Gethin Harvey

From: Christina Emerson <christina.emerson@spab.org.uk>
Sent: 26 April 2022 16:02
To: Poppy Crooks
Cc: Gethin Harvey
Subject: Cambridge, King's College Chapel - Proposed renewal of roof covering and installation of photovoltaic panels and rainwater harvesting facilities

Dear Poppy,

Thank you for seeking pre-application advice from the SPAB on the proposals for King's College Chapel, Cambridge. The proposals were discussed by our Casework and Technical Committees recently and I am now writing to you with their comments.

The committees noted that the Chapel, which was built between 1446 and 1515, is an outstanding example of the craftsmanship of the period. Internationally significant, it is an iconic building in the Cambridge townscape. The College wishes to carry out the re-roofing of the chapel and essential repairs of the roof structure. It also wishes to Install solar PV arrays to the main chapel roof and rainwater harvesting facilities. The project architect has set out a number of questions for consultees so we have used these to structure our response, as follows:

1. Is the scheme proposal for the re-roofing of chapel and the essential repair of the roof structure supported?

The lead roofs are clearly suffering from a number of problems, the full extent of which may not have been discovered. The report does not say how many bays have been lifted and inspected. The main issues appear to be over-fixing of sheets and rolls, the use of inadequate nails and possibly relatively thin lead for such an exposure (Code 6). This has resulted in creep, splits and tears and allowing water ingress to cause rot to timbers and boarding. There is also water ingress at the parapet/gutter junctions attributable to maintenance issues. Underside corrosion has been identified including some very active patches but the full extent is not defined.

Total replacement of all the leadwork can be controversial, particularly if it includes altering historic designs to accommodate the recommendations for new roofs. Good conservation practice seeks to ensure that a roof is weathertight but repairs should maximise the amount of historic fabric and detailing that is retained. Problems occur when a roof profile is raised to accommodate ventilation causing difficulties with abutment detailing, particularly if window cills or other details are situated close to the lead surface. Conforming to today's standards also call for defined bay sizes and the introduction of drips on low pitched roofs which will have a drastic effect on historic detailing and appearance, particularly for 'oversized' bays. Many of these have survived on historic buildings for centuries without harm, so the need for change should be justified.

The situation at King's is different, because raising the roof on a pitch of 20° plus should mean that laps will be retained. The bay sizes will alter depending on the weight of lead used and ridge detail will change but apart from its elevation, there will not be much visual difference. Hollow rolls as proposed would be an advantage as these are certainly more correct historically, but they have also shown to be less prone underside corrosion.

The LCA report concedes that the roof and gutters have performed well, particularly the N slope which has performed for over 160 years. However, the defects are worse on the S slope which is now causing water ingress and are only likely to get worse. The QI identified substantial defects over most of the roof which suggests that it is all suffering. Complete stripping and recasting is an inevitable and traditional treatment for any lead roof when piecemeal repair are regularly needed.

The gutters have apparently performed well so it is questionable whether these need to be replaced, particularly if the walkways which seem to have protected them, are to be retained. Minor repairs can rectify most of the identified shortcomings, including the water ingress which is leading to rotted boards. Ventilation is suggested as a way of dealing with underside corrosion, but this requires complete replacement and redesign. The report does not make clear how widespread the corrosion is.

The significant cost of major works to roofs, raises the temptation to carry out the maximum in order to try and ensure that it will not need doing again for over a century. Whilst a strong argument can be made for replacing the main roofs, this is not the case for the gutters. However, climate predictions indicate that although total rainfall may not increase in the east, deluge storms and more dramatic rain events are expected. This proposed redesign of new gutters (including the use of Code 9 lead) will enhance the chances of the roof coping with extreme conditions. If the walkway boarding is returned the gutters will not be visible.

2. Is the scheme for access and temporary roofing supported? What further details would be needed?

In the view of the Society, a temporary scaffold roof is always good practice when major roofing work is proposed to an important historic building. Besides protecting precious interiors, they allow continuous working, prevent timber from getting wet and allow mortar to cure effectively. They also provide time for an effective recording of previous roof designs if evidence such as old nail holes survive. We are content to defer comment on the founding and fixing proposals to others. Our only query would be how heavy materials can be transported along the gutters from the loading deck without a continuous external scaffold which is the normal arrangement.

3. Is the proposal for a new PV array supported? Are the initial views and impact analysis in this paper sufficient for the purposes of consents? Do the regulators need to see trials and mock ups before determining an application? What challenges or questions around justification might need to be answered in the context of the wider college estate environmental strategy?

The proposed array would extend the full length of both slopes and, while the architect's report states that there will be some moderate impact on views of the roof, with glimpses of the roof through the parapets, it was evident from the site visit that the visual impact will be far greater than this as the roof slopes are clearly visible from the ground within the college buildings as well as from a number of key viewpoints. While the Committee members were generally supportive of the principle of a PV array in this location, they felt strongly that, with such an important building, the aesthetics of the proposal must have greater weight than in other schemes. This is likely to be regarded as a precedent, which if not done well, could have adverse consequences for other highly-designated buildings contemplating similar schemes.

It was felt essential that the panels did not appear above the ridge line and the view through the tracery of the parapets should be given careful consideration to see if there might be some means of installing a mesh or screening that could help to break up the hard reflective line of an installation. It was also felt that the north facing array was unlikely to be able to pass any test of harm vs benefit. The north facing array is proposed at a pitch of 24 degrees, at which pitch it will only be 60% efficient: shallower pitch is needed to increase efficiency beyond this point. Nor were we convinced by the shading report in respect of the north face and we would like to see more information on how the tall parapet pinnacles would affect performance, and how this would be mitigated (perhaps by using a solar edge or similar invertor).

We would wish to see more details on the panel fixings and view this as a critical matter as the height of the panels and their fixings may result in greater visibility than suggested in architect's report. We would also wish to see a discussion of the options for the panels themselves as there are a number of these including commissioning a bespoke colour, frameless glass (bi-facial) models, and thin film technology which can be welded to the roof in strips. This avoids the need for frames and fixing structures but compatibility with a lead roof would need to be investigated. If a frame is employed, then matt black edging rather than silver can be used to minimize glare.

The conclusion reached by the Committees was that the final solution may need to be smaller to be acceptable, be very well designed, and possibly only occupy the south roof. The aim should be to create an exemplar installation sized to meet the energy needs of the chapel and responding sensitively to its context.

A mock up is considered to be absolutely essential and must involve the specified fixing system and panels that will be used, rather than painted plywood, for example. We understand from the local conservation officer that a number of other colleges have employed mock ups of this nature. While Committee members accepted that there would always be places where such an array would be visible, there were certain views which were important as mentioned in the report. One view not mentioned in the report was that from Castle Mound, although this was identified as a key view in the 2018 Local Plan appendix. Members noted that the photos in the architect's report did not give a very accurate depiction of the impact of the panels and felt that a full verified views analysis should be carried out.

4. Is the proposal for the installation of rainwater harvesting facilities supported in principle?

The committees were content to support this in principle but would prefer to comment further once details of pipe runs etc. become available, together with an archaeological report detailing any impact the installation would have.

We hope that this initial response is helpful to the DAC and the College and look forward to commenting further as the proposals evolve.

With best wishes

Christina

Christina Emerson
Head of Casework
020 7456 0910

The Society for the Protection of Ancient Buildings
37 Spital Square, London E1 6DY