Local Bridge Owners Guide

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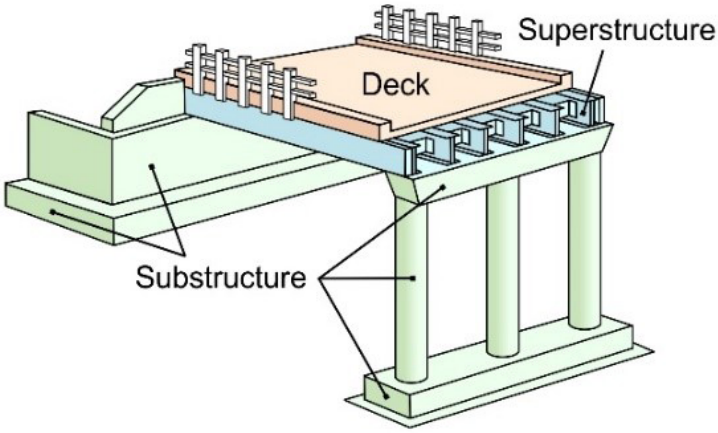
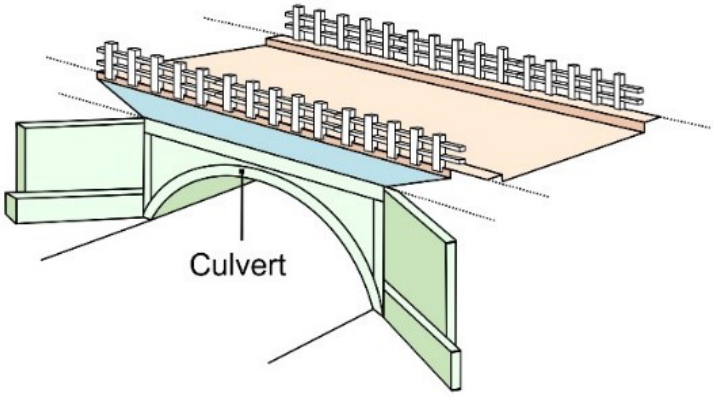
► What is a bridge?

The National Bridge Inspection Standards (NBIS) defines a bridge as a structure, including supports, erected over a depression or an obstruction, such as water, a highway or a railway, having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the roadway of more than 20 feet.





► Inventory

- The NBIS requires each bridge owner to maintain and update a file for each bridge.
- The bridge file must include the following components (when applicable):
  - Construction plans.
  - Inspection reports, including history of any structural damage.
  - Waterway information (channel cross-sections, soundings, stream profiles).
  - Special inspection procedures or requirements.
  - Load rating documentation, including load testing results.
  - Posting documentation.
  - Critical findings and actions taken.
  - Scour assessment.
  - Scour plan of action (POA) (for scour critical bridges and those with unknown foundations) and documentation of post-event inspection or follow-up.
  - Inventory and evaluation data and collection/ verification forms.
  - Significant correspondence.
- The State of Michigan uses the Michigan Bridge Management and Inspection System (MiBridge) to document this information.
- Pictures and other documents can be uploaded into MiBridge and serve as the bridge file.

► Non-compliance details and warning

Failure to comply with the following rules and regulations can cause federal and state transportation funds to be withheld and new projects may not be able to proceed.

Mi Bridge Inspection and Reporting System BRIDGE

► Inspection

- Personnel Qualifications
  - A two-person team is recommended for all bridge inspections. The lead inspector must be a qualified team leader (QTL).
  - There are five ways to qualify as a team leader. Each include a level of education, experience and training.
    - Be a registered professional engineer (P.E.) and successfully complete a Federal Highway Administration (FHWA)-approved comprehensive bridge inspection training course.
    - Have five years of bridge inspection experience and successfully complete an FHWA-approved comprehensive bridge inspection training course.
    - Be a certified National Institute for Certification in Engineering Technologies (NICET) Level III or IV bridge safety inspector and successfully complete an FHWA-approved comprehensive bridge inspection training course.
    - Have a bachelor's degree in engineering from an Accreditation Board for Engineering and Technology (ABET)-accredited college or university, successfully pass the National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering exam, have two years of bridge inspection experience, and successfully complete an FHWA-approved comprehensive bridge inspection training course.
    - Have an associate degree in engineering or engineering technology from an ABET-accredited college or university, have four years of bridge inspection experience, and successfully complete an FHWA-approved comprehensive bridge inspection training course.
  - Michigan's policy for recurrent bridge inspection training requires successful completion of 24 hours of approved training within a five-year period. Verification of adherence to this policy is determined by reviewing the training completed within the five years prior to the month the QTL completed an inspection.
- Routine Inspections
  - **Every bridge requires a routine inspection.** Most bridges are inspected every 24 months, but high-risk bridges or bridges in poor condition may need to be inspected more frequently. Inspection frequency recommendations should be provided by the qualified inspector.

