Chapter 7  Quality Control/Quality Assurance

7-1  General

This chapter establishes policies on how the Washington State Department of Transportation (WSDOT) and local agencies within the state of Washington conduct quality control/quality assurance (QC/QA) on its respective bridge and tunnel inspection programs to meet FHWA requirements within 23 CFR 650.307(c), §650.313(g), §650.507(c) and §650.513(i).

The guidelines presented herein are those in use by both the WSDOT Bridge Preservation Office (BPO) and Local Programs (LP). Sections 7-2 through 7-8 pertain to the QC/QA program implemented by the BPO. Sections 7-9 through 7-11 pertain to the QC/QA program developed by the LP Office. Local Agencies are encouraged to follow these guidelines so as to provide a consistent basis for evaluation and reporting of inspection data.

The QC/QA programs documented in this chapter, including the appendices, have been approved for use by the Federal Highway Administration (FHWA.) As an alternative individual agencies may choose to establish their own QC/QA policies and procedures. The procedures will require documentation similar to what is discussed in this chapter and meet the approval of the SPM or named delegate as well as the FHWA Division Bridge Engineer within the state of Washington.

Any QC/QA program being developed will want to reflect on the five areas identified in §650.307 through §650.315 and §650.507 through §650.515. A thorough QC/QA program will examine these five areas as well as any internal policies and procedures established within a given agency as a means of determining whether or not the inspection program maintains what FHWA defines as a high degree of accuracy and consistency.

The five topics identified in 23 CFR 650 include:

• Bridge Inspection Organization (§650.307 and §650.507)
• Inspection Staff Qualifications and Re-Certification (§650.309 and §650.509)
• Inspection Frequency (§650.311 and §650.511)
• Inspection Procedures (§650.313 and §650.513)
• Inventory (§650.315 and §650.515)

There are also many sources of information available that can help an agency in developing their own QC/QA programs. One particularly helpful is a document written by Dr. Glen Washer and Dr. C. Alec Chang entitled *Guideline for Implementing Quality Control and Quality Assurance for Bridge Inspection*. AASHTO sponsored the creation of this document completed in June 2009 to help those agencies in need of assistance in developing their own QC/QA programs. Section 1-4 from that document identifies seven characteristics that are common to effective programs.
These include:

1. Independent Reviews.
2. Objective and quantitative measures of quality.
3. Quality program documentation.
4. Comprehensive coverage of the inspection and load rating program.
5. Established procedures for corrective actions.
6. Established schedule for evaluations.
7. Documented review procedures.

The section concludes by saying that these characteristics of effective programs can be used in many ways and methodologies depending upon an agency's specific programmatic characteristics and needs.

It is the intent throughout this chapter that the term “bridge” refers to all structures including bridges, culverts and tunnels. The QC/QA process for tunnel inspections performed in the state of Washington is currently under development and is anticipated to be incorporated into the 2018 update of the WSBIM.
7-2 WSDOT Bridge Preservation Office Quality Control Program

7-2.1 Purpose
To establish within management a diverse set of quality control (QC) procedures to be used in the BPO in order to maintain a high degree of accuracy and consistency within the BPO inspection program. These procedures have been developed uniquely for each of the different units in the office. The procedures focus on the following areas:

- Qualifications of designated positions within the office.
- Maintaining bridge information (electronic and physical information).
- Management/analysis of bridge load rating and bridge scour.
- Office review and Field verification of information and conditions collected in bridge inspection reports.

The QC program’s role is to evaluate and communicate directly with staff, any assessments made of their work. BPO policy and practices should be evaluated throughout this process and be addressed and adjusted accordingly in order to create a more consistent and accurate inspection program.

7-2.2 Definitions
Both the National Bridge Inspection Standards (NBIS) Regulation 23 CFR 650.305 and National Tunnel Inspection Standards (NTIS) regulation 23 CFR 650.505 define Quality Control as those procedures intended to maintain the quality of a bridge/tunnel inspection and load rating at or above a specified level. QC is performed within a work group.

7-2.3 Time Frame of Evaluation
This is an ongoing process throughout the year by each of the individual units within the office.

7-2.4 Personnel
To meet the federal requirements identified in 23 CFR 650 for Bridges, Tunnels, Structures and Hydraulics, the BPO has six distinct units that work together. These units consist of the following:

- Coding and Appraisal Unit
- Regional Inspection Unit
- Risk Reduction Unit
- Special Structures Unit
- Underwater Inspection Unit
- Movable Bridge Unit (Ch. 8 is dedicated to this unit and the work performed)

The QC program will be administered by the supervisor in each of these respective units. There may be portions of the work that are delegated to staff positions. This work will be addressed further below in each of the individual units.
7-3 **Coding and Appraisal Unit**

The Coding and Appraisal Unit is led by the Coding and Appraisal Engineer and is responsible for administering QC procedures within the unit. Listed below are those areas identified in 23 CFR 650 that require defined QC procedures. These procedures may be delegated to others within the unit at the discretion of the Coding and Appraisal Engineer.

7-3.1 **Bridge File Maintenance**

There are two positions within the Coding and Appraisal Unit that work at maintaining both the physical and electronic bridge files. These are parallel positions (Resource Technician and Inventory Technician) that operate as QC for each other.

**Physical Letter Files** – The Resource Technician performs an annual audit by comparing a current list of bridges from the Washington State Bridge Inventory System (WSBIS) database against the physical letter files. All conflicts between the electronic list and the physical letter files are addressed, validating both the physical and electronic portions of the bridge files.

This audit has three QC functions:

- Identifies physical letter files that are missing so they can be recovered.
- Validates the accuracy of the electronic database with respect to the bridges listed in the inventory.
- Ensures that records for bridges that have been added, transferred, or removed from the inventory are complete and accurate.

Verify that all signed inspection reports from the previous year made it into the letter file.

There are two types of letter files depending on the type of inspection a bridge receives. Appendix 7-A provides information on what is contained in each of these two types. The physical letter files are located in the Bridge Resource Room (Room #2041). See the attached Bridge Office floor plan in Appendix 2-A for locations of the other various types of physical files kept in the office.

**Electronic Files** – The Resource Technician is also responsible for scanning electronic copies of signed inspection reports which are placed in the physical letter files, for placement in the electronic file for a particular bridge. The Inventory Technician is assigned the task of QC of this scanning process, reviewing 10 percent of the electronic files for accuracy and completeness.

