run on plates attached to the towers to maintain the transverse and longitudinal position of the span as it is raised and lowered. The span joins at the primary (vehicle) resting level with a standard finger joint. Openings allow the tower rails to pass through the span and continue down to the railroad level. At that point, a plate with mitered rails connects to the tracks. It was challenging to detail this configuration because joints usually are not designed to have tracks pass through them and continue below.

Cost Efficiency of Precast Concrete Towers

Precast concrete was chosen for the towers after all possibilities were evaluated. This option was most efficient and cost effective because all the equipment and setup needed for erection, post-tensioning, and epoxy joining for the tower segments were already on site for the precast concrete segmental superstructure.

Each tower consists of 21 precast concrete match-cast segments. Tower segments were cast at the project site using standard segmental concrete match-casting procedures. Forms were stripped from wet-cast segments and moved into place to serve as a match-cast segment. After the first three segments were erected and adjusted to the proper line and grade, a 3 ft starter segment was cast below to establish the baseline erection geometry. This was necessary to begin erection of the tower segments. The match-cast precast concrete tower segments needed to be placed on top of the cast-in-place footing. To ensure the correct starting geometry, the segments were erected on temporary supports and properly adjusted, with a short closure pour between the precast concrete tower segments and the cast-in-place footing. Erection geometry was monitored and adjusted as necessary to maintain erection tolerances. The towers were capped with a precast concrete tower cap with cast-in-place concrete topping.

Jeffrey S. Folsom, P.E., is assistant bridge program manager with the Maine Department of Transportation in Augusta.

AESTHETICS **COMMENTARY**

by Frederick Gottemoeller

The Sarah Mildred Long Bridge is an impressive bridge that meets a set of complex functional requirements while achieving a high level of visual quality suitable for its location within an area that encompasses two historic cities and an attractive natural setting. Meeting both the functional and aesthetic requirements of the project within a reasonable budget required innovation in layout, design, contracting arrangements, and construction. That the design, construction, and client team was able to meet all of these requirements so successfully is a credit to all involved.

Projects with this kind of functional complexity often have a corresponding and unattractive visual complexity. The old bridge was an example of that type of design. On the new bridge, concrete segmental construction offered a solution to the aesthetic challenges. On the spans, it allowed for fewer piers and simplified the appearance of the girders. On the towers, it eliminated the usual cross bracing and concealed the lifting equipment. At the same time, the haunched girders, which are deeper at the piers where the forces are the greatest, and the solid towers, rising from a massive base, provide an impression of great strength. This impression is reinforced by the simple but robust modulation of the concrete piers.

There is also a kind of delicacy at the tops of the towers, which taper to reveal the counterweight sheaves. Because the sheaves are a visual feature, the design conveys that the bridge is meant to move. The sheaves are round, and things that are round rotate. Why else would they rotate but to lift the center span? Finally, the vertical strips of tower windows that show the counterweights moving are visual compensation to drivers stuck in the traffic backup as a ship or train passes through the crossing. Sarah Mildred Long would indeed be proud of the bridge bearing her name.