES provides a range of publications used by approved ConstructionSkills training centres. These are used as part of training delivery and in some assessments. They can also be used for self-study and workplace reference.</p>					
		Water	<p>The scheme is split into three categories:</p> <p>Category 1</p>	Applicants with a background in plumbing, heating and ventilation and/or gas who wish to install, commission and service UHWSS		Assessment centre. BES provides a range of publications used by approved ConstructionSkills training centres. These are used as part of training delivery and in some assessments. They can also be used for self-study and workplace reference.	Certificate and ID card	UHWSS assessment needs to be undertaken only once to gain registration onto the ConstructionSkills UHWSS scheme.
		Category 2	Applicants with a relevant allied trade background such as electrical who wish to inspect and commission only UHWSS					
		<p>Category 3</p> <p>Successful completion of assessments in categories 1 and 2 will assist you in satisfying the competence requirements of Building Regulations Approved Document G3. Successful completion of category 3 assessment is for inspection only and does not entitle you to install, commission or service UHWSS.</p>	Applicants with no formal relevant trade qualifications or experience, such as; building inspectors; designers/architects; site supervisors and manufacturers' technical staff but as part of their duties are required to carry out inspections of UHWSS.					
		Oil	<p>There are two entry points for individuals wishing to undertake assessment:</p> <p>Category 1</p>	Applicants renewing or extending existing OFTEC qualifications		Assessment centre	Certificate of Competence	Valid for five years from the date of successful completion. You will be notified by ConstructionSkills six months prior to the expiry of any categories.
		Category 2	Applicants with a relevant trade background and qualification in either plumbing, heating and ventilation or gas. Training prior to undertaking assessment is not mandatory, however, in most cases it is recommended to ensure you are aware of the most recent changes to legislation, British Standards and industry best practice. It should be noted that attendance of training courses will not influence independent impartial assessment testing.					
		Refrigerants	<p>The BES refrigerants scheme covers:</p> <ul style="list-style-type: none"> <li>• Safe Handling of Refrigerants</li> <li>• Anhydrous Ammonia</li> <li>• Pipework and Brazing.</li> </ul>	<p>If you are already working within the industry and wish to renew your certificate you can attend an approved Construction Skills centre and undertake an assessment.</p> <p>New entrants should have some knowledge of working within the refrigerants industry but not necessarily recognised qualifications. Formal training should be undertaken through one of CITB-Construction Skills approved training providers to gain a better knowledge and understanding of the industry and its practices.</p>		Assessment centre	Refrigeration certificate and card.	Three year renewal period. Don't wait until the card expires to get re-assessed. ConstructionSkills sends you a letter detailing categories which need renewing in the next six months.



Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
Certificate of Competence of Demolition Operatives (CCDO) <a href="http://www.cskills.org">www.cskills.org</a>	The CCDO scheme is for persons who work in on-site demolition.		The Certificate of Competence of Demolition Operatives (CCDO) scheme is for anyone whose job entails on-site demolition. The scheme applies to new entrants, temporary workers, and existing operatives with site experience.  The scheme was affiliated to the CSCS in July 2002 and it means that a person holding the card will meet the minimum qualification, experience and Health and Safety requirements to work on a Major Contractors Group site.  There are seven different cards available, depending on qualifications and experience.	It is partly NVQ based, with the Demolition Site Operative and Demolition Operative 1 (Labourer) being the only cards not requiring proof of an NVQ.	-	Approved assessment centre	Certificate and card	All renewable cards require a Health and Safety test in either Demolition or Demolition and Plant to be reissued every five years.
Certification Scheme for Welding and Inspection Personnel (CSWIP) <a href="http://www.cswip.com">www.cswip.com</a>	CSWIP is accredited by the United Kingdom Accreditation Service on behalf of the UK Department of Trade and Industry in accordance with EN ISO 17024 'Criteria for certification bodies operating certification of personnel'.  CSWIP training is provided by TWI; a selection of some of the courses provided are show opposite	CSWIP 3.1U- NDT Inspection Diver	Theoretical instruction to CSWIP approved syllabus; general underwater and close visual inspection; recording by video and still photography; cathodic protection measurements; ultrasonic digital thickness measurements; end-of-course assessment.  Objectives: · to explain theoretical principles of subsea visual inspection · to be proficient in practical visual subsea inspection techniques · to gain eligibility to sit the CSWIP 3.1U examination	- Hold an HSE surface supplied air qualification, or HSE equivalent - Hold an in-date full commercial diver medical	10 day course	1 day exam (written and practical)	Certificate and card	
		CSWIP 3.4U - Underwater Inspection Controller	Advanced NDT techniques; recording and processing data; computer data based reporting systems; interpretation and recording methods; quality assurance; intervention techniques; inspection, planning and briefing.  Objectives: · to be competent to plan and co-ordinate sub-sea inspection programmes · to be proficient in recording and processing data produced by subsea inspection campaigns · to gain eligibility to sit the CSWIP 3.4U examination	- Hold a qualification in a relevant engineering or science subject, HNC or above including a minimum of 60 days spent at an offshore site OR - Be a currently or previously approved CSWIP 3.3U inspector who has held this certification for a minimum of one year, with a minimum of 300 logged hours plus 1 years experience of underwater inspection work OR - Be a currently or previously approved CSWIP 3.1U or 3.2U diver inspector who has held such certification for a minimum of 100 logged hours plus 3 years experience of underwater inspection work OR - Be a surface NDT practitioner certified under PCN or CSWIP for at least 3 years and has spent a minimum of 30 days at an offshore work site gaining familiarity with underwater inspection techniques.	10 day course	2 day exam (written and practical)	Certificate and card	
	Visual Welding Inspector - Level 1	Suitable for: Welders, operators, line inspectors and foremen who undertake visual examination of welded joints; quality control staff associated with welding; all staff who need basic training in welding inspection coupled with a qualification in this field.  Course Content: Visual inspection procedures; relevant codes of practice, terms and definitions; welding processes and typical welding defects; weld measurements; typical documentation and requirements; practical inspection and reporting. All CSWIP requirement documents are available at <a href="http://www.cswip.com">www.cswip.com</a>  Objectives: · to identify various weld imperfections (defects) · to understand the relevant welding technology related to visual inspection · to understand the need for documentation in welding · to be aware of codes and standards related to inspection requirements · to carry out inspection of parent materials and consumables · to carry out visual inspection of welds, report on them and assess their compliance with specified acceptance criteria · to pass the CSWIP 3.0 Visual Welding Inspector qualification.	- Examination applicants must submit a detailed CV/résumé when booking this course.  Six months experience in engineering, independently verified.	2 days	Continuous and end-of-course assessment.	Certificate and card		
	Welding Inspector - Level 2	Course Content: The duties and responsibilities of a welding inspector; fusion welding processes; typical weld defects; types of steel; carbon-manganese, low alloy and stainless steels; hardening of steels; weldability; heat treatment; parent metal defects; visual inspection; testing parent metals and welds; destructive tests; NDT techniques; welder and procedure approval; codes and standards; outline of safe working practices; practice in examination questions.  Objectives: · to understand factors which influence the quality of fusion welds in steels	Three years as a welding inspector or certificated visual welding inspector for a minimum of 2 years or welding instructor/welding foreman/supervisor for a minimum of 5 years independently verified	5 days	Continuous and end-of-course assessment. Candidates meeting the CSWIP requirements for eligibility complete the relevant CSWIP examination on day 5	Certificate and card		

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
			<ul style="list-style-type: none"> <li>to recognise characteristics of commonly used welding processes in relation to quality control</li> <li>to interpret drawing instructions and symbols to ensure that specifications are met</li> <li>to set up and report on inspection of welds, macrosections and other mechanical tests</li> <li>to assess and report on welds to acceptance levels</li> <li>to confirm that incoming material meets stipulated requirements and recognise the effects on weld quality of departure from specification</li> <li>to be in a position to pass the Welding Inspector - Level 2 examinations</li> </ul>					
		Senior Welding Inspector - Level 3	<p>Course Content: Function and responsibilities of a senior welding inspector; defects in welds; weld symbol interpretation; interpretation of NDT reports; documentation of welding; approval and certification procedures; general principles of supervision; case studies; planning; organisation; interpretation of fractured surfaces; auditing; practice in typical examination questions; course assessments.</p> <p>Objectives:</p> <ul style="list-style-type: none"> <li>to understand the various facets of welding inspection and quality control</li> <li>to assess the validity of a welding procedure</li> <li>to recognise origins of weld defects</li> <li>to interpret features of a fracture surface and prepare detailed reports</li> <li>to scrutinise and correct inspection reports</li> <li>to plan, organise and supervise use of skilled inspectors and NDT personnel</li> <li>to conduct pre-, during and post welding audits</li> <li>to be in a position to pass the relevant examination</li> </ul>	Three years as a welding inspector or 5 years independently verified experience in supervision of welding, inspectors and visual welding inspectors, final acceptance and certification, interpretation of weld drawings and weld symbols, interpretation of weld radiographs, maintenance of comprehensive inspection records, assessment of NDT reports on welding work, or ensuring that quality assurance standards and procedures are maintained.	5 days	Continuous and end-of-course assessment. Candidates meeting the CSWIP requirements for eligibility complete the relevant CSWIP examination on day 5	Certificate and card	
		BGAS-CSWIP Site Coatings Inspector	<p>Suitable for: Candidates with or without previous experience in site coatings or painting inspection wishing to attain BGAS-CSWIP Approval as Site Coatings Inspector.</p> <p>Course Content: Corrosion, theory, preparation of surfaces, paint technology, M.C.L, concrete coatings, pipeline surveys, coal tar enamels, polyethylene, powder coatings, paint and paint film testing, health and safety. Suitable for individuals engaged in the inspection and painting of new and existing pipelines. This approval is very useful to welding inspectors as it can extend their working time capability on pipeline projects.</p> <p>Objectives:</p> <ul style="list-style-type: none"> <li>to understand the principles of pipeline coatings</li> <li>to recognise the need for quality in preparation</li> <li>to appreciate the difficulties associated with pipeline site coating</li> <li>to understand the practical methods of testing and inspection</li> <li>to interpret the requirements of standards</li> <li>to pass BGAS-CSWIP Site coatings Inspector examination</li> </ul> <p>Course duration of 5 days. Fee does not include exam fee.</p>	<p>No formal entry qualifications required, but a knowledge of pipeline fabrication techniques, safe working practices, and a general understanding of coating application would be advantageous.</p> <ul style="list-style-type: none"> <li>a valid eyesight certificate from a doctor or an optician showing satisfactory eyesight for near vision, permitting reading a minimum of Times Roman N4, or equivalent type and size letters, at not less than 300mm on a standard test chart for near vision, in at least one eye, corrected or uncorrected. Candidates for the painting inspector will be required to have had a colour perception assessment by the Ishihara 24 plate test or an equivalent.</li> </ul>	5 days	½ day exam	Certificate and card	
Client Contractor National Safety Group (CCNSG) <a href="http://www.ccnsq.com">www.ccnsq.com</a>	CCNSG Nationally Accredited Safety Passport Scheme; developed to provide a standard for general health and safety training of contractors in construction and related industries.	The CCNSG National Course	Course for basic site safety		2days		Certificate	3 years
		The CCNSG Renewal Course	A refresher course for those who have already passed the CCNSG National Course.	This has to be taken within three months of the Safety passport expiry date	1 day		Certificate	3 years
		The CCNSG Supervising Safety Course		To be eligible to attend the Supervising Safety Course, you must hold a current Safety Passport.	1 day		Certificate	3 years
Construction Industry Scaffolders Record Scheme (CISRS) <a href="http://www.cisrs.org.uk">www.cisrs.org.uk</a>	CISRS is for scaffolding operatives and is affiliated to the CSCS.		<p>Training Card</p> <p>The CISRS Trainee Card is valid for 18 months from the date of issue, in which time the Trainee must gain the recommended 6 months* practical experience and attend the Part 1 training course for tube and fitting at an Accredited centre.</p> <p>*An operative must have a minimum of 6 months site experience prior to attending</p> <p><b>Part 1 training</b></p> <p>Part 1 training courses are booked directly with an Accredited Centre. Upon successful completion of Part 1 training, the Trainee will be issued with a CISRS Completion Certificate and an application form to have their Trainee Card endorsed with the Part 1 training for tube and fitting. The Accredited providers will notify the data management unit at Construction Skills of successful completion. Trainee Scaffolders may now be registered for Vocational Qualification and start gathering records of work based evidence.</p>	Since September 1996, in addition to completing CISRS Part 1, Part 2 and Advanced practical courses it has been a mandatory requirement of the Operative Scheme for candidates to achieve the relevant National or Scottish Vocational Qualification (i.e. Level 2 NVQ/SVQ for a Scaffolder Card and Level 3 NVQ/SVQ for an Advanced Scaffolder Card).	2 weeks per part (10 consecutive working days Monday to Friday).		There are various cards available to show the different stages of competence. There are also certificates available.	In 2001 CISRS introduced a card renewal programme which requires its cardholders to update their card on a regular basis (usually 5 years) after completing an up to date Health and Safety test.



Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
			<p>Trainee's must have at least 6 months practical scaffolding experience following the successful completion of the Part 1 course before they can progress to the next stage.</p> <p><b>Part 2 Scaffolder training</b></p> <p>CISRS Accredited Centres are required to check the individual holds a valid completion certificate or an updated CISRS Trainee Card before accepting a booking.</p> <p>Trainees / Employers / Sponsors do not have to use the same Accredited Centre as attended previously and may use different Accredited Centres of their choice. Following the successfully completion of the Part 2 training for tube and fitting, trainees will be issued with a CISRS completion certificate by the Approved Centre, however they will not qualify to have their card upgraded and endorsed until the Vocational Qualification Level 2 (VQ2) has been achieved. The Accredited providers will notify the data management unit at Construction Skills of successful completion. Trainees who fail to demonstrate the required levels of skills and knowledge will have to attend the 2 week course again if they wish to progress. New Entrant Trainees require a further 6 months site experience, gathering work based evidence, before returning to an Accredited Centre to undertake a 1 Day VQ2 Assessment.</p> <p>If an Adult Trainee already has the relevant experience and evidence to achieve the VQ, then the assessment date may be brought forward at the discretion of the training provider. The training Provider must keep a brief report as a record of such instances, as this may need to be verified by a CISRS Auditor. As an alternative to completing the VQ portfolio of work based evidence Employers/ Sponsors can choose for Trainee's to undertake the Experienced Worker Practical Assessment (EWPA) route. Trainees who cannot demonstrate the required work based evidence for VQ2 will be referred back to their Employer / Sponsor for further practical experience. Upon achievement of the VQ2, and providing they have a current CSCS HandS Test (achieved within 2 years of the application), Trainees can now apply for the CISRS Scaffolder Card (Tube and Fitting), and may be deemed a qualified Scaffolder.</p>					
<p><b>Construction Skills Certification Scheme (CSCS)</b></p> <p><a href="http://www.cscs.uk.com">www.cscs.uk.com</a></p> <p><a href="http://www.cskills.org">www.cskills.org</a></p>	<p>CSCS scheme designed to improve quality and reduce accidents in UK construction.</p> <p>CSCS Cards list the holder's qualifications and are valid for either three or five years. All cardholders have to pass the appropriate CITB-Construction Skills Health and Safety Test. This is the industry's largest scheme.</p>	NVQ route		Proof of completion of NVQ level 3, 4 or 5			Photo ID Card	
		Trainee route		Proof of registration onto an NVQ or another further/higher education construction related qualification.				
		Industry Accreditation Route (For a person with experience but no formal qualifications)		<p>One year on-site experience or experience appropriate to the occupation</p> <p>Verification by an employer/appropriately qualified person working within the same firm/member of a professional body (ICE, IHT) working within the relevant industry, that the applicant meets the specified competencies. A list, of competencies, needs to be signed-off before the application for the CSCS card is made.</p>				
		Experienced Technical Supervisor or Manager		Proof of NVQ registration and profiling at an NVQ accredited centre				
		Professional Membership Route		<p>Proof of membership of a professional body, ICE, IHT etc.</p> <p>Verification by an appropriately qualified member of equivalent or higher grade within the same professional body, that the applicant meets the minimum specified competencies.</p> <p>One year on-site experience or experience appropriate to the occupation</p>				
<p><b>Construction Skills Register (CSR)</b></p> <p><a href="http://www.cskills.org">www.cskills.org</a></p>	<p>The CSR is a register of construction workers living in Northern Ireland who have completed the industry approved CSR health and safety training course. The</p>		<p>Launched in 1997, the Construction Skills Register (CSR) is a registration scheme designed to meet the needs of both clients and contractors and to improve the training standards of the construction industry. When employees are registered with the CSR, clients are advised that the workforce on their sites have received safety training and, where appropriate, have a stated level</p>			<p>To obtain a CSR card all candidates must attend a one day Health and Safety training course. Depending on your job description you may require to pass a formal Occupational Competence</p>	Card	

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
	card is affiliated with the Construction Skills Certification Scheme (CSCS) in Britain.		of occupational competence.			interview. This normally takes no longer than 20 minutes and will be carried out by an Occupational Assessor after your Health and Safety Training.		
<b>Electrochemical certification Scheme (ECS)</b> <a href="http://www.job.org.uk">www.job.org.uk</a>	The Joint Industry Board (JIB) ECS cards are for electrical, electronic, installation engineering and building services personnel. Some examples are provided opposite	Technician Grade	Technicians must have knowledge of the most economical and effective layout of electrical installations together with the ability to achieve a high level of productivity in the work which they control.	Varies, but typically includes criteria such as City and Guilds, V/SVQ, experience etc.			The front of the card issued to a fully skilled craftsman shows the holder's name, photograph and registration number, their main occupation and up to five additional occupations in which the holder is certified, together with the appropriate JIB Grade where this has been awarded by the JIB, or where a Grade has been agreed under the open-access facility of this scheme.	3 years
		Approved Electrician Grade	Approved Electricians must possess particular practical, productive and electrical engineering skills with adequate technical supervisory knowledge so as to be able to work on their own proficiently and carry out electrical installation work without immediate supervision in the most efficient and economical manner; be able to set out jobs from drawings and specifications and requisition the necessary installation materials; be able to accept responsibility for the proper completion of jobs and, if required, supervise other operatives.					
		Electrician Grade	Must be able to carry out electrical installation work efficiently in accordance with the National Working Rules for the Electrical Contracting Industry, the current IEE Regulations for Electrical Installations, and the Construction Industry Safety Regulations.					
		Electrical Improver Grade	Must, under the supervision of a fully skilled operative, be able to install wiring systems, wiring enclosures and electrical equipment required by electrical installation work in accordance with the National Working Rules for the Electrical Contracting Industry, the current IEE Regulations for Electrical Installations and the Construction Industry Safety Regulations. An Electrical Improver will not be deemed competent to carry out final connections, isolation of supplies or any form of inspection or testing.					
<b>International Powered Access Federation (IPAF)</b> <a href="http://www.ipaf.org">www.ipaf.org</a>	IPAF is an operative record scheme, for users of all forms of powered access equipment. The scheme is approved by the Major Contractors Group (MCG).		<p>Courses Available</p> <p>Mobile Elevating Work Platform (MEWP) courses for:</p> <ul style="list-style-type: none"> <li>• Operators</li> <li>• Demonstrators</li> <li>• Instructors</li> </ul> <p>Categories of MEWP equipment:</p> <ul style="list-style-type: none"> <li>• Static Vertical (1a)</li> <li>• Static Boom (1b)</li> <li>• Mobile Vertical (3a)</li> <li>• Mobile Boom (3b)</li> <li>• Insulated Aerial Device (IAD)</li> <li>• Specialist machines (SPECIAL)</li> </ul> <p>Mast Climbing Work Platform (MCWP) courses for:</p> <ul style="list-style-type: none"> <li>• Mobile Operators</li> <li>• Demonstrators</li> <li>• Installers</li> <li>• Advanced Installers</li> <li>• Instructors</li> </ul> <p>Other courses:</p> <ul style="list-style-type: none"> <li>• Harness Use and Inspection (H)</li> <li>• Loading/Unloading (LOAD)</li> <li>• MEWPs for Managers (MM)</li> <li>• Telehandler Platform - Integrated (TPI)</li> </ul> <p>IPAF itself does not provide training. Training is provided by approved training centres, mostly manufacturer and rental members of IPAF. They are regularly audited by IPAF. Class sizes are kept small.</p>		Courses generally last one to two days	Mixture of theory and practice, with a written and a practical test.	<p>Successful trainees receive a PAL Card (Powered Access Licence), a safety guide, a log book and a certificate. It shows the types of equipment that the holder has been trained to operate.</p> <p>It shows the level to which the holder has been trained, e.g. operator, demonstrator and instructor.</p> <p>It has security features including a holographic logo and the holder's photograph and signature to prevent mis-use.</p>	The PAL Card is valid for five years. It shows the date on which the holder was assessed and the expiry date by which re-training would be needed.
<b>National Competency Control Agency (NCCA) Sentinel track safety card</b> <a href="http://www.ncca-sentinel.co.uk">www.ncca-sentinel.co.uk</a>	The Sentinel card is a Network Rail Scheme for making sure that the people who within the Network Rail infrastructure are competent and medically fit. It is mandatory to hold the card if working on or near the line.	PTS Initial	Every cardholder must be registered and managed by a sponsor / employer. The system was introduced in April 1999 by Network Rail to improve the control and processes for track safety training / competence, certification and the supply of on-track labour.	None	2 days (desk training plus a 30min visit to a site)	Multiple choice exam	Photo ID card	2 years
		PTS Recert		Valid PTS Initial	1 day	Multiple choice exam	Photo ID card	2 years

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
<b>New Roads and Streetworks Act (NRSA) Card</b> <a href="http://www.cskills.org">www.cskills.org</a>	The NRSA card is for both supervisors and operatives working in a gang, and is affiliated to CSCS.		The New Roads and Streetworks Act (NRSA) is for both supervisors and operatives working in a gang.  The 100% target requires that each gang working on the public highway must have at least one operative and one supervisor with a NRSA card. The supervisor can be travelling and responsible for more than one gang.  In addition to this, each operative must hold a relevant competence card for the work being carried out.				Certificate and ID card	
Plumbers, Mechanical Engineering Services (PMES) <a href="http://www.jib-pmes.org.uk">www.jib-pmes.org.uk</a>	The JIB PMES scheme is the standard measure of skills, knowledge, competency and health and safety awareness for the UK plumbing industry.  Some examples of the cards provided are shown opposite.	Plumber JIB-PMES CSCS Card (Blue)	A Blue JIB-PMES CSCS Card is issued to those who have achieved Level 2 NVQ/SVQ in Plumbing or an equivalent qualification (i.e. City and Guilds Craft Certificate).	To obtain a Plumber JIB-PMES CSCS Card (Blue), applicants must submit: • A correctly completed application form sections 1,2,3,4 and 5 plus appropriate fee. • A copy of the Level 2 NVQ/SVQ or City and Guild Craft Certificate • JIB Health and Safety test Pass Certificate if required, or hold an exemption. • Evidence of working within the Plumbing and Mechanical services industry - contact details of an appropriate industry referee must be included on the application form.	N/A	N/A	Card	JIB-PMES CSCS Cards issued on this basis are valid for five years, and may be renewed after that period.
		Plumber JIB-PMES CSCS Card (Gold)	A Gold JIB-PMES CSCS Card is issued to those who have achieved Level 3 NVQ/SVQ Plumbing or equivalent qualification (i.e. City and Guilds Advanced Craft Certificate).	To obtain a Plumber JIB-PMES CSCS Card (Gold), applicants must submit: • A correctly completed application form sections 1,2,3,4 and 6 plus appropriate fee. • A copy of the Level 3 NVQ/SVQ completion or City and Guilds Advanced Craft Certificate. • JIB Health and Safety test Pass Certificate if required, or hold an exemption. • Evidence of working within the Plumbing and Mechanical services industry - contact details of an appropriate industry referee must be included on the application form.				
		Plumbing Supervisor JIB-PMES CSCS Card (Gold)	A Gold JIB-PMES CSCS Card is issued to Plumbing supervisors who hold suitable NVQ/SVQ Level 4 qualifications or have equivalent site experience and who can provide a letter from their employer/clients to support their application.	To obtain a Plumbing Supervisor JIB-PMES CSCS Card (Gold), applicants must: • Submit a correctly completed application form sections 1,2,3,4 and 14A plus appropriate fee. • Pass the CITB Supervisor Health and Safety Test. • Provide evidence of a suitable NVQ/SVQ Level 4 qualification or equivalent site experience • Have their application form verified by an appropriate manager				
<b>SKILL card</b> <a href="http://www.skillcard.org.uk">www.skillcard.org.uk</a>	The engineering services 'SKILLcard' provides a register of the skills and competence of people working throughout the heating, ventilating, air conditioning and refrigeration sector of building services engineering. Engineering Services SKILLcard is affiliated to the pan-industry Construction Skills Certification Scheme (CSCS). The terms of affiliation ensure that Engineering Services SKILLcard complies with the requirements and standards	Red	(a) New entrant trainees – such as Modern Apprentices and Advanced Modern Apprentices – who are pursuing a programme of training leading to NVQ/SVQ Level 2 or 3 appropriate to their occupation and who have not yet reached NVQ/SVQ Level 2; (b) Adult Trainees who do not have directly relevant experience, but who have experience of similar work in other industrial sectors, which their employer believes suits them for training for employment in the heating, ventilating, air conditioning and refrigeration sector and who are registered for an NVQ/SVQ Level 2 or 3 (but who have not yet achieved the qualification); or (c) Student Engineers training to be Project Engineers/Project Managers. Trainee cards are valid for five years. However, if you are covered by (a) and (b) above, you are expected to upgrade from a Red card to a Blue card when you achieve NVQ/SVQ Level 2. You should also upgrade to a Gold card when you achieve NVQ/SVQ Level 3 (if Level 3 is available). If you are covered by (c) above, you are expected to upgrade from a Red card to a Gold (Supervisory) card when you have completed your training, to indicate your status as a Junior/Assistant Project Engineer. This is a holding position, until you complete the appropriate qualification enabling you to apply for a Platinum or Black SKILLcard.				Certificate and ID card	Valid for either 3 or 5 years

Organisation or Scheme	General	Courses	Course Information	Requirements	Course Duration	Assessment	Proof	Validity
	of CSCS. There is no need, therefore, for separate registration with CSCS.  Some examples of the cards are provided opposite	Green	If you are neither a Trainee, nor Skilled, nor a Supervisor or Manager, you can apply for a Green SKILLcard. These cards are available if you carry out basic site skills only. If you carry out skilled work you should apply for a Blue or Gold card. Green cards have the words "Mate" or (if you work in the Services and Facilities sector) "Service Assistant" printed on the front.				Certificate and ID card	Valid for either 3 or 5 years
		Blue	A Blue SKILLcard is available for skilled workers.	Modern Apprentice with NVQ/SVQ Level 2; or Skilled worker with NVQ/SVQ Level 2; or Skilled worker with an informal apprenticeship and a City and Guilds craft certificate appropriate to your trade; or Skilled worker without formal qualifications: by Industry Accreditation if this route is still available for your occupation			Certificate and ID card	Valid for either 3 or 5 years

