

INDOT BRIDGE INSPECTION MANUAL

PART 4

QA / QC

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4-1.0 INTRODUCTION

4-1.01 Purpose

Federal Regulation 23 CFR 650.313(g) requires that each state use systematic quality control and quality assurance procedures to maintain a high degree of accuracy and consistency in the State Bridge Inspection Program (SBIP). To meet this requirement, bridge owners shall implement the quality control and quality assurance measures described herein.

Quality control and quality assurance procedures shall include periodic field review of inspection teams, periodic bridge inspection refresher training, and independent review of inspection reports and computations.

4-1.02 Scope

This manual outlines the following items in the state quality control and quality assurance program:

- Bridge inspection training
- Quality control roles and review procedures
- Quality assurance roles and review procedures
- Maintenance of the bridge file
- Identification and resolution of data errors, omissions, and/or changes
- Disqualification and requalification processes

4-1.03 Definitions

- **Bridge Inspection Training:** Training that covers all aspects of bridge inspection and enables inspectors to relate conditions observed on a bridge to established criteria.
- **Critical Finding:** A structural or safety related deficiency that requires immediate follow-up inspection or action.
- **Inspecting Agency:** The organizational unit responsible for conducting or overseeing bridge inspection. The inspecting agency for a state-owned bridge is the appropriate District. The inspecting agency for a county, toll road, or other locally owned bridge is the Inspection Consultant.
- **Load Rating:** The determination of the live load-carrying capacity of a bridge using bridge plans and supplemented by information gathered from a field inspection.

- **Quality Assurance (QA):** The use of sampling and other measures to assure the adequacy of quality control procedures to verify or measure the quality of the inspection and load rating programs. Typically conducted from outside of the inspecting agency for the purpose of evaluating the quality of the program overall.
- **Quality Control (QC):** Procedures intended to maintain the quality of a bridge inspection and load rating at or above a specified level. Typically conducted from within an inspecting agency for the purpose of providing consistency within the inspecting agency, or from an external source when reviewing data for a specific district, county, toll road, or local agency.

4-2.0 QUALITY CONTROL

4-2.01 Inspection and Load Rating Teams

The qualifications and responsibilities for the individuals performing inspections and load ratings are discussed in Part 1-1.04(14).

4-2.02 Inspection Process

For information related to Local Public Agency (LPA) – Consultant Bridge Inspection Contracts please refer to the Local Public Agency Project Development Process Guidance Document which can be found on the INDOT website.

4-2.03 Quality Control Reviewer (QCR)

A designated quality control reviewer must have team leader credentials. For firms without an active second Inspection Team Leader, another consulting firm with a qualified Inspection Team Leader will need to act as the quality control reviewer.

The QCR:

- Shall not be a member of the original inspection team to ensure an independent review.
- Shall have knowledge of required procedures and practices, as well as federal or state requirements.

4-2.04 Quality Control Office Review

4-2.04(01) Purpose and Scope

The primary goal of the Quality Control Office Review is to ensure the accuracy and consistency within an Inspecting Agency, and completeness of the inspection data and all required reports. This should include reviewing the data and reports to make certain that they meet both federal and state requirements. Prior to the Quality Control Office Review, the Inspection Team Leader should run

all data checks and make all required corrections.

4-2.04(02) Quality Control Criteria

This review by the QCR shall include the following:

- The quality control review will follow the NBIP File Review Checklist form that can be found in the APPENDICES of the INDOT Bridge Inspection Manual (BIM).
- The metrics to be assessed in the review are metric 12, 13, 14, 15, 16, 17, 18, 22, and 23.
- Guidance for evaluation criteria and metric commentary may be found in the Federal Highway document *Metrics for the Oversight of the National Bridge Inspection Program*.
- The Federal Highway document may be found at:
<http://www.fhwa.dot.gov/bridge/nbip/metrics.pdf>.

4-2.04(03) Sampling

INDOT shall carry out Quality Control Office Reviews on 100% of all Routine, Special, In-Depth, and Post-Rehabilitation Inspections done each year on all State-Owned and State-Maintained Bridges. This review shall consist of the Team Leader in charge of the inspection submitting the completed inspection report to another INDOT Team Leader who was not involved with the inspection. The QC Team Leader shall review the report and attachments for completeness, accuracy, and adhering to the requirements in the INDOT BIM. The QC Team Leader shall further document the review findings using the Quality Control Review section in the BIAS Field Notes-National Bridge Inventory data areas. The QA/QC NBIP File Review Checklist Form provided in the Appendix of the INDOT Bridge Inspection Manual (BIM) and referenced in 4-2.04(02) in the INDOT BIM is not required for INDOT QC Reviews for State-Owned and State-Maintained Bridges.

