

The 2022 NBIS Rule: What Changed for Owners and Engineers

The NBIS final rule published May 6, 2022 (effective June 6, 2022) was the first major rewrite of the federal bridge inspection standards since 2004. This course walks through what changed and what it means for owners, consultants and engineers who inspect, rate and manage bridges.

Learning objectives

- Identify the major changes in the 2022 NBIS final rule
- Describe the qualification paths for program managers and team leaders
- Explain the new requirements for critical findings, load rating timing and data submittal
- Locate NBIS requirements in 23 CFR 650 Subpart C

Why the rule was rewritten

MAP-21 (2012) directed FHWA to update the NBIS to address inspection procedures, risk-based intervals, inspector qualifications and a national certification approach for team leaders. The 2022 rule implements those mandates, incorporates the AASHTO *Manual for Bridge Evaluation* (MBE, 3rd Ed. with 2019 and 2020 interims) and *Manual for Bridge Element Inspection* (MBEI, 2nd Ed.) by reference, and adopts the new *Specifications for the National Bridge Inventory* (SNBI, FHWA-HIF-22-017).

The rule applies to all highway bridges on public roads, on and off the Federal-aid system, including tribally and federally owned bridges, private bridges connected to public roads at both ends, temporary bridges and bridges under construction with portions open to traffic (23 CFR 650.303).

New and sharpened definitions

Section 650.305 adds definitions that drive the rest of the rule. Key ones:

- **Nonredundant Steel Tension Member (NSTM)** replaces "fracture critical member" — a primary steel member fully or partially in tension, without load path, system or internal redundancy, whose failure may cause collapse.
- **Critical finding** — a structural or safety-related deficiency that requires immediate action to ensure public safety.
- **Service inspection** — a lighter inspection required midway when a risk-based routine interval exceeds 48 months.
- **Scour appraisal, assessment and evaluation** — distinct terms; the appraisal is the risk-based determination of vulnerability.
- **Hands-on inspection** — within arm's length, visual, possibly supplemented by NDE.

Personnel qualifications

Section 650.309 sets the minimums. A **program manager** must be a PE or have 10 years of bridge inspection experience, complete FHWA-approved comprehensive training with a 70% or better end-of-course assessment, and complete 18 hours of FHWA-approved refresher training every 60 months.

A **team leader** (the "nationally certified bridge inspector") must meet one of four paths: PE plus 6 months experience; 5 years experience; ABET bachelor's degree plus passing the FE exam plus 2 years; or ABET associate's degree plus 4 years. Team leaders also need the comprehensive course, the 70% assessment and 18 refresher hours per 60 months. NSTM team leaders need FHWA-approved NSTM training. **Load ratings** must be performed by or under the direct supervision of a registered PE.

This LoadPath PDH course is supplemental PE/NICET PDH. It is **not** FHWA-approved refresher training under 650.309.

Intervals, critical findings, load rating and posting

Routine intervals become risk-based under Method 1 (12, 24 or 48 months with criteria) or Method 2 (a Risk Assessment Panel approach allowing up to 72 months with FHWA approval). Underwater and NSTM intervals follow parallel structures (650.311).

Owners must document critical-finding procedures and notify FHWA within 24 hours of discovery for NHS bridges where the finding requires full or partial closure or results in an NSTM rated 3 or less, and provide monthly status reports until each critical finding is resolved (650.313(q)).

Load ratings must be completed as soon as practical but no later than 3 months after the initial inspection or after a change warrants re-rating. Postings must be made as soon as possible but not later than 30 days after a rating determines the need, and bridges must be closed when gross live load capacity is less than 3 tons (650.313(k)–(m)).

Inventory, QC/QA and scour

Inventory changes must be entered within 3 months after the month the field inspection is completed (650.315(b)). Element-level data is required for NHS bridges per the MBEI. QC and QA reviews must be performed by someone other than the person who did the original report or calculation, with documented extent, interval and responsibility (650.313(p)).

Every bridge over water needs a documented scour appraisal consistent with HEC-18 and HEC-20; scour-critical bridges and bridges with unknown foundations need a scour plan of action consistent with HEC-18 and HEC-23 (650.313(o)).

Practical impacts for engineers

- Load raters: track the 3-month rating clock from inspections that identify changes, and document permit-load analysis for routes that carry permits.
- Inspection consultants: verify team leader qualification records — owners must maintain a registry of nationally certified inspectors.
- Owners: written procedures are now explicitly required for intervals, critical findings, special inspections, posting and QC/QA.
- Everyone: use precise terms (NSTM, scour appraisal) in reports and contracts.

