

# Bridge Inspection Reports and Documentation QC

An inspection is only as useful as its report. This course covers writing condition narratives, photos and sketches that drive correct engineering decisions, and the QC/QA expectations under the NBIS.

## Learning objectives

- Write clear, defensible condition narratives
- Use photos and sketches effectively
- Apply QC/QA review to reports
- Avoid documentation errors that mislead owners

## What the report must do

The NBIS defines the inspection report as the document summarizing findings and recommendations and identifying the responsible team leader (23 CFR 650.305). Inspections follow MBE Section 4.2 procedures (650.313(a)). A good report lets an engineer who has never seen the bridge understand its condition, the changes since last time, and what needs to be done.

## Writing condition narratives

- Lead with the most significant finding for each component.
- Use quantities and locations: "Span 2, Beam 4, bottom flange: 6 ft long spall exposing two strands, one with broken wires, 3 ft from Bent 2."
- Distinguish new versus existing defects and state whether conditions have changed.
- Justify ratings, especially changes.
- Avoid vague words like "some," "minor" or "typical" without quantities.

## Photos and sketches

Each significant defect needs a photo with a scale reference and a caption giving location and description. Overview photos of each elevation and the roadway establish context. Sketches with dimensions are better than photos for section loss, crack maps and delamination maps. Keep photo numbering tied to the narrative.

## Recommendations and maintenance items

Separate structural recommendations (load rating review, repair, monitoring, special inspection) from routine maintenance (clean drains, seal joints, remove debris). Prioritize by urgency. Critical findings follow the owner's critical findings procedure immediately, not just the report.

## QC and QA

The NBIS requires systematic QC/QA per MBE Section 1.4, documented extent, interval and responsibility, and reviews by someone other than the original author (650.313(p)). Effective QC checks: rating consistency with element data and photos, arithmetic of element quantities, previous findings addressed, critical items escalated, and inventory data changes entered

within 3 months (650.315(b)). QA samples inspections independently, often with field re-inspection, to measure program-wide consistency.

## Part A — Why the report is the product

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Most people who rely on a bridge inspection never see the bridge. Load raters, maintenance planners, program managers, hydraulic engineers, the next inspection team, and sometimes attorneys work from the report and the bridge file. If a defect is seen but not recorded clearly, it is, for every practical purpose, not found. If a defect is recorded vaguely, it may be misjudged, mis-prioritized or forgotten. The field work and the report are two halves of the same job, and the report is the half that lasts.

A good inspection report does three things. First, it records condition accurately and consistently, so ratings and element data can be trusted and compared over time. Second, it communicates what matters, so that serious or worsening conditions reach people who can act on them. Third, it creates a defensible record that shows what was inspected, how, by whom, and what was found.

This course is about how to write and review reports that do those three things. It is written for engineers who write reports as team leaders, engineers who review consultant reports, and program managers who set reporting standards. It is not a substitute for an owner's manual or for the NHI comprehensive bridge inspection training required of team leaders under 650.309.

## Part B — The regulatory frame for documentation

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The NBIS (23 CFR 650 Subpart C) sets several documentation requirements that shape what a report must contain and what happens to it afterward:

- **Bridge files.** Under 650.313(n), owners must prepare and maintain bridge files in accordance with Section 2.2 of the AASHTO Manual for Bridge Evaluation (MBE). The inspection report is a central part of the bridge file, alongside plans, load ratings, scour appraisals, inspection procedures and correspondence.
- **Inventory data.** Under 650.315, owners must collect and maintain inventory data per the Specifications for the National Bridge Inventory (SNBI) and submit it to FHWA annually or when requested. For NHS bridges, inventory data must include element-level data per the AASHTO Manual for Bridge Element Inspection (MBEI). Under 650.315(b), changes to inventory data from any inspection type must be entered into the owner's inventory within 3 months after the month the field portion of the inspection is completed.
- **QC and QA.** Under 650.313(p), owners must use systematic QC and QA procedures identified in Section 1.4 of the MBE; document the extent, interval and responsible party for review of field teams, inspection reports, NBI data and computations; have reviews performed by someone other than the individual who completed the original report or calculation; and document and address the findings.
- **Critical findings.** Under 650.313(q), owners must document procedures to address critical findings in a timely manner, including the minimum triggers listed in the regulation, and FHWA must be notified within 24 hours for NHS bridges with findings warranting closure.
- **Inspection dates and follow-up.** The NBIS defines the inspection date as the date the field portion of the inspection is completed, and the procedures require documenting inspection dates and required follow-up actions in the bridge file.

