

Deliver on the Promise of Life-Cycle Cost Analysis: Mandates Proven Not to Work; LCCAs Need Improved Data Resources to Save Money

As Congress prepares to reauthorize the FAST Act, the proper role of life-cycle cost analysis (LCCA) is frequently discussed. An LCCA, when performed correctly, is an economic decision-support tool used by transportation agencies to help identify the most beneficial and cost-effective project alternatives. While the benefits of LCCA for improved decision-making and potential cost savings are well documented, beyond its application in the pavement design process, the use of LCCA on infrastructure projects is varied and limited. Simply mandating LCCA will not solve the problem. In 1995, states were ordered to conduct LCCA and Value Engineering Analysis for every National Highway System (NHS) project costing \$25 million or more. The mandate was removed in 1998 because states could not meet the requirements¹.

Instead of mandates, NAPA supports federal legislation and policies that focus on:

- Strengthening existing use of performance evaluation in the planning process;
- Tying funding to performance to encourage and incentivize state and local agencies to use existing tools, including LCCA, to optimize performance;
- Ensuring consistent and accurate data for use by states and local agencies; and
- Funding education for conducting and implementing economic analyses.

As noted by the ASCE/Eno report² and a Transportation Research Board report³, ***the major inhibitor for expanding LCCA use in transportation infrastructure is the lack of quality data – a critical input for LCCA.*** Real data based on local conditions, materials, and experiences are essential for an accurate and unbiased LCCA. The literature and case studies consistently point to the lack of quality data as a significant barrier to the effective use of LCCA.

Relying on generalizations and estimates will provide incorrect and unrealistic results, which will negatively impact project delivery times and siphon funds from already limited agency budgets. LCCA requires many predictions and estimates — initial prices, quantities, maintenance, rehabilitation, the time-value of money, and more. A change in any one factor can significantly change the result, which makes LCCAs inherently malleable. While the accuracy of any prediction spanning decades is questionable, with bad data, bad predictions are a certainty. This is an important concern because bad infrastructure decisions on the front end can limit flexibility in the long-term.

¹ American Society of Civil Engineers (ASCE), Eno Center for Transportation, [Maximizing the Value of Investments using Life Cycle Cost Analysis](#), 2014

² Ibid.

³ NCHRP Synthesis 494, [Life-Cycle Cost Analysis for Management of Highway Assets](#), 2016

Rather than require a new unfunded federal mandate on the states, there are better ways to ensure Americans get the best infrastructure value for their investment. ***What is needed are better data resources for agencies to carry out LCCAs effectively and accurately.***

Improved data resources are needed to determine service life under different loadings and in different climates, predict maintenance and rehabilitation, estimate user delays, and evaluate options when uses change or materials must be replaced or recycled.

Recognizing this challenge, NAPA strongly supports the creation of data collection standards and retention policies for this sorely needed data. LCCA is a complex, data- and labor-intensive process that must be performed using statistically valid, transparent inputs to be effective. Therefore, NAPA calls on Congress to include the following provision in the next reauthorization bill:

LIFE-CYCLE COST REDUCTION — *In order to most effectively reduce the life-cycle cost of transportation infrastructure in design, construction, maintenance and operations, the Federal Highway Administration (FHWA) must lead in addressing the greatest challenge to performing effective life-cycle cost analysis (LCCA): the lack of resources to collect and maintain high-quality data on costs, maintenance, deterioration, user costs, service life, and salvage value. FHWA is directed to update its LCCA guidance to ensure agencies appropriately apply LCCA for highway infrastructure with accurate input data. Congress also directs FHWA to establish a data registry clearinghouse for extraction and analysis of data for use in LCCA.*

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Accelerated Research on the Potential for Recycling Plastics in Asphalt

In late 2018, media reports and online networks began generating an interest in the possibility of using recycled plastic waste in asphalt mixtures. The idea was marketed as an opportunity to simultaneously improve the quality of asphalt pavements and solve the problem of growing piles of waste plastic in cities and towns across the U.S. While magazine articles and videos have trumpeted potential positive impacts of using recycled plastic modified (RPM) asphalt, such as increased service life and reduced need for oil-derived polymers to modify asphalt binders, and while preliminary research suggests some of these benefits maybe realized, a full set of research to confidently back these claims is lacking.

