

New Hampshire Municipal Bridge Checklist of Preservation Activities



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NEW HAMPSHIRE MUNICIPAL BRIDGE MAINTENANCE CHECKLIST

This document is written with the sole purpose of helping municipalities to better maintain the bridges they own. Beyond the prime purpose of keeping bridges safe to the travelling public, the municipalities should be concerned with protecting their inventory and investment. As the cost of new bridges is usually very expensive and the fact that most municipalities have limited funds for bridge replacement, it becomes imperative and cost effective to properly maintain existing bridges to extend the life of the existing bridge before replacement is necessary.

Per the Federal Highway Administration (FHWA) [Bridge Maintenance Guideline](#): “A successful bridge program seeks a balanced approach to preservation and rehabilitation/ replacement. Bridge owners are striving to be more strategic by adopting and implementing systematic processes for bridge preservation as an integral component of their overall asset management.”

Appropriate personnel in municipalities need to know the existing condition of their bridges. NHDOT inspects every municipal bridge as per RSA 234.25 and Federal requirements biennially, except the Red List Bridges, which are inspected annually. A Red List bridge is defined as a bridge that has one element of the bridge rated as a 4 (Poor) or lower. Municipal bridges can also be inspected upon request, if deemed by local officials that something has been observed to have changed since the last bridge inspection, possibly after a storm event or after a vehicular accident. All of these bridge inspections are provided by NHDOT at no expense to the municipality. Hard copies of these bridge inspection reports are mailed to the municipality. Beyond these NHDOT inspections, municipalities should perform interim inspections on their own, and certainly contact NHDOT with any questions or concerns.

There are many different bridge types with greatly varying lengths, widths, and foundations. As bridges can be made of metal, concrete, timber, or stone, the following bullets for preventive maintenance will not all apply to a specific bridge. This checklist does not serve as an official bridge inspection guide and should not be used in place of an NHDOT Inspection. This checklist is intended to assist municipalities with assessments of the state of their local bridges and with identifying red flags. Relevant contact information is in the “Red Flag” section below. If someone identifies any of these red flag issues, they should immediately get in touch with NHDOT to inspect the area. This field guide is not all-encompassing and should not be considered a legal document. This guide offers suggestions and guidance for many typical situations that arise on local bridges, but specific site conditions may make that guidance inappropriate, so while this guide provides guidance for design and application of traffic control devices, it should not be considered a substitute for engineering judgment or escalation to NHDOT.

Be sure to employ appropriate traffic control measures, safety and personal protective equipment, and document all maintenance efforts throughout any procedures. Establish proper traffic control operations on the bridge/roadway to ensure worker safety during all maintenance activities.

Annual Maintenance Checklist:

- Sweep and/or shovel bridge deck to remove dirt and deicing salt buildup.
 - Utilize a mechanism sweeper/vac or hand sweeping. Do not sweep debris into the water way or will leave a berm to impede necessary water flow from paved surfaces.
 - Use shovels, brooms, hand scrapers, and other hand tools to physically remove large accumulations of roadway debris, dirt, bird nesting material, and bird excrement from beam seats.
 - NOTE: Bird and bat droppings can be hazardous if disturbed or moved. When doing so, use respirators and disposable Tyvek protective suits to ensure optimum safety.

- Wash bridge. Any expansion joints on bridge need to be cleaned more often. It is especially important to remove debris, salt & contaminants, and bird droppings from girders, bearings, back walls, bridge seats, and deck drains.
 - This can be done using a portable pump and fire 1" to 2" hose, or a pressure washer connected to some portable water source, beginning at highest elevation and working away from the joints.
 - Use a water flow rate of at least 5 gallons per minute (higher pressure when not washing painted members but limited to 1000 psi when washing painted surfaces).
 - Don't wash flaking paint.
 - Following washing operations, confirm that all washed members are freely draining and do not trap water.

