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THROUGH SLEET AND SNOW

RPA Winners 2002

An electric snow-melt system at Chicago's main post office helps the mail get through.

If there ever was a project that was a perfect application for a snow-melt system, it's the main post office in downtown Chicago. The building is a 24-hour-a-day operation with 6,000 employees and a constant stream of traffic, says Charles May, head of maintenance for the facility. Semi-trailer trucks full of mail come in one side of the sorting facility, and semi-trailer trucks full of mail go out the other side.

They can't wait for the snow to stop to plow, May says, and it would be difficult to plow around the traffic. And in a corollary to Murphy's Law, "it always snows when it's busy," May says.

The facility services the six-county Chicago area, the Midwestern states and all the mail shipping out of O'Hare International Airport.

The electric radiant snow-melt project, designed by Delta-Therm Corp. owner Ed Slagis and consulting engineers Tony Trekas and Walter Frick, won first place in the Electric Commercial category of the Radiant Panel Association's 2002 System Showcase awards program. The system is designed to produce 45 watts per square foot, with some exceptions, and can melt 2-inches of snow per hour. Frick specified that the system carry a 10-year warranty, which "kept the fly-by-night bidders out."

Designers of the new Main Post Office in Chicago knew that a snowmelt system would be the only practical method to keep ramps and driveways clear.

Slagis designed the system for Trekas, who incorporated Slagis' work into his initial drawings. The electrical contractor awarded the equipment contract to Delta-Therm after the project went out for bid.

Ramping up

Electric snow melting has been used in Chicago since the 1950s, Slagis notes, so engineers have acquired a great deal of experience with it. At 45 watts per square foot, a snow-melting system will melt almost anything but might leave slush during the heaviest snows. Pedestrian walkways typically are heated at 50 watts per square foot, and 60 watts per square foot could keep a hospital's helicopter pad clear during a blizzard. Slagis designed the handicapped ramps at 55 watts per square foot, he says, because it's difficult to maneuver a wheelchair through slush.

"It all traces back to weather data and figures in the ASHRAE handbook," Slagis says. "You look at existing data, installation cost and energy consumption, and then go just a little bit more than you think is necessary."

The snow-melting system, comprised of 36,505 linear feet of mineral-insulated snow-melting cable covering 20,643 square feet, is applied on three postal truck ramps leading to docks, two handicap ramps and three parking garage ramps underneath the 1.6-million-square-foot structure.

The electrical contractor was McCook, Ill.-based Meade Electric, which installed the snow-melt system and other electrical equipment in the building. Meade spent 400,000 man-hours and almost four years on the project. The building covers an entire city block.

"The building is like a 'U,'" says Glen Hicks, senior project manager for Meade. "There are 130 dock doors so truck traffic is always coming and going."

The parking garage ramps are on all sides of the building, Hicks notes. In addition, the dock areas are under roof

The snowmelt system was applied on ramps to the underground parking garage and on pedestrian and handicapped access ramps.

because the second floor workroom floor extends out over the docks.

"But it's open to the elements so you could get snow and water and ice built up on the flat areas," Hicks says.

"The decision [to use snow melt] was based on the locations of the ramps coming into the building," May says. "The majority have steep inclines and a lot of traffic, and basically the decision was made that it's difficult to plow when it's snowing and a big hazard once it becomes wet. It was a safety issue and an easier way to do it too."

Access to the parking garage is controlled by card access and cars would probably skid into the card readers were it not for the snow-melt system, Hicks notes.

Set in concrete

Meade Electric had a crew of 10 installing the snow-melt cable on a schedule based on the concrete pours. The contractor had a limited amount of time between pours to get the cable installed and tested before the concrete was poured. The firm had someone present during each pour to inspect and test the system in case the concrete crew broke it or something malfunctioned during the pour.

Fortunately, Meade did not have to pull cable out of wet cement for repairs, but that would have been easier than waiting for it to dry. The cable is strong enough to withstand the cement workers walking on it, Slagis says.

To keep the cable suspended at the proper level inside the slab, Hicks' crew tied smaller rebar to the reinforcing bar and then fastened the snow-melt cable to the rebar with cable ties. The workers installed the 104 separate cables on 6-inch centers, Hicks says, based on a layout provided by Delta-Therm and the engineers.

"In most cases these are elevated slabs so you had air getting underneath them, which made it more critical to have snow melt because it's like a bridge and would freeze quickly," Hicks recalls.

The cable can't cross expansion joints that might experience vertical shear, Slagis says. Because the cable couldn't cross expansion joints, Meade had to put separate cables in each slab and then tie two slabs together electrically in pairs.

The size of the layout in each slab also has practical considerations. Electrical equipment is economical up to 40 amps, Slagis says, so that limits circuit size. Moreover, one worker can handle a coil of cable of 300 to 350 feet without help, a practical consideration for installation labor.

Slagis also strove to balance the load electrically. He designed it to minimize the number of circuits; to balance the load across all three phases off the 480-volt, three-phase system; and to balance the loads inside each electrical panel. Because Trekas laid out the system, he told Slagis where all the panels were located beforehand.

Meade also installed six SMC-120A automatic snow-melting controls supplied by Delta-Therm. The sensors detect moisture, ambient temperature and slab temperature, Hicks notes. The system activates when two moisture sensors detect moisture, ambient temperature is less than 40 degrees Fahrenheit and slab temperature is less than 35 degrees.

"You have to have moisture and cold in order for it to come on," Hicks says. "You could have either a cold slab or cold air but if there's no moisture, it wouldn't be on. On the other hand, even if snow is not falling, if people are bringing it in with their cars, the sensors are situated so the runoff from cars would show up as moisture, so you don't get buildup from people driving off the street with it."

The system will heat until the slab temperature is 50 degrees or higher. At that point the surface will usually be dry, the system shuts off and the slab temperature coasts back down toward 32 degrees.

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