



# The Road to Preserving Bridges

By Anwar S. Ahmad, P.E.

State departments of transportation and other bridge owners are faced with significant challenges in addressing the Nation's highway bridge preservation and replacement needs.

According to the National Bridge Inventory, more than 30% of the 600,000 highway bridges nationwide have exceeded their 50 year design life and are in need of repairs and or replacement; more than 25% are classified as structurally deficient or functionally obsolete. This issue is exacerbated by an increase in travel demands, shortfalls in funding, and increasing costs of labor and materials. As a result, it is more imperative now than ever before that cost effective bridge preservation strategies are adopted by the bridge community.

The American Association of State Highway and Transportation Officials (AASHTO) defines bridge preservation as "actions or strategies that prevent, delay or reduce deterioration of bridges or bridge elements, restore the function of existing bridges, keep bridges in good condition and extend their life." Preservation actions may be preventive or condition-driven.

Typically, the term "bridge preservation" is associated with existing bridges. However, bridge preservation actions and strategies should be considered during all phases of a bridge's life, from the initial planning through design, construction, and its service life until the bridge is decommissioned. Considering preservation throughout these stages is essential to maximize the service life and minimize the overall lifetime cost of the bridge.

The Federal Highway Administration's (FHWA) Bridge Preservation Guide (FHWA-HIF-11042) contains some common bridge related definitions, commentaries and examples that can assist bridge owners in developing and implementing a systematic preventive maintenance (SPM) program, which is a major component of bridge preservation. The key steps of an effective SPM program include:

## Establishing Goals & Measures

As with any effective bridge management program, an SPM program should have objectives and measurable goals. This is a key step in the development of a successful program as it serves as a compass for the journey ahead and a mirror that reflects past performance.

Some of the items that are generally considered during this step include:

- Current condition of the bridge inventory;
- Historical condition and funding trends;
- Available resources; and
- Customer & stakeholder input.

## Identifying SPM Activities

This involves the selection of proven and cost effective treatments and activities. Generally, preventive maintenance activities can be classified under two categories: 1) Condition based activities, such as sealing or replacing leaking deck expansion joint material, painting structural steel elements, installation of scour countermeasures, performing electro chemical extractions on heavily chloride contaminated concrete deck, etc.; and, 2) Cyclical activities, such as bridge cleaning, lubricating bearing devices, sealing and waterproofing bridge decks, etc.

Some of the items that are generally considered during this step include:

- Activities that will facilitate achievement of goals;
- Establishing condition thresholds for bridge elements, components, or entire bridge. For example, bridges in overall fair to good condition;
- Bridge material types; and
- Cyclical and condition-based activities.

## Determining Investment Levels

This involves estimating the cost of the work needed to achieve the established program goals. Some of the items that are generally considered during this step include:

- Data currency for bridge condition and unit costs;
- Adequacy and sustainability of funding levels to achieve desired goal(s); and
- Balancing investment levels for preservation and replacement needs.

## Selecting & Prioritizing Work Efforts

This involves selecting and prioritizing qualified projects based on the established program's parameters. Factors such as traffic volumes, detour lengths, risks, safety, etc. can be considered when developing a prioritization scheme.

## Developing & Executing Work Plans

This involves the development and execution of short and long term plans based on established goals and objectives. Key factors that are typically considered during this stage include:

- Availability of funding;
- Resources (in-house vs. outsourcing);
- Environmental restrictions;
- Work zone traffic restrictions; and
- Past plan delivery performance.

Preservation activities often cost much less than major reconstruction or replacement activities. Delaying or forgoing warranted preservation treatments will result in worsening condition and can escalate the feasible treatment or activity from preservation to replacement. The latter will result in extensive work and higher cost. A viable alternative is timely and effective bridge preservation of sound bridges to assure their structural integrity and extend their useful life before they require replacement.

As bridge stewards and owners, we need to become more strategic in our approach to managing our bridge programs, and embrace the concept of bridge preservation as an integral component of the overall management of our bridge assets. Investing wisely in timely preventive maintenance reduces high costs for future major repairs and replacements.

Implementing an effective bridge preservation program calls for appropriate tools and resources. Optimum results are achieved by applying the appropriate treatments/strategies at the appropriate time. ■

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