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Title 23 - Highways

Chapter I - Federal Highway Administration, Department of Transportation

Subchapter G - Engineering and Traffic Operations

Part 650 - Bridges, Structures, and Hydraulics

Authority: 23 U.S.C. 119, 144, and 315.

Subpart C National Bridge Inspection Standards (NBIS)

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Subpart C - National Bridge Inspection Standards (NBIS)

Source: 87 FR 27429, May 6, 2022, unless otherwise noted.

§ 650.301 Purpose.

This subpart sets the national minimum standards for the proper safety inspection and evaluation of all highway bridges in accordance with 23 U.S.C. 144(h) and the requirements for preparing and maintaining an inventory in accordance with 23 U.S.C. 144(b).

§ 650.303 Applicability.

The National Bridge Inspection Standards (NBIS) in this subpart apply to all structures defined as highway bridges located on all public roads, on and off Federal-aid highways, including tribally-owned and federally-owned bridges, private bridges that are connected to a public road on both ends of the bridge, temporary bridges, and bridges under construction with portions open to traffic.

§ 650.305 Definitions.

The following terms used in this subpart are defined as follows:

AASHTO Manual. The term “AASHTO Manual” means the American Association of State Highway and Transportation Officials (AASHTO) “Manual for Bridge Evaluation”, including Interim Revisions, excluding the 3rd paragraph in Article 6B.7.1, incorporated by reference in § 650.317.

Attribute. Characteristic of the design, loading, conditions, and environment that affect the reliability of a bridge or bridge member.

Bridge. A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between under copings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it includes multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

Bridge inspection experience. Active participation in bridge inspections in accordance with the this subpart, in either a field inspection, supervisory, or management role. Some of the experience may come from relevant bridge design, bridge load rating, bridge construction, and bridge maintenance experience provided it develops the skills necessary to properly perform a NBIS bridge inspection.

Bridge inspection refresher training. The National Highway Institute^[1] (NHI) “Bridge Inspection Refresher Training Course” or other State, federally, or tribally developed instruction aimed to improve quality of inspections, introduce new techniques, and maintain consistency in the inspection program.

Bridge Inspector's Reference Manual or the BIRM. A comprehensive FHWA manual on procedures and techniques for inspecting and evaluating a variety of in-service highway bridges. This manual is available at the following URL: www.fhwa.dot.gov/bridge/nbis.cfm. This manual may be purchased from the Government Publishing Office, Washington, DC 20402 and from National Technical Information Service, Springfield, VA 22161.

Complex feature. Bridge component(s) or member(s) with advanced or unique structural members or operational characteristics, construction methods, and/or requiring specific inspection procedures. This includes mechanical and electrical elements of moveable spans and cable-related members of suspension and cable-stayed superstructures.

Comprehensive bridge inspection training. Training that covers all aspects of bridge inspection and enables inspectors to relate conditions observed on a bridge to established criteria (see the BIRM for the recommended material to be covered in a comprehensive training course).

Consequence. A measure of impacts to structural safety and serviceability in a hypothetical scenario where a deterioration mode progresses to the point of requiring immediate action. This may include costs to restore the bridge to safe operating condition or other costs.

Critical finding. A structural or safety related deficiency that requires immediate action to ensure public safety.

Damage inspection. An unscheduled inspection to assess structural damage resulting from environmental factors or human actions.

Deterioration mode. Typical deterioration or damage affecting the condition of a bridge member that may affect the structural safety or serviceability of the bridge.

Element level bridge inspection data. Quantitative condition assessment data, collected during bridge inspections, that indicates the severity and extent of defects in bridge elements.

End-of-course assessment. A comprehensive examination given to students after the completion of the delivery of a training course.

[1] The NHI training may be found at the following URL: www.nhi.fhwa.dot.gov/.

Hands-on inspection. Inspection within arm's length of the member. Inspection uses visual techniques that may be supplemented by nondestructive evaluation techniques.

Highway. The term “highway” is defined in 23 U.S.C. 101.

In-depth inspection. A close-up, detailed inspection of one or more bridge members located above or below water, using visual or nondestructive evaluation techniques as required to identify any deficiencies not readily detectable using routine inspection procedures. Hands-on inspection may be necessary at some locations. In-depth inspections may occur more or less frequently than routine inspections, as outlined in bridge specific inspection procedures.

Initial inspection. The first inspection of a new, replaced, or rehabilitated bridge. This inspection serves to record required bridge inventory data, establish baseline conditions, and establish the intervals for other inspection types.

Inspection date. The date on which the field portion of the bridge inspection is completed.

Inspection due date. The last inspection date plus the current inspection interval.

Inspection report. The document which summarizes the bridge inspection findings, recommendations, and identifies the team leader responsible for the inspection and report.

Internal redundancy. A redundancy that exists within a primary member cross-section without load path redundancy, such that fracture of one component will not propagate through the entire member, is discoverable by the applicable inspection procedures, and will not cause a portion of or the entire bridge to collapse.

Inventory data. All data reported to the National Bridge Inventory (NBI) in accordance with the § 650.315.

Legal load. The maximum load for each vehicle configuration, including the weight of the vehicle and its payload, permitted by law for the State in which the bridge is located.

Legal load rating. The maximum permissible legal load to which the structure may be subjected with the unlimited numbers of passages over the duration of a specified bridge evaluation period. Legal load rating is a term used in Load and Resistance Factor Rating method.

Load path redundancy. A redundancy that exists based on the number of primary load-carrying members between points of support, such that fracture of the cross section at one location of a member will not cause a portion of or the entire bridge to collapse.

Load posting. Regulatory signs installed in accordance with 23 CFR 655.601 and State or local law which represent the maximum vehicular live load which the bridge may safely carry.

Load rating. The analysis to determine the safe vehicular live load carrying capacity of a bridge using bridge plans and supplemented by measurements and other information gathered from an inspection.

Nationally certified bridge inspector. An individual meeting the team leader requirements of § 650.309(b).