Items reviewed include whether the final inspection report form was the “released” version of the report, all pages are included, all inspection types listed on the first page are included, and that the Team Leader signed the report. Once the spot check has been performed by the Inventory Technician on a batch of inspection reports, the Resource Technician uploads the reports on the BEISt server for access by all with the privileges to do so.
7-3.2  Processing Inspection Reports

**Field Inspections** – Bridge inspection reports are processed by the Bridge Data Steward after all the QC is complete between inspectors and supervisors. The Bridge Data Steward performs the following QC actions:

- Validates that the QC process between the inspectors and supervisors was performed (initials required on WSBIS sheet used to initiate inspection processing).
- Checks changes made to all codes in WSBIS report for reasonableness and consistency.
- Runs automated error checks within BridgeWorks application. See BPO coding guide for a detailed list of error checks.
- Checks to ensure that inspection report types are used correctly, and that when multiple report types are used in a single inspection that they all have the same inspection date.

When these checks are completed and errors corrected, the Bridge Data Steward “releases” the inspection data into the “State System Bridge Inventory” database.

The Bridge Data Steward then prints out a fresh copy of the bridge inspection report with released data, and sends that to the bridge inspectors for signature. The Bridge Data Steward then sends the WSBIS report with initials validating the inspector QC process to the Bridge Resource Technician, who also receives the signed inspection reports from the inspectors for scanning and filing. This WSBIS report is matched against the signed inspection reports to ensure they are returned to the Bridge Resource Technician for final processing as described above. The WSBIS report with QC initials is then filed for auditing purposes. These changes will then be permanently recorded in the database and immediately visible on the BEISt website.

**Informational Inspections** – The “State System Bridge Inventory” database often needs updated information from sources other than field bridge inspections. This includes updates to traffic or route information and setting flags for inspectors to take measurements or other specific field work that should be performed during the next field inspection. In all cases, a note is added to the informational inspection describing the changes made.

When single bridges or a small number of bridges need updating for new non-inspection data, the electronic data is reviewed and processed by the Bridge Data Steward prior to releasing into the database, though no printouts, signatures, scanning or filing is done. When batch updates are performed on a large number of structures, the Bridge Data Steward is involved in reviewing the changes, but the release process is done automatically by the BridgeWorks Application Engineer. Similarly, informational inspections are also created by the Bridge Preservation Supervisor as needed to make changes to bridge repairs. These changes are not reviewed by the Bridge Data Steward.
7-3.3 **Coding New Bridges**

The Bridge Inventory Technician has primary responsibility for tracking the construction of new bridges and entering them into the “State System Bridge Inventory” database. See the attached flowchart in Appendix 7-B that describes this process. This involves considerable coordination with many individuals both within BPO and other offices in WSDOT to obtain complete and accurate information. Due to this complexity, the flow chart is considered part of the QC process since it plays a key role in ensuring that all steps are taken.

QC of the inventory process consists of the following:

- All plan sheets are reviewed by the Bridge Resource Technician prior to loading onto BEISt to ensure that the sheet labels are correct and that the image is complete and legible.
- The new bridge inventory data is created as an Inventory report type, and is reviewed by the Bridge Data Steward prior to release into the “State System Bridge Inventory” database.

7-3.4 **Data Concurrency**

The Bridge Geometric Engineer is responsible to make sure that selected WSBIS fields have data that is reasonably concurrent with other WSDOT databases which serve as sources for these fields. Since this is a manual operation at this time, data queries are initiated with several other offices once per year in the late summer and the WSBIS is updated with the revised data in the following winter. The WSBIS fields managed this way are included in Appendix 7-C.

In order to obtain complete information on these selected fields from other databases in WSDOT, these external databases must have a complete and current list of bridges in the WSBIS and selected location information accurately coded. Regular communication and cross checking between the Bridge Geometric Engineer and the data stewards for these other external databases ensures this data integrity and concurrency, and has significant quality benefits for both the WSBIS and other databases with shared information.

7-3.5 **Vertical Clearance and Clearance Posting**

The Bridge Geometric Engineer manages the collection of vertical clearance data for all bridges intersecting state routes. In most cases, this consists of providing guidance to bridge inspectors on when and how to collect vertical clearance data, and reviewing and entering this data after it has been collected. This work serves as a QC mechanism for the vertical clearance data and for any bridge posting recommendations that result from vertical clearance findings.

7-3.6 **Inspector Certification**

Every Team Leader is responsible for keeping their own records. Their supervisors will validate certification training records during each annual performance evaluation and provide this information to BridgeWorks Application Engineer for implementation into the Bridgeworks software. Acceptable recertification courses or conferences as established by the Statewide Program Manager (SPM) can be found in Chapter 1. Inspectors who meet the qualifications retain active certification in the BridgeWorks software and retain accounts as needed to create bridge inspection reports.
7-3.7 **Inspection Status Report and Performance Indicators**

The BridgeWorks Application Engineer maintains a database and reporting tool called the Inspection Status Report (ISR) that serves as a “management dashboard” for the BPO. The ISR identifies bridges due for inspection and tracks their inspection progress. It also creates a record of NBI compliance for on-time inspection for federally reported inspection types. The ISR is considered a QC process for the entire bridge inspection operation.

7-4 **Risk Reduction Unit (Load Rating)**

The Load Rating group is led by the Risk Reduction Engineer who is responsible for administering QC within the group. QC consists of procedures defined below that will assess load rating work completed by consultants as well as what is completed in-house. Currently those load ratings completed by consultants and in-house consist of state owned bridges that meet the federal definition of a bridge. QC levels 1 and 2 listed below will be applied to all ratings submitted to the load rating section.

7-4.1 **QC Criteria**

All state owned bridges (owner code 1), that qualify as an NBI reportable bridge with new load ratings shall be reviewed per Level 1 as described below.

**Level 1** –

- Verify that a stamped summary sheet is included in the rating file.
- Evaluate the rating factors, do they make sense? For example, is the OL1 RF greater than OL2 or the RF for AASHTO 1 greater than HS20.
- Verify that all elements/members that require ratings are rated.
- Verify that preliminary calculations are included in the submittal, especially for complex structures for accuracy. These files might include dead loads, factors, and any assumptions used in the calculations.
- Verify that the rating represent the condition of the structure based on the latest inspection report.
- Verify that each bridge's physical characteristics are modeled properly.
- Verify reinforcing/pre-stressing; typically check points at maximum stress.
- Verify that dead and live loads are modeled properly.
- Verify that the inventory and operating tons are updated in BridgeWorks and the posting matches the rating where needed.

**Level 2** – This will require an independent load rating of eight structures per calendar year for state bridges. Rating factors and condition of the superstructure or substructure will be the main factors in choosing the bridges. That is, bridges with low rating factors or have an NBI code less than 5 for superstructure or substructure will have higher priority for review as well as when rating factors do not appear to be correct based on either the design load or condition.
Risk Reduction Unit (Scour Group)

The Scour Group is also led by the Risk Reduction Engineer and is responsible for administering QC within the group. QC tasks may be delegated to the Scour Engineer at the discretion of the Risk Reduction Engineer. QC of scour items will consist of procedures defined below to assess the scour work completed by the Regional and Special Structures Inspection Units as well as that of the Scour Group. QC will also verify that new structures added to the inventory are properly designed for scour and are not scour critical.

