BY LISA MURTON BEETS

MOUNTAINOUS INNOVATIVE

A creative installation brings snow-melting technology to curved stairs and landings.

Although only a 500-square-foot project, the Conifer Mountain House snow-melt application presented two huge challenges with its curved stairs and landings, says John Abularrage, president of Advanced Radiant Design, Stone Ridge, N.Y.

"First we needed to ensure that technically, the job would work," he says. "Second, we needed to come up with some creative ways to install it."

The Conifer Mountain House in Catskill, N.Y., is one of dozens of buildings situated on 350 acres of property, home to an expansive wellness center retreat. The house, which sits on a very steep hill, features 16 residential bedrooms and baths for overnight guests.

Advanced Radiant Design's snow-melt installation at the Conifer Mountain House was creative enough for it to capture first place in the Radiant Panel Association's System Showcase Most Innovative category.

A fresh approach

The Conifer Mountain House project required snow melting for a series of 24 straight stairs, seven curved stairs and five landings, leading from the building down a steep hill to a parking lot. The snow-melt area is 6 feet wide by 85 feet long.

No stranger to snow-melt applications, Abularrage and his team were nonetheless challenged by this project.

At the onset, they noted the following parameters:

- Site conditions dictated the stairway be poured in two separate pours.
- Because of the curved stairs, using the traditional method of tubing installation across the treads would make it difficult to lay out the tubing in an even density.
- Given the overall length of the stairs, the tubing lengths also would have dictated the use of multiple loops being fed from multiple locations with excessively long leaders, all of which would have had to be buried and insulated.
- The use of 5/8-inch PEX would be difficult to install in the curving stairs.

"Traditionally, when doing radiant snow melting on stairs, you would use 5/8-inch tubing, crossing it horizontally across treads, going from one stair to the next," Abularrage says. "However because these stairs are curved, there was no practical way to go down and back up again. When crossing treads, because of the curves, we wouldn't be able to get even spacing and, therefore, the snow melting would be uneven."

The solution Abularrage devised was to install the tubing perpendicular to the treads, using 1/2-inch tubing with much shorter than average loop lines.

"We decided to lay 1/2-inch Wirsbo HePEX Plus tubing 6-inch on center perpendicular to the stairs," Abularrage says. "We would feed the upper set of curved stairs directly from the building, thereby reducing the leaders to a minimum. This would allow us to keep the total loop lengths to 100 feet, which was very important given the use of 1/2-inch tubing. Using a 40 percent glycol solution, at 150 Btuh/square-foot, and a delta T of 25 degrees Fahrenheit, with a 40 percent glycol solution, we calculated the flow rate at .67 gallons per minute per tube with a pressure drop of 2 feet at the given loop lengths. Clearly this was an acceptable tubing design for the circumstances – unique, perhaps, but certainly viable."

Learning curve

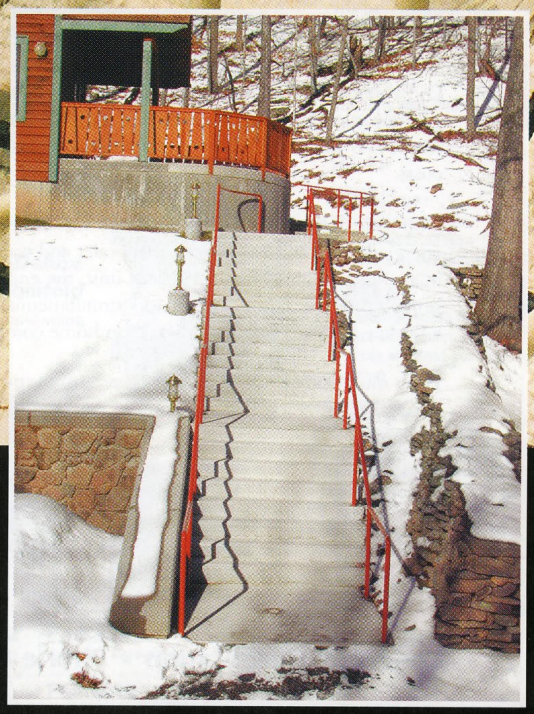
"Once we were sure the project was technically feasible, we had to be creative to come up with the best way to install it," Abularrage says.

This involved some experimenting – something the staff at Advanced Radiant Design is constantly encouraged to do, Abularrage says.