The Quality Control Office Review shall be carried out on LPA-owned and LPA-maintained bridges selected from a group that meet any of the following criteria if available:

- A rating of 4 or less for Items 58, 59, 60, or 62
- A rating that changed by two or more for Items 58, 59, 60, or 62
- A rating of 3 or less for Item 113
- Posted

For the purposes of quality control, each QC Team Leader will ensure that no less than two LPA bridge files are reviewed for each LPA/County bridge asset inventory for which the Quality Control Team Leader's firm is under contract per major phase; specifically Phase 1 and Phase 2. The LPA bridges selected for the quality control office reviews shall be done using the QA/QC NBIP File Review Checklist Form provided in the Appendix of the INDOT BIM for the reporting period. The completed QA/QC NBIP File Review Checklist Forms shall be uploaded to the county's Asset Details in BIAS (where the County Summary Reports are placed) in the QA/QC Section of the Files Tab.

4-2.05 Quality Control Field Review

4-2.05(01) Purpose and Scope

The primary goal of the Quality Control Field Review is to ensure consistency within an Inspecting Agency of the field inspection and data collection. The review will evaluate the consistency and accuracy of component ratings, inventory items, and adequacy of photographic documentation, notes, and recommended maintenance actions.

A Quality Control Field Review involves a field inspection of a bridge, including verification of data incorporated in the inspection report. The field inspection should take place within twelve months of the original inspection to ensure that conditions have not changed significantly.

4-2.05(02) Quality Control Criteria

This review should include the following:

1. Perform an independent field review.
2. The quality control review will follow the NBIP File Review Checklist **form** that can be found in **the APPENDICES of the INDOT BIM**.
3. The metrics to be assessed in the review are metric 12, 13, 14, 15, 16, 17, 18, 22, and 23.
4. Guidance for evaluation criteria and metric commentary may be found in the Federal Highway document Metrics for the Oversight of the National Bridge Inspection Program.
5. The Federal Highway document may be found at: <http://www.fhwa.dot.gov/bridge/nbip/metrics.pdf>.

For the purposes of quality control, each team leader will ensure that one bridge file is field reviewed per year. On or before November 1st of each year a report will be available upon request. The quality control file will include the quality control review forms filled out for the reporting period. The reports will remain in the file for three years.

4-2.05(03) Sampling

The Quality Control Field Review shall be **carried out** on bridges selected from a group that meet any of the following criteria if available:

- A rating of 4 or less for Items 58, 59, 60, or 62
- A rating that changed by two or more for Items 58, 59, 60, or 62
- A rating of 3 or less for Item 113
- Posted
- A Critical Finding has been reported.

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For the purposes of quality control each team leader will ensure that, at minimum, one bridge is field reviewed as specified herein:

- INDOT shall carry out Quality Control Field Reviews for each INDOT Team Leader for any selected Routine, Special, In-Depth, and Post-Rehabilitation Inspections done each calendar year on State-Owned and State-Maintained Bridges. This Field Review shall be done by an INDOT Team Leader who was not involved with the inspection and the results shall be documented on the QA/QC NBIP File Review Checklist Form provided in the Appendix of the INDOT BIM. The completed forms shall be submitted to the Bridge Inspection State Program Manager.
- A certified team leader shall carry out Quality Control Field review(s) for selected Routine Inspection(s) done during each LPA/Countywide bridge inspection contract for which the team leader's firm is under contract per major phase; specifically Phase 1 and Phase 2. The LPA bridge(s) selected for the quality control field review(s) shall be done using the QA/QC NBIP File Review Checklist form provided in the Appendix of the INDOT BIM for the reporting period. The completed QA/QC NBIP File Review Checklist form(s) shall be uploaded to the county's Asset Details in BIAS (where the County Summary reports are placed) in the QA/QC Section of the Files Tab.