Note: The criteria set below contain QA elements.

Bridge Selection Criteria

1. All state bridges in which the scour code has changed since the last inspection.
2. All state bridges in which the POA has changed in regards to new directions to the regions.
3. All new state bridges over water.
4. All state bridges with a scour code of 2 or less.

These four items will be verified for validity.

In addition, a list of 60 bridges over water will be selected randomly from the previous inspection season. Of the bridges selected, 40 of them shall have a scour code of 3, 4, or 7.

Office Review

1. Verify that each bridge over water has a scour summary sheet, scour calculations if appropriate, a bridge layout sheet and initial ground line drawings.
2. Verify that the bridge is properly coded based on scour calculations.
3. Verify that each scour critical bridge has a Plan of Action and that it has clear direction for the field staff to follow.
4. Review waterway adequacy code (1662) for accuracy.

On Site Field Review

1. Verify that the scour code (1680) in the bridge inspection report is correct and that it reflects the field conditions.
2. Verify that the scour note (1680) added to all bridges over water has clear and direct information.
3. Verify any scour related concerns such as exposed footings, channel migration, presence or need for countermeasures.
4. Verify that the POAs reflect the conditions in the field.
5. Verify the channel protection code (1677) for accuracy.
6. Verify that the channel protection note (1677) adequately reflects site conditions.
7-6  **Regional and Special Structures Inspection Units**

The responsibility of structural inspections has been divided between three supervisors within the BPO. There are two Regional Inspection Engineers that oversee the bulk of the state inventory of bridges within the state of Washington. One Special Structures Engineer oversees the more unique types of structures within the inventory.

7-6.1  **Office Review of Structural Inspections**

A Regional Inspection Engineer or a second Team Leader will review 100 percent of High Risk, Fracture Critical, In-Depth, Interim, Damage, Special Feature, 48-month frequency, Inventory and Local Agency inspection reports under their responsibility, with the exception being those that qualify for “Team Leader Approval.” See Appendix 7-D for specific criteria. The reviews are targeted in such a manner that all Team Leaders have close to an equal number of bridges reviewed.

The Special Structures Engineer reviews 100 percent of all Special Structure reports under his area of responsibility.

The office review of reports will consist of the following validation for accuracy and consistency:

- **Inspection Type** – The appropriate inspection types are identified.
- **Inspection Date** – Ensure that bridges are inspected on time.
- **Inspection Frequency** – Verify that inspection frequency is based on condition or policy (i.e., 48-month frequency criteria).
- **Inspection Hours** – Verify that the correct inspection hours are reported based on history of previous report hours, structure type and condition.
- **Accounting Codes** – Verify that the correct accounting codes are used.
- **Organization of Report** – Verify that the report is organized, understandable, uses correct photo and file references that follow office policy.
- **Proper Inspection Forms** – Verify that the appropriate inspection forms are included in the reports.
- **Soundings and Ground Lines** – Verify if bridge requires soundings. If required, verify that soundings and ground lines are correct and completed.
- **Inspection Resources** – Verify that the appropriate resources needed for safety, access, and adequate inspection are being used.
- **NBI Codes** – Verify that the NBI codes are supported by inspection report content.
- **BMS Elements** – Verify that the BMS elements are complete and accurate.
- **BMS Condition States** – Verify that the BMS condition states are supported by the inspection report content.
- **Repair Recommendation and Priorities** – Verify that appropriate repairs and repair priorities are recommended based on inspection report content.
- **Follow-Up Actions on Significant/Critical Findings** – Ensure deficiencies that require immediate action have had the proper parties notified and are being monitored and/or followed up on.
- **Follow-Up on Damage and Critical Damage Bridge Repair Report (CDBRR) Reports** – Verify that CDBRR’s and Alerts have updated information added such as future repaired dates and/or completed repairs.
Additional QC measures that are associated with the inspection program consist of the following:

- Regional Inspection Team Leaders are scheduled to inspect bridges randomly. This limits the chances of the same bridge getting inspected by the same Team Leader repetitively.

- Regional Inspection Engineers have the opportunity to review reports written by all Regional Team Leaders. The two Regional Inspection Engineers participate in a two-year rotation in which one is responsible for reviewing all Local Agency inspection reports inspected by the BPO. All Regional Team Leaders (under both Regional Inspection Engineers) are assigned to inspect these Local Agency bridges. This allows the Regional Inspection Engineer on that particular rotation to review reports and provide feedback to all Regional Team Leaders, not just the Team Leaders working under them.

- All changes made or suggested for any particular report during the QC review process must be agreed upon by the Team Leader responsible for the final submittal of the report. In the event of a disagreement, the Bridge Preservation Engineer shall intervene as arbitrator to determine a final solution to the matter.

Documentation of reports reviewed includes, but is not limited to bridge name, inspector name, date bridge inspected, date reviewed and review state (APPROVED, APPROVED AS NOTED(AAN) OR RETURN FOR CORRECTION(RFC)). Example office review forms are included in Appendices 7-E and 7-F.

### 7-6.2 Field Review of Structural Inspections

Each year, 2 percent of all structural inspections are selected for field review. Structures are selected from a list of current year inspections, along with a concurrent review of the prior inspection. The reviews are targeted in such a manner that all Team Leaders have close to an equal number of bridges reviewed.

During the field review, the primary focus is to evaluate the accuracy of:

- NBI inventory items.
- NBI ratings of condition codes.
- Bridge BMS elements.
- Bridge BMS element condition states.
- Written or omitted repairs.
- Proper safety procedures.
- Areas of improvement.

Field reviews allow the supervisor an opportunity to see how the various Team Leaders are evaluating structures, relative to how the supervisor would evaluate the same structure. The expectation for coding NBI data items for “Deck, Super, and Substructure,” relative to the supervisors rating, are for the NBI condition codes to be within plus or minus 1 except for codes less than 5. Codes of 4 or less should not deviate at all, unless there are changed conditions warranting an updated code. For the BMS elements, there should be no missing elements. For BMS condition states, verbiage in the report should be supportive of the condition state ratings and quantities. For repairs, all repairs need to be supported by inspection findings.
All deviations from the above standard are documented, and the supervisor shall dialogue one-on-one with the Team Leader responsible for the report concerning all deviations. It is the responsibility of the supervisor to determine if more training is necessary for the Team Leader, or if other measures need to be taken to insure consistency of the bridge inspection reports. A field review form is included in Appendix 7-G.

7-7 Underwater Inspection Unit

The Underwater Inspection (UW) Unit within the BPO focuses on the structural inspection of substructure bridge elements identified to be in water deeper than 4 feet. The Special Structures Engineer has the responsibility of administering QC procedures identified below for this unit.