Part A — How to read 23 CFR 650 Subpart C

Before working through what changed, it helps to know how the regulation is organized, because most practical questions ("how often?", "who can sign?", "what do I report?") map to one section. Subpart C is short — a dozen sections — and an engineer who knows the section numbers can answer most compliance questions in a few minutes by going to eCFR, which is the authoritative, continuously updated text.

Section	Topic	Typical question it answers
650.301	Purpose	Why do the standards exist?
650.303	Applicability	Is this structure covered?
650.305	Definitions	What exactly is an NSTM, a critical finding, a service inspection?
650.307	Bridge inspection organization responsibilities	Who is accountable — the State, a Federal agency, a Tribe?
650.309	Inspection personnel qualifications	Who can be program manager, team leader, load rater, underwater diver?
650.311	Inspection intervals	How often must each inspection type occur?
650.313	Inspection procedures	What must be done during and after an inspection — ratings, postings, scour, QC/QA, critical findings?
650.315	Inventory	What data must be reported and how fast?
650.317	Reference manuals	Which documents are incorporated by reference?

A good habit: when someone quotes a requirement to you, ask "which paragraph?" Many myths about the NBIS (for example, that every bridge must be inspected every two years with no exceptions) disappear once the actual paragraph is read. Likewise, the regulation sets *minimums*. An owner agency can always inspect more often or require more qualifications than the federal minimum, and many State manuals do.

Incorporation by reference

When a regulation incorporates a document by reference, the cited edition carries the force of the regulation for the purposes it is cited. The 2022 rule incorporates the AASHTO MBE and MBEI, and the FHWA SNBI. This matters in two ways. First, practitioners must know which edition is incorporated — a later AASHTO edition does not automatically become the federal requirement until the rule is updated, although FHWA may accept its use. Second, incorporated documents are not free in every case (AASHTO manuals are sold), but the regulation lists where they may be inspected. When you prepare a load rating or inspection report, cite the specific edition your owner requires.

Part B — Applicability in practice

Section 650.303 extends the NBIS to all highway bridges located on public roads. The definition of "bridge" carried forward from earlier rules is a structure carrying traffic over a depression or obstruction with an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes where the clear distance between openings is less than half of the smaller contiguous opening. Always confirm the exact wording in 650.305.

Worked example 1 — Is it an NBIS bridge?

Situation. A county road crosses a creek on three 8-ft diameter corrugated metal pipes, spaced 3 ft apart (clear distance between pipes).

1. Total length along the roadway centerline from the outside of the first pipe opening to the outside of the last: $8 + 3 + 8 + 3 + 8 = 30$ ft.
2. Check the multiple-pipe spacing rule: clear distance 3 ft; half of the smaller contiguous opening $= 8/2 = 4$ ft. Because $3 \text{ ft} < 4 \text{ ft}$, the pipes are treated together.

3. Opening measured along centerline exceeds 20 ft, so the structure meets the bridge length definition.

Result. It is an NBIS bridge and must be inventoried and inspected under Subpart C. If the pipes had been spaced 5 ft apart, each would be evaluated separately and none would exceed 20 ft, so the structure would not be an NBIS bridge — though many owners still inspect such culverts under their own programs.

Worked example 2 — A private bridge

A privately owned bridge connects a public road at one end to a private industrial site at the other. Under 650.303, private bridges are covered when they are connected to a public road on both ends. This one is not, so the federal standards do not apply — but check State law, which may cover it anyway.

Bridges under construction and temporary bridges

The rule explicitly covers temporary bridges and bridges under construction with portions open to traffic. Practically, this means a phased construction project that shifts traffic onto a completed half of a new structure must have that portion inventoried and inspected per the NBIS, and the project team should coordinate with the owner's bridge inspection unit before the traffic switch. A common gap is that construction staff assume the bridge is "not in service" until final acceptance; the regulation looks at whether traffic is on it.

Part C — Responsibilities of the inspection organization

Section 650.307 makes each State transportation department responsible for inspecting, or causing to be inspected, all highway bridges on public roads that are fully or partially within the State's boundaries, except those owned by Federal agencies and Tribal governments. Federal agencies and Tribes have parallel responsibilities for their own bridges. The State may delegate functions — to counties, cities, toll authorities or consultants — but it cannot delegate its overall responsibility.

