Bridging the gap: Bridge maintenance and management in the new millennium

Katrina Jones, E.I.T.
Bridge Program Coordinator
Department of Public Works Engineering
Metro Government of Nashville & Davidson County
Nashville, Tennessee

Introduction
Public works departments around the nation have a common responsibility to ensure public safety by infrastructure (buildings, roads, bridges, etc.). Available funding to address all the agency's needs is usually a limited and sometimes scarce commodity, and pieces of the infrastructure (i.e., bridges) are sometimes delayed until the structures become an unavoidable safety hazard. As a result, local agencies have to resort to reactionary measures by addressing the most critical problems in their bridge infrastructure, if they address them at all. This reactionary method can be very inefficient and costly. By adopting a proactive approach to bridge maintenance, an agency can establish a bridge maintenance and management program that will alleviate most of these issues.

Benefits of a proactive approach
The proactive approach lays out a well thought-out, efficiently managed program that allows for more preventive maintenance solutions to problems in the bridge infrastructure. An agency can benefit from this method in several ways. It will:

1. Aid in implementing the Governmental Accounting Standards Board's (GASB) Modified Approach for reporting the bridge infrastructure in governmental financial statements;
2. Provide a basis to elected officials and management for annual bridge maintenance funding;
3. Improve the structural integrity, sufficiency ratings, and overall bridge ratings of a greater percentage of the bridges in the bridge infrastructure which will be reflected in the GASB 34 Report;
4. Direct the program towards preventive maintenance;
5. Significantly reduce major repairs and replacements;
6. Provide cost savings to budget of the community;
7. Allow for more efficient use of governmental resources; and
8. Allow for better coordination with other departments and utility companies.

For some agencies, transforming the way bridge maintenance and management is handled may seem to be a nearly impossible task for many reasons. For others, there may be little to transform, but obtaining the necessary funding is the difficult part. So how do you get there? Evaluate the agency's current bridge program, create a strategic business plan and budget proposal, and finally implement the plan.

Evaluate the current bridge program
First, determine where the existing program stands today, what the overall status is, and what
you have to work with. Start by identifying the current practices related to bridge maintenance and management such as:

- **Policies and procedures relative to the bridge program**: Are they being used? Do they need to be revised or tossed?
- **Codes and standards**: Are they up-to-date? Do they need to be revised or tossed? Are any additional codes needed?
- **Current resource capabilities**: Is the current program using the available workforce and equipment? Is there coordination with other departments and utilities?
- **Current processes of doing business**: Document the workflow processes the agency uses for project implementation, work order implementation, bid processes, etc.

Second, take an inventory of the bridges owned and maintained by the agency. Create or purchase a database or bridge maintenance management software to store the inventory data (if one is not already in place) and populate it with inspection information that is pertinent to maintaining the bridge infrastructure. This will provide a better overall picture of the status of the agency’s bridge network.

Next, determine the status of any existing capital bridge projects. Where are they in the developmental phase (planning, design, right-of-way acquisition, or construction), what is left to be done to complete them, what is the budget, how much is obligated or under contract to a consultant or contractor, how much of that is remaining, are additional funds needed, and does it qualify for state or federal funds?

Finally, determine the overall financial needs of the bridge program that is required to get the program up and running (startup), address the maintenance concerns of the bridge network, and maintain the bridge program on an annual basis.

This process (excluding most of the startup costs) can be repeated with each group of inspection reports, or it can be repeated once all of the deficiencies have been at least minimally addressed. For agencies with larger bridge networks, it may take several years for this to be accomplished, but that's how the momentum of the program can be maintained.

**Create a strategic business plan and budget proposal**
Writing the strategic business plan will not be as daunting as it may seem because the hard work has already been done. A standard outline or format of a business plan may not work for internal government business, but the Executive Summary and the Strategic Plan components of a business plan will be needed.

