

# Bridge Inspection Frequency

*How Can We Better Utilize Limited Resources?*

By Jennifer C. Laning, P.E.

Bridge inspection frequency is mandated by the Federal Highway Administration (FHWA) metrics in their *National Bridge Inspection Standards* (NBIS) and the *Code of Federal Regulations*. The mandate on a regular frequency of inspection is how we ensure safety. That said, we operate under the current reality of limited resources.

The relationship between frequency and resources is complicated. Resources are not only funding; they also include people and equipment. These all relate to the key components of any project: scope, schedule, and budget. So how do limitations on these resources affect the bridge inspection industry and the decisions we make about inspection frequency?

It is a challenge. When seeking to reduce the demands caused by already limited resources, there must be a way to change the inspection frequency so that resources can be applied elsewhere. We cannot make cost a justifiable reason to extend or reduce frequency due to the high priority for safety. However, safety is often a basis for changing the frequency to shorter timeframes. Frequency can be affected by a decrease or worsening of the condition state (i.e., a rating of “4” results in more frequent inspections) or the presence of certain elements (i.e., Fracture Critical Members (FCM) results in more frequent inspections). While it is justifiable to change inspection frequency because of the poor condition of the bridge, the frequency should not be stretched based solely on a good condition rating; some circumstances increase deterioration or affect the condition that would go unnoticed or unmonitored in the between-inspection timeframe.

It is also essential to consider how the availability of people and equipment impact the industry. Availability is often the critical path for inspection plans, so stretching the frequency would ease the demand on staff resourcing as well as the tight demand for available access equipment. There are notable limitations throughout the industry caused by the lack of qualified people to perform inspections. Longer frequencies would also potentially ease the impacts to the traveling public since bridge inspections typically require lane closures or restrictions.

What if we look at a risk management concept to develop informed decisions for justifying stretching out the frequency? Frequency change all boils down to trying to manage risk (i.e., bridges in poor condition are inspected more often, for example). In 2009, the author participated in a paper proposing a basis for evaluating the risk for bridge management. In this proposition, the paper looked at three things: condition, exposure (what the bridge might experience, like deicing salts or proximity to an industrial area), and importance (is the bridge on a critical route or in a rural area). By looking at not only condition but also the hazards a bridge might be exposed to and how critical the bridge is to the overall system, the risk can be better understood. Note that there are undoubtedly similar risk management propositions currently being studied, so this is an example. However, the author does propose that thinking along these lines is the best way

to make educated and informed decisions about frequency, which subsequently can directly impact the cost of performing inspections as well as other limited resources.

Inspections are essential and, in the author’s personal experience, decisions have been arrived at based on inspection findings

that ultimately saved lives or preserved structures. However, we can better utilize the resources we have to prioritize the structures that should receive our attention. There has been a considerable improvement in formalizing processes for prioritizing infrastructure preservation investment, but we must decide on how to evaluate priorities on the inspection side. There needs to be a common baseline, and risk management tools are a way to get there. The decades of information that we have been collecting about our bridge infrastructure can be utilized to help make these decisions and preserve not only the infrastructure itself but be more efficient with our limited resources.

Other thoughts for improving how we do business in bridge inspection include ideas such as utilizing more innovative technologies like drones, using non-destructive evaluation for decks, and placing more consideration on the inspectability of signature or complex structures during construction (e.g. adding catwalks and tie off points and ensuring structures can be accessed with commercially available equipment). Furthermore, we need to do more to expose engineering students to NBIS when in college, making people aware of the importance of NBIS to public safety and that it exists as a career path within civil/structural engineering.

The goal for the industry should be to consider bridge inspection within the larger lens of how we can take the information provided and make smart decisions on more effectively using resources to preserve bridge structures and keep the traveling public safe. ■



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