Take Advantage of Precasters' Expertise

Contractor-alternate design, new casting and erecting techniques help meet growing challenges as owners tap into full range of precasters' knowledge and skills

by Heinrich O. Bonstedt, Central Atlantic Bridge Associates

The Ashcom Cove Creek Bridge in Bedford County, Pa., consists of five 120-ft-long precast concrete bulb-tee girders and a total-precast concrete structure. Photo: PennStress.

In highway and bridge construction, a continuum of options and variations exists that impact each stakeholder, including owners, designers, contractors, and suppliers. Taking advantage of all of the skills and knowledge of each member of the team ensures the creation of a high-performance structure that is efficient, cost-effective, quick to complete, and aesthetically pleasing. In many cases, offering a "contractor-alternate design" approach achieves this goal.

In this format, contractors can supplement the owner's design effort. It allows contractors to adjust the plans to take advantage of new techniques and their own skills and equipment to optimize the design at the lowest possible bid.

Contractors offer the logical choice to maximize efficiency in the design and construction. They have traditionally taken the lead in value engineering and engaging design professionals. Providing this option allows the contractor to provide extensive preconstruction services, such as estimating, value engineering, and constructability review, and they can then manage and create a comprehensive integration of supply channels. Further, the contractor assumes the risk and liability for defects and related problems.

Using the contractor-alternate design approach ensures the contractor can take full advantage of the knowledge of the precaster and other key subcontractors, leveraging their techniques and state-of-the-art facilities to maximize efficiency and design. This factor can be significant, as long delays can occur between design completion and bidding, locking projects into approaches that have been much improved in that interval.

Precasters are skilled at value-engineering projects after designs are available, and the contractor-alternate design approach maximizes those adaptations by bringing the precaster into the process earlier.

BIM Aids Designs

The use of three-dimensional building information modeling (BIM) software ensures precasters can consider every option and every possible component configuration to produce the most efficient design in terms of piece count, sizes, weights, and other factors. This works especially well with total-precast concrete designs, where all the components can be fit together comprehensively and supplied by one source, minimizing communication problems.

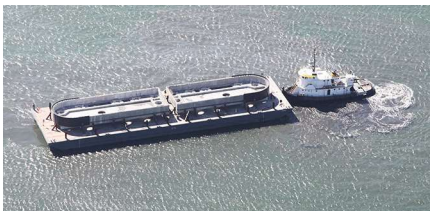
An example can be seen in the Ashcom Cove Creek Bridge in Bedford County, Pa. The bridge features one span of five 120-ft-long precast concrete bulb-tee girders and a total-precast concrete structure, including footings, piers, abutments, and deck panels with integral parapets, all designed and evaluated with BIM software. The changes reduced traffic detours from 7 months to 8 weeks and saved more than $125,000. The new version provided a one-for-one replacement of the original cast-in-place concrete design, maintaining similar connections with few adjustments.

Bridges for Life™

Precast concrete designs also can help owners improve durability and lower long-term maintenance costs. Precast concrete continually adapts with new concrete mixtures and new casting techniques that create longer lasting designs with lower life-cycle costs. As a highly engineered product, precast concrete continues to develop higher strength and more durable concrete as precasters test new materials and practices.

Such factors as self-consolidating concrete, lightweight concrete, cementitious formulations, pozzolan concentrations, improved reinforcement coatings, high-performance grout, and prefabricated welded-wire reinforcement are increasing the capabilities of precast concrete at an increasing rate.

The Federal Highway Administration's (FHWA's) Every Day Counts initiative



Barging of the precast concrete components that were used to construct the 3.1-mile-long Tappan Zee Bridge in New York. The precast concrete open-footing tubs were set on drilled shafts and filled with concrete to create the bases for the bridge's piers. Photo: Bayshore Concrete.

Workers place precast concrete abutments for the Ashcom Cove Creek Bridge. Photo: PennStress.

encourages accelerated bridge construction (ABC), and precast concrete designs offer many techniques to assist in ABC. Fabricating precast concrete components in a controlled, high-quality plant produces fast, efficient construction that allows work to progress as the site is prepared and keeps the site clear of congestion. Those elements create an efficient, safer environment that reduces contractor risk while speeding up construction and reducing user costs.

An example can be seen in the total-precast concrete design for the September 11 Memorial Bridge on Route 70 in Ocean and Monmouth Counties, N.J. The goal of the New Jersey Department of Transportation was to use as much precast concrete as possible to simplify the architectural concept and minimize the duration of in-water construction. The bridge was built with precast concrete pier cofferdams, columns, cap beams, and bulb-tee girders. (For more on this project, see the Fall 2009 issue of *ASPIRE.*™)

Total-Precast-Concrete Designs

The desire to speed construction is leading more designers to select more precast concrete components, leading to total-precast-concrete solutions. This understanding has taken some time to develop. Some designers that rely on traditional methods haven't realized the capabilities available to design substructure elements as precast concrete components.

The 3.1-mile-long Tappan Zee Bridge in New York, at $3.9 billion, is the largest bridge-construction project in state history. It features many precast concrete components, from precast concrete deck panels on top down to 60 precast concrete open-footing tubs for the foundations. The tubs sit on drilled shafts and are filled with concrete to create the bases for the bridge's piers. The precaster provided proof of longevity with concrete testing and continued testing throughout the casting cycle.

CABA Members Innovate

Such techniques can be provided by any of the members of the Central Atlantic Bridge Associates (CABA). Founded in 1957 as the Prestressed Concrete Association of Pennsylvania (PCAP), the group promotes the use, application, and technical development of prestressed concrete.

A total-precast concrete design was used for the September 11 Memorial Bridge on Route 70 in New Jersey, which maintained the architectural concept and minimized the duration of in-water construction. Photo: Aurora and Associates P.C.

PCAP was the first regional marketing organization to advance and market prestressed concrete for bridge designs. The association and its members have helped bring to market many technical improvements and refinements of standards. Products it helped refine are being used throughout the central Atlantic region of Virginia, District of Columbia, Maryland, Delaware, and New Jersey.

Owners, designers, and contractors can take full advantage of the technical skill and detailed knowledge available from CABA's members to create efficient designs. Using contractor-alternate designs, bringing the precaster onto the project early in the design phase, can ensure every innovation is employed to create a cost-effective, quickly constructed, and aesthetically pleasing structure.

CABA Members

To learn more about the benefits of working with precast concrete designs, contact any of the members of CABA:

- Bayshore Concrete Products
  (www.usa.skanska.com)
  (757) 331-2300
- Jersey Precast Corp.
  (www.jerseyprecast.com)
  (609) 689-3700
- Northeast Prestressed Products
  (www.nppbeams.com)
  (570) 385-2352
- PennStress, a division of MacInnis Group LLC (formerly Newcrete, a division of New Enterprise Stone & Lime Co.
  (www.pennstress.com)
  (814) 695-2016

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