

Manual

Structures Inspection Manual

**Part 3 - Appendix E: Inspector Accreditation Appraisal
Procedures**

September 2016

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1 Objectives

1. To establish the minimum standard of knowledge the department considers an Inspector should possess to ensure uniform and accurate assessment of the condition of bridges and other road structures.
2. To prepare a standard appraisal system for inspectors applying for:
 - a. Level 1 - Routine Maintenance Inspection Accreditation, and
 - b. Level 2 - Bridge Condition Inspection Accreditation.

1.1 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. Appendix E Form A3 - Bridge Inspector Accreditation – Level 1 has been devised in order to ensure a uniform approach.

The applicant is required to demonstrate:

1. *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. A minimum of two years' experience with a bridge construction/maintenance/rehabilitation crew will be required.
2. *Satisfactory completion of the Level 1 Training Course for Bridge Inspection.*

Upon satisfactory completion of the Level 1 Training Course, Appendix E Form A3 is completed by the applicant and sent to Bridge Construction, Maintenance and Asset Management section for approval. The applicant is then added to the Bridge Information System (BIS) as a qualified Level 1 Inspector.

1.2 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. Appendix E Forms A1 - *Bridge Inspector Accreditation* and A2 - *Bridge Inspection Accreditation/Report Assessment* have been devised in order to ensure a uniform approach.

Training of Level 2 structures inspectors is undertaken by RoadTek, in accordance with their internally documented training processes.

The applicant is required to demonstrate:

1. *Relevant pre-requisite qualifications or experience.* A minimum of five year's experience in construction, maintenance, rehabilitation or inspection of road structures will be required. Relevant tertiary or trade qualifications shall also be considered.
2. *Satisfactory completion of both the Level 2 Training Course for Bridge Inspectors and the necessary components of the RoadTek Inspector training process.*
3. *Technical knowledge and competency with respect to bridge and other road structures and construction materials relevant to the category of accreditation sought.* 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.

The various available categories of accreditation available, along with any necessary pre-requisites is tabulated below:

Accreditation Category	Number of inspections required	Structure Types required for accreditation submission
Concrete Structures	3	One PSC Deck Unit Bridge One PSC or RC Girder Bridge One concrete culvert
Steel Structures *	2	One Steel Girder Bridge One steel culvert
Timber Structures	3	Three Timber Bridges
Large Traffic Management Structures (LTMS)	2	One Cantilever-type LTMS One Gantry-type LTS
Tunnels **	1	One Tunnel structure
Prerequisites * requires accreditation in Concrete Structures or Timber Structures first ** requires accreditation in Concrete Structures first.		

4. Conversance with the inspection methodology defined in the department's *Structures Inspection Manual*. This will be appraised by the evaluation of a specified number of structure inspections carried out and submitted by the applicant. The inspections must be completed and reports submitted for appraisal within six months of commencement of the final stage of the RoadTek Level 2 Structures Inspector Trainee Development Process. Standard forms Appendix E A1 and A2 shall be used by an assessor from Structures Management Services (RoadTek) to conduct the appraisal and record the findings.

Upon successful completion of the necessary number of inspections, a submission is made to Bridge Construction, Maintenance and Asset Management section recommending that the applicant be accredited as a Level 2 Inspector against the requested category. The applicant is then added to the BIS as a qualified Level 2 Inspector.

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.

