Quality Control *and* Quality Assurance Procedures *for the* INDOT and County Bridge Inspections

Presented by:
Michael W. Cox, PE
& Tyler Wolf, PE
Beam, Longest and Neff, LLC

Quality Control Procedures

- Internal review process (District or Consultant)
- Similar to current INDOT/LPA design process (QA Form)
- Focus on at-risk bridges
- Office and field reviews

Quality Control Procedures

- **Time added is approximately 2 days per inventory**
- **Procedures began for INDOT Team Leaders in June 2010**
- **For Consultants, the QC Procedures will need to be conducted on all Phase I Inspections after September 30, 2010**

Quality Control Procedures

- **Designate a Quality Control Officer**
  - Consultant—Another Team Leader within firm (direct supervisor or a program manager)
  - INDOT District—District Bridge Engineer
  - Firms w/o active 2nd team leader—shall use another firm
  - Not the team leader of original inspection team

Quality Control Office Review

- **Not practical to thoroughly review all items**
- **Items to review**
  - Inspection performed on time
  - Review noted deficiencies and compare to recommended maintenance and repair
  - Were critical findings properly handled
  - Review load ratings
  - Photos taken for condition ratings of 4 or less
  - Has scour plan of actions been updated

Quality Control Office Review

- **Sampling of County-owned bridges**
  - Minimum of 5% or 5 bridges, whichever is greater
  - Maximum of 15
- **Sampling of INDOT District bridges**
  - 5 bridges per team leader, per quarter

Quality Control Office Review

- **Sampling County-owned bridges**
  - Selected structures with structural condition rating of a 4 or less
  - Selected structures posted 10 tons or less
  - Minimum of 5% or 5, whichever is greater
  - Maximum of 15
  - Select lowest sufficiency ratings if no low-condition ratings or posted bridges

Example: QC Office Review Form

BRIDGE INSPECTION MANUAL Appendix A

PART 2: QA/QC Quality Control Office Review Form (Internal)

APPENDIX A QUALITY CONTROL OFFICE REVIEW FORM (INTERNAL)

(One copy of this sheet shall be filled out for each Inspection Team Leader.) Date: _____

Company/District: _____

Quality Control Officer: _____

QCO Team Leader No.: _____

Team Leader: _____

Team Leader No.: _____

Team Members: _____

County/County No.: _____

List Selected Bridges _____ _____ _____

(5% or 5 min) (15 max): _____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

The Quality Control Office Review shall be performed on selected bridges that meet any of the following criteria:

- A rating of 4 or less for Items 58, 59, 60, or 62
- A rating that changed by 2 or more for Items 58, 59, 60, or 62
- Posted for 10 tons or less
- A rating of 3 or less for Item 113A

For bridges inspected by Inspection Consultants, the minimum number of bridges to undergo the Quality Control Office Review shall be the greater of five percent of the total number of bridges, or five bridges.

The maximum number of bridges required to undergo the Quality Control Office Review shall be 15 bridges.

If the number of bridges which meet the sampling criteria is less than the minimum number listed above, the bridges with the lowest sufficiency ratings shall be selected for the remaining bridges for the Quality Control Office Review. If multiple Inspection Team Leaders are involved in the inspections, all efforts shall be made to review every Inspection Team Leader.

For bridges inspected by state employees, five bridges per Inspection Team Leader, per quarter, shall be reviewed by the Quality Control Officer for the above criteria. In addition, if the Inspection Team Leader is responsible for any Fracture Critical or Special Inspections, one of each shall be sampled for each of these inspection types, per quarter.

Example: QC Office Review Form

BRIDGE INSPECTION MANUAL Appendix A

PART 2: QA/QC Quality Control Office Review Form (Internal)

Date: _____ Bridge No. _____

Office Review Form – (One copy of this sheet shall be filled out for each bridge.)

Item #	Items to Review
1	All inspectors qualified
2	Inspection completed within the required frequency
3	Ratings of 4 or less for Items 58, 59, 60, or 62 have been documented properly (photos, notes, and sketches)
4	Critical Deficiencies properly handled (Part 1 – Section 7)
5	Load ratings performed and reflect current site conditions (Part 3)
6	Posting policies have been complied with (Part 3)
7	Maintenance and repair items reflective of noted deficiencies
8	"Estimated Year Remaining Life" values consistent with the condition ratings
9	Bridge files contain all available data (Part 1 – Section 5)
10	Priority schedule consistent with the bridge usage and deterioration
11	If required, scour Plan of Action developed, on file, and current (Part 4 – Section 7)
12	Printed inspection report uses standard format

Provide items reviewed, printed name, and signature in space below.

Item(s)	Inspection Team Leader	Quality Control Officer

Quality Control Field Review

- Evaluates condition ratings assigned
- Various inventory items
- Adequacy of photo documentation
- Review recommended maintenance and repair recommendations
- Review condition ratings of a 4 or less
- Verify proper postings
- Verify scour documentation and scour plan of action

Quality Control Field Review

- **Sampling County-owned bridges**
  - Selected structures with structural condition rating of a 4 or less
  - Selected structures posted 10 tons or less
  - Minimum of 5% or 5, whichever is greater
  - Maximum of 15
  - Select lowest sufficiency ratings if no low-condition ratings or posted bridges

Quality Control Field Review

- **Sampling INDOT District bridges**
  - 5 bridges per team leader per quarter
  - Fracture Critical & Special Detail Inspections do not require QC due to special access equipment requirements

Example: QC Field Review Form

BRIDGE INSPECTION MANUAL Appendix B

PART 2: QA/QC Quality Control Field Review Form (Internal)

APPENDIX B QUALITY CONTROL FIELD REVIEW FORM (INTERNAL)

(One copy of this sheet shall be filled out for each Inspection Team Leader.) Date: _____

Company/District: _____

Quality Control Officer: _____

Team Leader No.: _____

Team Leader: _____

Team Leader No.: _____

Team Members: _____

County/County No.: _____

List Selected Bridges _____ _____ _____

(5% or 5 min) (15 max): _____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

The Quality Control Field Review shall be performed on selected bridges that meet any of the following criteria:

- A rating of 4 or less for Items 58, 59, 60, or 62
- A rating that changed by two or more for Items 58, 59, 60, or 62
- A rating of 3 or less for Item 113A
- Posted for 10 tons or less

The minimum number of bridges to undergo the Quality Control Field Review shall be the greater of five percent of the total number of bridges inspected, or five bridges.

The maximum number of bridges required to undergo the Quality Control Field Review shall be 15 bridges

If the number of bridges which meet the sampling criteria exceeds 15 bridges, then only 15 bridges are required to be reviewed. If multiple Inspection Team Leaders are involved in the inspections, all efforts shall be made to review every Inspection Team Leader.