4-2.06 Corrective Actions

The team leader is responsible for any corrective action that is needed for an existing bridge file under review. The office and field reviews are intended to be an instructive process where errors and omissions can be found and eliminated. The only repercussion to the quality control reviews would be the lack of quality of the review or if corrections were recommended but not completed or explained by the team leader. The INDOT Data Manager (Asst Bridge Inspection Mgr) will review the files in question.

4-2.07 State Owned and Maintained Fracture Critical Bridges

INDOT shall perform a Quality Control Review on 100% of all Fracture Critical Inspections conducted each year, on all State Owned and Maintained Fracture Critical Bridges. This shall consist of the Team Leader in charge of the inspection submitting the completed inspection report to another Team Leader at INDOT who was not involved with the inspection. This Team Leader is to review the report and attachments for completeness, accuracy, and adhering to the requirements in the INDOT Bridge Inspection Manual, primarily those outlined in Part 5 of the Manual, (Fatigue and Fracture Critical Inspections).

4-3.0 QUALITY ASSURANCE

4-3.01 Quality Assurance

The INDOT Bridge Inspection Unit has revised the procedures for quality assurance, incorporating two quality assurance methods.

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The first method will incorporate a procedure for inspecting a control bridge or bridges. The control bridge will be evaluated by a designated team of highly qualified bridge inspectors which will establish the target values for the control bridge. The team leaders will then be assigned a time to inspect the control bridge or bridges.

The second quality procedure will be independent oversight. In this method, a third party is enlisted to re-inspect a bridge previously inspected by a team leader. The independent reviewer will then compare the inspections.

These two procedures will be further developed in the next two section of the manual.

4-3.02 Control Bridge or Training Workshop

At the discretion of the Bridge Inspection Program Manager (Asst Bridge Inspection Mgr), a test bridge or training workshop will be held annually. The control bridge will be evaluated by a designated team of inspectors. The team members will be highly qualified and will independently determine the rating values for the bridge. The team members will also identify any deficiencies and critical findings. Any required notes or explanation of findings will be noted in the inspection. The inspection team will then meet and determine the values and findings to assign to the structure.

All team leaders will inspect the control bridge. The directions and expectations will be clearly defined well in advance of the date selected for the control bridge inspection. The exact testing procedures and review of results may vary for testing sessions, but all expectations will be outlined in the testing instructions.

All team members are required to inspect the control bridge. Failure to inspect the control bridge will be cause for review of the team member's credentials. This review may include a review of bridge files submitted into BIAS and/or the basis for an independent oversight review. A team member missing two consecutive control bridge inspections shall have their Bridge Inspection qualifications reviewed by the Program Manager and shall be considered for a Quality Assurance Review.

Team members performing poorly on the control inspection will be subject to corrective actions.

If the Bridge Inspection Program Manager (Asst Bridge Inspection Mgr) elects to hold an annual training workshop in lieu of a test bridge, the training workshop attendance is required and may include testing.

4-3.03 Independent Oversight

As a minimum, 24 bridge files will be selected annually for independent oversight. These structures in part will be selected from the list of team leaders that did not participate in the control bridge testing or workshop training. The remaining portion of the selected files will be selected at random.

For the selected bridge files, a third party will re-inspect the bridge. This inspection will be a complete inspection which will generate a comparison of the original inspection. This will give a very accurate comparison for consistency and accuracy.

4-3.03(01) Independent Oversight Closeout

For Quality Assurance Independent Oversight Reviews, after the inspections have been concluded, the reviewer will generate a Quality Assurance Report summarizing the findings. The findings shall be discussed with the State Program Manager and submitted to all Inspection Team Leaders involved in the inspections. An annual report will be generated which summarizes the findings.

4-3.04 Bridge File and Load Rating Review

4-3.04(01) Purpose and Scope

The primary goal of the Quality Assurance Bridge File Review is to ensure the completeness of the individual bridge files. The Quality Assurance Bridge File Review ensures that the QC efforts are effective across Inspecting Agencies, resulting in overall quality in the State Bridge Inspection Program. Bridge files should be reviewed to ensure that the bridges are properly load-rated and documented and that they contain any other required/available bridge documentation.

4-3.04(02) Bridge File Review

The INDOT Data Base Manager (Asst Bridge Inspection Mgr) will select a minimum of 10 bridge files per quarter for quality control review. One half of those files will be selected by searching files for known or suspected inaccuracies. The remaining files will be selected at random.