Policies and procedures

The inspection organization must maintain documented policies and procedures covering, among other things, quality control and quality assurance, critical findings, load rating, posting, scour, bridge files, and inspection intervals including any risk-based methods. In audits (FHWA's annual NBIS compliance reviews use a set of metrics), missing or out-of-date written procedures are a frequent finding even when field practice is good. The lesson for consultants: the owner's written procedure governs your work, and you should obtain and follow the current version.

Function	Can be delegated?	Who stays accountable
Field inspection	Yes (to qualified consultants or local agencies)	State DOT / owner organization
Load rating calculations	Yes	State DOT
Inventory reporting to FHWA	Data collection yes; submission is by the State	State DOT
Program management	Must be a qualified individual designated by the organization	State DOT

Bridge files

Each bridge must have a record that includes items such as plans, inspection reports, load rating documentation, scour assessments and plans of action, and critical-finding follow-up. MBE Section 2 describes typical file contents. A complete file is the difference between an inspector arriving on site knowing where the fatigue-prone details are and one rediscovering them. When you deliver an inspection, think of the file as the deliverable, not just the report.

Part D — Personnel qualifications in depth

The 2022 rule restructured 650.309. The roles and core requirements are summarized below; always read the full paragraph for the alternatives.

Role	Core qualification (summary)
Program manager	Registered PE, <i>or</i> 10 years of bridge inspection experience; plus completion of FHWA-approved comprehensive bridge inspection training and periodic refresher.
Team leader	One of several qualification paths combining PE licensure, experience, NICET certification at a specified level, or degrees with experience; completion of FHWA-approved comprehensive training with a score of at least 70% on the end-of-course assessment; 18 hours of FHWA-approved refresher training every 60 months.
Load rating engineer	Registered PE; responsible for load rating per the MBE.
Underwater bridge inspection diver	Completion of FHWA-approved underwater bridge inspection training (or equivalent per rule).
NSTM inspection team leader	Team leader qualifications plus FHWA-approved NSTM inspection training.

Why the end-of-course assessment matters

Before 2022, "completion" of the comprehensive course was enough in many States. The rule now requires a passing score on the end-of-course assessment, so organizations need records showing the score, not just attendance. Consultant firms should keep a training matrix for every team leader with course numbers, dates, scores and the 60-month refresher clock.

Worked example 3 — Tracking refresher hours

A team leader completed the comprehensive course with an 84% score in March 2021. She attended a 6-hour FHWA-approved refresher module in 2023 and a 12-hour module in 2025. Her 60-month window from completion closes in March 2026. Total approved refresher hours in the window: $6 + 12 = 18$ hours. She meets the requirement. If the 2025 module had been a non-FHWA-approved vendor seminar, those 12 hours would not count toward the NBIS refresher (they might still count as PE continuing education), and she would need to complete approved training before March 2026 to keep leading NBIS inspections.

This LoadPath PDH course is **not** FHWA-approved NBIS refresher training. It supports general PE continuing education and technical understanding only.

Qualified personnel on every inspection

The rule expects a qualified team leader to be at the bridge and in charge during the field inspection for the inspection types where 650.309 and 650.313 require one — read those paragraphs for which types apply. The team leader leads the field work rather than just signing the report afterward. A frequent audit issue is a report signed by a qualified person who was not present. The best practice is to record the team leader's name and dates on site in the report and in the inventory.

Part E — The inspection types and what each is for

The NBIS recognizes several inspection types. Knowing the purpose of each keeps scope discussions short.

Type	Purpose	Interval driver
Initial	First inspection of a new, replaced or rehabilitated bridge, or one newly added to the inventory; establishes baseline condition and inventory data.	Before or soon after opening; sets the baseline.
Routine	Regularly scheduled inspection to determine physical and functional condition and identify changes from the baseline.	650.311 routine interval (Method 1 or 2).
Underwater	Inspection of underwater portions of the bridge that cannot be inspected visually at low water by wading or probing.	Underwater interval.
NSTM	Hands-on inspection of nonredundant steel tension members.	NSTM interval.
Damage	Unscheduled inspection after an event such as a vehicle or vessel impact, flood, fire or earthquake.	Event-driven.
In-depth	Close-up inspection of one or more members, above or below water, to identify deficiencies not readily detectable in a routine inspection; may use NDE.	Owner-defined.
Special	Monitoring of a known or suspected deficiency.	Owner-defined, set by the condition being monitored.
Service	Lighter inspection required between routine inspections when a risk-based routine interval exceeds 48 months.	Midpoint of the extended interval.