These requirements mean the report is not just a narrative for the owner's engineers. Its ratings and element data become national data used to allocate funds and measure performance, and its review is itself an auditable activity.

## Part C — Anatomy of a complete inspection report

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Owners use different formats and software, but most complete reports contain the same building blocks:

1. **Identification:** structure number, name, route, feature crossed, location, owner, and inspection type (initial, routine, in-depth, NSTM, underwater, special, damage, service).
2. **Inspection information:** inspection date, team leader and team members, weather and conditions, access methods and equipment, and any portions not inspected and why.
3. **Inventory and rating items:** the SNBI items updated by the inspection, including component condition ratings and appraisal items.
4. **Element data:** elements, quantities by condition state, and defect elements per the MBEI and owner manual, required for NHS bridges and used by many owners on all bridges.
5. **Narrative:** concise descriptions of condition and changes since the last inspection, organized by component and element.
6. **Photographs:** general views required by owner procedures plus defect photos, captioned and referenced.
7. **Sketches and measurements:** crack maps, section loss sketches, clearance measurements, channel cross-sections, and similar.
8. **Recommendations:** maintenance, repairs and follow-up inspections, prioritized.
9. **Critical findings and notifications:** any critical finding with the notification record.
10. **Sign-off and review record:** team leader certification and QC review evidence per owner procedures.

The rest of this course works through the parts that most often go wrong: narratives, photos, sketches, ratings consistency, recommendations, and review.

## Part D — Writing condition narratives

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A condition narrative should let a reader who has never seen the bridge picture the defect, judge its severity, and find it again. The most useful narratives answer five questions for each significant defect: **what**, **where**, **how big**, **how bad**, and **what changed**.

### What

Name the defect with standard terms from the MBEI defect definitions and the owner's manual: spall with exposed reinforcement, delamination, efflorescence, corrosion with section loss, fatigue crack, decay, check, split, scour. Avoid informal words like "bad," "rough," or "deteriorated" without a specific defect.

### Where

Use the owner's location convention consistently: span and girder numbers, bay, pier and face, station, distance from a bearing or a joint, top or bottom flange, upstream or downstream. A location that cannot be found next time is not useful. If the bridge has no established numbering, define one in the report and include a key sketch.

### How big

Give measured dimensions: length, width, depth, area, crack width, remaining thickness, percent of section loss where measured. State the measurement method when it matters, such as a crack comparator or an ultrasonic thickness gauge. Distinguish measured from estimated values.

## How bad

Describe severity in terms that tie to condition states and ratings: whether reinforcement is exposed, whether section loss is measurable, whether a crack is active or arrested, whether bearings function. Where the defect affects capacity or safety, say so plainly.

## What changed

Compare with the previous inspection. "Spall at pier 2 north face, previously 2 ft by 1 ft, now 3 ft by 1.5 ft with two exposed bars" is far more useful than either measurement alone. If a condition is unchanged, say so, so readers know it was checked.

## Examples

*Weak:* "Girders have some rust. Deck is in fair condition."

*Better:* "Span 2, girder 3, bottom flange 4 ft from pier 2 bearing: active corrosion with pack rust between flange and cover plate, measured flange thickness 0.62 in. at worst location versus 0.75 in. on plans; previously no measured loss. Recommend load rating review. Deck: spalls and patched areas total about 3% of deck area, concentrated near expansion joints; no full-depth holes; similar to last cycle."

The better version is longer, but every word helps someone make a decision.

