



Chesapeake Bay marina builds stronger after snowy collapse

by Anna Townshend

Like many coastal towns along the Chesapeake Bay, Chesapeake City, Md., is all about the water. The town emerged in 1829 when the hand-dug 14-mile Chesapeake & Delaware Canal was opened to traffic. Today, water access in Chesapeake City is just as important with bodies of water like the Bohemia River, which drains to the picturesque Chesapeake Bay through the Big Elk River.

Here, where a central focus is water recreation, boaters dock at Bohemia Bay Yacht Harbour to soak up the beauty and charm of the area. After a February 2010 snowstorm, part of its charm lie under a collapsed roof, and the 300-slip condominium marina prepared to rebuild a 450-foot long covered pier that collapsed over 38 boats.

Snowy February

After sustaining multiple snow events since it was first built in the late 1980s, the final

straw for the Bohemia Bay covered pier was back-to-back winter storms in February 2010, the second of which was dubbed “Snowmageddon.” The storms dumped snow that shut down the region and left a path of destruction all the way up the East Coast with snow totals of 20 to 30 inches throughout the Chesapeake Bay area. Some locations recorded more than 3 feet of snow.

Snowbound at home surrounded by 4-foot drifts, Bohemia Bay General Manager Ken Long got the fateful call from the Cecil County Department of Emergency Services on the evening of Feb. 11—a roof had collapsed on one of his nine docks.

“Driving up to the wreckage I could smell fuel. The overwhelming destruction was a sight that I won’t forget anytime soon,” Long said.

After the immediate shock wore off, Long swung into crisis mode. Guided by the marina’s crisis management plan, the cleanup process took two weeks to complete. Once the collapsed roof and

The marina rebuilt its covered docks with a steel-on-steel structure. Twenty-two boats sank to the bottom under the weight of the timber and steel roof wreckage at Bohemia Bay Yacht Harbour in Chesapeake City, Md. Property damage losses were estimated at more than \$2 million on one dock alone. Boat losses were estimated at more than \$4 million.

sunken boats were removed, marine contractor Dissen & Juhn Co. in Stevensville, Md., was called in to begin the lengthy process of removing what was left of the existing pier, and designing, permitting and ultimately, constructing a new covered pier.

Innovate, not just replace

At the time when the Bohemia Bay roof came crashing down, the Chesapeake Bay region had few examples of a steel pipe foundation, galvanized steel roof marina structure. In an effort to provide an innovative option to Bohemia Bay, Gil Dissen, president of Dissen & Juhn, reached out to Al Caito, president of International Fabricated Steel in Stevensville, Md., to explore whether this new design would work for the covered dock renovation. International Fabricated Steel ultimately built the new covered pier’s roof, with a

design by Watkins Partnership Inc. in Bowie, Md.

"I received several proposals for replacing the covered pier at Bohemia Bay—two with the traditional timber foundation and a similar roof structure as the previous covered pier and Al's steel-on-steel design," Dissen said. "At that point, bottom line costs for design, materials and construction come into play. It isn't an apple-to-apples comparison particularly when you talk about value and the benefits of one material over the other," he added.

Caito said at first he didn't think this type of structure would accommodate the water application economically. "But once I really started thinking about the benefits of steel over wood and the design implications, I realized I could do it better and more accurately since steel has less tolerance and requires more precision. With this new steel application you can actually eliminate a lot of the supports that you would normally need with wood, since steel is so much stronger and can be driven deeper," Caito said. "We were able to design a more aesthetically appealing structure that created more room for the boats since they didn't have to maneuver around so many piles," he added.

Ultimately, factors like overall strength and durability outweighed the concerns over cost and the possible risk associated with innovation and taking a landside application and making it work in a marine construction application. No one could argue, however, that a steel-on-steel structure could better handle wind and snow loads, as well as last longer.

"Whenever you innovate and take a fresh look at a traditional way of doing things you can expect to get some push-back," Dissen said. "Concern about cost is usually the pivotal point, but the more we looked at this design and how steel really did suit this application, value ultimately directed the decision. It could be built better and stronger, lasting much longer than the tradition timber foundation structure." The design also satisfied new, more stringent building codes with fewer structural members.

When Long looks back on the decision, it came down to four qualities (strength, aesthetics, comfort level and maintenance)

and overall confidence in how the structure was going to be built. "The properties of steel enable this type of structure to be built not only stronger, but also with a sharper look," Long said. "Wind loads and snow loads are not an issue, and it will last a long, long time with negligible maintenance."

Installation

The dock was constructed "in location, in kind," meaning that the new dock was essentially the same as the old dock. However, because there was a hard clay layer running underneath part of the pier—sufficiently hard enough that it was not practical to continue to impact drive the piles their entire length—some of the steel pipe piles were pre-augured, after which the impact process resumed for the remaining few feet.

Although building over water presents obvious construction complexities, namely the difficulties of working on floating equipment and driving steel pipe piles, in the end, the project came together well, Dissan said. "We were basically working from a rendered mature design based on a landslide application, which made the process of installation a little more challenging."

On landside jobs, mobile aerial lifts enable crews to access roof construction quickly and easily. However, when working on the water, the lift equipment is typically mounted on specialty barges, which have to be re-positioned with a work boat. At Bohemia Bay it was necessary to build the dock before putting up the roof superstructure, so crews were frequently navigating around finger piers and roof piles. Dissen said this is specifically a challenge when the construction equipment is as long as the fairways are wide.

Implications

There are numerous covered slip structures on the Chesapeake Bay like the one that collapsed at Bohemia Bay. Many (if not most) are very old and are becoming increasingly difficult to repair, and most likely, to insure, as well. They are in demand by boat owners that like to keep their boats out of the weather. Like docks or any

Bohemia Bay Yacht Harbour Renovation

- 450-foot long by 120-foot wide (54,000 square feet)
- Constructed of galvanized steel (roof columns, heavy structural framing and galvanized heavy gauge corrugated roof deck panels)
- 48 concrete-filled steel pipe piles, measuring 12 feet and ¾ inches in diameter by 60-foot long, with 38-ton bearing (vertical load capacity and 30 feet of penetration; some were augured into the hard bottom, then impact driven to achieve the specified bearing and penetration)
- 450-foot long by 8-foot wide timber dock with full-length finger piers (up to 60-foot long)
- 44 new slips in total—50' and 60' long

other marina infrastructure, they are part of the "total package"—what the marina is selling to prospective boat owners. In many markets, the more current or "state-of-the-art" a marina's infrastructure is, the more competitive it will be.

"The decision to replace an aging covered pier with a new steel-on-steel design comes down to a cost of steel versus the benefit of steel. While there is no doubt that steel costs more than wood, steel is stronger, it can take heavier loads and span longer distances," Dissen added.

For Long, the final decision was about rebuilding better and stronger. "Unfortunately, this wasn't our first loss," said Long, who recalls a \$10 million fire at the marina back in 1989. "When you have that perspective of loss, your natural inclination is to invest to do it better. We knew that if we rebuilt with better stuff, we didn't have to worry about it," he added.

In the end, Long felt the marina couldn't afford not to invest more upfront to protect that investment in the long term. ⚓