HISTORIC ACCOMMODATION BUILDINGS PROJECT
THE RUBRICS BUILDING, TRINITY COLLEGE DUBLIN

West elevation prior to the Conservation Works.

1. BUILDING CHRONOLOGY

1699 - 1705 The Rubrics Building was built at Trinity College Dublin.
Ireland's oldest surviving purpose-built residential building.
Its design has been attributed to Thomas Burgh who designed the Long Library.

1838 - 1840 The ends of the range were demolished.

1894 The building received a new curvilinear-gabled roof and red-brick façade.
Westmoreland Green slates were imported from Cumbria.
Steel roof trusses were sourced from Scotland.
Portmarnock brick from north Dublin was used to clad the front west-elevation.

c.1976 The end gables were reconstructed in concrete block with red-brick cladding due to apparent bowing or instability.

PROJECT INFORMATION

Title: Historic Accommodation Buildings Project
Date: 2019 - 2023
Design Team: Pascall & Watson Architects, Carrig Conservation, Passivate Building Energy Consultants, and AECOM Engineers
Client: Trinity College Dublin

Aerial view of east elevation prior to the Conservation Works.

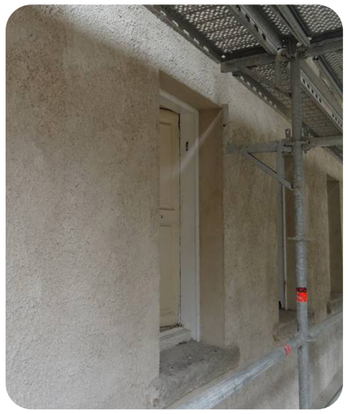
Thermal upgrade works to the roof.

2. RETROFIT STRATEGY

The retrofit need was driven by Trinity's brief to achieve modern performance standards in a historic building while respecting the heritage and continuing its use as accommodation. Working with Passivate Building Energy Consultants, a series of in-situ, lab-based and desk-based measurements and analyses were undertaken to obtain a thorough understanding of the existing building physics before work began. The condensation and thermal bridge risk analysis was done to minimise the risk of unintended consequences post-retrofit

Building Fabric & Environment Assessments
- Brick porosity testing
- Petrographic analysis
- Indoor Air Quality (IAQ) monitoring
- In-situ U-value measurements
- Condensation Risk Assessment
- Thermal Bridge Analysis

New Valentia slates to the roof.



Removal of the cementicious render and new insulated external render on the east-elevation.

3. ENERGY CONSERVATION WORKS

- Having reached the end of its life, the natural slate was removed from the roof. An exemplar approach was taken to insulating the roof at rafter level. Woodfibre sarking board was laid outside the rafters to minimise thermal bridging and vapour permeable insulation was friction fit between the rafters.
- Following the application of insulation, new handcut Irish slates from Valentia were installed.
- Existing rainwater goods have been restored on a like-for-like basis.
- Dense cementitious pebbledash, installed in the mid-20th century, has been removed from the rear east-facing elevation. A new insulating cork lime render has been applied and finished with a roughcast lime render and a breathable water-based rain repellent.
- All windows throughout the building are single-glazed timber frame units. These were removed, restored and draughtproofed. In lieu of secondary glazing, existing shutters were restored to ensure they closed tightly. Where shutters no longer or never existed, thermal curtains will be installed.
- External doors will be upgraded in line with fire safety compliance and will be insulated and draughtproofted.
- Lime plaster is being used to restore internal lath and plaster ceilings. Some vulnerable ceilings have been tied back to save the early plasterwork.
- Timber floor joists and large oak beams have been retained and strengthened, as required. Existing floorboards have been retained for reuse.
- An innovative approach was taken to insulating at the ground floor – 250mm of loose fill recycled foam glass aggregate was used to warm the subfloor void while maintaining sufficient cross-flow ventilation.
- Essential fire stopping measures have been carried out to prevent the spread of a potential fire. A reversible system of mineral wool fire batts has been installed between floor joists. New lobby partitions, which will protect the stairs from the spread of fire from units, can also be reversed in time, if desired.
- New mechanical, electrical and plumbing services have been designed for the building.
- These carefully chosen thermal upgrades will improve the energy efficiency of the building enough to enable the installation of a geothermal heat pump system which was the lowest carbon heat source for the building.

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4. HEATING SOLUTION

To select the optimum heating solution for the Rubric Building, AECOM completed an extensive feasibility study, which examined a range of heating solutions. Each heating solution was scored against a range of criteria, including energy consumption, carbon dioxide emissions, conservation impact and campus impact.

The results of this feasibility study showed that, as well as having the lowest carbon dioxide (CO2) emissions of all of the heating options, a ground source heat pump system was the. Optimum heating solution for this building. The closed loop collector system for the ground source heat pump consists of 21nnr 170m deep vertical boreholes in New Square, which fie a total collector length of 3570m over an area of approximately 2300sqm. Specialist predictive modelling over a 50-year period was completed by the geothermal specialist, Geoserv, to establish the collector size. This thermal modelling was based on thermal profiles of the buildings established using dynamic thermal simulations by AECOM.

Water from the collector system, with an initial temperature range of 9-12C is used in 3nr. 63kW ground source heat pumps to provide fully renewable space, and domestic hot water heating for the Rubrics Building. The heat pumps also use wate heat recovery to generate domestic hot water fort the majority of the year.

Ventilation is provided by a demand controlled continuous mechanical extract system, which extracts air from all bathrooms and kitchens to maintain excellent indoor air quality levels. Indoor Air Quality (IAQ) monitoring is provided throughout the building via wall mounted CO2 sensors.

Installation of the ground collector system.

5. KEY FEATURES

- 3570m of geothermal collector.
- 21nr. 1700m deep boreholes over an area of 2300sq.m.
- 188kW installed heating capacity.
- Delivers 425MWh of renewable heating annually.
- 40% improvement in building fabric thermal performance.
- 75% reduction in primary energy and CO2 emissions for the building.
- Construction commenced August 2021 with completion in March 2023.

View of east elevation and New Square prior to the Conservation Works.

Installation of the ground collector system.

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