

# MICHIGAN STRUCTURE INSPECTION MANUAL

## BRIDGE INSPECTION

### CHAPTER 13

#### BRIDGE INSPECTION SAFETY

##### 13.01 Purpose

The Michigan Department of Transportation is committed to ensuring the safety of its employees, partners, and the public through comprehensive measures that foster the prevention of accidents. MDOT occupational safety guidelines are instituted as a result of the regulations promulgated under Public Act 154 of 1974; the provisions of which are enforced by the [Michigan Occupational Safety and Health Administration](#) (MIOSHA). This chapter describes the minimum safety requirements that must be adhered to for bridge safety inspection. Each MDOT employee who engages in functions where task-related hazards or health risks may exist is offered specific training that is pertinent to their occupation. Any employee disregarding the safety requirements may cause their organization to be cited for the violation and possibly be terminated depending on the extent of negligence. Although local agencies or consultants performing bridge inspections may use alternate methods of training to comply with the regulations, they are encouraged to follow MDOT practices to supplement their own when applicable.

The following information is intended to serve as a brief summary and reminder for the personnel performing bridge inspection activities. Team leaders and staff assisting during inspections that have questions regarding safe work practices or are unfamiliar with particular MIOSHA requirements should consult their organization's occupational safety specialist or consult a knowledgeable trained professional. All team leaders are recommended to review Topic 3.2 of the FHWA [Bridge Inspectors Reference Manual](#) (BIRM), AASHTO *Manual for Bridge Evaluation* Section 4.5 *Safety*, and the MIOSHA guidelines for additional information.

##### 13.02 Responsibilities

MISOHA requires employers to develop, maintain, and coordinate an accident prevention program. In order to comply with the requirements, the MDOT Accident Prevention Plan has been developed for department employees and is available in hardcopy or electronic formats for staff to retain as a reference. All employees conducting field work are responsible for maintaining a copy of the reference so that it is readily available while performing bridge inspections. Local agency and consultant organizations performing inspection functions on the National Bridge Inventory (NBI) shall have their own agency developed plan available at the work site. The organization responsible for employing inspection staff must also provide the necessary safety equipment suitable for each type of inspection, and offer the opportunity for each employee engaged in inspection to receive proper training when required.

Each employee is required to inspect the equipment before each use and notify the employer of any defects or damage that may affect the performance of the equipment. During the bridge file review, the team leader should evaluate the bridge plans and previous inspection reports for consideration of special safety equipment.

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### **13.03 Personal Protective Equipment**

All MDOT employees and consultants inspecting MDOT owned bridges are required to review [Guidance Document 10118 - Personal Protective Equipment Policy](#) and the [Accident Prevention Plan](#) prior to performing any inspections. The guidance document provides up-to-date information regarding the minimum requirements for eye, head, and foot protection. The requirement for additional safety equipment to perform other bridge inspection tasks should be assessed according to the specific type of activities to be performed.

Immediately when exiting the confines of their vehicle, personal protective equipment should be used in accordance with MIOSHA and the employing agency's safety plan. The team leader and assisting staff shall be responsible for wearing and maintaining the minimum items which include:

- Hard Hat (ANSI Standard Z89-1, Type 1 Class C or E)
- Safety Glasses (ANSI Z87.1)
- Safety Vest (ANSI 107 Class 2 or 3)
- Steel or Composite Toe Boots (ASTM F2413, previously ANSI Z41 Impact Rating I-75)

In addition, the inspection of bridges that carry or cross railroads requires attention to safety and compliance with the railroad owner's safety requirements. Team leaders will need to be familiar with the safety requirements of the railroads that are within their inspection areas. Some companies require the use of specific safety gear with specific colors that are not associated with MDOT practices. When the requirements are unknown, the team leader should seek information from the railroad bridge owner and may be required to attend specific training prior to entering the railroad right-of-way.

