



### 3.5 Bridges

The value of a bridge includes the direct value of the asset itself as well as the access and continuity it provides.<sup>i</sup> As with road surfaces, preventive, nonstructural maintenance can yield significant gains in the longevity of the asset (typically 30-50 years), postponing and reducing major structural rehabilitation or replacement costs.

*Purpose:* Extend the life-cycle of the asset, and prioritize public safety and access

*Best Practices:* Bridge owners should establish a program of inspection, condition rating, and preventive maintenance. The Federal Highway Administration Bridges and Structures webpage offers links to applicable legislation and policies, local examples of bridge preservation and maintenance programs, management best practices, and research and development.<sup>ii</sup>

The American Public Works Administration (Preventive Maintenance Programs Keep Your Bridges Open for Years to Come) explains that the sufficiency level of a bridge (based on structural adequacy and safety, serviceability and functional obsolescence, essentiality for public use, and special reductions) should be reported to the Federal Highway Administration and can be useful in developing a maintenance program like those highlighted in two case studies from Florida.<sup>iii</sup>

The Greater Buffalo-Niagara Regional Transportation Council details best practices for bridge maintenance in the colder climate in the Erie-Niagara area. Cyclical Maintenance includes preventive measures such as bridge washing and debris clearing, deck sealing, steel bearings lubrication, and painting load-carrying steel members. Corrective Maintenance includes replacement of an element (joints, bearings, pedestals, bridge seat/pier cap, or columns/stems) of a bridge that is otherwise in good structural condition.<sup>iv</sup> The overall structural condition of a bridge is The Bridge Maintenance Technical Guide (see pages 9 and 10) lays out the following maintenance activities schedules for Cyclical and Corrective measures:<sup>v</sup>

Cyclical Activity	Selection Criteria	Cycle
Bridge Washing (including substructure concrete, deck & crack sealing)	All functional structures regardless of CR, priority to structures over highways.	2 years
Deck Sealing (including crack & substructure concrete, sealing)	<p>Concrete wearing surfaces (present wearing surface codes 02, 03, 06, 12, 22, 32, 42, 45, 52 in RC 15 of BDMS) rated <math>\geq 5.0</math> on structures rated 4.5 to 7.</p> <ul style="list-style-type: none"> <li>• 02 - Portland Cement concrete overlay</li> <li>• 03 - Precast Portland Cement Concrete Plank</li> <li>• 06 - Integral or Monolithic Portland Cement Concrete</li> <li>• 12 - Bonded Concrete</li> <li>• 22 - Concrete with membrane</li> <li>• 32 - High Density Concrete</li> <li>• 42 - Latex Modified Concrete</li> <li>• 45 - Micro-Silica Overlay</li> <li>• 52 - Class "HP" Concrete</li> </ul>	6 years
Bridge Painting	<p>Painted structures (coating types 1, 2 or 3 in RC 15 of BDMS) on structures rated 4.5 to 7.</p> <ul style="list-style-type: none"> <li>• 1 - Painted, Lead-Based</li> <li>• 2 - Painted, Not Lead-Based</li> <li>• 3 - Painted, Unknown</li> </ul>	12 years
Deck Overlay	<p>Wearing surfaces (present wearing surface codes 04, 14, 24, 34, 44, 54, 64 in RC 15 of BDMS) on structures rated 4.5 to 7.</p> <ul style="list-style-type: none"> <li>• 04 - Asphalt Concrete</li> <li>• 14 - Asphalt Concrete without Membrane</li> <li>• 24 - Asphalt Concrete with Membrane</li> <li>• 34 - Asphalt Concrete with Preformed Sheet Membrane</li> <li>• 44 - Asphalt Concrete with Coal Tar Epoxy Membrane</li> <li>• 54 - Asphalt Concrete with Membrane other than Coal Tar</li> <li>• 64 - Asphalt Concrete with Mastic Membrane</li> </ul>	12 years

Corrective Activity	Selection Criteria	Objective
"5 – 7" Program	Bridges in generally good condition (Condition Rating > 4.8) that have individual structural elements that are deficient (Element Ratings < 5).	Repair the deficient element and thus extend the non-deficient life of the bridge.
"Vertical Down"	Structures with average condition rating between 4.8 and 6 with a substructure condition index $\leq 5.0$ .	Repair deficient substructures (i.e. bearings, pedestals, bridge seat/pier cap, columns/stems) where needed
"Joints"	<p>Structures with average condition rating between 4.8 and 6 with joints (Joint Type codes 07, 11, 12, 13, 15, 16, 17, 18, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34 in RC02 and RC15 of BDMS) rated <math>\leq 5.0</math>.</p> <ul style="list-style-type: none"> <li>• Elastometric <ul style="list-style-type: none"> <li>07 - expansion</li> <li>27 - fixed</li> </ul> </li> <li>• Armored Elastometric <ul style="list-style-type: none"> <li>11 - expansion</li> <li>28 - fixed</li> </ul> </li> <li>• Armored Compression Seal <ul style="list-style-type: none"> <li>12 - expansion</li> <li>29 - fixed</li> </ul> </li> <li>• Compression Seal <ul style="list-style-type: none"> <li>13 - expansion</li> <li>30 - fixed</li> </ul> </li> <li>• Strip Seal with Integral Armoring Angle <ul style="list-style-type: none"> <li>15 - expansion</li> <li>31 - fixed</li> </ul> </li> <li>• Strip Seal – Extrusion Anchored to Deck, No Elastometric Concrete <ul style="list-style-type: none"> <li>16 - expansion</li> <li>32 - fixed</li> </ul> </li> <li>• Strip Seal – Extrusion Embedded in Elastometric Concrete <ul style="list-style-type: none"> <li>17 - expansion</li> <li>33 - fixed</li> </ul> </li> <li>• Strip Seal – Type Unknown <ul style="list-style-type: none"> <li>18 - expansion</li> <li>34 – fixed</li> </ul> </li> <li>• Sawed and Filled <ul style="list-style-type: none"> <li>21 - fixed</li> </ul> </li> <li>• Filled, Elastic Material <ul style="list-style-type: none"> <li>22 - fixed</li> </ul> </li> </ul>	Repair deficient joints to prevent water and chlorides from falling onto substructure elements.

*Notes:* While bridge inspection is only federally mandated for vehicular bridges spanning more than 20 feet, all bridge owners should note that substantial public welfare and financial costs can result from deferred bridge maintenance.

<sup>i</sup>[Herbst, Preventive Maintenance Programs](#)

<sup>ii</sup>[USDOT, FHWA, Bridges and Structures](#)

<sup>iii</sup>[Herbst, Preventive Maintenance Programs](#)

<sup>iv</sup>[Greater Buffalo-Niagara Regional Transportation Council, p. 3](#)

<sup>v</sup>[Greater Buffalo-Niagara Regional Transportation Council, pp. 9-10](#)