arboreal

Clapham Retrofit

PROJECT DESCRIPTION

DATE: 02.06.14

SUBJECT: Retrofit of Historic Building to AECB Silver Standard

CONTACT: Harry Paticas – Arboreal Architecture

harry@arborealarchitecture.com

020 8980 5066

07789 062753

This project is a "deep-retrofit" of a 170-year old grade II listed Victorian townhouse. It is the first retrofit project in England to meet the AECB Silver Performance Standard. Using Passivhaus methodology, the estimated Space Heat Demand of the 170sqm building has been reduced by over 75% from 180kWh/m2/yr (5,631 kgCO2e) to 40kWh/m2/yr (1,251 kgCO2e) and the air leakage reduced from 9.6ach to 1.8ach. Measured actual gas energy use from January to March 2014 (4,199kWh) matches the predicted energy demand over the same period. Construction commenced in February 2013 and the client moved into the house in November 2013. Since occupation, the internal temperature has remained steady at 20°C and the internal relative humidity has stayed within 50-55%.

The client has provided the following feedback about their first 6 months in their new home: "The even temperature and humidity make the house extremely comfortable to live in. The secondary double glazing is hardly noticeable visually but is already proving very versatile for warmer weather too. The small garden is looking splendid and we were astonished to find space in all the new cupboards (plus easy to access cold-roof attic) for most of the things previously stored in our large cellar. The LED lighting is elegant and sufficiently bright for old eyes. We are loving it!"

The retrofit design ambition was to:

- sensitively restore the structure and fabric of the house respecting original features
- install quality kitchens, bathrooms and services fit for a modern lifestyle
- open up the dark lower ground floor into a light-filled stepped courtyard
- carefully integrate new built in cabinetry
- thermally upgrade the house following English Heritage retrofitting best practice
- create a comfortable and liveable home fit for the 21st century and beyond

Following consultation with English Heritage and the conservation officer, the 4-storey semi-detached masonry building was investigated in detail to establish the condition of the fabric, key elements of historic significance and the existing thermal performance. The company Archimetrics were appointed to carry out airtightness and thermographic surveys, U-value measurement and interstitial moisture monitoring. These step by step investigations informed a deep and holistic understanding of the building allowing a “finer grain” of design and specification to be carried out.

External landscaping and new planting provide a modern setting for the house and resolve level differences at the front and rear. New services were installed including solar thermal panels, a new heating system and continuous mechanical extract ventilation into the existing wall vents. The original sash windows were thermally upgraded by installing single full-height panes of discretely detailed secondary glazing which allow the original window details to be enjoyed.

The key technical innovation in the project lies in the approach towards the specification of the internal insulation to the roof, floor and walls. Nine key insulation materials (including woodfibre, aerogel and cellulose) were installed by responding directly to localised historic fabric and performance requirements. Prior to the application of internal insulation, wireless sensors (connected to an internet gateway) were installed into the walls of the building. The monitoring of the building fabric moisture is on-going and at the 18th International Passivhaus Conference in April 2014, Harry Paticas delivered a paper summarising the results.

The delivery of this high-quality refurbishment demonstrates that the beauty and historic character of traditional buildings can be maintained while achieving high standards of thermal performance and comfort.