## **APPENDIX [E]**

# **Possible Routes for Developing an Accredited Qualification and/or a Recognised Certification Programme**

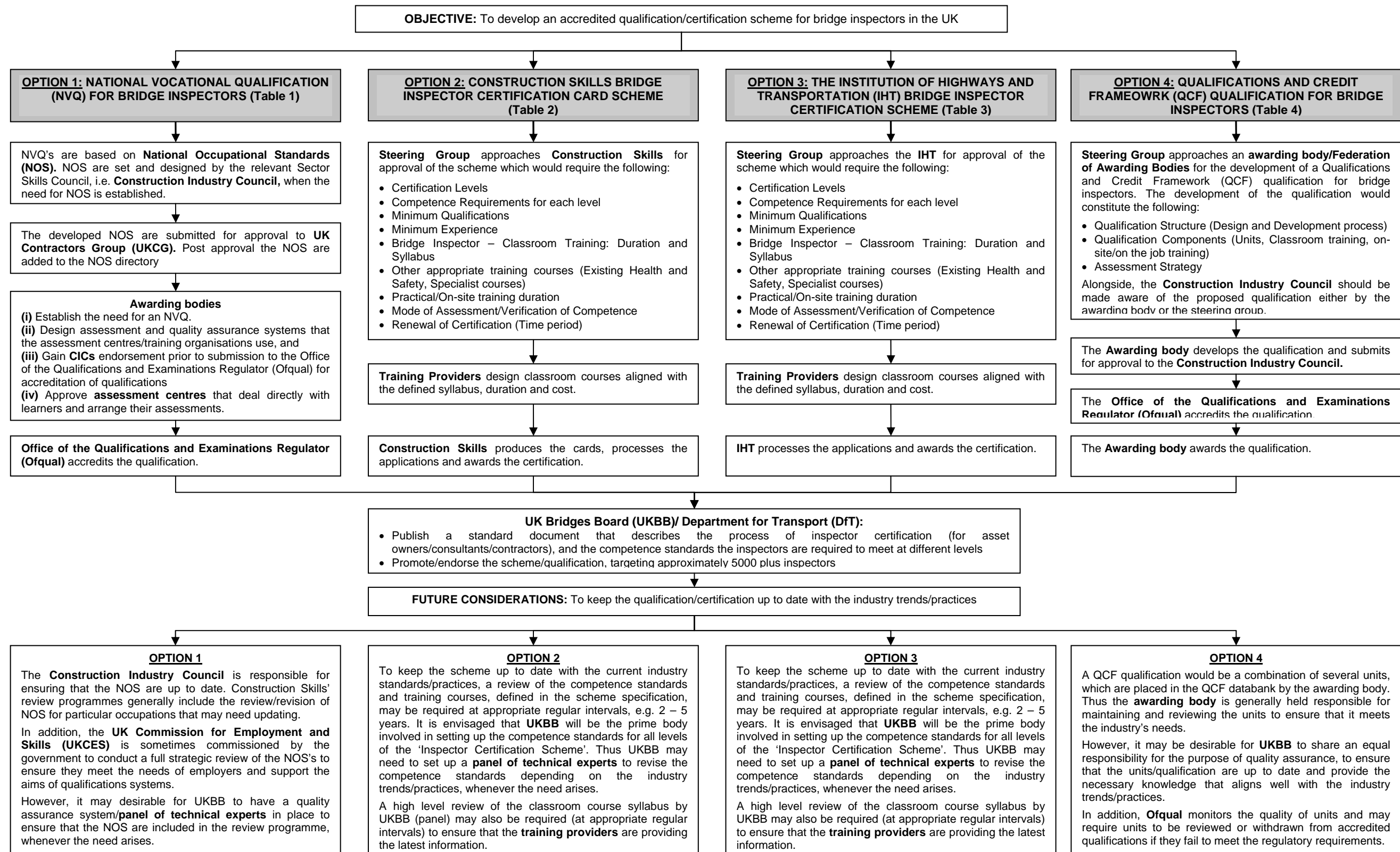


Figure 1: Options for Developing an Accredited Qualification and/or a Recognised Certification Programme



**Table 1: OPTION 1 – National Vocational Qualification (NVQ) for bridge inspectors**

OPTION 1	NATIONAL VOCATIONAL QUALIFICATION FOR BRIDGE INSPECTORS
<p><b>THE PROCESS</b></p>	<p>[1] NVQs are based on <b>National Occupational Standards (NOS)</b> which are normally defined by/through the Sector Skills Councils. <b>Construction Industry Council (CIC)</b> is the sector skills council for Construction and Civil Engineering. Once the need for NOS is established the council applies for funding to the <b>UK Commission for Employment and Skills (UKCES)</b> and post approval a NOS development programme is set up.</p> <p>[2] Under the NOS development programme a <b>National Working Group</b> is formed which comprises technical experts from the relevant field (bridge inspections). They play an important role in the development of the NOS.</p> <p>[3] Along with the developed NOS, the sector skills council also recommends a qualification structure (titles, levels) and a general assessment strategy for the NVQs and SVQs.</p> <p>[4] The developed standards are submitted for approval to <b>UK Contractors Group (UKCG)</b>. The process from application for funding to application for approval takes approximately 12 months or less.</p> <p>[5] Once approved the standards are added to the <b>NOS directory</b>. The <b>awarding bodies (e.g. Construction Awards Alliance)</b> then assess the need of an NVQ. Once the need is established the awarding body designs the qualification structure, assessment and quality assurance systems that the assessment centres/training organisations use. Awarding bodies generally have a good understanding of the qualifications framework and any other statutory regulations that may apply, and therefore would play an important role in the development of the qualification.</p> <p>[6] <b>The Office of the Qualifications and Examinations Regulator (Ofqual)</b> accredits proposals for the NVQ awards developed by the awarding bodies; quality assures and audits the activity of awarding bodies.</p> <p>[7] The <b>awarding body</b> then approves <b>assessment centres</b> that deal directly with learners and arrange their assessments for specified NVQs. Assessments normally include experience assessment (portfolio evidence), practical assessment and/or written exam.</p>
<p><b>FEASIBILITY/ VIABILITY</b></p>	<p>Atkins approached the <b>Construction Industry Council (CIC)</b> to discuss their interest in setting up NOS for bridge inspectors.</p> <p>According to <b>CIC</b>, the nature of the sector's National Occupational Standards (NOS) is such that, job functions are described in reasonably broad terms so that they can be used by a range of related occupations. This approach enables a wider audience to be encompassed by the NOS.</p> <p>Thus CIC has suggested a review of some of the existing sector NVQ/SVQs which could be relevant to the project, such as 'Surveying, Property and Maintenance' at levels 3, 4 and 5, 'Site Inspection' level 3, 'Senior Site Inspection' level 4, and 'Transportation Technical Support' level 3.</p> <p>Unless there are substantial departures in terms of the functions of bridge inspectors from these suites, and there are significant numbers of people that fall into this category, it is unlikely that a completely new suite can be developed (and that could not be started until next year at the earliest). However, if any gaps are identified in existing coverage these can be considered for review with National Working groups as minor incremental changes to existing NOS, or qualification structures.</p> <p>CIC will be starting the review of the NOS for Transportation Development Level 4. If it is considered to be relevant, UKBB/steering group may be able to join the National Working Group that will be undertaking this work starting later this month.</p>

OPTION 1	NATIONAL VOCATIONAL QUALIFICATION FOR BRIDGE INSPECTORS
<p><b>ACCREDITATION/ RECOGNITION/ INDUSTRY ACCEPTANCE</b></p>	<p>A very clear process exists for the accreditation of a NVQ qualification, whereby <b>Construction Skills</b> and <b>Office of the Qualifications and Examinations Regulator (Ofqual)</b> are involved hand in hand.</p> <p>In addition, <b>DfT/UKBB's</b> initiative towards promoting the qualification will be an important factor contributing towards the acceptance of the qualification by asset owners/consultants/contractors.</p>
<p><b>FUTURE CONSIDERATIONS</b></p>	<p>The Sector Skills Council (the standards setting body) is responsible for ensuring that the NOS are up to date.</p> <p>For instance, the Construction Skills review programme of 2008 comprised of review/revision of (i) NOS, (ii) Recommended Qualification Structures, (iii) Key/Core Skills and (iv) Assessment Strategy for:</p> <ul style="list-style-type: none"> <li>• Highways Maintenance</li> <li>• Heritage Skills</li> <li>• Steel fixing Occupations</li> <li>• Transportation</li> </ul> <p>In addition, the UK Commission for Employment and Skills (UKCES) has been commissioned by the government to conduct a full strategic review of national occupational standards to ensure they meet the needs of employers and support the aims of qualifications systems. The main outcomes of the review were submitted to the government at the end of January 2009.</p> <p>Thus it is considered that, in future, the NOS for bridge inspectors would be maintained up to date with the current industry standards/practices, by the Construction Industry Council and similar government initiatives. However, it may be desirable for UKBB to have a quality assurance system/panel of technical experts (in the field of inspections) in place to ensure that the NOS are included in the review programme, whenever the need arises.</p>
<p><b>ORGANIZATION CONTACTS</b></p>	<p>The <b>Construction Industry Council</b> (<a href="http://www.cic.org.uk/home/index.shtml">http://www.cic.org.uk/home/index.shtml</a>) is a partner body of Construction Skills, which is responsible for setting up/designing National Occupational Standards (NOS).</p> <p><b>David Cracknell</b> Director of Lifelong Learning, Construction Industry Council e-mail : <a href="mailto:dcracknell@cic.org.uk">dcracknell@cic.org.uk</a> t: 020 7399 7403 m: 07809 385891 f: 020 7399 7425</p>
<p><b>NOTES</b></p>	<p><b>Construction Skills:</b> Construction Skills is the Sector Skills Council for the construction and civil engineering sector. The Sector Skills Councils (SSCs) were set up to ensure that UK has a highly skilled and trained workforce that is able to compete effectively within a global market.</p> <p>SSCs are independent, employer-led organisations that actively involve trade unions, professional bodies and other key stakeholders, i.e. they are the voice of the industry not the Government. However, SSCs are licensed by the government and are answerable to Government for meeting their targets through their Sector Skills Agreement (SSA).</p> <p><b>National Vocational Qualifications:</b> are work-based qualifications which assess the skills and knowledge people have and need to perform their job role effectively. The qualification design must include:</p> <ul style="list-style-type: none"> <li>• The title of the NVQ</li> <li>• The level of the NVQ</li> </ul>



OPTION 1	NATIONAL VOCATIONAL QUALIFICATION FOR BRIDGE INSPECTORS
	<ul style="list-style-type: none"> <li>• The units<sup>1</sup> which need to be achieved; mandatory, optional, etc.</li> </ul> <p><b>National Occupational Standards (NOS):</b> are statements of performance that describe what competent people in a particular occupation are expected to be able to do. They cover all the main aspects of an occupation, including current best practice, the ability to adapt to future requirements and the knowledge and understanding that underpin competent performance. The standards comprise:</p> <ul style="list-style-type: none"> <li>• <i>Performance criteria:</i> define what is meant by competent performance.</li> <li>• <i>Range:</i> of situations in which candidates have to demonstrate competence.</li> <li>• <i>Knowledge and Understanding:</i> Candidates need to have relevant knowledge and understanding of their field</li> <li>• <i>Evidence requirements:</i> describe the types of evidence which demonstrate a person's competence.</li> </ul> <p>Example: <a href="http://www.ukstandards.org/Admin/DB/0012/O12NVR511-FW.pdf">http://www.ukstandards.org/Admin/DB/0012/O12NVR511-FW.pdf</a></p>
<p><b>REFERENCE MATERIAL</b></p>	<p><b>Developing national occupational standards for NVQs and SVQs, Qualifications and Curriculum Authority (QCA), 1999:</b> This document gives underpinning guidance on designing national occupational standards which form the basis for NVQ and SVQ development. It is aimed at standard setting bodies and awarding bodies which are involved in the development process.</p> <p><b>NVQ Code of Practice:</b> This document outlines the principles and practices specified by the regulatory authorities against which awarding body procedures, for the assessing and awarding of NVQs, are designed and evaluated. Although it is mainly aimed at awarding bodies, assessment centres should also understand the code of practice.</p> <p><b>Support Pack for the Qualifications and Credit Framework, Version 3, QCA/08/3989:</b> This support pack is aimed at those involved in the design and development of units and qualifications for the Qualifications and Credit Framework (QCF)<sup>2</sup>. It will also be useful to others who want to develop their knowledge and understanding of the QCF.</p>

<sup>1</sup> A set of learning outcomes which specify the skills, knowledge and understanding required to perform competently. There are mandatory units, optional units, and additional units.

<sup>2</sup> At present, it is difficult to fully appreciate all the different types of qualifications – what level they are, how long they take to complete, what content they cover, and how they compare to other qualifications. The Qualifications and Credit Framework will present qualifications in a way that is easy to understand and measure.

