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## Crumbling bridges: Now is the time to take action

Convergence of new federal transportation funding flexibility and innovative contracting and construction approaches herald better days for America's deteriorating bridges

As 2015 came to a close, the federal government finally enacted legislation that provides long-term funding for America's transportation system. The Fixing America's Surface Transportation Act, despite having its critics, was a welcome development for many infrastructure owners who had endured a decade of frustrating funding uncertainty spawned by a long string of short-term funding extensions.

Media headlines understandably focused on the federal money the FAST Act would provide: an authorization of \$305 billion over fiscal years 2016 through 2020 to pay for various highway, bridge, rail, public transportation and safety programs. Deeper in the Act's details, however, were substantial policy changes that encourage greater innovation among state and local leaders responsible for ensuring bridge safety and performance.

### Keeping bridges safe – many unique challenges

Nearly 60,000 bridges across the country have been rated as "structurally deficient," the worst of five possible ratings, according to the 2015 National Bridge Inventory. These bridges, representing about 10 percent of all the nation's bridges, are in desperate need of repair. In some cases, deficiencies are visible and readily apparent, which is why public outcries and media coverage tend to focus on crumbling concrete or rutted bridge decks. Yet, more often, bridge deficiencies are invisible to everyone but engineers and, left unaddressed, these hidden problems inexorably increase the risk of asset failure while elevating the complexity and cost of future remedies.

As a consequence, bridge owners have long had to grapple with complex practical, political and financial factors when

deciding how best to maintain, repair and replace bridges. What's more, they've been constrained by federal transportation rules that linked bridge funding to highly prescriptive contracting, engineering and construction processes. Now, with the passage of the FAST Act, many of those constraints are being loosened in an effort to accelerate innovation and reduce unnecessary costs.

Specifically, the FAST Act has increased the availability of two key strategies that can help states proactively address deteriorating and dangerous bridges while achieving an optimal blend of efficiency, creativity and technical excellence. These strategies, combined with enhanced funding options targeted specifically to bridges, make this the right time to take action.

### Bridge bundling – the power of scale

The first such strategy is bridge bundling. With the FAST Act, states are now encouraged to bundle multiple bridge projects into one larger project, which can then be awarded as a single contract. This authorization may be used to aggregate a specific set of projects or to undertake a statewide bridge improvement program.

With bundling, bridge owners can gain several advantages:

- **Simplicity:** They negotiate and manage one large contract for a collection of bridge projects, rather than dozens – or even hundreds – of contracts focused on individual, discrete projects.
- **Savings:** Large projects attract greater attention from major contractors, who compete aggressively to formulate a winning bid at an attractive price.

- **Efficiency:** When bridges are bundled, engineers can analyze their characteristics and design standard elements to be mass-produced, while builders can deliver economies of scale relating to materials, equipment and know-how.
- **Speed:** Winning contractors can hire a range of subcontractors – ready to begin work in communities where the bridges are located – to quickly ramp up construction while benefiting from standardized bridge elements and knowledge from other projects.

One example of the power of bridge bundling is found in Missouri, which in the fall of 2008 launched an ambitious \$685 million program to improve or replace 802 bridges statewide within five years. The 554 bridges slated for replacement were bundled into a 2009 mega design-build contract – the first of its kind in the nation – with a joint-venture contractor comprising national industry players. With an aggressive target completion date of December 2014, the contractor tackled the project by engaging, among other firms, more than 100 Missouri contractors and subcontractors, which lowered costs and boosted local knowhow. Such efficient sourcing, combined with collaboration and economies of scale unprecedented in bridge rehabilitation programs, contributed to the 554 bridges being replaced a full year early – and under budget.

#### **Accelerated bridge construction – harnessing creativity**

The FAST Act also includes reforms for accelerating bridge project delivery, thus reducing costs of bridge replacement projects, among other benefits. Specifically, it allows for the second of our two key strategies, called accelerated bridge construction, a relatively recent development in how cities and states plan and execute bridge replacements.

At the core of ABC is the acknowledgement that traditional processes for bridge replacement can take a significant amount of time and adversely impact social and economic wellbeing in nearby communities. Replacing a heavily used span over a river, for example, might traditionally demand that the existing bridge be closed and removed, and then a new bridge built in the same location – a process taking years. Meanwhile, commuters would have to log many thousands of extra miles and endure delays due to detours and congestion, commercial transportation efficiency would suffer, and emergency services could be hamstrung. On the job site workers would spend more months exposed to construction and vehicular risk, while opportunities for labor and material cost overruns would also increase.

By contrast, ABC can bypass many of these issues. Rather than adhere to a traditional, sequential approach, ABC allows a range of activities to be performed concurrently and in controlled environments to more efficiently design, procure, prefabricate and erect replacement bridge systems. In most cases, the replacement bridge is created offsite, then transported to the final location and secured in place. Construction is faster and the replacement activity itself can happen in as little as a few days, or even hours.

To understand what ABC makes possible, consider the case of the Lake Champlain Bridge, an 80-year-old structure that had to be closed down in October 2009 when irreparable pier cracking was discovered below water level. People living on the New York and Vermont sides of the bridge were suddenly faced with the need to navigate an 85-mile detour to access

work, services, family and friends, and emergency services. Initial engineering estimates projected a five-year process to replace the bridge.

The bi-state owners of the bridge, eager to hasten the return of this critical asset, turned to their private-sector partners for a creative solution. In just weeks, rather than the typical year, HNTB serving as their engineering partner offered a plan for a bridge design featuring a center arch span that could be built off-site at the same time the bridge's approaches were being constructed. New York and Vermont agreed to pursue the plan, and work began. In August 2011, barely two years after preliminary engineering began, the center arch span was floated in, lifted into place and attached. Soon, the new bridge was in service, connecting communities once again.

#### **Time for analysis and action**

The combination of greater FAST Act bridge funding and incentives to use new, innovative delivery strategies are making this the best time in decades for infrastructure owners to make headway with long-delayed bridge improvements and replacements.

As a first step, owners should work with partners to analyze existing at-risk bridges and prioritize those that can offer the most immediate returns on investment. Like any form of asset management, this requires a process that is thorough, objective and driven by the most comprehensive data available. Analysis looks beyond the simple answers to uncover the most important priorities. For example, a structurally deficient bridge that carries 50,000 vehicles a day might initially seem a more urgent priority than one carrying just 5,000. Yet, perhaps the second bridge is a critical crossing for school bus traffic, ferrying a hundred buses filled with children every day. Factoring such differences into the asset management process enables more clear-eyed decision making and eases the process of explaining priorities to a broad range of stakeholders.

The mandate for improving America's bridges is strong. And, now, federal funding and policies are better aligned to achieve quick progress. This is no time for delay – our bridges aren't getting any younger.

#### **About the Author**

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