

## Revolutionary War Hospital Turned Church Seeks HVAC Comfort

**T**he gruesome battles of Brandywine and Germantown left the American Continental Army defeated, retreating, and in great need for a place of safety from the British Army.

In the aftermath of the battles, more than 1,000 American soldiers were killed or wounded, and some teetered on the brink of death.

Gen. George Washington was first in command when the U.S. Army fell into retreat. Given word that a large religious community was 50 miles away, Washington requested permission from the Lititz Moravian Brethren to accommodate several hundred wounded soldiers.

From Dec. 14, 1777, to Aug. 28, 1778, Washington commanded the Lititz Moravian Brethren's House as a military hospital.

The Lititz Moravian Congregation still exists to this day. The Brethren's House is no longer a military hospital but is now used for Sunday school, where church members gather regularly for bible studies, meetings and vacation bible school.

### COMFORT CONCERNS

"Over the years, the building has expanded numerous times," explained Matt Good, Lititz Moravian's former sexton. "The building now consists of several large sections with the fellowship hall itself being the biggest.

"In past heating seasons, we had to manipulate the rooms in order to get heat to all areas," added Good. "Opening and closing doors and using fans to blow warm air are just a few ways we'd try to move heat from our old system."

Until early 2017, the old building was heated by a gargantuan, 750,000-Btu steam boiler, which delivered barely warm heat at best through ancient cast-iron radiators. The cost to fuel the behemoth was no small expense.

And, with no form of air conditioning, the fellowship hall was unconditioned all summer long. A few inefficient window units were used but could never provide a comfortable cooling solution. Summer events and vacation bible school left attendees hot and uncomfortable.



**UNDER CONTRACT:** Stevens, Pennsylvania-based Vertex Mechanical Inc. was hired to complete the mechanical overhaul at Lititz Moravian.

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The fellowship hall also has two very old pipe organs that suffered the effects of wild temperature swings and uncontrolled humidity. The pitch of organ pipes go up or down in direct relation to air temperature and humidity. If the organ isn't being played at plus or minus 2°F of what the room was at when it was tuned, it will render the organ out of tune.

Also, when the internal metalwork of an organ is exposed to humidity swings, corrosion harms components and influences the organ's sound.

"We needed a solution and had concerns about the viability of year-round comfort," said Good. "Could we achieve it? There were also very real budgetary concerns, too. We knew that, somewhere, there'd be a solution, but we weren't sure where."

Because the fellowship hall isn't in use every day, a key requirement for the new system also needed to have the capability of being easily turned down or activated for relatively quick response if an event was to be held.

In the fall of 2016, the church board invited several HVAC

contractors to create a comfort plan for the fellowship hall.

Vertex Mechanical, a Stevens, Pennsylvania-based firm, was awarded the bid based on its experience retrofitting churches, including some previous work for the Moravian church.

Yet they, too, were held to a high standard. They impressed board members with a design for a complete heating system overhaul that also included air conditioning. The bid focused on energy efficiency, comfort, and preservation of the historic building's artifacts.

### OUT WITH THE OLD

In February of 2017, Vertex appointed a five-man crew to complete the mechanical overhaul at Lititz Moravian. It took the team five days to give the space a complete comfort facelift.

First to go were the old cast-iron steam radiators — soon to



**WINTER READY:** Jared Fox, lead installer, Vertex Mechanical Inc., fastens snow legs to a Fujitsu Halcyon multizone condenser outside the Lititz Moravian fellowship hall.



**REVOLUTIONARY RETROFIT:** Part of the Lititz Moravian campus was once used as a Revolutionary War hospital commandeered by Gen. George Washington.



**CHARGED UP:** Lester Gonzalez (foreground), installer, Vertex Mechanical Inc., charges a Halcyon unit while Jared Fox (background), lead installer, organizes refrigerant line sets for units serving the fellowship hall.



**FLOORED:** Man Khadka, installer, Vertex Mechanical Inc., installs a floor console unit in the main fellowship hall.

be replaced by super-efficient mini-split units from Fujitsu General America.

The retrofit required 16 tons (192,000 Btu) of heating and cooling.

“Our crew started by tearing out the existing radiators mounted to the floor and capping off pipes,”

explained Vince Youndt, owner of Vertex Mechanical.

Because the radiators had been built into the wall, a team of carpenters prepared to build out those areas flush to the wall, availing mounts for the new air handlers. Vertex chose floor-mounted console units and

some wall-mounted units for most of the facility.

“Because of the high ceilings in the main room, we chose floor-mount console units to keep the heat towards the floor,” added Youndt.

While carpenters trimmed out and painted the new wall build-outs, Vertex technicians ran line sets from the new condensing units outside to the air handlers inside.

As is too often the case with old buildings, this proved to be a real challenge, yet nothing compared to the challenge of installing ductwork.

Running several hundred feet of refrigerant line sets required a measure of creativity at every turn. Always present were the 3-foot-thick solid limestone walls. As the Vertex team ran the lines, they spent many hours honing their skills with wet diamond core drilling gear.

### IN WITH THE NEW

“The combination of floor-mounted and wall units was ideal for this job,” said Youndt. “The Fujitsu line offers an amazing array of air handler and line set combinations. There was no compromise in providing exactly what was best-suited for any of the rooms.

“Wherever a radiator used to be, we installed a Fujitsu Halcyon floor unit for a total of six to meet the needs of the main hall,” continued Youndt.

Halcyon wall units were selected for the stage areas of the fellowship hall, where getting air conditioning up higher



**BRANCHING OUT:** Ryan Schweitzer, installer, Vertex, works on a Fujitsu branch box in a mechanical area in the basement of the fellowship hall.

would help cool the open space more efficiently.

Outside, two Fujitsu AOU45 multi-zone condensing units were connected to the fellowship hall’s main indoor units. Two Fujitsu condensing units were connected to the mini splits serving other branches of the building. All units were connected with Wi-Fi controllers to allow remote operation.

Fujitsu’s new multi-zone split system made it easy for the technicians. One heat pump condensing unit can be connected to two to five indoor units while offering 19.7 SEER and 10.3 HSPF. They provide the flexibility to control each indoor unit individually or to use the optional central remote control.

The Fujitsu AOU48 allows for up to eight heads to be installed but use branch boxes for connectivity.

And, for technicians involved in the job, it was helpful that single-port evacuation and internal branch boxes cut down installation time and line set management for Vertex crews.

“We bring Fujitsu to the table for almost every HVAC project we tackle,” explained Youndt.

“We favor Fujitsu’s equipment because of its reputation and reliability. It makes my job easy while giving me the equipment I need for high-quality and highly efficient solutions.”

### MORE TO COME

For the time being, the massive steam boiler was left in its place. Only half of the huge building was upgraded mechanically. Left behind were several areas below and above the most frequently used rooms.

Next up will be a total retrofit of the facility, which will be easily accomplished around the work just completed by Vertex crews.

“The old boiler’s nearing the end of its life,” Youndt said. “I hope its affairs are in order. I doubt the Moravians want the facility to become a health care center again — this time for a dying hydronic system.” **N**

*Information courtesy of Rachel Ruhl, an account manager and writer for Common Ground. Ruhl writes about HVAC, hydronic, plumbing, mechanical, radiant heat, geothermal, solar, and broad building systems industries. For more information, call 717-664-0535 or email cground3@ptd.net.*