**Table 2: OPTION 2 - Construction Skills Bridge Inspector Certification Card Scheme**

OPTION 2	CONSTRUCTION SKILLS BRIDGE INSPECTOR CERTIFICATION CARD SCHEME
<p><b>THE PROCESS</b></p>	<p>[1] <b>Construction Skills (CS)</b> needs to be approached for the development and approval of an inspector certification card scheme.</p> <p>[2] Development of a <b>certification scheme</b> would constitute defining the following:</p> <ul style="list-style-type: none"> <li>• Certification Levels</li> <li>• Competence Requirements for each level</li> <li>• Minimum Qualifications</li> <li>• Minimum Experience</li> <li>• Bridge Inspector – Classroom Training: Duration and Syllabus</li> <li>• Other appropriate training courses (Existing Health and Safety, Specialist courses)</li> <li>• Practical/On-site training duration</li> <li>• Mode of Assessment/Verification of Competence</li> <li>• Renewal of Certification (Time period)</li> </ul> <p><b>Appendices F, G, and H</b> present the proposed/suggested definitions/descriptions of the above components.</p> <p>[3] <b>Training Providers</b> will then design classroom courses aligned with the defined syllabus, duration and cost.</p> <p>[4] <b>Construction Skills</b> will be providing the following services:</p> <ul style="list-style-type: none"> <li>• Production of the certification card (standard ID format size of 85 x 54 mm with rounded corners to ISO 7810)</li> <li>• Processing/Reviewing applications</li> <li>• Awarding the certification/card for each level defined</li> </ul>
<p><b>FEASIBILITY/VIABILITY</b></p>	<p>The potential for developing a bridge inspector certification scheme was discussed with Construction Skills. They expressed an interest and indicated they would be able to provide services ranging from producing certificates and ID cards to processing/reviewing applications and awarding the certification.</p> <p>Additionally, Symmons Madge and Sheffield Hallam University, who are established training providers, have expressed interest in getting involved with the development of inspector training classroom courses.</p>
<p><b>RECOGNITION/INDUSTRY ACCEPTANCE</b></p>	<p>The scheme will be supported by <b>Construction Skills</b> which is the sector skills body for Construction and Civil Engineering; this will offer a significant weight/recognition to the scheme.</p> <p>The CSCS card, which aims to register every competent construction operative within the UK on a skills registration scheme, exemplifies the same. Most contractors and clients now demand proof of competence, before allowing workers onto their sites, which is provided by a CSCS card. Not having a CSCS card may limit an individual from working on certain sites. For instance: the Olympic Delivery Authority<sup>3</sup> (ODA) has specified that all professional and site staff involved in construction of the Olympic facilities will be required to hold a valid CSCS card or a card affiliated to the scheme.</p>

<sup>3</sup> The Olympic Delivery Authority (ODA) is the public body responsible for developing and building the new venues and infrastructure for the Games and their use post 2012

OPTION 2	CONSTRUCTION SKILLS BRIDGE INSPECTOR CERTIFICATION CARD SCHEME
	<p>In addition, <b>DfT/UKBB's</b> initiative towards promoting the scheme will be an important factor contributing towards the acceptance of the scheme by asset owners/consultants/contractors.</p>
<p><b>FUTURE CONSIDERATION</b></p>	<p>To keep the scheme up to date with the current industry standards/practices, a review of the competence standards and training courses, defined in the scheme specification, may be required at appropriate regular intervals, e.g. 2 – 5 years.</p> <p>It is envisaged that the <b>UKBB/Steering group</b> will be the prime body involved in setting up the competence standards for all levels of the 'Inspector Certification Scheme'. Thus the UKBB/Steering Group may need to set up a <b>panel of technical experts</b> (in the field of inspections) to revise the competence standards depending on the industry trends/practices, whenever the need arises.</p> <p>A high level review of the classroom course syllabus by UKBB (panel) may also be required (at appropriate regular intervals) to ensure that the <b>training providers</b> are providing the latest information.</p> <p>However, according to Peter Symmons of Symmons Madge, training courses are generally reviewed and updated by them (the training providers), whenever the need for an update is identified. The need is established through:</p> <ul style="list-style-type: none"> <li>• Active involvement of the tutors in the industry</li> <li>• Awareness through newsletters, newly issued specifications, manuals etc.</li> <li>• Feedback from the delegates</li> <li>• Other QA processes</li> </ul> <p>Once the need is established, the course goes through a 3 month time frame of update.</p>
<p><b>ORGANIZATION CONTACTS</b></p>	<p><b>Construction Skills</b> (<a href="http://www.constructionskills.net/aboutus/">http://www.constructionskills.net/aboutus/</a>) is the Sector Skills Council for construction and civil engineering sector. They represent every part of the construction industry, from architects to bricklayers, in every part of the UK.</p> <p><b>Pauline Pattinson</b> Card Schemes Manager, Construction Skills e-mail: <a href="mailto:pauline.pattinson@cskills.org">pauline.pattinson@cskills.org</a> t: 0300 456 7221 m: 07786 526123</p> <p><b>Symmons Madge</b> (<a href="http://www.symmonsmadge.co.uk/home.html">http://www.symmonsmadge.co.uk/home.html</a>) is an established training provider with 9 regional training centres across the UK.</p> <p><b>Peter Symmons</b> Director, Symmons Madge e-mail: <a href="mailto:peter.symmons@symmonsmadge.co.uk">peter.symmons@symmonsmadge.co.uk</a> t: 01446775959</p> <p><b>Sheffield Hallam University</b> (<a href="http://www.shu.ac.uk/university/">http://www.shu.ac.uk/university/</a>)</p> <p><b>Professor Pal Mangat</b> Sheffield Hallam University e-mail: <a href="mailto:p.s.mangat@shu.ac.uk">p.s.mangat@shu.ac.uk</a> t: 0114 225 3339</p>

---

<b>OPTION 2</b>	<b>CONSTRUCTION SKILLS BRIDGE INSPECTOR CERTIFICATION CARD SCHEME</b>
<b>NOTES</b>	The <b>Sector Skills Council</b> were set up to ensure that UK has a highly skilled and trained workforce that is able to compete effectively within a global market. They are independent, employer-led organisations that actively involve trade unions, professional bodies and other key stakeholders. However, they are licensed by the Government and are answerable to the Government for meeting their targets through their Sector Skills Agreement (SSA).

**Table 3: OPTION 3 – The Institution of Highways and Transportation (IHT) Bridge Inspector Certification scheme**

OPTION 3	THE INSTITUTION OF HIGHWAYS AND TRANSPORTATION (IHT) BRIDGE INSPECTOR CERTIFICATION SCHEME
THE PROCESS	<p>[1] The <b>IHT</b> needs to be approached for the development and approval of an inspector certification scheme.</p> <p>[2] Development of a <b>certification scheme</b> would constitute defining the following:</p> <ul style="list-style-type: none"> <li>• Certification Levels</li> <li>• Competence Requirements for each level</li> <li>• Minimum Qualifications</li> <li>• Minimum Experience</li> <li>• Bridge Inspector – Classroom Training: Duration and Syllabus</li> <li>• Other appropriate training courses (Health and Safety, Specialist courses)</li> <li>• Practical/On-site training duration</li> <li>• Mode of Assessment/Verification of Competence</li> <li>• Renewal of Certification (Time period)</li> </ul> <p><b>Appendices F, G, and H</b> present the proposed/suggested definitions/descriptions of the above components.</p> <p>[3] <b>Training Providers</b> will then design classroom courses aligned with the defined syllabus, duration and cost.</p> <p>[4] <b>IHT</b> will be providing the following services:</p> <ul style="list-style-type: none"> <li>• Processing/Reviewing applications</li> <li>• Awarding the certification for each level defined</li> </ul>
FEASIBILITY/ VIABILITY	<p>IHT has expressed interest in supporting and developing the bridge inspector certification scheme.</p> <p>Additionally, Symmons Madge and Sheffield Hallam University, who are established training providers, have expressed interest in getting involved with the development of inspector training classroom courses.</p>
RECOGNITION/ INDUSTRY ACCEPTANCE	<p>The Royal Charter of <b>Engineering Council UK (ECUK)</b> formally recognises IHT as an awarding body for registration towards CEng/IEng/EngTech status. It is considered to have sufficient experience, procedures and resources to undertake the following tasks:</p> <ul style="list-style-type: none"> <li>• monitor the conduct of registrants;</li> <li>• monitor the continuing professional development of registrants; and</li> <li>• assess the competence and commitment of candidates for registration.</li> </ul> <p>This will offer a significant weight/recognition to the certification scheme developed jointly with the IHT.</p> <p>In addition, <b>DfT/UKBB's</b> initiative towards promoting the scheme will be an important factor contributing towards the acceptance of the scheme by asset owners/consultants/contractors.</p>
FUTURE CONSIDERATION	<p>To keep the scheme up to date with the current industry standards/practices, a review of the competence standards and training courses, defined in the scheme specification, may be required at appropriate regular intervals, e.g. 2- 5 years.</p> <p>It is envisaged that the UKBB/Steering group will be the prime body involved in setting up the competence standards for all levels of the 'Inspector Certification</p>

OPTION 3	THE INSTITUTION OF HIGHWAYS AND TRANSPORTATION (IHT) BRIDGE INSPECTOR CERTIFICATION SCHEME
	<p>Scheme'. Thus the UKBB/Steering Group may need to set up a <b>panel of technical experts</b> (in the field of inspections) to revise the competence standards depending on the industry trends/practices, whenever the need arises.</p> <p>A high level review of the classroom course syllabus by the UKBB (panel) may also be required (at appropriate regular intervals) to ensure that the <b>training providers</b> are providing the latest information.</p> <p>However, according to Peter Symmons of Symmons Madge, training courses are generally reviewed and updated by them (the training providers), whenever the need for an update is identified. The need is established through:</p> <ul style="list-style-type: none"> <li>• Active involvement of the tutors in the industry</li> <li>• Awareness through newsletters, newly issued specifications, manuals, etc.</li> <li>• Feedback from the delegates</li> <li>• Other QA processes</li> </ul> <p>Once the need is established, the course goes through a 3 month time frame of update.</p>
<p><b>ORGANIZATION CONTACTS</b></p>	<p>The <b>Institution of Highways and Transportation (IHT)</b> (<a href="http://www.iht.org/en/about-us/index.cfm">http://www.iht.org/en/about-us/index.cfm</a>) is formally recognised by ECUK as awarding body for registration towards CEng/IEng/EngTech status.</p> <p><b>Sue Stevens</b> Director of Education and Membership, The Institution of Highways and Transportation e-mail: <a href="mailto:sue.stevens@iht.org">sue.stevens@iht.org</a> t: 020 7336 1572</p> <p><b>Symmons Madge</b> (<a href="http://www.symmonsmadge.co.uk/home.html">http://www.symmonsmadge.co.uk/home.html</a>) is an established training provider with 9 regional training centres across the UK.</p> <p><b>Peter Symmons</b> Director, Symmons Madge e-mail: <a href="mailto:peter.symmons@symmonsmadge.co.uk">peter.symmons@symmonsmadge.co.uk</a> t: 01446775959</p> <p><b>Sheffield Hallam University</b> (<a href="http://www.shu.ac.uk/university/">http://www.shu.ac.uk/university/</a>)</p> <p><b>Professor Pal Mangat</b> Sheffield Hallam University e-mail: <a href="mailto:p.s.mangat@shu.ac.uk">p.s.mangat@shu.ac.uk</a> t: 0114 225 3339</p>
<p><b>NOTES</b></p>	<p>The <b>Engineering Council UK</b> is an organization set up by the Royal Charter to regulate the engineering profession in the UK. It achieves this by working through a number of engineering institutions, providing the standard for assessment of individuals, and for education programmes and for professional development programmes. ECUK regulates the engineering profession through 36 engineering Institutions (Licensed Members) who are licensed to put suitably qualified members on the ECUK's Register of Engineers. The register has three sections: Chartered Engineer, Incorporated Engineer and Engineering Technician.</p>

**Table 4: OPTION 4 – Qualifications and Credit Framework (QCF) Qualification for Bridge Inspectors**

OPTION 4	QUALIFICATIONS AND CREDIT FRAMEWORK QUALIFICATION FOR BRIDGE INSPECTORS
<p><b>THE PROCESS</b></p>	<p>[1] An <b>awarding body (e.g. Edexcel)/Federation of Awarding Bodies (FAB)</b><sup>4</sup> to be approached for the development of a QCF qualification for bridge inspectors. Alongside, the sector skills council (Construction Industry Council) should be made aware of the proposed qualification either by the awarding body or the steering group. It is best to assign this responsibility to the awarding body since they liaise with the sector skills council more often and thus may be aware of the relevant procedures.</p> <p>[2] Development of a <b>QCF qualification</b> would constitute defining the following:</p> <ul style="list-style-type: none"> <li>• Qualification Structure (Design and Development process)</li> <li>• Qualification Components (units, classroom training, on-site or on the job learning)</li> <li>• Assessment Strategy</li> </ul> <p>Awarding bodies generally have a good understanding of the Qualifications and Credit framework and any other regulations that may apply, and therefore would play an important role in the development of the qualification.</p> <p>[3] The awarding body develops the qualification and submits it for approval to the sector skills council (<b>Construction Industry Council</b>).</p> <p>[4] <b>The Office of the Qualifications and Examinations Regulator (Ofqual)</b> accredits proposals for qualifications developed by awarding bodies; quality assures and audits the activity of awarding bodies.</p> <p>[5] The awarding body assesses and awards the qualification.</p>
<p><b>FEASIBILITY/ VIABILITY</b></p>	<p>The ‘QCF qualification’ approach is generally adopted by employers who wish to get their in-house training converted into a qualification within the national system. Thus it is believed that this approach can be adopted by UKBB to develop an accredited qualification for bridge inspectors at a national level.</p> <p>The Qualifications and Curriculum Authority (QCA) indicated that such flexible QCF qualifications are in general welcome by the organization, provided the sector skills council approves the qualification.</p> <p>One such project for developing a more flexible qualification for the automotive sector is currently being undertaken. The purpose is to create a qualification in vehicle maintenance and repair that develops skills and knowledge, assesses competence and gives employers an opportunity to train their workforce through a flexible route.</p> <p>This indicates that it may be possible to set up a QCF qualification development programme for bridge inspectors with the sector skills councils’ (Construction Industry Council) approval.</p>
<p><b>ACCREDITATION/ RECOGNITION/ INDUSTRY ACCEPTANCE</b></p>	<p>A very clear process exists for the accreditation of a QCF qualification, whereby the <b>awarding body</b> submits an application to the <b>Office of the Qualifications and Examinations Regulator (Ofqual)</b>, which then accredits the qualification.</p> <p>In addition, <b>DfT/UKBB’s</b> initiative towards promoting the qualification will be an important factor contributing towards the acceptance of the qualification by asset owners/consultants/contractors.</p>

<sup>4</sup> If an organization is not aware of a suitable awarding body the FAB can be approached, who can then suggest an appropriate awarding body depending on the organizations’ needs.



