Proposed AASHTO Standards for Segmental Bridges Represent a Growing Market for the Precast Concrete Industry

Eugene C. Figg, Jr., P.E.
President
Figg Engineering Group
Tallahassee, Florida

Eugene C. Figg, Jr. is founder and president of the Figg Engineering Group (FEG). For the past 20 years, FEG has been a leader in the design of cost effective and aesthetically pleasing prestressed concrete bridges in North America. Currently, the firm has bridges in design or construction inspection worth more than $1 billion in construction costs. FEG and its clients have received more than 100 design awards from various organizations including PCI. In particular, three Presidential Design Awards from the National Endowment for the Arts stand out for Linn Cove Viaduct (1984), Sunshine Skyway Bridge (1988) and Natchez Trace Parkway Arches (1995). Currently, Mr. Figg is serving as president of the American Segmental Bridge Institute.

With the introduction of AASHTO-PCI-ASBI Standards for precast segmental concrete bridges, this is an opportune time for the precast concrete industry to more fully enter this growing market.

Precast, prestressed concrete girders and other precast products are currently used very widely and successfully for many of the nation's bridges. They are an economical solution to many bridge projects and are also very durable; hence, they have low life-cycle costs.

Despite this steady market, there are many bridge projects in which precast segmental construction would be advantageous. This is a multi-billion dollar industry that needs to be exploited.

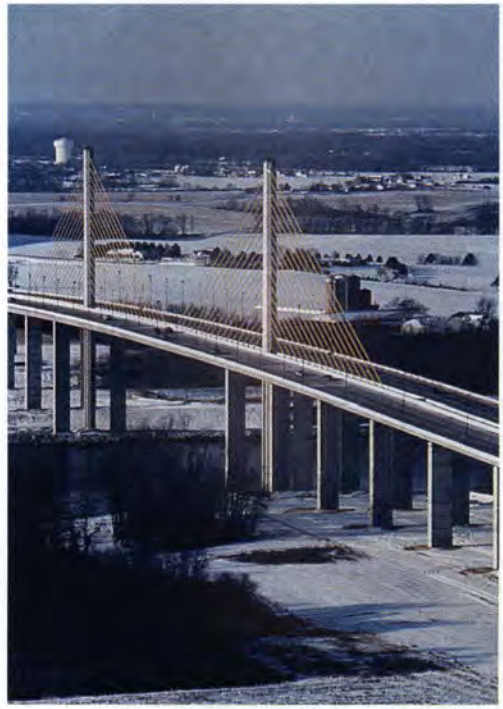
Currently, only a few precast producers are occasionally involved in segmental construction. The country needs more established precasters producing segments for concrete segmental bridges. Precast concrete segments represent a large and expanding market that can increase the precast industry's total production. Also, unlike typical concrete girder bridges, concrete segments comprise the entire cross section, including the deck. This results in a larger portion of the total project that can be supplied by precast concrete producers.

High curvature and longer span bridges are not easily accommodated with conventional prestressed concrete girders. However, high curvature ramps with longer spans, typical of modern urban interchanges, are an ideal application for the torsionally stable box girder sections associated with precast segmental bridges. Therefore, this large and important sector of bridge projects becomes a viable market for precast product suppliers.

The good news is that a joint committee of the Precast/Prestressed Concrete Institute (PCI) and the American Segmental Bridge Institute (ASBI) has established Segmental Box Girder Standards that were accepted as a 1997 ballot item by the AASHTO Sub-Committee on Bridges and Structures in Jackson, Wyoming, on June 12, 1997,

Note: This article is based on an editorial that appeared in the ASBI Newsletter, July 1997.

Delaware's award-winning Chesapeake & Delaware Canal cable-stayed bridge combines a dramatic visual statement with an economical design. The all-precast segmental bridge has a 750 ft (229 m) main span. Designer: Figg Engineering Group; Precast Prestressed Concrete Manufacturer: Bayshore Concrete Products Corporation.



as AASHTO-PCI-ASBI Standards. In the past, nearly all items accepted for ballot have been approved in the formal balloting that takes place in the Fall. PCI played an important role in developing these standards.

Standardization of the sections allows reuse of forms for multiple projects. This should be a tremendous incentive for the precast/prestressed concrete industry. Now, segmental box girders become an economical solution for smaller bridge projects such as grade separations. The use of segmental construction for these projects introduces further benefits inherent to segmental bridges. Segmental spans can be erected very quickly, typically in a few days, minimizing disruption of traffic. Box girders offer outstanding aesthetics and, with public involvement becoming more common, aesthetics can frequently become a primary objective.

Segmental columns represent an additional product that the precast industry can benefit from producing. For example, Bayshore Concrete Products of Cape Charles, Virginia, produced all the column segments for the $58 million Chesapeake & Delaware Canal Bridge at St. Georges, Delaware, completed in December 1995, and barged the product to the site.* Bayshore also produced all of the superstructure segments, including those for the 150 ft (46 m) approach spans and the 750 ft (230 m) cable-stayed main span.

Similar to segmental superstructures, precast segmental columns can be erected very quickly [up to 100 ft (30 m) per day], providing an additional time benefit and saving money. (There was a $6 million savings for the C&D Canal Bridge as built by Recchi America, Inc. in precast segmental construction vs. the steel design.)

Precast segmental bridges provide owners with superior durability and lower life-cycle costs. The decks of these structures, precast integrally with the sections, are prestressed in two directions to prevent cracking, thus precluding the primary avenue for chloride penetration that initiates corrosion. The segments have the further advantage of being precast using high strength concrete in a climate-controlled factory setting, preventing any possibility of adverse quality impact from inclement weather.

In conclusion, precasting of segmental concrete bridge sections, both superstructure and substructure, represents an expanding and viable market for the precast concrete industry. As established precasters add precast segments to their line of standard products, it provides benefits to owners as segments become more readily available for smaller bridge projects. Thus, segmental bridges become a highly durable, economical and aesthetic solution for more bridge projects. So, it is now incumbent on the precast concrete industry to begin producing these standard sections and to more fully participate in the promotion, design, and construction of segmental concrete bridges.

* See the article "The Chesapeake and Delaware Canal Bridge — Design-Construction Highlights" by Denney Pate, PCI JOURNAL, V. 40, No. 5, September-October 1995, pp. 20-30.