

# Methods of Determining Moisture and Rising Damp in Buildings

## Microwave Radar

Microwave radar is a technique that sends high frequency radio waves into materials to assess the interior conditions of the material. Some interior conditions can be identified based on the reflections generated by internal features. Based on the velocity of radar waves in a building material, materials that have absorbed significant moisture can be distinguished from the same materials that are dry.

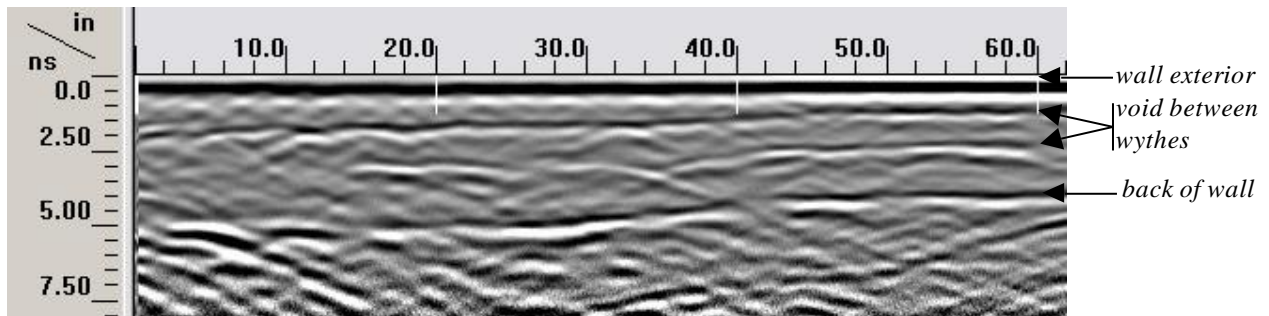
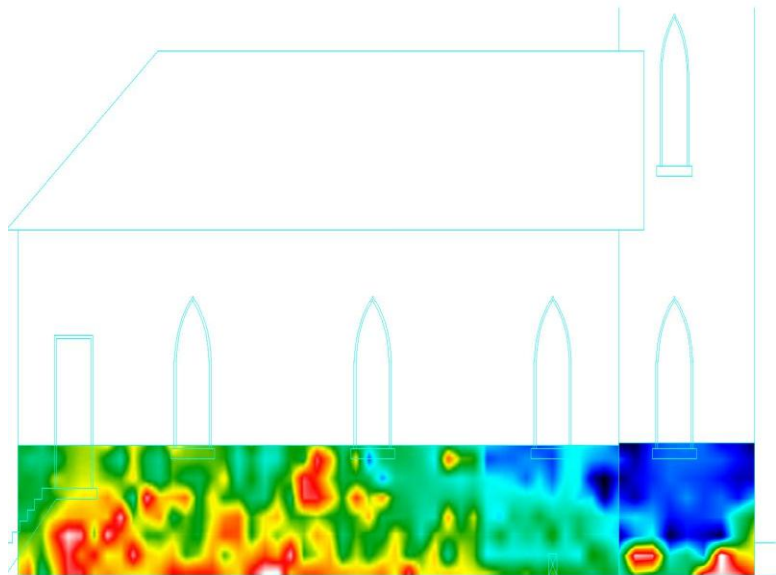


Figure 1 – Vertical radar scan of wall. Reflection time to the back of the wall ranges from 5 ns at the bottom of the wall where there is a higher level of moisture to 3.8 ns where it is dryer at five feet above the sidewalk.

Figure 2 – Map of radar velocities on elevation of church with rising damp. Red areas indicate low radar velocities corresponding to high moisture content of the masonry.



## Drilling

Moisture samples can be obtained from the building by drilling and drying the collected dust. With rising damp, a series of probes are made at various heights to develop a moisture profile.



Figure 3. Moisture sampling.