For bridges inspected by state employees, five bridges per Inspection Team Leader, per quarter, shall be reviewed by the Quality Control Officer for the above criteria. In addition, if the Inspection Team Leader is responsible for any Fracture Critical or Special Inspections, one of each shall be sampled for each of these inspection types, per quarter.

Example: QC Field Review Form

BRIDGE INSPECTION MANUAL Appendix B

PART 2: QA/QC Quality Control Field Review Form (Internal)

Date: _____ Bridge No. _____

QC #	Items to Review
1	Main structure type correct (43A)
2	"One Lane Bridge" or "Narrow Bridge" (51, 28A, 102, & 41) postings in place; if not, is it recommended (41)?
3	Load limit (66B) bridge postings in place (66C & 70); if not, is it recommended (41)?
4	Bridge rail and approach coding (36A) acceptable
5	Foundation type acceptable (113B)
6	Maintenance and repair items properly addressed
7	Photos taken of load posting
8	Photos taken of condition ratings of 4 or less for Items 58, 59, 60, or 62
9	Channel profiles or cross-sections taken for all bridges
10	If scour noted, was it adequately documented?
11	If deterioration noted, was it adequately documented?
12	Stream channel alignment problems are noted using sketches

Example: QC Field Review Form

BRIDGE INSPECTION MANUAL Appendix B

PART 2: QA/QC Quality Control Field Review Form (Internal)

Date: _____ Bridge No. _____

QC #		Ratings		QCO Concur*	
		Prev. Inv.	Curr. Inv.	Yes	No
15	Item 58: Deck			☐	☐
16	Item 59. Superstructure			☐	☐
17	Item 60: Substructure			☐	☐
18	Item 62: Culvert			☐	☐
19	Item 113A: Scour Critical Bridge			☐	☐

*The Quality Control Officer shall provide concurrence for all items coded a 4 or less, or a change of two or more from the previous inspection. If no ratings are 4 or less, a minimum of one item is to be concurred with.

Comments:

Provide items reviewed, printed name, and signature in space below.

QC Nos.	Inspection Team Leader	Quality Control Officer

Example: QC Field Review Form

BRIDGE INSPECTION MANUAL — Appendix C

PART 2: QA/QC — Quality Control Field Log Form

APPENDIX C QUALITY CONTROL FIELD LOG FORM

NBI #	County/ District / Toll Road / LA	Bridge #	Item 43A Bridge Type	Item 58 Deck	Item 59 Super	Item 60 Sub.	Item 62 Culv.	Item 113A Scour	Item 66B H Rating	Suff. Rating	Date of Field Rev.	Team Leader Name

All bridges that meet the sampling criteria shall be input into the Quality Control Log Form; however, only bridges reviewed by the Quality Control Officer (QCO) should have values in the "Date of Field Review" field. If additional structures were added to meet the minimum number of reviewed bridges criteria, these should also be listed on the form.

Submitted by QCO: _____ **Date:** _____
(Signature)

Printed Name: _____ **Company/District:** _____

Submission to INDOT—Data Review

- After the internal review is complete—submit to QC Data Officer (Gerald)
- QC data review shall be 30 days maximum
- If errors found—correct and then 30 days reset
- Sampling—100% of data reviewed
- Inspect Tech program should minimize error issues

Submission to INDOT—Report Review

- **After the data review is complete—submit to QC Report Officer (Debbie)**
- **Submission requirements**
  - All summary reports
  - SIA's for 5 bridges with lowest sufficiency ratings
  - Entire special inspection reports
- **Level 1 Review**
  - Ensure Federal and State reports are included
  - Ensure individual SIA's utilize appropriate forms
  - Verify inspector meets requirements

Continued…

Submission to INDOT—Report Review

- **Level 2 Review (Not INDOT)**
  - All requirements of the Level 1 Review
  - Verify deficiencies are documented with photos
  - Proper recommended actions are stated in reports
- **Sampling**
  - Level 1—100% of reports submitted
  - Level 2—5% of reports submitted
- **QC Report review shall be 30 days maximum**
- **If errors found—correct and then 30 days reset**
- **Inspect Tech will set up majority of up front summary reports**

Quality Assurance Procedures

- **INDOT or INDOT's designate will be the quality assurance officer**
- **Ensure adherence to FHWA and INDOT criteria**
- **Review includes team leader's choice of:**
  - Inspection equipment
  - Information gathering methods
  - Time and frequency of inspection
- **Review quality control efforts**
- **Office and field reviews**

Quality Assurance Office and Field Reviews

- Ensure consistency of data collection
- Ensure QC efforts are equally effective
- Results gathered from QC data and report reviews
- Results provided on quarterly basis to INDOT/FHWA
- If district or county consultant is selected, they will be asked to complete a questionnaire

Quality Assurance Office and Field Reviews

BRIDGE INSPECTION MANUAL — Appendix D

PART 2: QA/QC — Quality Assurance Questionnaire

APPENDIX D QUALITY ASSURANCE QUESTIONNAIRE

(To be completed by the District Engineer or Inspection Consultant)

Date	Inspection Agency Under Review	District/County/Toll Road/LA

QUALIFICATIONS

Refer to Part 1, Section 2.4 of the Indiana Bridge Inspection Manual for personnel qualification requirements.

Quality Control Officer – Person in charge of inspection program

Name: _____

Team Leader No: _____

Registered Professional Engineer: ☐ Yes ☐ No Complex Bridge Certified: ☐ Yes ☐ No

Inspection Team Leaders – Personnel that sign the inspection reports

Name: _____

Team Leader No: _____

Registered Professional Engineer: ☐ Yes ☐ No Complex Bridge Certified: ☐ Yes ☐ No