Choosing between in-depth and special

In-depth inspections are about *finding*; special inspections are about *watching*. If a routine inspection discovers a crack in a cross-frame connection plate, the next step may be an in-depth inspection with magnetic particle testing of all similar details to determine extent. Once the extent is known and a repair is scheduled, a special inspection every few months may monitor crack growth until the repair is done.

Worked example 4 — Scoping after a strike

An over-height truck strikes the fascia girder of a prestressed concrete overpass. The owner's procedure requires a damage inspection within a set time. The team leader documents spalled concrete with exposed strands, measures section loss (two strands severed, one nicked), checks for girder displacement and bearing damage, and photographs everything. The load rating engineer then evaluates the reduced section; if the rating falls below legal loads, the bridge must be posted or restricted within the rule's timelines. The damage inspection does not reset the routine inspection clock.

Part F — Intervals: Method 1 and Method 2 worked through

Section 650.311 offers two methods for setting routine inspection intervals. The figures below are the federal maximums; owners may be more conservative.

Inspection	Method 1 (condition based)	Method 2 (risk based)
Routine	12 months for bridges in poor condition or with other defined triggers; 24 months standard; up to 48 months for bridges meeting the rule's criteria for good condition and low risk	Up to 72 months, based on a documented risk assessment by a Risk Assessment Panel
Underwater	Standard 60 months; 24 months where triggered by condition; up to 72 months under criteria	Risk-based, up to 72 months
NSTM	Standard 24 months; 12 months where triggered; up to 48 months under criteria	Risk-based, up to 48 months

Confirm the exact trigger criteria for each interval in 650.311 — the summary above deliberately omits the item-by-item conditions.

The Risk Assessment Panel (RAP)

Method 2 requires a RAP of at least four members, at least two of whom are registered professional engineers, with collective expertise in bridge design, evaluation and inspection. The RAP establishes damage modes, attributes that influence their likelihood and consequence, and scoring that assigns bridges to interval categories. NCHRP Report 782 (*Proposed Guideline for Reliability-Based Bridge Inspection Practices*) is the research foundation that many States draw on. Method 2 also requires FHWA approval of the State's policies.

Tolerances

The rule allows a tolerance around the target date: **2 months** for intervals of less than 24 months and **3 months** for intervals of 24 months or more. The tolerance is a scheduling allowance, not a permanent extension — the next inspection is still due based on the established interval, per the owner's procedure.

Worked example 5 — Due dates with tolerance

A bridge on a 24-month routine interval was last inspected on April 10, 2025.

1. Target date: April 10, 2027.
2. Interval is 24 months, so the tolerance is 3 months.
3. The inspection is compliant if performed by July 10, 2027 (and owners typically also limit early inspections so data stays meaningful).

A bridge with a 12-month interval last inspected on September 15, 2026 is due September 15, 2027 with a 2-month tolerance — compliant through November 15, 2027.

Worked example 6 — When an extended interval needs a service inspection

A State with FHWA-approved Method 2 policy assigns a 72-month routine interval to a short, good-condition prestressed slab bridge. Because 72 months exceeds 48, the rule requires a service inspection in between. The service inspection is a lighter visit to confirm there are no obvious changes — for example, new impact damage, scour, or drainage problems — that would warrant a full routine inspection sooner. If the service inspector finds significant change, the owner's procedure should trigger a routine or damage inspection and reconsider the interval.

Part G — Procedures: load rating, posting and closure

Section 650.313 ties inspection to evaluation. Each bridge must be load rated per the MBE, and the rating updated when changes in condition or loading warrant it. The 2022 rule set firm clocks:

Action	Time limit
Complete a new or updated load rating after a change that warrants it (e.g., a finding of deterioration, a new bridge)	Within 3 months of the triggering event per the rule
Post a bridge after it is determined posting is required	Within 30 days

Action	Time limit
Close a bridge	When the gross live load capacity is less than 3 tons

Worked example 7 — Posting clock

A routine inspection on March 3 finds heavy section loss on steel stringer webs at the bearings. The team leader flags it; the load rating engineer completes an updated rating on April 20 showing the bridge cannot carry State legal loads at the inventory/operating level used for posting. The determination that posting is required is made April 20. Posting signs must be installed no later than May 20. If the rating had shown a gross capacity under 3 tons, the bridge would have to be closed.

