Chapter 7 Quality Control/Quality Assurance

7-1 General

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

The guidelines presented herein are those in use by the WSDOT Bridge Preservation Office (BPO). Sections 7-2 through 7-8 pertain to the QC/QA program implemented by the BPO. The QC/QA procedures established for local agencies are contained within the Local Agency Guidelines (LAG) Manual.

The QC/QA programs documented in this chapter, including the appendices, have been approved for use by the Federal Highway Administration (FHWA).

Any QC/QA program being developed will want to reflect on the five areas identified in 23 CFR 650.307 through 23 CFR 650.315 and 23 CFR 650.507 through 23 CFR 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 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 (23 CFR 650.307 and 23 CFR 650.507)
- Inspection Staff Qualifications and Re-Certification (23 CFR 650.309 and 23 CFR 650.509)
- Inspection Interval (23 CFR 650.311 and 23 CFR 650.511)
- Inspection Procedures (23 CFR 650.313 and 23 CFR 650.513)
- Inventory (23 CFR 650.315 and 23 CFR 650.515)

There are also many sources of information available that can help an agency in developing their own QC/QA programs. Authored by Dr. Glen Washer and Dr. C. Alec Chang, *Guideline for Implementing Quality Control and Quality Assurance for Bridge Inspection*, was sponsored by AASHTO to assist bridge owners 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.

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 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 review 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 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, including QC))

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*

The WSDOT Coding and Appraisal Unit maintains bridge and tunnel inspection reports for WSDOT structures in accordance with the NBIS 23 CFR 650.307(e)(5) and the NTIS 23 CFR 650.507(e)(2).

7-3.2 *Processing Inspection Reports*

Field Inspections – Bridge inspection reports are processed by the Bridge Data Steward after 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 WSBIS database.

When an inspection report is released for digital signature, the Bridge Data Steward has completed the process. The inspectors are automatically notified via email to digitally sign the reports using the BridgeWorks application, and when both signatures are added the report is automatically loaded onto BEISt.

When inspection reports are released for hand signature, the Bridge Data Steward then coordinates with the inspectors and others in the Unit to get the reports signed, scanned, and loaded onto the BEISt website. For both digitally signed and hand signed reports, the Bridge Data Steward then sends the WSBIS report with initials validating the inspector QC process to the Bridge Resource Technician, who also receives any hand signed inspection reports from the inspectors.

Informational Reports – The WSBIS 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 report describing the changes made.

7-3.3 Coding New and Repaired/Rehabilitated Structures

This Unit tracks bridge and tunnel construction with regular monitoring of several WSDOT sources, including CCIS and Unifier. Contracts are reviewed and when new or repaired/ rehabilitated structures are identified they are tracked in the ContractHistory database. When plans are available and the construction work is nearing completion, new or updated inventory inspections are added to the WSBIS database. For new bridges, inspection supervisors are notified to coordinate the initial inspection. For repaired/ rehabilitated bridges, inspection supervisors are not notified but contract information is available in the record for use by the next scheduled inspection team.

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 WSBIS database.

7-3.4 Data Concurrency

The Bridge Geometric Engineer is responsible to make sure that select 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.

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 Bridge Inspector Certification System (BrICS). 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 structures with new load ratings shall be fully checked by another engineer. For updated ratings by BPO, the Engineer of Record shall do a QC of the existing rating as part of the update; a checker might not be needed. Ratings submitted to WSDOT by consultants shall be reviewed as described below.

- 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 represents 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.

Data Check: Query database for superstructure or substructure with SNBI Condition 4 or less. Evaluate whether any of the structures will require updating and address accordingly. QC or independently load rate a minimum of eight structures per calendar year for state bridges. Condition of the superstructure or substructure will be the main factors in choosing the bridges as well as evaluating ratings completed by consultants or by WSDOT.

7-5 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.

7-5.1 *Bridge Selection Criteria*

- All state bridges in which the scour code has changed since the last inspection.
- All state bridges in which the POA has changed regarding new directions to the regions.
- All new state bridges over water.
- 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.

7-5.2 *Office Review*

- Verify that each bridge over water has a scour summary sheet, scour calculations if appropriate, a bridge layout sheet and initial ground line drawings.
- Verify that the bridge is properly coded (NBI 1680 and SNBI B.AP.03) based on a documented scour assessment. If scour calculations have been made and are available for review, verify that the assessment complies with the calculated scour or that documented justification to disregard the calculations is available.
- Verify that each scour critical bridge has a Scour Plan of Action and that it has clear direction for the field staff to follow.
- Review waterway adequacy code (1662) for accuracy.

