REMR Technical Note HY-N-1.11

Heater Panels for Ice Prevention at Roller Gate End Recesses

Purpose

The purpose of this technical note is to describe techniques for preventing or shedding ice buildup at roller gate end recesses and downstream concrete walls.

Equipment, Tools, and Personnel Requirements

A concrete drill and regular hand tools are required. The heater panels are 4 ft by 8 ft by 1-1/4 in. and 3 ft by 8 ft by 1-1/4 in. Each panel weighs about 300 lb and can be attached to the concrete wall by two to three men working from a boat or barge. A small crane or come-along can be used to position a panel for mounting.

Applications and Limitations

Ice can buildup on the concrete walls at the end of roller gates and has even punctured the ends of the gates. Ice can also buildup on the concrete wall just downstream of the gate. The end shield strikes this ice and prevents movement of the gate. These areas are shown in Figure 1. Shown in Figure 1 are two 3000 W infrared heaters that can be lowered near the lifting rack to keep it ice free. The heater panel shown in Figure 2 can be mounted in the recess at the end of the roller gate. The heater panel is made of two 1/4- by 48- by 96-in. aluminum plates separated by seven spacers. Between the spacers is placed a 40 W/ft self-regulating heat cable. The end of the heat cable and the junction to the 240 VAC supply wire must be absolutely waterproof. This can be done by using Scotchcast 2130 poured into plastic molds placed around the heat cable. A heater panel of another size (Figure 3) can be placed just downstream of the gate, as shown in Figure 1. It is important to mount the heater panels with flush mounted flathead screws.

Step-by-Step-Procedure

For fabricating a heater panel, a full set of working drawings can be obtained from the point of contact. After fabrication of a heater panel, 13/32-in. countersunk holes are drilled in the panel for mounting. These holes are used as a guide for drilling holes in the concrete wall. The mounting is

accomplished by placing 3/8- by 2-1/2-in. flathead Tapcon screws or equivalent through the panel into the concrete. The number of panels and their exact location is based on known problem areas of ice buildup.

Advantages

A heater panel field-tested at Starved Rock Lock and Dam in 1994 was very successful in preventing ice growth on a miter gate recess concrete wall. A distinct advantage of the self-regulating heat cable is that it draws less electrical current as it heats up. For example, at 30° F it may draw 8 amps while at 65° F it will draw only 2 amps. A thermostat can be used but is not necessary. Heater panels can be made in any size and shape. They can be bent to fit around curved surfaces. Different sizes of heater cables can be used, e.g. 20 W/ft instead of 40 W/ft. The estimated cost of materials for one panel is about $1,000.00. The heater panel can be operated constantly to prevent ice buildup or intermittently to shed ice. The heater panels are made of aluminum because it is lightweight and a good conductor of heat and it does not rust.

