

STRUCTURE AND BRIDGE DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Bridge Safety Inspection QC/QA Program	NUMBER: IIM-S&B-78
SPECIFIC SUBJECT: Establishing Quality Control and Quality Assurance Procedures to Maintain a High Degree of Accuracy and Consistency in the Inspection Program	Date: January 7, 2008
	SUPERSEDES: None
DIVISION ADMINISTRATOR APPROVAL: Kendal R. Walus, P.E. / Original Signed State Structure and Bridge Engineer Approved January 7, 2008	

EFFECTIVE DATE: This memorandum is effective upon receipt.

PURPOSE:

The NBIS in Title 23 (Highways) of the Code of Federal Regulations Part 650.313(g) was amended in January 2005, which requires each state to “Assure systematic quality control and quality assurance procedures are used to maintain a high degree of accuracy and consistency in the inspection program. Include periodic field review of inspection teams, periodic bridge inspection refresher training for Program Managers and Team Leaders, and independent review of inspection reports and computations.” The following outlines the minimum acceptable standards for VDOT’s quality control and quality assurance program.

INTRODUCTION

Bridge safety inspection is required by the Federal Highway Administration (FHWA) and state policy. Inspection procedures and requirements are detailed in the National Bridge Inspection Standards (NBIS) in Title 23 (Highways) of the Code of Federal Regulations Part 650 and in the latest Virginia Department of Transportation (VDOT) Informational & Instructional Memorandum dealing with bridge inspection. Accuracy, thoroughness and completeness of bridge safety inspections are essential for the evaluation of a structure's safety and for decisions on planning, budgeting, and performing of maintenance, repair, rehabilitation and replacement of our bridges. Since 1991 VDOT has had in place a policy for the quality control and quality assurance of the bridge safety inspection program. The NBIS in Title 23 (Highways) of the Code of Federal Regulations Part 650.313(g) was amended in January 2005, which requires each state to "Assure systematic quality control and quality assurance procedures are used to maintain a high degree of accuracy and consistency in the inspection program. Include periodic field review of inspection teams, periodic bridge inspection refresher training for Program Managers and Team Leaders, and independent review of inspection reports and computations." The following outlines the minimum acceptable standards for VDOT's quality control and quality assurance program.

The procedures set forth herein apply to employees of VDOT, employees of any consultant firm providing inspection services to VDOT and to agencies and municipalities that have the responsibility of providing inspection services to structures that they maintain.

Where applicable, VDOT has adopted the definitions and qualifications as set forth in the NBIS. This has been noted in the pertinent sections that follow.

Unless otherwise stated the term 'Team Leader' within this document refers to the individual who is in charge of an inspection team.

DEFINITIONS

Quality Assurance (QA)

The NBIS gives the following definition – "The use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program."

Quality Control (QC)

The NBIS gives the following definition – "Procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level."

Program Manager

The NBIS give the following definition – "The individual in charge of the program, that has been assigned or delegated the duties and responsibilities for bridge inspection, reporting, or inventory. The program manager provides overall leadership and is available to inspection team leaders to provide guidance."

Each District shall have one individual with the qualifications of a Program Manager who is responsible for the bridge inspection program within the District. In addition, the Central Office shall have one individual with the qualifications of a

Program Manager who is responsible for the bridge inspection program statewide.

Team Leader

The NBIS gives the following definition – “Individual in charge of an inspection team responsible for planning, preparing, and performing field inspection of the bridge.”

The Team Leader is responsible for the overall management/supervision of an inspection team composed of one or more inspectors. The Team Leader assures that inspections within the jurisdiction of the team are performed on-time and in accordance with the NBIS and VDOT’s latest policies and procedures.

Inspector Senior

This position is not defined by the NBIS. This position meets the minimum NBIS qualification of a team leader. VDOT defines this position as the individual who may be in charge of an inspection team and is responsible for the planning and preparation required before performing a field inspection of a bridge.

This position differs from a Team Leader in that the Inspector Senior is not responsible for the overall management of a team, may not have supervisory responsibilities of other inspectors and may not lead a team on a daily basis.

Inspector

This position is not defined by the NBIS. VDOT defines this position as the individual who assists a Team Leader or Inspector Senior in the inspection of a structure.

Load Rater

This role is responsible for determining the safe load-carrying capacity of a structure in accordance with the ‘Manual for Condition Evaluation of Bridges’, published by the American Association of State Highway Transportation Officials (AASHTO), and VDOT’s current load rating guidelines.