Name: _____

Team Leader No: _____

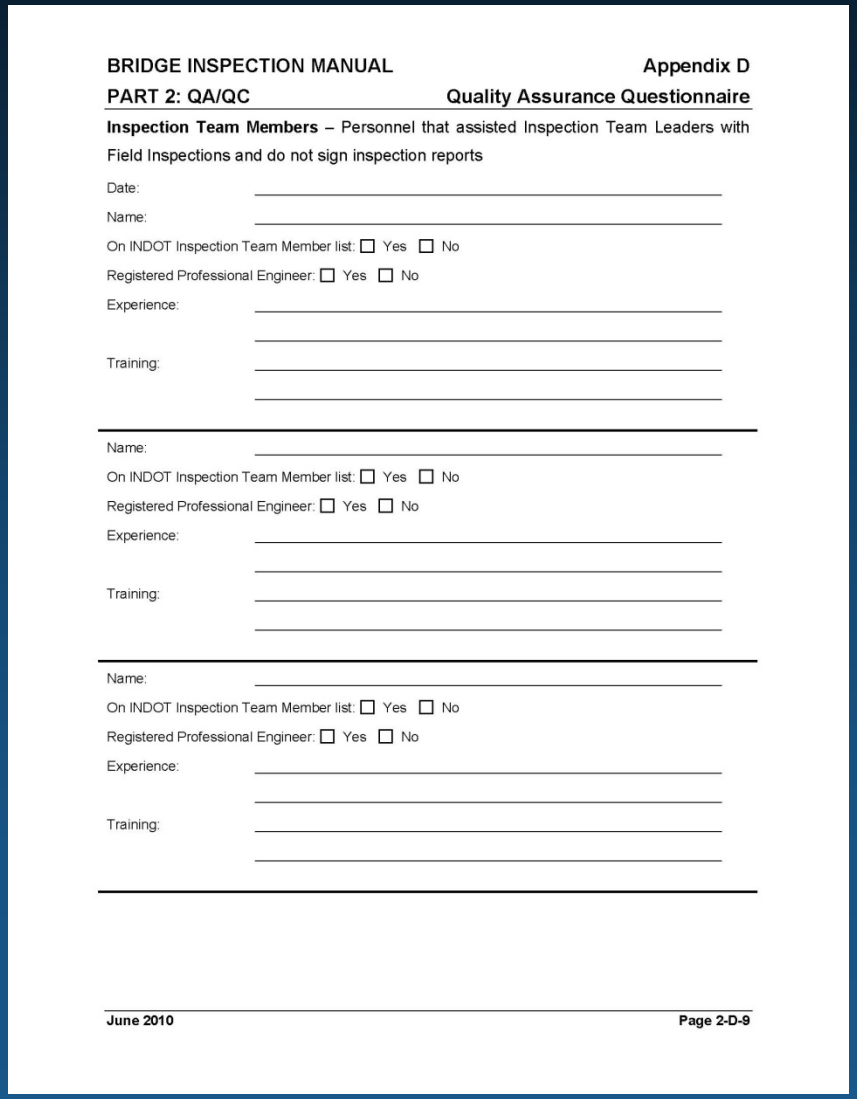
Registered Professional Engineer: ☐ Yes ☐ No Complex Bridge Certified: ☐ Yes ☐ No

Name: _____

Team Leader No: _____

Registered Professional Engineer: ☐ Yes ☐ No Complex Bridge Certified: ☐ Yes ☐ No

Quality Assurance Office and Field Reviews



BRIDGE INSPECTION MANUAL — Appendix D

PART 2: QA/QC — Quality Assurance Questionnaire

Inspection Team Members – Personnel that assisted Inspection Team Leaders with Field Inspections and do not sign inspection reports

Date: _____

Name: _____

On INDOT Inspection Team Member list: ☐ Yes ☐ No

Registered Professional Engineer: ☐ Yes ☐ No

Experience: _____

_____

Training: _____

_____

Name: _____

On INDOT Inspection Team Member list: ☐ Yes ☐ No

Registered Professional Engineer: ☐ Yes ☐ No

Experience: _____

_____

Training: _____

_____

Name: _____

On INDOT Inspection Team Member list: ☐ Yes ☐ No

Registered Professional Engineer: ☐ Yes ☐ No

Experience: _____

_____

Training: _____

_____

June 2010 — Page 2-D-9

Quality Assurance Office and Field Reviews

BRIDGE INSPECTION MANUAL **Appendix D**

PART 2: QA/QC **Quality Assurance Questionnaire**

RECORD KEEPING

Bridge owners should maintain a complete, accurate, and current record of each bridge under their jurisdiction. Complete information, in good usable form, is vital to the effective management of bridges. Such information also provides a record which may be important in legal action.

Bridge File – The bridge file should contain all cumulative information about each individual bridge.

Location of bridge file: _____

Date: _____

File accessible to users: ☐ Yes ☐ No

Length of time information is kept in the file: _____

Comments: _____

_____

_____

Planning and Scheduling

Number of bridges Inspection Team Leaders responsible to inspect (per Inspection Team Leader): ____

Number of inspections performed in the past calendar year (per Inspection Team Leader): _____

Load-Posted/Closed Bridges

Number of bridges posted or closed: _____

Computations or summary on file for load-posted/closed bridges (provide number): _____

Computations or summary not on file for load-posted/closed bridges (provide number): _____

Comments: _____

_____

_____

Routine Inspections

Number of inspections performed within the recommended frequency (provide number): _____

Number of inspections performed outside of the recommended frequency: _____

Number of bridges scheduled for a Routine Inspection at less than a 24-month frequency: _____

Comments: _____

_____

_____

June 2010 **Page 2-D-10**

Quality Assurance Office and Field Reviews

BRIDGE INSPECTION MANUAL **Appendix D**

PART 2: QA/QC **Quality Assurance Questionnaire**

Special Inspections

Number of bridges that require part or all of the bridge to be examined in more detail or at a greater frequency than standard for Routine Inspections:

____ Cantilevered Bearings
____ Cover Plates
____ Fatigue Details E and E'
____ Hinge Connections
____ Pin or Hinge Connections
____ Hangers
____ Hoan Details
____ Bridges Crossing Major Rivers
____ Cable-Stayed Bridges
____ Suspension Bridges
____ Timber-Covered Bridge
____ Steel Box Girders
____ Movable Bridges
____ Bridges With Post-Tensioned Elements
____ Bridges or Details as Determined by the State Program Manager
____ Primary Truss Gusset Plates With Corrosion and Difficulty Quantifying Section Loss

Fracture Critical Inspections

Number of bridges requiring a Fracture Critical Inspection: _____

Number of Fracture Critical Inspections performed within the recommended frequency: _____

Number of Inspections performed outside of the recommended frequency: _____

Underwater Inspections

Number of bridges requiring an Underwater Inspection: _____

Bridge No.	Inspection Frequency	Bridge No.	Inspection Frequency

Scour Critical Bridges

Number of Scour Critical Bridges: _____

Number of bridges that require inspections at a reduced frequency due to scour issues: _____

Number of Scour Critical bridges with a scour Plan of Action on file: _____

Number of Scour Critical bridges without a scour Plan of Action on file: _____

Comments: _____

Quality Assurance Office and Field Reviews

Unknown Foundations

Review the steps taken to eliminate unknown foundations, classify the scour risk for bridges with unknown foundations, and provide an appropriate Plan of Action:

_____

_____

_____

_____

Movable Bridge Inspections

Number of movable bridges: _____

Bridge No.	Inspection Frequency
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Coordination with Bridge Owner

The bridge file should contain all cumulative information about each individual bridge.