The current waste plastic crisis is a critical concern; however, there is equal concern about the current state of the U.S.'s aging transportation infrastructure. Investment in maintenance, improvement, and expansion of transportation infrastructure in the U.S. must focus on delivering long-lasting, high-performing pavements as cost-effectively as possible. Any action taken to change the way an asphalt mixture is designed, produced, and constructed must demonstrate through independent, third-party research that there will be no negative impact to pavement performance or unintended consequences that could impact the health safety of plant operators or construction crews. If that can be demonstrated, RPM will serve as a mutually reinforcing solution; helping to bolster the recycling of plastics as well as improve performance of the transportation infrastructure.

A systematic accelerated research program designed to answer critical questions regarding long-term performance, health and safety, plant emissions, binder aging, construction and production best practices, and re-recyclability of RPM asphalt mixtures should be implemented. NAPA recognizes the current challenges associated with plastic waste and believes establishing a well-funded, comprehensive, accelerated research program led by the U.S. Department of Transportation that brings together all the stakeholders is the most effective and expeditious way to evaluate the long-term performance and feasibility for widespread adoption of RPM asphalt mixtures as a solution to creating a much needed end market to support the expansion of plastics recycling.

Sec. ###. **Accelerated Research on the Potential for Recycling Plastics in Asphalt**

- (a) *IN GENERAL.* —The Secretary shall conduct research for the purpose of evaluating the use of Recycled Plastic Modified (RPM) Asphalt Mixtures.
- (b) *ACTIVITIES.* —In carrying out subsection (a), the Secretary shall—
 - 1. seek input and guidance from, and work in collaboration with, the asphalt pavement and plastic industries, American State Highway and Transportation Officials, state Departments of Transportation, and academia;
 - 2. evaluate the effects of RPM asphalt mixtures on long-term pavement performance, emissions, binder aging, plant and construction operations, and re-recyclability;
 - 3. utilize experimental test sections at test tracks and accelerated loading facilities to quickly gain an understanding of long-term performance for RPM asphalt mixtures;
 - 4. enter into cooperative agreements with institutions of higher education and non-profit organizations for research and technology deployment; and
 - 5. conduct demonstrations and open houses of technologies incorporating RPM Asphalt Mixtures.
- (c) *REPORT.* —Not later than 1 year after the date of enactment of this Act, and annually thereafter, the Secretary shall submit a report to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report on the status of the research conducted under this section.
- (d) *FUNDING.* —From amounts authorized to carry out the Highway Research and Development Program, the Secretary shall use not less than \$2 million for each of the fiscal years 2020 through 2026 to carry out this section.

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Reauthorize the Accelerated Implementation and Deployment of Pavement Technologies Program

Background

The Accelerated Implementation and Deployment of Pavement Technologies (AID-PT) program, established under MAP-21, advances the latest innovations, best practices, and technologies for constructing and maintaining high-quality, long-lasting pavements. According to Thomas D. Everett, Federal Highway Administration (FHWA) Associate Administrator for Infrastructure, "This [AID-PT] program is vital to FHWA's mission."¹

The AID-PT program focuses on research and implementation of select pavement technologies that have an immediate potential to benefit our infrastructure and the nation's highway users. The program aims to implement, deploy, demonstrate, showcase, support, and document the application of ready-to-use concrete and asphalt pavement material technologies and practices that will yield performance enhancements to improve mobility on the nation's highways. Since its inception, the AID-PT program has resulted in meaningful and cost-effective strategies that have benefited road owners, the traveling public, and taxpayers as well as both pavement industries.

Request

The member companies of the American Concrete Pavement Association (ACPA) and the National Asphalt Pavement Association (NAPA) support the reauthorization of the AID-PT program. We would also ask that Congress consider a modification that would encourage collaboration with government and academia. Specifically, we are proposing that 23 U.S. Code § 503(c)(3) be amended as follows:

SEC. ___ TECHNOLOGY AND INNOVATION DEPLOYMENT PROGRAM.

Section 503(c)(3) of Title 23, United States Code, is amended—
in subparagraph (C) by striking "2016 through 2020" and inserting "2021 through ___"

SEC. ___ TECHNOLOGY AND INNOVATION DEPLOYMENT PROGRAM.