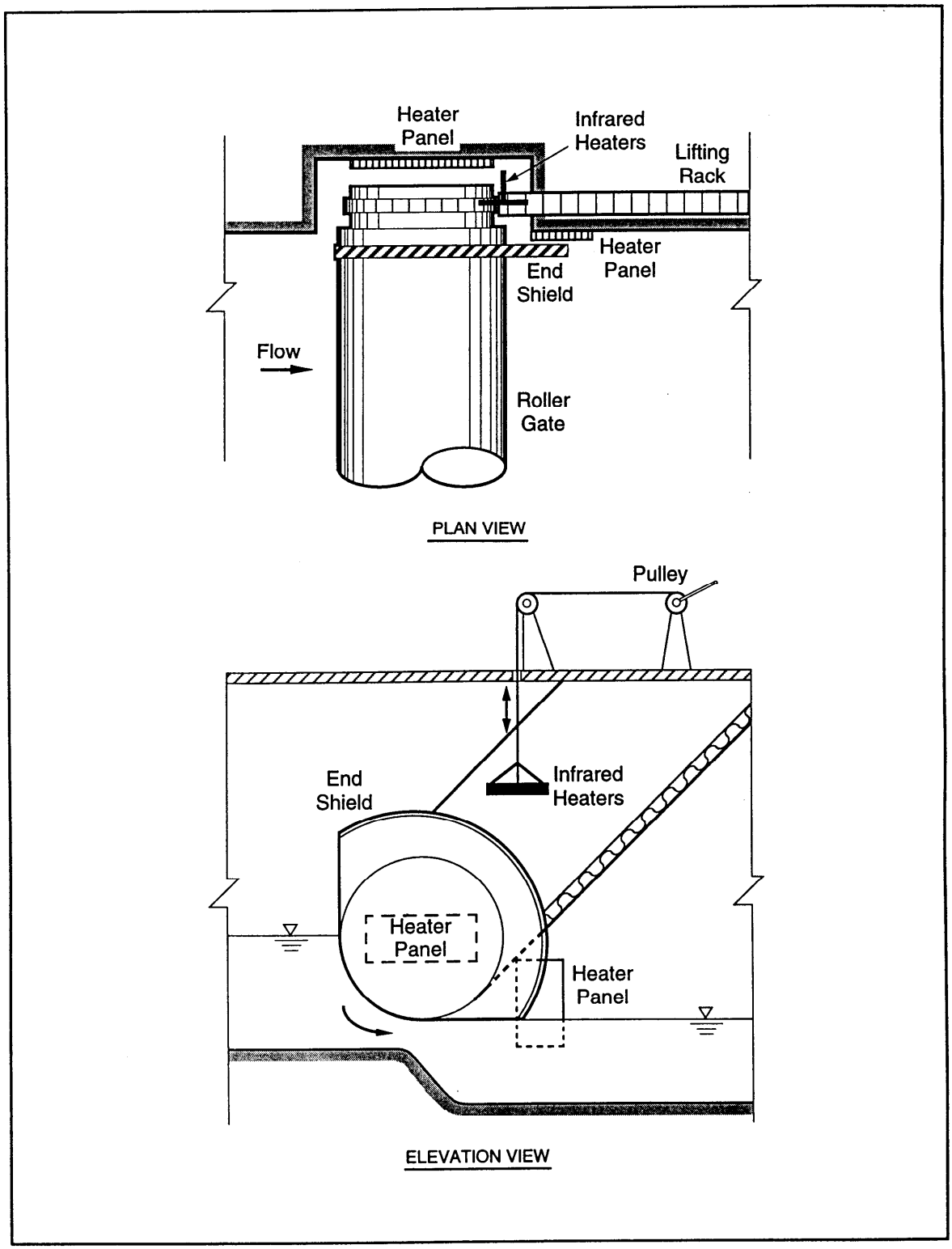

Figure 1. Schematic showing locations of end shield and infrared heaters

