



**US Army Corps
of Engineers**
Engineer Research and
Development Center

Cable-Based Roof Moisture Detection and Location System

Problem Moisture in roofs is a major problem. Wet insulation promotes heat loss, and deterioration of roof components leads to expensive repair or replacement efforts.

Description Researchers at the Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, have designed and constructed a cable-based roof moisture detection and location system (patent # 5,648,724) to monitor roofing for the presence of moisture. The system has demonstrated a capability to detect and locate wet areas in low-slope roofing. A metallic time-domain reflectometer (MTDR) can pinpoint the location of the boundary between dry and wet insulation to within 1 m (3.3 ft) over 30.5 m (100 ft) for up to four separate portions of wetted cable. CRREL is seeking a commercial partner to work with to further develop and commercialize the sensor for roof applications.

Expected Products In-the-roof sensor technologies include cable systems and individual sensors. Some cables note the presence of moisture by closing a circuit. A type of individual embedded sensor incorporates water-activated battery-powered autonomous transmitters mounted in an array within the layers of low-slope compact roofing. When the battery becomes wet, the associated transmitter sends a signal that indicates wetting and identifies the location.

Potential Users This technology would benefit buildings that have low-slope roofs, as well as the individuals and organizations (e.g., installation DPWs) responsible for maintaining them.

Projected Benefits Early detection of leaks in low-slope, compact roofing systems can save significant maintenance costs, because repairing or replacing these roofs can cost 76 to 108 \$/m² (7 to 10 \$/ft²).

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