The **Executive Summary** serves as the cover letter for the entire document. It is the program overview, strategic plan, and budget proposal at a glance, and it should be used to introduce the importance of a Bridge Maintenance and Management Program to the reader (typically upper management and city officials).
The **Bridge Program Overview** is the meat of the document where the specific details of the program are covered and all the findings from the evaluation are identified. It may consist of the following:

*Facts and Assessment* - facts about the bridge infrastructure (i.e., bridges, underpasses, culverts) the agency owns and is responsible for maintaining; assessment of the agency's current business practices related to bridge maintenance and management; short-term and long-term plan.

*Strategic Plan* - background of the current program; identify the vision, purpose, benefits, goals, and objectives; lay out a plan to implement all of the suggested changes from the short-term and long-term plans; specify what has been accomplished with the previous budget(s), what is being done with the current budget(s), and what is planned to be done with the proposed budget?

*Support Data* - tables, charts, indexes, etc., that are used to simplify some of the budget and project information for the reader.

- Three- to Seven-Year Budget Plan (dependent on agency's terms) - A projection of the funding needed to maintain the plan over the next three to seven years.
- Year One Spending Plan - A breakdown of the first year's budget by bridge and any other proposed expenditure.
- Prioritization Process - Identifies how the projects and maintenance jobs will be prioritized.
- Bridge Index - An alphabetical list of the bridges owned and their ranking number based on the way they were prioritized.
- Funding Index - A complete list of the bridges ranked in order of importance according to the Prioritization Process, with estimated total project costs for each bridge and overall program costs by fiscal year.

**Implementation of the bridge program**
Assuming that upper management and your government officials have accepted the Strategic Business Plan and Budget Proposal presented to them, and the requested funds have been appropriated to the new Bridge Maintenance and Management Program, implementation can begin. The following steps can be used to implement the approved plan:

1. Obtain/hire the necessary personnel (bridge engineer(s), staff engineers, consultants, or contractors) needed to accomplish this work.
2. Purchase the latest bridge design, construction, or maintenance codes and standards (including all necessary revisions) relative to the type of bridges owned.
3. Investigate the nature of the work needed on each bridge planned for the first year of repairs, document the findings, and identify the recommended course of action with corresponding cost estimates.
4. Obtain/create a Bridge Management System (BMS) and a Bridge Maintenance Management System (BMMS).
5. Coordinate work with other departments and utilities. Clue them in early in the plan's review process.
6. Create work orders, and assign them to in-house crews or contractor.
7. Monitor the work being done. Document and track quantities, daily activities, and the completed work.
8. Prepare for the next year’s budget.

By using some or all of these components, eventually the Bridge Maintenance and Management Program will reach the desired goal of becoming a proactive preventive maintenance operation.

**Conclusion - future developments**

A proactive preventive maintenance program has one potential downfall from a funding standpoint—everything may get fixed! There will continue to be the normal routine maintenance such as clearing vegetation and debris, replacing damaged guardrails and signs, some concrete repairs here and there, but the bulk of the more serious work will be done. This may reflect as a significant drop in the proposed budget depending on the size of the bridge infrastructure, and you don’t want to give the agency the idea that a continual allocation of funds for bridge maintenance is not needed on a regular basis. So, to keep the momentum going, begin thinking about future developments. Consider adding culverts to the infrastructure owned and maintained. Develop a culvert maintenance and management program if one is not already in place. The same BMS and BMMS can be used to manage those as well, and the process for evaluation, developing a budget proposal, and implementation is similar to what has already been done. After that, the only thing left to do will be to upgrade the Bridge/Culvert program as needed and continue to educate the bridge program staff through training, conferences, and magazines to help the staff stay on top of the latest codes, materials, and maintenance practices.

This article is sponsored by the APWA UPROW Committee. Katrina Jones will be a presenter at the 2006 APWA Congress. Her session is entitled “Bridging the Gap—Bridge Maintenance and Management in the New Millennium” and takes place on Monday, September 11, at 11:00 a.m. She can be reached at (615) 862-8775 or katrina.jones@nashville.gov.