Emergency vehicles and specialized hauling vehicles

FHWA memoranda (SHV, November 15, 2013; Emergency Vehicles, November 3, 2016) require owners to evaluate bridges for these vehicle types, which can produce higher load effects than older legal trucks on short spans. A bridge that rates adequately for the traditional legal vehicles may still need posting for SHVs. Course BR-L03 covers these in detail.

Scour

Every bridge over water must have a scour appraisal. Bridges determined to be scour critical, or with unknown foundations, must have a scour plan of action that includes monitoring and closure criteria, and the plan must be implemented. HEC-18 is the technical reference for scour evaluations. Course BR-H01 covers scour evaluation.

Part H — Critical findings and quality programs

A critical finding is a structural or safety-related deficiency that requires immediate action to ensure public safety. The rule requires owners to have a documented procedure that ensures immediate action — such as closure, restriction, shoring or emergency repair — and to track each finding to resolution.

FHWA notification

FHWA must be notified within 24 hours of certain critical findings — specifically the closure or partial closure of a bridge on the National Highway System, or an NSTM rated in condition 3 or below. Other critical findings are reported per the State's procedures and summarized to FHWA as required.

Worked example 8 — Is FHWA notification required?

Scenario	Critical finding?	24-hour FHWA notice?
Off-system county bridge closed after a pier undermined by flood	Yes	Not under the 24-hour NHS/NSTM trigger (report per State procedure)
Interstate bridge (NHS), one lane closed due to deck punch-through	Yes	Yes — partial closure on NHS
Non-NHS truss with an eyebar NSTM rated 3 (serious)	Yes	Yes — NSTM rated 3 or less
Local bridge with a cracked approach slab, no structural concern	Probably not	No

QC and QA

The organization must have quality control (checking work as it is done — for example, office review of every report, field verification of ratings) and quality assurance (independent, periodic review of the program — for example, re-inspecting a sample of bridges with a separate team and comparing ratings). Effective QA tracks rating agreement statistics and uses disagreements to target training. MBE Section 4 and the BIRM give practical guidance.

Part I — Inventory under the SNBI

Section 650.315 requires each State, Federal agency and Tribe to prepare and maintain an inventory of bridges in accordance with the SNBI and report it to FHWA. The rule requires updates for changes such as new bridges, modifications, posting or closure, and inspection results within **3 months** of the change or completion of the activity, per the rule's specifics. The SNBI (FHWA-HIF-22-017) replaced the 1995 *Recording and Coding Guide*, changing many data items and adding element-level data for more bridges.

Why it matters to engineers

Inventory data drive federal performance measures under 23 CFR 490 Subpart D, which classify NHS bridge deck area as good, fair or poor based on the lowest of deck, superstructure, substructure or culvert ratings. Those classifications affect how States program funding. A mis-coded rating is not just a paperwork error: it can change a bridge's classification and the State's performance totals.

Worked example 9 — Deck-area classification

An NHS bridge has ratings: deck 6, superstructure 5, substructure 4. Under 23 CFR 490, the bridge's classification is driven by the lowest of the component ratings: 4 falls in the poor range (4 or less is poor; 5–6 fair; 7 or more good). The bridge's entire deck area counts as poor. If the substructure were 5, the bridge would be fair.

Part J — Implementation checklist for practitioners

Use this checklist to compare your organization or your client's program to the 2022 rule.

#	Check	Section
1	Written procedures exist and are current for intervals, QC/QA, critical findings, load rating, posting, scour, files	650.307, 650.313
2	Every team leader has documented qualification path, ≥70% end-of-course score, refresher hours in window	650.309
3	NSTM team leaders have NSTM training on record	650.309
4	Interval for each bridge is documented with the criteria that justify it; service inspections scheduled for intervals over 48 months	650.311
5	Load ratings current per MBE and completed within 3 months of a triggering change	650.313
6	Postings installed within 30 days; closures where capacity < 3 tons	650.313
7	SHV and emergency vehicle evaluations complete	FHWA memos
8	Scour appraisals complete; plans of action for scour-critical and unknown-foundation bridges	650.313
9	Critical findings procedure, 24-hour FHWA notification for NHS closures and NSTM's rated ≤3	650.313

#	Check	Section
10	Inventory updated within required time per SNBI	650.315

Common pitfalls seen in practice

- Treating the interval tolerance as a standing extension.
- Counting non-approved seminars toward NBIS refresher hours.
- Posting delays caused by waiting for sign fabrication — plan stock signs in advance.
- Inspection reports that describe a defect but do not tell the load rater whether section loss was measured.
- Construction phases opened to traffic without an inventory record or initial inspection.

