

The Contractor's

FRIEND

Florida Bridge and Transportation works hard to solve problems for contractors in Florida

Submitted by Florida Bridge and Transportation

Who do you call when you have a pile out of tolerance or other non-conforming construction? What about when you have a cost- or time-saving idea on your construction project that must be submitted to the owner for approval?

"We do a lot of design work for contractors," said Mark Niedermann, president of Florida Bridge and Transportation (FBT). "We design bridges all day long for the state and other clients within traditional contracts, but the really challenging projects are when we get phone calls from contractors asking us how we can help them reduce time and costs on their projects, or

how we can help them resolve an issue with non-conforming construction. That is when we get to really stretch our ingenuity."

He went on to say, "Often, we have to really sharpen our pencil and use sophisticated analysis techniques to achieve the contractors' goals. Some of our clients jokingly call us 'the cleaners' because we make their problems go away. Naturally, our solutions are based on solid engineering principles, and we never sweep things under the rug. Most of the time we determine the as-built construction is acceptable and can remain



as-is, or it can remain in place with little modification to meet the intent of the original contract plans. However, sometimes we have to deliver the bad news and tell the contractor the retrofit is going to be quite expensive."

Niedermann says it really bothers him to make that phone call to the contractor to deliver bad news.


"We enjoy being the cleaners, and we hate it when the only resolution is expensive."

That scenario happened recently on a mile-long bridge project across the

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“We have a very good understanding of how to save time and money. A significant portion of our revenue is derived from redesigning other engineers’ work to make it more economical given the contractors’ equipment and abilities.”

— Mike Hebert, Vice President, Florida Bridge and Transportation



FBT checked the foundation and substructure design for a runway expansion project.

Photo courtesy of
Mark Niedermann



FBT designed the cofferdam for the repairs to this historic swing bridge over the St. Mary's River

Photo courtesy of Mark Niedermann

Everglades. It was determined through dynamic testing during the pile driving that one of the piles must have crushed at the tip while driving through the dense limestone. Ultimately, the issue had to be resolved by driving two new piles perpendicular to the intermediate bent at the damaged pile to form a cross in the pile cap in order to support the load at the damaged pile.

"Typically, we can use the results from the dynamic testing to determine what load the pile can carry through skin friction above the damaged area, then perform calculations that show the particular pile will not receive more load than it can resist," explained Niedermann. "The required pile loads in the plans are for the worst-case location, and other piles within that bent will never experience that maximum load. Through sophisticated analysis techniques, we can prove that a very small amount of movement in the pile cap will shed the load to the adjacent piles. That is the benefit of the inherent redundancy in driven pile foundations. You can't achieve that result as often with drilled shafts due to the lack of redundancy, and the reduced number of foundation units within a given substructure unit."

Who they are

FBT is a civil engineering consulting firm that specializes in the design of transportation-related structures. They have been in business since 2005, and are located in Orlando,



FBT designed the temporary trestle and the bridge replacement at CR 245 over Olustee Creek.

Photo courtesy of Leware Construction Company

FBT redesigned a 400-foot-long bridge as a value engineering change proposal.

Photo courtesy of Mike Hebert

Fla. They are in the center of the state, but they cover the state from Key West to Pensacola.

"We enjoy traveling to the coastal projects. We always travel with our fishing poles in case our part of the project finishes early," said Mike Hebert, vice president of FBT. "All joking aside, being centrally located has worked out very well for us that

we can take on projects anywhere in the state with a quick response time."

FBT has a total of seven employees, most of whom are registered professional engineers. Their employees gained valuable experience working on challenging mega projects while at large national and regional firms prior to joining FBT.

"It is the best of both worlds," said

Hebert. “We have the experience base of the large national firms, but we have the agility of a small firm. This enables us to make decisions on the spot. We don’t have to get clearance from the home office in another state.”

This flexibility has factored into their significant success as a company.

“Not all of our design work is addressing non-conforming construction,” said Hebert. “We have redesigned many bridges and structures through the value-engineering process as a change proposal. That is another benefit of doing so much work directly with contractors. We have a very good understanding of how to save time and money. A significant portion of our revenue is derived from redesigning other engineers’ work to make it more economical given the contractors’ equipment and abilities.”

Recently, FBT worked with a contractor to redesign the foundations for a bridge replacement project on SR 79 south of Vernon, Fla. where the soil conditions were highly variable. The use of steel piles in lieu of concrete piles reduced the time and risk associated with the potential need for splicing concrete piles.