QUALIFICATIONS

For Program Managers, Team Leaders and Inspector Seniors performing or supervising inspections in Virginia and for those performing load ratings, the ‘Qualification of Personnel’ form in Appendix A shall be submitted to and approved by the Central Office Structure and Bridge Division prior to the individual performing inspections or rating bridges. The form shall be resubmitted when data other than years of experience changes.

Program Manager

The qualifications are the same as those detailed for a Program Manager in the NBIS. A Program Manager must, at a minimum:

- (1) Be a registered professional engineer, or have ten years bridge inspection experience; and
- (2) Successfully complete a FHWA approved comprehensive bridge inspection training course.

Team Leader

The qualifications are the same as those detailed for a Team Leader in the NBIS.

There are five ways to qualify as a team leader. A team leader must, at a minimum:

- (1) Have the qualifications specified for the Program Manager; or
- (2) Have five years bridge inspection experience and have successfully completed an FHWA approved comprehensive bridge inspection training course; or
- (3) Be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer's program for National Certification in Engineering Technologies (NICET) and have successfully completed an FHWA approved comprehensive bridge inspection training course; or
- (4) Have all of the following:
 - (i) A bachelor's degree in engineering from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology;
 - (ii) Successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals of Engineering examination;
 - (iii) Two years of bridge inspection experience; and
 - (iv) Successfully completed an FHWA approved comprehensive bridge inspection training course; or
- (5) Have all of the following:
 - (i) An associate's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology;
 - (ii) Four years of bridge inspection experience; and
 - (iii) Successfully completed an FHWA approved comprehensive bridge inspection training course.

Inspector Senior

This position requires the same qualifications as a Team Leader.

Inspector

This is considered an entry level position and there are no specific qualification requirements. However, it is preferred that the individual have a background in bridge maintenance or construction.

Load Rater

The NBIS states that the individual charged with the overall responsibility for load rating structures must be a registered professional engineer. In addition, VDOT prefers that the individual also have a background in bridge design, bridge inspection, and bridge maintenance and/or bridge construction.

Underwater Bridge Inspection Diver

The qualifications are the same as those detailed for underwater bridge inspection diver in the NBIS.

An underwater bridge inspection diver must complete an FHWA approved comprehensive bridge inspection training course or other FHWA approved underwater diver bridge inspection training course, and shall meet the qualifications for diving as set forth in the VDOT 'Dive Safety Manual'.

TRAINING AND CERTIFICATION

The NBIS requires Program Managers and Team Leaders to successfully complete an FHWA approved comprehensive bridge inspection training course, within VDOT all bridge safety inspection personnel shall successfully complete the National Highway Institute (NHI) course 'Safety Inspection of In-Service Bridges' (FHWA-NHI-130055) within the first five years of employment in bridge inspection. In addition, VDOT inspection personnel shall successfully complete the NHI course 'Bridge Inspection Refresher Training' (FHWA-NHI-130053) every three years. Successful completion of either course shall mean obtaining a grade of 70 or better.

VDOT's Employee Health and Safety Division requires additional training and/or certification for bridge safety inspectors which may include, but are not limited to the following: CPR, Fall Protection, Confined Space, Lead Base Abatement, etc. It's the responsibility of the Program Managers in the districts and central office to ensure full compliance with all required training and certification.

Additionally, VDOT underwater inspectors shall fulfill the training requirements as set forth in the VDOT 'Dive Safety Manual'.

Other recommended training is:

- Engineering Concepts for Bridge Inspectors (FHWA-NHI-130054)
- Fracture Critical Inspection Techniques for Steel Bridges (FHWA-NHI-130078)
- Bridge Coatings Inspections (FHWA-NHI-130079)
- Inspection and Maintenance of Ancillary Highway Structures (FHWA-NHI-130087)
- Hazardous Bridge Coatings: Design and Management of Maintenance and Removal Operations (FHWA-NHI-130069)
- College level courses in statics, steel design, concrete design and strength of materials.

REVIEW AND VALIDATION PROCEDURES

Both the Central Office and the Districts have a responsibility to review and validate inspection reports and inventory data. Discrepancies found during field and office reviews performed by both District and Central Office personnel shall be documented in a written report and shared with all parties involved. An action plan shall be developed to address any found discrepancies. The action plan shall include the discrepancy found, the corrective action required, an estimated compliance date and the responsible person (see Appendix B).

It is important that 'best practices' are shared throughout the state. It is also important to correct inaccuracies that are discovered that indicate a misunderstanding or misapplication of a policy/procedure. Each year a summary report shall be compiled of the findings of the Central Office review and sent to all Districts by March of each year.