OPTION 4	QUALIFICATIONS AND CREDIT FRAMEWORK QUALIFICATION FOR BRIDGE INSPECTORS
<p><b>FUTURE CONSIDERATION</b></p>	<p>A QCF qualification would be a combination of several units<sup>5</sup>, which are placed in the QCF databank by the awarding body. Thus the <b>awarding body</b> is generally held responsible and accountable for the quality of the units and for maintaining and reviewing the units to ensure that it meets the industry's needs. However, it may be desirable for <b>UKBB</b> to share an equal responsibility for the purpose of quality assurance, to ensure that the units are up to date and that the qualification provides the necessary knowledge that aligns well with the industry trends/practices.</p> <p>In addition, <b>Ofqual</b> monitors the quality of units and may require units to be reviewed or withdrawn from accredited qualifications if they fail to meet the regulatory requirements.</p> <p>It should be noted that once a unit is included in an accredited qualification it cannot be amended but only replaced by a new updated unit.</p>
<p><b>ORGANIZATION CONTACTS</b></p>	<p>The <b>Qualifications and Curriculum Authority</b> (QCA) [<a href="http://www.qca.org.uk/aboutQCA.aspx">http://www.qca.org.uk/aboutQCA.aspx</a>] is a public body, sponsored by the Department for Children, Schools and Families (DCSF), which plays a vital role in the development, delivery and reform of the education and training framework for England. During 2009-10, QCA will evolve into the Qualifications and Curriculum Development Agency (QCDA), a new agency which will create, develop and deliver the Government's programmes for the management and reform of qualifications, curriculum and assessment, to promote quality and coherence in education and training in England.</p> <p><b>Qualifications and Curriculum Authority</b>              83 Piccadilly              London W1J 8QA              e-mail: <a href="mailto:info@qca.org.uk">info@qca.org.uk</a>              t: 020 7509 5555</p>
<p><b>NOTES</b></p>	<p><b>QCF Unit Pro forma:</b> For details see Pages 74 – 79 of the following document: <a href="http://www.qca.org.uk/libraryAssets/media/Guidelines_for_writing_credit_based_units_4th_proof_web_ready.pdf">http://www.qca.org.uk/libraryAssets/media/Guidelines_for_writing_credit_based_units_4th_proof_web_ready.pdf</a></p>

<sup>5</sup> A set of learning outcomes which specify the skills, knowledge and understanding required to perform competently. There are mandatory units, optional units, and additional units.



**OPTION 4** **QUALIFICATIONS AND CREDIT FRAMEWORK QUALIFICATION FOR BRIDGE INSPECTORS**

Title	
Level	
Credit value	
Learning outcomes	Assessment criteria
1.	1.1 1.2
2.	2.1 2.2
3. etc	3.1 3.2 etc
Additional information about the unit	
Unit purpose and aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant national occupational standards or other professional standards or curricula (if appropriate)	
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	
Support for the unit from a sector skills council or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	
Availability for use	
Unit available from	
Unit guided learning hours	

**QCF qualification title:** Each QCF qualification title contains the following:

- *The level of the qualification:* Entry level at the bottom to Level 8 at the top (See QCF Level Descriptors)
- *The size of qualification:* Award (between 1 and 12 credits)/Certificate (between 13 and 36 credits)/Diploma (37 credits or more)
- *Details indicating the content of the qualification:* e.g. retail skills, bridge inspections, professional cookery etc.

Examples of QCF qualifications: Level 1 award in retail skills, Level 2 certificate in professional cookery.



OPTION 4	QUALIFICATIONS AND CREDIT FRAMEWORK QUALIFICATION FOR BRIDGE INSPECTORS
	<p><b><i>Qualifications and Credit Framework (QCF):</i></b> The QCF is a new way of recognising skills and qualifications, and was under development and trial until June 2008. It gives qualification designers the opportunity to develop more flexible/fit-for-purpose qualifications. At present, it is difficult to fully appreciate all the different types of qualifications – what level they are, how long they take to complete, what content they cover, and how they compare to other qualifications. The QCF presents the qualifications in a way that is easy to understand and measure.</p> <p><b><i>Federation of Awarding Bodies (FAB):</i></b> A membership body representing organizations that award vocational qualifications in the UK. Their members range from organizations that are well known for offering vocational qualifications for a particular industry, to larger generic awarding bodies offering vocational qualifications across a wide range of sectors.</p> <p>Current members of Federation of Awarding Bodies (FAB): <a href="http://www.awarding.org.uk/public/membership/currentmembers">http://www.awarding.org.uk/public/membership/currentmembers</a></p>
REFERENCE MATERIAL	<p><b><i>Support Pack for the Qualifications and Credit Framework, Version 3, QCA/08/3989:</i></b> This support pack is aimed at those involved in the design and development of units and qualifications for the Qualifications and Credit Framework (QCF). It may also be useful to others who want to develop their knowledge and understanding of the QCF.</p> <p><b><i>Working Specification for the Qualifications and Credit Framework Tests and Trials, Version 2, QCA/07/3412:</i></b> This guidance was published to help organizations submitting proposals to gain an understanding of the process.</p> <p><b><i>Employer Qualification Accreditation, Approach 2: Working with an Awarding Organization, QCA/08/3871:</i></b> The leaflet describes how an employer can work with an existing awarding organization that designs and awards bespoke qualifications for the employer and provides the quality assurance and accreditation.</p> <p><b><i>Simplifying qualifications: a guide for employers, Introducing a national framework designed to make qualifications easier to understand, QCA/07/3113:</i></b> This leaflet covers the approach (for developing a QCF qualification) in which an organization partners with an awarding body to design and develop a qualification that meets the organization’s training needs.</p>

## **APPENDIX [F]**

### **Inspector Certification Options 2 and 3**

---

## Overview

There are mechanisms and organisations in place to support the development of accredited qualifications and certification schemes. However, it is considered that setting up an accredited qualification can take a considerable amount of time (up to a year) and effort with very few benefits over a certification scheme. It should also be noted that under the NVQ route, the nature of existing and/or currently under development NOS (upon which NVQs are based) is such that, job functions are described in reasonably broad terms so that these can be used by a range of related occupations. Therefore there is currently no desire to develop a NOS for bridge inspection. The relevant existing NVQs have been reviewed and although it was found that they are wide ranging it is considered that the modules relating to inspections are not detailed or specific enough to provide appropriate training for bridge inspectors.

The findings of this study indicate that the most appropriate routes for developing a bridge inspector certification scheme is through either Construction Skills (the Sector Skills Council for the Construction and Civil Engineering Sector) or the Institution of Highways and Transportation. This appendix is an extension to Tables 2 and 3 in Appendix E which present two identical options of developing a certification scheme through two separate organizations, e.g. Construction Skills and/or the Institution of Highways and Transportation (IHT), whichever is considered appropriate.

## Certification Components

In undertaking the development of a certification scheme, it is essential to define the following components that will form the foundation for setting up a certification scheme:

- Certification Levels
- Competence Requirements for each level
- Minimum Qualifications
- Minimum Experience
- Bridge Inspector – Classroom Training: Duration and Syllabus
- Other appropriate training courses (Existing Health and Safety, Specialist courses)
- Practical/On-site training duration
- Mode of Assessment/Verification of Competence
- Renewal of Certification (Time period)

## Options

The following tables set out some high-level options for the above certification components. These are provided as a starting point for Phase 2 and it is recognised that considerable discussion and development is required.

Table A and Table B present two possible options for setting up the certification components, using four and two levels<sup>1</sup> of competence respectively. The competence levels are defined in the second row of each table. The subsequent rows in the tables present possible options, under the competence headings, for each of the certification components.

For instance, in Table A, under ‘minimum qualifications’ there are three options presented:

- (i) None (implies no qualifications required), **or**
- (ii) GCSE, **or**
- (iii) HND Civil Engineering.

Depending on what is considered to be appropriate, only one out of the three options may form the base criteria for ‘minimum qualification’, for obtaining certification at each of the four levels. That is, if

---

<sup>1</sup> Assuming that there may be cases where introducing certification at two levels might be considered beneficial as opposed to introducing certification at four levels.

---

GCSE is selected as the minimum qualification criteria then inspectors applying for a certification, at any of the four levels, should provide evidence of completion of appropriate GCSEs.

In some instances, where the options are separated by 'and' instead of 'or', it is proposed that all three options are considered as relevant requirements for the corresponding scheme component. For example, in Table A, under 'Health and Safety courses' the following three options have been provided for level 1 and level 2 certification:

- (i) IOSH Working Safely/CITB-Construction Skills Health and Safety Test, **and**
- (ii) Access to Highways for inspection and survey, **and**
- (iii) Mandatory Health Check

This implies that in order to obtain level 1 and level 2 certification, an inspector will be required to successfully complete all of the aforementioned courses.

Table A: INSPECTOR CERTIFICATION – OPTIONS 2.1/3.1

REQUIREMENTS ↓	CERTIFICATION LEVELS ↓			
	LEVEL 1: TRAINEE INSPECTOR	LEVEL 2: INSPECTOR	LEVEL 3: SENIOR INSPECTOR	LEVEL 4: LEAD INSPECTOR
<b>Core Skills</b>	Ability to plan and undertake General Inspections on simple structure types and forms under appropriate supervision	Ability to plan and undertake General Inspections on all structures and Principal Inspections on simple structure types and forms under general/occasional supervision	Ability to plan and undertake General and Principal Inspections on all structure types/forms and also trained in undertaking some Special Inspection/testing duties with minimal or no supervision	Satisfies Level 3 requirements and also coordinates and supervises the overall inspection programme.
<b>Minimum Qualification</b>	(i) None or (ii) GCSE or (iii) HND Civil Engineering			
<b>Experience required in a relevant field [in the absence of relevant qualification(s)]</b>	(i) None or (ii) 1 year or (iii) 2 years			
<b>Minimum Experience required to apply for certification</b>	(i) None or (ii) 2 months or (iii) 6 months	(i) None or (ii) 1 year or (iii) 2 years	(i) None or (ii) 2 – 4 years or (iii) More than 5 years	(i) Less than 5 years or (ii) More than 5 years or (iii) More than 10 years
<b>Minimum no. of inspections required to demonstrate competence</b>	(i) None or (ii) 1 or (iii) 2 or (iv) 3 or (v) 4	(i) Less than 5 or (ii) 5-10 or (iii) 10-15 or (iv) More than 15	(i) Less than 15 or (ii) 15-20 or (iii) 20-30 or (iv) More than 30	(i) Less than 20 or (ii) 20-30 or (iii) 30-40 or (iv) More than 40
<b>CLASSROOM TRAINING OPTIONS: [Description in Appendix G]</b>				
<b>Trainee Inspector Course</b>	(i) None, or (ii) Certified completion of 'Trainee Inspector Course'	(i) None, or (ii) Certified completion of 'Trainee Inspector Course', or (iii) Certified completion of 'Trainee Inspector Course' and 'Bridge Inspector Course'	(i) None, or (ii) Certified completion of 'Trainee Inspector Course' and 'Bridge Inspector Course', or (iii) Certified completion of 'Trainee Inspector Course', 'Bridge Inspector Course' and 'Advanced Inspector Course'	
<b>Bridge Inspector Course</b>				
<b>Advanced Inspector Course</b>				
<b>DURATION OF CLASSROOM TRAINING OPTIONS:</b>				
<b>Trainee Inspector Course</b>	(i) 1 Day or (ii) 2 Days or (iii) 3 Days or (iv) 4 Days or (v) 5 Days or (vi) 5 – 10 days or (vii) More than 2 weeks			
<b>Bridge Inspector Course</b>	(i) 1 Day or (ii) 2 Days or (iii) 3 Days or (iv) 4 Days or (v) 5 Days or (vi) More than 5 days			
<b>Advanced Inspector Course</b>	(i) 1 Day or (ii) 2 Days or (iii) 3 Days or (iv) 4 Days or (v) 5 Days or (vi) More than 5 days			
<b>COST OF CLASSROOM TRAINING OPTIONS:</b>				
<b>Trainee Inspector Course</b>	(i) £250 or (ii) £250 - £500 or (iii) £500 - £800 or (iv) £800 - £1000 or (v) £1000 - £1200			
<b>Bridge Inspector Course</b>	(i) £250 or (ii) £250 - £400 or (iii) £400 - £600 or (iv) £600 - £800 or (v) More than £800			
<b>Advanced Inspector Course</b>	(i) £250 or (ii) £250 - £400 or (iii) £400 - £600 or (iv) £600 - £800 or (v) More than £800			
<b>Health and Safety Courses</b>	(i) IOSH Working Safely <sup>2</sup> /CITB-Construction Skills Health and Safety Test, and (ii) Access to Highways for inspection and survey, and (iii) Mandatory Health Check		(i) IOSH Working Safely/CITB-Construction Skills Health and Safety Test, and (ii) Access to Highways for inspection and survey, and (iii) First Aid Procedures, and (iv) Mandatory Health Check	
<b>Specialist Courses [depending on the type of structures to be inspected]</b>	None	(i) None, or (ii) Confined Space Training <sup>3</sup>	(i) Confined Space Training, and (ii) Personal Track Safety <sup>4</sup> , and (iii) Underwater Inspection <sup>5</sup> Training	
<b>Competence Assessment [Requirements defined in Appendix H]</b>	(i) Practical Exam (on-site), and/or (ii) Verification by an employer/lead inspector/appropriately qualified person working within the same firm/member of a professional body (ICE, IHT) working within the relevant industry, that the applicant meets the specified competencies.			
<b>Bridge Inspection Refresher Training Options [To renew certification]</b>	(i) 3 years or (ii) 4 years or (iii) 5 years or (iv) 5 – 10 years			

<sup>2</sup> Working Safely is a one-day course for staff from any sector with no supervisory or managerial responsibility, which provides a grounding in the essentials of health and safety. Delegates who attend the course and successfully complete the written and practical assessments are awarded either an IOSH Working safely certificate or an IOSH passport card.