## Part E — Photographs that work

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Photographs are the most persuasive part of a report and also one of the most commonly misused. A set of beautiful photos with no captions, no scale and no locations is little better than none. A useful photo set has a structure:

### Standard views

Most owners require a set of general views each cycle, such as the approach roadway in each direction, the elevation from each side, the underside, and the feature crossed upstream and downstream for waterways. Taking the same views from the same positions each cycle makes changes obvious. Many teams keep a photo log with camera positions and reuse it.

### Defect photos

- **Context and close-up.** Take a wider shot that shows where the defect is on the structure, then a close-up that shows the defect itself. One without the other often fails a reader.
- **Scale.** Include a tape, ruler, crack card, or another object of known size in close-ups.
- **Orientation.** Note the direction of view in the caption, such as "looking north at pier 2 west face."
- **Lighting.** Use flash or a light for shadowed areas such as girder bays and bearings; a dark photo of a bearing tells nothing.
- **Repeat views.** For tracked defects, repeat the previous cycle's view so the change is visible side by side.

### Captions

A caption should state the photo number, the component and element, the location, the direction of view and what the reader should see. "Photo 14: Span 3, girder 2, web at midspan, looking east. Fatigue crack at connection plate weld toe, about 2 in. long, marked with paint; new this cycle." A caption that just says "girder" wastes the photo.

## Quantity and selection

Digital cameras make it easy to take hundreds of photos. Reports should include the ones that document conditions and changes; the rest can be archived in the bridge file per owner procedures. Too many uncaptioned photos bury the important ones.

## Metadata and storage

Keep the original files with their date and time information, and store them so that they can be associated with the inspection and the structure. Follow owner procedures for file naming and retention, since these photos are part of the bridge file under 650.313(n).

## Part F — Sketches, maps and measurements

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Some conditions cannot be captured by photos: the extent of delamination across a deck, a pattern of cracks on a pier cap, section loss along a flange, or channel geometry. Sketches fill the gap.

- **Framing plans and keys.** A simple plan with span, girder and pier numbering lets every other note refer to locations consistently.
- **Crack maps.** Show crack locations, lengths and widths on an elevation of the member. Note crack widths at specific points and whether efflorescence or rust staining is present.
- **Section loss sketches.** Show where thickness was measured and the readings, so a load rater can model the reduced section.
- **Deck condition maps.** Show spalls, patches and delaminations from sounding, with approximate areas, so quantities for element data and repair estimates can be checked.
- **Clearance and alignment measurements.** Record vertical clearances, bearing positions, joint openings and temperature at the time, and plumbness measurements where movement is suspected.
- **Channel cross-sections.** For waterways, plot soundings with prior cycles, as covered in the underwater inspection course.

Sketches do not need to be pretty, but they must be legible, dimensioned where it matters, oriented with a north arrow or stationing, and dated. Scanned field sketches are acceptable in many programs if they are clear.

## Part G — Ratings and element data that agree with the narrative

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The most frequent finding in report reviews is inconsistency: a narrative that describes one condition and ratings or element quantities that describe another. Consistency checks every reviewer should make include:

- **Component ratings versus narrative.** If the narrative says "widespread section loss on several girders with holes in webs," a superstructure rating of 6 needs explanation. SNBI component ratings use defined descriptions; the narrative should support the rating chosen.
- **Element quantities versus narrative.** If the narrative describes spalls on about 10% of the deck underside, but all deck element quantity is in condition state 1, one of them is wrong.
- **Element data versus component ratings.** Element data and component ratings come from different systems but describe the same bridge. A large quantity in condition state 4 on a primary element should be reflected in the component rating, or the narrative should explain why not.

- **Change since last cycle.** A rating that improves without a repair, or a quantity that moves to a better condition state without work, is a red flag unless the narrative explains a correction to previous data.
- **Across reports.** Routine, underwater, NSTM and special inspections on the same bridge should be reconciled, so the bridge file tells one story.

Document the reason for any rating change. "Superstructure rating lowered from 6 to 5 due to new section loss at girder 3 bearing area" lets the next team and the reviewer understand the decision.