7-5.3 *On Site Field Review*

- Verify when the scour code (1680) is coded a 7, 4 and 2 or less in the bridge inspection report that it reflects the field conditions.
- Verify from both office and field that the scour note (1680) added to all bridges over water has clear and direct information.
- Verify any scour related concerns such as exposed footings, channel migration, presence or need for countermeasures.
- Verify that the POAs reflect the conditions in the field.
- Verify the channel protection code (1677, SNBI B.C0.9 and B.C.10) for accuracy.
- Verify that the channel protection note (1677) adequately reflects site conditions.
- Verify BMS 361 (SNBI B.C.11) for completeness and accuracy of coding/condition states.
- Review 1662 code and note, if applicable, and observe for indications of highway or bridge deck overtopping.

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 NSTM, In-Depth, Interim, Damage, Complex Feature, 48-month Interval, Initial and Local Agency inspection reports under their responsibility. Reports outside the above criteria, and not meeting "Team Leader Approval" criteria, receive a lower level of review. See Appendix 7-D for specific criteria. The reviews are random regarding Team Leaders and are based on complexity and risk of structures and report.

The Special Structures Engineer reviews 100 percent of the following structural reports: Special Structures Bridges, Tunnels, and Ferry Terminals. In rare cases, a review by a second Team Leader may be substituted for Special Structures Engineer review.

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 Interval –** Verify that inspection interval is based on condition or office policy (i.e., 48-month interval criteria).
- **Inspection Hours** – Verify that the correct inspection hours are reported based on history of previous report hours, structure type and condition.
- **Organization of Report** – Verify that the report is organized, understandable, and 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 current inspection report content.
- **Follow-Up Actions on 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 Finding Damage Report (CFDR) –** Verify that CFDRs 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 generally scheduled to inspect bridges randomly. This limits the same bridges getting inspected by the same Team Leader repetitively.
- Both Regional Inspection Engineers can review bridge inspection reports written by all Team Leaders that perform regional bridge inspections at the BPO.
- All changes made or suggested for any 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 Condition Engineer or Program Manager 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, up to 2 percent of all structural inspections should be 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 regional and special structure inspection engineers an opportunity to observe how all Team Leaders are evaluating structures, relative to the NBI and office procedures, policies and requirements

The following are the expectations that the regional and special structures inspection engineers have regarding the variance of coding elements, condition codes and condition states:

- NBI Condition Codes “Deck, Superstructure, and Substructure,” shall be within plus or minus 1 for codes 5 or higher. Codes of 4 or less will not deviate.
- BMS elements: there should be no missing elements.
- BMS condition states: verbiage in the report should be supportive of the condition state ratings and quantities.
- Repairs, all repairs need to be supported by inspection observations.

All deviations from the above standards are documented, and the regional and special structures inspection supervisors shall dialogue one-on-one with the Team Leader responsible for the report concerning all deviations. It is the responsibility of the team leader’s direct supervisor to determine if more training is necessary for the Team Leader to ensure 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:

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 inspections performed each year.

7-8 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 23 CFR 650.307 through 23 CFR 650.315 and 23 CFR 650.507 through 23 CFR 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 23 CFR 650.305 and 23 CFR 650.505 as the use of sampling and other measures to ensure 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 23 CFR 650.307(e), 23 CFR 650.313(p), 23 CFR 650.507(e), and 23 CFR 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 one when evaluating 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-I).
   - Load ratings.

   Review of load rating information:
   - Load posting at bridge matches that of load rating documentation.
   - Reported load rating factors match information recorded on load rating summary sheet.
   - Summary sheet in the letter file is signed and stamped by Engineer of Record (EOR).

   Inspection reports:
   - Appropriate report forms:
     - NSTM report
     - Underwater Inspection report
     - Complex Feature Inspection report
     - Damage inspections
   - Bridges on 48-month interval.
   - 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/SNBI coding and element level 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 Appendices

Appendix 7-A	Vacated
Appendix 7-B	Vacated
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 Quality Assurance Bridge File Review

This page intentionally left blank.

Appendix 7-A Vacated

This page intentionally left blank.

Appendix 7-B Vacated

This page intentionally left blank.

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 (new SNBI fields will be identified in 2025):

   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

f**ed_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.

This page intentionally left blank.

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 Team Leader.