7-7.1 Underwater Inspection Office Report Review Process

Reviews of UW inspection reports are based on the type and condition of the bridge inspected. A complete office review is performed for all bridges that fall into one of the following categories:

- Local Agency owned.
- Washington State Ferry terminals.
- Scour critical bridges (scour code of 3 or less).
- Structures with exposed footings.
- Bridge with repairs associated with the underwater inspection findings.

The review ensures that all documentation is included to support the underwater findings. This includes:

- Correct substructure coding (based on inspection findings).
- Sketches and drawings showing the extents of underwater inspection.
- Documentation of ground lines around all piers.
- Drawings showing the location and extents of all defects.
- Drawings showing the current channel cross section.
- Repairs must be adequately described and written into the text of the inspection findings.

A UW report checklist is used to make sure the report package is complete.

7-7.2 Field Review of Underwater Bridge Inspections

The Special Structures Engineer accompanies the underwater bridge inspection team for 5 percent of all of the inspections performed each year.
WSDOT Bridge Preservation Office Quality Assurance Program

7-8.1 **Purpose**

To conduct an independent annual evaluation of the adequacy of the bridge and tunnel inspection program within the BPO in meeting the FHWA requirements as defined in the §650.307 through §650.315 and §650.507 through §650.515, as well as office policy, procedures and best management practices established in the WSBIM. The program will also assess the adequacy and consistency of QC procedures in place within the BPO.

7-8.2 **Definitions**

Quality assurance (QA) is defined in §650.305 and §650.505 as the use of sampling and other measures to assure the adequacy of QC procedures to verify or measure the quality level of the entire bridge inspection and load rating program. QA is administered from outside a work group.

7-8.3 **Timeframe of the Quality Assurance Evaluation**

QA will be conducted on bridges inspected in the previous inspection season. See Appendix 7-H for details on the selection process.

7-8.4 **Personnel**

To meet the federal requirement identified in §650.307(c), §650.313(g), §650.507(e), and §650.513(i) the BPO created a Quality Assurance Engineer (QAE) position. This position is responsible for administering the QA program. The QAE must meet the same qualifications and re-certification requirements as a TL.

7-8.5 **Quality Assurance**

The QA program treats the separate units within BPO as a whole to evaluate the following areas below for accuracy and consistency and produces an annual summary of findings. In addition to that, the QAE will participate in an annual office wide “Process Change” meeting, a meeting with management and staff prior to the beginning of the next inspection season. This will consist of a summary of the information that is contained in the annual report submitted to the SPM.

1. **Staff Qualifications and Re-Certification** – Document validity of qualifications and re-certification of SPM, TL, LRE and UBID based on roles and responsibilities defined in Chapter 1.

2. **Office Records and Procedures** – Review and document the accuracy and completeness of the following for those bridges selected using the selection criteria described in Appendix 7-H:
   - Contents of bridge letter and electronic files (see Appendix 7-A).
   - Load ratings.

Review of load rating information:
   - Load posting at bridge matches that of load rating documentation.
   - Operating level codes match legal load ratings and posting codes.
   - Summary sheet in the letter file is signed and stamped by Engineer of Record (EOR).
Inspection reports:
  • Appropriate report forms:
    - Fracture Critical report
    - Underwater report
    - Special Inspection report
    - Damage inspections
  • Bridges on 48-month frequency.
  • Scour Evaluation of bridges over water.

3. Field Procedures – Review and document the accuracy and completeness of the following for those bridges selected using the selection criteria described in Appendix 7-H:
  • Appropriate forms used.
  • NBI appraisal coding, NBI inventory data and Bridge Management System (BMS) condition state coding.
  • Inspection notes.
  • Photographs and sketches.
  • Maintenance recommendations.
  • Resources used to conduct bridge inspections.
  • Safety hazards addressed.

4. Data Quality – The Coding and Appraisal Unit completes QC/QA processes that include error checks, incorporated results from FHWA provided error checks, persistent error reports, and State developed consistency, compatibility and accuracy checks.

5. De-certification/Reinstatement – For process on de-certification and reinstatement see Chapter 1.

6. Deliverables – A written report will be provided to the SPM prior to the beginning of the next inspection season that will include:
  • Executive summary.
  • Selection breakout by category. See Appendix 7-H for details.
  • Individual QA field and office reports for each bridge selected.
  • Findings (from both office and field procedures).
  • Recommendations to management.
7-9  WSDOT LP Quality Control/Quality Assurance Program

7-9.1  General

LP conducts quality control/quality assurance (QC/QA) reviews of local agency bridge programs statewide to:

• Verify that local agency bridge inspection programs maintain a high degree of accuracy and consistency.
• Identify future training needs.
• Ensure compliance with the NBIS.

QC reviews are conducted by both the local agency bridge owners and by LP. The LP Local Agency Bridge Inventory Engineer continually performs routine QC on the data contained in the Local Agency Bridge Inventory.

QA reviews are formal reviews of an agency that are conducted a minimum of once every five years. This formal agency review consists of both a bridge file review and the field review as detailed in Section 7-11.2. See Local Agency Guidelines (LAG) M 36-63 Appendix 34.57 for a copy of the checklist used by LP for this review.

7-10  WSDOT LP Quality Control Program

LP has established a set of QC procedures to be used with Local Agencies in order to maintain a high degree of accuracy and consistency within the bridge inspection program. The procedures focus on the following areas:

• Qualifications of designated bridge positions within the agency.
• Maintaining bridge information (electronic and physical information).
• Management/analysis of bridge load rating and bridge scour.
• Office review and Field verification of information and conditions detailed in bridge inspection reports.

The QC program’s role and that of those involved in the process is to evaluate and communicate the assessments made directly with staff involved. Local Agency practices should be evaluated throughout this process and be addressed and adjusted accordingly in order to create a more consistent and accurate inspection program.

Quality control is defined per 23 CFR 650.305 and §650.505 as “procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level.” QC is performed within a work group.

7-10.1  Personnel – Roles, Responsibilities, and Qualifications

The roles and responsibilities for the following local agency bridge inspection personnel are described in detail in Chapter 1. The minimum qualifications for each of these positions are described in the NBIS.

List of typical local agency bridge inspection personnel:

• Program Manager
• Team Leader
• Load Rater
• Underwater Bridge Inspection Diver
7-10.2 Personnel – Continuing Education Requirements

The Certified Bridge Inspector (CBI) list is managed through the Local Agency BridgeWorks bridge inspection software. Each CBI must fulfill the continuing education requirements as listed in Chapter 1 or as outlined in LAG Chapter 34 prior to the expiration date on their Local Agency BridgeWorks account and must submit their training records for review and request an extension of their Local Agency BridgeWorks account rights.

LP will also search the database for all inspectors that are due for the refresher course within the next year and notify each inspector of the need to attend the refresher course and availability of training. A CBI who does not fulfill the requirements of Chapter 1 will have their certification suspended until the inspector supplies LP with proof that they have successfully fulfilled the continuing education requirements (see Section 1-6).

