

UNH T² Center Technical Note

Bridge Maintenance Practices



The most effective way to prevent bridge deterioration and keep bridges serviceable is to perform regular, planned bridge maintenance, and maintain a bridge inventory. Any crew can perform the eight bridge maintenance practices summarized in this technical note. These practices are fundamental to ensure the safety and dependability of the bridge, extend its useful life, and save money.

Inspect Bridges

Inspect town bridges yearly to track their performance and maintain a written file. Include pictures in the file.

Control Vegetation and Small Animals

A plant's root system can cause considerable damage to a bridge.

Plants create and expand cracks. Remove small plants from the abutments and other members. To protect the structure and improve driver visibility, cut back brush and small trees on the approaches and the banks near abutments.

Small animals can also pose a problem. Animals may burrow into the banks or close to the abutment which may allow water to enter the fill. If possible, remove all small animals.

Remove Debris

Debris often collects upstream, downstream, and against the bridge. Debris creates waterway restriction. This may result in eroded fill material from the stream bed and banks, a faster current, as well as weaken piers or abutments. Completely remove debris. Do not place it on river banks, where it may be picked up by high water.

Wash Bridges

Sand and salt from winter maintenance attracts moisture, which ponds on the bridge deck and other members. Ponding leaves the bridge susceptible to rust and weakens the concrete. Use a small, portable, high pressure pump to remove accumulated dirt and salt. Sweep the deck before washing to avoid having material fall into the water.

Begin washing the bridge deck at the highest elevation. Remove dirt from drain holes and expansion joints. Dirt also collects under the bridge therefore, wash trusses, panel joints, and bridge seating.

Improve Transitions

A rough transition from the road onto the bridge causes vehicle loads to abruptly hit the bridge deck. Severe jolts can prematurely weaken the bridge.

Gravel road approaches create buildup above the deck elevation, which spills onto the bridge deck. Cut down gravel approaches with a grader to prevent this. Handwork is necessary to remove

dirt in areas where the grader cannot.

Install a bituminous asphalt surface 25' from the bridge prevent problems resulting from gravel road approaches.

Waterproof Concrete Surfaces

To prevent portland cement concrete from spalling, waterproof the bridge deck and areas exposed to chloride every two years.

Use a solution of linseed oil and petroleum mineral spirits or use silane-siloxane. When applying silane-siloxane follow manufacturer's guidelines.

Patch Concrete Decks

Patch cracks to prevent moisture and chemicals from penetrating the reinforcing steel. This stops the steel from rusting. Rust causes expanding and spalling. Seal cracks with an approved sealer.

To patch, remove loose and deteriorated concrete and clean the area with a dry blast before sealing. Coat reinforcing steel with an epoxy bonding compound, unless an epoxy mortar will be used for sealing. While the epoxy coat is still tacky, apply mortar in the patch area, screed, and float even with the deck. When traffic can be restricted for only a few hours, use a fast-setting mortar.

Post Bridges

If the load limit is unknown seek advice of a professional engineer. Check the load limit of the bridge against the state-designated load. The NHDOT rates bridges based on a load limit (see the next section of this tech note). Load limits below state-designated loads must be posted using the Manual on Uniform Traffic Control Devices (MUTCD). Notify the appropriate users of the bridge: schools, police, fire departments, and others affected by the posting. Failure to post may result in unnecessary bridge wear and tear as well as premature failure.

Bridge Rating System

New Hampshire Revised Statutes Annotated (RSA) Chapter 266 relative to truck weight, permits vehicles "certified" by the Department of Safety to

carry additional weight on any way (road) other than the Interstate and Defense Highway System.

The Commissioner of Transportation may restrict at their discretion the crossing of certain bridges, which they determine to have insufficient strength to safely carry "certified" loads by limiting the vehicles to a caution crossing or by prohibiting the crossing. The Commissioner may post standardized warning signs designating these bridges as caution crossing bridges, or as excluded bridges, and publish a list which designates bridges at least annually. For local and privately owned bridges, it is the duty of the authority having jurisdiction to place similar signs.

