



PennDOT Bridge Safety Inspection Frequently Asked Questions

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What is the overall bridge condition rating?

Bridge Condition is determined by the lowest condition rating of the primary components of a bridge or culvert. The lowest condition rating of the Deck, Superstructure, Substructure, or Culvert. If the lowest rating is greater than or equal to 7, the bridge is classified as Good; if it is less than or equal to 4, the classification is Poor. Bridges rated 5 or 6 are classified as Fair.

How many bridge safety inspections does PennDOT conduct each year?

About 18,000. PennDOT is responsible for the safety inspection of approximately 25,000 state-owned highway bridges. Each of these bridges must be inspected at least once every two years. Some bridges such as those with weight restrictions are inspected once a year or more frequently if a bridge is in Poor condition. PennDOT also oversees the inspection of approximately 6,500 highway bridges and culverts owned by local municipalities or other agencies.

What is an underwater dive inspection?

At bridges that cross waterways with water depths too deep for inspectors to use wading techniques, underwater inspections are performed with divers trained to inspect abutments and piers below the waterline for structural deterioration, streambed scour, or undermining at the foundations. Underwater inspections occur on an interval ranging from one to five years depending on the conditions of the bridge foundations or streambed scour below the waterline.

Who makes sure that bridges in PA are safe?

PennDOT is responsible for ensuring that the nearly 32,000 bridges in Pennsylvania are inspected according to state and federal regulations. Approximately 25,000 bridges are owned by the state and inspections are done by PennDOT employees and consultants who are certified bridge safety inspectors. PennDOT provides oversight for the approximately 6,500 bridges owned and inspected by local municipalities and other agencies.

The Pennsylvania Turnpike Commission is responsible for inspecting their bridges and they are required to submit the inspection information to PennDOT.

What do the Federal Highway Administration Condition Rating numbers really mean?

The condition rating numbers indicate the general structural condition of the bridge components. Each component (deck, superstructure, substructure, or culvert) is assigned a condition rating. The rating number is based on a scale of nine to zero established by the National Bridge Inspection Standards (NBIS) that are followed by all states:

- 9 = Excellent
- 8 = Very good
- 7 = Good, some minor problems noted
- 6 = Satisfactory, structural elements showing minor deterioration
- 5 = Fair, primary structural elements are sound but showing minor cracks and signs of deterioration
- 4 = Poor, deterioration of primary structural elements has advanced
- 3 = Serious, deterioration has seriously affected the primary structural components
- 2 = Critical, deterioration of primary structural components has advanced and bridge will be closely monitored, or closed, until corrective action can be taken.
- 1 = Imminent failure, major deterioration in critical structural components. Bridge is closed but corrective action may put the bridge back into light service.
- 0 = Failed, bridge is out of service and beyond corrective action.
- N = Not applicable

A bridge is classified by the lowest component condition rating for either the deck, superstructure, substructure, or culvert. Condition ratings of 7-9 means the bridge is in Good condition under a Good/Fair/Poor condition classification system. Condition ratings of 5 or 6 is classified as Fair condition. A condition rating of 4 or lower means that deterioration on at least one structural component is advanced and the bridge is classified as being in Poor condition. Inspectors provide documentation and photographs to structural engineers to review the deterioration. Structural engineers confirm the assigned condition rating, perform a load rating analysis to determine the load (or weight) capacity of the bridge, compare results to previous studies to determine if the capacity has changed, and determine what other actions must be taken. PennDOT will either make immediate repairs to the bridge, take temporary actions (for example, shoring the weakened sections, restricting traffic from critical areas, or posting a weight restriction) to keep the bridge open until repairs can be made, or close the bridge until repairs can be made.

Bear in mind that these condition ratings are only used to generally categorize bridge conditions and to provide a global view for planning transportation improvements. Similar to evaluating a person's overall health, a bridge's condition is too complex to be fully described with just three condition ratings. To develop a more detailed assessment of a bridge's health and the priority for repairs, the structural engineer evaluates many factors including the bridge type and construction materials, age, traffic volumes, load carrying capacity and location and extent of deterioration.

How does a Component Condition Rating relate to Bridge Load Capacity?

Although there is no mathematical relationship, a low superstructure condition rating may be accompanied by a lower bridge load capacity. Bridge load capacity defines the maximum weight limit

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that can safely cross the bridge and is based primarily on the ability of the superstructure component to carry legally loaded trucks. Different truck axle configurations are used to evaluate weight limits, such as an 18-wheel tractor trailer weighing 40 tons.

There are exceptions – a large number of older bridges were designed to carry truck loadings significantly less than today’s legal truck loads. The superstructure component of these bridges may be free of deterioration and warrant a condition rating of 7, for example. However, the weight limit may be only 15 tons per the original design and therefore the bridge is posted for weight restriction.

Does a posted weight limit on a bridge mean it’s unsafe?

