AESTHETICS COMMENTARY

by Frederick Gottemoeller

A major part of the visual impact of haunched box girder bridges is created by the interaction of two basic structural decisions. The first is setting the ratio of the girder depth at the haunch to the girder depth at midspan. The second is establishing the slope of the webs. The most noticeable visual aspect of the girders—the three-dimensional curves of their bottom edges—are a geometric result of those two decisions. The greater the depth ratio and the greater the slope of the webs, the more pronounced those curves become, and consequently the more memorable the structure.

Two of the completed cantilevers highlight the curves of the structure.

Obviously, considerations of structural efficiency, constructability, and the geometric interaction of the two factors themselves limit how far one can go. The U.S. Route 460 Phase I Connector over Grassy Creek and Route 610 has found a good balance. The curves are strong enough to catch the eye. In so doing, they make the bridge visually interesting while illustrating the flow of forces in the structure. The girder is thickest above the piers, where intuition says the forces will be greatest.

The split piers at pier 4 provide another element that engages the viewer. From most angles, they seem thick and robust. But from straight on, where the void between them is evident, they almost disappear. As a viewer moves around a structure the alternation from solid to slim is breathtaking. Concrete box girder bridges constructed in balanced cantilever are at their most dramatic at that moment when the cantilevers are done but not yet connected. The immense girders seem balanced on toothpicks. With split piers, that is indeed the case.

Engineers know the forces involved and the strength of the materials involved and so take all of this in stride. But to non-engineers, it is a kind of magic. In a sense, split piers draw back the magician's veil and show how the trick is done. Engineers will be forgiven if they do that more often.