Table E1 - Minimum requirements

Measure	Minimum Requirements						
1. Inventory	<p>General The inspection inventories must be compiled in accordance with bridge inspection methodology defined in the <i>Structures Inspection Manual</i> as itemised below. References quoted hereafter relate to Part 3 - Procedures of the <i>Structures Inspection Manual</i>.</p> <p>Bridge Component Designation 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>Exposure Classification The appropriate exposure classification must be correctly interpreted from the table in Section 3.8.7.</p> <p>Data Recording The inventory must be compiled on Appendix A Forms A2/1 & A2/2: Bridge Condition Inspection Report.</p> <p>Rating Guidelines</p> <table border="0"> <tr> <td>Satisfactory:</td> <td>> 90% of items correctly identified.</td> </tr> <tr> <td>Improvement Required:</td> <td>80 - 90% of items correctly identified.</td> </tr> <tr> <td>Unsatisfactory:</td> <td>< 80% of items correctly identified.</td> </tr> </table>	Satisfactory:	> 90% of items correctly identified.	Improvement Required:	80 - 90% of items correctly identified.	Unsatisfactory:	< 80% of items correctly identified.
Satisfactory:	> 90% of items correctly identified.						
Improvement Required:	80 - 90% of items correctly identified.						
Unsatisfactory:	< 80% of items correctly identified.						
2. Structure Rating	<p>The condition of the overall structure and any associated widenings must be correctly assessed in accordance with the guidelines given in Sections 3.8.3 and 3.8.6.</p> <p>Rating Guidelines</p> <table border="0"> <tr> <td>Satisfactory:</td> <td>Correct structure rating.</td> </tr> <tr> <td>Improvement Required:</td> <td>Not applicable.</td> </tr> <tr> <td>Unsatisfactory:</td> <td>Incorrect structure rating. In particular failure to correctly identify major deficiencies which significantly affect safety, load capacity or serviceability.</td> </tr> </table>	Satisfactory:	Correct structure rating.	Improvement Required:	Not applicable.	Unsatisfactory:	Incorrect structure rating. In particular failure to correctly identify major deficiencies which significantly affect safety, load capacity or serviceability.
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Improvement Required:	Not applicable.						
Unsatisfactory:	Incorrect structure rating. In particular failure to correctly identify major deficiencies which significantly affect safety, load capacity or serviceability.						
3. Condition Rating	<p>General 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>Commentary 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>						

Measure	Minimum Requirements						
	<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 Appendix A Form A2/6: Photographic and Sketches Record.</p> <p>Timber Drilling</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 Appendix A Form A2/5: Timber Drilling Survey Report and tests on individual members referenced in the comments field Appendix A Form A2/1 & A2/2: Bridge Condition Inspection Report. Inspectors must be able to interpret the correct condition state of a member from the drilling records.</p> <p>Scour Sounding</p> <p>Scour soundings will normally be carried out as part of a Level 2 Inspection of all bridges over waterways in order that the current bed profile may be measured and compared against previous soundings. Details of the soundings should be recorded on Appendix A Form A2/7: Bridge Scour Soundings Report and overall waterway findings for each span referenced in the comments field Appendix A Form A2/1 & A2/2: Bridge Condition Inspection Report. Inspectors must be able to identify potential scour/aggradation issues from the sounding records.</p> <p>Non-Destructive Testing</p> <p>Appropriate records of any non-destructive testing carried out as part of the inspection (for example, the ultrasonic measurement of residual steel thickness) shall be included in the report and shall be reflected in the rating of the components investigated.</p> <p>Rating Guidelines</p> <table border="0"> <tr> <td>Satisfactory:</td> <td>> 80% of components in state 1 or 2 correctly rated. > 90% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.</td> </tr> <tr> <td>Improvement Required:</td> <td>> 70% of components in state 1 or 2 correctly rated. > 80% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.</td> </tr> <tr> <td>Unsatisfactory:</td> <td>< 70% of components in state 1 or 2 correctly rated. < 80% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.</td> </tr> </table>	Satisfactory:	> 80% of components in state 1 or 2 correctly rated. > 90% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.	Improvement Required:	> 70% of components in state 1 or 2 correctly rated. > 80% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.	Unsatisfactory:	< 70% of components in state 1 or 2 correctly rated. < 80% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.
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Unsatisfactory:	< 70% of components in state 1 or 2 correctly rated. < 80% of components in state 3 correctly rated. 100% of components in state 4 correctly rated.						
<p>4. Defective Components</p>	<p>General</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 Appendix A Form A2/3: Defective Components Report. The inspector is required to assess the criticality of the defects and recommend the appropriate actions.</p> <p>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.</p> <p>The inspector must be able to demonstrate the ability to consistently identify defective components and the appropriate remedial actions. In addition, the Inspector must have the ability to accurately communicate the extent, severity and criticality of member defects through photograph, sketch and written records.</p>						