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 Team Leader.

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 (Initial Inspections).
4. Interim Inspections to monitor deterioration of BMS elements.
5. NSTM bridges.
6. Local Agency bridges.
7. UBIT Bridge Inspections with NBI codes for Deck, Superstructure or Substructure are less than 6.
8. Any inspection with a interval >24 months.
9. Any bridge that is currently having issues with scour.
10. Any time an inspection/report type and/or interval is either changed, added, or deleted.

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

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

This page intentionally left blank.

Appendix 7-E Bridge Preservation Office Quality Control Review Tracking Form

2011 Inspection Report Status

EXAMPLE

									Non UBIT Totals = 10						UBIT Totals= 10					
									Routine	Short	Damage	Interim	Safety	Hours	Routine	Interim	F.C.	Special	UBIT Hours	
	Total	Structure ID	Bridge Number	Bridge Name	Lead Inspector	CO-Inspector	Inspection Date	Date Received	8	0	1	0	1	10.5	3	1	6	0	107.5	Returned to Lead
Routines	1	0009245A	16/120	OLYMPIC DR NW OVER SR 16	WDS	HDR	1/4/11	1/6/11			1			1.5						1/6/11
	2	0017677A	285/10P	GEORGE SELLAR PED TUNNEL	GAS	GAS	1/8/11	3/21/11					1	1.0						3/22/11
	3	0013077C	2/101	SLOUGH	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
	4	0013077D	2/102	STREAM	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
	5	0006347A	9/117	SNOHOMISH R OVERFLOW	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
	6	0008375C	405/103E	228TH ST OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
	7	0008375D	405/103W	228TH ST OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
	8	0008673D	512/23N	FRUITLAND AVE OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
	9	0008673C	512/23S	FRUITLAND AVE OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
	10	0008761A	522/142	SR 522 OVER W MAIN ST	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
UBITS	1	0003477A	285/10	SEN. GEORGE SELLAR BR.	GFC	ABK	1/8/11	[illegible]									1		28.0	1/27/11
	2	0002001B	2/215	WENATCHEE R	DCC	TKK	4/5/11	[illegible]									1		7.0	5/10/11
	3	0002657A	207/4	WENATCHEE RIVER	DCC	TKK	4/6/11	5/4/11									1		8.0	5/10/11
	4	0008116A	5/345W	NISQUALLY R	DAG	AES	4/17/11	[illegible]									1		14.0	5/10/11
	5	0013731C	504/36	MARATTA CREEK	RAA	RCD	[illegible]	[illegible]							1				2.5	5/12/11
	6	0005358A	509/30	DRY GULCH	RAA	RCD	[illegible]	[illegible]								1			1.0	5/12/11
	7	0013620A	504/27	HOFFSTADT CREEK	RAA	RCD	5/5/11	[illegible]									1		23.0	6/6/11
	8	0002069A	5/345E	NISQUALLY RIVER	RAA	RCD	5/1/11	[illegible]									1		18.0	6/7/11
	9	0008175E	167/127E	BN RR OC (NP)	RAA	RCD	[illegible]	6/8/11							1				3.0	6/8/11
	10	0008175F	167/127W	BN RR OC (NP)	RAA	RCD	[illegible]	6/8/11							1				3.0	6/8/11

This page intentionally left blank.

Appendix 7-F Bridge Preservation Office Quality Control Report Review Tracking Form

