NHDOT Bridge Strategy - Definitions

Maintenance & Preservation Bridge Strategy – Getting the most for your investment

Definition – A long term strategy that uses a variety of small- to mid- sized efforts to extend the life of a bridge. Maintenance includes activities like washing and sealing a bridge, cleaning drainage ways, and keeping vegetation controlled. Preservation includes activities like replacing expansion joints, sealing cracks, and replacing the membrane protecting the bridge deck.

Department's Perspective – Like most things, bridges last longer when proper maintenance and preservation work is performed. For each type of bridge, there is a recommended preservation and maintenance schedule that should be followed to get the maximum benefit. Unfortunately, there is not enough money to follow the recommended schedule for all bridges because the NHDOT has a backlog of Red List bridges. Though costing more in the near term, performing regular preservation and maintenance will cost the state less money in the long term.

Rehabilitation Project – Restoring bridges in poor condition

Definition – A one-time project that significantly improves the condition of the major parts of a bridge while keeping the underlying structure in place.

Department's Perspective – A bridge rehabilitation project requires more work than scheduled preservation and maintenance, but does not require a brand new bridge (reconstruction). This work is used when major parts of the bridge need to be replaced, but there is some service life remaining in other parts of the bridge. Because this strategy involves replacing major parts of the bridge, it should only be used when those parts have been used for as long as safely possible. These projects are included in the Department's Ten Year Transportation Improvement Plan.

Reconstruction Project – A new bridge is needed.

Definition – A one-time project that replaces an entire bridge with a brand new bridge.

Department's Perspective – Reconstruction happens when the entire bridge is too deteriorated for a cost effective rehabilitation. This high-cost work has a significant impact on traffic and often requires closures, detours, and / or temporary bridges. While this work cannot be completely avoided, it can be significantly postponed by applying effective maintenance and preservation strategies. Bridge reconstruction should be planned well in advance of when the effort will be needed.

Priority List – Which bridges should we fix?

Definition – A list of bridges, updated annually, that ranks rehabilitation and reconstruction investment priorities based on various bridge characteristics.

Department's Perspective – Each year, NHDOT updates a prioritized list of bridges so that limited funding is put to the best use. NHDOT uses a variety of factors to determine how a bridge is prioritized, including roadway tier, detour length, bridge condition, and the amount of traffic. This list helps determine which bridges are included and when they are scheduled in the Ten Year Transportation Improvement Plan.

Red List – Bridges requiring more attention

Definition – A list of bridges requiring additional inspections and more frequent repairs due to known deficiencies, poor condition, or load restrictions, usually the result of structural deterioration.

Department's Perspective – Over time, the condition of every bridge will deteriorate so that at some point it will be on the Red List due to one or more structural deficiencies. A bridge on the Red List requires additional effort by NHDOT, including two inspections per year, as well as plans to address the deficiency in a timely fashion before the bridge is down posted, closed, or requires special/emergency interim attention. When funding levels are insufficient, this list can grow at a rapid pace.

Structurally Deficient – A backlog of poor condition bridges.

Definition – Any bridge that has deteriorated such that at least one major element (deck, superstructure, substructure) is classified as being in "poor" condition, and thus fails to meet the needs of the highway it carries because of its deteriorated condition.

Department's Perspective – Structurally deficient bridges comprise most of the Red List. Depending on the severity of the deficiency, the bridge's condition may be improved through rehabilitation or reconstruction. When funding levels are insufficient, the number of structurally deficient bridges can grow at a rapid pace, potentially compromising public safety.

High Investment Bridges – The most expensive bridges in the State

Definition – Any bridge, regardless of ownership, that has a deck area (the surface that vehicles drive on) greater than 30,000 square feet or has a lift mechanism.

Department's Perspective – The state has made significant investments in High Investment Bridges (HIBs). In order to get the most out of this investment, NHDOT is developing a separate bridge strategy for HIBs. This strategy will include a detailed maintenance plan and a high priority rating for preservation and maintenance activities. Unlike tiers, HIBs are not based on ownership. While most HIBs are owned by the state, some HIBs are municipally owned such as the Loudon Road Bridge over the Merrimack in Concord.

Costs

All bridge costs are approximate and evolving as data is further analyzed for bridge treatment life cycles and costs. As such, these costs and treatments will change over time and are based on the best available information as of 2014. The associated costs for preservation and maintenance efforts are shown in Table 1 and represent the yearly costs to preserve and maintain state and turnpike owned bridges.

Table 1: Yearly Cost for Bridge Preservation and Maintenance Strategies

Strategy	HIB*	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Preservation and Maintenance Cost	$4,300,000	$7,720,000	$6,990,000	$3,700,000	$1,870,000	$2,070,000
Bridge area *(millions square feet)*	1.9	3.4	2.0	1.1	1.9	0.7

** HIB cost is only for state and turnpike owned structures, not the 9 municipally owned HIB's.*

The associated costs for rehabilitation and reconstruction are shown in Table 2. These are approximate one-time project costs. The costs for rehabilitation and reconstruction are highly variable and are dependent on a number of factors such as the width and length of the bridge, property impacts, traffic control alternatives, and environmental impacts.

Table 2: Average Cost per 2000 ft2.

Strategy	HIB	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Rehabilitation	$200,000	$200,000	$300,000	$300,000	$300,000	$300,000
Reconstruction	$1,300,000	$1,300,000	$1,820,000	$1,820,000	$1,820,000	$1,690,000

Typical Bridge Work Schedule

To get the most out of the initial investment, the state should follow a routine work schedule. While schedules for individual bridges vary depending on geography and type of bridge, Table 3 lists scheduled work efforts for a typical bridge.

Table 3: Typical Bridge Schedule Work Effort.

Category	Work Effort
Preservation / Maintenance	Wash and Oil Every Year
	Crack Seal the Pavement (every 10 years starting in year 5)
	Replace the Bridge Pavement (every 10 years starting in year 10)
	Replace Membrane and Expansion Joints (every 20 years)
	Paint exposed steel, if any (every 20 years)
Rehabilitation	Replace Worn Out Components (year 60)
Reconstruction	Completely Replace Bridge (year 120)

Note: Many existing bridges have not had the recommended maintenance to this point; therefore, they will likely require rehabilitation and reconstruction before 120 years.