7-10.3 Maintain Bridge Information (Electronic and Physical Information)

Each agency is responsible for maintaining a bridge file for each bridge within its jurisdiction. A detailed list of information that should be in the bridge file is listed and described in Section 2-2. In addition, agencies are required to maintain a record of other general information. This information may be requested during the QA review of the bridge inspection program. The following general information should be on file:

• An experience and training record for each lead inspector.
• A master list of all bridges within the agency’s jurisdiction. This list should identify bridges that have fracture critical members, require underwater inspection, and/or warrant special inspection because of their design features, location, or strategic importance.

Physical Letter Files – The LP Local Agency Bridge Engineer will perform an annual audit by comparing a current list of bridges from the Local Agency WSBIS database against the physical letter files. All conflicts between the electronic list and the physical letter files are addressed, validating both the physical and electronic portions of the bridge files. This annual audit has three QC functions:

• Identifies physical letter files that are missing so they can be recovered.
• Validates the accuracy of the electronic database with respect to the bridges listed in the inventory.
• Ensures that records for bridges that have been added, transferred, or removed from the inventory are complete and accurate.

All physical letter files should include an individual bridge record checklist as provided in LAG Appendix 34.56.

Electronic Files – Local Agencies have the option of keeping some or all of their bridge files electronically. If an agency chooses to maintain an electronic copy, it is the local agency program manager’s responsibility for scanning the signed inspection reports. The agency should review the data scanned to ensure the files are accurate and complete.
Items to be reviewed include:
- Did the agency “release” the final inspection report form:
  - Were all pages included
  - Were all inspection types listed on the first page included
  - Did the Team Leader sign the report

See LAG Appendix 34.55, for additional information that should be reviewed and included as part of an individual electronic bridge record.

### 7-10.4 Management/Analysis of Bridge Load Rating and Bridge Scour

**Load Rating** – The QC tasks for load rating are the responsibility of the LP Local Agency Bridge Engineer or the Local Agency Program Manager. A PE license is required for the individual responsible for this review. The QC tasks apply to any new load rating work to be completed on a structure or for revisions to a load rating on a structure.

QC consists of procedures defined below that assess the load rating work completed by consultants as well as by local agencies. These rules currently apply to those load ratings completed by consultants and local agencies on locally owned bridges that meet the federal definition of a bridge (NBI bridges). However, agencies are also encouraged to follow these methods for their non-NBI bridges.

A selected number of locally owned bridges (Owner code of 2, 3, 4, 25, or 32) that qualify as NBI bridges will be reviewed annually. A sub-set of the selected bridges will consist of a combination of Fracture Critical bridges and bridges with a Superstructure or Substructure NBI Code of 4 or less.

The QC review on all selected structures will include the following:
- Verify the bridge has been rated.
- Verify a stamped summary sheet is included in the rating file.
- Verify the inventory and operating tons match the values reported in bridge inventory through the BridgeWorks software and the posting matches the rating where needed.
- Evaluate the rating factors, do they make sense? For example, is the OL1 RF greater than OL2 or the RF for AASHTO 1 greater than HS20?

For structures that consist of a combination of Fracture Critical bridges and bridges with a superstructure or substructure NBI condition code of 4 or less, additional information will be reviewed for these structures as follows:
- Verify all elements/members that require ratings are rated.
- Verify the preliminary calculations are included in the submittal and are checked for accuracy. These files might include dead loads, factors, and any assumptions used in the calculations.
- Verify the ratings represent the condition of the structure based on the latest inspection report.
- Verify each bridge’s physical characteristics are modeled properly.
- Verify reinforcing/pre-stressing; typically check points at maximum stress.
- Verify dead and live loads are modeled properly.
**Bridge Scour** – The QC tasks for bridge scour are the responsibility of the LP Local Agency Bridge Engineer or the Local Agency Program Manager. The LP Local Agency Bridge Engineer will conduct an annual review on all local agency bridges in which the scour code has changed since the last inspection and on all bridges in which the scour Plan of Action (POA) has changed in regards to new directions for monitoring or implementing. These two items will be verified for validity.

The QC review on all selected structures will check the following:
- Verify each bridge over water has:
  - a scour summary sheet
  - scour calculations if appropriate
  - a bridge layout sheet
  - Initial ground line drawings
- Verify the bridge is properly coded based on scour calculations.
- Verify each scour critical bridge has a Plan of Action and that it has clear direction for the field staff to follow.

A field review is also conducted as part of the QC review on the bridges selected annually that includes the following:
- Verify the scour code in the bridge inspection report is correct and that it reflects the field conditions.
- Verify the scour code note added to all bridges over water has clear and direct information.
- Verify any scour related concerns, exposed footings, channel migration, presence or need for countermeasures.
- Verify the POAs reflects the conditions in the field.

**7-10.5 Review and Validation of Inspection Reports and Data**

QC reviews are conducted by both the local agency bridge owners and by LP. The LP Local Agency Bridge Inventory Engineer continually performs routine QC on the data contained in the Local Agency Bridge Inventory.

An individual bridge record specific QC check by the LP Local Agency Bridge Inventory Engineer begins after agencies conduct bridge inspections and perform their internal QC procedure. After an Agency’s QC is complete, notification is made to LP by email that their bridge inspection records are ready for release to the Local Agency Bridge Inventory. Any necessary information or instructions related to their updated inspection data are also provided in this email. The Local Agency Bridge Inventory Engineer then starts the QC process on the updated, as well as the existing bridge data associated with the bridge records. This includes the following:
- A query is run on all inventory data for verification of data consistency and correct data field correlation.
- An in-depth review is run on all inventory data for verification of data consistency and correct data field correlation on all new data prior to releasing into the bridge inventory.
- A review of the inspection coding for consistency, completeness and accuracy.
- A review of additional bridge file components as they become available electronically through the bridge inspection software.
- Note any discrepancies, errors or questions.
Along with the individual inventory review:
- An evaluation of all bridge inventory data integrity is made whenever bridge information requests are made.
- Individual questions are answered daily through one-on-one instruction by phone call or email.
- Review visits with an Agency are conducted periodically with formal review visits as noted above.
- Quarterly reports are prepared from the bridge inventory data and are forwarded to the Agencies for review and action. This report lists bridges with inspections that appear to be out of date, with inspection work that needs to be completed and released, and a projection of what inspections need to be scheduled in the next quarter.

If discrepancies or errors are found the following will occur:
- A documented phone call may be sufficient to clear up the issue.
- If the error has been previously noted or is severe enough to warrant immediate action, the structure update will be returned un-released with an explanation as to why the update was not released and instructions on how to resolve the issue.
- An Excel spreadsheet of the errors found is prepared from the review notations and is sent to the Agency with instructions on how to correct their record. The updated inspection information is released and the corrections are made through an informational update or during the next inspection.
- If the review does not result in questions or concerns, the update is released without comment.

