



Courtesy J. David Williams and Williamson Pounders Architects

Making Waves

By Louis R Pounders, FAIA, Adam T. Brown and Beth S. Pollak

A new park on the Mississippi River in Tunica County, MS features a visitors center and a floating dock that make extensive use of exposed HSS.

Prior to the construction of the Tunica RiverPark in Tunica County, MS, there was little opportunity in the county to view and experience the Mississippi River. Today, the park provides a harbor, visitor center and nature exhibits. Exposed structural steel provides a creative and attractive frame for a welcoming space that highlights the river and its history.

The park is located at River Mile 699 on the Mississippi. Because the 168-acre site is subject to periodic flooding, the building and parking areas were raised to elevation 214.0, one foot above the 100-year flood level. The curving harbor, dredged out of the existing riverbank (providing fill for the building pad), shelters a 300'-long custom-designed floating steel dock that accommodates excursion riverboats and small pleasure craft. Three 80'-tall steel towers anchored to concrete foundations secure the dock, which rises and falls with the changing river levels. A 200'-long steel HSS truss gangway bridge, hinged to accommodate the dock's vertical movement, provides

access. A large fountain is a gateway into the park.

The 37,000-sq.-ft visitors center is a two-story steel-framed building that showcases the life of the river. The building includes administrative and public spaces overlooking the river and a two-story Mississippi River museum organized around a central atrium space. The museum features interpretative exhibits focusing on the relationship between the delta, its wildlife, the levee system and the economic impact of the river on the region. The overlook structure or "sail," the iconic feature of the building, is framed with a curving horizontal truss attached to vertical three-dimensional trusses and veneered with perforated aluminum panels. The sail is visible from the park entry and for miles up and down the river. The four-story-high observation platform within the sail structure provides spectacular vistas of the river and its wetland environment.

An outdoor Nature Experience exhibit adjoining the building includes nature trails and interpretative information about the wetland environment of the



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The floating steel dock rises and falls with the river level. A 200'-long hinged HSS truss gangway connects the dock to dry land. (Photo courtesy TetraTech, Inc.)

river. Landscaping and interpretive forms like levees and earth mounds describe the historic flood levels at this location, and wind sculptures decorate the park.

The park's architecture is strongly influenced by exposed structure. Steel columns, trusses and struts were painted white, reflecting nautical imagery; a red accent beam and the building's corrugated metal skin, rendered in silver, blue and black, relates to the colors of navigation buoys, riverboats and commercial towboats. The curving steel space-frame arc at the entry plaza, light poles, trellis structures, bollards and steel handrails reinforce the contemporary marine aesthetic.

Floating Dock

For scheduling reasons related to the rise and fall of the Mississippi River, the first structural elements that had to be designed and installed were the mooring structures for the dock, which are a trio of three-sided vertical towers of welded 18"-vertical and 8"-diagonal round members. These towers are anchored to the bottom of the harbor on massive pile caps that were constructed within coffer cells. The round shapes were used to allow smooth movement of the dock (which can fluctuate as much as 50' vertically with the Mississippi River) against the towers and to help keep silt and other debris from building up on the towers when submerged. The mooring towers were, in a sense, the structural anchor for the project and set the theme for the structural "style" of the rest of the facility.

The mooring towers were designed to resist massive lateral loads, as they are designed to not only moor the dock in a 12 mph current, but also to resist the

impact of large river-cruise vessels that might be docking in up to 60' of water.

Signature Sail

The visitors center's "sail" entry structure required an innovative structural solution. The primary challenge was achieving lateral-load resistance. The sail structure is wrapped in a perforated aluminum skin, giving it a transparent appearance. It is also completely open to the sky. The sail shape is formed by a series of rolled girts wrapping around vertical truss towers, which are slender versions of the mooring towers. The aluminum skin and girts are too slender to be relied on as structural elements, and bracing was not desired between towers. This, coupled with the lack of a roof diaphragm, made achieving lateral-load resistance quite difficult. The solution was to construct a large horizontal truss at the level of the viewing platforms that transfers lateral load to the stair tower and south wall of the building. The towers cantilever vertically well past the horizontal truss, and the truss itself must transfer much of the lateral loads through horizontal cantilever action, resulting in significant torsion at the stair tower. This allowed for the transparency and openness that was desired—the horizontal truss is concealed largely by the viewing platforms that it supports and the bracing is hidden within the stair well and building walls.

Gangway Design

The main challenge for the gangway was not the span, but accommodating the 50' vertical range of movement that can occur as the dock follows the river stage. The support on the dock was

designed as a hinge and the support on the shore was designed as a hinge/roller capable of accommodating up to 3.5' of longitudinal movement. The hinging action was accomplished by custom-designed bronze sleeves with annular grooves for lubricant, and the longitudinal movement was accommodated using a custom "railroad car" design.

Construction Sequencing

Construction on the site work began in Spring 2001, with final completion of the building in fall of 2003. The mooring structures were fabricated in Louisiana and trucked to Memphis where they were installed. The barge was fabricated in Indiana and floated to Louisiana. The barge superstructure was fabricated in Memphis and shipped to Louisiana where it was erected on the barge. The gangway was then floated with the barge up-river to the site where both were installed in a matter of hours. The gangway was installed using two cranes—one on shore and one on a barge.

Now that the park is open, the \$24-million project provides an interactive opportunity for visitors to experience the Mississippi and to understand the role that the river has played in American national heritage.

The project is a merit award winner in the \$10 million or greater but less than \$25 million category of the 2004 IDEAS awards.★

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Engineering Software

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