Nonredundant Steel Tension Member (NSTM). A primary steel member fully or partially in tension, and without load path redundancy, system redundancy or internal redundancy, whose failure may cause a portion of or the entire bridge to collapse.

NSTM inspection. A hands-on inspection of a nonredundant steel tension member.

NSTM inspection training. Training that covers all aspects of NSTM inspections to relate conditions observed on a bridge to established criteria.

Operating rating. The maximum permissible live load to which the structure may be subjected for the load configuration used in the load rating. Allowing unlimited numbers of vehicles to use the bridge at operating level may shorten the life of the bridge. Operating rating is a term used in either the Allowable Stress or Load Factor Rating method.

Private bridge. A bridge open to public travel and not owned by a public authority as defined in 23 U.S.C. 101.

Procedures. Written documentation of policies, methods, considerations, criteria, and other conditions that direct the actions of personnel so that a desired end result is achieved consistently.

Probability. Extent to which an event is likely to occur during a given interval. This may be based on the frequency of events, such as in the quantitative probability of failure, or on degree of belief or expectation. Degrees of belief about probability can be chosen using qualitative scales, ranks, or categories such as, remote, low, moderate, or high.

Professional engineer (PE). An individual, who has fulfilled education and experience requirements and passed examinations for professional engineering and/or structural engineering license that, under State licensure laws, permits the individual to offer engineering services within areas of expertise directly to the public.

Program manager. The individual in charge of the program, that has been assigned the duties and responsibilities for bridge inspection, reporting, and inventory, and has the overall responsibility to ensure the program conforms with the requirements of this subpart. The program manager provides overall leadership and is available to inspection team leaders to provide guidance.

Public road. The term “public road” is defined in 23 U.S.C. 101.

Quality assurance (QA). The use of sampling and other measures to assure the adequacy of QC procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program.

Quality control (QC). Procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level.

Rehabilitation. The major work required to restore the structural integrity of a bridge as well as work necessary to correct major safety defects.

Risk. The exposure to the possibility of structural safety or serviceability loss during the interval between inspections. It is the combination of the probability of an event and its consequence.

Risk assessment panel (RAP). A group of well experienced panel members that performs a rigorous assessment of risk to establish policy for bridge inspection intervals.

Routine inspection. Regularly scheduled comprehensive inspection consisting of observations and measurements needed to determine the physical and functional condition of the bridge and identify changes from previously recorded conditions.

Routine permit load. A live load, which has a gross weight, axle weight, or distance between axles not conforming with State statutes for legally configured vehicles, authorized for unlimited trips over an extended period of time to move alongside other heavy vehicles on a regular basis.

Safe load capacity. A live load that can safely utilize a bridge repeatedly over the duration of a specified inspection interval.

Scour. Erosion of streambed or bank material due to flowing water; often considered as being localized around piers and abutments of bridges.

Scour appraisal. A risk-based and data-driven determination of a bridge's vulnerability to scour, resulting from the least stable result of scour that is either observed, or estimated through a scour evaluation or a scour assessment.

Scour assessment. The determination of an existing bridge's vulnerability to scour which considers stream stability and scour potential.

Scour critical bridge. A bridge with a foundation member that is unstable, or may become unstable, as determined by the scour appraisal.

Scour evaluation. The application of hydraulic analysis to estimate scour depths and determine bridge and substructure stability considering potential scour.

Scour plan of action (POA). Procedures for bridge inspectors and engineers in managing each bridge determined to be scour critical or that has unknown foundations.

Service inspection. An inspection to identify major deficiencies and safety issues, performed by personnel with general knowledge of bridge maintenance or bridge inspection.

Special inspection. An inspection scheduled at the discretion of the bridge owner, used to monitor a particular known or suspected deficiency, or to monitor special details or unusual characteristics of a bridge that does not necessarily have defects.

Special permit load. A live load, which has a gross weight, axle weight, or distance between axles not conforming with State statutes for legally configured vehicles and routine permit loads, typically authorized for single or limited trips.

State transportation department. The term "State transportation department" is defined in 23 U.S.C. 101.

System redundancy. A redundancy that exists in a bridge system without load path redundancy, such that fracture of the cross section at one location of a primary member will not cause a portion of or the entire bridge to collapse.

Team leader. The on-site, nationally certified bridge inspector in charge of an inspection team and responsible for planning, preparing, performing, and reporting on bridge field inspections.

Temporary bridge. A bridge which is constructed to carry highway traffic until the permanent facility is built, repaired, rehabilitated, or replaced.

Underwater bridge inspection diver. The individual performing the inspection of the underwater portion of the bridge.

Underwater Bridge Inspection Manual. A comprehensive FHWA manual on the procedures and techniques for underwater bridge inspection. This manual is available at the following URL: www.fhwa.dot.gov/bridge/nbis.cfm. This manual may be purchased from the Government Publishing Office, Washington, DC 20402 and from National Technical Information Service, Springfield, VA 22161.

Underwater bridge inspection training. Training that covers all aspects of underwater bridge inspection to relate the conditions of underwater bridge members to established criteria (see Underwater Bridge Inspection Manual and the BIRM section on underwater inspection for the recommended material to be covered in an underwater bridge inspection training course).

Underwater inspection. Inspection of the underwater portion of a bridge substructure and the surrounding channel, which cannot be inspected visually at low water or by wading or probing, and generally requiring diving or other appropriate techniques.

Unknown Foundations. Foundations of bridges over waterways where complete details are unknown because either the foundation type and depth are unknown, or the foundation type is known, but its depth is unknown, and therefore cannot be appraised for scour vulnerability.

§ 650.307 Bridge inspection organization responsibilities.

