

National Bridge Inspection Standards— Part 1, A Brief History

by Samantha Lubkin and
Dr. Joseph Hartmann, Federal
Highway Administration

The Federal Highway Administration adopted the National Bridge Inspection Standards in 1971. Bridges, like this one on Foothills Parkway in Tennessee, are inspected following these standards. All Photos: Federal Highway Administration.

It is in the vital interest of the United States to have a strong national bridge inspection program and maintain an inventory of the nation's bridges. Regular and thorough bridge inspections are necessary to maintain safe operations and prevent structural and functional failures. Data on the condition and performance of bridges are necessary for bridge owners to make informed investment decisions as part of an asset management program.

Safety is the top priority of the Federal Highway Administration (FHWA). The agency's long-standing and successful national bridge inspection program has been at the core of highway bridge safety for 51 years.

The Silver Bridge collapse in Point Pleasant, W.Va., on December 15, 1967, brought nationwide attention to the issue of bridge safety and led to a systematic effort to ensure bridge safety at the national level. It was an event of historic significance and one that many would agree was a wake-up call that propelled the nation into a new era of bridge safety. FHWA adopted the National Bridge Inspection Standards (NBIS) in 1971, prompted by the U.S. Congress enacting the Federal-Aid Highway Act of 1968, which was a direct response to this tragedy.

By 1971, when the NBIS were established, the standards required that bridges be inspected at least once every two years, with special emphasis on identifying and assessing fractures, corrosion, and fatigue. FHWA was ultimately charged with using the data from bridge inspections nationwide to create the National Bridge Inventory and to standardize bridge inspector qualifications.

More than a half century later, FHWA's NBIS continue to ensure that only bridges safe for travel are open to traffic.

Working with FHWA division offices, state departments of transportation (DOTs), and federal agencies, hundreds of qualified inspectors evaluate the condition and safety of the nation's highway bridges. These bridges are inspected on a routine basis and the results are reported annually to FHWA. If inspectors deem a bridge unsafe, immediate action is taken, which may include closure, prompt repair, or load posting to limit the weight of vehicles that can use the bridge.

This national program has been successful in identifying bridge deficiencies, while federal and other funding programs have supported efforts to address these deficiencies. Because of the commitment to bridge safety by FHWA and state DOTs, the percentage of bridges in poor condition has dropped from 11.9% in 2000 to 6.9% in 2022.

While state DOTs are on the front lines conducting the inspections, FHWA provides the standards and oversees state programs to ensure safety and track bridge conditions nationwide. FHWA assesses compliance with the regulations through a detailed annual review process. Since FHWA established the NBIS regulations in 1971, the agency has continually worked to evolve, improve, and refine the bridge inspection program. Improvements have included requiring more rigorous inspections for certain steel bridges with less redundancy, requiring underwater inspections for bridges over water, and taking appropriate and timely follow-up actions when inspections identify critical safety issues. FHWA has also updated training requirements for bridge inspectors.

Another bridge tragedy occurred on August 1, 2007, when the Interstate 35W Bridge in Minneapolis, Minn., collapsed during the evening

rush hour. This event led to renewed interest in the bridge inspection program.

In response, FHWA moved in 2011 from a qualitative process to a risk-based, data-driven process to assess compliance with the NBIS. FHWA now requires annual assessments of 23 specific inspection program areas to determine how well state DOTs and federal agencies are meeting the regulations. In addition, FHWA has dedicated more staff to support bridge inspection efforts. The aim is to improve consistency in bridge inspections and simplify efforts to identify challenges state by state. FHWA has also expanded the amount of data collected on bridges to monitor bridge conditions more closely nationwide.

FHWA continues to explore new ways of keeping bridges safe, including use of unmanned aerial vehicles (drones) and other cutting-edge tools to support or assist with bridge inspections. Among the technology-based tools used by bridge inspectors are nondestructive evaluation (NDE) techniques such as ultrasonic testing, which uses sound to detect subsurface characteristics, and infrared thermography, which uses the heat radiating from a bridge component as an indicator of its condition.

FHWA supports the application of science and advanced technology, including drones and NDE, to supplement bridge inspections. However, physical and visual inspection methods remain the primary tools that bridge inspectors use to assess the condition of a bridge.

While advanced technologies may not replace the human inspector at this time, they can accelerate inspections and improve inspector safety. NDE can be used to improve the accuracy of some inspections and the proper identification




Unmanned aerial systems (drones) are now being used to assist bridge inspectors. However, physical and visual inspection methods remain the primary tools that bridge inspectors use when assessing the condition of a bridge.



Nondestructive evaluation technologies can improve the accuracy of some bridge inspections. Here, an inspector checks post-tensioning tendon encapsulation with electrically isolated tendon technology. (For details on electrically isolated tendon systems, see the Concrete Bridge Technology article in the Spring 2019 issue of *ASPIRE*®.)

of certain issues. Bridge inspectors are trained to identify when these technologies are needed.

FHWA recently updated the NBIS to address statutory requirements, provide flexibility, and address ambiguities identified since the previous update to the regulation in 2009. Improvements include expanding the requirements to tribally owned highway bridges and to privately owned bridges that connect to a public highway on each end, updating the training and qualification requirements for bridge inspectors, and establishing a national certification for inspectors. In addition, requirements for the intervals between inspections were updated using a risk-based approach, and procedures for reporting and monitoring critical findings were established. The changes are primarily aimed at ensuring national uniformity for inspections and evaluations and clarifying responsibilities. For more information on these changes, stay tuned for part 2 of this article series, which will appear in the Winter 2023 issue of *ASPIRE*®. Information on the NBIS can be found at www.fhwa.dot.gov/bridge/inspection. Questions should be submitted to NBIS_SNBI_Questions@dot.gov. 

Samantha Lubkin is the safety inspection team leader of the Federal Highway Administration (FHWA) Office of Bridges and Structures in Washington, D.C. She previously managed the National Bridge Inventory and the National Tunnel Inventory and spent 14 years as a bridge and tunnel inspector.

Dr. Joseph Hartmann has been the director of the FHWA Office of Bridges and Structures in Washington, D.C., since 2014. His office is responsible for the development and implementation of federal regulations, policy, and technical guidance that support bridge and tunnel programs to improve safety and design practice at the national level.