Other personal protective equipment may be necessary depending on the type of activity being performed. For example, personnel performing an in-depth inspection to verify the presence of fatigue cracking should wear appropriate gloves while using a grinder to remove rust scale or protective coatings. A second example requires a suitable respirator while responding to a request from construction personnel to inspect surfaces during an active steel cleaning and coating project where particulates and lead may be present. Whenever the type of equipment that should be used is unknown the employee's supervisor must be contacted to confirm the specific items that are needed.

### **13.04 Working Near Traffic**

Working near traffic is an inherent hazard that the team leader must be cautious of during all types of inspections as the majority of NBI inspections occur after a bridge has been placed in-service and opened to the public. While high visibility safety gear provides attention to motor vehicle operators of a worker's presence near the structure, additional precautions are necessary to limit the risk of an accident. All vehicles used to transport personnel and inspection equipment to the site should be outfitted with high visibility lighting and conspicuity tape to provide an additional means for cautioning motorists that work is actively being completed in proximity to the structure. Vehicles should also be parked in the safest

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manner possible; where the potential to limit site distance for adjacent intersections is minimized and worker protection is maximized.

Inspectors should also be cautious of motorist's actions and aware that distracted driving is commonplace. It is never safe to assume that motorists are attentive to the activities being performed even when advanced signing or traffic control devices are in-place. It is always preferred to efficiently utilize time for a comprehensive inspection that limits the duration that work occurs nears traffic. When it is possible, inspect bridge elements from behind the protection of guardrail or have an escape path identified when a barrier does not exist.

### **13.05 Fall Protection**

Any team leader or worker performing bridge inspection shall wear a personal fall arrest system when there is an unprotected side or edge that is 6 feet or greater above the lower level. Although the majority of routine bridge safety inspections occur after permanent bridge railing is constructed, bridge owners or team leaders may be required to provide guidance during active construction or rehabilitation phases prior to substantial completion of the work. If working surfaces are exposed on a bridge or other structure that meet or exceed the threshold limit, the area should not be approached until personal fall arrest equipment, guardrails, or another MIOSHA compliant safety system is employed.

Personal fall arrest systems must be certified by the manufacturer to meet specific strength tests. They require use of corrosion resistant steel connectors, dee rings, and the application of specific types of snaphooks contingent on the function and feature they will be secured to. Lanyards must also limit the rate of deceleration and restrict the fall distance to 6 feet or less.

Additionally, specific MIOSHA requirements exist for working in aerial lifts such as platform bucket trucks or under-bridge inspection units. Securing a lanyard to an adjacent structure such as a pole, bridge element, or other equipment must not be performed. Standing or climbing on the sides of the platform is also prohibited as it will increase the likelihood that a worker may fall from the raised elevation. Aerial devices must not be moved with personnel standing on the platform unless the equipment was specifically constructed by the manufacturer for that specific use.

### **13.06 Power Lines**

While performing bridge inspections from an aerial lift device or ladder, the focus of the work is often on the bridge elements and identifying whether deficiencies exist. However, failure to review one's surroundings prior to performing the work will lead an increased risk of injury or death. Before entering the platform of a bucket truck or under-bridge inspection unit the team leader and equipment operator should review the site for the presence of power lines. Although some overhead wires may be insulated for protection, the vast majority are not and rely on adequate clearance to provide shielding. MIOSHA provides minimum recommended distances for working near electrical lines that are dependent on the amount of voltage that is being transmitted. When work must be conducted near the lines contact the

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utility owner to determine the rating and consult MIOSHA for the minimum clearance to determine whether a temporary shutoff during the inspection will be required.

### **13.07 Confined Spaces**

A permit-required confined space is defined by MIOSHA as a space that has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere;
2. Contains a material that has a potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4. Contains any other recognized serious safety or health hazard.