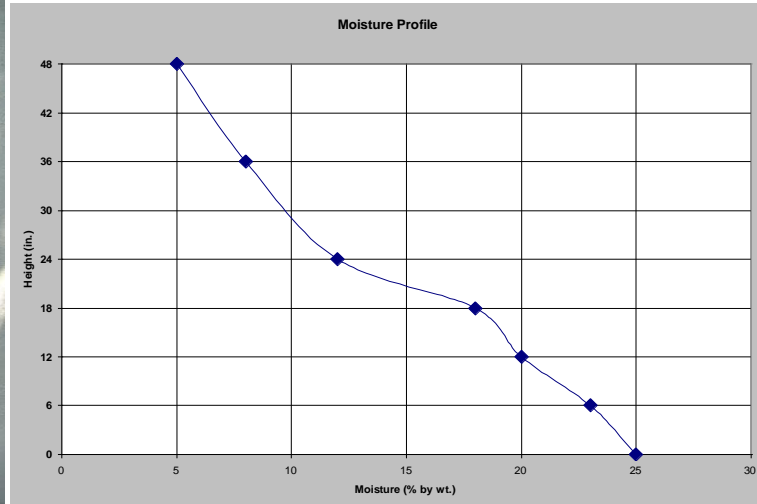
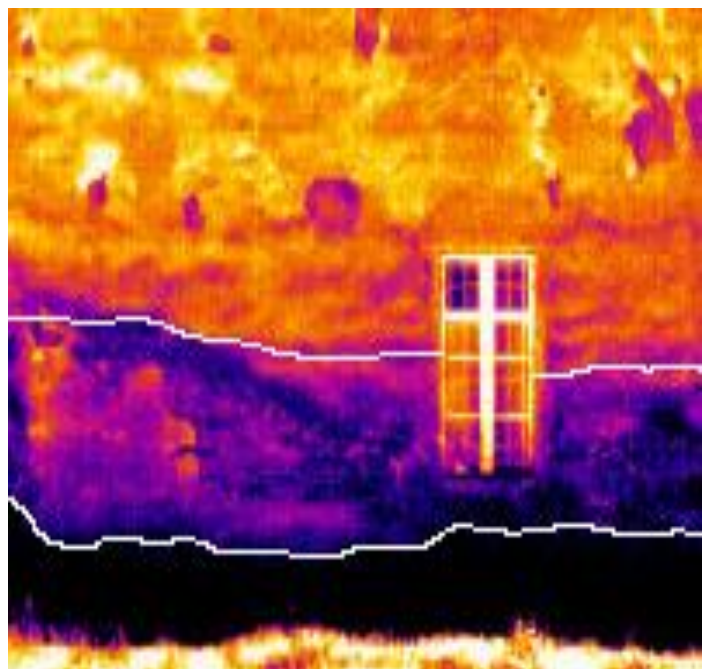


Figure 4. Plot of moisture content vs. height above grade.

## Infrared (IR)

Infrared cameras detect the radiation given off by objects as a result of their surface temperature and surface characteristics (emissivity). When building materials are damp and the surrounding air is dry enough to promote evaporation, the surface will be cooled by the evaporation. The figure below shows the thermal effects due to rising damp on a masonry building.

Figure 5. Thermal gradient due to rising damp. The lowest area had a moisture content of 16%, the middle area 9% and the area above the higher white line had a moisture content of 4% (photo courtesy of Jonathan Spodek,, Ball State University)



## Moisture Meters

Hand held meters are available that are capable of measuring the relative presence of moisture in materials for up to 4 inches in depth. The instruments measure the capacitance of the substrate which is influenced by the presence of moisture. The figure below shows a typical instrument.

Figure 6. Moisture meter in use on a clay masonry wall. Values indicated by meter are relative moisture content based on calibration with each particular material.

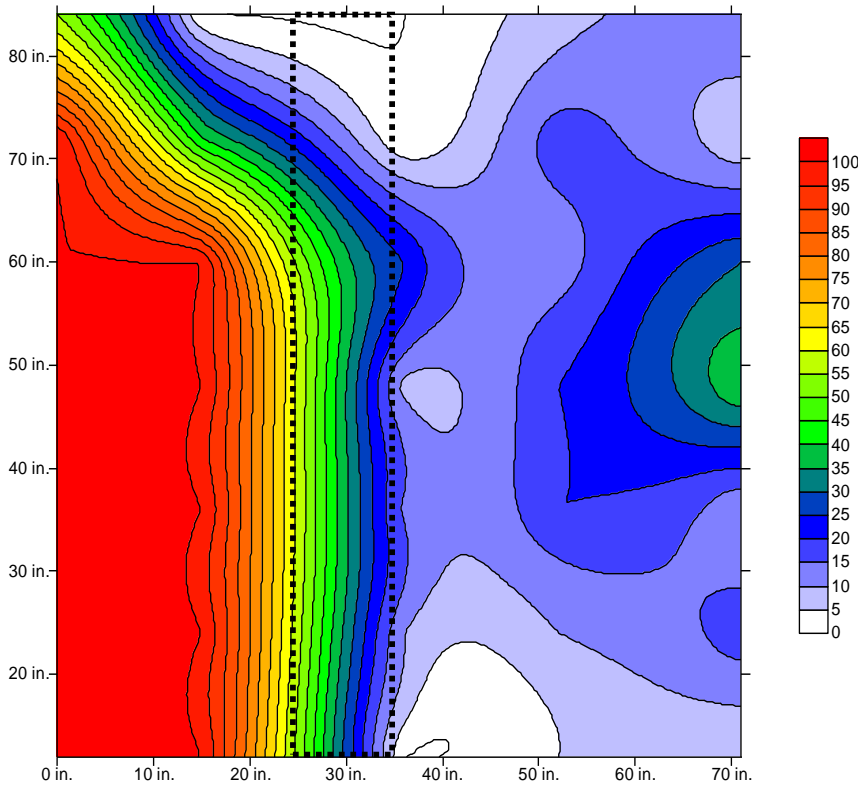


Figure 7. Results of moisture survey of a masonry wall. The scale at right indicates relative moisture content, with a reading of 0 being dry and 100 being damp. Horizontal and vertical axes are measured in inches. Moisture appears to be coming from the floor above, rather than the exterior wall at the right side of the image. Heat from steam pipes (inside dashed line) also is having a drying effect.