- (a) Each State transportation department must perform, or cause to be performed, the proper inspection and evaluation of all highway bridges that are fully or partially located within the State's boundaries, except for bridges that are owned by Federal agencies or Tribal governments.
- (b) Each Federal agency must perform, or cause to be performed, the proper inspection and evaluation of all highway bridges that are fully or partially located within the respective Federal agency's responsibility or jurisdiction.
- (c) Each Tribal government, in consultation with the Bureau of Indian Affairs (BIA) or FHWA, must perform, or cause to be performed, the proper inspection and evaluation of all highway bridges that are fully or partially located within the respective Tribal government's responsibility or jurisdiction.
- (d) Where a bridge crosses a border between a State transportation department, Federal agency, or Tribal government jurisdiction, all entities must determine through a joint written agreement the responsibilities of each entity for that bridge under this subpart, including the designated lead State for reporting NBI data.
- (e) Each State transportation department, Federal agency, and Tribal government must include a bridge inspection organization that is responsible for the following:
 - (1) Developing and implementing written Statewide, Federal agencywide, or Tribal governmentwide bridge inspection policies and procedures;
 - (2) Maintaining a registry of nationally certified bridge inspectors that are performing the duties of a team leader in their State or Federal agency or Tribal government that includes, at a minimum, a method to positively identify each inspector, inspector's qualification records, inspector's current contact information, and detailed information about any adverse action that may affect the good standing of the inspector;
 - (3) Documenting the criteria for inspection intervals for the inspection types identified in these standards;
 - (4) Documenting the roles and responsibilities of personnel involved in the bridge inspection program;
 - (5) Managing bridge inspection reports and files;
 - (6) Performing quality control and quality assurance activities;
 - (7) Preparing, maintaining, and reporting bridge inventory data;
 - (8) Producing valid load ratings and when required, implementing load posting or other restrictions;
 - (9) Managing the activities and corrective actions taken in response to a critical finding;
 - (10) Managing scour appraisals and scour plans of action; and
 - (11) Managing other requirements of these standards.

- (f) Functions identified in paragraphs (e)(3) through (11) of this section may be delegated to other individuals, agencies, or entities. The delegated roles and functions of all individuals, agencies, and entities involved must be documented by the responsible State transportation department, Federal agency, or Tribal government. Except as provided below, such delegation does not relieve the State transportation department, Federal agency, or Tribal government of any of its responsibilities under this subpart. A Tribal government may, with BIA's or FHWA's concurrence via a formal written agreement, delegate its functions and responsibilities under this subpart to the BIA or FHWA.
- (g) Each State transportation department, Federal agency, or Tribal government bridge inspection organization must have a program manager with the qualifications defined in § 650.309(a). An employee of the BIA or FHWA having the qualification of a program manager as defined in § 650.309(a) may serve as the program manager for a Tribal government if the Tribal government delegates this responsibility to the BIA or FHWA in accordance with paragraph (f) of this section.

§ 650.309 Qualifications of personnel.

- (a) A program manager must, at a minimum:
 - (1) Be a registered Professional Engineer, or have 10 years of bridge inspection experience;
 - (2) Complete an FHWA-approved comprehensive bridge inspection training course as described in paragraph (h) of this section and score 70 percent or greater on an end-of-course assessment (completion of FHWA-approved comprehensive bridge inspection training under FHWA regulations in this subpart in effect before June 6, 2022, satisfies the intent of the requirement in this paragraph (a));
 - (3) Complete a cumulative total of 18 hours of FHWA-approved bridge inspection refresher training over each 60 month period;
 - (4) Maintain documentation supporting the satisfaction of paragraphs (a)(1) through (3) of this section; and
 - (5) Satisfy the requirements of this paragraph (a) within 24 months from June 6, 2022, if serving as a program manager who was qualified under prior FHWA regulations in this subpart.
- (b) A team leader must, at a minimum:
 - (1) Meet one of the four qualifications listed in paragraphs (b)(1)(i) through (iv) of this section:
 - (i) Be a registered Professional Engineer and have 6 months of bridge inspection experience;
 - (ii) Have 5 years of bridge inspection experience;
 - (iii) Have all of the following:
 - (A) A bachelor's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology; and
 - (B) Successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals of Engineering examination; and
 - (C) Two (2) years of bridge inspection experience; or
 - (iv) Have all of the following:

- (A) An associate's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology; and
- (B) Four (4) years of bridge inspection experience;
- (2) Complete an FHWA-approved comprehensive bridge inspection training course as described in paragraph (h) of this section and score 70 percent or greater on an end-of-course assessment (completion of FHWA-approved comprehensive bridge inspection training under FHWA regulations in this subpart in effect before June 6, 2022, satisfies the intent of the requirement in this paragraph (b));
- (3) Complete a cumulative total of 18 hours of FHWA-approved bridge inspection refresher training over each 60 month period;
- (4) Provide documentation supporting the satisfaction of paragraphs (b)(1) through (3) of this section to the program manager of each State transportation department, Federal agency, or Tribal government for which they are performing bridge inspections; and
- (5) Satisfy the requirements of this paragraph (b) within 24 months from June 6, 2022, if serving as a team leader who was qualified under prior FHWA regulations in this subpart.
- (c) Team leaders on NSTM inspections must, at a minimum:
 - (1) Meet the requirements in paragraph (b) of this section;
 - (2) Complete an FHWA-approved training course on the inspection of NSTMs as defined in paragraph (h) of this section and score 70 percent or greater on an end-of-course assessment (completion of FHWA-approved NSTM inspection training prior to June 6, 2022, satisfies the intent of the requirement in this paragraph (c)); and
 - (3) Satisfy the requirements of this paragraph (c) within 24 months from June 6, 2022.
- (d) Load ratings must be performed by, or under the direct supervision of, a registered professional engineer.
- (e) An Underwater Bridge Inspection Diver must complete FHWA-approved underwater bridge inspection training as described in paragraph (h) of this section and score 70 percent or greater on an end-of-course assessment (completion of FHWA-approved comprehensive bridge inspection training or FHWA-approved underwater bridge inspection training under FHWA regulations in this subpart in effect before June 6, 2022, satisfies the intent of the requirement in this paragraph (e)).
- (f) State transportation departments, Federal agencies, and Tribal governments must establish documented personnel qualifications for Damage and Special Inspection types.
- (g) State transportation departments, Federal agencies, and Tribal governments that establish risk-based routine inspection intervals that exceed 48 months under § 650.311(a)(2) must establish documented personnel qualifications for the Service Inspection type.
- (h) The following are considered acceptable bridge inspection training:
 - (1) **National Highway Institute training.** Acceptable NHI courses include:
 - (i) Comprehensive bridge inspection training, which must include topics of importance to bridge inspection; bridge mechanics and terminology; personal and public safety issues associated with bridge inspections; properties and deficiencies of concrete, steel, timber, and masonry;