Examples of confined spaces that may be encountered by the team leader while performing bridge inspections include, among others, certain types of steel box girders, tie girders, and culverts. Specialized equipment is necessary to test the atmospheric conditions inside the space, provide suitable air for employees to perform the work, and provide a means for retrieving individuals that cannot exit under their own effort.

Each organization that requires entry of its bridge inspection staff into a permit-required confined space must develop a written permit confined space program. Briefly stated, the plan requires the organization to prevent unauthorized entry of the identified area, perform a hazard assessment prior to entering the space, and to develop procedures for performing safe work functions. The employer is also responsible for providing the necessary testing equipment and specialized PPE. All inspection team leaders that enter a confined space must receive training prior to engaging in the activity.

### **13.08 Working Over or Near Water**

MIOSHA requires the prevention of drowning by use of a life jacket, buoy, and/or rescue boat depending on the type of activity being performed. While inspecting structures which have been erected over surface waters there are usually two occurrences where the team leader may have to take additional precautions for work near the water. Thoughtful consideration for the necessary equipment should be resolved during the bridge file review phase prior to performing field activities.

The first instance occurs at structures with submerged substructure elements where wade and probe or boat and probe methods are performed. These methods most often require the use of a life jacket and should be performed in the presence of an assistant inspector. Waders may also be used to decrease the likelihood of contact with pollutants, organisms, and to provide a means for insulation while working in cold water. Due to the likelihood of unexpected scour holes near abutments, piers, or protection systems a wader belt should accompany use of personal flotation device. There are also numerous hazards present while performing underwater diving inspections and separate detailed MIOSHA specifications must be adhered to prior to and during the inspection.

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The second case involves the use of aerial equipment over a body of water. While performing inspection in an under-bridge inspection unit personnel should wear life jackets over their personal fall arrest systems. This will increase the likelihood of survival should the aerial equipment malfunction and an emergency deployment from the platform is necessary. Where rapid flow, current, extreme water temperature, or depth exist the use of stand-by rescue boat may be necessary as an additional precaution.

### **13.09 Extension Ladders**

Prior to each use the rope, connections, and other features of ladder systems should be inspected for damage or deterioration. All ladders should be rated for the individuals using them and erected on suitable substrate at a 4 on 1 to ensure adequate stability while supporting inspection personnel. Ladders should only be used where there is adequate clearance from traffic and the risk of collision with motorists is limited. After each use the equipment should be secured in accordance with the manufacturer's recommendations to prevent premature failure and sustained future use.

### **13.10 Asbestos**

Conduit, utility insulation, bond breakers, and other elements that were used in the construction of structures may contain asbestos. For bridges that are more than 25 years old the possibility of asbestos containing materials increases as restrictions limiting use were not instituted until the 1980's. Asbestos that is intact and undisturbed does not present a hazard until it is moved, modified, or damaged. Therefore, team leaders should never touch materials that are suspected to contain asbestos until laboratory testing confirms the absence of the mineral.

### **13.11 Histoplasmosis**

Working near or disturbing large quantities of bird excrement can lead to the contraction of histoplasmosis. The disease occurs from the inhalation of fungus spores that flourish in nitrogen rich feces. Prior to disturbing the material to inspect bridge element surfaces or removing false decking, a suitable respirator should be worn to reduce the opportunity for exposure. A method for controlling the dust created from disturbing the material should also be implemented when the material is removed.

### **13.12 Emergency Equipment**

MIOSHA and the Federal Motor Carrier Safety Administration requirements exist for additional equipment that must be at the jobsite or in a commercial work vehicle. For the purposes of bridge inspection, items that are required to be on site must be stored in the vehicle. Among these objects are first aid kits, fire extinguishers, spare fuses, and warning triangles. First aid kits should be maintained to administer relief for minor cuts, abrasion, or to assist with serious injuries until emergency personnel arrive at the scene. Fire extinguishers and additional safety equipment, though not required for equipment with a gross vehicle or gross combination weight rating of less than 10,001 pounds, are recommended to be stored securely for emergency situations.