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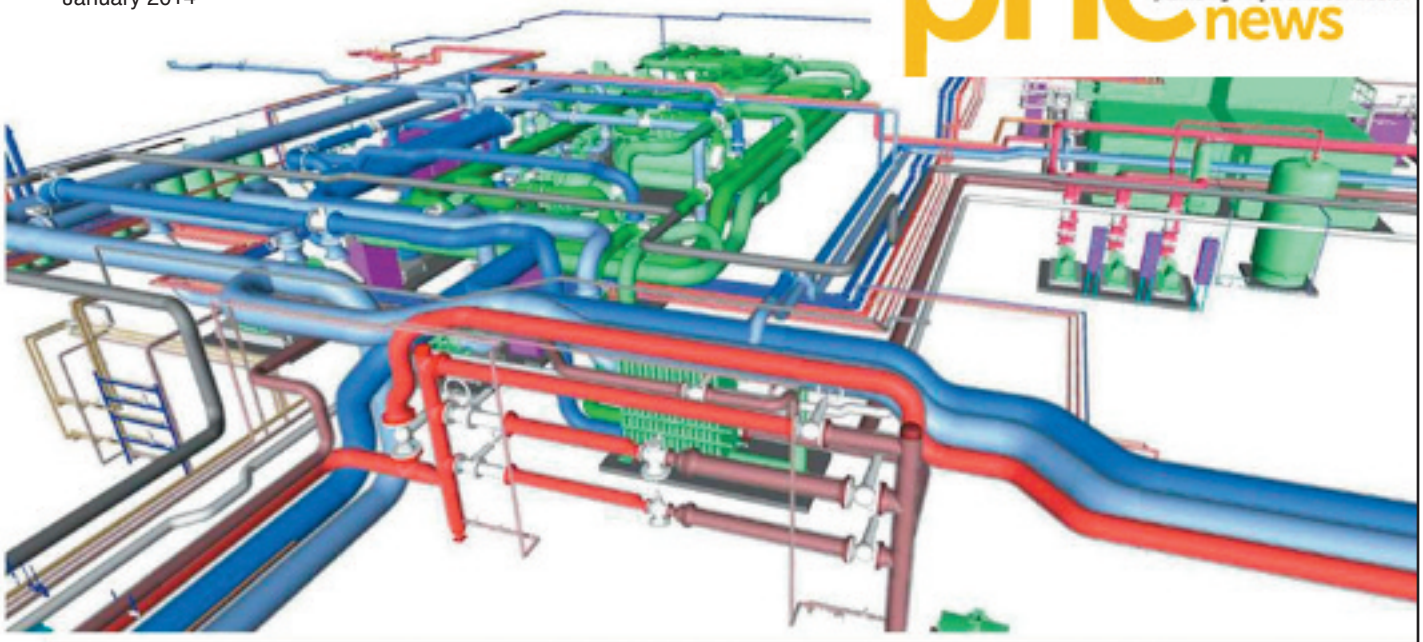


Towering success at INOVA Fairfax Hospital

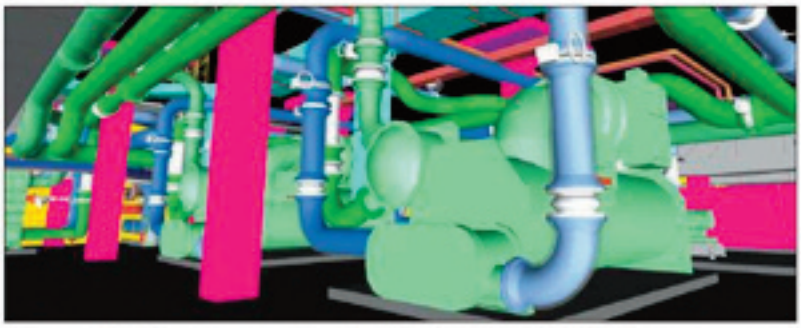
BIM and CAD are keys to Shapiro & Duncan, Inc.'s cost-efficient design and routing of piping systems in new South Patient Tower

BY CHRIS CANTER

INOVA Fairfax Hospital, in Falls Church, Va., is one of the premier health care facilities in the Washington, D.C. area. The new 216,000 square-foot, 11-story addition of the South Patient Tower and future Women's and Children's Center added 174 private inpatient beds. Five of the floors are dedicated as medical/surgery rooms and three floors are dedicated as Intensive Care Unit (ICU) rooms.

Shapiro & Duncan, Inc.'s Building Information Modeling (BIM) system played a pivotal front-end role in development and delivery of the mechanical solution we provided during construction of the South Patient Tower.

Our BIM process, which is managed and operated in-house, incorporates the latest AutoCAD and other leading third-party CAD programs. This process is used on every project to produce composite mechanical drawings in 3D for planning, fabrication and installation of mechanical components. Using NavisWorks as the primary BIM platform, we are able to identify collisions and work through any clash detection issues well before any piping hits the job site.



The entire fifth floor was a mechanical floor that housed air handlers, a pressure-reducing steam station as well as domestic water heaters and booster pumps.

