Pier 5 Fender Replacement

on the I-10 Mississippi River Bridge

by Richard Potts,
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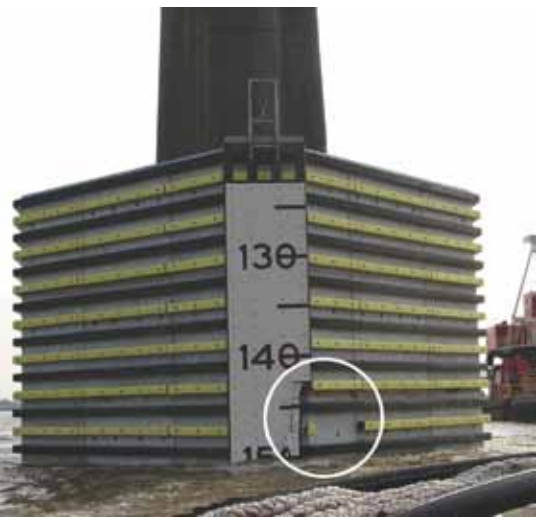
The I-10 Mississippi River Bridge Pier 5 fender nearing completion.

The project involved removal of the existing steel and timber fender system protecting Pier 5 on the I-10 Mississippi River Bridge, East Baton Rouge, La., and replacing it with modular concrete open cell box system. The innovative concept was the selection of a sacrificial precast concrete box for the fender system in a zone of heavy ship impact. You might say they were thinking outside the box.

Minor damage at the lower corner of the fender during construction was repaired by replacement of the attached marine timbers.



The original bridge construction was completed in 1968. The Pier 5 caisson was capped with a distribution block, forming a shelf to support the fender system. The fender protects a sub-shaft between the top of the caisson and the pier columns. Beginning 19 ft below the water surface and extending to 45 ft above, the fender completely surrounds the pier and was installed in five tiers. Pier 5 supports the bridge's 1235-ft-long main span over a 500-ft-wide shipping channel. The design impact loadings are a six hopper barge column, or a three tanker barge column, or a ship of 100,000 deadweight tonnage traveling at 10 mph.

Precast concrete modules for this project are large cellular boxes stacked to create a fender wall. Of the 138 modules, 100 were side modules, 20 were corner modules, 10 were nose modules, and eight were supplied as replacement sections for future collision repairs. All modules were required to be cast prior to beginning erection. Composite marine timbers manufactured from recycled plastic and reinforced with fiberglass were attached and coal tar epoxy applied prior to loading on barges. The perimeter dimensions of the largest box are 14.5 ft by 10.7 ft by 12.8 ft. The heaviest weighed 86 tons before timber attachment.

The vision for this unique concept was developed by Paul Fossier, project manager for the Louisiana Department of Transportation and Development and design engineers Zolan Prucz and Buck Ouyang with the New Orleans office of Modjeski and Masters. The general contractor was Weeks Marine in Cranford, N.J. The precast concrete was supplied by Standard Concrete Products in Mobile, Ala.

A modular precast concrete box allows the section to be erected with vertical alignment guides. It is gravity supported on the distribution block and braced for impact by concrete fill between the back of the precast unit and the face of the pier shaft. The open cell at each joint between boxes is filled with concrete to distribute shear and anchor a tieback. The mass of the system and remaining open cells allow for controlled crushing of the boxes to absorb and deflect a major impact. A minor impact would have damage limited to replacing marine timbers at the surface. This was demonstrated during construction when Pier 5 was struck by a commercial barge just off center at the pier nose. The minor damage was repaired by replacement of the marine timbers.

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A corner module being slid into place for the Pier 5 fender.