## Part H — Recommendations that get acted on

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A recommendation is only useful if someone can program it. Good recommendations are:

- **Specific:** what work, on which element, at what location, and approximately how much.
- **Prioritized:** using the owner's priority system, such as immediate, high, medium or low, with time frames.
- **Justified:** tied to the finding in the narrative and photos.
- **Routed:** recognizing who acts on it, such as maintenance forces, a design section, the load rating engineer, or the hydraulics group.
- **Tracked:** carried in a list or system so the next inspection can verify whether it was done.

Distinguish maintenance recommendations, such as cleaning drains or sealing a joint, from engineering recommendations, such as load rating review or a repair design, and from inspection recommendations, such as a special inspection to monitor a crack or an in-depth inspection of a bearing. Each goes to a different group.

Avoid recommending everything. A list of thirty equally weighted items hides the two that matter. Lead with safety and structural capacity items.

## Part I — Critical findings in the report

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A critical finding should never first appear in a report that arrives weeks after the field work. The NBIS requires owners to document procedures to address critical findings in a timely manner. Field teams should follow those procedures, usually by notifying a designated person immediately, and the report should record:

- The condition found, with location, photos and measurements.
- Which critical-finding criterion it meets under the owner's procedures, including the NBIS minimums in 650.313(q), such as a component or channel item rated 2 or less, or a condition warranting closure.
- Who was notified, when and how.
- Immediate actions taken, such as closure, load restriction, or traffic control.
- Follow-up actions required and their status.

The owner tracks critical findings to resolution. The report is one piece of evidence in that tracking, so dates and names matter.

## Part J — Quality control and quality assurance of reports

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Under 650.313(p), QC and QA are required program elements, performed by someone other than the original author, documented, and followed up. MBE Section 1.4 discusses QC and QA in bridge inspection programs. In practice, QC is

usually performed within the inspecting organization before the report is submitted, while QA is performed by the owner or an independent party to verify the program's consistency.

## **A practical QC checklist for a report**

1. Identification and inspection type are correct; inspection date is the date the field portion was completed.
2. Team leader is qualified for the inspection type, and the team leader was present and actively participated, as 650.313 requires.
3. All components and elements are addressed, or exclusions are explained.
4. Ratings and element data agree with the narrative and photos.
5. Changes since the last inspection are explained.
6. Measurements are recorded with units and locations.
7. Photos are captioned, scaled, oriented and referenced.
8. Recommendations are specific, prioritized and routed.
9. Critical findings were notified per procedure, and the record is complete.
10. Interval is set correctly given the ratings, including any reduced interval criteria in 650.311.
11. Required special procedures, such as NSTM or underwater procedures, were followed and referenced.
12. The SNBI data submission is updated within the 3-month window in 650.315(b).

## **QA activities**

- Field review of a sample of bridges by an independent team, comparing ratings and element data.
- Office review of a sample of reports for completeness and consistency.
- Data checks across the inventory, such as rating changes without explanation or element quantities that do not sum to totals.
- Calibration exercises in which teams inspect the same bridge and compare results.
- Feedback, training and procedure updates based on findings, with tracking to completion.

The goal of QA is consistency across the program. When different teams rate similar conditions differently, the data loses value for planning and the public loses protection.

## **Part K — Documentation errors that mislead owners**

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Some errors are minor. Others change decisions. The following patterns are common enough that every reviewer should look for them.

### **Copy-forward narratives**

Software makes it easy to start from the previous report. That saves time but invites unchanged text describing conditions that have changed, or repairs that no longer exist. Every carried-forward sentence should be confirmed in the field. Some owners require inspectors to mark each carried-forward item as verified.

### **Missing negatives**

If a defect previously reported is not mentioned, a reader cannot tell whether it was repaired, has not changed, or was missed. State the status of all previously reported significant defects.

## Unstated limitations

If high water, traffic, lack of access equipment or heavy vegetation prevented inspection of part of the bridge, say so explicitly, and recommend follow-up. A report that silently omits a bearing area implies it was inspected.