Wrap-up

The 2022 NBIS is best understood as a system: qualified people, inspecting at justified intervals, using standard procedures, feeding standardized data that drive ratings, postings and funding decisions. Each part of the rule supports the others. As you work through the other courses in this catalog — intervals (BR-I02), critical findings (BR-I03), element inspection (BR-I04) and the SNBI (BR-S01) — you will see each piece in more depth.

Part K — A short history: why the standards exist

The National Bridge Inspection Standards trace directly to the December 15, 1967 collapse of the Silver Bridge over the Ohio River between Point Pleasant, West Virginia and Kanauga, Ohio, which killed 46 people. The eyebar-chain suspension bridge failed when a single eyebar fractured from a small defect that had grown by stress corrosion and corrosion fatigue — a nonredundant tension member, in today's language. In response, the Federal-Aid Highway Act of 1968 directed the establishment of national inspection standards, and the first NBIS were published in 1971.

Later events continued to shape the program:

Year	Event	Program effect
1967	Silver Bridge collapse	Led to the 1968 Act and the first NBIS (1971)
1983	Mianus River Bridge (I-95, Connecticut) pin-and-hanger failure	Increased attention to fracture-critical and fatigue-prone details; fracture-critical inspection requirements followed
1987	Schoharie Creek Bridge (New York Thruway) collapse from scour	Drove national scour evaluation programs and HEC-18
1988	NBIS revision	Added fracture-critical, underwater and special inspection requirements
2004	NBIS revision	Updated qualifications and procedures
2007	I-35W bridge (Minneapolis) collapse; NTSB cited undersized gusset plates	FHWA gusset plate guidance (FHWA-IF-09-014) and load-rating attention to connections
2012	MAP-21 enacted	Mandated NBIS updates and national performance measures
2022	NBIS final rule	The rule this course describes

The pattern is worth remembering: each major revision followed a failure mode that inspection practice had not adequately addressed — fracture of nonredundant members, scour, connection capacity. When you read a requirement that seems burdensome, it is useful to ask which failure mode it guards against.

Part L — From fracture critical to NSTM

The 2022 rule replaced "fracture critical member" with **nonredundant steel tension member (NSTM)**. The terminology change is more than cosmetic. Historically, many owners classified members as fracture critical by a simple load-path count — two-girder bridges, single-box girders, truss tension members, pin-and-hanger assemblies — without considering system redundancy (the ability of the structure as a whole to redistribute load after a member fractures) or internal redundancy (for example, built-up members with multiple components).

The NSTM definition explicitly recognizes all three forms of redundancy. FHWA has issued guidance on how owners can demonstrate system or internal redundancy through refined analysis, which may allow a member to be reclassified and inspected on a routine schedule rather than as an NSTM. That reclassification requires engineering analysis to an accepted methodology and owner acceptance — it is not a judgment the field team makes.

Worked example 10 — Is it an NSTM?

Member	Steel? Tension?	Redundancy	Likely classification
Bottom flange of a two-girder steel bridge in positive moment	Yes / yes	No load-path redundancy; system redundancy not demonstrated	NSTM
Bottom chord eyebar of a pin-connected truss (two-bar panel)	Yes / yes	Low internal redundancy	NSTM
Bottom flange of a six-girder rolled-beam bridge	Yes / yes	Load-path redundant	Not NSTM
Prestressed concrete girder	Not steel member	—	Not NSTM (concrete)
Steel cap beam in a straddle bent carrying girders	Yes / yes (in flexure tension zone)	Often no redundancy	Often NSTM — check analysis

NSTM inspections are hands-on — within arm's length — and the team leader must have NSTM training. The NSTM interval follows 650.311 (with 12/24/48-month options under Method 1).

Part M — Element-level data and the MBEI

The NBIS has long relied on component ratings — a single 0 to 9 number each for deck, superstructure, substructure and culvert. MAP-21 required element-level data for NHS bridges, and the 2022 rule and SNBI build on that. Element-level inspection, governed by the AASHTO MBEI, divides the bridge into defined elements (for example, reinforced concrete deck, steel open girder, elastomeric bearing) and records the quantity of each element in four condition states: good, fair, poor and severe.

