

FROM THE FIELD

Commercial radiant



BY DAN FOLEY CONTRIBUTING WRITER

Several years ago, I was asked by a developer to help design the ultimate comfort system for a high-end condominium project. The developer was going to renovate a 19th century brick schoolhouse that had been abandoned and had become dilapidated after many years. He was going to convert the building into seven condominiums with an underground parking garage, as well as put up six rowhouses that would blend in with the period architecture of the neighborhood. The Wormley School, a brick schoolhouse built in 1885, presented unique challenges. The outside of the structure could not be altered, due to the building's location in the historic Georgetown district of Washington, D.C. In order to maintain the architectural integrity, the single-pane glazed windows had to stay.

We worked with the developer, Encore Development, located in Bethesda, Md., Architect Cunningham + Quill, based in Georgetown and mechanical engineer Summit Engineering, based in Arlington, Va., to design a first class mechanical system within the constraints of the 100-plus-year-old building. Developer Steve Kay of Encore Development says, "I tasked Foley Mechanical and Summit Engineering with designing a best-in-class mechanical system in terms of comfort, efficiency and reliability. This



Dan Foley of Foley Mechanical stands in the mechanical room in the newly renovated Wormley School building.

system had to meet the expectations of our demanding clientele. The system Foley installed exceeded these criteria."

As this was a commercial project, detailed shop drawings were required. I had met Abe Stallcup, principal at Monterey Energy Group at a previous RPA function. I contacted Abe about doing these drawings, and he agreed. I spent many hours with Abe on countless phone calls and emails to develop the drawings. The results were outstanding. The shop drawings allowed my crew, as well as the architect, GC and other trades to know exactly where our tubing, piping and equipment should be installed well in advance of the actual work. It is far easier to "fix" problems on paper rather than on the jobsite.

We decided early on that radiant floor heat would be ideal, due to the poured concrete construction and large eight-foot tall single-pane windows. It would be difficult to

heat this structure with forced air. We ran into a slight problem with the structural engineer: He did not want the radiant tubing in the 6" structural slab. His contention was that the radiant tubing would compromise the integrity of the slab. I did not agree with this, as we had installed many radiant systems in structural slabs. Rather than battle with the structural engineer, we developed an alternate plan. Instead, we had a layer of 2" extruded polystyrene insulation installed on top of the structural slab. A 2" capping slab was poured with our radiant tubing embedded in that layer. As the ceilings were 12-14 ft. tall, we had the luxury of the additional 4" required by this installation method.

In hindsight, this may have been the best outcome, as we installed the tubing late in the construction process. The tubing was installed long after the plumber, electrician, tel-com, alarm contractor and general contractor had completed their rough-ins and floor penetrations. This minimized the number of tubing punctures and repairs. The radiant tubing was only hit once, which was amazing for a project this size. In addition, the 2" capping slab allowed for quicker response time on a heat demand.

One downside was the time frame allotted for installing the radiant tubing. No other subs could work in the areas where we were installing it. In addition, the capping slab required a pump truck when it was poured, which required closing one lane of Prospect Street, a busy Georgetown thoroughfare. We had to get the tube down quickly and get it covered in 2" of concrete.

In order to meet this schedule, I put a crew of nine on the job; we were able to lay approximately 15,000 lineal feet of ½" Uponor Wirsbo PEX in a two-day period. We split up and were working on three floors simultaneously. Of most help was a tie tool I first saw at ISH-Frankfurt the year before. This tool automated the task of tying the tube to the re-bar or steel wire mesh. Previously, we had to twist the "squiggies" using a hand tool. This was fine for small jobs but was too slow and tedious for a large project like this. After several hours of twisting the ties, your wrist was ready to give out.

Enter the Max tie tool. It was originally designed for rod busters tying steel re-bar on concrete jobs. By loosening the adjustable tension and using a softer plastic-coated aluminum tie wire, it was easily modified for tying radiant tubing to the mesh. It will wrap, twist and cut the wire in about a second. This is exactly what I needed, and we used three of these tools on the project.

Yes, these tools are expensive (around \$2,200 in 2009), but labor is my largest expense. I will readily invest in tools that will reduce man hours as well as wear and tear on bodies. Most importantly, it kept us on a very tight schedule and allowed concrete to be poured as planned. As this entailed scheduling a street closure, we had no choice. We either had to deliver, or we would be removed from the job. I am happy to report that my crew delivered in spades.

Radiant floor heat serves as the primary heat source in the seven condominiums. Each one is sub-divided into multiple zones using manifold tel-stats. We incorporate second stage hot deck coils on the air handlers. This also

➔ Turn to FOLEY on p 32

FOLEY | CONTINUED FROM PAGE 30

serves as a backup in the event of a component failure in the radiant system. Cooling is provided using Carrier unitary equipment. A central chiller plant was considered, but space, noise and billing issues shelved this idea. Fresh air is ducted into each unit through an Aaon make-up air unit, which brings in 1,800 cfm of fresh air while filtering and conditioning (heating/cooling/de-humidification) the air, depending on ambient conditions. Common areas such as the lobby, hallways and elevator lobby are conditioned by a gas pack rooftop unit. A back stairwell and a common area exercise room are conditioned by Mitsubishi ductless split units.

The heart of the mechanical system was the boiler plant: Two Lochinvar Knight XL condensing gas boilers. The two boilers are staged with a tekmar staging/reset control. The boilers supply two 120-gal., indirect DHW tanks, radiant zones, hot deck coils on the air handlers and snowmelt for the parking ramp and public walkways. Snowmelt is automatically controlled by a tekmar 661 snow/ice detection control. A timer switch allows for manual activation of the system. The radiant supply water is mixed down using Wirsbo Pro Mix 101 controls tied to Belimo 3-way floating action motorized valves.

The underground parking garage was ventilated with two 7,500 cfm exhaust fans with a fresh air louver at the opposite end of the garage. A Macurco CO monitor and switch activates the fans if ambient CO in the garage rises

above 25 ppm. In addition, a timer runs the fans for 10 minutes every hour, regardless of CO level, to flush out stale air and bring in fresh air.

One of the biggest challenges on this project was logistics. With no parking, difficult deliveries and limited staging area, poor planning would have been costly. I learned quickly to plan ahead, coordinate deliveries and arrive at the site early. We were able to use the underground garage for a while, but my bigger work trucks would not fit in the garage. I had budgeted \$2,000 for parking tickets on this job, but we have already racked up over \$5,000 in tickets, and we are just starting the rowhouses. This has to be factored in when pricing the job. You are not going to do a commercial project in Georgetown and not get tickets.

This condominium project has been operational since late 2009. The six rowhouses are going up at this writing. Commercial jobs lend unique challenges to mechanical projects that require unique solutions. Our commercial project base is growing, and we have several more in progress. Don't be afraid to jump in and try a commercial project, but make sure that you are adequately prepared and are ready for tight schedules and hard work.

I will detail the logistics getting, designing, planning and installing large residential and commercial projects in future columns. More information on the Wormley Row project can be found at these links: www.wormleyrow.com/, <http://bit.ly/r96tIf>, and <http://bit.ly/oxaHEy>. ●



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