List inspector's contacts for emergency closures or repairs: _____

_____

List who has authority to close a bridge in an emergency: _____

_____

List who has authority to open a bridge: _____

_____

_____ _____ _____

(Inspection Team Leader Printed Name) (Inspection Team Leader Signature) (Date)

Quality Assurance Office Review

- **Consists of reviewing the bridge files**
- **Two levels of review**
  - Level 1—cursory review of file
  - Level 2—thorough review of file

Quality Assurance Office Review—Level 1

- Verify bridge plans are available
- Verify load rating calculations are on file
- Verify scour plan of actions are on file
- Verify pertinent correspondence on file
- Verify team leader documentation

Quality Assurance Office Review—Level 1

APPENDIX E QUALITY ASSURANCE OFFICE REVIEW – LEVEL I

Date	District/Consultant Under Review	Bridge Number

RECORD KEEPING

Bridge owners should maintain a complete, accurate, and current record of each bridge under their jurisdiction. Complete information, in good usable form, is vital to the effective management of bridges. Such information also provides a record which may be important in legal action.

Bridge File – The bridge file should contain all cumulative information about each individual bridge.

Location of bridge file: _____

File accessible to users: ☐ Yes ☐ No

Comments: _____

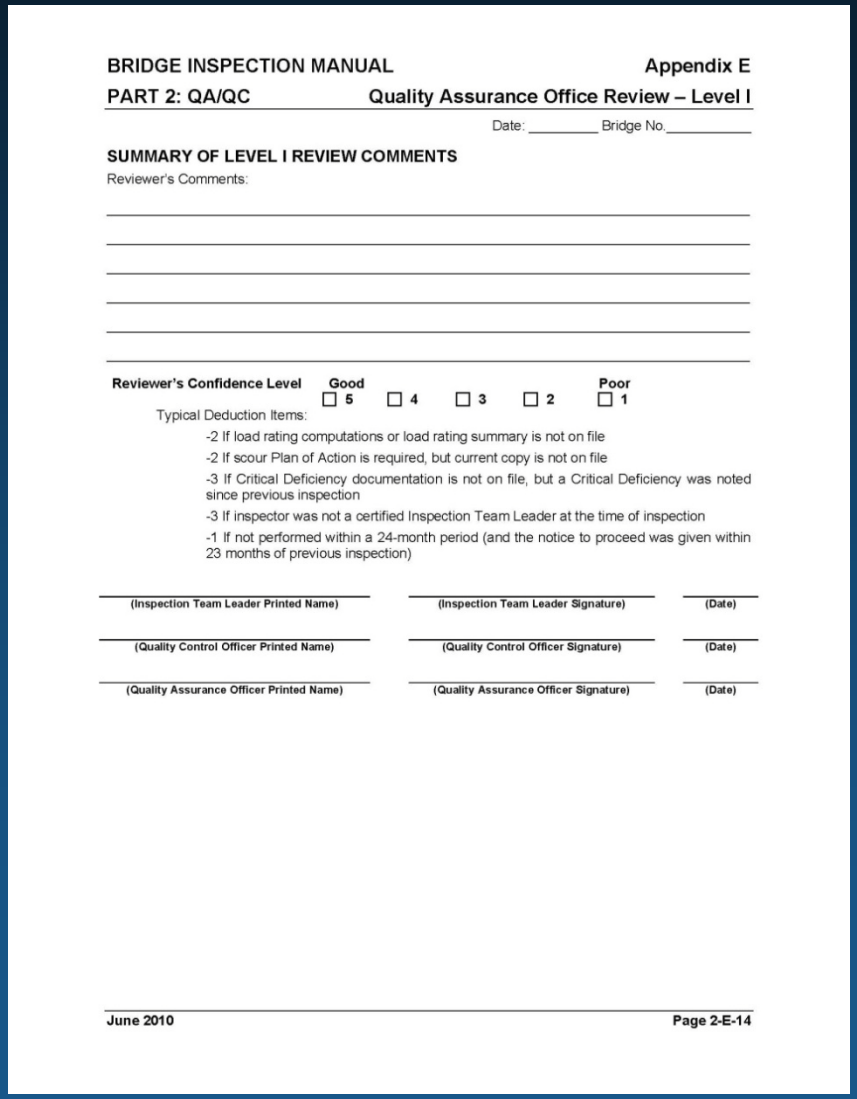
_____

_____

Bridge File Documents

Yes	No	N/A	Document
☐	☐	☐	Bridge design plans, as-builts, and/or rehab plans
☐	☐	☐	Correspondence
☐	☐	☐	Load rating analysis computations or load rating summary
☐	☐	☐	Initial/inventory update inspection reports
☐	☐	☐	Inspector qualification records
☐	☐	☐	Routine Inspection performed within 24 months of previous inspection
☐	☐	☐	Critical Deficiency documentation current
☐	☐	☐	Scour Plan of Action
			Additional Inspections
☐	☐	☐	Damage Inspection reports
☐	☐	☐	Special Inspection reports
☐	☐	☐	Fracture Critical reports
☐	☐	☐	Underwater Inspection reports
☐	☐	☐	Border Bridge Inspection reports
☐	☐	☐	Other

Quality Assurance Office Review—Level 1



BRIDGE INSPECTION MANUAL Appendix E

PART 2: QA/QC Quality Assurance Office Review – Level I

Date: _____ Bridge No._____

SUMMARY OF LEVEL I REVIEW COMMENTS

Reviewer's Comments:

_____

_____

_____

_____

_____

_____

Reviewer's Confidence Level Good ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 Poor

Typical Deduction Items:

-2 If load rating computations or load rating summary is not on file

-2 If scour Plan of Action is required, but current copy is not on file

-3 If Critical Deficiency documentation is not on file, but a Critical Deficiency was noted since previous inspection

-3 If inspector was not a certified Inspection Team Leader at the time of inspection

-1 If not performed within a 24-month period (and the notice to proceed was given within 23 months of previous inspection)

(Inspection Team Leader Printed Name)	(Inspection Team Leader Signature)	(Date)
(Quality Control Officer Printed Name)	(Quality Control Officer Signature)	(Date)
(Quality Assurance Officer Printed Name)	(Quality Assurance Officer Signature)	(Date)

June 2010 Page 2-E-14

Quality Assurance Office Review—Level 2

- All requirements of Level 1
- Load rating verification (Stage I, II or III)
- Verify documentation of deficiencies for baseline
- Verify special inspections on file

