

Storm solution

Rapid production of new modular bridge units enabled a vital link in the US to reopen at full capacity in a matter of months



At the end of August last year, Hurricane Katrina crossed the State of Florida on a path toward the Gulf of Mexico, leaving in its wake several deaths and flooding. But as it continued over the warm waters of the Gulf it intensified into a category five hurricane - the highest on the scale - with winds exceeding 255km/h. On 29 August, it made landfall on the USA again, this time between the cities of New Orleans in Louisiana and Biloxi in Mississippi. As it came on shore the storm was rated as a category four, causing severe damage up to 120km east from its centre.

As it passed over New Orleans, the surge created by the storm undermined and flooded the levees, which are the main line of flood defence for the city. Many parts of the city were flooded to depths of up to 7m. Thousands of people were displaced, many died, and hundreds of thousands found themselves without electric power, clean water, communications, and other fundamental elements of infrastructure. The same storm surge also hit the main cross-country highway Interstate 10; a vital road that connects the east and west coasts of the United States. As the surge collided with the I-10 bridge across Lake Pontchartrain, it ripped the concrete spans from the concrete piers, dislodging some of them to the south and completely washed others away into the lake.

The devastation was widespread and paralysing. The State of Louisiana made it a priority to reopen this critical highway, since the link was urgently needed to support the massive recovery and rebuilding effort that had to take place. The DOTD very quickly organised specifications and bid documents and invited a list of pre-qualified contractors to bid. Within one day of receipt of bids the US\$30.9 million contract was awarded to the low bidder Boh Bros, a local contractor based in New Orleans.

The contractor began immediately mobilising staff and equipment, but at the same time as Boh Bros was mobilising, the company also had the daunting task of relocating its main corporate headquarters to Baton Rouge, as its New Orleans headquarters was completely flooded.

Work began on the eastbound bridge first. Many sections of this bridge had been dislodged, displaced or destroyed, and the approach taken was similar to that used on the Escambia Bay Bridge in Florida following Hurricane Ivan (*Bd&E issue no 38*). The contractor and the state's engineers quickly determined which spans were repairable and could be used; then spans which had been dislodged were realigned by placing barges under them, raising the spans by ballasting the barge, then lowering the barge to replace the span in its correct position. For those spans that were too badly damaged, Boh Bros used undamaged spans from the westbound bridge as replacements. Efficient implementation of this plan allowed the eastbound

Left: The repaired bridge with modular elements in place

Right: Installation work under way

bridge to reopen 17 days ahead of schedule, carrying one lane of traffic in each direction.

However, this meant that the westbound bridge was now missing many of its 19.8m spans and the DOTD approached the Florida state DOT to ask whether it could use 1.5km of the state's Acrow bridging that was stored in Oviedo. Florida maintains the bridge inventory for use on its highways when faced with both non-

emergency and emergency applications. However, after discussions with Florida, the DOTD decided instead to buy new Acrow 700XS bridges so that after their use, Louisiana state would be able to hold the bridges in stock and have them available for use in emergencies or as permanent crossings.

The state transportation department intends to go out to tender for the construction of an entirely new bridge later this year, to replace both the east and westbound structures. The new bridge is on a fast track design schedule and is planned to be a high-profile structure. Once it is complete, in about three years' time, the Acrow bridges will be removed and put into storage for future use.

Through Boh Bros, the state bought Acrow 700XS bridge units from Acrow Corporation. Acrow instructed its partner company, Milton Steel, to carry out a 24-hour, seven day a week manufacturing operation at its factory in Pennsylvania to meet the order. Acrow also asked other team members, such as V&S Galvanizing, to increase to a 24/7 manufacturing operation.

Acrow's engineers worked directly with DOTD in Baton Rouge to design and detail the units for the I-10. The existing pier caps needed modifications and the engineers worked together to develop all of the necessary details.

Acrow began shipping the units to New Orleans directly from its storage yards in the USA and Canada. The balance of the steel bridge components that were not in stock were manufactured. As the steel components arrived Boh Bros assembled them into spans on top of existing concrete spans, with Acrow's engineers on site monitoring and guiding the quality of assembly. Once a few spans had been assembled, Boh Bros lifted the multiple spans with a single crane pick and placed them on to a barge. The barge and the crane were then transported to the appropriate location and the spans would be placed into the final position. This process took approximately 70 days to replace all the missing spans.

Final touches on the westbound bridge were put into place between Christmas day and the new year; all of the assembly was finished, guide rails were installed and road markings were put down. The bridges arrived from the factory with an aggregate finished deck and therefore Boh Bros did not need to allocate precious time to apply an asphalt overlay. The westbound bridge was reopened to traffic on 5 January 2006 ■