inspection equipment needs for various types of bridges and site conditions; inspection procedures, evaluations, documentation, data collection, and critical findings for bridge decks, superstructures, substructures, culverts, waterways (including underwater members), joints, bearings, drainage systems, lighting, signs, and traffic safety features; nondestructive evaluation techniques; load path redundancy and fatigue concepts; and practical applications of the concepts listed in this paragraph (h)(1)(i);

- (ii) Bridge inspection refresher training, which must include topics on documentation of inspections, commonly miscoded items, recognition of critical inspection findings, recent events impacting bridge inspections, and quality assurance activities;
 - (iii) Underwater bridge inspection training, which must include topics on the need for and benefits of underwater bridge inspections; typical defects and deterioration in underwater members; inspection equipment needs for various types of bridges and site conditions; inspection planning and hazard analysis; and underwater inspection procedures, evaluations, documentation, data collection, and critical findings; and
 - (iv) NSTM inspection training, which must include topics on the identification of NSTMs and related problematic structural details; the recognition of areas most susceptible to fatigue and fracture; the evaluation and recording of defects on NSTMs; and the application of nondestructive evaluation techniques.
- (2) **FHWA approval of alternate training.** A State transportation department, Federal agency, or Tribal government may submit to FHWA a training course as an alternate to any of the NHI courses listed in paragraph (h)(1) of this section. An alternate must include all the topics described in paragraph (h)(1) and be consistent with the related content. FHWA must approve alternate course materials and end-of-course assessments for national consistency and certification purposes. Alternate training courses must be reviewed by the program manager every 5 years to ensure the material is current. Updates to approved course materials and end-of-course assessments must be resubmitted to FHWA for approval.
- (3) **FHWA-approved alternate training under prior regulations.** Agencies that have alternate training courses approved by FHWA prior to June 6, 2022, have 24 months to review and update training materials to satisfy requirements as defined in § 650.305 and paragraph (h)(1) of this section and resubmit to FHWA for approval.

§ 650.311 Inspection interval.

- (a) **Routine inspections.** Each bridge must be inspected at regular intervals not to exceed the interval established using one of the risk-based methods outlined in paragraph (a)(1) or (2) of this section.
 - (1) **Method 1.** Inspection intervals are determined by a simplified assessment of risk to classify each bridge into one of three categories with an inspection interval as described below.
 - (i) **Regular intervals.** Each bridge must be inspected at regular intervals not to exceed 24 months, except as required in paragraph (a)(1)(ii) of this section and allowed in paragraphs (a)(1)(iii) of this section.
 - (ii) **Reduced intervals.**
 - (A) State transportation departments, Federal agencies, or Tribal governments must develop and document criteria used to determine when intervals must be reduced below 24 months. Factors to consider include structure type, design, materials, age, condition

ratings, scour, environment, annual average daily traffic and annual average daily truck traffic, history of vehicle impact damage, loads and safe load capacity, and other known deficiencies.

- (B) Certain bridges meeting any of the following criteria as recorded in the National Bridge Inventory (NBI) (see § 650.315) must be inspected at intervals not to exceed 12 months:
 - (1) One or more of the deck, superstructure, or substructure, or culvert components is rated in serious or worse condition, as recorded by the Deck, Superstructure, or Substructure Condition Rating items, or the Culvert Condition Rating item, coded three (3) or less; or
 - (2) The observed scour condition is rated serious or worse, as recorded by the Scour Condition Rating item coded three (3) or less.
- (C) Where condition ratings are coded three (3) or less due to localized deficiencies, a special inspection limited to those deficiencies, as described in § 650.313(h), can be used to meet this requirement in lieu of a routine inspection. In such cases, a complete routine inspection must be conducted in accordance with paragraph (a)(1)(i) of this section.

(iii) **Extended intervals.**

- (A) Certain bridges meeting all of the following criteria as recorded in the NBI (see § 650.315) may be inspected at intervals not to exceed 48 months:
 - (1) The deck, superstructure, and substructure, or culvert, components are all rated in satisfactory or better condition, as recorded by the Deck, Superstructure, and Substructure Condition Rating items, or the Culvert Condition Rating item coded six (6) or greater;
 - (2) The channel and channel protection are rated in satisfactory or better condition, as recorded by the Channel Condition and Channel Protection Condition items coded six (6) or greater;
 - (3) The inventory rating is greater than or equal to the standard AASHTO HS-20 or HL-93 loading and routine permit loads are not restricted or not carried/issued, as recorded by the Inventory Load Rating Factor item coded greater than or equal to 1.0 and the Routine Permit Loads item coded A or N;
 - (4) A steel bridge does not have Category E or E' fatigue details, as recorded by the Fatigue Details item coded N;
 - (5) All roadway vertical clearances are greater than or equal to 14'-0", as recorded in the Highway Minimum Vertical Clearance item;
 - (6) All superstructure materials limited to concrete and steel and all superstructure types limited to certain arches, box girders/beams, frames, girders/beams, slabs, and culverts, as recorded by the Span Material items coded C01-C05 or S01-S05, and the Span Type items coded A01, B02-B03, F01-F02, G01-G08, S01-S02, or P01-P02; and
 - (7) Stable for potential scour and observed scour condition is rated satisfactory or better, as recorded by the Scour Vulnerability item coded A or B and the Scour Condition Rating item coded six (6) or greater.

