



## Excerpt from: PRECAST PUSHES THE LIMITS OF SCALE

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By Bridget McCrea

### Precast enables rapid dam construction

Elsewhere in the state, and armed with a \$1.7-million grant from the U.S. Department of Energy, Bill French of Billerica, Mass.-based French Development Enterprises LLC set out to create a dam that incorporates non-traditional construction methods with off-site manufacturing and on-site installation. Calling his development “The French Dam,” he wanted to make the entire dam production and installation process both “just-in-time” and weather-independent.

FDE’s patented technology for rapid dam construction was also funded through the Massachusetts Clean Energy Center.



**“The French Dam” includes six 27,000-pound precast concrete blocks interconnected to form a 24-foot-long, 16-foot-high monolithic structure. *Photo courtesy of Oldcastle Precast.***

The 24-foot-long, 16-foot-high prototype was designed by GEI Consultants of Woburn, Mass., and Oldcastle Precast of Littleton, Colo. It comprises six 27,000-pound precast concrete 8-foot-by-8-foot-by-8-foot blocks interconnected with each other, forming one monolithic structure. A modular precast impoundment for construction and retrofit of hydroelectric dams, water control systems and powerhouses, the product was assembled on-site in less than four hours, even with a heavy rainstorm occurring during installation.

“Building on Massachusetts’ long history of innovation, this investment advances inventive technologies and strengthens renewable energy infrastructure that powers the Commonwealth with clean resources such as hydropower,” said MassCEC Interim CEO Stephen Pike (2). “By modernizing our energy infrastructure, we are capitalizing on investments that produce cost reductions and economic growth to benefit residents across Massachusetts.”

### **Precast: The material of choice**

Bob Kramer, Oldcastle’s vice president of marketing and product development, said French approached his team with the idea of using precast modular components to build hydroelectric dams. Kramer added that French wanted to build a prototype to commercialize the concept. Oldcastle served as a design-manufacturing partner on the project.

Working with a civil design consultant, a dam expert and other members of FDE’s cross-functional team, Oldcastle spent about a year developing the dam prototype and experimenting with different manufacturing, assembly and connection iterations.

“The main driver was how to manufacture and create mechanical connections that would be suitable in the environment of what’s known as a small head dam,” Kramer said. “So that’s what the team did.”

For example, one condition of the federal grant dictated the manufacture and assembly of the modules in a way that would ensure watertightness and the ability to withstand the hydrostatic pressures. This was in addition to being able to unbolt, remove and replace a piece, if necessary.

“Collectively, we created a design and were successful in building up a prototype that satisfied the requirements of the federal grant,” Kramer said.

### **Dam of the future?**

In total, Oldcastle produced six modules. All were of identical dimensions inside and out and manufactured from rigid steel forms to extremely tight manufacturing tolerances. The specifications weren’t unusual for the precaster, although Kramer said that if the dams were



to be commercialized at some point – and then scaled up to make fully assembled, working dams – the project magnitude would increase exponentially.



**Members of the project team hope to commercialize the dam and scale up for real-world implementation in the future. *Photo courtesy of Oldcastle Precast.***

“The product could be used to replace existing spillways, and would be particularly useful for municipal-owned dams that have fallen into disrepair,” said Kramer, noting that there are more than 80,000 non-electric-producing dams in the U.S. “These need to be retrofitted with a quick-fix, low-cost, high-impact solution.”

*Bridget McCrea is a freelance writer who covers manufacturing, industry and technology. She is a winner of the Florida Magazine Association’s Gold Award for best trade-technical feature statewide.*

## **Endnotes**

(1) [cseengineermag.com/prototype-of-modular-precast-french-dam-completed/](https://cseengineermag.com/prototype-of-modular-precast-french-dam-completed/)