BUIDLING INVESTIGATION

ST MARY'S CHURCH
DEVIZES

09 April 2013

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BRIEF:
Instructions were received via Richard Heath of Momentum Engineering to visit St Mary's Church, Devizes, to carry out a non-destructive investigation of stone ledgers, timber floors and ventilation ducts, and prepare a written report.

NOTES:

The on-site assessment was carried out on 09 April 2013.

All measurements are in millimetres. Where an area of degradation is dimensioned, the dimension defines the limit of the degradation's significance, unless otherwise defined.

For identification purposes, it is assumed that the church aligns east-west.

SPECIALIST EQUIPMENT USED

Sibert DDD200 microdrill
The microdrill works by recording the rate of penetration of a 1mm diameter probe as it penetrates into the timber being tested, up to a depth of 200mm. The better the condition and quality of the wood tested, the slower the rate of penetration. The results can be recorded to a paper chart, from which the quality and condition of the timber can be assessed, and the presence and extent of any degradation can be measured and located within the cross-section. The hole left by the probe after testing is 1mm diameter, and is indistinguishable from a furniture beetle flight hole.

Protimeter MS moisture meter
The Protimeter measures the electrical resistance of the timber between two prongs a fixed distance apart, and correlates this to the moisture content of the material. In practice, there are many factors, such as salts and surface finishes etc, that will alter the resistance of a material, and therefore the accuracy of the moisture content readings obtained. Moisture meter readings taken at or near the surface of the timber will also vary from day to day, depending on changes in weather and seasonal variations. The results should be treated with some caution, but do give a reasonably reliable measurement, and can be useful in establishing a pattern of moisture distribution.

Amber Raytheon Radiance PM thermographic camera
The thermographic camera measures very small temperature differences at the surface of elevations caused by variations in the thermal properties and moisture content etc of the various materials that make up the fabric of the wall, and which are often concealed behind the surface finishes. The Radiance PM is the most sensitive thermographic camera available on the civilian market, capable of identifying temperature variations as small as 0.1^{o}C.

Endoscopes
Everest-Vit 10mm x 400mm rigid borescope
Hawkeye flexible borescope.

Ultrasound
PUNDIT ultrasonic test equipment with 25KHz and 100KHz transducers.

REPORT

The brief required a non-destructive investigation of the nave floor to establish as far as practicable:-

1. The thickness of the stone ledgers and floor slabs in the central and side aisles
2. The construction of the timber floors under the pews
3. The construction of the heating vents within the floor depth.

Ledgers and Slabs

The stone ledgers and floor slabs vary in thickness between 55mm and 125mm. Generally, as might be expected, the smaller stones are thinner, typically under 75mm. The larger ledgers, particularly in the central aisle, are typically thicker than 100mm.

The stones of the central aisle seem to be bedded on a compacted aggregate contained between brick dwarf walls running each side of the aisle. There is probably some voiding under the stones. There may also be intermediate brick cross walls under joints.

In the side aisles, the smaller stones of the side aisles are supported on brick dwarf walls, running across the aisle (i.e. north-south) seemingly built as necessary to suit the stone sizes. The cross walls are relatively crudely constructed, and built with what appears (by visual examination only) to be relatively strong cementitious mortar. The dwarf walls running east-west are more neatly constructed and have been limewashed. It seems reasonable to deduce that the cross walls are a later alteration/intervention.

The clear void under the slabs is typically 200-250 deep from underside of stone. There is no evidence of any infill between the brick walls.