Definitions

Certified Vehicle – A vehicle certified pursuant to RSA 266:18-D operating in excess of the weight limitation set forth in RSA 266:18-A but not exceeding the weight limitations established by RSA 266:18-B.

E-1 – This bridge shall not be crossed by a certified single unit vehicle. Certified combination vehicles may cross the bridge.

E-2 – This bridge shall not be crossed by any certified vehicle.

C-1 – A certified single unit vehicle may cross the bridge but must not be on the bridge at the same time as any other vehicle weighing over six tons. If a vehicle larger than a pickup truck is approaching the bridge it must stop and allow the other vehicle to clearly cross. Then, the certified vehicle may cross the structure. Certified combination vehicles may cross the bridge at the same time as other certified combination vehicles or other lesser loads.

C-2 – Any certified vehicle may cross the bridge but a certified vehicle must not be on the bridge at the same time as any other vehicle weighing over six tons. If a vehicle larger than a pickup truck is approaching the bridge, the certified vehicle must stop

and allow the other vehicle to clearly cross. Then the certified vehicle may cross the structure.

C-3 – A certified combination vehicle may cross the bridge but must not be on the bridge at the same time as any other vehicle weighing over six tons. If any vehicle larger than a pickup truck is approaching the bridge a certified combination vehicle must stop and allow the other vehicle to clearly cross. Then the certified combination vehicle may cross the structure. ❖

Checklist for Maintenance

1. Inspect Bridges

- Perform inspections annually.
- Update written and photographic files.

2. Control Vegetation and Small Animals

- Remove small plants and brush.
- Look for burrowing small animals.

3. Remove Debris

- Remove debris completely off-site.
- Remove debris up/downstream and against the bridge.

4. Wash the Bridge

- Remove debris from bridge deck.
- Sweep deck to remove accumulated dirt and salt.
- Begin washing at highest elevations.
- Pay attention to underside of bridge as well.

5. Improve the Transition of the Road onto the Bridge

- Cut down gravel at road approaches.
- Hand work may be required at corners.
- Create a bituminous surface on the approach to prevent gravel buildup.

6. Waterproof Concrete

- Waterproof every two years.
- Waterproof surfaces exposed to chloride.
- Waterproof with lineseed oil or silane-siloxane (following manufacturer's instructions).

7. Patch Concrete Decks

- Remove loose and deteriorated concrete.
- Clean area with a dry blast.
- Use slow-setting mortar when traffic can be controlled for long time periods.
- Use fast-setting mortar when traffic can be restricted for a few hours.

8. Post Bridges

- When load limit is unknown, consult the NHDOT for load limit ratings or professional engineer.
- Check bridge load limit against state-designated loads.
- Post signs when bridge load is under state-designated loads.
- Send notices of postings to appropriate bridge users and officials.

References:

“Administration of Bridge Inspection,” Action Guide Volume I-6, National Association of County Engineers, 1990
“Checklist for Inspecting Bridges,” KUTC Newsletter, May 1988
Standard Specifications for Road and Bridge Construction, NHDOT, 2002



Technology Transfer Center
New Hampshire LTAP at UNH

BRIDGE PREVENTIVE MAINTENANCE CHECKLIST

Structure _____ Date _____

Feature Crossed: _____ Inspected By _____

ITEM	Satisfactory Condition	Needs Repair	Needs Engineering Study	Comments	Date Reported
Signs					
Delineation					
Debris					
Islands or Sand Bars					
Erosion or Scour					
Berms					
Riprap					
Settling or Railing @ Approach					
Abutments					
Pilings					
Bridge Seats					
Spalling (abutment)					
Paint					
Truss Broken/ Bent/Rusted					
Stringers					
Girders					
Bearings					
Expansion Joints					
Deck					
Curbs					
Sidewalk					
Railing					
Cleaning					
Painting/ waterproofing					