## Wrong locations

Reversed numbering, mixed up upstream and downstream, or an incorrect span number can send a maintenance crew or a load rater to the wrong member. Use a key sketch and check locations against plans.

## Unit and measurement errors

Inches recorded as millimeters, crack widths recorded without units, or percentages without a base cause real confusion. Always record units and what a percentage is of.

## Rating drift

Ratings that slowly change from cycle to cycle without narrative support, or that change with each new inspector, undermine trend data. QA calibration helps.

## Overstatement and understatement

Alarming language without supporting measurements, or soft language for serious conditions, both mislead. Use measured facts and standard terms and let the ratings and recommendations carry the severity.

## Speculation presented as fact

Inspectors may note likely causes, but should distinguish observation from inference: "Cracking is consistent with alkali-silica reaction; recommend testing to confirm" rather than "Deck has ASR."

## Part L — Defensibility and professional responsibility

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Inspection reports are public records in many jurisdictions and may be used in litigation after an incident. That is not a reason to write defensively, but it is a reason to write accurately. A defensible report:

- Records what was actually done: dates, team, methods, access and limitations.
- Records what was observed with measurements and photos, separate from opinion.
- Follows the owner's procedures and the NBIS, and notes deviations with reasons.
- Shows that findings were communicated and acted on, especially critical findings.
- Avoids casual remarks, jokes, or speculation unrelated to condition.

Licensed engineers who sign or seal inspection reports, or who are responsible for programs, have professional obligations under their state licensing laws and rules, including competence and protection of public safety. Engineers should know their state's rules and their employer's procedures on who signs reports and what that signature means.

## Part M — Digital tools and data management

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Most owners now use bridge management or inspection software with tablets in the field. These tools can enforce required fields, carry element lists, link photos to elements and check simple consistency rules. They can also create new kinds of

errors: dropdown selections made by habit, photos linked to the wrong element, or offline data that fails to sync. Good practice includes:

- Reviewing the generated report as a reader would, not only the data entry screens.
- Checking photo links and captions before submittal.
- Backing up field data daily and confirming sync.
- Recording the data source for inventory items, such as plans, field measurement or prior reports.
- Keeping the bridge file complete, including documents outside the software such as plans, load ratings, scour appraisals and correspondence, consistent with MBE Section 2.2.

Remote sensing tools such as drones, laser scanning and photogrammetry can produce large data sets. Treat them as part of the record: document what was collected, how it was used to support ratings, and where it is stored. A drone image that showed a defect is evidence; make sure it can be retrieved.

## Part N — Worked review examples

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### Example 1 — Rating without support

A consultant report rates the substructure 4 but the narrative only states "minor spalling at pier caps" with two photos of small spalls. *Discussion:* Either the rating is too low or the narrative omits the conditions that justify it. Return the report for clarification. Ask for locations, dimensions and photos of the conditions that drove the rating, and for the element quantities to be checked.

### Example 2 — Carried-forward repair

The narrative says "pier 3 column encased, encasement in good condition," but photos show the encasement has spalled away, exposing corroded reinforcement. *Discussion:* The narrative was carried forward without field verification. Correct the narrative and element data, review the substructure rating, and add a recommendation. Note in QA findings for training.

### Example 3 — Missing limitation

The report covers all spans of a long bridge over a rail yard, but the access plan shows the team had no rail flagging for the spans over active tracks. *Discussion:* Ask whether those spans were inspected and how. If not, the report must state the limitation, and a follow-up inspection is needed. The inspection may not be complete for NBIS purposes until those portions are inspected per owner procedures.

### Example 4 — Critical finding reported late

A draft report submitted three weeks after field work describes a deck hole through a slab span with rebar exposed and traffic driving over it, and recommends "repair as soon as possible." No notification record is included. *Discussion:* Determine immediately whether this meets the owner's critical finding criteria, notify the responsible person, and take action. Then investigate why the field team did not notify, and correct the procedure or training. This kind of delay is exactly what critical-finding procedures under 650.313(q) are meant to prevent.