- (B) State transportation departments, Federal agencies, or Tribal governments that implement paragraph (a)(1)(iii)(A) of this section must develop and document an extended interval policy and must notify FHWA in writing prior to implementation. Factors to consider include structure type, design, materials, age, condition ratings, scour, environment, annual average daily traffic and annual average daily truck traffic, history of vehicle impact damage, loads and safe load capacity, and other known deficiencies.
- (2) **Method 2.** Inspection intervals are determined by a more rigorous assessment of risk to classify each bridge, or a group of bridges, into one of four categories, with inspection intervals not to exceed 12, 24, 48, or 72 months. The risk assessment process must be developed by a Risk Assessment Panel (RAP) and documented as a formal policy. The RAP must be comprised of not less than four people, at least two of which are professional engineers, with collective knowledge in bridge design, evaluation, inspection, maintenance, materials, and construction, and include the NBIS program manager. The policy and criteria which establishes intervals, including subsequent changes, must be submitted by the State transportation department, Federal agency, or Tribal government for FHWA approval. The request must include the items in paragraphs (a)(2)(i) through (vi) of this section:
 - (i) Endorsement from a RAP, which must be used to develop a formal policy.
 - (ii) Definitions for risk factors, categories, and the probability and consequence levels that are used to define the risk for each bridge to be assessed.
 - (iii) Deterioration modes and attributes that are used in classifying probability and consequence levels, depending on their relevance to the bridge being considered. A system of screening, scoring, and thresholds are defined by the RAP to assess the risks. Scoring is based on prioritizing attributes and their relative influence on deterioration modes.
 - (A) A set of screening criteria must be used to determine how a bridge should be considered in the assessment and to establish maximum inspection intervals. The screening criteria must include:
 - (1) Requirements for flexure and shear cracking in concrete primary load members;
 - (2) Requirements for fatigue cracking and corrosion in steel primary load members;
 - (3) Requirements for other details, loadings, conditions, and inspection findings that are likely to affect the safety or serviceability of the bridge or its members;
 - (4) Bridges classified as in poor condition cannot have an inspection interval greater than 24 months; and
 - (5) Bridges classified as in fair condition cannot have an inspection interval greater than 48 months.
 - (B) The attributes in each assessment must include material properties, loads and safe load capacity, and condition.
 - (C) The deterioration modes in each assessment must include:
 - (1) For steel members: Section loss, fatigue, and fracture;
 - (2) For concrete members: Flexural cracking, shear cracking, and reinforcing and prestressing steel corrosion;

- (3) For superstructure members: Settlement, rotation, overload, and vehicle/vessel impact; and
- (4) For substructure members: Settlement, rotation, and scour.
- (D) A set of criteria to assess risk for each bridge member in terms of probability and consequence of structural safety or serviceability loss in the time between inspections.
- (iv) A set of risk assessment criteria, written in standard logical format amenable for computer programming.
- (v) Supplemental inspection procedures and data collection that are aligned with the level of inspection required to obtain the data to apply the criteria.
- (vi) A list classifying each bridge into one of four risk categories with a routine inspection interval not to exceed 12, 24, 48, or 72 months.
- (3) **Service inspection.** A service inspection must be performed during the month midway between routine inspections when a risk-based, routine inspection interval exceeds 48 months.
- (4) **Additional routine inspection interval eligibility.** Any new, rehabilitated, or structurally modified bridge must receive an initial inspection, be in service for 24 months, and receive its next routine inspection before being eligible for inspection intervals greater than 24 months.
- (b) **Underwater inspections.** Each bridge must be inspected at regular intervals not to exceed the interval established using one of the risk-based methods outlined in paragraph (b)(1) or (2) of this section.
 - (1) **Method 1.** Inspection intervals are determined by a simplified assessment of risk to classify each bridge into one of three categories for an underwater inspection interval as described in this section.
 - (i) **Regular intervals.** Each bridge must be inspected at regular intervals not to exceed 60 months, except as required in paragraph (b)(1)(ii) of this section and allowed in paragraph (b)(1)(iii) of this section.
 - (ii) **Reduced intervals.**
 - (A) State transportation departments, Federal agencies, or Tribal governments must develop and document criteria used to determine when intervals must be reduced below 60 months. Factors to consider include structure type, design, materials, age, condition ratings, scour, environment, annual average daily traffic and annual average daily truck traffic, history of vehicle/vessel impact damage, loads and safe load capacity, and other known deficiencies.
 - (B) Certain bridges meeting at least any of the following criteria as recorded in the NBI (see § 650.315) must be inspected at intervals not to exceed 24 months:
 - (1) The underwater portions of the bridge are in serious or worse condition, as recorded by the Underwater Inspection Condition item coded three (3) or less;
 - (2) The channel or channel protection is in serious or worse condition, as recorded by the Channel Condition and Channel Protection Condition items coded three (3) or less; or
 - (3) The observed scour condition is three (3) or less, as recorded by the Scour Condition Rating item.

- (C) Where condition ratings are coded three (3) or less due to localized deficiencies, a special inspection of the underwater portions of the bridge limited to those deficiencies, as described in § 650.313(h), can be used to meet this requirement in lieu of a complete underwater inspection. In such cases, a complete underwater inspection must be conducted in accordance with paragraph (b)(1)(i) of this section.

(iii) **Extended intervals.**

- (A) Certain bridges meeting all of the following criteria as recorded in the NBI (see § 650.315) may be inspected at intervals not to exceed 72 months:

- (1) The underwater portions of the bridge are in satisfactory or better condition, as recorded by the Underwater Inspection Condition item coded six (6) or greater;
- (2) The channel and channel protection are in satisfactory or better condition, as indicated by the Channel Condition and Channel Protection Condition items coded six (6) or greater;
- (3) Stable for potential scour, Scour Vulnerability item coded A or B, and Scour Condition Rating item is satisfactory or better, coded six (6) or greater.