<sup>3</sup> The aim of this course is to provide awareness of a safe working environment within a confined space and to make staff aware of the procedure and to ensure a safe access and egress from a confined space using the appropriate equipment.

<sup>4</sup> The aim of this course is to ensure that delegates correctly interpret the knowledge and skills required to walk / work on Rail Infrastructure, understand the potential dangers whilst on or near the line, and their ability to follow a safe system of work.

<sup>5</sup> The aim of this course is to provide individuals with an understanding of the need and benefits of underwater inspections, typical underwater defects and special underwater inspection equipment etc.

Table B: INSPECTOR CERTIFICATION – OPTIONS 2.2/3.2

REQUIREMENTS ↓	CERTIFICATION LEVELS ↓	
	LEVEL 1: INSPECTOR	LEVEL 2: LEAD INSPECTOR
<b>Core Skills</b>	Ability to plan and undertake General Inspections on all structures and Principal Inspections on simple structure types and forms under general/occasional supervision	Satisfies Level 3 requirements and also coordinates and supervises the overall inspection programme.
<b>Minimum Qualification</b>	(i) None or (ii) GCSE or (iii) HND Civil Engineering	
<b>Experience required in a relevant field [in the absence of relevant qualification(s)]</b>	(i) None or (ii) 1 year or (iii) 2 years	
<b>Minimum Experience required to apply for certification</b>	(i) None or (ii) 1 – 2 years or (iii) 2 – 4 years	(i) Less than 5 years or (ii) More than 5 years or (iii) More than 10 years
<b>Minimum no. of inspections required to demonstrate competence</b>	(i) Less than 5 or (ii) 5 – 10 or (iii) 10 – 20 or (iv) More than 20	(i) Less than 20 or (ii) 20 – 30 or (iii) 30 – 40 or (iv) More than 40
<b>CLASSROOM TRAINING OPTIONS: [Description in Appendix G]</b>		
<b>Trainee Inspector Course</b>	(i) None, or (ii) Certified Completion of 'Trainee Inspector Course', or (iii) Certified Completion of 'Trainee Inspector Course' and 'Bridge Inspector Course'	(i) None, or (ii) Certified Completion of 'Trainee Inspector Course' and 'Bridge Inspector Course', or (iii) Certified Completion of Trainee Inspector Course, 'Bridge Inspector Course' and 'Advanced Inspector Course'
<b>Bridge Inspector Course</b>		
<b>Advanced Inspector Course</b>		
<b>DURATION OF CLASSROOM TRAINING OPTIONS:</b>		
<b>Trainee Inspector Course</b>	(i) 1 Day or (ii) 2 Days or (iii) 3 Days or (iv) 4 Days or (v) 5 Days or (vi) 5 – 10 days or (vii) More than 2 weeks	
<b>Bridge Inspector Course</b>	(i) 1 Day or (ii) 2 Days or (iii) 3 Days or (iv) 4 Days or (v) 5 Days or (vi) More than 5 days	
<b>Advanced Inspector Course</b>	(i) 1 Day or (ii) 2 Days or (iii) 3 Days or (iv) 4 Days or (v) 5 Days or (vi) More than 5 days	
<b>COST OF CLASSROOM TRAINING OPTIONS:</b>		
<b>Basic Inspector Course</b>	(i) £250 or (ii) £250 - £500 or (iii) £500 - £800 or (iv) £800 - £1000 or (v) £1000 - £1200	
<b>Bridge Inspector Course</b>	(i) £250 or (ii) £250 - £400 or (iii) £400 - £600 or (iv) £600 - £800 or (v) More than £800	
<b>Advanced Inspector Course</b>	(i) £250 or (ii) £250 - £400 or (iii) £400 - £600 or (iv) £600 - £800 or (v) More than £800	
<b>Health and Safety Courses</b>	(i) IOSH Working Safely/CITB-Construction Skills Health and Safety Test, and (ii) Access to Highways for inspection and survey, and (iii) Mandatory Health Check	(i) IOSH Working Safely/CITB-Construction Skills Health and Safety Test, and (ii) Access to Highways for inspection and survey, and (iii) First Aid Procedures, and (iv) Mandatory Health Check
<b>Specialist Courses [depending on the type of structures inspected]</b>	(i) None, or (ii) Confined Space Training	(i) Confined Space Training, and (ii) Personal Track Safety, and (iii) Underwater Inspection Training
<b>Competence Assessment Options [Requirements defined in Appendix H]</b>	(i) Practical Exam (on-site); and/or (ii) Verification by an employer/lead inspector/appropriately qualified person working within the same firm/member of a professional body (ICE, IHT) working within the relevant industry, that the applicant meets the specified competencies.	
<b>Bridge Inspection Refresher Training Options (To renew certification)</b>	(i) 3 years or (ii) 4 years or (iii) 5 years or (iv) 5 – 10 years	

**APPENDIX [G]**  
**Inspector Training Courses**



COURSE	TRAINEE INSPECTOR COURSE
<b>INTENDED FOR</b>	This course should be intended for fresh graduates and experienced professionals entering the field of bridge inspections and/or personnel applying to obtain the 'Trainee Inspector' certification
<b>COURSE COST</b>	£1000 - £1200 per delegate (also see Appendix F, Table A and Table B)
<b>COURSE DURATION</b>	5 days to 10 days (also see Appendix F, Table A and Table B)
<b>COURSE DETAILS/ SYLLABUS</b>	<p><b>INTRODUCTION TO INSPECTIONS:</b></p> <ul style="list-style-type: none"> <li>• Importance/Purpose of inspections,</li> <li>• Different roles/responsibilities of bridge inspectors – Inspector, Senior Inspector, Lead Inspector</li> <li>• Training/Certification Requirements for bridge inspectors</li> <li>• Inspection Regime – Inspection types, Nominal Intervals and brief description</li> </ul> <p><b>BASIC CONCEPTS:</b></p> <ul style="list-style-type: none"> <li>• Overview of bridges</li> <li>• Bridge Components and Elements</li> <li>• Types of Bridges – Simple structural forms and types</li> <li>• Other Highway Structures – Culverts, Retaining Walls, Sign Gantries etc.</li> <li>• Basic Structure Mechanics</li> <li>• Common Bridge Construction Materials and Basic Properties – Concrete, Reinforced Concrete, Steel, Masonry.</li> <li>• Common defects and treatments</li> </ul> <p><b>ADDITIONAL TOPICS<sup>1</sup></b> – Introduction to:</p> <ul style="list-style-type: none"> <li>• Types of Bridges – Various structural form and types</li> <li>• Bridge Construction Materials and Basic Properties – Concrete, Reinforced Concrete, Pre-Stressed Concrete, Steel, Cast Iron, Wrought Iron, Masonry, Timber, Advanced Composites, etc.</li> <li>• Material deterioration, associated defect types and causes</li> <li>• Maintenance and Treatments</li> <li>• Simple inspection equipment – Crack gauges, laser metre, etc.</li> <li>• Simple testing techniques – Simple Non-destructive testing techniques, e.g. hammer testing, etc.</li> </ul> <p><b>THE INSPECTION PROCESS:</b></p> <ul style="list-style-type: none"> <li>• Planning and Preparing for inspections – Overview of basic steps involved in the planning and preparation of an inspection e.g. reviewing previous inspection and maintenance records, identifying components and elements, method statement, risk assessment, methods of access, equipment needed, necessary PPE, etc.</li> <li>• Recording condition of bridges and other highway structures – Element condition rating, CSS inspection pro-forma</li> <li>• Inspection Reports – Layout, content of a GI report</li> <li>• Simple bridge general arrangement drawings and specs – Reading</li> </ul>

<sup>1</sup> To introduce topics that can be covered in greater detail in the next level course. Therefore if these are included the duration of the training will extend to 10 days.

---

COURSE	TRAINEE INSPECTOR COURSE
	<p>simple as-built plans and specifications to determine basic dimensions, and descriptions of component locations.</p> <p><b>PRACTICAL EXPERIENCE:</b></p> <ul style="list-style-type: none"><li>• Relevant videos relating to common bridge types, construction materials and associated defects</li><li>• Site visit</li></ul> <p><b>ASSESSMENT</b></p> <ul style="list-style-type: none"><li>• Multiple choice test</li><li>• Practical exercise using a simple as-built drawing to identify the basic components and dimensions of a bridge</li></ul>

COURSE	BRIDGE INSPECTOR COURSE
<b>INTENDED FOR</b>	This course should top up the knowledge gained through the Trainee Inspector Course and thus should be intended for personnel working in the field of inspections for <b>more than a year</b> and/or personnel applying to obtain the 'Inspector' certification
<b>COURSE COST</b>	£600 - £800 per delegate (also see Appendix F, Table A and Table B)
<b>COURSE DURATION</b>	3 Days (also see Appendix F, Table A and Table B)
<b>COURSE DETAILS/ SYLLABUS</b>	<p>The topics remain similar to the 'Trainee Inspector Course' but should aim to provide detailed and greater in-depth knowledge.</p> <p><b>INSPECTIONS:</b></p> <ul style="list-style-type: none"> <li>• Inspections Types – Detailed description of different types of inspections</li> </ul> <p><b>BRIDGE CONCEPTS:</b></p> <ul style="list-style-type: none"> <li>• Types of Bridges – Various structural form and types</li> <li>• Details of Other Highway Structures – Culverts, Retaining Walls, Sign Gantries etc.</li> <li>• Bridge Construction Materials and Basic Properties – Concrete, Reinforced Concrete Pre-Stressed Concrete, Steel, Cast Iron, Wrought Iron, Masonry, Timber, Advanced Composites etc.</li> <li>• Material deterioration, associated defect types and causes</li> <li>• Inspection and Evaluation of Bearings, Expansion Joints, Half – Joints, etc.</li> <li>• Maintenance and Treatments</li> <li>• Simple inspection equipment – Crack gauges, laser metre, etc.</li> <li>• Simple testing techniques – Simple Non-destructive testing techniques e.g. hammer testing, etc.</li> <li>• Introduction to special testing techniques</li> </ul> <p><b>DETAILED INSPECTION PROCESS:</b></p> <ul style="list-style-type: none"> <li>• Planning and Preparing for inspections – Details of steps involved in the planning and preparation of an inspection e.g. reviewing previous inspection and maintenance records, identifying components and elements, method statement, risk assessment, methods of access, equipment needed, necessary PPE, etc.</li> <li>• Recording condition of bridges and other highway structures – Element condition rating, CSS inspection pro-forma</li> <li>• Inspection Reports – Layout, content of a PI report</li> <li>• Bridge general arrangement drawings and specs – Understanding and using as-built plans and specifications to determine dimensions, types of materials, and member make-up, shape, and size.</li> </ul> <p><b>PRACTICAL EXPERIENCE:</b></p> <ul style="list-style-type: none"> <li>• Relevant videos relating to different bridge types, construction materials and associated defects</li> <li>• Site visit</li> </ul> <p><b>ASSESSMENT</b></p> <ul style="list-style-type: none"> <li>• Multiple choice test</li> <li>• Practical exercise using as-built drawings to identify the defect locations</li> </ul>

COURSE	BRIDGE INSPECTOR COURSE
	with the help of a set of photographs and descriptions, and provide recommendations for required maintenance works

COURSE	ADVANCED INSPECTOR COURSE
INTENDED FOR	This course should be intended for personnel working in the field of inspections for a <b>minimum of 3 years</b> and/or personnel applying to obtain the ‘Senior Inspector’ and/or ‘Lead Inspector’ certification
COURSE COST	£400 - £500 per delegate (also see Appendix F, Table A and Table B)
COURSE DURATION	2 Days (also see Appendix F, Table A and Table B)
COURSE DETAILS/ SYLLABUS	<p><b>BRIDGE CONCEPTS</b></p> <ul style="list-style-type: none"> <li>• Complex Structural Forms and types</li> <li>• Inspection and Evaluation of Bearings, Expansion Joints, Half – Joints, etc.</li> <li>• Structure Mechanics – Loading and forces on bridges, Determining Safe Live Load Capacity of existing simple bridges</li> </ul> <p><b>INSPECTION ARRANGEMENTS</b></p> <ul style="list-style-type: none"> <li>• Review of bridge plans, past inspection reports, and other pertinent information for bridges to be inspected.</li> <li>• Special Access Equipment for inspections – Mobile Elevating Platforms and Tower Scaffolds, etc.</li> <li>• General Traffic Arrangements</li> <li>• Arranging necessary equipment for inspection and traffic control</li> <li>• Notifying owners and third parties (statutory undertakers)</li> </ul> <p><b>INVESTIGATION AND TESTING:</b></p> <ul style="list-style-type: none"> <li>• Defect Description and Causes</li> <li>• General Testing Techniques</li> <li>• Special Testing Techniques</li> <li>• The testing process – planning, sampling, recording and reporting test results, Evaluation of test results</li> </ul> <p><b>PRACTICAL EXPERIENCE:</b></p> <ul style="list-style-type: none"> <li>• Relevant videos relating to different testing techniques, special access equipment, etc.</li> </ul> <p><b>ASSESSMENT</b></p> <ul style="list-style-type: none"> <li>• Multiple choice test</li> <li>• Practical exercise for interpreting/evaluating previously collected structure testing results</li> </ul>

