

Royal College of Physicians

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**Replacement of air
conditioning chiller**

**Design and Access
Statement**

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7341 Design and Access
Statement

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Design and Access Statement in support of a Listed Building Application for the replacement of an existing air conditioning chiller at the Royal College of Physicians

1.0 INTRODUCTION

The Royal College of Physicians is a professional and learned institution which occupies grade 1 listed premises at 11 St Andrews Place, Regents Park, London. The premises are used for administration, meetings, lectures, receptions, dining and include some residential accommodation for members.

Parts of the main building are provided with air conditioning systems which rely upon chilled water for cooling purposes. Chilled water is currently generated using a water cooled liquid chiller located in a basement plant room. The existing chiller is 15 years old and is approaching the end of its useful life. Notably, it operates on refrigerant R22, a substance that, from January 2014, it will no longer be able to obtain for maintenance purposes. The existing chiller is inefficient, compared to modern equipment, and The College is committed to a programme of improving efficiency and reducing carbon impact wherever possible. It is for these reasons that permission is being sought to replace the existing chiller.

2.0 THE SITE

The main building is identified in red outline on the site location plan, reference 7341 P 001. Other, adjoining buildings occupied by The College are identified in blue outline on the plan.

The chiller and associated equipment are located in a basement plant room, the position of which is identified on drawing reference 7341 P 002. Routine access to the plant room may be gained from inside the main building. A secondary means of access and escape is provided up the adjacent stairs to external doors at ground level on Albany Street. It is this secondary means of access that would be used for plant removal and replacement.

The chiller is connected to a system of dry air cooling coils and ventilation fans at roof level which are currently used, at night, for heat rejection in conjunction with an ice storage system. It is proposed that this equipment be retained, un-modified, for use with the new chiller.

An exhaustive feasibility study has been carried out to consider alternative design strategies for the new equipment. The option which was considered most appropriate is the one for which listed building permission is now being sought. The rationale for selecting this option was as follows:

- The new equipment replaces an existing machine which is life expired, inefficient and unserviceable.

- The proposed system has the highest possible efficiency and the associated carbon emission is as low as possible.
- The proposed system would allow chilled water to be used at night with air conditioning systems that protect rare books and objects in the College collection, recently awarded Museum status. Chilled water is only currently available during the day as the chiller system regenerates an ice store during the night. Humidity conditions regularly fall outside recommended limits at night.
- The acoustic impact of new equipment has been carefully checked. The new chiller compressors are significantly quieter than the existing ones. Existing heat rejection plant at roof level is to be reused but enabled to run during the day.
- The external appearance of the building is completely unchanged.
- The only alterations proposed to building fabric involve the temporary removal of internal plant room walls and a steel staircase. These elements were originally designed for temporary dismantling to allow for plant removal and replacement. The walls will be rebuilt and the staircase reinstated on completion of the proposed works.

3.0 DESIGN

The new design offers a very marked improvement in efficiency over the current arrangement. The replacement chiller would be one of the most efficient currently available using the latest variable speed, compressor technology.

The existing chiller works in conjunction with a thermal store which allows it to build ice whilst running at night. The ice absorbs heat during the day. This process was originally conceived because running the chiller during the day resulted in overloading the College's electrical supply which it was not possible to up-rate. It is also proposed to replace the existing thermal store with a more efficient, modern equivalent. The new thermal store would use phase change material (PCM), instead of water, as the heat absorbing medium. The PCM would be selected to change phase, or state, from liquid to solid at a temperature within the normal operating range of the chilled water system. The PCM would be encapsulated and contained within a new rectangular storage tank that would replace the existing cylindrical tanks within the chiller plant room. The change of operating temperature further enhances system efficiency and results in the availability of chilled water 24 hours per day to support air conditioning plant protecting rare books and important artefacts in the College's collection. The Royal college of Physicians was recently awarded Museum status.

Another benefit of the proposed chiller design is that it is significantly quieter than the existing plant item. Whilst beneficial, this attribute is not critical since the chiller is contained within the

internal, basement plant room adjoining Albany Street and there are no issues with noise from internally located plant.

The new chiller would re-use the existing dry cooler coils and ventilation fans for heat rejection. These are located at roof level in a plant room which was originally designed for that specific purpose. No physical alterations are proposed to these plant items. However, new controls are proposed that would allow staged operation of the cooling fans. The new controls would run only those fans required at a given time. Currently, all the fans run when the system is in operation. This has the potential to save energy.

The proposals described in this application make no changes whatsoever to external fabric. The only alterations which it is proposed to make are temporary and necessary to facilitate plant removal and replacement. The original design concept for replacement of chiller plant was the temporary removal of internal plant room walls and the temporary dismantling of a steel staircase, fabricated so it could be removed if required. It is intended to follow this original concept. The internal wall is constructed from concrete blocks which would be removed and rebuilt using similar concrete blocks. The staircase would be unbolted, carefully lifted out and set aside until works were completed whereupon it would be reinstated exactly as before.

4.0 ACCESS

The new equipment does not change the access to any existing buildings or facilities. Access will be required for periodic maintenance using the same facilities as at present. Access for maintenance will be safe and effective.