- Waterproof concrete with siloxane or Silane as required to maintain water beading (every 4-5 years)
 - Utilize a pump sprayer or a manufacturer's recommended applicator on all exposed concrete surfaces.
 - Note that previously, an annual or biannual application of Siloxane or Silane was recommended when linseed oil was applied; this is no longer an option thus Siloxane or Silane is recommended on a 4- to 5-year cycle.

- Remove waterway debris upstream and downstream against bridge and in channel.
 - Removal of sticks, limbs, other debris which is causing the stream to deviate from its normal course or is restricting the flow.

- Control vegetation against bridge and railing.
 - Trim grass, weeds and cut brush from sides of the bridge approaches and railings. Remove any vegetative berms which may be restricting run off from entering vegetative areas. Note: Address invasive plants per proper protocol.

- Control small animals in bridge area. Remove any bird nests.
 - Utilize appropriate pest and small animal removals, and bird nests. Burrowing animals and birds can cause additional maintenance issues for bridge maintenance.

Post bridges as recommended. Repair or replace signs as needed. Enforcement of postings is necessary.

- The NHDOT Bridge Inspection group will notify municipalities with the appropriate weight posting for the bridge, "E or C posting" and any other required postings such as narrow bridge, etc. Signs shall be maintained & in good condition.

Fill in eroded areas on slopes and banks.

- These areas should be repaired as soon as possible to avoid further erosion and slope derogation which could undermine roadways, and piers. These areas should be repaired with appropriate erosion control BMP's. Consider adding asphalt curbs or pressure-treated wood curb boards to redirect water away from the steep slopes adjacent to wingwalls to prevent erosion

Maintain any catch basins or other water diversion devices such as ditches on bridge approach roadway that keep roadway storm water from reaching the bridge. It is imperative to facilitate drainage.

- Clean Catch Basins annually.
- Clean debris (leaves etc.) ditch lines by vacuuming, rake or blowing.

Repair as required:

Patch or replace concrete decks. If not necessary, seal any cracks or joints on concrete deck.

- Conduct necessary asphalt crack sealing.
- Clean expansion joints and reseal as required.
- Repair asphalt or concrete deck surfaces with appropriate materials.

Clean, repair and paint steel members. If full painting is cost prohibitive, consider spot or zone painting the worst areas where deterioration is occurring the fastest to slow down the deterioration process.

- Areas should be cleaned (washed,) primed and painted with a rustproof inhibiting paint. Caution should be used with lead paint mitigation/removal and disposal (to include any required testing and licensing).

Lubricate bearings.

- May require bridge contractor to assist.

Repair or replace timber members.

- May require Bridge Engineer assessment and contractor to assist.

Install and maintain appropriate and acceptable bridge and approach guard rail.

- Inspect existing bridge railing and bridge approach railing for damage, loose or missing bolts, deterioration, and concrete degradation around the base plates.

Shim approach pavement behind abutments if settlement has occurred to eliminate any “bridge bumps” that can cause truck pounding damage to top of abutments and deck joints.

- Asphalt shim applied to approaches.

Maintain smooth gravel roadway approaches onto bridges to avoid bumps that produce pounding of the bridge.

- Gravel approaches should be graded and have approaches compacted to help maintain the surface to be free of potholes and at the appropriate grade.

Maintain stone or concrete abutments and piers. Water gets behind stone abutments and wings and can wash out fill behind and under the footing.

- The construction of new concrete toe walls, mortar joints, or concrete facing may be necessary.
- Spalled concrete in abutments and piers may need to be patched.
- Do not fully point dry laid stone walls; drainage must be maintained or additional pressure will be applied to the wall.

Steel or aluminum multi-plate culverts may need to be replaced or repaired with a concrete invert or new plastic liner pipe with grout.

- Recommended to consult with NHDOT Bridge Engineering Group or Town Engineer to ensure proper DES permit and hydraulic calculation loading.

