



BRIDGE ADVISORY
Bridge Field Services
Structure Management Section

BRIDGE ADVISORY NUMBER: BA-2013-01

DATE: April 16, 2013

SUBJECT: Guidelines for Bridge Inspection Frequencies

ISSUED BY: Rich Kathrens, P.E., Bridge Safety Inspection Engineer

REVIEWED BY: Eric Burns, P.E., Structure Management Engineer

Contact Information: Rich Kathrens, Bridge Safety Inspection Engineer, 517-322-5715 or kathrens@michigan.gov

PURPOSE

The National Bridge Inspection Standards (NBIS) require States to develop criteria for inspecting bridges less than the maximum intervals. MDOT has recently updated the “**Guidelines for Bridge Inspection Frequencies**”. These guidelines can be found at www.michigan.gov/mdot, then click on “Doing Business”, then “Bridge Operations”, then choose “Manual and Guides”.

Maximum frequencies are set by the NBIS. Bridge inspection frequencies less than the maximum are set based on the condition of structure and the confidence that the structure will remain in its current condition until the next inspection is completed.

The purpose of the updated frequency guidelines is to provide addition clarification for inspecting structures less than the maximum intervals.

Evaluation of the conditions encountered during the inspection for each bridge will require engineering judgment to verify the appropriate frequencies for future inspections. The updated frequency guidelines are to be used as reference for bridge inspectors to maintain consistency statewide.

MDOT recommends that Bridge Owners and Inspectors review the attached Guidelines for Bridge Inspection Frequencies and implement an increased level of inspection for structures meeting the listed criteria.

SUMMARY of CHANGES

Below is brief list of changes to the **Guidelines for Bridge Inspection Frequencies**:

- Updated the guidelines to be used by all agencies statewide. The previous guidelines were focused on MDOT Owned structures.

- Frequency of completing Load Ratings was removed. Load rating calculations should be reviewed and reflect the current conditions of the structure. Most of the conditions listed in the updated frequency guidelines warrant a review of the load rating calculations.
- Updated the recommended frequencies to less than or equal to 6, 12, and 24 months to be more consistent with general practices. Bridge inspectors can use their judgment to choose a reduced frequency between the recommended values. Please provide comments in the General Notes section of the inspection reports to justify the recommended frequency.
- Provided guidance for the use of the “Other, Special” inspection. In lieu of changing the Routine inspection frequency, a special inspection can be scheduled and completed to monitor conditions of specific bridge elements. These inspections can be documented in the Michigan Bridge Inspection or Reporting Systems (MBIS/MBRS). The inspector does not need to meet the “Team Leader” requirement as defined in the NBIS, but they should be knowledgeable in bridge mechanics and be able to make a judgment to the safety of the structure.
- Updated the guidance for setting frequencies for Scour Critical Bridges. Bridge Owners should review the Plan of Action for their scour critical bridges to maintain consistency with the level of inspection required during the routine and special inspections. Please document findings in the bridge file during routine or special inspections for follow up during future inspections.
- Added a section for completing Stream Bed Cross Sections. All structures over water are required to have at least once stream bed cross section in the file. Guidance is provided for how often these stream bed cross sections should be updated.

The NBIS sets the maximum frequencies for Routine, Fracture Critical, and Underwater inspections. Typically maximum frequencies are used for bridges in fair to good condition. Evaluation of the conditions encountered during the inspection for each bridge will require engineering judgment to verify the appropriate frequency for future inspections. These guidelines are to be used as reference for bridge inspectors to maintain consistency statewide. It is recognized that the conditions encountered are unique for each bridge.

Reduced frequencies are set to verify and ensure stability of the deficient element and to make sure there are no significant changes in the primary elements between inspections.