District – General

The District Program Manager shall select, at a minimum one municipality or agency per year within the District for review and validation of inspection reports, inventory data and their overall program. This review shall be at the same level as the review performed on VDOT inspectors and records. The review requirements are described below under the office and field reviews.

For Districts that have three or less municipalities or agencies, the District Program Manager shall assure that each entity is reviewed at least once every three years.

District - Office Review

An office review of every inspection report including structures owned by municipalities and other entities shall be made by the District Program Manager or their designee. If the review process is conducted by a designated individual other than the Program Manager, the designee, at minimum shall have the same qualifications as a Team Leader.

The review shall be documented by the reviewer initialing and dating the inspection report. While not considered a comprehensive list, the reports should be reviewed for their:

- Organization
- Quantification
- General condition ratings within 1(+/-) of the reviewers estimate
- Element data
- Maintenance and repair recommendations
- Fracture critical documentation and sketches
- Fatigue prone documentation and sketches
- Timely completion of the report
- Timely completion of load rating analysis when necessary
- Other required supporting documentation, including photographs, sketches, etc.

District - Field Review

Field reviews of structures shall be made by the District Program Manager. These reviews shall consist of a minimum of four structures per team per year and shall include consultant inspectors. All selected structures for review shall have received an inspection within six months of the field review. It is recommended that the inspections reviewed be selected from those structures that have:

- A significant change in the condition rating(s) since the last inspection.
- A second opinion requested by the inspector.
- Condition ratings appearing questionable.
- A designation of structurally deficient or functionally obsolete.
- The possibility of posting or reducing the posting due to items found during an inspection.
- Critical or near critical conditions.
- Special inspection requirements.
- Fracture critical structures
- Field posted structures

At a minimum, one field review shall be performed while an inspection is being performed for each inspection team. Reviews should also include a cursory verification of the information on the structure inventory sheets.

A standard 'check list' shall be used during the field reviews to assist in assuring all items to be reviewed have been considered (See Appendix C). Findings during the field review shall be discussed with the lead inspector when a discrepancy is detected. A list of all structures reviewed in the field along with all associated documentation shall be kept on file for a minimum of a two (2) year period.

Central Office – General

The Central Office Program Manager is responsible for reviewing the inspection programs in all nine Districts. Every effort will be made to review the inspection program of all nine Districts annually, however, at minimum four District's inspection programs will be reviewed annually. The review will focus on validation of inspection reports, inventory data and the overall program within the respective District. In each District an office review and field reviews shall be performed. All structures selected for review shall have received an inspection within six months of the review and a minimum of two reports shall be selected for each inspector that has signed a report including consultant inspectors within that six months. The selection of structures shall include structures with special inspection needs such as fracture critical members, fatigue prone details, etc. and structures that have had 'Critical Recommendations' During the review, one municipality or agency within the District shall be chosen for review and validation of inspection reports, inventory data and the overall program within the municipality or agency. This review shall be at the same level as the District review.

In addition to the overall review of the Districts inspection programs, the Central Office Program Manager or his designee will review a minimum of five percent of all completed inspection reports annually. The review shall be documented by the reviewer and tracked by the Program Manager. All discrepancies shall be documented and brought to the attention of the responsible program manager in the district.

Central Office – Office Review

During the office review, items to be examined for adherence to federal and state policy and guidelines shall include but are not limited to the following:

- District's documentation of its quality assurance reviews
- District's process for notifying Residencies of emergency work and/or posting required
- 'Critical Recommendations'
 - Distribution when required
 - Work completed in a timely manner
 - Follow-up inspections are performed in a timely manner on the completed work
- Maintenance and repair recommendations
- Inspection folder
 - Organization
 - Complete history available
 - Fracture critical members documentation and sketches
 - Fatigue prone details documentation and sketches
 - Ultrasonic inspection documentation

- Vertical clearance documentation
- Load Rating Analysis information
- Pertinent plan sheets available
- Encroachment documentation
- Scour reports
- Inspection reports
 - Organization
 - Proper quantification
 - Condition ratings are within 1(+/-) of the reviewers estimate.
 - Reviewer's initials (Program Manager or designee)
 - Fracture critical members documentation and sketches
 - Fatigue prone details documentation and sketches
 - Timely completion of inspection reports
 - Timely completion of load rating analysis
- Check for past due and/or delinquent inspections. Is there an action plan for having these structures inspected? If the structures are in another entity was the proper notification made?
- Load rating analysis being performed when required and in a timely manner
- Updates to the electronic databases (HTRIS, Pontis, Teamsite, etc) are done in a timely manner
- Use of 'Preventative Maintenance Forms'
- Review qualifications of personnel
- Certifications and medical checks current (Standard First Aid, CPR, lead testing, etc.)
- Review previous QA's performed and the Districts follow-up on recommendations