7-10.6 Reporting of Quality Control Reviews

Reporting annual results and findings of QC reviews will be as follows:
- Provide results to the Statewide Program Manager for incorporation into overall Washington QC/QA annual report by the end of October.
- Copies of all reporting and documentation of the LP QC reviews will be available at the WSDOT LP Office.

7-11 WSDOT LP Quality Assurance Program

QA reviews are formal reviews that are conducted by LP annually for bridge inspector personnel qualifications and a minimum of once every five years to verify the adequacy of the QC procedures for a local agency. The QA review is performed by the LP Local Agency Bridge Engineer as an independent reviewer from the bridge inspection team on a sample of work completed within a three-year timeframe prior and up to the time of the formal review.

Quality assurance is defined per 23 CFR 650.305 and §650.505 as “the use of sampling and other measures to assure the adequacy of QC procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program”. QA is administered from outside a work group.
7-11.1 Annual QA Review – Certified Bridge Inspector

At a minimum, the LP Local Agency Bridge Engineer will review qualifications and re-certification records for a sample of certified inspectors within the database on an annual basis. Continued certification will be in accordance with the inspector certification process established in Chapter 1. Any suspensions of certification will be in accordance with the process described in Section 1-6.

7-11.2 QA Review – On Local Agency QC Procedures

The formal QA review that is conducted a minimum of once every five years consists of both a bridge file review and the field review as detailed below. This review will be performed by, or under the direction of the LP Local Agency Bridge Engineer. The agencies and structures that are selected for review are those responsible for NBIS inspections and reporting. The number of bridges to be reviewed will be determined based on agency inventory and types of structures. If an agency has a cross section of structure types and condition states a sample from all types will be included as part of the review.

Selection criteria for agencies to receive a QA review includes the following:

- Agencies responsible for NBIS inspections and reporting will have a higher priority.
- Elapsed time since last local agency QA review (maximum interval of five years).
- **Past Performance** – An agency that has had a review with minor deficiencies and/or corrections will receive higher priority; conversely agencies with a demonstrated record of high quality results will be a lower priority.
- **Condition of Bridges** – Agencies with inventories of higher risk bridges (such as bridges with low sufficiency ratings that are fracture critical or structurally deficient) will receive high priority.

Listed below are the procedures and sampling parameters that will be used in selecting bridges to review from each selected agency:

- Is the bridge load restricted?
- Bridge's deficiency status.
- Is the bridge programmed for rehabilitation or replacement?
- Does the bridge have critical findings and what is the status of any follow-up action?
- Bridges with unusual changes in condition ratings.
- Bridges that require special inspection.
- Location of bridges.

A close-out meeting will be conducted at the conclusion of each local agency QA review. Any deficiencies, as well as commendable practices will be identified for the agency at the time of the review. See Appendix 7-J for procedure on documenting an agencies deficiencies and corrective action to be taken. If no deficiencies were found during the local agency's bridge program QA review, the local agency will be informed in writing.

**Office File Review** – The QA office file review assesses the following items documenting the results via the checklist in LAG Appendix 34.57:

- Inspection reports.
- Verify inspections were completed by qualified staff.
- Complete and organized bridge files.
• Accurate and current master lists.
• Accurate documentation of bridge load ratings.
• Accurate documentation of scour evaluations including scour codes and a plan of action for all scour critical bridges.
• Thorough and accurate documentation of inspections performed.
• Inspection frequency as outlined by the NBIS at a minimum or agency specific defined frequencies, see LAG Appendix 34.52.
• For agencies with a Program Manager delegated by WSDOT, an in-depth review to validate the agencies QC/QA procedures.

Field Review – The field bridge inspection QA review is the second component of the overall QA review. The field review will be performed by, or under the direction of the Local Agency Bridge Engineer. Other members of the team will consist of representatives from the bridge owner agency and possibly Region Local Programs Personnel. The number of bridges the team selects will be based on a review of the agency’s overall inventory and past performance. The Local Agency Bridge Engineer will consider the number of bridges in an agency’s inventory when making the following decisions on the number of structures to be sampled:

• The various inspection types of structures in an agency’s inventory. (i.e., fracture critical, special, underwater, routine).

• The sample reviewed should have a cross section of structures of all types of bridges within and agency’s inventory. This should be at a minimum of three bridges per structure inspection type depending on the individual inventory.

• The number of bridges in poor condition. Generally, 10 percent of bridges considered structurally deficient in the Local Agency BridgeWorks Inventory should be reviewed, but not more than three will be required.

• An agency’s past performance that has had a review with major deficiencies and/or corrections will have a higher priority.

The field review process will compare the bridge site condition report with the routine inspection reports as well as Fracture Critical, Underwater, and/or Complex Bridge Inspection Reports if applicable:

• General site review checklist:
  – Review Bridge Inspection Report(s).
  – NBI Appraisal Rating Items and Condition Codes (WB76).
  – BMS Element correctness and condition states.
  – Accuracy of notes.
  – Repair Recommendations.
  – Special inspections and procedures (fracture critical, underwater, complex).
  – Correct correlation of report elements.
  – Field aspects of frequency, scour, and load rating.

• One or more condition ratings are out of tolerance more than ± 1. This will be reported on the closeout meeting and the information will also be included in the letter to the agency.

• Review Bridge Inventory Report
  – Inspection date and frequency for all reportable inspection types (WB77).
  – Additional coding not noted on the Bridge Inspection Report.
7-11.3 Reporting of Quality Assurance Reviews

Reporting results and findings of QA reviews will be as follows:

- Detailed in the Federal Aid Highway Program Stewardship and Oversight Agreement entered into by WSDOT and FHWA that is to be in place in early 2015 (pending signatures).
- Provided to the Statewide Program Manager for incorporation into overall Washington QC/QA annual report by the end of October.
- Copies of all reporting and documentation of the LP QA reviews will be available at the WSDOT LP office.
7-12 Appendices

Appendix 7-A  Bridge Letter File Contents for State Bridges
Appendix 7-B  Flowchart for Tracking New Bridges
Appendix 7-C  WSBIS Fields Maintained With Other WSDOT Database Source Information
Appendix 7-D  Bridge Preservation Office Lead Approval Criteria
Appendix 7-E  Bridge Preservation Office Quality Control Review Tracking Form
Appendix 7-F  Bridge Preservation Office Quality Control Report Review Tracking Form
Appendix 7-G  Bridge Preservation Office Quality Control Field Review Form
Appendix 7-H  Bridge Preservation Office Quality Assurance Bridge Selection Process
Appendix 7-I  Bridge Preservation Office Field Review
Appendix 7-J  LP Quality Assurance Deficiencies
Appendix 7-A   Bridge Letter File Contents for State Bridges
## State Bridge Files with 2 Dividers
(including Underwater and Fracture Critical Inspections)