Measure	Minimum Requirements
	<p>Rating Guidelines</p> <p>Satisfactory:</p> <ul style="list-style-type: none"> i. Clear and accurate recording of defects. ii. Appropriate actions recommended. iii. Criticality of defects accurately and clearly communicated. <p>Improvement Required: Minor departures from (i) - (iii)</p> <p>Unsatisfactory:</p> <ul style="list-style-type: none"> i. Inability to record extent, severity or criticality of defects. ii. Failure to define the appropriate actions.
<p>5. Procedure Exceptions</p>	<p>General</p> <p>It is expected that inspectors will carry out inspections fully in accordance with the methodology defined in the <i>Structures Inspection Manual</i>. 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 Appendix A Form A2/4: Standard Procedure Exceptions Report if there is any departure from the standard methodology.</p> <p>Undefined Component</p> <p>The appropriate box should be ticked and a detailed description of the component together with sketches and/or photograph references must be entered in the comments fields.</p> <p>Partial Inspections</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>Rating Guidelines</p> <p>Satisfactory:</p> <ul style="list-style-type: none"> i. All exceptions must be recorded on Appendix A Form A2/4. ii. Reasons for partial inspections must be defined. iii. Undefined components must be accurately described and supplemented with photographs and/or sketches as appropriate. <p>Improvement Required: Minor departures from the satisfactory rating with respect to comments. All exceptions must be recorded.</p> <p>Unsatisfactory: Failure to record exceptions or incorrect exceptions recorded. Inadequate or incorrect description of exceptions.</p>
<p>6. Photographic and Sketch Record</p>	<p>An appropriate photographic and sketch record must be compiled for each inspection covering:</p> <ul style="list-style-type: none"> i. Mandatory inventory photographs (deck surface, side view and underside). ii. Deficient components and major defects. iii. Undefined Components.

Measure	Minimum Requirements
	<p>All photographs and sketches must be given a reference and details of the subject matter recorded on Appendix A Form A2/6. These references should also be recorded against the relevant component and included in the following forms as appropriate:</p> <p style="margin-left: 40px;">A2/1 & A2/2: Bridge Condition Inspection Report A2/5: Timber Drilling Survey Report A2/3: Defective Components Report A2/4: Standard Procedure Exceptions Report A2/7: Bridge Scour Soundings Report.</p> <p>Photographs or documents detailing the results obtained from any non-destructive testing of specific components should also be included in this report.</p> <p>Rating Guidelines</p> <p>Satisfactory: Appropriate photographic and sketch record has been compiled and cross-referenced on the appropriate forms.</p> <p>Improvement Required: Minor departure from satisfactory rating.</p> <p>Unsatisfactory: Failure to compile mandatory photographic record or to document records correctly.</p>
<p>7. Technical Competency</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 the construction, maintenance, rehabilitation or inspection of road structures to be considered for Level 2 accreditation and must have an extensive knowledge of bridge and road 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> <p>Satisfactory: The inspector must demonstrate the ability to consistently:</p> <ul style="list-style-type: none"> • identify defect mechanisms • quantify and record defects accurately • determine the criticality of defects • recommend the appropriate corrective action. <p>Improvement Required: Marginal departure from the satisfactory standard.</p> <p>Unsatisfactory: Significant departure from the satisfactory standard or any incorrect finding or interpretation that places road users at risk.</p>

Measure	Minimum Requirements
8. Field Assessment	Field audit of items 1 - 7 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 if necessary.
9. Overall Assessment	<p>Satisfactory: A satisfactory rating must be achieved for at least five of the seven categories and must include items (4) "Defective Components" and (7) "Technical Competency". The remaining two categories must be rated as Improvement Required.</p> <p>Unsatisfactory An "unsatisfactory" rating on any category or an "improvements required" rating for (4) "Defective Components" or (7) "Technical Competency."</p>
	<p>Award or Denial of Accreditation</p> <p>The result of the assessment should be documented on Appendix A Form A1: "Bridge Inspector Accreditation Appraisal" and forwarded to the applicant and their direct supervisor.</p> <ul style="list-style-type: none"> • If the submission has been found to be satisfactory the inspection shall be noted as 'Suitable for Accreditation' on the Appendix A A1 form. Once the necessary number of satisfactory inspections have been received and reviewed, a submission will be made to Bridge Construction, Maintenance and Asset Management section recommending the accreditation of the applicant. The individual's details shall be added to the relevant inspector's register and updated accordingly on the BIS. • In the event of an unsatisfactory rating detailed feedback with respect to deficiencies detected in the submission and constructive advice as to how these deficiencies might be addressed shall be provided to the applicant.