- (B) State transportation departments, Federal agencies, or Tribal governments that implement paragraph (b)(1)(iii)(A) of this section must develop and document an underwater extended interval policy and must notify FHWA in writing prior to implementation. Factors to consider include structure type, design, materials, age, condition ratings, scour, environment, annual average daily traffic and annual average daily truck traffic, history of vehicle/vessel impact damage, loads and safe load capacity, and other known deficiencies.

(2) **Method 2.** Inspection intervals are determined by a more rigorous assessment of risk. The policy and criteria which establishes intervals, including subsequent changes, must be submitted by the State transportation department, Federal agency, or Tribal government for FHWA approval. The process and criteria must be similar to that outlined in paragraph (a)(2) of this section except that each bridge must be classified into one of three risk categories with an underwater inspection interval not to exceed 24, 60, and 72 months.

- (c) **NSTM inspections.** NSTM must be inspected at regular intervals not to exceed the interval established using one of the risk-based methods outlined in paragraph (c)(1) or (2) of this section.

- (1) **Method 1.** Inspection intervals are determined by a simplified assessment of risk to classify each bridge into one of three risk categories with an interval not to exceed 12, 24, or 48 months.

- (i) **Regular intervals.** Each NSTM must be inspected at intervals not to exceed 24 months except as required in paragraph (c)(1)(ii) of this section and allowed in paragraph (c)(1)(iii) of this section.

- (ii) **Reduced intervals.**

- (A) State transportation departments, Federal agencies, or Tribal governments must develop and document criteria to determine when intervals must be reduced below 24 months. Factors to consider include structure type, design, materials, age, condition, environment, annual average daily traffic and annual average daily truck traffic, history of vehicle impact damage, loads and safe load capacity, and other known deficiencies.

(B) Certain NSTMs meeting the following criteria as recorded in the NBI (see § 650.315) must be inspected at intervals not to exceed 12 months:

(1) The NSTMs are rated in poor or worse condition, as recorded by the NSTM Inspection Condition item, coded 4 or less; or

(2) [Reserved].

(iii) **Extended intervals.**

(A) Certain NSTMs meeting all of the following criteria may be inspected at intervals not to exceed 48 months:

(1) Bridge was constructed after 1978 as recorded in the NBI (see § 650.315) Year Built item and fabricated in accordance with a fracture control plan;

(2) All NSTMs have no fatigue details with finite life;

(3) All NSTMs have no history of fatigue cracks;

(4) All NSTMs are rated in satisfactory or better condition, as recorded in the NBI (see § 650.315) by the NSTM Inspection Condition item, coded 6 or greater; and

(5) The bridge's inventory rating is greater than or equal to the standard AASHTO HS-20 or HL-93 loading and routine permit loads are not restricted or not carried/issued, as recorded in the NBI (see § 650.315) by the Inventory Load Rating Factor item coded greater than or equal to 1.0 and the Routine Permit Loads item coded A or N;

(6) All NSTMs do not include pin and hanger assemblies.

(B) State transportation departments, Federal agencies, or Tribal governments that implement paragraph (c)(1)(iii)(A) of this section must develop and document an extended interval policy, and notify FHWA in writing prior to implementation. Factors to consider include structure type, design, materials, age, condition, environment, annual average daily traffic and annual average daily truck traffic, history of vehicle impact damage, loads and safe load capacity, and other known deficiencies.

(2) **Method 2.** Inspection intervals are determined by a more rigorous assessment of risk. The policy and criteria which establishes intervals, including subsequent changes must be submitted by the State transportation department, Federal agency, or Tribal government for FHWA approval. The process and criteria must be similar to that outlined in paragraph (a)(2) of this section except that each bridge must be classified into one of three risk categories with a NSTM inspection interval not to exceed 12, 24, or 48 months.

(d) **Damage, in-depth, and special inspections.** A State transportation department, Federal agency, or Tribal government must document the criteria to determine the level and interval for these inspections in its bridge inspection policies and procedures.

(e) **Bridge inspection interval tolerance.**

(1) The acceptable tolerance for intervals of less than 24 months for the next inspection is up to two (2) months after the month in which the inspection was due.

(2) The acceptable tolerance for intervals of 24 months or greater for the next inspection is up to three (3) months after the month in which the inspection was due.

- (3) Exceptions to the inspection interval tolerance due to rare and unusual circumstances must be approved by FHWA in advance of the inspection due date plus the tolerance in paragraphs (e)(1) and (2) of this section.
- (f) **Next inspection.** Establish the next inspection interval for each inspection type based on results of the inspection and requirements of this section.
- (g) **Implementation.**
 - (1) The requirements of paragraphs (a)(1)(ii), (b)(1)(ii), and (c)(1)(ii) of this section must be satisfied within 24 months from June 6, 2022.
 - (2) Prior FHWA approved extended inspection interval policies will be rescinded 24 months after June 6, 2022.

§ 650.313 Inspection procedures.