Challenges

For Shapiro & Duncan, two major challenges were involved in the South Patient Tower project. First, re-engineering of the mechanical system, including the chilled water piping lines, had to be done in the existing tower steam tunnel, which is only 8 feet, 9 inches wide and in which the temperature range is 105 – 120 degrees. Second, the new system had to be installed without disrupting domestic water service and other critical operating systems in the Heart Institute, Women's and Children's Center, and Pharmacy. To accomplish this under a tight timeframe, almost

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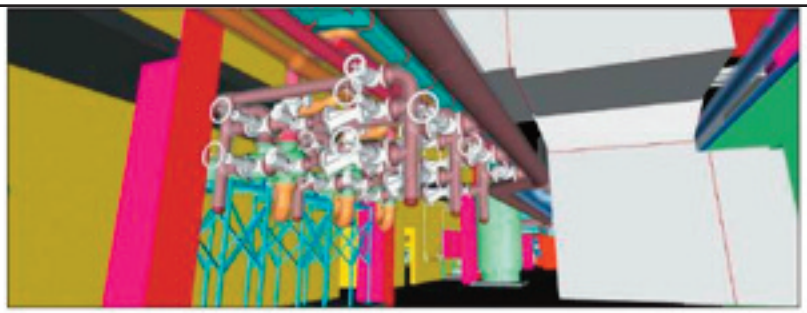


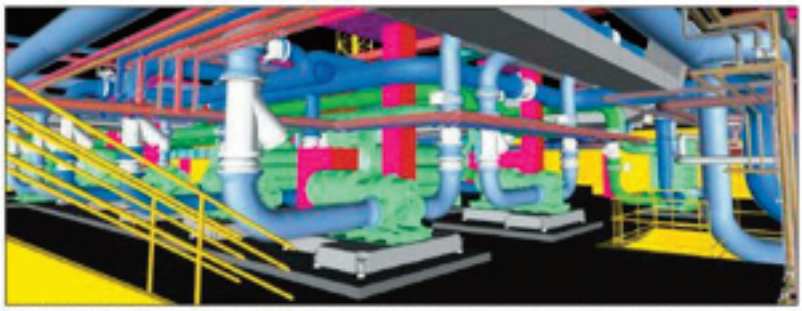
all of the mechanical system fabrication was done at Shapiro & Duncan's 51,000 square-foot fabrication shop in Landover, Md.

Further complicating the task was the complexity of the mechanical systems confined within the available space above the ceiling, as designed by the architect. The new building was built up to an existing hospital, which meant everything above the ceiling had to match the configuration of existing hospital floors. Another huge obstacle above the ceiling was the amount of structural steel supports needed to hold operating room equipment, overhead lights and so on.

Solution

To begin with, the existing tunnel system was 100 percent field measured by our BIM/CAD team in coordination with our field personnel. After those measurements were taken, we made hand sketches of the existing mechanical components and transferred those drawings back to our main office. There, the hand sketches were redrawn in CAD by a planning coordinator. Our team was able to model the entire hospital plumbing, mechanical piping and medical gas systems down to half-inch copper pipe (the smallest size).

Our team also drew and modeled an extensive floor support system on the fifth floor of the South Tower. The entire fifth floor was a mechanical floor that housed air handlers, a pressure-reducing steam station as well as domestic water heaters and booster pumps. There was so much duct work above the piping system that the mechanical structure was not visible. So our modeling team had to come up a floor support system that allowed egress to all of the mechanical equipment on the fifth floor. At the same time, we had to take into consideration all service clearances needed to perform routine maintenance on the equipment. On top of that, the floor support system had to meet seismic requirements mandated by the engineering specifications.



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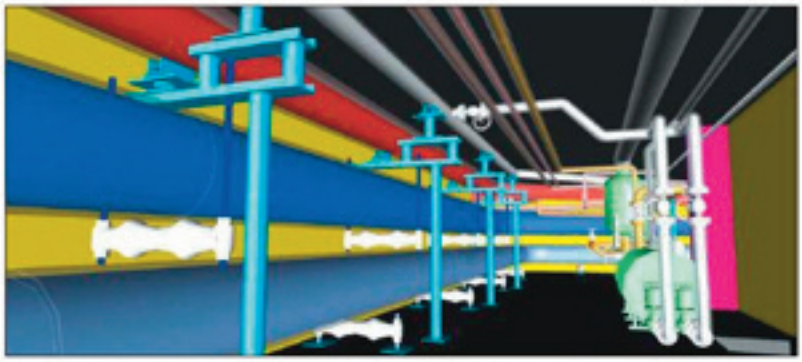

When it came time for slab penetrations, all of them were fully coordinated by our personnel in accordance with strict structural requirements approved by the structural engineer.

Results

In the final analysis, 80 to 90 percent of what was drawn by our drafting department, coordinated with the BIM/CAD team and shown in the BIM model was actually fabricated and installed onsite. This represented a huge success for our BIM process.

And, when it came to keeping such a fast-paced project on schedule, our BIM capability gave us the tremendous advantage of being able to provide answers and direction instantly during coordination meetings with the project engineer and architect.

The bottom line is that the INOVA South Tower project demonstrated that Shapiro & Duncan has the BIM and CAD capabilities to succeed on the most challenging and complex projects. Our BIM and CAD systems were two of the keys to on-time, on-budget completion of the project. Ultimately, the success of our BIM/CAD design directly contributed to securing the next phase of the project.

Chris Canter *is the planning manager at Shapiro & Duncan, Inc., a mechanical solutions provider for complex commercial, government and institutional design-build projects throughout the Washington, D.C. metro area. A third generation family business based in Rockville, Md., Shapiro & Duncan continues a 37 year track record of dependability and innovation that has consistently enabled the company to deliver high value and efficient mechanical infrastructure to its customers.*