Common sense: Monitoring of vulnerable wooden constructions

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The church of Værnes in the middle part of Norway is a medieval stone church. The original roof construction is preserved both in the nave and in the chancel. The construction in the chancel is dendrochronologically dated to about 1140. The most vulnerable part of the roof construction is in the chancel where it is built into the top of the wall construction. Some times ago a leakage occured where the chancel roof is jointed to the east wall in the nave. Early in 2009 water began to drip through the ceiling and into the chancel. Later dry rot fungus was detected in parts of the construction. The Norwegian Institute for Cultural Heritage Research (NIKU) was engaged to document the damages and to make a plan for repair work that was executed in 2010.

In 2008 NIKU was engaged to make a technical investigation of listed buildings in Norway dated after 1537 in the county of Telemark, in the middle part of southern Norway. Most of the buildings were log built houses from the 17th and 18th centuries with turf on the roof. Originally the turf was used to press down a layer of birch bark that was put upon the roof boards to prevent rain water from coming into the house. In addition the turf would isolate the house in the winter. In modern times the bark has in most cases been replaced by roofing felt or plastic moisture barrier for foundation walls but in principle the construction works the same way. A frequent find during the investigations was rot in the lower part of the roof construction where moisture was collected in turf with direct contact to the wooden parts. Most damages were on the north side of the houses where the sun is not strong enough to dry the turf. The damages were reported but it is uncertain what will happen to them.

In some cases it is difficult to predict damages in wooden constructions. A sudden storm can cause structural difficulties, and a piece of wood can contain a hidden weakness. In other cases, however, it is not so hard to say what can or will happen. One example is the above mentioned leakage that allowed water to penetrate into a roof construction that is built into a wall construction with stones and mortar. There must be rot. In some cases it will even result in dry rot fungi.

The roof construction in the chancel in the church of Værnes is a type that is known from seven other Norwegian medieval stone churches where the original roof construction is more or less preserved. One possibility is to install a wood moisture meter in the construction to measure the amount of humidity in the wooden parts at any time. Another possibility, however, is to make frequent investigations of the constructions and make sure that no leakage is allowed to take place.

Also the roof constructions with turf can be monitored by use of moisture meters. In this case, however, the constructions can be counted in the thousands. They are simply too many to use this kind of equipment. With the predicted change to a wetter climate in Norway in the future there will even be more damages in the roofs with turf.

Again the key is to know the structure and the problems that might occur. Another word for the same is common sense. One solution is to make sure that no more wooden parts than necessary are in direct contact with the humid turf. Another solution is to install a removable piece of wood to protect the most exposed parts of the roof construction. In earlier days farmers would do things like that all the time.

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There could also be an historical answer to the problems with the rotten roof constructions. In the 18th and 19th centuries there was a tradition for using wooden boards on the roofs in some parts of the country. In the living houses the boards were put upon the turf. By using a similar technique in the restoration of historic buildings in the same area it is possible to attain a better technical solution and in some cases even get a more authentic result.