No. It means that in order to maintain public safety, only vehicles weighing no more than the posted weight limit can cross the bridge.

What qualifications do Pennsylvania bridge safety inspectors have?

The Federal Regulations that govern bridge inspections, National Bridge Inspection Standards (NBIS), have basic qualifications requirements for bridge safety inspectors. Pennsylvania requirements meet and exceed those qualifications with its extensive training and certification program.

Each bridge inspection is done by a team of at least two, or more, certified inspectors depending on the size of the bridge. To become a certified inspector in Pennsylvania, PennDOT employees and consultants must complete PennDOT’s Bridge Safety Inspector Training and Certification program. This program began in 1980 and served as a model for the current Federal Highway Administration Bridge Inspection Training Program used throughout the country. The program consists of an initial, 15-day training course that addresses bridge engineering concepts, recognizing material deterioration, inspection techniques and procedures, and rating and documenting conditions of all components. A comprehensive final exam must be passed to receive a Pennsylvania certification.

To maintain a Pennsylvania inspection certification, inspectors are required to attend a Refresher training course every two years to remain current with new inspection technologies and procedures, and to pass a final exam.

Each inspection team is supervised by a team leader. In addition to completing PennDOT’s Bridge Safety Inspector Training and Certification program, a team leader must have one of the following five qualifications:

- Be a registered professional engineer.
- Have five years bridge-inspection experience.
- Be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer’s program for National Certification in Engineering Technologies.
- Have a bachelor’s degree in engineering from a college or university accredited by the Accreditation Board for Engineering and Technology, and successfully passed the National Council of Examiner for Engineering and Surveying Fundamentals of Engineering examination, and two years bridge inspection experience.

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- Have an associate's degree in engineering or engineering technology from a college or university accredited by the Accreditation Board for Engineering and Technology and four years bridge inspection experience.

What does a bridge inspection entail?

A bridge safety inspection includes five tasks:

- **Planning:** Identifying, in advance, needs for traffic control/restriction, access and safety equipment, inspection tools, personnel, and daily schedules.
- **Preparation:** Procuring equipment and services identified in planning task.
- **Inspection:** Performing visual and physical evaluations of bridge components and all bridge elements according to the National Bridge Inspection Standards (NBIS) and PennDOT's Bridge Safety Inspection Policy and Procedures manual.
- **Reporting:** Documenting methods and procedures used and findings as a result of the inspection.
- **Recommendations:** Preparing a list of prioritized maintenance, repair and replacement activities.

What do bridge inspectors look for?

Bridge safety inspectors evaluate the entire bridge to verify current conditions as compared to the "as built" condition or to previous inspection reports. Items looked at include the proper alignment of the superstructure to the substructure, alignment of the bridge to the roadway, proper installation of road signs, and the condition of the waterway or roadway area beneath the bridge. Each bridge element is inspected primarily for deterioration due to weather, chemicals (such as road salt), and traffic impacts. This detailed assessment includes looking for rust/corrosion of steel, cracks in steel and concrete, missing/broken off sections of concrete, flow of water around bridge supports, and stream bed erosion. While every element on the bridge is inspected, emphasis is placed on the primary structural elements that support the weight of the bridge itself and traffic loads.

What is done with the information collected by bridge inspectors?

The information is reviewed by structural engineers to verify the condition ratings assigned by the inspector and to verify the safe weight limits of the bridge. This information is then used to determine when the bridge requires maintenance and repair actions. PennDOT uses the combined inspection data from all bridges to plan future repair and replacement projects and to estimate the cost of such projects.

When is a bridge closed?

A bridge is closed when advanced deterioration results in a load rating capacity (weight limit) of less than 3 tons. If safety of the traveling public cannot be guaranteed, then the bridge is closed.

What bridge terminology is no longer being used by the bridge community?

With the enactment of the Federal Law MAP-21, FHWA Pavement and Bridge Condition Performance Measures final rule Federal Register: National Performance Management Measures; Assessing Pavement Condition for the National Highway Performance Program and Bridge Condition for the National Highway Performance Program, and FHAWA memo – Changing the Language of the Federal Aid Bridge Program dated February 15, 2017 the following terms are no longer considered current as of January 2018.

Structurally Deficient is a legacy classification which referred to the condition of a bridge. Under the performance-based funding programs established by MAP-21 federal legislation in 2012, SD has been redefined as Poor in a Good/Fair/Poor condition classification system and is no longer needed within the Federal-aid Highway Program.

Functionally Obsolete is a legacy classification which referred to the roadway geometry of the bridge; it was discontinued with the enactment of MAP-21 federal legislation in 2012 and the Federal Highway Administration (FHWA) is no longer tracking this measure.

Sufficiency Rating is a legacy classification which referred to funding eligibility but was discontinued with the enactment of MAP-21 federal legislation in 2012 and is no longer used within the Federal-aid Highway Program.

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