**APPENDIX [H]**  
**Proposed Competence Requirements**

---

## COMPETENCE REQUIREMENTS FOR A TRAINEE INSPECTOR

1. Awareness of standard inspection manuals
2. Understanding of importance/purpose of inspections
3. Awareness of minimum health and safety requirements on-site, including PPE requirements.
4. Awareness of different bridge types, bridge components, materials, etc.
5. General awareness of the pre-inspection processes which includes:
  - planning an inspection,
  - preparing method statements,
  - undertaking risk assessments,
  - obtaining site visit authorisations,
  - abiding by the company specific safety procedures e.g. registering a call with Safe Operations System (SOS) before leaving the office environment is mandatory for Atkins' inspectors
6. Ability to understand previous general inspection records and simple as-built drawings
7. Ability to assist with/undertake General Inspections of structures under appropriate supervision which includes:
  - identifying and recording defects
  - preparing rough sketches on-site
  - taking general measurements – span length, span width, headroom, etc.
  - collating photographic evidence of defects
8. Awareness of the element condition rating system, condition reporting methods/CSS inspection pro-forma
9. Awareness of general format of GI reports and ability to produce GI reports under appropriate supervision

---

## COMPETENCE REQUIREMENTS FOR AN INSPECTOR

1. Awareness of standard inspection manuals
2. Understanding of importance/purpose of inspections
3. Knowledge of minimum health and safety requirements on-site, including PPE requirements
4. Appreciation of different bridge types, bridge components, material properties, and mechanics of materials, the response of materials and structural members to a variety of loadings, etc.
5. Undertaking the pre-inspection processes with general supervision, which includes:
  - planning an inspection,
  - preparing method statements,
  - undertaking risk assessments,
  - obtaining site visit authorisations,
  - abiding by the company specific safety procedures e.g. registering a call with Safe Operations System (SOS) before leaving the office environment is mandatory for Atkins' inspectors
  - assisting in notifying owners and third parties
6. Ability to understand previous GI and PI records and detailed as-built drawings
7. Ability to undertake General Inspections of structures with minimal supervision, which includes:
  - identifying and recording defects
  - preparing rough sketches on-site
  - taking general measurements – span length, span width, headroom, etc.
  - collating photographic evidence of defects
8. Knowledge of simple testing techniques to check the condition of the structure and ability to apply them on-site
9. Ability to assist with/undertake Principal Inspections of Structures with general supervision, which includes:
  - identifying and recording major, minor defects and their causes
  - preparing rough sketches on-site
  - taking measurements using laser meters, crack gauges, etc.
  - collating photographic evidence of defects
  - recommending maintenance works
  - liaising with CAD technicians to produce general arrangement, defect drawings of a structure
10. Knowledge of the element condition rating system, condition reporting methods/CSS inspection pro-forma and ability to evaluate and record the condition of bridge components and elements
11. Knowledge of the GI, PI reporting formats and ability to produce GI reports with minimal supervision and PI reports with general supervision

---

## COMPETENCE REQUIREMENTS FOR A SENIOR INSPECTOR

1. Knowledge of standard inspection manuals
2. Understanding of importance/purpose of inspections
3. Knowledge of health and safety requirements on-site, including PPE requirements
4. Awareness of first aid procedures to administer first aid on-site in-case of an accident
5. Knowledge of different bridge types, bridge components, material properties, and mechanics of materials, the response of materials and structural members to a variety of loadings, etc.
6. Undertaking the pre-inspection processes with no supervision, which includes:
  - planning an inspection,
  - preparing method statements,
  - undertaking risk assessments,
  - obtaining site visit authorisations,
  - abiding by the company specific safety procedures e.g. registering a call with Safe Operations System (SOS) before leaving the office environment is mandatory for Atkins' inspectors
  - notifying owners and third parties
  - assisting the lead inspector in producing cost estimates for an inspection
7. Knowledge of special access equipment e.g. mobile elevating platform and ability to identify and arrange the appropriate equipment for inspections and the associated traffic management requirements
8. Ability to understand previous inspection records and detailed, complex as-built drawings
9. Knowledge of simple testing techniques to check the condition of the structure and ability to apply them on-site
10. Ability to undertake General Inspections of structures independently, with no supervision, which includes:
  - identifying and recording defects
  - preparing rough sketches on-site
  - taking general measurements – span length, span width, headroom, etc.
  - collating photographic evidence of defects
11. Ability to undertake Principal Inspections of Structures with no supervision, which includes:
  - identifying and recording major, minor defects and their causes
  - preparing rough sketches on-site
  - taking measurements using laser meters, crack gauges, etc.
  - collating photographic evidence of defects
  - recommending maintenance works
  - liaising with CAD technicians to produce general arrangement, defect drawings of a structure
12. Knowledge of special testing techniques to check the condition of the structure and ability to apply them on-site with minimal supervision



- 
13. Ability to undertake special inspections and acceptance inspections with minimal supervision
  14. Knowledge of the element condition rating system, condition reporting methods/CSS inspection pro-forma and ability to evaluate and record the condition of bridge components and elements
  15. Knowledge of the inspection (GI, PI, SI, AI) reporting formats and ability to produce inspection reports with minimal/no supervision
  16. Ability to supervise inspections carried out by trainee inspectors or inspectors, demonstrated through a minimum of 15 – 30 inspections (see Appendix F, Table A and Table B)
  17. Ability to review inspection reports produced by trainee inspectors or inspectors, demonstrated through a minimum of 15 – 30 inspections (see Appendix F, Table A and Table B)

---

## COMPETENCE REQUIREMENTS FOR A LEAD INSPECTOR

1. Knowledge of standard inspection manuals
2. Understanding of importance/purpose of inspections
3. Knowledge of health and safety requirements on-site, including PPE requirements
4. Knowledge of first aid procedures to administer first aid on-site in-case of an accident
5. Knowledge of different bridge types, bridge components, material properties, and mechanics of materials, the response of materials and structural members to a variety of loadings, etc.
6. Undertaking the pre-inspection processes with no supervision, which includes:
  - producing cost estimates,
  - planning an inspection,
  - preparing method statements,
  - undertaking risk assessments,
  - obtaining site visit authorisations,
  - abiding by the company specific safety procedures e.g. registering a call with Safe Operations System (SOS) before leaving the office environment is mandatory for Atkins' inspectors
  - notifying owners and third parties
  - producing cost estimates for an inspection
7. Knowledge of special access equipment e.g. mobile elevating platform and ability to identify and arrange the appropriate equipment for inspections and the associated traffic management requirements
8. Ability to understand previous inspection records and detailed, complex as-built drawings
9. Knowledge of simple testing techniques to check the condition of the structure and ability to apply them on-site
10. Ability to undertake General Inspections of structures independently, with no supervision, which includes:
  - identifying and recording defects
  - preparing rough sketches on-site
  - taking general measurements – span length, span width, headroom, etc.
  - collating photographic evidence of defects
11. Ability to undertake Principal Inspections of Structures with no supervision, which includes:
  - identifying major, minor defects and their causes
  - preparing rough sketches on-site
  - taking measurements using laser meters, crack gauges, etc.
  - collating photographic evidence of defects
  - recommending maintenance works
  - liaising with CAD technicians to produce general arrangement, defect drawings of a structure

- 
12. Knowledge of special testing techniques to check the condition of the structure and ability to apply them on-site with no supervision
  13. Ability to undertake special inspections and acceptance inspections with no supervision
  14. Knowledge of the element condition rating system, condition reporting methods/CSS inspection pro-forma and ability to evaluate and record the condition of bridge components and elements
  15. Knowledge of the inspection (GI, PI, SI, AI) reporting formats and ability to produce inspection reports with no supervision
  16. Ability to supervise inspections carried out by trainee inspectors or inspectors or senior inspectors, demonstrated through a minimum of 20 – 40 inspections (see Appendix F, Table A and Table B)
  17. Ability to review inspection reports produced by trainee inspectors or inspectors or senior inspectors, demonstrated through a minimum of 20 – 40 inspections (see Appendix F, Table A and Table B)
  18. Knowledge of training standards and requirements for all levels of inspector certification
  19. Ability to identify and monitor training needs for trainee inspectors, inspectors and senior inspectors under his/her supervision

**APPENDIX [I]**  
**Draft Competence Requirements Previously Developed by  
Transport for London**

# Occupational Standards

Title	Behaviour of Highway Structures	
Level	Level 4	
Credit value	To be entered	
Learning outcomes	Assessment criteria	
The learner will:	The learner can:	
1. Be able to describe the different types of highway structure	1.1 Describe the full range of highway structures	
The learner will:	The learner can:	
2. Be able to describe different structural forms	2.1 Describe the function of the major structural elements 2.2 Describe component properties	
The learner will:	The learner can:	
3. Be able to describe elements and components of a structure	3.1 Describe the range of typical structural elements and components 3.2 Describe failure mechanisms 3.3 Describe component properties 3.4 Describe the principal causes of defects likely to be encountered in differential structural components 3.5 Describe how to treat causes and rectify defects in key elements and components	
The learner will:	The learner can:	
4. Be able to describe different materials (concrete, steel, concrete/steel composite, masonry structures, etc.)	4.1 Describe material properties 4.2 Describe component properties 4.3 Describe the principal defects that are likely to be encountered in different materials and how to identify them 4.4 Explain tests and testing techniques for different materials	
The learner will:	The learner can:	
5. Be able to describe loading and load paths	5.1 Describe loadings applied to a structure 5.2 Describe failure mechanisms	

Additional information about the unit	
Unit purpose and aim(s)	This unit details the knowledge and understanding you need to identify the behaviour of Highway Structures globally and at component and material level. You will be required to demonstrate the fundamentals of structural behaviour, the basic principles of structural mechanics and material properties.

Title	Plan and Prepare for the Inspection of Bridges (and Highway Structures?)	
Level	Level 4	
Credit value	To be entered	
Learning outcomes	Assessment criteria	
The learner will:	The learner can:	
1. Be able to access, review and understand information about the scheduled inspection	1.1 Locate and access all required information for the scheduled inspection 1.2 Locate and interpret historical structures information 1.3 Identify stakeholder and third party requirements of the scheduled inspection 1.4 Describe the need for, and content of, each item of required information 1.5 Check the currency and validity of all the information gathered 1.6 Seek guidance to obtain needed information when unsure about the quality, completeness, currency or validity of the information gathered	
The learner will:	The learner can:	
2. Be able to determine the need for further information that can only be gained from a site visit prior to inspection	2.1 Identify the need for further information to be gathered on site 2.2 Plan site visit and gather information needed 2.3 Use further information gathered to inform and develop the planning of the scheduled inspection 2.4 Identify environmental considerations of the scheduled inspection	
The learner will:	The learner can:	
3. Be able to ensure safe working conditions for the scheduled inspection	3.1 Describe the inspector's duties and obligations under the Health and Safety at Work Act 3.2 Describe the risks and hazards arising from the planned inspection and how they are mitigated 3.3 Plan safe access to all parts of the structure for the scheduled inspection 3.4 Plan safe working systems for the scheduled inspection 3.5 Determine need for, and role of, any contractors or subcontractors 3.6 Produce a method statement detailing all access and safe working requirements 3.7 Identify resources and personal protective equipment required for safe working during the scheduled inspection	

Additional information about the unit	
Details of the relationship between the unit and relevant national occupational standards or other professional standards or curricula (if appropriate)	There are no national occupational standards available for bridge inspection. Detail for this unit has been derived from a working party of bridge inspectors from leading infrastructure owners and inspection contractors as well as the industry standard Inspection Manual for Highway Structures (May 2007) available from The Stationery Office online <a href="http://www.tsoshop.co.uk">www.tsoshop.co.uk</a> ISBN 978 0 11 552797 5.
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	<p>This unit should be assessed by:</p> <ul style="list-style-type: none"> <li>• examination of products, i.e. method statement, notification of third parties, arrangements for delivery and erection of equipment, etc.</li> <li>• professional discussion of the issues surrounding planning of bridge inspection between assessor and candidate.</li> <li>• accreditation of prior achievements, e.g. training courses completed and passed, formal qualifications possessed, etc.</li> </ul> <p>Assessors should be:</p> <ul style="list-style-type: none"> <li>• vocationally competent (e.g. previous experience of doing the job or responsibility for managing the job or the quality of processes involved or training people to carry out bridge inspection.</li> <li>• holders of Learning and Development Unit A1 – “Assess candidates using a range of methods.”</li> </ul>
Support for the unit from a SSC or other appropriate body (if required)	To be entered
Location of the unit within the subject / sector classification system	To be entered
Name of the organisation submitting the unit	To be entered
Availability for use	To be entered
Unit available from	To be entered
Unit guided learning hours	To be entered

Title	Ensure the Inspection of Bridges (and Highway Structures?)
Level	Level 4
Credit value	To be entered
Learning outcomes	Assessment criteria
<p>The learner will:</p> <p>1. Be able to access, review and understand information about assets in scope of inspection</p>	<p>The learner can:</p> <p>1.1 Locate and access all required information for the assets in scope  1.2 Locate and interpret historical structures information  1.3 Identify stakeholder and third party requirements of the assets in scope  1.4 Describe the need for, and content of, each item of required information  1.5 Check the currency and validity of all the information gathered  1.6 Seek guidance to obtain needed information when unsure about the quality, completeness, currency or validity of the information gathered</p>
<p>The learner will:</p> <p>2. Be able to determine the need for further information that can only be gained from a site visits</p>	<p>The learner can:</p> <p>2.1 Identify the need for further information to be gathered on site  2.2 Plan site visit and gather information needed  2.3 Use further information gathered to inform and develop other information held on assets in scope</p>
<p>The learner will:</p> <p>3. Be able to schedule inspections to ensure statutory and contractual requirements</p>	<p>The learner can:</p> <p>3.1</p>
<p>The learner will:</p> <p>4. Be able to monitor progress of inspections against schedules</p>	<p>The learner can:</p> <p>4.1</p>



