BRIDGE INSPECTION GUIDELINES

CHAPTER 6 - QUALITY CONTROL AND QUALITY ASSURANCE

6.1 INTRODUCTION

Quality Control and Quality Assurance (QC/QA) are an integral part of a successful bridge inspection program. The (QC/QA) process is essential in ensuring bridge inspection report are consistently completed with the highest degree of accuracy.

The quality in a bridge inspection program is dependent on qualified, experienced, and well trained bridge inspectors performing the bridge inspections. Inspectors are required to attend mandatory inspection training offered by the National Highway Institute (NHI), and to follow guidelines and procedures issued by the State agency to ensure inspections and inspection reports are completed correctly and are compliant with federal requirements.

6.2 QUALITY CONTROL ENGINEER AND QUALITY ASSURANCE ENGINEER

The Quality Control Engineer is responsible for the review of inspection reports finalized and submitted by in-house staff or consultants. The QC Engineer is also responsible for review of the field inspection methods utilized by the inspection team. The Quality control engineer should have extensive experience in the safety inspection of in-service bridges and should be familiar with the most up to date inspection procedures and requirements.

The Quality Assurance Engineer is responsible for ensuring that the quality control procedures meet or exceed the standards set by the agency.

6.3 REVIEW SELECTION ON INSPECTION DOCUMENTS

Independent review of bridge inspection reports will be performed to enhance quality measures. Quality Control Engineers must select at least 50% of each packet of routine bridge inspection reports to be reviewed. The QC Engineer shall look through the entire routine inspections packet and then select the reports to be reviewed. Packets that include in-depth, underwater, NSTM, initial or special inspection reports will be fully reviewed. Inspection packets shall be reviewed regardless of bridge ownership and whether in-house staff or consultants performed the inspections. The following are some of the criteria that shall be used when selecting routine inspection reports to be reviewed:

- Bridges designated as “Poor”
- Bridges with one or more condition rating that changed by 2 points or more
- Bridges with Condition State 4 (CS4) quantities.
- Change in vertical or horizontal clearance that may affect NBI items
- Bridges in need of changing/adding/removing vertical clearance signs
- Bridge inspections that include repair recommendations
- Bridge inspections that include maintenance item related to missing or obstructed load posting sign

6.4 REVIEW AND CORRECTION OF INSPECTION DOCUMENTS PROCEDURE

The quality control engineer's review includes but is not limited to the following:

1. Overall review of the inspection report that includes a check that the correct bridge has been identified through examination of information such as structure number, structure name, route, milepost, location, and photos. Further detail review should assure all required information has been entered correctly in accordance with the FHWA Specifications for the National Bridge Inventory (SNBI). This review includes but not limited to checking if proper coding conventions, formats, correct significant digits and units have been used.
2. Check the condition ratings of NBI items B.C.01 (Deck), B.C.02 (Superstructure), B.C.03 (Substructure), and B.C.04 (Culvert) for consistency with the element ratings. The elements input should be reviewed for accuracy, including element numbers, units and quantities under different condition states.
3. Check that the condition ratings and element condition state quantities are supported by narrative that appropriately justifies and documents the component and/or element rating.
4. Check all photographs and/or sketches for proper cross referencing to the inspection report.
5. Check that all notable bridge deficiencies include supporting photographic documentation. Notable bridge deficiencies are those leading to an NBI component condition rating of 5 or less, or those requiring some kind of immediate action.
6. Check that supplemental reports document the use of special equipment or techniques, and/or traffic control as necessary.
7. Check that it was noted a qualified Team Leader was present at the bridge and actively participated at all times during each routine, initial, in-depth, NSTM, and underwater inspections.
8. Check that it was noted a qualified Team Leader was present at the bridge and actively participated at all times for each special inspection used to monitor conditions on bridges with reduced routine intervals.
9. Check consistency of information between the current inspection report and previous inspection reports, load rating reports, scour plan of action reports, inspection procedures and supplemental reports (When applicable for NSTM, in-depth, special and underwater inspection).
10. Review all items in the SI&A to check they have been properly and correctly entered including a check of the SI&A inventory data against the record drawing to ensure that the data is consistent.