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Appendix 7-B  Flowchart for Tracking New Bridges

Bridge Inventory Flow

- Contract data entered into Contract Tracking DB
- All contracts From Bid Opening
- Download Award Plans & Spec from Print Services
- Initial review of plans for bridge-related work
- Confirm review of all contracts for bridge-related work & 10 actual plans sheets Q/C
- Create new record in Bridge Works
- 6 mos - 1 year prior to expected completion
- Load plans to Bridge Works
- Crossing Records review
- Check for relevant Change Orders/CIBPs
- GS Data
- Final review & release to Bridge Works
- 1 month prior to traffic structure placed in "GO INSPECT" Status in Contract Tracking DB
- Layout to Roman Craig for review if UBIT/Hit
- Inspection Scheduled

Other Data Sources
- Bids
- Exchange
- *CCIS
- Section data from Roman Craig Engineer
- Load Rating data from Load Rating Engineer
- BOS Element review
- Dive Inspection Notification

DSB  SAL  GB  GC  RC  RBO  IT  HI

C:\Users\Bywaterj\Documents\Bridge Preservation Management\QC\QC Manual\C&A\Copy of Bridge Inventory Flow.xlsx  2/14/2012
Appendix 7-C  WSBIS Fields Maintained With Other WSDOT Database Source Information

1. Fields that BPO would like to get from TDO to check for NBI submittal:

   **hwy_class (char(1), null)** – This code identifies what type of highway the inventoried route is one using the following:
   - 1 Interstate highway
   - 2 U.S. numbered highway
   - 3 State Highway
   - 4 County road
   - 5 City street
   - 6 Federal lands road
   - 7 State lands road
   - 8 Other (included toll roads not otherwise identified.)

   **serv_level_code(char(1), null)** – This code describes the designated level of service provided by the inventoried route:
   - 1 Mainline (most local agency bridges)
   - 2 Alternate
   - 3 Bypass
   - 4 Spur
   - 6 Business
   - 7 Ramp or “Y”
   - 8 Service and/or unclassified Frontage Road
   - 0 None of the above

   When two or more routes are concurrent, the highest class of route will be used. The hierarchy is as listed above

   **adt(numeric(6,0), null)** – This is the Average Daily Traffic (ADT) volume carried on the route being inventoried. If bridges on a divided highway are coded as parallel, then the ADT is the volume carried on the individual bridge, not the cumulative volume carried on the route. The determined ADT volume must be no more than four (4) years old. Add leading zeros to fill all spaces in the field.

   **adt_truck_pct (numeric(2,0),null)** – This is the percentage of the ADT volume that is truck traffic. It does not include vans, pickups, or other light delivery trucks. Code to the nearest whole percent.

   **adt_year(numeric(4,0), null)** – This is the year in which the estimate of the ADT volume was determined. If the year entered in this field is more than four years in the past, a new ADT volume must be determined and entered in the ADT and the year the ADT was determined in this field.

   **Future_adt(numeric(6,0), null)** – This is the ADT volume that the inventory route is expected to carry 20 years in the future. This field may be updated whenever a new projection is made. The field must be updated any time the projected date of this forecast is less than 17 years, but not more than 22 years from the current year.
**Future_adt_year(numeric(4,0), null)** – This is the year for which future_adt has been projected. This date must be at least 17, but no more than 22 years from the current year. If the date in this field is outside these limits, then a new value will be required for and a new year will need to be entered in this field.

**strahnet_hwy(char(1),null)** – For the inventory route identified indicate STRAHNET highway status using one of the following codes:

- 0 The inventory route is not a STRAHNET highway.
- 1 The inventory route is an Interstate STRAHNET highway.
- 2 The inventory route is a non-Interstate STRAHNET highway.
- 3 The inventory route connects with a Department of Defense facility.

**nat_truck_ntwrk_flag(char(1),null)**

**fed_hwy_system_code(char(1),null)** – This item shall be coded for all records in the inventory. For the inventory route identified indicate whether the inventory route is on the NHS or not on that system. This code shall reflect an inventory route on the NHS as described in the TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY (TEA21).

If more than one federal aid highway is carried on or under the bridge, indicate only the classification of the more primary route.

- 0 Inventory Route is not on the NHS.
- 1 Inventory Route is on the NHS.

**fed_functional_class(class(2),null)** – This code describes the Federal Functional classification of the inventory route as classified according to Statewide National Functional Classification System maps. Statewide National Functional Classification System maps are located at local agency planning departments or WSDOT Service Center Planning.

Separate codes are used to distinguish roadways located in rural or in urban areas. Routes shall be coded rural if they are not inside a designated urban area, Codes 08, 09, and 19 are for off-system roads.

**Rural Codes**

- 01 Principal Arterial – Interstate
- 02 Principal Arterial – Other
- 06 Minor Arterial
- 07 Major Collector (Federal Aid Secondary)
- 08 Minor Collector
- 09 Local

**Urban Codes**

- 11 Principal Arterial – Interstate
- 12 Principal Arterial – Other Freeway or Expressway
- 14 Other Principal Arterial
- 16 Minor Arterial
- 17 Collector
- 19 Local
fed_lands_hwy_code(char(1),null) – This code identifies bridges on roads which lead to and traverse through federal lands. These bridges may be eligible to receive funding from the Federal Lands Highway Program. Use one of the following codes:

0 Not Applicable  
1 Indian Reservation Road (IRR)  
2 Forest Highway (FH)  
3 Land Management Highway System (LMHS)  
4 Both IRR and FH  
5 Both IRR and LMHS  
6 Both FH and LMHS  
9 Combined IRR, FH, and LMHS

For definition of IRR (Indian Reservation Roads), see Title 23 USC Section 101.

2. Fields BPO would like to get from TDO if available:

Region_code(char(2),null) – This is a two-digit code, which identifies the WSDOT region in which the bridge is located.

County_id(int,null) – This is a two-digit code, which identifies the county in which the bridge is located. If this is a jointly owned bridge, the county that is responsible for reporting the data to the inventory should be entered here. Use one of the following codes.

City_id(int,null) – This is the city in which the bridge is located. (Codes for cities and towns are identified according to the most recent U.S. Bureau of the Census Identification Schedule.) Contact the Bridge Engineer for Local Agencies for newly incorporated municipalities. If the bridge is outside of corporate limits or in an unincorporated city, code all zeros.

Leg_dist_code_1(int, null) – This field identifies the first or only State Legislative District in which the bridge is located. If the legislative district number is followed by a letter (District 19A, for example), disregard the letter and enter the two-digit number only.

Leg_dist_code_2(int, null) – For bridges which span a State Legislative District dividing line, use this field to identify the second State Legislative District number. Use both this and the Legislative District Number (1) field to enter the two separate State Legislative District numbers. If no code is applicable, enter all zeroes.

speed_limit(tinyint, null) – Speed limit on the bridge.

