For the project, the Louisiana Transportation Research Center (LTRC) handled the mix designs, testing, and evaluation. Arcosa Lightweight provided the lightweight aggregate for the ICC, which in turn was used to build two of the five bridge deck spans, one guardrail wall, and one approach slab.

INTERNAL CURING PROVES VALUE ON LOUISIANA BRIDGE

From an engineering perspective, Mitch Wyble really likes what he sees when he assesses the value of internally cured concrete (ICC), a concrete mixture where a portion of the fine aggregate is replaced with similar sized prewetted lightweight aggregate (LWA).

Wyble first encountered ICC a few years ago while serving on the Technical Committee of the Concrete and Aggregates Association of Louisiana (CAAL).

"After researching ICC through other states and other entities, I pretty much knew in my mind that it was a win-win for Lafayette Consolidated Government," says Wyble.

As a past CAAL Technical Committee member, Wyble also knew that the Louisiana Department of Transportation & Development (LADOTD) was investigating ICC's potential for state projects. "I suggested we use internal curing on this particular bridge," says Wyble, "knowing that it wouldn't cost us any more than what the bid was for the typical cast-in-place concrete option."

For the project, the Louisiana Transportation Research Center (LTRC) handled the mix designs, testing, and evaluation. Arcosa Lightweight provided the lightweight aggregate for the ICC, which in turn was used to build two of the five bridge deck spans, one guardrail wall, and one approach slab. The approach slab is 10' X 30' while each bridge deck span is 20' X 30' and 16 inches thick, according to Dennis Kilborn Technical Sales Representative for Arcosa Lightweight.

"The goal was to demonstrate the ICC's value and monitor its performance over time," says Kilborn, who adds that project completion was made easier due to the use of ICC. "Evidently, the concrete sand being used was less than ideal in terms of grading. The replacement of a portion of the sand with lightweight sand that was a little coarser in gradation had the effect of improving the performance of the combined fine aggregates, allowing the concrete to be finished more easily and with less hand trowel work."

GOAL: REDUCE CRACKING

Tyson Rupnow, Ph.D., P.E., Associate Director of Research at LTRC, says the Congress Street Bridge project originated based on LADOTD's goal of reducing the cracking severity on its bridge decks. "ICC helps reduce cracking, thus allowing us to increase the service life of our deck structures and reduce overall maintenance costs," says Rupnow. "And while we expect it to take nine months to a year to show any major cracking patterns, so far there have been no signs of such activity."

Calling ICC a “great tool for bridge engineers and designers,” Rupnow says if the process helps extend bridge service life and strength, then it should be looked at more closely for upcoming projects. That’s already happening, he says, noting that the successful West Congress Street project has already prompted Lafayette Consolidated Government to build another, 150-foot-long bridge plus barrier rails out of ICC.

“They liked what they saw,” says Rupnow. “In the words of the contractor, producer, and engineers, ‘it looks just like regular concrete.’”

Wyble says he knew early on that ICC would be a winning option for the LADOTD – even though the material had yet to be tested by the department. In fact, Wyble’s not surprised at all that the end result was extremely positive. “The job came out beautifully,” says Wyble. “To date, we haven’t seen a single crack in that bridge.”