



Photo: PCI

SUBSTITUTE MATERIALS

William N. Nickas, *Editor-in-Chief*

In 1941, when the president of the United States launched the Lend-Lease program to transfer, sell, or lease war goods to U.S. allies, American management and labor were asked to increase production. Stories about the wartime shortages of aluminum, steel, and copper are well known, but did you know that shellac was also rationed? Only 30% of the shellac produced at 1941 levels could be consumed domestically in 1942. The remainder was reserved for the military, which needed it for phonograph records and radio transcription.

So, where did I run across this historical recap? After my mother passed away a little over a year ago, my brother and I started clearing out our parents' home, where we discovered her keepsakes. In a cabinet, we found a copy of the April 18, 1942, issue of *Business Week* addressed to her grandfather. This magazine gives insight into the war-machine build-up effort, and it also demonstrates how timeless some materials are in terms of resiliency. A theme in this particular publication concerning substitute materials is among the topics that continues to have relevance to today's construction industry.

In the magazine, the wood industry touts that, largely due to adhesives, plywood could be used to build planes. An advertisement proclaims that, "after a half century trend away from wood," the industry had overcome the challenges of rot, termites, and, to a great extent, fire through the use of modern wood preservatives. The ad highlights the use of creosote, chromatic zinc chloride, and other chemicals as "wolmanizing" (preservation) techniques. The same magazine discusses a "strange mineral" that works as an insulating material for mounting electrical apparatuses. The article expresses the potential, once the war is over, to expand the use of ebonized asbestos.

Other stories in the same issue cover labor and factory worker shortages. Steel was scarcer than gold, and portland cement was advertised to be a substitute material for the construction of badly needed war factories. Cement and glass had been featured previously in the magazine, but this issue includes a Portland Cement Association advertisement offering resources to improve and extend the use of concrete, a material that exemplified fire safety, great sturdiness, low maintenance, and thriftiness. I find it fascinating that, 75 years later, many of the same benefits of concrete are still being promoted today, and are increasingly linked to the concept of resiliency.

Time has a way of sorting out which structural materials are the most advantageous. While I am not sure that creosote and asbestos can be considered time-tested materials, concrete and steel can. We have reported in *ASPIRE*SM [Spring 2017] on how many bridges have been built with concrete, steel, and, yes, wood, as reported by the Federal Highway Administration. Concrete has earned a commanding advantage.

Today, construction materials are not being rationed due to a war, but our industry is being closely scrutinized by sustainability experts. Structural materials need to perform under increasing demands related to more severe and frequent weather events. The American Society of Civil Engineers is attempting to assess this evolution of performance qualities through an assessment system by the U.S. Resiliency Council (USRC). The USRC system has three aspects: *safety*, *repair costs*, and *recovery time*. Among other things, resiliency reminds me to include all aspects of potential repair and recovery actions for the in-service bridge to create an accurate life-cycle cost analysis. **A**

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Cover

The Veteran's Memorial Bridge over the Neches River opened in 1991 as the first cable-stayed segmental concrete bridge in the Texas and the state's first design-build project. Photo: Williams Brothers Construction.

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