### Example 5 — Element quantities that do not add up

A deck element shows total quantity smaller than the deck area computed from the inventory length and width. *Discussion:* Check the quantity definition in the MBEI and owner manual, and the inventory dimensions. Correct whichever is wrong so

the data are consistent for program-level analysis.

### **Example 6 — Rating improves without work**

The superstructure rating increased from 5 to 6 with a new inspector, with no repair recorded. *Discussion:* Ask for justification. If the previous rating was an error, the narrative should say so and explain. Otherwise, the change may be rating drift. QA calibration and a field check may be warranted, since the change may also affect inspection interval eligibility.

### **Example 7 — Excellent report**

A short-span bridge report has a key sketch, consistent numbering, standard views matching last cycle, captioned defect photos with scales, a narrative comparing each defect with last cycle, a section loss sketch with thickness readings, ratings consistent with element data, three prioritized recommendations routed to maintenance and the load rater, and a QC sign-off by a second team leader. *Discussion:* This is the target. It need not be long; it needs to be complete and clear.

## **Part N2 — Documenting different inspection types**

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The same reporting principles apply to every inspection type, but each type has its own emphasis.

### **Initial inspections**

The NBIS describes the initial inspection as the first inspection of a new, replaced or rehabilitated bridge, serving to record required inventory data, establish baseline conditions and establish intervals for other inspection types. Baseline documentation matters more here than anywhere else. Record as-built conditions thoroughly, including minor construction defects, so that later inspectors can tell new deterioration from original conditions. Confirm that inventory data match the as-built plans, and identify NSTMs, underwater portions and other features needing special procedures.

### **Routine inspections**

Routine reports carry the bulk of trend data. Their value depends on consistency: the same views, the same numbering, the same measurements of tracked defects, every cycle.

### **In-depth and NSTM inspections**

These focus on specific members, often with close-up or hands-on access and nondestructive testing. Reports should reference the bridge-specific procedures, show exactly which members and details were inspected, record NDT methods and results, and map findings to the members precisely enough that a load rater or designer can use them.

### **Underwater inspections**

As covered in the underwater course, conditions, methods, levels of effort, soundings with fixed references and probing results are essential, and the findings must be reconciled with routine element data.

### **Special and damage inspections**

These are targeted. State the reason for the inspection, the specific condition monitored or damage assessed, the measurements compared with the prior baseline, and the decision or recommendation. For damage inspections after vehicle impacts, floods or other events, record the event date and source of information, the extent of damage, immediate safety actions and whether a load rating review is needed.

## Service inspections

Where owners use service inspections, keep the documentation proportionate but still record the date, inspector, what was checked and any condition requiring follow-up.

## Part N3 — Building a report template that helps

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Owners and consultants can make good reports the path of least resistance by designing templates and software forms carefully:

- Include a required "changes since last inspection" field for each component.
- Include a required "portions not inspected and reason" field.
- List previously reported significant defects automatically, with a required status for each: repaired, unchanged, worse, or not found.
- Prompt for measurement units and locations where defects are entered.
- Require a reason when a component rating changes.
- Show the calculated interval and the rating criteria behind it, so errors are visible.
- Link recommendations to a tracking list with priorities and responsible groups.
- Include a QC sign-off block that records the reviewer's name and date and cannot be the same person as the author.

Templates should not become checklists filled by habit. Periodic QA reviews should check whether the fields are being used thoughtfully, and templates should be revised when reviews reveal recurring gaps.

## Part N4 — How report data drive intervals and programs

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Ratings in a report are not only descriptions; they trigger rules. Under 650.311, a routine inspection interval may not exceed 12 months when the deck, superstructure, substructure or culvert is rated in serious or worse condition, coded 3 or less, and the extended 48-month interval under Method 1 is available only when several criteria are all met, including all components coded 6 or greater. Similar rules apply to underwater and NSTM intervals. This means a single mis-keyed digit can shorten or lengthen an interval by years. Reviewers should check the interval against the ratings every time, and owners should design data checks that flag combinations that do not fit the rules.

