



KING'S BUILDINGS LIBRARY

Basic description of the project.

This project involves the demolition of the single storey Robertson Library building and replacing it with a new four storey library. In addition to the new building works, the existing public space between the library and the KB Centre will also be upgraded, including the introduction of new cyclist changing and locker facilities. The first phase of the public realm campus masterplan will also be delivered as part of this project, with new landscape areas to the south and west of the new library building.

Basic description of the building.

The building is a four storey steel framed building, orientated to face towards the campus green to the south of the site. The ground floor contains a new café and soft study areas, with the library bookstacks and quiet study spaces being located on the upper floors. The external walls are mainly finished in Scottish larch cladding boards to the south and west elevations and rendered concrete blockwork walls to the north and east elevations. There are large areas of curtain walling glazing to the south and west elevations to bring in daylight to the deep plan spaces, along with large overhangs and horizontal timber louvres to provide solar shading in the summer months. This allows a natural ventilation strategy for the building and reduces the need for mechanical ventilation. There is also a sedum roof covering and rainwater harvesting to provide water to flush the toilets.

The key innovative and low impact design features of the building.

The building is designed using passive design concepts to reduce the long term running costs rather than introducing micro renewable technologies. There are four key concepts in implementing a passive design strategy: - the use of natural resources such as the sun and wind; increased fabric insulation; a high level of air tight construction; and the use of materials to create a healthy indoor environment.

The site is orientated such that the best views are to the south, across the campus green. Views to the east and west are limited by the adjacent Chemistry Building and KB Centre. To the north lies the CHP heating plant for the main campus. Using the passive design strategy, the orientation of the site lends itself to using large glazed areas on the main elevation, with smaller windows on the other elevations. This will allow for good daylighting, some solar gain and the means of providing natural ventilation over most of the floor plan. The use of large areas of glazing on a south facing elevation could give rise to excessive solar gain and to a high level of glare, so the controlled use of sunlight has informed elevational treatments. We have introduced two main solar control elements: - the large overhanging eaves; and the horizontal timber boards that act as a sun shade. The depth of the floor plate is such that we can achieve a natural ventilation strategy by using the staircases as thermal chimneys to help draw warm air up and out of the building.

Looking at the increased fabric insulation concept, it is relatively simple to introduce additional insulation into most constructions but a balance has to be struck between using a lightweight structure which heats up and cools down quickly and a heavyweight structure that takes longer to heat up but retains the heat for longer. In this case, the library will likely be fully used between the hours of 9am to 10pm which would suit the option of using a thermally heavyweight construction. A composite concrete floor construction will be used throughout the building along with an external wall containing both masonry and timber frame elements. The timber frame construction will allow us to use 250-300mm thick insulation around the entire perimeter of the building, with the masonry and concrete elements acting as the thermal storage. Suspended ceilings will not be used in most of the open library spaces to enable heat to be soaked up by the structure.

To ensure that the benefits of increased insulation are fully recognized we propose that a high level of air tightness is sought for the building. This is achieved through the establishing of an



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air tight barrier. Particular attention needs to be paid to the junctions of major elements: - at windows; at doors; at walls to floors; at walls to roof; at the lift shaft; and at butt joints between panels.

Internal finishes are specified from natural sources. This has the benefit of reduced or zero voc emissions and will also reduce the maintenance requirements. All construction materials will come from companies that have an environmental management system in place to show that these have been responsibly resourced.

The building will be connected into the campus CHP system. It will provide all the heat for the radiators and underfloor heating zones. The building energy model has predicted that the library will operate at half the running cost of similar buildings on the campus.

The steps taken during the construction process to reduce environmental impacts, i.e. innovative construction management techniques.

Recycled or natural materials have been specified where possible. Recycled material will be used in the steel frame, the aggregate below the ground floor slab, the concrete blockwork, the wall and roof insulation, the membrane roof, the built up accessories for the sedum roof, the plasterboard and possibly any grid ceiling tiles. This will achieve at least 10% by value of materials used in this project. All windows and doors will be aluminium with a polyester powder coated finish (PPC). No uPVC is to be used.

All timber used in the project will come from certified sustainably managed forests and similar records will be required for other materials to prove that they have been obtained from environmentally sound sources. The main contractor will record where all materials used in the construction have originated from and also where waste generated will be removed to.

The main contractor will register the project with the Considerate Constructor's Scheme and is to comply with the CCS guidance to ensure that the site will achieve an overall score of at least 32 out of 40, with a minimum score of 3 in each section. There is also a requirement to provide a site waste management plan, identify and monitor key performance indicators and keep site records of all travel to and from the site.

A list of any social or economically sustainable measures achieved/piloted.

The new library building has a dual purpose. It has to provide a new home for library collections currently stored in several different locations around the campus and it provides new centralised study facilities for the campus. The site is located at the junction of several key pedestrian routes through the campus and the long term masterplan is to enhance the adjacent route from Gate 2 so that it becomes the "processional way" i.e. the main formal route into the campus. Re-structuring the existing trees and planting will open up the college green space in front of the library for the benefit of students and staff. The aim is that the new library will be the focal point of the social core of the campus.

Another key consideration is how much the new library will cost to run through out the life of the building. The passive design approach is intended to deliver a low energy use building which also has low maintenance requirements. The focus has been on designing a well insulated, robust building fabric based on the likely performance requirements of the 2013 Building Standards as the first step to meeting the long term criteria. The air tightness target that has been specified for the building is also better than that required by the current Building Standards and is the key step towards delivering a low energy building.

If during the life of the building micro-renewables become more efficient and cost effective, these can be retrofitted onto the library roof. This area is easily accessible and is adjacent to the plant room and services routes.

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KEY FACTS

A. BREEAM Rating and score – Projected as Excellent, with a target score of 70.54%

B. Basic Building Cost - £1550/m²

C. Services Cost - £721/m²

D. External Works - £199/m²

E. Gross floor area – 2188 m²

F. Total area of site – 0.27744 hectares

G. Area of each type of function space –

Café / soft study 245.85 m²
Ground floor soft study 51.46 m²
Library and study space 841.43 m²
Study room A 24.89 m²
Study room B 25.46 m²

H. Area of circulation – 354.39 m²

I. Area of storage – 36.73 m²

J. 100% area of site can be used by the staff, students and visitors

K. 88% area of building is available for use by students and visitors

L. Predicted electricity consumption - 57 kWh/m²

M. Predicted fossil fuel consumption – 166 kWh/m²

N. Predicted renewable energy generation – 0 kWh/m²

O. Predicted water use – 3.2 m³/person/year

P. % predicted water use to be provided by rainwater or grey water.

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