

MICHIGAN STRUCTURE INSPECTION MANUAL BRIDGE INSPECTION

CHAPTER 12

NON-NBI STRUCTURES

12.01 Purpose

The National Bridge Inspection Standards (NBIS) provide the governing rules and regulations for the inspection of highway bridges located on all public roads throughout the entire United States. Section 650.305 of the provision provides the definition of a bridge, which briefly stated, includes those structures on public highways carrying traffic that span 20 feet or more measured from the center of the roadway. Michigan Act 354 of 1925 also has additional requirements regarding bridge safety inspection. Section 254.19a and 254.30 necessitates biennial inspection of all bridges and culverts under state transportation department jurisdiction. This section relates to those bridges that are not applicable to the statutes established under NBIS or Michigan Law because of the designated purpose or length (see Figure 12.01.01).



Figure 12.01.01 Pedestrian Structures are Not Regulated by NBIS Provisions

Although there is no governing state law or federal requirement to inspect non-NBI structures, it is strongly recommended that each agency with designated responsibility of the traveled way perform systematic routine inspections to maintain safety of the traveled way.

12.02 Documenting Non-NBI Inspections

The recording of inventory and appraisal information for structures that do not meet National Bridge Inventory (NBI) criteria shall be performed at the discretion of the owner. When inspections are performed it is recommended that documentation of the observations is recorded in the MiB^{RIDGE} Management and Inspection System. The web based application has the tools and fields necessary for

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NBI inspection, but easily delineates between the various agencies and inventories of structures that do not require reporting to FHWA. Bridges included or not contained within the NBI may easily be filtered on each of the dashboards within the system. Using MiB^{RIDGE}, a methodical system is instituted for organizing data so it may be used for safety and asset management.

The system also provides advanced notification to the owner, three months prior to the inspection due date, which is based according to the frequency established during the previous inspection. For local agency non-NBI structures, the application was recently enhanced to allow inspection frequencies to be decreased and set at intervals that may extend up to 60 months. While MiB^{RIDGE} is available for any public agency to use without licensing fees, structures should not be added to the database unless a commitment exists to regularly perform the inspections.

12.03 Inspector Qualifications

Personnel who perform the inspection of bridges that are not in the NBI do not have to meet the education or experience requirements specified by NBIS. Any individual who has adequate knowledge of condition rating structures and sufficient experience may perform field inspections and document their findings. It is recommended that the inspector have previous involvement in bridge maintenance, construction, or design. When serious or critical deficiencies exist or are suspected that affect the continued safe-use of the structure, the owner should be notified and a review should occur. It is recommended that the owner seek a qualified inspection team leader or licensed structural engineer to determine whether additional action including repair or replacement is necessary.

12.04 Culverts

Prior to revisions in the FHWA Bridge Inspector's Reference Manual (BIRM), culverts were defined as any structure that did not meet the NBIS length requirements of a bridge. The method of classifying culverts in this fashion did not consider the dissimilarities present in the structural characteristics and design. The BIRM defines a culvert as a structure designed hydraulically to take advantage of submergence to increase water carrying capacity (see Figure 12.04.01).

[Structure Inventory & Appraisal \(SI&A\)](#) Item 43B (Structure type, Main – Type of Design) is used to identify the primary structure type. In conjunction with Item 43B, the coding for Item 8 (Structure Identification) may include a "C" within the structure number, whether or not it is regulated under the NBIS provisions. In order to determine whether a culvert must be inspected according to NBIS, SI&A Item 112 (NBIS Length) shall be reviewed using MiB^{RIDGE}. Structures which are coded "N" are not included in the NBI and do not require regular inspection in accordance with the NBIS. However, without periodic field visits an inordinate degree of unanticipated failure leading to elevated replacement costs exists (see Figure 12.04.02).

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Figure 12.04.01 Double Barrel Metal Culverts that Do Not Meet the Minimum Span Length for the NBI



Figure 12.04.02 Failure of Non-NBI Culvert in Poor Condition during HMA Compaction

For those culvert structures which are coded “Y”, local agencies may consider applying for an extended inspection frequency to reduce routine inspection costs if several parameters, including condition ratings, are met. Agencies interested in seeking approval should contact the MDOT Bridge Program Manager for additional information and to determine whether the application should be pursued and submitted to FHWA. All agencies are subject to the requirements specified by NBIS and MDOT policies until the approval is granted by FHWA and MDOT. MDOT plans to submit one request on behalf of all local agencies which will include the minimum requirements for structures to be considered for extended frequencies.

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12.05 Railroad over Highway (“X”) Structures

Bridges that carry or cross railroads typically have maintenance agreements between the railroad owner and the agency that has jurisdiction for the roadway. These maintenance agreements vary from structure to structure and the detail to which agency is responsible for the maintenance of the structure will need to be reviewed. In some cases there may be joint responsibility for maintaining portions of the structure. For example, a railroad bridge crossing a roadway may have the railroad owner responsible for the superstructure only, and the roadway owner may be responsible for the substructure. Additional information regarding the inspection of bridges that carry or cross railroads is provided in Bridge Advisory [BA-2014-01](#).

MDOT has performed biennial bridge safety inspections of railroad structures over State of Michigan routes for many years. While continuing this practice it is recommended that Michigan Bridge Elements and condition state quantities are collected in cases where MDOT is responsible for the maintenance of the superstructure.

The Federal Railroad Administration also implemented safety requirements for railroad bridges which were promulgated under [49 CFR Part 213](#). The Bridge Safety Standards require railroad owners to establish a bridge management program which includes scheduling inspection for each bridge in railroad service at least once in each calendar year.

12.06 Pedestrian Bridges

Inspections of pedestrian bridges over State of Michigan routes are performed biennially by MDOT. This practice usually allows deficiencies to be detected and prompt notification to the bridge owner. For MDOT owned bridges, when capacity or stability concerns exist, repairs are completed immediately as they are identified (see Figure 12.06.01). Other non-emergency repair work is scheduled through the normal programming and construction contract letting process. Without these inspections hazards to the public would be difficult to detect and resolve in a timely fashion.

Although numerous pedestrian bridges are non-redundant an arms-length inspection of the superstructure is not necessary unless observations from the routine inspection necessitate a closer examination. The primary purpose of regularly scheduled hands-on inspections for vehicular bridges is to identify fatigue cracking and propagation. Since pedestrian structures experience fatigue loading from wind and truck induced gusts the probability of crack development is low. When cracking or other serious defects are suspected the bridge inspector should submit an RFA to the bridge owner requesting a detailed inspection.

Michigan Bridge Elements and condition state quantities should also be collected during the routine inspections. Recording the element level data allows for improved life cycle analysis and serves as an additional measure for the inclusion of rehabilitation work during corridor reconstruction projects. It is also recommended that local agencies which own pedestrian bridges, or are responsible for the

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maintenance aspects, continuously perform routine safety inspections at a frequency dependent upon condition for improved preservation and asset management.



Figure 12.06.01 Loss of Bearing Prompted Immediate Response for Installation of Temporary Supports