Quality Assurance Office Review—Load Rating Verification

- **Stage I**
  - Compare load rating with proper posting
  - Verify PE involved in calculations
- **Stage II**
  - Review calculations for assumptions
  - % deterioration included?
  - Rehabilitation made to bridge?
- **Stage III**
  - Independent recalculation of load rating
  - Tolerance level is 2 tons

Quality Assurance Office Review

- **Sampling**
  - 2 INDOT Districts each year
  - 2 Counties in each district each year
  - No County reviewed twice within five years
  - 8 bridge files reviewed for Level I
  - 4 bridge files reviewed for Level II
    - At least one bridge—Stage II load rating
    - At least one bridge—Stage III load rating

Example: QA Office Review Form

BRIDGE INSPECTION MANUAL — Appendix F

PART 2: QA/QC — Quality Assurance Office Review – Level II

APPENDIX F — QUALITY ASSURANCE OFFICE REVIEW – LEVEL II

Date	Inspection Agency Under Review	Bridge Number

RECORD KEEPING

Bridge owners should maintain a complete, accurate, and current record of each bridge under their jurisdiction. Complete information, in good usable form, is vital to the effective management of bridges. Such information also provides a record which may be important in legal action.

Bridge File – The bridge file should contain all cumulative information about each individual bridge.

Location of bridge file: _____

File accessible to users: ☐ Yes ☐ No

Comments: _____

Bridge File Documents

Yes	No	N/A	Document
☐	☐	☐	Available bridge design plans, as-builts, and/or rehab plans
☐	☐	☐	Correspondence
☐	☐	☐	Load rating analysis computations or load rating summary
☐	☐	☐	Initial/inventory update inspection reports
☐	☐	☐	Inspector qualification records
☐	☐	☐	Routine Inspection performed within 24 months of previous inspection
☐	☐	☐	Critical Deficiency documentation current
☐	☐	☐	Scour Plan of Action
			Additional Inspections
☐	☐	☐	Damage Inspection reports
☐	☐	☐	Special Inspection reports
☐	☐	☐	Fracture Critical reports
☐	☐	☐	Underwater Inspection reports
☐	☐	☐	Border Bridge Inspection reports
☐	☐	☐	Other

Example: QA Office Review Form

BRIDGE INSPECTION MANUAL **Appendix F**

PART 2: QA/QC **Quality Assurance Office Review – Level II**

Date: _____ Bridge No._____

INSPECTION

Bridge Inspections are conducted to determine the physical and functional condition of the bridge. Successful bridge inspection is dependent on proper planning and techniques, adequate equipment, and the experience and reliability of the personnel performing the inspection.

Planning and Scheduling

Previous inspection reports available for review: ☐ Yes ☐ No

Comments: _____

_____

_____

Initial Inspections – New and Rehabilitated Structures

Previous inspection reports available for review: ☐ Yes ☐ No ☐ NA

Bridge inspection forms updated to reflect modifications: ☐ Yes ☐ No ☐ NA

Comments: _____

_____

_____

Routine Inspections

List frequency for Routine Inspection (in months): _____

ADDITIONAL INSPECTIONS

Damage Inspections

Bridge load posted due to damage: ☐ Yes ☐ No ☐ NA

Bridge closed due to damage: ☐ Yes ☐ No ☐ NA

Previous inspection reports available for review: ☐ Yes ☐ No ☐ NA

Bridge Inspection Report Form updated to reflect modifications: ☐ Yes ☐ No ☐ NA

Load Posted/Closed Bridges

Bridge re-load rated: ☐ Yes ☐ No ☐ NA

Load limit reduced: ☐ Yes ☐ No ☐ NA

Describe how load posting and/or closure was determined: ☐ Calculated ☐ Deterioration ☐ Other ☐ NA

Comments: _____

_____

_____

Example: QA Office Review Form

BRIDGE INSPECTION MANUAL **Appendix F**

PART 2: QA/QC **Quality Assurance Office Review – Level II**

Date: _____ Bridge No._____

Fracture Critical Inspections

List frequency for Fracture Critical Inspection (in months): _____

Fracture Critical Inspection Plan of Action adequately documented: ☐ Yes ☐ No ☐ NA

Scour Critical Bridges

Describe how Scour Critical Rating determined (N/A if determined previously and not documented):

☐ Calculated ☐ Visually ☐ Other ☐ NA

_____

_____

_____

LOAD RATINGS

Stage I

Load rating performed (by summary or calculation): ☐ Yes ☐ No ☐ NA

Professional Engineer involved: ☐ Yes ☐ No ☐ NA

Calculations checked: ☐ Yes ☐ No ☐ NA

How was the load rating determined?

☐ Calculation ☐ Deterioration ☐ Summary ☐ Standards ☐ Other

Comments: _____

_____

_____

Stage II (Complete Stage I Also)

Adequate documentation of assumptions: ☐ Yes ☐ No ☐ NA

Deterioration of bridge accounted for: ☐ Yes ☐ No ☐ NA

Stage III (Complete Stage I & II Also)

Post-inspection review performed on subject bridge: ☐ Yes ☐ No

Quality Assurance Officer's calculated load rating: ___ H-20 Inv ___ HS-20 Inv. ___ HS-20 Oper.

Inspection Agency's load rating: ___ H-20 Inv ___ HS-20 Inv. ___ HS-20 Oper.

Inspection Agency's load rating within two tons of QAO's load rating: ☐ Yes ☐ No ____ Difference

Comments: _____

_____

_____

Example: QA Office Review Form

BRIDGE INSPECTION MANUAL **Appendix F**

PART 2: QA/QC **Quality Assurance Office Review – Level II**

Date: _____ Bridge No._____

FOLLOW-UP ACTIONS

Each inspection report shall be reviewed by the owner for completeness and recommendations. The inspector's recommendations should be considered for implementation within the limits established for public safety, cost effectiveness, and fiscal restraints.

Inspectors inform maintenance personnel/owner about maintenance/repair needs: ☐ Yes ☐ No ☐ NA

Repair/maintenance recommendations are consistent with deterioration: ☐ Yes ☐ No ☐ NA

Estimated repair costs provided to owner (N/A for state-owned bridges): ☐ Yes ☐ No ☐ NA

Deterioration provided to Load Rating Team Leader (Load Rating Team Leader may also be the Inspection Team Leader): ☐ Yes ☐ No ☐ NA

INSPECTED AGENCY COMMENTS

1. Please take this opportunity to ask questions or make comments about the State Bridge Inspection Program.

2. Do the bridge Inspection Team Members feel they have enough time / equipment / training / experience to do their jobs properly?