At the program level, ratings and element data feed bridge condition measures used for performance reporting and investment decisions. Element data in particular support deterioration modeling and life-cycle cost analysis in bridge management systems. Consistent, accurate reports make those models meaningful; inconsistent reports produce plans built on noise.

## Part N5 — Training and calibrating report writers

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Good reporting is a skill that improves with feedback. Practical ways owners and firms build it include:

- **Model reports.** Keep a small library of excellent reports for different bridge types as examples for new team leaders.
- **Paired review.** Have newer team leaders review reports written by experienced ones, and vice versa, with discussion of differences.
- **Calibration days.** Send several teams to the same bridge, compare ratings, element quantities and narratives, and discuss the reasons for differences.
- **QA feedback loops.** Summarize recurring QA findings periodically and turn them into short training topics.

- **Photo critiques.** Review a set of report photos together and ask whether each one, with its caption, tells a reader what they need to know.

Training is also where owners communicate expectations that go beyond the regulation, such as preferred terms, location conventions, and what level of detail is expected in each inspection type. Writing these expectations into the owner's inspection manual makes them consistent across in-house and consultant teams.

## Part N6 — Communicating report results to managers

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Most managers will read a summary, not a full report. A one-page summary for significant bridges can include: overall condition and change; any critical findings and actions; top three recommendations with priorities and rough cost ranges where the owner provides them; interval changes; and open items from previous inspections. Keep it factual and consistent with the full report. A summary that differs from the report, even slightly, creates confusion about which is correct.

## Part N7 — A field-to-report routine for team leaders

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Many reporting problems start in the field. A simple daily routine helps team leaders produce better reports with less rework:

1. **Before the visit**, read the last report and recommendations, print or load the key sketch, and list the tracked defects to remeasure and the standard views to repeat.
2. **On arrival**, record the date, weather, temperature, team members and access methods, and note anything that will limit the inspection.
3. **During the inspection**, work in a consistent order, such as deck, superstructure, bearings, substructure, then channel, and record defects with locations and measurements as they are found, not from memory later.
4. **Photograph as you go**, noting photo numbers against the defect notes so captions can be written accurately.
5. **Before leaving the site**, walk the list of tracked defects and previous recommendations and confirm the status of each. Check that nothing on the access-limited list was forgotten.
6. **If a critical finding is found**, follow the owner's notification procedure immediately, before leaving the bridge where practical.
7. **The same day**, back up photos and data, and draft ratings while observations are fresh.
8. **Before submitting**, read the report as the owner's engineer would, then route it for QC by someone else.

This routine takes little extra time and prevents most of the errors that reviewers find: missing measurements, mismatched photos, forgotten defects and unrecorded limitations. Over time, it also builds the consistent, comparable record that makes each future inspection faster and more reliable.

## Part O — Writing style for technical readers

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Inspection reports are technical documents read quickly by busy people. A few style habits make them much more useful:

- **Lead with the important.** Start each component section with the overall condition and any significant change, then detail.
- **One defect, one sentence or bullet.** Do not bury three defects in one long sentence.
- **Use standard terms consistently.** If the owner's manual calls it a spall, do not alternate with "pop-out" or "chip."
- **Prefer present-tense observations.** Write what is there now, such as "Joint seal at abutment 1 is torn for about 6 ft and debris fills the gap," and reserve the past tense for history, such as repairs completed or conditions previously reported.

- **Use numbers.** "Three spalls, largest 18 in. by 10 in. by 2 in. deep" beats "several large spalls."
- **Use active, direct phrasing.** "Bearing at pier 2 girder 4 is tipped about 10 degrees toward the span" rather than "some evidence of possible bearing movement was perhaps noted."
- **Separate fact from opinion.** Observations first, then interpretation, clearly labeled.
- **Avoid unexplained abbreviations,** or define them once.
- **Proofread locations and numbers,** the details most likely to cause wrong actions.

Read a draft aloud, or ask a colleague unfamiliar with the bridge to read it. If they cannot locate a defect, judge its severity, or see what changed since last cycle, revise. Tables work well for repeated measurements, such as thickness readings at several points or joint openings at each pier, and keep the narrative short. Short is good when complete. A five-page report that covers everything clearly beats a forty-page report that hides the important finding on page 31.