Central Office – Field Review

A standard 'check sheet' shall be used during the field reviews to assist in assuring all items to be reviewed have been considered (see Appendix C). During the field review items to be examined for adherence to federal and state policy and guidelines shall include but are not limited to the following:

Inspection reports

- Accurate representation of field conditions
- Organization
- Proper quantification
- Reviewer's initials by the District Program Manager or their designee
- Fracture critical members documentation and sketches
- Fatigue prone details documentation and sketches
- Adherence to NBI and Pontis rating guidelines
- Appropriate use of photos
- Appropriate use of sketches and tables
- Channel profile documentation and sketches
- Underwater inspection reports included and/or referenced
- Appropriate recommendations are made
- Proper weight restriction and advance warning signs, including placement

CC: Chief Engineer
Chief of Systems Operations
Division Administrators under the Chief Engineer
Division Administrators under the Chief of Systems Operations
Local Assistance Division Director
District Administrators
District Maintenance Engineers
District Structure and Bridge Engineers
Assistant State Structure and Bridge Engineers
Structure and Bridge Transportation Engineer Program Supervisors
Federal Highway Administration

APPENDIX A

QUALIFICATION OF PERSONNEL

NAME: _____

FIRM: _____

INSPECTION LOCALE: _____

Use a separate form for each District/Office, municipality or other entity where inspections are performed.

TITLE (within your organization): _____

DATE FORM COMPLETED: _____

1. Within your organization, does the individual listed above have the duties of:
 - Program Manager - The individual in charge of the program, that has been assigned or delegated the duties and responsibilities for bridge inspection, reporting, or inventory. The program manager provides overall leadership and is available to inspection Team Leaders to provide guidance.
 - Team Leader - Individual in charge of an inspection team responsible for planning, preparing, and performing field inspection of the bridge.
 - Inspector Senior - individual who may be in charge of an inspection team and is responsible for the planning and preparation required before performing a field inspection of a bridge..
 - Load Rater - Individual who is responsible for determining the safe load-carrying capacity of a structure.

2. Is the individual listed above a registered professional engineer? Yes No
If yes, in what state(s)? _____.

3. Has the individual listed above successfully completed a Federal Highway Administration (FHWA) approved comprehensive bridge inspection training course? Yes No
If yes, note the date of the latest course completed _____.

4. Has the individual listed above successfully completed a Federal Highway Administration (FHWA) approved bridge inspection refresher training course? Yes No
If yes, note the date of the latest course completed _____.

5. Is the individual listed above certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer's program for National Institute for Certification in Engineering Technologies (NICET)? Yes No
If yes, note the level and certification number _____.

6. Does the individual listed above possess a bachelor's degree in engineering from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology? Yes No

7. Does the individual listed above possess an associate's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology? Yes No

8. Has the individual listed above successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals of Engineering examination? Yes No

9. List the number of years the individual listed above has actively participated in bridge inspections in accordance with the NBIS, in either a field inspection, supervisory, or management role. A combination of bridge design, bridge maintenance, bridge construction and bridge inspection experience, with the predominant amount, or more than fifty percent, in bridge inspection, is acceptable. _____ years.

APPENDIX B
ACTION PLAN

ITEM NO.	REVIEW CONCERN	CORRECTIVE ACTION	ESTIMATED COMPLIANCE DATE	RESPONSIBLE PERSON/POSITION	RESPONSE BY DISTRICT/MUNICIPALITY
1					
2					
3					
4					
5					
6					
7					
8					
9					

APPENDIX C

**STRUCTURE & BRIDGE
QA INSPECTION**

County/Str. No.		Date of QA Inspection:	
Route:		Name of QA Inspector:	
Facility Carried:			
Feature Intersected:		Date of Inspection:	
		Name of Team Leader:	

NBI ITEM	Q/A GENERAL CONDITION RATING	REPORT GENERAL CONDITION RATING
Deck		
Superstructure		
Substructure		
Channel		
Culvert		

PONTIS	ELEMENT NUMBER	UNIT	CONDITION STATE 1	CONDITION STATE 2	CONDITION STATE 3	CONDITION STATE 4	CONDITION STATE 5
REPORT							
QA							
REPORT							
QA							
REPORT							
QA							
REPORT							
QA							
REPORT							
QA							
REPORT							
QA							
REPORT							
QA							

(use additional sheets if necessary)