- (a) **General.** Inspect each bridge to determine condition, identify deficiencies, and document results in an inspection report in accordance with the inspection procedures in Section 4.2, AASHTO Manual (incorporated by reference, see § 650.317). Special equipment or techniques, and/or traffic control are necessary for inspections in circumstances where their use provide the only practical means of accessing and/or determining the condition of the bridge. The equipment may include advanced technologies listed in the BIRM.
- (b) **Initial inspection.** Perform an initial inspection in accordance with Section 4.2, AASHTO Manual (incorporated by reference, see § 650.317) for each new, replaced, rehabilitated, and temporary bridge as soon as practical, but within 3 months of the bridge opening to traffic.
- (c) **Routine inspection.** Perform a routine inspection in accordance with Section 4.2, AASHTO Manual (incorporated by reference, see § 650.317).
- (d) **In-depth inspection.** Identify the location of bridge members that need an in-depth inspection and document in the bridge files. Perform in-depth inspections in accordance with the procedures developed in paragraph (g) of this section.
- (e) **Underwater inspection.** Identify the locations of underwater portions of the bridge in the bridge files that cannot be inspected using wading and probing during a routine inspection. Perform underwater inspections in accordance with the procedures developed in paragraph (g) of this section. Perform the first underwater inspection for each bridge and for each bridge with portions underwater that have been rehabilitated as soon as practical, but within 12 months of the bridge opening to traffic.
- (f) **NSTM inspection.**
 - (1) Identify the locations of NSTM in the bridge files.
 - (i) A State transportation department, Federal agency, or Tribal government may choose to demonstrate a member has system or internal redundancy such that it is not considered an NSTM. The entity may develop and submit a formal request for FHWA approval of procedures using a nationally recognized method to determine that a member has system or internal redundancy. FHWA will review the procedures for approval based upon conformance with the nationally recognized method. The request must include:
 - (A) Written policy and procedures for determining system or internal redundancy.

- (B) Identification of the nationally recognized method used to determine system or internal redundancy. Nationally recognized means developed, endorsed and disseminated by a national organization with affiliates based in two or more States; or currently adopted for use by one or more State governments or by the Federal Government; and is the most current version.
 - (C) Baseline condition of the bridge(s) to which the policy is being applied.
 - (D) Description of design and construction details on the member(s) that may affect the system or internal redundancy.
 - (E) Routine inspection requirements for bridges with system or internally redundant members.
 - (F) Special inspection requirements for the members with system or internal redundancy.
 - (G) Evaluation criteria for when members should be reviewed to ensure they still have system and internal redundancy.
- (ii) Inspect the bridge using the approved methods outlined in paragraphs (f)(1)(i)(E) and (F) of this section.
- (2) Perform hands-on inspections of NSTMs in accordance with the procedures developed in paragraph (g) of this section.
 - (3) Perform the first NSTM inspection for each bridge and for each bridge with rehabilitated NSTMs as soon as practical, but within 12 months of the bridge opening to traffic.
- (g) **NSTM, underwater, in-depth, and complex feature inspection procedures.** Develop and document inspection procedures for bridges which require NSTM, underwater, in-depth, and complex feature inspections in accordance with Section 4.2, AASHTO Manual (incorporated by reference, see § 650.317). State transportation departments, Federal agencies, and Tribal governments can include general procedures applicable to many bridges in their procedures manual. Specific procedures for unique and complex structural features must be developed for each bridge and contained in the bridge file.
- (h) **Special inspection.** For special inspections used to monitor conditions as described in § 650.311(a)(1)(ii) and (b)(1)(ii), develop and document procedures in accordance with Section 4.2, AASHTO Manual (incorporated by reference, see § 650.317).
- (i) **Service inspection.** Perform a service inspection when the routine inspection interval is greater than 48 months. Document the inspection date and any required follow up actions in the bridge file.
- (j) **Team leader.** Provide at least one team leader at the bridge who meets the minimum qualifications stated in § 650.309 and actively participates in the inspection at all times during each initial, routine, in-depth, NSTM, underwater inspection, and special inspection described in paragraph (h) of this section.
- (k) **Load rating.**
- (1) Rate each bridge as to its safe load capacity in accordance with Sections 6 and 8, excluding the 3rd paragraph in Article 6B.7.1, AASHTO Manual (incorporated by reference, see § 650.317).
 - (2) Develop and document procedures for completion of new and updated bridge load ratings. Load ratings must be completed as soon as practical, but no later than 3 months after the initial inspection and when a change is identified that warrants a re-rating such as, but not limited to, changes in condition, reconstruction, new construction, or changes in dead or live loads.

- (3) Analyze routine and special permit loads for each bridge that these loads cross to verify the bridge can safely carry the load.

(l) **Load posting.**

- (1) Implement load posting or restriction for a bridge in accordance with the incorporated articles in Section 6, AASHTO Manual (incorporated by reference, see § 650.317), when the maximum unrestricted legal loads or State routine permit loads exceed that allowed under the operating rating, legal load rating, or permit load analysis.
- (2) Develop and document procedures for timely load posting based upon the load capacity and characteristics such as annual average daily traffic, annual average daily truck traffic, and loading conditions. Posting shall be made as soon as possible but not later than 30 days after a load rating determines a need for such posting. Implement load posting in accordance with these procedures.
- (3) Missing or illegible posting signs shall be corrected as soon as possible but not later than 30 days after inspection or other notification determines a need.

- (m) **Closed bridges.** Develop and document criteria for closing a bridge which considers condition and load carrying capacity for each legal vehicle. Bridges that meet the criteria must be closed immediately. Bridges must be closed when the gross live load capacity is less than 3 tons.

- (n) **Bridge files.** Prepare and maintain bridge files in accordance with Section 2.2, AASHTO Manual (incorporated by reference, see § 650.317).

(o) **Scour.**

- (1) Perform a scour appraisal for all bridges over water, and document the process and results in the bridge file. Re-appraise when necessary to reflect changing scour conditions. Scour appraisal procedures should be consistent with Hydraulic Engineering Circulars (HEC) 18 and 20. Guidance for scour evaluations is located in HEC 18 and 20, and guidance for scour assessment is located in HEC 20.
- (2) For bridges which are determined to be scour critical or have unknown foundations, prepare and document a scour POA for deployment of scour countermeasures for known and potential deficiencies, and to address safety concerns. The plan must address a schedule for repairing or installing physical and/or hydraulic scour countermeasures, and/or the use of monitoring as a scour countermeasure. Scour plans of actions should be consistent with HEC 18 and 23.
- (3) Execute action in accordance with the plan.