- Underwater Inspections
  - **The NBIS requires that all underwater structural elements are inspected.**
  - The following water depths are general guidelines for selecting the appropriate method of underwater inspection:
    - Wade and probe: Water depths of 4 feet or less.
    - Boat and probe: Water depths of 4 feet to 10 feet.
    - Underwater diving inspection: Water depths exceeding 10 feet.
  - Underwater inspections are performed at regular intervals dependent on the required method. At water depths of 10 feet or less, the inspection can be performed at the same frequency as the routine inspection. At water depths that exceed 10 feet, the diving inspection must be completed at regular intervals not exceeding 60 months.
  - The frequency should be determined based on factors such as age, design of the structure, previously observed conditions, and suspected rate of deterioration.
- Fracture Critical Inspections
  - Fracture critical bridges are steel bridges where the failure of one member could lead to collapse. Inspections of these structures must occur at regular intervals no greater than 24 months. It is recommended that the inspector performing the fracture critical inspection has successfully passed the FHWA-NHI-130078 Fracture Critical Inspection Techniques for Steel Bridges course.
  - **The NBIS requires all fracture critical members to be inspected at arms-length.**

- Critical Findings
  - A critical finding is a structural or safety-related deficiency that requires immediate follow-up inspection or action. A critical finding includes any instance where an entire bridge, lane, or shoulder is closed to protect public safety due to the condition of a bridge element, or damage sustained by a bridge element. Examples of critical findings include:
    - Recommendations for immediate work on fracture critical bridge members;
    - Recommendations for immediate correction of scour or hydraulic problems;
    - Condition ratings of 2 or less for the deck (Item 58), superstructure (Item 59), substructure (item 60), or culvert (Item 62);
    - Recommendations for immediate work to prevent substantial reduction in the safe load capacity.
  - Once a critical finding is observed it is vital to act in a prudent manner to protect public safety and infrastructure investments. MDOT has developed the Request for Action (RFA) report within MiBridge to be used for addressing issues with structures that need to be scheduled for repair more urgently than the normal capital work programming process. **The bridge owner or owner's representative must notify MDOT's Structure Inspection Program manager once a critical finding is identified.** MDOT staff will be responsible for contacting the FHWA Bridge Program team leader once notification from the local agency has been provided.

► Scour

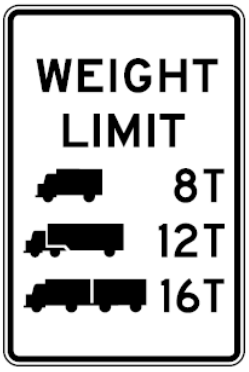
Scour occurs when water washes away the soil supporting a bridge. Many older bridges were not designed for scour. Additionally, the land use or stream profile may have changed over time, which could increase the impacts of heavy storm events on the bridge.

- Scour Critical
  - A bridge that could suffer structural damage due to loss of soil around the supports based on a certain storm size is considered scour critical.
    - **The NBIS requires all bridges over water to be evaluated for scour.** This analysis identifies a bridge's vulnerability to scour and is typically performed by a team of hydraulic, geotechnical and structural engineers.
    - **All scour critical bridges and bridges with unknown foundations require a Scour POA to be created and maintained in MiBridge until the bridge is replaced or properly designed scour countermeasures are installed.**

► Load Rating

The NBIS requires load ratings for all bridges. Load ratings check for how much weight a bridge can safely carry. Load ratings should reflect the current condition of the bridge and must be updated when there is a change in condition. Load ratings must also be updated to incorporate rehabilitation and reconstruction performed on the bridge.

- Qualifications
  - Load ratings must either be analyzed by or checked by a registered P.E. The same person cannot perform both duties. It is recommended that the P.E. has a minimum of five years of bridge analysis and inspection experience.
- Post or restrict
  - Bridges that cannot safely carry all Michigan legal loads must be posted, load restricted, strengthened, or closed. If a bridge cannot safely carry at least 3 U.S. tons, it must be load posted, strengthened, or closed.
- **Load rating data and pictures of load posting signs (if present) must be uploaded to MiBridge.**



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► Additional Resources

FWHA: Federal-aid Essentials for Local Public Agencies
www.fhwa.dot.gov/federal-aidessentials/companionresources/87nbis.pdf

FHWA: Federal-aid Essentials for Local Public Agencies (videos)
www.fhwa.dot.gov/federal-aidessentials/catmod.cfm?id=87

Metrics for the Oversight of the National Bridge Inspection Program
www.fhwa.dot.gov/bridge/nbip/metrics.pdf

Bridge Inspection Program Requirements
www.michigan.gov/documents/mdot/Chapter_1_Program_Requirements_12-08-2017_608341_7.pdf

Overview of Local Bridge Program
www.michigan.gov/documents/mdot_Overview_of_Local_Bridge_Program_116617_7.pdf

Michigan Structure Inventory and Appraisal Coding Guide (SI&A)
www.michigan.gov/documents/mdot_SIA_Manual-2_79072_7.pdf

Michigan Structure Inspection Manual (MiSIM)
www.michigan.gov/mdot/0,4616,7-151-9625_24768_24773-326737--,00.html

MDOT Prequalified Service Vendors for Inspection and Load Rating
https://mdotjboss.state.mi.us/PSVR/PSVRHome.htm

Requirement	Timings	Non-Compliance Deadlines
Critical Findings	Notify MDOT within 24 hours of a critical finding; for example, closing a bridge, closing lanes or significant load posting.	Insufficient action on a critical finding may lead to immediate non-compliance and funding may be withheld immediately.
All Inspections	Within the same month as scheduled based on the frequency.	Funding may be withheld when the inspection is greater than two months past due.
Scour Analysis	Must be updated as necessary based on inspection findings or changes to the POA, such as bridge closure contacts.	MiBridge must be updated within 180 days or funding may be withheld.
Load Rating Analysis	Must be updated as necessary based on inspection findings and maintenance or contract work done to the bridge.	Posting signs, when required, should be placed as soon as possible. MiBridge must be updated within 180 days or funding may be withheld.
Inventory Information	Should be reviewed during routine inspections.	MiBridge must be updated within 180 days of the inventory information change or funding may be withheld.

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