The bridge files will be reviewed for accuracy and completeness. The items checked for the bridge file will be as outlined in the *AASHTO Manual for Bridge Evaluation*, Section 2.

The findings of the quarterly review will be submitted to the INDOT Bridge Inspection Program Manager (Asst Bridge Inspection Mgr).

4-3.04(03) Load Rating Verification Review

The INDOT Bridge Load Rating Engineer will select a minimum of 10 bridge files per quarter for quality control review. These files may have been selected for a bridge file review where the load rating section of the file was in question, or the files may be selected at random.

The file will be reviewed for accuracy and completeness. The file must contain the summary sheet from the load rating and all supporting computations which must include a clear statement of all assumptions used in calculating the load rating. For computer modeling, an input data file will be included in the file.

The findings of the quarterly review will be submitted to the INDOT Bridge Inspection Program Manager.

4-3.05 Corrective Actions

Data errors, omissions, and/or changes can occur during the inspection and inventory process, as well as during the quality assurance process. The identification and resolution of these items shall be done in an expedited manner. Notification of the issue shall occur immediately to the appropriate INDOT inspector or Inspection Consultant. The issue will be discussed in-depth. Any revision to the report shall be documented and submitted to the State Program Manager. Once reviewed and accepted by the State Program Manager, the corrected information shall be submitted to the Inspecting Agency for their files or further action.

4-4.0 DISQUALIFICATION & REQUALIFICATION

4-4.01 Disqualification Process

When Quality Assurance Reviews indicate that an Inspection Team Leader and/or an Inspecting Agency continue to make the same or similar mistakes or omissions, the State Program Manager shall implement disqualification procedures as follows:

1. Upon receiving INDOT's Quality Assurance Report, the team leader shall address the findings of the report and take steps to correct the problems to ensure they will not be repeated in the future.
2. The Inspection Team Leader will be placed on probation and two inspected bridges will be reviewed within the next inspection cycle. This review will be conducted by a team selected by the Program Manager.
3. If the inspections are found to be of poor quality, the team leader will be disqualified.

INDOT reserves the right to disqualify immediately and indefinitely if gross negligence, misconduct, and/or major omissions are found. These errors may adversely affect the safety of the public and/or the capacity of the bridge.

4-4.02 Disqualification Criteria

The criterion for disqualification of an Inspecting Agency or Inspection Team Leader includes, but is not limited to, the following:

1. Lack of proper follow-up with the bridge owner for Critical Deficiencies, such as broken load-carrying members, critical scour at foundations, vehicular impacts which could adversely affect load-carrying members, or bridges requiring closure.
2. Lack of follow-up with the bridge owner for correcting load-posting deficiencies
3. Failure to satisfy the required testing for quality control.
4. Failure to correct findings from Quality Control or Quality Assurance Reviews, including recurring unacceptable scores.

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5. Recurring miscoded National Bridge Inventory (NBI) items
6. Recurring miscoded critical rating items such as condition states
7. Recurring condition rating deviations of more than one above or below an independent condition review
8. Failure to submit completed inspection data and/or corrections in a timely manner.
9. Failure to maintain the bridge file to meet minimum requirements.
10. Failure to maintain or update any required Plans of Action.
11. Failure to inspect the bridges within the required frequency (unless the notice to proceed was given too late to make this possible)
12. Dishonest or unethical behavior that adversely affects the inspection results.

INDOT has the final authority to carry out this disqualification process. Inspecting Agencies must accept these procedures as part of any bridge inspection agreement before they will be allowed to perform any bridge inspections.

4-4.03 Regualification Process

1. A disqualified Inspection Team Leader and/or Inspection Agency may be re-qualified after the two-year period if they explain in writing how they will correct their deficiencies. Upon approval by INDOT, the Inspection Team Leader or Inspecting Agency shall be placed back on the qualified list and under probation for 12 months.
2. A disqualified Inspection Team Leader may also be re-qualified following the two-year disqualification period after he/she has retaken the Safety Inspection of In-Service Bridges (FHWA-NHI-130055) class and successfully completed.
3. Henceforth, prospective Inspection Team Leaders taking the Safety Inspection of In-Service Bridges (FHWA-NHI-130055) class must attend the entire course.