

CONDITIONS OF LOCALLY OWNED BRIDGES, PART I

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A short-span bridge consisting of reinforced-concrete slab resting on abutments. Photo: PennDOT LTAP.

Bridges provide essential links in an efficient roadway system, whether on a national or a local scale. Our nation is home to more than 620,000 bridges on public roads, and slightly more than 40% are locally owned by counties and municipalities. In Pennsylvania, approximately 25,500 bridges are on state-owned routes, and about 6,700 are on locally owned roads.

As with other components of the infrastructure, bridges deteriorate over time. This is due to several factors including overstress caused by increasing traffic volumes and material breakdown caused by environmental and manmade influences, such as rain or the extensive use of road salts. To maintain the roadway system, regular maintenance must be done to the bridges. Neglecting this maintenance could accelerate the structure's deterioration to the point where either extensive bridge rehabilitation or replacement becomes the only option.

This Tech Sheet #171 is the first of a three-part series on locally owned bridges. It is intended to serve as a "call to action" for local bridge owners to reevaluate their approach to bridge ownership. Part II, Tech Sheet #172 further details inspections and assessments of bridges. Part III, Tech Sheet #173 explains maintenance practices for locally owned bridges.

National Bridge Inspection Standards (NBIS)

The NBIS was created as a result of passage of the Federal Aid Highway Act (1968), the Surface Transportation Assistance Act (1978), and the Surface Transportation and Uniform Relocation Assistance Act (1987). The NBIS regulations apply to all publicly owned bridges greater than 20 feet measured along the centerline of the highway. The National Bridge Inventory (NBI) is to maintain data related to the location, type and geometry, features intersected, responsible owner, age, material, type, and design-load capacity for each bridge. The current version of the NBIS regulations has been in effect since June 2022.

The Federal Highway Administration (FHWA) uses three indicators to evaluate the condition of the nation's bridges:

- 1) the bridge condition ratings,
- 2) the number of poor condition bridges, and
- 3) the percentage of deck area on poor-condition bridges.

The classifications and number of poor-condition bridges are widely used by policymakers and will be discussed here.

According to PennDOT's website as of March 2024, 1,588 of the 6,682 (23.8%) of the locally owned bridges in Pennsylvania are in poor condition.

With the third largest number of state-owned bridges in the nation, Pennsylvania has the second highest number of bridges in poor condition. The average age of a bridge on PennDOT's system is about 55 years old. Table 1 compares the percentages of poor condition bridges in Pennsylvania with those percentages nationwide.

Table 1. Percentage of Poor Condition Bridges*		
BRIDGE TYPE	% Poor Condition	% Deck Area in Poor Condition
Publicly owned bridges in U.S.*	6.8	5
PennDOT-owned bridges *	8.2	5.6
Locally owned bridges in Pa.*	23.8	19.6

*Bridges greater than 20 feet in length on public roadways.



Poor-Condition Bridge

Poor condition means that deterioration has occurred to one or more of the bridge's major components (deck, superstructure, and substructure), or culvert*. Although deterioration is present, a poor-condition bridge is not unsafe. Poor-condition bridges often feature weight limit postings less than the legal limit because of material losses from the original structural components.

* A bridge is made up of a deck, superstructure, and substructure. A culvert comprised of one or more barrels, beneath an embankment. Many culverts take advantage of headwater submergence of the inlet to increase hydraulic efficiency and economy.

Weight limit postings help to preserve the bridge by moving overweight vehicles to other roadways. However, forcing vehicles such as emergency vehicles, commercial trucks, school buses, and farm equipment to use alternative routes can cause other problems. Alternative routes typically involve longer distances, which increase travel time and fuel consumption and can reduce the efficiency of the local economy.

Poor Condition by Bridge Deck Area

In addition to poor-condition bridge counts, the bridge deck area for bridges in poor condition is calculated to gather a more accurate representation of the state of Pennsylvania's bridges. Bridge deck area takes into account the size of bridges when determining what percentage is in poor condition. A larger river-crossing bridge will impact the percentage in poor condition by deck area more than a smaller 20-foot bridge on a rural local roadway.

Risk Score for Bridges

The risk score is a calculated score essential for a risk-based decision-making process for planning, programming, and general asset management. The risk score is based upon the bridge's structural adequacy and safety, how essential it is for public use, and its serviceability and size.

Factors included in risk score calculation are:

1. Deck Area
2. Average Daily Traffic and Truck Traffic
3. Scour Critical Category

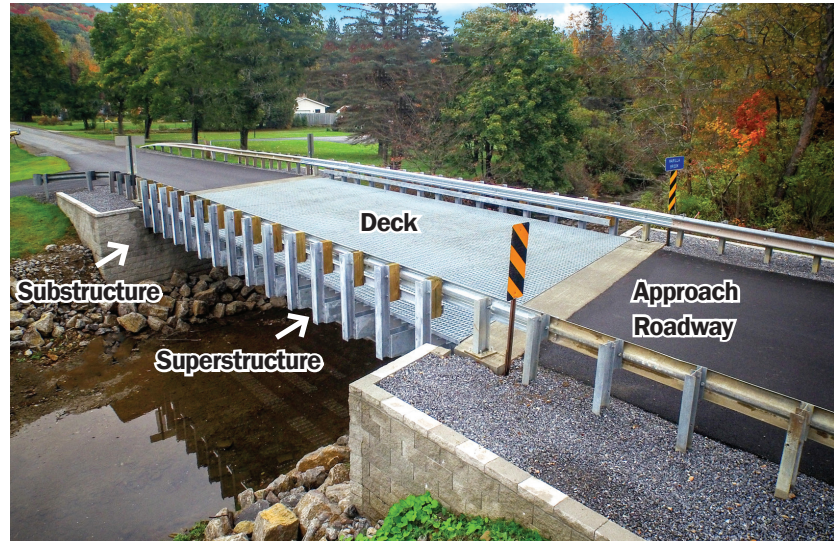
Resources

PennDOT Bridge Safety Inspection FAQ 2025:

<https://www.pa.gov/agencies/pennDOT/programs-and-doing-business/bridges/bridge-safety-inspection-faqs.html>

Federal Highway Administration, Specifications for the National Bridge Inventory:

https://www.fhwa.dot.gov/bridge/snbi/snbi_march_2022_publication.pdf



Above, a bridge with a deck, superstructure, substructure, and approach roadway. Photo: PennDOT LTAP.



Above, a culvert with an integral top, sides, and bottom and designed structurally to account for soil-structure interaction. Photo: PennDOT LTAP.

4. Does bridge contain Non-redundant Steel Tension Members (NSTM)
5. Detour Length
6. Flooding susceptibility

Local bridge owners must be able to recognize the importance of their bridges, understand their overall condition designation, including poor condition and risk score and know what to do with the information.