## Part P — A workflow for reviewing consultant reports

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Owners that rely on consultants need an efficient, consistent review workflow. One practical sequence is:

1. **Triage on receipt.** Check first for critical findings, urgent recommendations and limitations, so that anything time-sensitive is acted on immediately.
2. **Completeness check.** Confirm required sections, photos, sketches and data are present, and that the inspection type and scope match the assignment.
3. **Consistency check.** Compare ratings, element data and narrative, and compare with the previous cycle.
4. **Technical check.** Review measurements, recommended intervals, load rating referrals, scour implications and special procedure compliance.
5. **Comments and resolution.** Return written comments, track responses, and accept the final report only when comments are resolved.
6. **Data acceptance.** Enter or approve inventory data within the 650.315(b) time frame and archive the report in the bridge file.
7. **Feedback.** Record recurring issues in QA files and discuss them with the consultant, so later reports improve.

Reviewers should keep their own comments specific and actionable, just as they expect of reports: "Photo 12 caption says span 2; plan view shows this is span 3. Please correct" rather than "check captions."

## Part Q — Frequently asked questions

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### Does every bridge need element data?

Under 650.315, element-level data per the MBEI is required for NHS bridges. Many owners collect it on other bridges too, per their own policies.

### How soon must data be updated after an inspection?

Changes to inventory data must be entered into the owner's inventory within 3 months after the month the field portion of the inspection is completed (650.315(b)). Owners may set shorter internal deadlines for reports.

## Can the team leader do the QC review of their own report?

No. Under 650.313(p), QC and QA reviews must be performed by personnel other than the individual who completed the original report or calculations.

## What goes in the bridge file?

Follow MBE Section 2.2 and owner procedures. Typically plans, inspection reports, photos, load ratings, scour appraisals and POAs, special inspection procedures, repair records, correspondence and critical finding records.

## Is the inspection date the date the report is signed?

No. The NBIS defines the inspection date as the date the field portion of the inspection is completed, which drives the interval.

## Part R — Summary checklist and glossary

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- Write narratives that answer what, where, how big, how bad and what changed.
- Use context and close-up photos with scale, orientation and full captions; repeat standard views.
- Use sketches for patterns, section loss, deck maps and channel geometry.
- Make ratings, element data and narrative agree; explain every rating change.
- Write specific, prioritized, routed recommendations and track them.
- Notify critical findings from the field and record the notification.
- State limitations and status of previous defects explicitly.
- Have QC performed by someone other than the author, and document QA.
- Update inventory data within 3 months and keep the bridge file complete.

**Glossary.** *Bridge file*: the owner's record for a bridge, prepared per MBE Section 2.2. *Inventory data*: data reported to the NBI per 650.315. *Element data*: quantities of elements by condition state per the MBEI. *QC*: procedures to maintain quality within the inspecting organization. *QA*: independent review to verify the program's quality and consistency. *Critical finding*: per 650.305, a structural or safety related deficiency that requires immediate action to ensure public safety. *Inspection date*: the date the field portion of the inspection is completed.

## Key takeaways

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- Reports must identify the responsible team leader and give findings and recommendations.
- Quantify and locate defects; explain rating changes.
- Photos with scale and captions; dimensioned sketches for loss.
- QC/QA by someone other than the author, documented per NBIS.

## References

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1. 23 CFR Part 650, Subpart C — National Bridge Inspection Standards (final rule published May 6, 2022)
2. FHWA, Bridge Inspector's Reference Manual (BIRM), FHWA-NHI-12-049, 2012 (as revised)
3. AASHTO, Manual for Bridge Element Inspection, 2nd Edition, 2019
4. FHWA, Specifications for the National Bridge Inventory (SNBI), FHWA-HIF-22-017, March 2022
5. AASHTO, The Manual for Bridge Evaluation, 3rd Edition, 2018 (with interim revisions)

Study text only; the final quiz is taken online. Verify all references against the edition your agency has adopted.