The Woodrow Wilson memorial bridge is truly a new icon in a city of monuments. The $680 million project replaces an outdated bridge carrying I-95 across the Potomac River connecting Maryland and Virginia at the southern tip of the District of Columbia. It is a vital link on I-95 and the Capital Beltway (I-495), the circumferential freeway surrounding the core of the Washington metropolitan area. The new state-of-the-art structure eliminates one of the nation’s worst traffic bottlenecks. The 12-lane bridge has separate local and express lanes, and capacity for future mass transit expansion. It also contains America’s largest movable span.

The previous bridge had a vertical clearance of only 50 ft, but its drawspan over the Potomac River’s navigational channel allowed larger marine vessels access to Washington, Alexandria, and other points north of the bridge. The decision was made to build new drawbridges rather than a higher fixed-span structure because many commercial, navy, Coast Guard and recreational vessels on the river require high clearances. A fixed bridge would have required a vertical clearance of 135 ft.

The previous double-leaf bascule span bridge opened an average of five times per week. The new drawbridge is about 20 ft higher than its predecessor, reducing the number of bridge openings each year from approximately 260 to less than 60.

This monumental bridge is packed full of innovation and is a trailblazer in the land of leaders. The engineering elements are amazing. This was a stimulus package before there was a need. The number of jobs created was incredible. It is an elegant, visually stunning bridge with good lines that enhances the surrounding architecture.

—Jury Comments
girder distances vary for different leaves, ranging from 35 ft to 40 ft, 6 in. The typical floor beam spacing is 20 ft, 9 in. and stringer spacing is kept under 6 ft. Girders and floor beams are welded I-shaped members, and the stringers are rolled sections. Bolted connections are used throughout the span.

In all, 16 bascule girders are required. These girders are very large, with webs varying in depth from nearly 12 ft at the toes to 20 ft in the vicinity of the turnnions, and with 28-in.-wide flanges that range between 1½ in. and 4 in. thick. The overall length of each girder is 215 ft. To keep girder segments within sizes and weights that could be fabricated and to provide shipping and erection options, the girder design included two field splices. Each bascule girder weighs between 350 tons and 400 tons.

Approach Spans
The approaches on each end of the bridge consist of two continuous units, with 13 individual spans on the Virginia side and 19 spans on the Maryland side. They use haunched plate girders having a depth of 11 ft, 9 in. at the support points and 6 ft, 10 in. at midspan. The parabolic shape was developed to provide the continuous curved line of the V-pier and the superstructure varies with the span length.

The variable-depth girders in conjunction with the V-shaped piers provide the arch-like appearance that was desired in order to be visually similar to the other great bridges in the capital city. The plate girder spans vary from 100 ft to 209 ft. This variation in span length is due, in part, to the height of the structure above the ground surface. Plate diaphragms support the substringers and provide a clean appearance from the historic park below the bridge.

The plate girders were designed as hybrid girders. They were primarily fabricated from ASTM A709 Grade 50 steel, but some flanges used Grade 70 HPS steel to minimize the plate sizes, reduce girder weight and minimize constructed cost.

Co-Owners
Maryland State Highway Administration, Baltimore
Virginia Department of Transportation, Chantilly, Va.

Designer
Parsons, Baltimore

General Contractor (bascule)
American Bridge (AISC/NSBA, IMPACT and TAUC Member)/Edward Kraemer & Sons (IMPACT Member) Joint Venture, Coraopolis, Pa.

Detailer (bascule)
Tensor Engineering, Indian Harbour Beach, Fla. (AISC/NSBA and NISD Member)

Consulting Engineer (bascule superstructure design)
Hardesty & Hanover LLP, Annapolis, Md.

General Engineering Consultants
Potomac Crossing Consultants, Alexandria, Va.

Fabricator – Virginia Approach
Williams Bridge Company, Manassas, Va. (AISC/NSBA Member)

Fabricator/Detailer – Maryland Approach
High Steel Structures Inc., Lancaster, Pa. (AISC/NSBA and IMPACT Member)

Thirty-four million pounds of structure move to clear a ship through the eight-leaf bascule arrangement on the Woodrow Wilson Memorial Bridge over the Potomac River.