Fill in erosion at culvert ends, such as scour holes. If possible, protect against future scour.

- This may require installation of precast head and wing walls.
- Install of erosion stone at the inlet and outlet areas (stone size is dependent on volume of water and velocity).

Maintain any pavement markings on bridge or approaches.

- Refresh markings as necessary for retro reflectivity and lane delineation.

When to contact the NHDOT

- If either a red flag or a yellow flag is thought to be present on a bridge, contact NHDOT immediately to get a professional out to evaluate the state of the bridge and determine the next steps.
 - **Red flag:** potential failure of a primary structural component that is likely to occur before the next scheduled biennial inspection.
 - **Yellow flag:** clear and present danger before next scheduled biennial inspection, used to report the actual or imminent failure of a non-critical structural component, where such failure may reduce the reserve capacity or redundancy of the bridge, but would not result in a structural collapse.

Red flags include:

- **Concrete:** Severe cracking, scaling, spalling, chemical attack, and other damage due to external forces on concrete (plain, reinforced, and prestressed).
- **Masonry:** Displaced, cracked, missing, or loose stones and loss of joint material.
- **Steel:** Extreme corrosion, cracks, distortion, poor condition of connections (rivets, bolts, welds, fenders), embedment loss, and other damage due to external forces (collision, heat damage, ice flows).
- **Timber:** Deflection, decay, abrasion, poor condition of connections (dowels, bolts, metal spikes and or brackets missing or corroded), embedment loss, and other damage due to external forces.

NHDOT Contact Information

- Bridge Inspection – Chief, Existing Bridge Section -
<https://www.nh.gov/dot/org/projectdevelopment/bridgedesign/contactus.htm>

In summary, municipalities should know the condition of their bridges and maintain them as needed. Municipalities should plan for bridge replacement or rehabilitation well in advance. With the several major storm events that portions of NH have experienced in 2005, 2006, 2007, and 2011, many municipalities were caught not fully aware or prepared for dealing with the many implications of bridges being washed out or compromised. NHDOT is ready and willing to help with inspections, funding program guidance, technical assistance, and emergency repairs as available. Contact NHDOT – Bureau of Planning and Community Assistance at 603-271-3344.

Additional Resources

- [FHWA Bridge Preservation Guide](#)
- [AASHTO TSP2 Local Agency Preservation Work Group *](#)
- [POCKET GUIDE A User's Guide to Removal and Replacement of Bridge Coatings *](#)
- [POCKET GUIDE A User's Guide to Bridge Cleaning *](#)
- [POCKET GUIDE Thin-Polymer Bridge Deck Overlay System *](#)
- [POCKET GUIDE A User's Guide to Concrete Bridge Deck Patching *](#)
- [POCKET GUIDE A User's Guide to Spot, Zone, and Overcoating Existing Bridge Coatings *](#)
- [POCKET GUIDE A User's Guide to Repair of Bridge Concrete Substructure Elements *](#)
- [FHWA Bridge Preservation Video](#)
- [TSP2 Bridge Preservation Video Library](#)
- [Bridge Replacement Unit Costs \(2019\)](#)
- [Infrastructure Report Card - Bridges](#)
- [Approaching Bridge Maintenance Efficiently](#)

**The pocket guides are also available as a smartphone app, downloadable at iTunes or Google Play Store. Search for "RBC Pocket Guide" for Bridge Coating, "BC Pocket Guide" for Bridge Cleaning, and "TPO Pocket Guide" for the Thin Polymer Overlay Guide.*

Acknowledgment and History

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UNH T2 is pleased to provide free and customized Technical Assistance to local road agencies on a variety of road maintenance and transportation infrastructure-related topics, including bridge preservation and maintenance activities. Please reach out to t2.center@unh.edu for additional resources, support, or technical assistance.

For additional resources, information, or Technical Assistance, visit <https://t2.unh.edu/>.

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