Bridge inspection personnel are reminded that assuring quality during their field inspection and throughout their documentation is their responsibility. The independent office review of bridge inspections is provided to maintain consistency throughout the state and shall not replace the

due diligence that an inspector must exercise while performing and documenting each bridge inspection.

Inspection personnel should strive to maintain objectivity and factual reporting of field observations. While some relevant comments with professional judgment are desirable and made to pinpoint source of a potential problem area, subjective reporting and editorializing of review comments are not acceptable. Special attention should be accorded to pattern errors.

Since the review may not entail every inspection report in a submitted packet, similar errors may be repeated in non-reviewed reports. Therefore, the team leader must correct non-reviewed reports for similar types of comments, and must update the review comment sheet to reflect the comments that were addressed for structures that were not reviewed.

6.5 QUALITY CONTROL AND QUALITY ASSURANCE OF INSPECTION DOCUMENTS

The following procedures to check inspection reports should be followed:

- Inspection reports are to be submitted for review in a packet. Each packet shall include the following:
    - Complete inspection report drafts.
    - Bridge inspection cycle summary sheet.
    - Review comments sheet.
- The QC Engineer shall provide a summary of comments on the review comments sheet for the structures that were selected for review. The QC Engineer's comments are sent back to the team leader for corrections.
- All QC comments must be addressed by the team leader. The team leader will either make corrections based on the comments provided by the QC Engineer or reasoning shall be provided to why the correction didn't occur. Every comment made by the QC Engineer must be addressed by the team leader and a record of the comment resolution will be sent to the QA Engineer for verification purposes.
- The QC process ends at this stage, and the QA process begins.
- The QA process starts when the team leader submits a packet to the QA Engineer that includes the bridge inspection cycle summary sheet and an updated review comments sheet.
- The QA Engineer will ensure that the quality control procedures were met. If the QA Engineer deems the QC review to have met the agency's standards; the QA Engineer will request the team leader to move to the next step in the process. If the QA Engineer determines that the QC review does not meet the agency's standards; the QA Engineer will return the QA packet to the QC Engineer with additional comments or corrections that need to be made and then returned to the QA Engineer for verification of corrections.
- After the QA Engineer deems the QC review to have met the agency's QC standards, the QA Engineer will request the team leader to submit a packet to the Bridge Inspection Records Manager that includes:
    - Final signed and sealed inspection reports
    - Bridge inspection cycle summary sheet

  - Review comments sheet that includes all the QC and QA Engineer's comments
- The final inspection report must be sealed and signed by a qualified team leader that is listed on the agencies "Nationally Certified Bridge Inspectors" registry.
- Sealed and signed inspection reports completed by consultants and deemed final by the QA Engineer will be uploaded to the agency's database by the consultant's staff.
- Sealed and signed inspection reports completed by in-house staff and deemed final by the QA Engineer will be uploaded to the agency's database by the in-house staff.
- The Bridge Inspection Records manager shall:
  - Confirm the sealed and signed inspection reports have been uploaded correctly to the agency's database.
  - Forward the repair and maintenance reports to the appropriate ADOT group (Maintenance district, Hydraulics or Geotechnical Services) or the bridge owner (if the bridge is owned by a local agency).

6.6 FIELD INSPECTION REVIEW

At least once every year, the Bridge Inspection Program Manager and the Quality Assurance Engineer should randomly choose at least five structures to review in the field for each inspection team. The composition of these structures shall represent a cross-section of bridge types inspected.

The Quality Assurance Engineer shall keep a logbook of the dates, review team, and Bridge Inspection Quality Assurance Review Form (See Appendix A, Figure 5.6) and shall have the logbook available to present to FHWA on the occasion of FHWA annual review.

6.7 TRAINING WORKSHOP

To minimize common mistakes and omissions from structure inspections, at least once every year, Bridge Inspection Program Manager should establish a training workshop to all bridge inspection personnel by utilizing the training plan developed in consultation with quality control engineers.

The plan should address concerns and not be limited to the following:

- Changes to the Specifications for the National Bridge Inventory (SNBI)
- Changes to the AASHTO Elements coding
- Changes to the bridge management software (BrM)
- Changes to structures inspection scheduling
- Common errors or problems occurring during and post inspections

The Training Workshop should include inspectors' views and observations in the field which may help to improve quality of the inspections and the inspection reports.