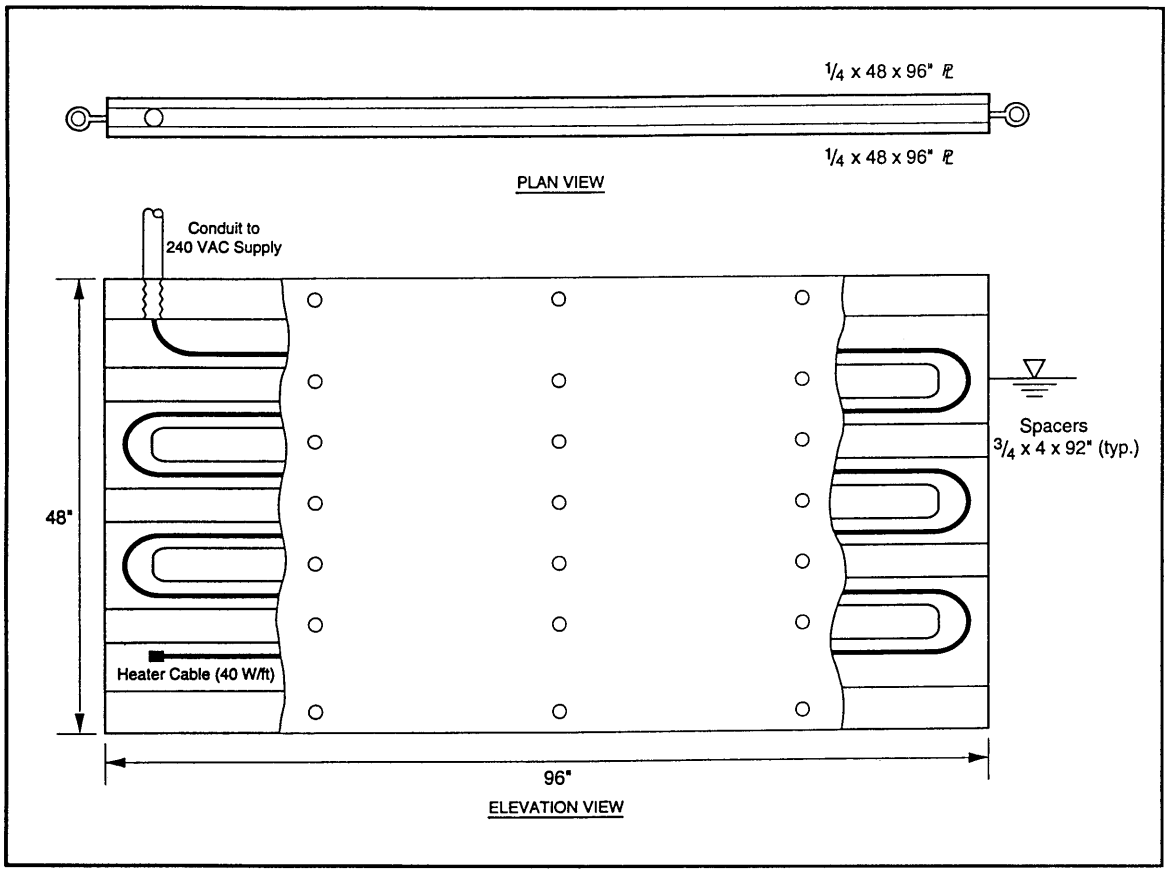

Figure 2. Schematic of heater panel

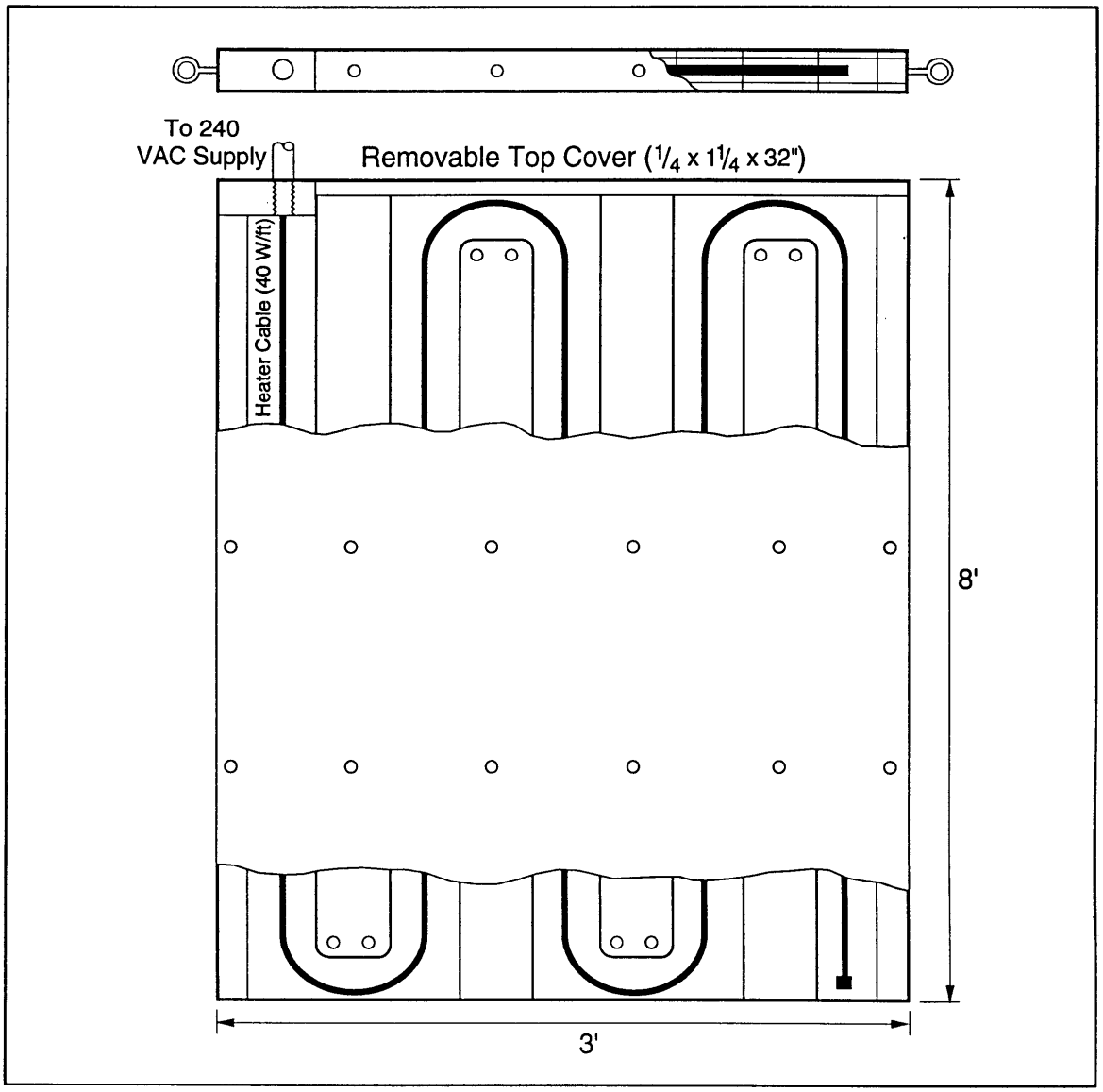

Figure 3. Another size heater panel