"We began the installation with the seven curved upper stairs," he notes. "To keep the 1/2-inch tubing as close as possible to the form of the stairs, we used metal bend supports to form and securely hold the tubing in place. While this was a workable solution and the installation came out beautifully, it was extremely labor intensive. It was also very time consuming. The tedious and difficult installation of 192 metal bend supports installed edge-to-edge in such a tight configuration gave us good reason to get the creative wheels turning to find an even better solution for the lower portion of the stairs."

CHALLENGE, SOLUTION

The the team chose composite tubing because it is flexible and holds its shape well; the way it was installed provides for even snow melting.



The curved stairs at the top of the house, along with the landings and overall length of the descending stairs, required a creative design and installation strategy.

After much experimenting in the shop, Advanced Radiant decided to use 1/2-inch Wirsbo Multicor, PEX-AL-PEX for the lower stairs.

"It was our first time working with this composite tubing, so it was a learning experience," Abularrage says. "We were able to use metal bend supports to form the tubing to the stairs much faster. We used fewer metal bend supports since the composite tubing bends and stays put, hence we didn't need to click the tubing into so many supports."

Because the lower stairs were remote from the building, Advanced Radiant used a fiberglass vault to house the second manifold at the edge of the stairs to reduce the leaders to a minimum. The manifold was fed with 1-inch Wirsbo HePEX Plus that was insulated and sheathed in corrugated plastic conduit. A loop of 5/8-inch PEX was installed in the drainage system on the outside of the stairs to ensure proper removal of melted snow.

The control system consists of a tekmar 362 mixing control operating in the snow-melt mode. The system operates in an idle mode with a tekmar 039 remote start/stop module to initiate a call for the melting mode. The control system was added to an existing boiler system with adequate capacity.

Impressive end result

Several aspects of Advanced Radiant's approach to this project caught the attention of the 2002 System Showcase judges as they were looking for innovative solutions.

"By bending the PEX-AL-PEX tubing, which holds its shape well, to the profile of the stairs rather than running tubing back and forth across the treads, Advanced Radiant was able to achieve a more even snow-melting pattern for the steps," said John Siegenthaler, P.E., principal of Appropriate Designs in Holland Patent, N.Y., and one of the judges. "This is an excellent example of a project well-suited to take advantage of the bending properties of composite tubing.

"Another great strategy John employed was to make use of an outdoor/underground manifold access box, which eliminated the need to run all circuits back through the basement wall. Another factor that impressed us was how neatly the work was executed.

"The steps themselves are relatively long and certainly would be dangerous if covered with snow and ice. Overall, even though this wasn't a huge area, it is an excellent example of a strategic application for snow melting."

Always room to grow

"On this project, we chose to spend a lot of time learning along the way in order to deliver an excellent system," Abularrage says. "We solved problems and developed new details. We wouldn't have proceeded in the first place, though, without first ensuring that the job was technically feasible.

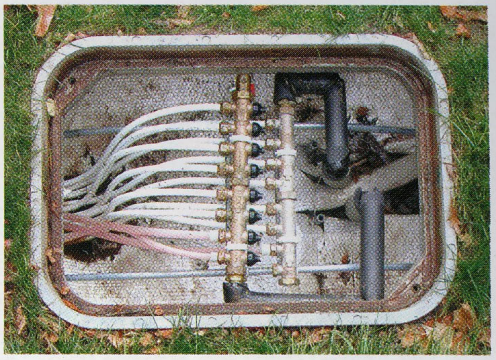
"In the end, we were able to reduce costs for the client by reducing the number of remote manifold stations and providing even heating for the curved stairs, and thus achieving greater efficiency; the system would have had to run harder if the snow melting was uneven due to varied spacing.

"We are very pleased with this installation. We feel it is the best approach for stair snow-melt applications, providing the loop lengths, flow rates and pressure drops in the tubing are carefully designed."

The project was completed in fall 2001. Only a few significant snowfalls occurred last winter and the system performed well, as expected, Abularrage says. He added that his company will continue to monitor the system during the winter ahead.

As for winning the award in the innovative category, Abularrage says that he looks at each job as a new opportunity to employ a unique approach.

"I've been in this business over 20 years and there is always more to learn," he says.



An outdoor/underground manifold access box eliminated the need to run all circuits back through the basement wall.

(Editor's Note: Advanced Radiant Design also won two 2002 System Showcase awards for another building on the property discussed here, in the hydronic commercial and overall highest score categories (see Radiant Living*, Summer 2002, page 9).*

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