“We determined there would be a

significant savings by changing the span lengths and the pile loads to take advantage of the foundation redesign,” explained Hebert. The bridge was completely redesigned in a short period of time, and the owner approved the change proposal.

Being proactive

“Many contractors approach us with proactive planning early in the schedule,” said Niedermann. “We help the contractors develop their approach to the construction. Recently, we helped a contractor with

design-related issues as they planned the construction of a bascule bridge replacement on the Miami River. We helped design a relieving platform so the loads from a 300-ton crane would not overstress an existing seawall that was to remain in place. We also designed the temporary cofferdams for the bascule piers so the same 300-ton crane could sit right behind the cofferdam to reduce the reach during pile driving. The layout of the project site was so tight, there was no other place to put the crane but right behind the cofferdam. The result was greatly increased earth pressure acting on the land side of the cofferdam as a result of the crane with the heavy lift.”

On a different project for this same contractor, FBT helped design the cofferdam system for the repairs on a historic swing bridge, which was built in 1925 over the St. Mary’s River on the Florida-Georgia State Line just south of Kingsland, Ga. The bridge was founded on spread footings on the limestone river bottom, which was over 25 feet below the water surface, making the installation of sheet pile cofferdam very challenging. Further complicating the construction of the cofferdam, the sheet pile could not be driven on one side of the pier under the fixed span approach. The contractor conceived an innovative means of floating in the side of the cofferdam under the fixed span, and FBT designed walers top and bottom to brace that side. Additional bracing was designed to hold down the seal concrete by using the existing pier as a reaction point. This enabled the contractor to dewater inside the cofferdam and perform the concrete repairs to the pier.

FBT has performed numerous design projects with Lucas Marine Acquisition Company doing construction in a marine environment. These projects include bridge

Photo courtesy of Lucas Marine Acquisition Company



FBT designed the cofferdam for the crane surcharge load for a bascule bridge on the Miami River

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FBT designed the cofferdam for the crane surcharge load for a bascule bridge on the Miami River

Photo courtesy of Mark Niedermann

crete piles at six-foot centers in a triple row in most locations.”

A recent project with Leware Construction Company involved a 450-foot-long bridge replacement in an environmentally sensitive area. In order to build the project, FBT worked with Leware to design a temporary trestle so the bridge could be built with top-down construction. The temporary trestle consisted of two 24-inch steel pipe piles per bent, with three W33x141 beams under each crawler track supporting timber mats.

“We reverse engineered the temporary trestle to work with the steel sections that

Leware had in their yard,” said Hebert. “In the end, it was a very economical solution.”

Relationships with contractors are one of the most important aspects of FBT’s success.

“We wouldn’t call ourselves the contractor’s best friend, but I know a lot of contractors have us on speed dial. I believe that at least makes us the contractor’s friend. Especially when we show up on the job site with coffee during night work,” Niedermann joked. “We have learned so much from them over the years, and we are very grateful for how they have included us in their projects.” ▼

replacements, elaborate timber boardwalks, port facilities and jetty extensions. An example project is the Boynton Beach Inlet at the Atlantic Ocean. In order to economically gain access to extend the jetty at the inlet, FBT worked with Lucas Marine to design a trestle that straddled the existing jetty with 24-inch diameter pipe piles and used a work platform over the top. This allowed Lucas Marine to walk along the jetty with a relatively small crane, not have to fight the currents at the inlet and have longer reaches with larger cranes while working from barges. On another typical project, FBT worked with Lucas Marine to design a ramp trestle with a movable section at Ft. Pierce Marina so Lucas could load barges by driving a front-end loader over the seawall to the anchored barges for a reef construction project. The ramp trestle ensured the existing sea wall would not be overstressed, and to avoid impacts to sea grasses near the dock.

Juan Valenzuela, FBT’s senior engineer, discussed an example of another unique project by stating, “FBT provided design review of the foundations and substructure units for a large runway expansion project at an international airport. The runway extension included spanning over a state highway and a railroad next to the airport property. The design for these highly skewed bents and piers included a complex design due to the extreme loads. The design of the runway included a 100 percent dynamic allowance from an A380-800 Airbus load, which is over 1 million pounds. Certain spans were designed with life-safety provisions similar to tunnel criteria due to the overall width of the runway, and included continuous wall-piers, which were three feet thick due to the significant loads. They had 24-inch prestressed con-



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