(p) **Quality control and quality assurance.**

- (1) Assure systematic QC and QA procedures identified in Section 1.4, AASHTO Manual (incorporated by reference, see § 650.317) are used to maintain a high degree of accuracy and consistency in the inspection program.
- (2) Document the extent, interval, and responsible party for the review of inspection teams in the field, inspection reports, NBI data, and computations, including scour appraisal and load ratings. QC and QA reviews are to be performed by personnel other than the individual who completed the original report or calculations.
- (3) Perform QC and QA reviews and document the results of the QC and QA process, including the tracking and completion of actions identified in the procedures.

(4) Address the findings of the QC and QA reviews.

(q) **Critical findings.**

(1) Document procedures to address critical findings in a timely manner. Procedures must:

(i) Define critical findings considering the location and the redundancy of the member affected and the extent and consequence of a deficiency. Deficiencies include, but are not limited to scour, damage, corrosion, section loss, settlement, cracking, deflection, distortion, delamination, loss of bearing, and any condition posing an imminent threat to public safety. At a minimum, include findings which warrant the following:

(A) Full or partial closure of any bridge;

(B) An NSTM to be rated in serious or worse condition, as defined in the NBI (see § 650.315) by the NSTM Inspection item, coded three (3) or less;

(C) A deck, superstructure, substructure, or culvert component to be rated in critical or worse condition, as defined in the NBI (see § 650.315) by the Deck, Superstructure, or Substructure Condition Rating items, or the Culvert Condition Rating item, coded two (2) or less;

(D) The channel condition or scour condition to be rated in critical or worse condition as defined in the NBI (see § 650.315) by the Channel Condition Rating or Scour Condition Rating items, coded critical (2) or less; or

(E) Immediate load restriction or posting, or immediate repair work to a bridge, including shoring, in order to remain open.

(ii) Develop and document timeframes to address critical findings identified in paragraph (q)(1)(i) of this section.

(2) State transportation departments, Federal agencies, and Tribal governments must inform FHWA of all critical findings and actions taken, underway, or planned to resolve critical findings as follows:

(i) Notify FHWA within 24 hours of discovery of each critical finding on the National Highway System (NHS) as identified in paragraphs (q)(1)(i)(A) and (B) of this section;

(ii) Provide monthly, or as requested, a written status report for each critical finding as identified in paragraph (q)(1)(i) of this section until resolved. The report must contain:

(A) Owner;

(B) NBI Structure Number;

(C) Date of finding;

(D) Description and photos (if available) of critical finding;

(E) Description of completed, temporary and/or planned corrective actions to address critical finding;

(F) Status of corrective actions: Active/Completed;

(G) Estimated date of completion if corrective actions are active; and

(H) Date of completion if corrective actions are completed.

- (r) **Review of compliance.** Provide information annually or as required in cooperation with any FHWA review of compliance with this subpart.

[87 FR 27429, May 6, 2022, as amended at 87 FR 57821, Sept. 22, 2022]

§ 650.315 Inventory.

- (a) Each State transportation department, Federal agency, or Tribal government must prepare and maintain an inventory of all bridges subject to this subpart. Inventory data, as defined in § 650.305, must be collected, updated, and retained by the responsible State transportation department, Federal agency, or Tribal government and submitted to FHWA on an annual basis or whenever requested. For temporary bridges open to traffic greater than 24 months, inventory data must be collected and submitted per this section. Inventory data must include element level bridge inspection data for bridges on the NHS collected in accordance with the “Manual for Bridge Element Inspection” (incorporated by reference, see § 650.317). Specifications for collecting and reporting this data are contained in the “Specifications for the National Bridge Inventory” (incorporated by reference, see § 650.317).
- (b) For all inspection types, enter changes to the inventory data into the State transportation department, Federal agency, or Tribal government inventory within 3 months after the month when the field portion of the inspection is completed.
- (c) For modifications to existing bridges that alter previously recorded inventory data and for newly constructed bridges, enter the inventory data into the State transportation department, Federal agency, or Tribal government inventory within 3 months after the month of opening to traffic.
- (d) For changes in load restriction or closure status, enter the revised inventory data into the State transportation department, Federal agency, or Tribal government inventory within 3 months after the month the change in load restriction or closure status of the bridge is implemented.
- (e) Each State transportation department, Federal agency, or Tribal government must establish and document a process that ensures the time constraint requirements of paragraphs (b) through (d) of this section are fulfilled.

§ 650.317 Incorporation by reference .

Certain material is incorporated by reference (IBR) into this subpart with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available for inspection at the U.S. Department of Transportation (DOT) and the National Archives and Records Administration (NARA). Contact DOT at: U.S. Department of Transportation Library, 1200 New Jersey Avenue SE, Washington, DC 20590 in Room W12-300, (800) 853-1351, www.ntl.bts.gov/ntl. For information on the availability of this material at NARA email: fr.inspection@nara.gov or go to: www.archives.gov/federal-register/cfr/ibr-locations.html. The material may be obtained from the following sources:

- (a) AASHTO. American Association of State Highway and Transportation Officials, 555 12th Street NW, Suite 1000, Washington, DC 20004; 1-800-231-3475; <https://store.transportation.org>.
 - (1) MBE-3. “The Manual for Bridge Evaluation,” Third Edition, 2018; IBR approved for § 650.305 and 650.313.:
 - (2) MBE-3-I1-OL. The Manual for Bridge Evaluation, 2019 Interim Revisions [to 2018 Third Edition], copyright 2018; IBR approved for § 650.305 and 650.313.

- (3) MBE-3-I2. The Manual for Bridge Evaluation, 2020 Interim Revisions [to 2018 Third Edition], copyright 2020; IBR approved for § 650.305 and 650.313.
- (4) MBEI-2: Manual for Bridge Element Inspection, Second Edition, 2019, IBR approved for § 650.315.
- (b) FHWA. Federal Highway Administration, 1200 New Jersey Avenue SE, Washington, DC 20590: 1-202-366-4000; www.fhwa.dot.gov/bridge/nbi.cfm.
 - (1) FHWA-HIF-22-017: Specifications for the National Bridge Inventory, March, 2022, IBR approved for § 650.315.
 - (2) [Reserved].