Example: QA Office Review Form

BRIDGE INSPECTION MANUAL **Appendix F**

PART 2: QA/QC **Quality Assurance Office Review – Level II**

Date: _____ Bridge No._____

SUMMARY OF LEVEL II REVIEW COMMENTS

Reviewer's Comments

_____

_____

_____

_____

_____

_____

Reviewer's Confidence Level **Good** ☐ 5 ☐ 4 ☐ 3 ☐ 2 **Poor** ☐ 1

Deduction Items:

-2 If load rating computations or load rating summary is not on file

-2 If scour Plan of Action is required, but current copy is not on file

-3 If Critical Deficiency documentation is not on file, but a Critical Deficiency was noted since previous inspection

-3 If inspector was not a certified Inspection Team Leader at the time of inspection

-1 If not performed within a 24-month period (and the notice to proceed was given within 23 months of previous inspection)

-2 If load rating computations are not within two tons of QAO value (Stage III review only)

(Inspection Team Leader Printed Name)	(Inspection Team Leader Signature)	(Date)
(Quality Control Officer Printed Name)	(Quality Control Officer Signature)	(Date)
(Quality Assurance Officer Printed Name)	(Quality Assurance Officer Signature)	(Date)

Quality Assurance Peer Field Review

- Ensure proper equipment utilized
- Proper safety measurements utilized
- Coordinate with team leader on schedule and bridge types
- QA officer (QAO) observes team leader
- Evaluation includes time, equipment, safety, access methods and thoroughness
- QAO shall not impede the inspection
- Field performance review form will be completed

Quality Assurance Peer Field Review

- **Sampling—Routine Inspections**
  - 5 bridges in each district annually
  - 5 bridges from 12 Counties annually
  - No county reviewed twice within a 4 year cycle
- **Sampling—Special Inspections**
  - 1 bridge in each district annually
  - 1 bridge from 12 Counties annually
  - No County reviewed twice within a 4 year cycle
- **Scoring on peer field review form**

Example: Peer Field Review Form

APPENDIX G QUALITY ASSURANCE PEER FIELD REVIEW

Quality Control Officer: _____

Team Leader No.: _____

Company/District: _____

Team Leader: _____

Team Leader No.: _____

Company/District: _____

Team Members: _____

County: _____

County No.: _____

Bridge No: _____

NBI No.: _____

Road Name: _____

Crossing: _____

Inspection Date: _____

Inspection Type: ☐ Routine ☐ Fracture Critical ☐ Underwater ☐ Special

Inspection Start Time: _____

Inspection Complete Time: _____

Example: Peer Field Review Form

BRIDGE INSPECTION MANUAL — Appendix G

PART 2: QA/QC — Quality Assurance Peer Field Review

Routine Inspection Review

Review each question below and record the score reduction in each blank below. It is possible to use a lower reduction than the maximum possible reduction listed below. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

Performance Review	Yes	No	N/A	Max Reduc.	Score
1. Inspections completed in a thorough manner	☐	☐	☐	-15	
2. Bridge cleaned if needed (Part 1 – 4.3.3)	☐	☐	☐	-10	
3. Critical areas inspected	☐	☐	☐	-20	
4. Deficiencies measured	☐	☐	☐	-10	
5. Proper equipment and appropriate safety measures used (Part 1- 4.5, 4.6, 4.7)	☐	☐	☐	-10	
6. Channel profile or cross-section measured (Part 1 – 3.4.2)	☐	☐	☐	-5	
7. Submerged substructure units probed (if an Underwater Inspection not required) (Part 1 – 3.4.2)	☐	☐	☐	-10	
8. Photos taken of deteriorated portions of the structure (Part 1 – 3.4.2)	☐	☐	☐	-20	
9. Inspection team has the proper qualifications (Part 1 – 2.4)	☐	☐	☐	-10	
				Total	

Score: 100-____ = _____

Comments:

_____

_____

Safety Equipment Used/Not Used:

_____

_____

Example: Peer Field Review Form

BRIDGE INSPECTION MANUAL **Appendix G**

PART 2: QA/QC **Quality Assurance Peer Field Review**

Fracture Critical/Special Inspection Review

Review each question below and record the score reduction in each blank below. It is possible to use a lower reduction than the maximum possible reduction listed below. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

Performance Review	Yes	No	N/A	Max Reduc.	Score
1. Inspections completed in a thorough manner	☐	☐	☐	-15	
2. Bridge cleaned if needed (Part 1 – 4.3.3)	☐	☐	☐	-10	
3. Critical areas inspected	☐	☐	☐	-20	
4. Deficiencies measured	☐	☐	☐	-10	
5. Proper equipment and appropriate safety measures used (Part 1 – 4.5, 4.6, 4.7)	☐	☐	☐	-10	
6. 100% hands-on inspection of all nonredundant members performed (Part 1 – 3.5.2)	☐	☐	☐	-15	
7. Photos taken of deteriorated portions of the structure (Part 4 – 11.6.6)	☐	☐	☐	-20	
8. Inspection team has the proper qualifications (Part 1 – 2.4)	☐	☐	☐	-10	
				Total	

Score: 100-____ = _____

Comments:

_____

_____

Safety Equipment Used/Not Used:

_____

_____

Example: Peer Field Review Form

BRIDGE INSPECTION MANUAL **Appendix G**

PART 2: QA/QC **Quality Assurance Peer Field Review**

Underwater Inspection Review

Review each question below and record the score reduction in each blank below. It is possible to use a lower reduction than the maximum possible reduction listed below. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

Performance Review	Yes	No	N/A	Max Reduc.	Score
1. Safety briefing conducted with emergency information and pre-dive checks	☐	☐	☐	-20	
2. Waterline measured to reference point on bridge (Part 1 – 3.9.2)	☐	☐	☐	-5	
3. All required soundings recorded (Part 1 – 3.9.2)	☐	☐	☐	-10	
4. Photos taken	☐	☐	☐	-5	
5. All appropriate dive equipment checked and used	☐	☐	☐	-20	
6. Inspection notes recorded	☐	☐	☐	-10	
7. Inspection team has the proper qualifications (Part 1 – 2.4)	☐	☐	☐	-20	
				Total	

Score: 100-_____ = _____

Comments:

_____

_____

Safety Equipment Used/Not Used:

_____

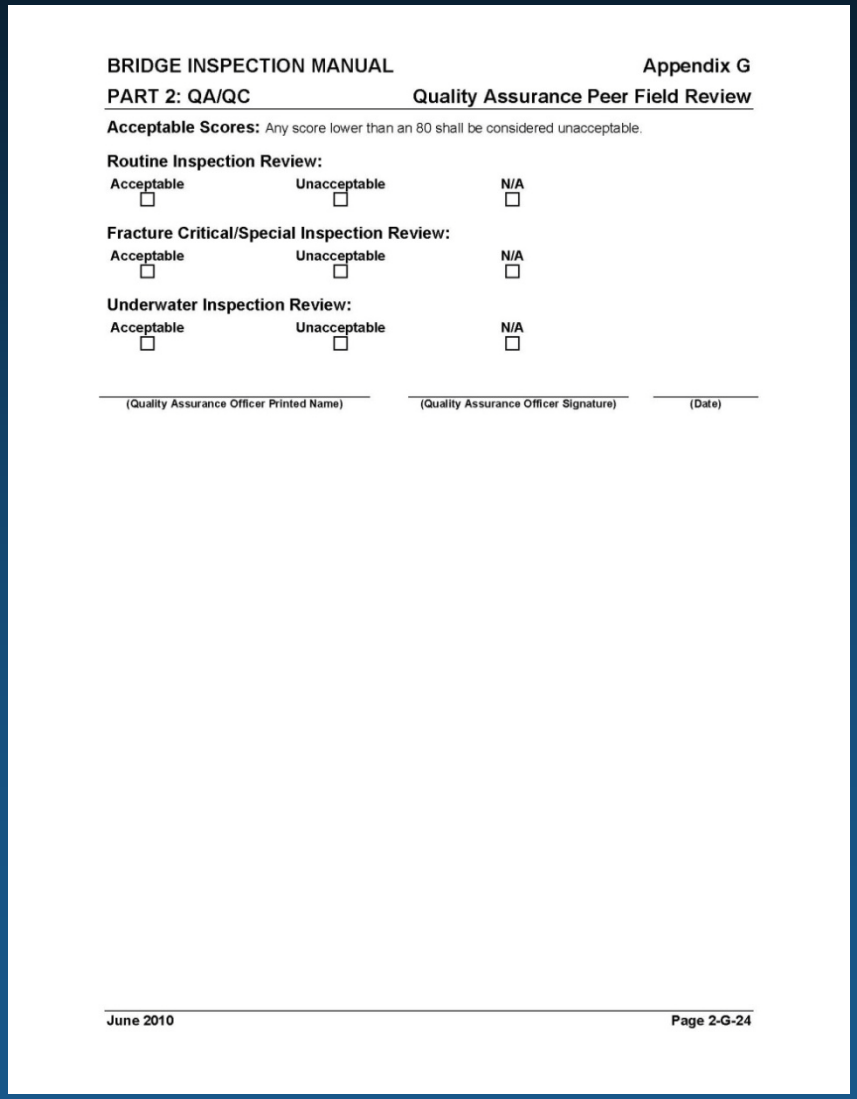
_____

_____

_____

_____

Example: Peer Field Review Form



BRIDGE INSPECTION MANUAL — Appendix G

PART 2: QA/QC — Quality Assurance Peer Field Review

Acceptable Scores: Any score lower than an 80 shall be considered unacceptable.

Routine Inspection Review:

Acceptable	Unacceptable	N/A
☐	☐	☐

Fracture Critical/Special Inspection Review:

Acceptable	Unacceptable	N/A
☐	☐	☐

Underwater Inspection Review:

Acceptable	Unacceptable	N/A
☐	☐	☐

(Quality Assurance Officer Printed Name) (Quality Assurance Officer Signature) (Date)

June 2010 Page 2-G-24

Quality Assurance Post-Inspection Field Review

- Ensure consistency of ratings
- Ensures QC efforts are equally effective
- QAO shall inspect without prior knowledge
- Performed within 6 months of team leader's inspection

Quality Assurance Post-Inspection Field Review

- **Sampling Consideration**
  - Sufficiency rating
  - Bridges needing rehabilitated or replaced
  - New structures
  - Bridges with critical findings
  - Bridges with unusual changes in condition
- **Sampling—Routine Inspections**
  - 4 bridges in each district annually
  - 5 bridges from 12 Counties annually
  - No county reviewed twice within 4 years

Continued…

Quality Assurance Post-Inspection Field Review

- **Sampling—Special Inspections**
  - 1 bridge in each District annually
  - 1 bridge from 12 Counties annually
- **Scoring provided on QA post-inspection field review form**

Example: Post-Inspection Review Form

APPENDIX H QUALITY ASSURANCE POST-INSPECTION REVIEW FORM

Quality Control Officer: _____

Team Leader No.: _____

Company/District: _____

Team Leader: _____

Team Leader No.: _____

Company/District: _____

Team Members: _____

County: _____

County No.: _____

Bridge No: _____

NBI No.: _____

Road Name: _____

Crossing: _____

Inspection Date: _____

Inspection Type: ☐ Routine ☐ Fracture Critical ☐ Underwater ☐ Special

Inspection Start Time: _____

Inspection Complete Time: _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL Appendix H

PART 2: QA/QC Quality Assurance Post-Inspection Review Form

Routine Inspection – Inventory Review – Part 1

Review each question below and record the score reduction in each blank below. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

	Yes	No	N/A	Reduc.	Score
1. Main structure type (43A), main widening type (43C), and approach structure type (44A) correct	☐	☐	☐	-10	
2. Bridge rail and approach coding (36A) acceptable	☐	☐	☐	-10	
3. Required maintenance and repair items properly documented and address deterioration	☐	☐	☐	-10	
4. Load limit (66B) bridge posting in place (66C & 70); if not, is it recommended (41)?	☐	☐	☐	-10	
5. Foundation type acceptable (113B)	☐	☐	☐	-10	
6. "One-Lane Bridge" or "Narrow Bridge" posting in place; if not, is it recommended (51, 28A, 102 & 41)?	☐	☐	☐	-10	
7. Inspection team has the proper qualifications (Part 1 – 2.4)	☐	☐	☐	-20	
				Total	

Score: 100-_____ = _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL Appendix H

PART 2: QA/QC Quality Assurance Post-Inspection Review Form

Routine Inspection – Inventory Review – Part 2

Review each question below and record the score reduction in each blank below. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

Measurements	Measurement		w/in ± 3"				
	Inspector (Team Leader)	QAO	Yes	No	N/A	Reduc.	Score
1. Max Span Length (48)			☐	☐	☐	-10	
2. Structure Length (50)			☐	☐	☐	-10	
3. Bridge Roadway Width (51)			☐	☐	☐	-10	
4. Vertical Clearance/Deck (53)			☐	☐	☐	-10	
5. Vertical Underclearance (54)			☐	☐	☐	-10	
6. Lateral Clearance (55)			☐	☐	☐	-5	
						Total	

Score: 100-_____ = _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL Appendix H