Additional information about the unit	
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	<p>This unit should be assessed by:</p> <ul style="list-style-type: none"> <li>• examination of products, i.e. method statement, notification of third parties, arrangements for delivery and erection of equipment, etc.</li> <li>• professional discussion of the issues surrounding planning of bridge inspection between assessor and candidate.</li> <li>• accreditation of prior achievements, e.g. training courses completed and passed, formal qualifications possessed, etc.</li> </ul> <p>Assessors should be:</p> <ul style="list-style-type: none"> <li>• vocationally competent (e.g. previous experience of doing the job or responsibility for managing the job or the quality of processes involved or training people to carry out bridge inspection.</li> <li>• holders of Learning and Development Unit A1 – “Assess candidates using a range of methods.”</li> </ul>
Support for the unit from a SSC or other appropriate body (if required)	To be entered
Location of the unit within the subject / sector classification system	To be entered
Name of the organisation submitting the unit	To be entered
Availability for use	To be entered
Unit available from	To be entered
Unit guided learning hours	To be entered

Title	Carry out Inspection of Bridges (and Highway Structures?)	
Level	Level 4	
Credit value	To be entered	
Learning outcomes	Assessment criteria	
The learner will:	The learner can:	
1. Be able to determine the scope and requirements of the scheduled inspection	1.1 Correctly locate the structure to be inspected 1.2 Interpret drawings and reports to confirm historical records are correct and accurate 1.3 Describe contractual and legal requirements of the planned inspection 1.4 Seek guidance to obtain needed information when unsure about the quality, completeness, currency or validity of the information gathered	
The learner will:	The learner can:	
2. Be able to ensure safe working conditions for the scheduled inspection	2.1 Describe the inspector's duties and obligations under the Health and Safety at Work Act 2.2 Describe traffic management and access requirements 2.3 Ensure that the correct equipment is present and that the necessary safety and calibration certificates are current 2.4 Ensure systems for traffic management and access are in place 2.5 Ensure safe working systems are in place and personal protective equipment is worn 2.6 Ensure safety of any contractors or subcontractors	
The learner will:	The learner can:	
3. Be able to recognise the condition of elements and components of highway structures	3.1 Describe the principal causes of defects likely to be encountered during the inspection, how to treat the cause and rectify the defects 3.2 Describe how to identify the principal defects likely to be encountered in the structural materials subject to inspection 3.3 Explain how to rate element and component condition 3.4 Explain how to recognise loss of functionality of an element or component	

Additional information about the unit	
Details of the relationship between the unit and relevant national occupational standards or other professional standards or curricula (if appropriate)	There are no national occupational standards available for bridge inspection. Detail for this unit has been derived from a working party of bridge inspectors from leading infrastructure owners and inspection contractors as well as the industry standard Inspection Manual for Highway Structures (May 2007) available from The Stationery Office online <a href="http://www.tsoshop.co.uk">www.tsoshop.co.uk</a> ISBN 978 0 11 552797 5.
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	<p>This unit should be assessed by:</p> <ul style="list-style-type: none"> <li>• observation of performance in the workplace during a scheduled inspection</li> <li>• examination of products, i.e. arrangements for traffic management, site safety, inspection report, supporting photographs, etc.</li> <li>• professional discussion of the issues surrounding planning of bridge inspection between assessor and candidate.</li> <li>• accreditation of prior achievements, e.g. training courses completed and passed, formal qualifications possessed, etc.</li> </ul> <p>Assessors should be:</p> <ul style="list-style-type: none"> <li>• vocationally competent (e.g. previous experience of doing the job or responsibility for managing the job or the quality of processes involved or training people to carry out bridge inspection.</li> <li>• holders of Learning and Development Unit A1 – “Assess candidates using a range of methods.”</li> </ul>
Support for the unit from a SSC or other appropriate body (if required)	To be entered
Location of the unit within the subject / sector classification system	To be entered
Name of the organisation submitting the unit	To be entered
Availability for use	To be entered
Unit available from	To be entered
Unit guided learning hours	To be entered

Title	Investigate and Test Bridges (and Highway Structures?)	
Level	Level 4	
Credit value	To be entered	
Learning outcomes	Assessment criteria	
The learner will:	The learner can:	
1. Be able to specify required investigation and testing	1.1 Explain the need and purpose of the planned investigation / testing 1.2 Identify the extent of investigation / testing required 1.3 Identify and appraise investigation / testing options 1.4 Set objectives for investigation / testing 1.5 Determine investigation / testing specifications and methods of measurement	
The learner will:	The learner can:	
2. Be able to review and plan required investigation and testing	2.1 Describe reviewing and planning requirements 2.2 Identify the resources required for the investigation / test 2.3 Produce a method statement detailing all working requirements 2.4 Ensure the plan complies with the contractual and legal requirements of the scheduled inspection 2.5 Establish criteria for selection of testing contractor	
The learner will:	The learner can:	
3. Be able to ensure safe working conditions for the scheduled investigation / testing	3.1 Describe the inspector's duties and obligations under the Health and Safety at Work Act 3.2 Describe hazards and risks associated with the planned tests 3.3 Ensure safe working systems, equipment and personal protective equipment are specified for the planned tests 3.4 Ensure safety of any contractors or subcontractors	

Additional information about the unit	
Details of the relationship between the unit and relevant national occupational standards or other professional standards or curricula (if appropriate)	There are no national occupational standards available for bridge inspection. Detail for this unit has been derived from a working party of bridge inspectors from leading infrastructure owners and inspection contractors as well as the industry standard Inspection Manual for Highway Structures (May 2007) available from The Stationery Office online <a href="http://www.tsoshop.co.uk">www.tsoshop.co.uk</a> ISBN 978 0 11 552797 5.
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	<p>This unit should be assessed by:</p> <ul style="list-style-type: none"> <li>• examination of products, i.e. arrangements and results for specific investigations and tests</li> <li>• professional discussion of the issues surrounding investigations and tests between assessor and candidate.</li> <li>• accreditation of prior achievements, e.g. training courses completed and passed, formal qualifications possessed, etc.</li> </ul> <p>Assessors should be:</p> <ul style="list-style-type: none"> <li>• vocationally competent (e.g. previous experience of doing the job or responsibility for managing the job or the quality of processes involved or training people to carry out bridge inspection.</li> <li>• holders of Learning and Development Unit A1 – “Assess candidates using a range of methods.”</li> </ul>
Support for the unit from a SSC or other appropriate body (if required)	To be entered
Location of the unit within the subject / sector classification system	To be entered
Name of the organisation submitting the unit	To be entered
Availability for use	To be entered
Unit available from	To be entered
Unit guided learning hours	To be entered

**APPENDIX [J]**  
**Project Specification: Phase 2**

---

## **Project Specification: Bridge Inspector Training and Certification Scheme**

### **BACKGROUND**

Bridges and other structures provide vital links and routes of passage on a wide range of infrastructure networks, e.g. road, rail and water. As such, they must be managed in a manner that minimises risk to public safety and disruption to service. Where organisations have failed in this duty, the result has been network disruption and, in some instances, injuries and fatalities to the travelling public.

The fundamental frontline activity at the disposal of bridge owners to ensure their assets are Safe for Use and Fit for Purpose is inspection. Inspections assist organisations to check that highway structures are Safe for Use and Fit for Purpose and provide the data required to support effective maintenance management and planning. It is therefore critical that inspections provide organisations with information they can have full confidence in.

Recent events in Montreal and Minneapolis, where highly publicised bridge collapses have caused fatalities, highlight the need for robust and effective regimes of inspection. Equally important is the need for consistent standards of inspection by suitably trained bridge inspectors, and the need to develop a national formal training and certification scheme for bridge inspectors.

A comparison of UK and international bridge inspection practices has been previously undertaken to confirm whether or not the UK has appropriate regimes in place. Through this comparison, it was evident that there are no major disagreements between the UK and international bridge inspection practices. By in large, bridge inspection practices in the UK have been highly successful and helped ensure safe and serviceable networks, this being in no small measure due to the skill and experience of inspection staff. However, the changing face of infrastructure management, in particular outsourcing work on medium to long-term contracts and ever increasing pressures on finances, is placing greater onus on inspection activities. In particular, how can bridge owners have confidence in the competence of internal and external inspection staff and the information they provide.

At present, there is no nationally recognised formal training programme for bridge inspectors in the UK. The need for formal training has been widely discussed at various forums, including the CSS Bridges Group, UK Bridges Board and Bridge Owners Forum. All these forums have recognised the need for formalised inspector training, not only to address issues such as those mentioned above, but also to help raise the profile of inspection duties at a time when many organisations are seeing dwindling numbers of inspection staff.

There is strong support from UK bridge owners for the development and implementation of a nationally consistent inspector training scheme. The consensus view of the industry is that the perceived benefits of formal inspector training significantly outweigh any concerns regarding its introduction.

### **PROJECT OBJECTIVES**

The objective of this project is to develop a formal inspector certification process the purpose of which will be to document the minimum requirements for experience and knowledge that an inspector should possess to ensure uniform and accurate bridge inspections are undertaken. It is envisaged that the formal inspector certification process will provide a standard appraisal framework and specification through which inspectors will be able to apply for certification and obtain/progress to different levels of competence.

The research contractor will be required to produce a final standard inspector appraisal framework manual which will document the requirements for the different levels of inspector competence, a detailed course syllabus, a list of appropriate training material and standards for vocational training along with relevant record templates and guidance notes. The manual will also document the process to be followed for future updates of the standard inspector appraisal framework and this should include the roles and responsibilities of the appropriate bodies for the management of the framework material.

---

## DESCRIPTION AND SCOPE OF THE WORK REQUIRED

The contractor shall develop, and agree with the UK Bridges Board technical sub-group, inspector competence levels e.g. Level 1 – Trainee Inspector, Level 2 – Inspector, Level 3 – Senior Inspector, Level 4 – Lead Inspector and, if deemed appropriate, variations for each or some of the competence Levels types to meet specific requirements and network characteristic of organisations that operate different transportation environments e.g. rail, highways, etc.

The contractor shall define the requirements for the different levels of inspector competence mentioned above. The work should set out detailed competence requirements for each inspection level and relevant associated duties; these should include, as a minimum, detailed competence statements/requirements and prerequisites for attaining a specific level of competence on the following:

- ◆ Education, e.g. training modules/courses completed, diploma, degree, etc.
- ◆ Knowledge, i.e. what the inspector must have knowledge and understanding of.
- ◆ Experience and skills, e.g. work locations, conditions of working, tools and equipment;
- ◆ Evidence, e.g. the type and quantity of evidence that must be provided.

The contractor should host a series of workshops and consultations with bridge owners, awarding bodies and training providers to determine the syllabus of the training course, which should include but not limited to:

- ◆ Identification and outline of content/duration of core training modules, i.e. modules that must be completed in order to attain initial levels of competence, e.g. Level 1 – Trainee Inspector and Level 2 - Inspector;
- ◆ Identification and outline of content/duration of additional improvement training modules, i.e. modules that may be completed to progress to higher levels of competence;
- ◆ Development of standard list of reference documents and material that the training syllabus/course should be based on or account for.
- ◆ Development of requirements for site training, which should include the number and type of structures that will need to be inspected prior to attaining specific levels of competence. This should also include requirements of vocational training, i.e. a Buddy System whereby the new/inexperienced inspector is teamed up with an experienced inspector to learn on the job. The required length of the Buddy period should be clearly defined for the different levels of competence. Generally, the Buddy approach should involve a gradual change from the 'trainee' watching to actually undertaking the inspection and cover as wide a range of structure types and forms as possible during the Buddy period.

The contractor shall identify and hold discussions with appropriate awarding bodies, training providers and/or certification organisations in order to select the most appropriate organisation(s) that can design a course, which aligns with the defined syllabus, process applications, assess the competence and award inspector certification. It is suggested that formal discussions are held with Construction Skills, the Sector Skills Council for construction and civil engineering and the Institution of Highways and Transportation.

The contractor shall liaise with the selected awarding body, training provider and/or certification organisation to develop, agree and fully document an appropriate method that will be used as the mode of assessment. This may include but should not be limited to:

- ◆ A standard test that the awarding body, training provider and/or certification organisation can use to assess inspector competence prior to awarding certification;
- ◆ A standard 'training activities book' such as a log book that inspectors or their supervisors can maintain for recording and signing-off their professional activities. The



---

logbook would then form part of assessment evidence submitted to the awarding body, training provider and/or certification organisation for assessment when moving from one inspection competence level to the next.

The contractor shall develop and fully document the process to be followed for future updates of the standard inspector appraisal framework and this should include the roles and responsibilities of the appropriate bodies with regards to the ongoing management of the syllabus (both classroom and site based), updates to the layout of the 'training activities books', etc.

The contractor shall aid in the identification of an appropriate reassessment period and develop and agree the requirements of re-assessment, e.g. a standard test to be (re)taken by the inspectors at five years intervals from any previous certification.

The contractor shall develop and fully document the requirements for continuous professional development.

The research contractor shall produce progress information and a final standard inspector appraisal framework manual, which will document the outcomes from the above activities including a detailed course syllabus, a list of appropriate training material and standards for vocational training along with relevant record templates and guidance notes, etc.

#### **TIMESCALE, OUTPUTS AND MEETINGS**

The project is expected to take around between 12 and 18 months.

The project manager contractor shall meet the designated Project Officer and the Project Steering Group at the commissioning of the Project, and prior to submission of the final documentation. Additional project steering meetings will be agreed at the inception meeting but it is envisaged that approximately 8 meetings will be required.

The research contractor will be required to produce a final standard inspector appraisal framework manual.

The research contractor will be required to liaise with the appropriate awarding body, training provider and/or certification organisation in order to set up the agreed inspector certification scheme.