| ELEMENT OR BRIDGE TYPE | FREQUENCY ⁽¹⁾ (Months.) | | | COMMENTS ⁽²⁾⁽³⁾ |
|--|---------------------------------------|------|-----|---|
| | ≤ 6 | ≤ 12 | <24 | |
| POSTED BRIDGES | | | | |
| Design Deficient | | | X | Evaluate design capacity and fatigue conditions to set frequency. |
| Structural Deterioration | | X | | Change in condition may warrant re-analysis. Load Analysis should be completed when there is significant deterioration to a primary load carrying member. |
| BRIDGE DECKS | | | | |
| Deck Soffit Rated 4 | | | X | Notify Maintenance (MDOT Owned) or Bridge Owner (Local Agency Owned) to monitor deck soffit |
| Deck Soffit Rated 3 | | X | | If necessary, sound and scale deck soffit. |
| Decks w/ False Decking | | | | If deck is completely false decked with timber, a portion must be removed to complete overall condition assessment of the structural members. Consider replacing false decking with metal mesh panels. |
| STEEL SUPERSTRUCTURE | | | | |
| Section loss evident (amount unknown) | | | | Schedule "Detailed" inspection |
| Extensive Loss of Section | | X | | Schedule "Other, Special" inspection to monitor until analysis or repairs have been completed. Extensive LOS on primary load carrying members includes beam ends with LOS>25% and locations of high stress that would result in a reduced capacity with less than 25% section loss. |
| Fatigue Cracks in Primary Structural Member | X | | | Schedule "Other, Special" inspection to monitor cracks until repairs are completed. |
| Temporary Supports Under Beams | | X | | Schedule "Other, Special" Inspection to monitor adequacy of supports and bearing location on beam until repairs are completed. |
| High Load Hit (HLH) Damage (Flange or web torn, Girder out of plane >6") | X | | | Schedule "Other, Special" inspection at an increased frequency to monitor damaged location until analysis and/or repairs are completed. Complete RFA form to document immediate actions such as shoulder, lane, or bridge closures. |
| CONCRETE SUPERSTRUCTURE | | | | |
| Main rebar or prestressing strands exposed with loss of section. | | | X | Complete Structural Analysis. Set frequency based on analysis. |
| HLH with main rebar damage or broken prestressing strands | X | | | Schedule "Other, Special" inspection to monitor until analysis or repairs have been completed. |
| Spall on Beam End with loss of bearing | | X | | Schedule "Other, Special" inspection to monitor beam and bearing until repairs are completed. |
| Longitudinal Cracks in Beam | | X | | Schedule "Other, Special" inspection to monitor until analysis or repairs have been completed. |
| Diagonal Shear Cracks in Beams | | X | | Schedule "Other, Special" inspection to monitor until analysis or repairs have been completed. |
| SUBSTRUCTURE (Concrete, Steel, Timber) | | | | |
| Structural Deterioration (Rated 4) | | | X | |
| Structural Deterioration (Rated 3) | | X | | Complete structural analysis. Adjust frequency based on analysis. |

| ELEMENT OR BRIDGE TYPE | FREQUENCY (Months.) | | | COMMENTS ^{(2) (3)} |
|--|------------------------|------|-----|---|
| | ≤ 6 | ≤ 12 | <24 | |
| SCOUR CRITICAL STRUCTURES⁽⁴⁾ | | | | |
| Structure with minor to no observed scour | | | | Monitoring per Scour Action Plan. Complete scour inspection after flood event. |
| Observed Scour noted with exposed footing | | X | | Schedule "Other, Special" inspection to monitor substructure until repairs are completed. Complete scour inspection after flood event. |
| Observed Scour within or below limits of footing, undermining. | X | | | Schedule "Other, Special" inspection to monitor substructure until repairs are completed. Complete scour inspection after flood event. When immediate repairs are required notify MDOT Bridge Inspection Program Manager per critical finding procedures. |

| ELEMENT OR BRIDGE TYPE | FREQUENCY (Months) | | | COMMENTS |
|---|-----------------------|----|----|--|
| | 24 | 48 | 72 | |
| STREAM BED CROSS SECTIONS | | | | |
| Scour Critical Bridges with active erosion or observed scour. | X | | | Minimum every two years or after flood event where the scour POA was activated. (Item 113=U, 0-3) |
| Scour Critical Bridges with no active erosion or observed scour. | | X | | Minimum every four years or after flood event where the scour POA was activated. (Item 113=U, 0-3) |
| Structures with no active erosion and or minor observed scour. | | X | | Note: Structures requiring underwater inspections will complete cross sections during the underwater inspection at a minimum of 60 months. |
| Structures over water with no substructures in the water and no channel erosion | | | X | Frequency of Stream Bed Cross Sections can be increased when stability of channel can be verified such as lined channel bottoms. There must be a minimum of (1) cross section in the file. |
| | | | | |
| | | | | |

- (1) Load rating calculations should be reviewed and reflect the current conditions of the structure. Most of the conditions listed in this frequency guideline warrant a review of the load rating calculations.
- (2) Requests for load analysis and immediate repairs are typically made with the use of a "Request for Action" form.
- (3) Whenever a structural analysis is indicated, an "**Other, Special Inspection**" may be used at the suggested frequency pending the result of the load analysis.
- (4) For MDOT owned structures with undermining contact MDOT Hydraulics to complete an emergency countermeasure design.