PART 2: QA/QC Quality Assurance Post-Inspection Review Form

Routine Inspection – Condition and Appraisal Review

The Quality Assurance Officer is to inspect the bridge and provide his/her condition ratings below. He/she should compare the ratings to the Inspection Team Leader under review and record the score reduction in each blank to the right. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

Condition and Appraisal	Ratings		w/in ± 1				
	Inspector (Team Leader)	QAO	Yes	No	N/A	Reduc.	Score
Item 58: Deck			☐	☐	☐	-10	
Item 59: Superstructure			☐	☐	☐	-10	
Item 59B: Paint Rating			☐	☐	☐	-5	
Item 60: Substructure			☐	☐	☐	-10	
Item 61: Channel			☐	☐	☐	-10	
Item 62: Culvert			☐	☐	☐	-10	
Item 65: Approach Roadway			☐	☐	☐	-5	
Item 71: Waterway Adequacy			☐	☐	☐	-5	
Item 72: Roadway Alignment			☐	☐	☐	-5	
Item 113A: Scour Critical			☐	☐	☐	-10	
						Total	

Score: 100-_____ = _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL Appendix H

PART 2: QA/QC Quality Assurance Post-Inspection Review Form

Fracture Critical/Special Inspection Review

The Quality Assurance Officer is to inspect the bridge and provide his/her condition ratings below. He/she should compare the ratings to the Inspection Team Leader under review and record the score reduction in each blank to the right. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

	Yes	No	N/A	Reduc.	Score
1. Correct elements identified (Fracture Critical or Special)	☐	☐	☐	-10	
2. Condition ratings within ±1 for all inspected elements	☐	☐	☐	-10	
3. Fatigue Details correctly identified (Part 4 – 11.6.6)	☐	☐	☐	-10	
4. Reported section loss reasonable (within 10%) (Part 4 – 11.6.6)	☐	☐	☐	-10	
5. All cracks noted (Part 4 – 11.6.6)	☐	☐	☐	-10	
6. Damage to elements documented	☐	☐	☐	-10	
7. Bridge appeared to be cleaned during original inspection (Part 1 – 4.3.3)	☐	☐	☐	-10	
8. Inspection team has the proper qualifications (Part 1 – 2.4)	☐	☐	☐	-20	
				Total	

Score: 100-_____ = _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL Appendix H

PART 2: QA/QC Quality Assurance Post-Inspection Review Form

Underwater Inspection – Inventory Review

The Quality Assurance Officer is to inspect the bridge and provide his/her condition ratings below. He/she should compare the ratings to the Inspection Team Leader under review and record the score reduction in each blank to the right. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

	Yes	No	N/A	Max Reduc.	Score
1. Waterline elevation accurately recorded (Part 1 – 3.9)	☐	☐	☐	-10	
2. All required soundings accurately recorded (Part 1 – 3.9)	☐	☐	☐	-15	
3. All required photos obtained and documented (Part 1 – 3.6)	☐	☐	☐	-10	
4. C.B. Material adjacent to Superstructure Units determined (Part 1 – 3.6)	☐	☐	☐	-10	
5. Scour and debris noted (Part 4 – 7.4)	☐	☐	☐	-10	
6. Defects noted with dimensions and section loss	☐	☐	☐	-15	
7. Shoreline conditions noted (Part 4 – 7.4)	☐	☐	☐	-10	
8. Plan view showing bridge configuration with north arrow, flow arrow, shorelines, etc. (Part 1 – 3.6)	☐	☐	☐	-10	
9. Foundation type correct (Item 113B)	☐	☐	☐	-10	
10. Underwater Inspection frequency reasonable	☐	☐	☐	-10	
11. Inspection team has the proper qualifications (Part 1 – 2.4)	☐	☐	☐	-20	
				Total	

Score: 100-_____ = _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL **Appendix H**

PART 2: QA/QC **Quality Assurance Post-Inspection Review Form**

Underwater Inspection – Condition and Appraisal Review

The Quality Assurance Officer is to inspect the bridge and provide his/her condition ratings below. He/she should compare the ratings to the Inspection Team Leader under review and record the score reduction in each blank to the right. At the conclusion of the inspection, add up the reductions and subtract from 100. Record the score below. "Yes" and "N/A" answers shall be scored with a zero reduction.

Condition and Appraisal	Ratings		Within ± 1				
	Inspector (Team Leader)	QAO	Yes	No	N/A	Reduc.	Score
Item 60: Substructure			☐	☐	☐	-10	
Item 61: Channel			☐	☐	☐	-10	
Item 113A: Scour Critical			☐	☐	☐	-10	
						Total	

Score: 100-_____ = _____

Example: Post-Inspection Review Form

BRIDGE INSPECTION MANUAL Appendix H

PART 2: QA/QC Quality Assurance Post-Inspection Review Form

Acceptable Scores: Any score lower than an 80 shall be considered unacceptable.

Routine Inspection – Inventory Review – Part 1:

Acceptable ☐ Unacceptable ☐ N/A ☐

Routine Inspection – Inventory Review – Part 2:

Acceptable ☐ Unacceptable ☐ N/A ☐

Routine Inspection – Condition and Appraisal Review:

Acceptable ☐ Unacceptable ☐ N/A ☐

Fracture Critical/Special Inspection Review:

Acceptable ☐ Unacceptable ☐ N/A ☐

Underwater Inspection – Inventory Review:

Acceptable ☐ Unacceptable ☐ N/A ☐

Underwater Inspection – Condition and Appraisal Review:

Acceptable ☐ Unacceptable ☐ N/A ☐

(Quality Assurance Officer Printed Name) (Quality Assurance Officer Signature) (Date)

Quality Assurance Closeout

- **Peer Field and Post Inspection Review reports discussed with Program Manager**
- **Annual report will summarize findings**
- **Corrective actions to inventory data may be necessary**

Disqualification and Requalification Process

- **Disqualification**
  - When making same or similar mistakes
    - Probation
    - Reviewed again
  - 2nd review finds similar mistakes
    - Secondary probation
    - Reviewed again
  - INDOT will place on probation or disqualify at their discretion

Disqualification and Requalification Process

- **Reasons for disqualification**
  - Not notifying bridge owner of critical finding
  - Lack of load posting notification
  - Failure to correct findings from QC or QA reviews
  - Recurring miscoded items
  - Recurring condition rating deviations
  - Dishonest or unethical behavior

Disqualification and Requalification Process

- **Requalification Process**
  - May requalify after a 2-year period
  - Provide a written report on how to correct deficiencies
  - Placed on probation for 12 months

Contact:

Michael Cox

mcox@B-L-N.com