Photo: PCI.

Technique is Cheap

William Nickas, *Editor-in-Chief*

In the Winter 2014 issue of *ASPIRE*™, Dr. Henry Russell commented in his editorial about specifications related to concrete materials and designing for service life. The editorial caused several readers to comment on the need for better service life prediction models for structures and their materials. In my Spring editorial, a futurist helped set the tone for the benefits of extending our thinking and moving beyond our engineering and construction constraints. In this issue, we want to continue to think in the future tense.

The Perspective in this issue is by Dr. Ben Graybeal of the Federal Highway Administration. In it, he examines the motivation for much of the past research on concrete materials. Given significant progress in the past several decades, Graybeal cautions of the risk to not engage the research community in a new level of challenges. He concludes by proposing four key topics that he sees as ripe for a strategic investment of research capital. Read his article beginning on page 10.

I took notice of an article about an avalanche of debate created by a statement by Harvey Littleton at a conference in 1972. Littleton is the son of Dr. Jesse T. Littleton, renowned director of research for Corning Glass Works and inventor of Pyrex glassware. Littleton commented, "Technique is cheap." To calm the debate, Littleton later stated, "All I meant by that is technique is available to everybody, that you can read technique, if you have any background. Technique in and of itself is nothing. But technique in the hands of a strong creative person takes on another dimension."

Strong creative engineers together with experienced and talented contractors can reshuffle the deck on how bridges are developed and delivered. Such teams create concepts for alternatives from which the best evolve to meet the requirements of a project. The challenges can be a large program of bridges for a state such as we've seen in Missouri or Pennsylvania or just a single off-system bridge found in every community in the nation.

These system approaches often introduce new levels of complexity. When bridges are built in the traditional way—piece by piece—the construction sequence allows some relief and redistribution of stresses during assembly. Complex systems approaches can lock in stresses during construction, which together with restrained thermal movements, may introduce significant stresses in the structure. One of Graybeal's proposed research topics involves this issue.

We have many techniques available to us to address the challenges created through today's more sophisticated structural demands and solutions. As Littleton said, "… technique in the hands of a strong creative person takes on another dimension."

Concrete is the ideal material for the nation's infrastructure. It is capable of assuming practically any shape. Today's materials technology allows superior durability and longevity. And still, we are finding astonishing new ways of refining the materials and new methods of construction such as

- hardening vulnerable locations like girder ends and pier caps under expansion joints,
- utilizing compressed concrete in vulnerable locations to increase long-term durability,
- providing multiple levels of protection in the newest post-tensioning systems,
- integrating use of high-performance and ultra-high-strength materials at connections, and
- layering technologies using resilient, impermeable materials at the riding surface so that bridge decks can reach a 100-year service life even on salted northern highways.

Let's dare to dream. As Graybeal concludes, "Visionary research can propel us through another century of concrete innovation."

American Segmental Bridge Institute

Epoxy Interest Group

Expanded Shale Clay and Slate Institute

Portland Cement Association

Post-Tensioning Institute

Precast/Prestressed Concrete Institute

Cover
The Putnam Bridge in Washington County, Ohio, is a testament to the timeless aesthetic of concrete bridges. For more information on Washington County's bridges, see the feature on page 38.
Photo: Julia David, Barr & Prevost.

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