Worked example 11 — Recording an element

A steel open girder element totals 840 linear feet (six girders × 140 ft). The inspector observes:

- 700 ft with sound coating and no corrosion → Condition State 1
- 110 ft with freckled rust, no section loss → Condition State 2
- 30 ft with section loss at the bearing areas, not warranting structural review → Condition State 3
- 0 ft in Condition State 4

The record is CS1 700 / CS2 110 / CS3 30 / CS4 0 = 840 ft. The component rating for the superstructure is a separate judgment that considers the significance of that 30 ft of section loss — element data and component ratings complement each other.

Element data are what make bridge management systems useful: they allow deterioration models, preservation planning, and cost estimates by quantity. Course BR-I04 goes into element inspection in depth.

Part N — Case study: putting the rule together

Consider a hypothetical 1960s three-span continuous steel girder bridge on a State route that is part of the NHS, crossing a river. Four plate girders, concrete deck, spread footings on the abutments, piles at the piers. Here is how the NBIS pieces apply over one year.

1. **Interval.** The bridge is in fair condition (lowest rating 5), so under Method 1 it receives a 24-month routine interval. The piers are in 12 ft of water; underwater inspection is on a 60-month interval.
2. **Routine inspection (January).** The qualified team leader leads the inspection. The team finds a 3-inch crack at the termination of a cover plate on an interior girder bottom flange near midspan of span 2, and records element quantities for the deck, girders, bearings and joints.
3. **Critical finding?** The team leader judges the crack a structural deficiency requiring immediate action, initiates the critical findings procedure, and notifies the program manager. With four girders, the girder is not an NSTM. The bridge is not closed, so the 24-hour FHWA notification trigger is not met; the State reports per its procedure.
4. **In-depth and special inspection.** An in-depth inspection with magnetic particle testing checks all similar cover-plate terminations (Category E' details are fatigue-prone). Two more small cracks are found. Holes are drilled at the crack tips as a temporary measure, consistent with FHWA's fatigue-crack repair guidance (FHWA-IF-13-020), and a special inspection is scheduled every 3 months until bolted splice retrofits are installed.
5. **Load rating.** The load rating engineer updates the rating within 3 months, accounting for the cracked flanges. The bridge rates above legal loads, so no posting is needed.
6. **Flood (June).** A major flood occurs. The scour plan of action for this scour-critical bridge calls for monitoring at a defined river stage; the bridge is closed temporarily, then a damage inspection — including an underwater inspection — finds no new scour. The bridge reopens. Because the bridge is on the NHS and was closed, FHWA is notified within 24 hours.
7. **Inventory.** The inspection results, the critical finding and the closure/reopening are entered in the inventory within the required timeframe.
8. **Interval revisit.** Given active fatigue cracking, the owner shortens the routine interval to 12 months until the retrofit is complete.

Every step maps to a section of the rule — that is the system working as intended.

Part O — Glossary of key terms

Term	Plain-language meaning
NBIS	National Bridge Inspection Standards, 23 CFR 650 Subpart C
SNBI	Specifications for the National Bridge Inventory (FHWA-HIF-22-017); the coding specification for inventory data
MBE	AASHTO Manual for Bridge Evaluation — inspection, load rating and evaluation procedures

Term	Plain-language meaning
MBEI	AASHTO Manual for Bridge Element Inspection — element definitions and condition states
NSTM	Nonredundant steel tension member
Critical finding	A structural or safety-related deficiency requiring immediate action
RAP	Risk Assessment Panel used for Method 2 intervals; ≥4 members, ≥2 PEs
Service inspection	Lighter interim inspection when a risk-based routine interval exceeds 48 months
Scour critical	A bridge whose foundation is determined to be unstable for assessed or calculated scour conditions
Plan of action	Document for a scour-critical or unknown-foundation bridge describing monitoring, closure and countermeasures
Posting	Signing a bridge to restrict loads below legal limits
Hands-on	Within arm's length of the member surface
QC / QA	Quality control (checks as work is done) / quality assurance (independent program review)

Self-check before the quiz

1. Name the section that governs inspection intervals. *(650.311)*
2. What tolerance applies to a 48-month interval? *(3 months)*
3. How fast must a required posting be installed? *(30 days)*
4. What two critical-finding situations require 24-hour FHWA notification? *(NHS closure or partial closure; NSTM rated 3 or less)*
5. What is the minimum RAP composition? *(4 members, at least 2 PEs)*

Part P — Frequently asked questions

Does the NBIS require every bridge to be inspected every 24 months?