- These are coming from the Data Mart process...an ARM value is returned as well.
- These are going to be populated by HPMS.
Appendix 7-D  Bridge Preservation Office Lead Approval Criteria

Please use the following criteria to help you determine which reports can be sent directly to the Bridge Information Group without further review by a supervisor or a second Lead.

A “Bridge Inspection Report” that fits any one of the following nine criteria must be reviewed by a Regional Bridge Inspection Engineer or a second Lead Inspector.

1. If NBI codes for Deck Overall, Superstructure or Substructure are less than “6”.
2. Structures with repairs or conditions to be monitored (excluding ‘J’ type repairs).
3. New bridge structures (Inventory Inspections).
5. Local Agency bridges.
6. UBIT Bridge Inspections.
7. Any inspection with a frequency >24 months.
8. Any bridge that is currently having issues with scour.
9. Any time an inspection/report type and/or frequency is either changed, added, or deleted.

Additionally, the Lead may submit for review any report that the Lead feels needs further input from the Regional Bridge Inspection Engineer.

If the “Bridge Inspection Report” does not meet any of these criteria, then the “Bridge Inspection Report" can be routed by the experienced Lead Inspector to the Info Group for processing.

For quality assurance reasons, the “Bridge Inspection Report" can be randomly reviewed at the Regional Bridge Inspection Engineer's option.
## 2011 Inspection Report Status

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**EXAMPLE**
# Bridge Preservation Office Quality Control Field Review Form

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<td>Inspection Date:</td>
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<td>Frequency:</td>
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<td>Previous Report Date</td>
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| Are all the applicable FHWA items for the structure properly coded? | Yes ____ No ____ |
|---------------------------------------------------------------------|

| Are all the BMS elements for the structure correctly identified? | Yes ____ No ____ |
|-----------------------------------------------------------------|

| Are all the BMS element condition states for the structure properly coded? | Yes ____ No ____ |
|------------------------------------------------------------------------|

| Do the BMS codes support the NBI Codes? | Yes ____ No ____ |
|-----------------------------------------|

(page 1 of 2)
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<td>QC Reviewer:</td>
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<td>Inspection Date:</td>
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<tr>
<td>Does the verbiage within the report support the condition states?</td>
<td>Yes ____ No ____</td>
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<tr>
<td>Were proper safety procedures practiced?</td>
<td>Yes ____ No ____</td>
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<tr>
<td>Are the existing repairs supported by the inspection findings?</td>
<td>Yes ____ No ____</td>
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<td>Are improvement processes necessary?</td>
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Appendix 7-H  Bridge Preservation Office Quality Assurance Bridge Selection Process

The following table identifies categories used to help evaluate whether or not the random selection is representative sample of the previous seasons inspections. If a particular category is not considered to be covered sufficiently, additional bridges can be traded out in order to establish more representative coverage. The selection set for the office and field review will include a minimum of 100 bridges of the previous year’s inspections. Like the NBIP compliance review trips performed in Washington state, the QA selection process as of 2014 uses a three-year cycle in which bridges are selected from two different regions each year. In this three-year cycle, a random set of bridges are selected and receive a QA inspection from each of the six regions. In addition to this cycle and due to the number of bridges in the Northwest Region, a smaller sampling of bridges (one or at most two inspection trips depending on complexity of bridges) will be selected from this region. This will be done in the off cycle years in order to maintain a representative sample of bridges within that region in the overall three-year cycle.

The three-year cycle will pair up the following regions:
- SCR and EAR (includes a small set in NWR)
- OLR and SWR (includes a small set in NWR)
- NWR and NCR

The final list developed prior to generating a random sample is screened for inspection types that consist of Routine, Safety or Short Span type inspections. The list is also screened for bridges that have been previously QA’d. Once a final list of bridges is developed, a random list is generated. The first 100 bridges are selected and represent the final short list for QA office and field review for that year. This final short list is then validated for reasonable representation of the categories listed below.

As an option, a minimum of five bridges previously receiving a quality assurance review, excluding work from the previous QA inspection season, can be added to the final short list for the season. The goal of doing this is to validate whether or not suggested changes in the report that reflect correct office procedures and federal requirements have been implemented or not. These bridges may be chosen by the QA Engineer to best fit within proximities of the randomly selected bridges.

- Region
- Scour Code
- Primary Material Type
- Open/Closed/Posted
- Primary Design Type
- Year Built
- Inspection Type
- Inspection Frequency
- By Team Leader
- NBI Reportable
- Sufficiency Rating
- Bridge Length
- Structurally Deficient/Functionally Obsolete (SD/FO)
- High Risk
BPO Scope of Field Review

The selection process above does not eliminate any bridges because of size or complexity. The typical bridge will be inspected in its entirety. However, the scope of field review for larger and more complex bridges is entirely a different matter. The process for QA inspection for these types of structures will be more case by case. The idea will be that some of all of the components for these particular bridges will be inspected. The QA process should consider both time and size in determining how to reach this goal for these types of bridges. Traffic windows, lane closure manpower, species windows, and equipment availability are other factors that will influence the ability for one QA team to accomplish a smaller scale inspection of a larger more complex structure.
Appendix 7-I  Bridge Preservation Office Field Review

The following is a list of contents in a typical bridge file for structures owned by the State of Washington which also includes Washington State Ferries (WSF) structures.

- Letter file contents include:
- Deck and Elevation Photos (More recent photos are stored on BEISt)
- Vicinity map
- Load Rating summary sheet
- Scour Summary sheet**
- Signed Inspection reports
- Fracture Critical report*
- Underwater (U/W) report*
- WSBIS forms (in file drawer)
- Correspondence
- Maintenance records
- Plan sheets (Most plans are stored on BEISt)

*For bridges with underwater and/or fracture critical inspections.
**For bridges over water.
Appendix 7-J       LP Quality Assurance Deficiencies

LP has established a procedure for documenting and reporting deficiencies found during Quality Assurance reviews of a local agency.

If deficiencies exist, the local agency will be sent a letter or email requesting that any missing documentation be submitted or provide a plan of corrective action, for LP's approval, to correct the deficiency within 60 days. This notification will be first in the form of email or other correspondence with the LP Bridge Office. If corrections are not made within 60 days of notification, the second notification will be a formal letter of non-compliance from the LP Engineering Services Manager.

Finally, failure to carry out the plan of corrective action will result in formal notification from the Director of LP that federal funds may be restricted until compliance is met. If continued deficiencies are found in subsequent reviews of the agency's procedures, management practices, or systems, or if specific inspection errors continue, LP will work with the agency to further determine the cause of the problems and will recommend addition training for the both the Bridge Program Manager and the Bridge Inspection Team Leader.

When a local agency is notified of deficiencies to correct, the LP Local Agency Bridge Engineer will notify and include the Statewide Program Manager (SPM) on all plans of corrective action and status updates to the plans of corrective action.