Photograph of underside of side aisle showing:

1. Underside of ledger
2. Ventilated brick wall running east west.
3. Brick cross wall supporting ledgers and slabs.

Figure 1

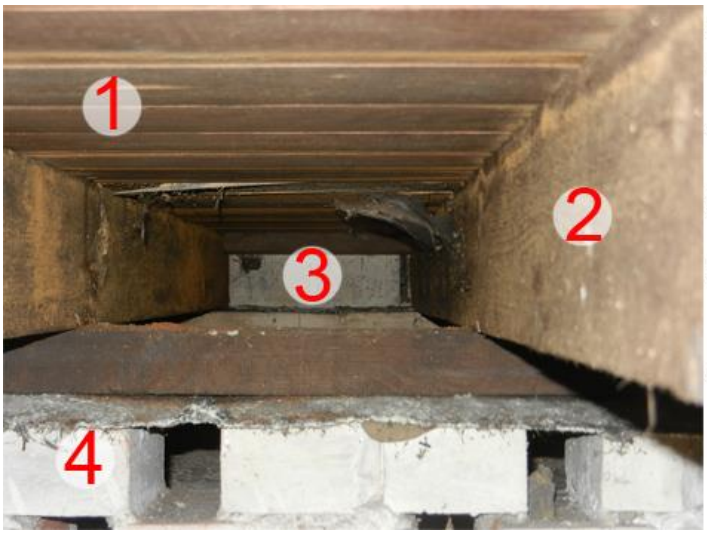
Some of the 'slabs' used in the side aisle have lettering cut into the underside, indicating that they are actually ledgers that have been inverted and re-used.

Photograph of underside of ledger in side aisle, showing incised lettering.

Figure 2

Timber Floors

The timber floors under the pews are approximately 4000mm wide and consist of softwood boards laid on 115d x 75w softwood joists spanning north-south at 375-400 centres. The joists bear on softwood plates on brick sleeper walls at approximately 2000mm crs. The wall at the edge of the central aisle is solid, probably a full-brick (225mm) wide, but possibly only half-brick (110mm) wide. The sleeper walls set approximately centrally and at the edge of the side aisle are half-brick wide, both with a honeycomb bond to allow cross ventilation. There are sundry additional supports bearing on foundation stones where they rise above the general sub-floor level. The sub-floor void is typically 200-225mm below the soffit of the joists.



Photograph of underside of timber floor, showing:

1. Underside of floorboards
2. Joist running north south
3. Solid brick wall adjacent to central aisle
4. Ventilated brick wall at approx. mid-width of timber floor, and running east-west.

Figure 3

There is no evidence of any significant degradation in the timber, although in many places, the moisture content on the joists and underside of the floor boards is 20-22%mc, which is close to the level at which fungal activity can survive. In one location adjacent to the central aisle, there were free water droplets on the underside of one plate. The general conditions in the sub-floor voids would not normally generate this sort of condensation, and the source and cause of these water droplets cannot be determined.

The timber floors to the outer side of the side aisles are of the same construction.

Heating Ducts

The brick-lined ventilation ducts run up from the original boiler room in the basement. They terminate in square 1200x1200mm chambers built each side of the central aisle, covered in perforated cast iron grills. The ducts are 1100mm wide and typically 700mm high. The duct supplying the south chamber drops down to run under the north duct. No evidence could be found for the brick ducts extending to other areas of the church, which is perhaps surprising. The ducts are almost certainly C19th, and pipework for the mid-C20th heating system runs through the ducts, and then continues to supply radiators in other areas of the church. It is possible that ducts were infilled during the installation of this pipework, but no evidence could be found for this.

The ducts seem to drop down to the basement boiler room, but the ducts are now bricked up and partially filled with loose bricks – presumably when the heating system was changed to a piped wet system.

Photograph of heating duct where it drops down towards the boiler room in the basement.

The duct has been bricked up and partially filled with loose bricks.

Figure 4

In the small chamber the leads off to the west from the basement boiler room, a number of human bones including a skull have become exposed, presumably by disturbance to the chamber roof.

Photograph of chamber to west of boiler room showing human bones, including a skull

Figure 5

Conclusions

The present floor of the nave is almost certainly entirely of C19th or possibly early C20th construction, but incorporating older ledgers in the central aisle, crossing and side aisles. There have been some significant alterations since the original brick ducts were installed, presumably when pipework and radiators were installed.

It is clear that the ledgers have been re-sited and in in at least some cases inverted so that the inscriptions are now obscured.

Report Prepared by:

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