2011 REPORT REVIEW STATUS

REVIEW DATE	REPORT DATE	006/115	INSPECTOR	APPROVAL STATUS	COMMENTS
03/26	02/28	006/101	FPP/WAW	AAN	
03/29	03/19	099/540NB	DCC/GAS	AAN	
03/29	03/19	099/540SB	DCC/GAS	AAN	
03/30	03/20	099/540W-S	DCC/GAS	APPROVED	
03/30	03/07	08507600	WDS/AES	AAN	LA Centralia
03/30	03/21	08039100	WDS/TJN	APPROVED	LA Klickitat County
03/30	03/21	08118500	WDS/TJN	AAN	LA Klickitat County
03/30	03/08	08201200	WDS/AES	AAN	LA Lewis County
03/31	03/24	08647200	WDS/SMP	AAN	LA State Park
03/31	03/23	08276000	WDS/TJN	AAN	LA Clark County
03/31	03/22	0012160A	WDS/TJN	AAN	LA Skamania County
03/31	03/22	08218700	WDS/TJN	AAN	LA Klickitat County
03/31	03/07	08288400	JED/TJN	AAN	LA Yakima County
04/01	03/08	08396900	JED/TJN	AAN	LA Yakima County
04/01	03/07	08651000	JED/TJN	AAN	LA Yakima County
04/04	03/17	08271700	DAG/TJN	AAN	LA Cowlitz County
04/04	03/15	08557500	DAG/TJN	AAN	LA Longview
04/04	03/15	08558400	DAG/TJN	AAN	LA Longview
04/04	03/03	0009236C	DAG/TKK	APPROVED	LA Cowlitz County
04/05	03/03	167/112W	DAG/TKK	AAN	
04/05	02/28	167/110	DAG/TKK	AAN	
04/05	03/03	167/116	DAG/TKK	APPROVED	
04/05	03/03	167/112W-N	DAG/TKK	AAN	
04/05	03/03	167/111W-N	DAG/TKK	AAN	
04/05	03/02	167/123W	DAG/TKK	AAN	
04/05	03/02	167/129	DAG/TKK	AAN	
04/05	03/02	167/131.25	DAG/TKK	AAN	
04/05	03/28	0010756A	DAG/HDR	AAN	LA Cowlitz County
04/05	03/29	08492300	DAG/HDR	AAN	LA Cowlitz County
04/05	03/14	0003093A	DAG/TJN	AAN	LA Kelso
04/06	03/09	08230200	WDS/AES	AAN	LA Cowlitz County
04/06	03/31	08164100	DAG/[illegible]	AAN	LA Cowlitz County
04/06	03/03	005/626.5A	JHL/RCD	APPROVED	
04/06	03/01	020/223N	JHL/RCD	APPROVED	
04/06	03/02	005/706	JHL/RCD	AAN	
04/06	03/03	005/651W	JHL/RCD	AAN	void under south approach
04/06	03/02	005/708	JHL/RCD	AAN	
04/06	03/03	005/726E	JHL/RCD	APPROVED	

This page intentionally left blank.

Appendix 7-G Bridge Preservation Office Quality Control Field Review Form

Field Review

2012 WASHINGTON STATE QUALITY CONTROL REVIEW

Bridge Number: _____ Bridge Name: _____
Inspectors: _____ QC Reviewer: _____
Inspection Date: _____
Frequency: _____
Previous Report Date _____

Description of Quality Control Method
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 _____

Field Review

2012 WASHINGTON STATE QUALITY CONTROL REVIEW

Bridge Number: _____ Bridge Name: _____

Inspectors: _____ QC Reviewer: _____

Inspection Date:

Does the verbiage within the report support the condition states?	Yes _____ No _____
Were proper safety procedures practiced?	Yes _____ No _____
Are the existing repairs supported by the inspection findings?	Yes _____ No _____
Are improvement processes necessary?	Yes _____ No _____

(page 2 of 2)

Appendix 7-H Bridge Preservation Office Quality Assurance Bridge Selection Process

This appendix describes two possible methods for selecting a random sample for QA. The goal of the program is to QA approximately 5% of bridges inspected each calendar year.

The first method, like the NBIP compliance review trips performed in Washington state, the QA selection process may use a three-year cycle in which bridges are selected from two different regions each year. In this three-year cycle, a random set of state bridges are selected and receive a QA inspection from two 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 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 second method will take a random set of state bridges representing all six regions within the state. Due to the disparity in the number of bridges within each region and to get a representative sample, this method may be required. Bridges within the Northwest Region will represent the largest percentage of the random sample due to the number of bridges within that region.

The final list developed prior to generating a random sample is screened for inspection types that consist of a reportable Routine type inspection. 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 a 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 maximum of five bridges previously receiving a QA 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 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.

The following list identifies categories used to help evaluate whether or not the random selection is representative sample of the previous season's 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.

- Region
- Scour Code
- Primary Material Type
- Open/Closed/Posted
- Primary Design Type
- Year Built
- Inspection Type
- Inspection Interval
- By Team Leader
- NBI Reportable
- Bridge Length
- 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 Quality Assurance Bridge File 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
- NSTM Inspection report*
- Complex Feature Inspection report*
- Underwater (U/W) Inspection report*
- WSBIS forms (in file drawer)
- Correspondence
- Maintenance records
- Plan sheets (Most plans are stored on BEISt)

*For bridges that may include an underwater, NSTM and/or Complex Feature inspections.
**For bridges over water.

This page intentionally left blank.