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**From:** Patrick Bonfield <patrick@webb-architects.co.uk>  
**Sent:** 31 December 2019 12:46  
**To:** Sild, Thomas  
**Cc:** Richard Webb  
**Subject:** Re: 1221-1 Chamberlain Street-Air Conditioning

Hi Thomas,

The following cooling hierarchy points in the guidance have been considered as below highlighted in blue. Prior to any work being undertaken there has been excessive heat build up during some days in the summer months making the bedroom space on the top floor virtually uninhabitable. The proposed work on the house will improve the situation so there will be less reliance on the mechanical cooling and shorten the days it is required, however to make the space habitable during these days it is a requirement to supplement the cooling with the proposed mechanical means.

10.7.-

**1. Minimise internal heat generation through energy efficient design**, considering the following:

- • Layout and uses: locate any spaces that need to be kept cool or that generate heat on cooler sides of developments.

There is no option here to change the layout as the main bedroom is on the top floor. It would not be appropriate to lose a bedroom space or locate a living space on this floor.

- • Reducing heat gains e.g. including low energy lighting.

The house will have the lighting redesigned with all bulbs proposed as LED. The main roof will have a higher specification of insulation added to reduce heat gain.

- • Seal/ insulate heat generating processes.

All new pipework will be insulated and sealed to reduce heat gain.

- • Reduce the distance heat needs to travel and insulate pipework.

The house is a tall building with limited storage space. The cylinder and boiler are located in the lower ground floor as this is the only space available for this equipment.

- • Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.

The proposed work is following the original layout of spaces and is a refurbishment. It has therefore not been possible to redesign the layout.

- • Consider evaporation cooling which cools air through the evaporation of water.

There would be the need for roof mounted fans that were deemed inappropriate for the listed building.

- Consider 'free cooling' or 'night cooling', which uses the cooling capacity of ambient air to directly cool the space.

This would require ducts running through the building from lower ground to third floor and the impact on the space and the listed building fabric too great to be possible to introduce.

## 2. Reduce the amount of heat entering a building in summer:

- Consider the angle of the sun and optimum daylight and solar gain balance.

The existing and proposed face the same southerly orientation. There is no scope to change this as it is a refurbishment.

- Orientate and recess windows and openings to avoid excessive solar gain.

The existing and proposed face the same southerly orientation. There is no scope to change this as it is a refurbishment. The windows however are set back into the opening to minimise heat gain.

- Consider low g-values and the proportion, size and location of windows.

The proposed external windows on the third floor are specified as having a solar control element to the glass to reduce heat gain. The other windows to the rear elevation facing south are existing sash windows and therefore there can be no improvement to these.

- Make use of shadowing from other buildings.

The building is an existing building and therefore cannot utilise this aspect.

- Include adequate insulation.

The main roof will have a higher specification of insulation added to reduce heat gain to the bedroom below.

- Design in shading: e.g. include internal courtyards, large shade-providing trees and vegetation, balconies, louvers, internal or external blinds, and shutters.

The building is listed and the addition of a louvre would have an impact on its appearance and the conservation area.

- Make use of the albedo effect (use light coloured or reflective materials to reflect the sun's rays).

The proposed frames to the new windows to the bedroom at the third floor level will be white in colour to reflect the sun's rays.

- Include green infrastructure e.g. green wall, green/blue roofs and landscaping, to regulate temperatures.

The existing main roof above the bedroom on the third floor would not be appropriate for a green roof due to the additional load this would create.

- Reduce the amount of heat entering a building in summer.

## 3. Manage the heat within the building through exposed internal thermal mass and high ceilings.

It is not possible to increase the thermal mass of the building and utilise this as it is a refurbishment of a listed building. The ceiling heights are also fixed as existing.

#### 4. **Passiveventilation:**

- Natural ventilation, openable windows, the ‘stack effect’ system (see Chapter 3 of this guidance).

With the windows open during the summer months the use of natural ventilation is not sufficient to lower the heat build up to a reasonable level.

- Design layouts to promote natural ventilation e.g. shallow floor plans and high floor to ceiling heights.

The proposed work is following the original layout of spaces and is a refurbishment. It has therefore not been possible to redesign the layout.

- Consider evaporation cooling which cools air through the evaporation of water.

There would be the need for roof mounted fans that were deemed inappropriate for the listed building.

- Consider ‘free cooling’ or ‘night cooling’ which uses the cooling capacity of ambient air to directly cool the space

This would require ducts running through the building from lower ground to third floor and the impact on the space and the listed building fabric too great to be possible to introduce.

#### 5. **Mechanicalventilation:**

- Ensuring the most efficient system possible.

The most efficient system will be specified. A green energy supplier will also be utilised for electricity.

- Consider mechanical ventilation with heat recovery

There is not a suitably large enough storage space for the required equipment and routing ductwork would have a negative impact on the space and the building fabric.

Best regards

Patrick Bonfield

Architect RIBA

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