Section 503(c)(3) of Title 23, United States Code, is amended—
(1) in subparagraph (A) by adding "*To accomplish the goals outlined in subparagraph (B), the Secretary may enter into cooperative agreements with institutions of higher education and non-profit organizations.*"

ACPA and NAPA have co-developed this language with the intent of strengthening the deployment features of the AID-PT program. This language would encourage the FHWA to lead a coordinated effort to advance knowledge and practices in pavement-related issues. In order to ensure that innovations developed in research are deployed in the field, it is very important to continue the exchange of ideas and interactions among Departments of Transportation, industry, academia, and FHWA throughout the life of the AID-PT program. This is only possible when government, industry, and academia collaborate across the entire innovation process.

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¹ [Accelerated Implementation and Deployment of Pavement Technologies 2017–2018 Annual Report](#), Federal Highway Administration, 2018



Enhancing Worker Safety During Roadway Construction

Purpose

This proposal will help protect workers and motorists from injury and death during roadway construction projects through the use of innovative contracting methods that enhance work zone safety. Specifically, state transportation agencies would be able to employ an innovative contracting mechanism to create a safety contingency fund to implement work zone safety enhancements that are not foreseen during the project planning and design stages.

Issue

On average, over the past three years, 135 occupationally related roadway construction work zone fatalities have occurred annually <<https://www.workzonesafety.org/crash-information/work-zone-fatal-crashes-fatalities/#national>>. The majority of these incidents were the result of third-party/distracted-driving intrusions into the work zone. During the same time-frame, an additional 600 fatalities occurred annually within roadway construction or maintenance work zones. While motor vehicle fatalities within a work zone have decreased slightly for the driving public over the last decade, injuries and fatalities of road construction workers have increased slightly during the same time period. Roadway construction work zones are dangerous places to work, and inattentive behavior on the part of drivers makes them even more dangerous.

As the U.S. Federal Highway Administration (FHWA), state departments of transportation (DOTs), and private sector construction contracting firms have sought to improve worker safety through the use of improved temporary traffic control provisions, one impediment remains constant — funding. In a low-bid roadway construction contracting environment, work is often awarded based on the lowest cost proposal that meets minimum agency specifications and requirements. The primary challenge for stakeholders arises when the contractor and agency realize that enhanced safety equipment or practices are needed beyond those originally specified in the bidding process. This can occur if mandatory work zone requirements are deemed unsatisfactory once road construction or maintenance begins, necessitating changes.

Unfortunately, at present, no federal funding mechanism is available to accommodate these types of modifications to an existing contract, and DOTs may be reluctant to

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approve such changes once a contract is accepted, if additional project-specific funds are not available to offset the cost of necessary increased safety measures.

Recognizing this shortcoming, the Texas Department of Transportation (TxDOT) has developed an innovative contracting method for road construction work projects whereby a “safety contingency fund,” an amount incidental to the roadway construction project’s total budget, is set aside to cover the cost of needed enhancements to ensure roadway work zone safety

<https://www.udot.utah.gov/main/uconowner.gf?n=28162109449105546> (starting on slide 9)>. The TxDOT safety contingency fund is typically 2–5 percent of the original engineer’s estimated total project cost; the percentage depends on the size of the project and is mutually agreed upon by the state and the contractor.

The road construction industry calls on Congress to encourage states to explore the use of such innovative contracting methods, which can mitigate or eliminate the funding barriers often associated with incorporating enhanced work zone safety measures. In particular, states should establish road construction safety contingency funds for all projects.

Solution

Title 23 of the United States Code, Section 120, Subsection (c)(3)(B), provides several examples of Innovative Project Delivery, including those that use innovative procurement and contracting procedures, and provides for an increased federal share payable up to 100 percent for innovative projects. This section should be amended to specifically include innovative project delivery methods that improve work zone safety for motorists and workers. Add as follows:

In general. — Section 120(c)(3)(B) of title 23, United States Code is amended by adding at the end, the following clause:

“(vii) contractual provisions that provide safety contingency funds to incorporate safety enhancements to work zones prior to or during roadway construction and maintenance activities.”

This amendment would add the establishment of a safety contingency fund to enhance work zone safety as a further example of an innovative project delivery technique that would improve safety for workers and the public.

