Bridge Inspection

By Brian J. Leshko, P.E.

Inspections are an integral part of the overall design, fabrication/casting, erection/construction, and maintenance life cycle of a structure. Focusing on bridges as a specific subset of engineered structures, we find that various types of inspections are performed throughout the process by specially certified inspectors. These talented engineers and technicians provide requisite inspection services including design checking, quality control/quality assurance, and in-service safety verification.

During the **design** phase, the Engineer of Record (EOR), typically a registered *Professional Engineer or Structural Engineer*, inspects/checks the work (structural analyses, design calculations and plan sheet development) performed by design engineers. State licensing boards mandate the type of registration (P.E. or S.E.) required for this design checking "inspection".

For steel bridges, American Welding Society (AWS) *Certified Welding Inspectors* (CWIs) perform quality control as members of the steel fabricator's team. During steel **fabrication**, independent third-party inspection firms provide unbiased CWIs to maintain quality assurance for the owner/client. In addition to a current and valid CWI, additional requirements may include the following American Society Non-Destructive Testing (ASNT) Standard SNT-TC-1a certification: Radiography Level II (film interpretation) [RT], Ultrasonic Inspection Level II (shear wave and compression wave) [UT], Magnetic Particle Inspection Level II [MT], and Liquid Penetrant Inspection Level II [PT]. Inspectors also rely upon bridge experience in the fabrication shops including: material certification review, material handling, weld joint preparation, welding process review, weld inspection to AWS D1.5, lay down, set up, paint preparation, paint application, and paint coating thickness verification.

During the **erection** of steel bridges, CWIs perform quality control as members of the steel erector's team. Also during erection, independent third-party inspection firms provide unbiased CWIs to maintain quality assurance for the owner/client.

For precast/prestressed concrete bridges, *Precast/Prestressed Concrete Institute* (PCI) *Level II* inspectors (at a minimum) typically perform quality control as members of the concrete **casting** plant's team. During concrete casting, independent third-party inspection firms provide unbiased PCI Level IIs to maintain quality assurance for the owner/client. In addition to a current and valid PCI Level II, additional requirements may include American Concrete Institute (ACI) Level I Field Technician Certification.

During the **construction** of precast/prestressed concrete bridges, *Post-tensioned Concrete Institute* (PCI) *Level II* inspectors (at a minimum) typically perform quality control as members of the construction team. Also during construction, independent third-party inspection firms provide unbiased PCI Level IIs to maintain quality assurance for the owner/client.

Beginning with the initial bridge inspection (upon completion of construction), and continuing every two years (biennial) throughout the life of the bridge, *Certified Bridge Safety Inspectors* (CBSIs) perform in-service bridge safety inspections to **maintain** the functional and load-carrying capacity of the bridge in accordance with the National Bridge Inspection Standards (NBIS). Completion of an FHWA approved comprehensive bridge inspection training course is now an explicit requirement to be a *Certified Bridge Safety Inspector* (CBSI) Project Manager and Team Leader. To satisfy the intent of the comprehensive training requirement, a Program Manager or Team Leader must meet the following four requirements:

1) Has held one of these titles and has been actively serving in this capacity since January 13, 2005 (date of inception of Revised NBIS);
2) Be a registered Professional Engineer;
3) Have extensive on-the-job training of 5 years or more involving direct field inspection of bridges; and
4) Has successfully completed bridge inspection refresher training within a reasonable time period (one year from inception).

The combination of professional engineering licensing requirements, prior on-the-job training, and refresher training are considered equivalent to the comprehensive training requirement as defined in the NBIS. Many states have mandated that any bridge inspector needs to be certified in accordance with the NBIS, as detailed herein.

As we have discovered, inspections occur throughout the life cycle of a structure. Engineers and technicians, specially certified as inspectors, perform required inspections throughout the design, fabrication/casting, erection/construction, and maintenance of steel and concrete bridges. These PEs, SEs, CWIs, ASNT Level IIs (RT, UT, MT, PT), ACI Level Is, PCI Level IIs and CBSIs reflect the professional work force in-place to assure the quality of the bridges we traverse each and every day. When you see some of these initials after a colleague's name, hopefully, you can fully appreciate the inspection services they perform to safeguard the traveling public.▪

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