No. 24 months is the standard Method 1 routine interval, but the rule requires 12 months for bridges meeting certain condition triggers and allows up to 48 months under Method 1 criteria and up to 72 months under an FHWA-approved Method 2 risk-based policy. Owners may also choose shorter intervals at any time.

Can a consultant team leader sign off as program manager?

The program manager is a role the inspection organization designates. A consultant could in principle meet the qualifications, but the organization (the State, Federal agency or Tribe) remains responsible and must designate the individual. In practice, program managers are almost always owner staff.

Is drone imagery a "hands-on" inspection?

No. Hands-on means within arm's length of the surface. Unmanned aircraft and other remote technologies are valuable supplements — for documenting hard-to-reach areas or screening for defects — but they do not by themselves satisfy a hands-on requirement such as an NSTM inspection. FHWA has encouraged their use as a tool within the inspection team leader's judgment.

If I find a critical finding on an off-system bridge, do I call FHWA?

The 24-hour FHWA notification is tied to NHS closures/partial closures and NSTMs rated 3 or less. For other critical findings, follow the State's procedure, which will require immediate notification within the owner organization and tracking to resolution. When in doubt, notify the program manager immediately; they decide on further reporting.

Does a damage inspection restart the routine interval?

Generally no — the routine schedule stands unless the owner chooses to treat a full-scope inspection as satisfying the routine requirement under its procedures. Check the owner's written policy.

Which edition of the MBE do I use?

The rule incorporates a specific edition with interims by reference; owners may adopt newer editions with FHWA acceptance. Use the edition your owner specifies and state it in your rating documentation.

Are culverts covered?

Yes, when they meet the bridge length definition. Culverts receive a culvert rating instead of separate deck, superstructure and substructure ratings. Course BR-CU01 covers culvert inspection.

Part Q — Writing reports that satisfy the rule

The inspection report is where all of the rule's requirements become visible to the owner, the load rater, the next inspector and, in an audit, FHWA. A good NBIS report does the following:

- **Identifies the team and the dates.** Name the team leader, list team members, and give the dates on site. This demonstrates the qualified-team-leader requirement.
- **States the inspection type and scope.** Routine, NSTM, underwater, damage, in-depth, special or service — and any access limitations (for example, "spans 3–4 over the railroad inspected from the ground only; snooper access not granted").
- **Quantifies defects.** "Section loss" is not enough. Give location, dimensions and remaining thickness: "Girder G3, web at north bearing, 6 in. by 10 in. area, remaining web thickness 0.31 in. measured with ultrasonic gauge (original 0.4375 in.)." The load rating engineer needs numbers.
- **Links ratings to evidence.** If the superstructure is rated 4, the narrative should show why — photographs keyed to plan locations and element quantities in CS3/CS4.
- **Flags critical findings and follow-up.** State when and to whom a finding was reported and what immediate action was taken.
- **Recommends.** Maintenance, repairs, further inspection (in-depth, special), load rating review, interval change.

Worked example 12 — Rewriting a weak narrative

Weak: "Some rust on beams. Bearings fair. Recommend painting."

Strong: "Steel open girders (element 107): coating failure with surface rust on bottom flanges, all girders, within 5 ft of both abutments (approx. 60 LF, CS2). Pack rust between bottom flange and sole plate at G2 and G4 south bearings with up to 1/8 in. measured section loss on flange edges (approx. 4 LF, CS3); no deformation. Elastomeric bearings (element 310): bulging

within limits; G4 south bearing walked 3/4 in. toward the span (CS2). Recommend spot coating at bearing areas within 2 years; monitor G4 bearing at next routine inspection; no load rating review required for observed section loss."

The strong version supports element quantities, informs the rater, gives maintenance staff a scope, and tells the next inspector what to look for. Course BR-I10 covers report writing in more detail.

Key takeaways

- The 2022 NBIS adopts MBE 3rd Ed., MBEI 2nd Ed. and SNBI by reference.
- Fracture critical member is now NSTM; critical findings are formally defined.
- Team leaders have four qualification paths plus 18 refresher hours per 60 months.
- Ratings within 3 months; postings within 30 days; close below 3 tons gross capacity.

References

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. FHWA, Specifications for the National Bridge Inventory (SNBI), FHWA-HIF-22-017, March 2022

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