The Rubrics Building

CLIENT Trinity College Dublin

DATE 2021-2023

ARCHITECT Pascall + Watson Architects

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SERVICES **MEP Engineering C+S** Engineering



The Rubrics Building is a 1715m², 4-storey building on Trinity College campus. Fronting onto Library Square and with New Square to the rear, the Rubrics Building is the oldest building on the campus and dates from circa 1699.

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To the right: Installation of the ground collector system (source Geoserv)





As a Protected Structure and Recorded Monument, the Rubrics Building is of significant historical importance. The Rubrics formed part of the original quadrangle of red-bricked residential buildings around Library Square, which included the Old Library to the south. After the 1850s, the other buildings of the quadrangle were gradually demolished to leave the free-standing Rubrics Building. The 3rd floor was added in 1894. It has operated continually as residential accommodation for the University since it was constructed.

AECOM was appointed on a Pascall + Watson led design team to provide Mechanical + Electrical, Civil + Structural engineering and PSDP services for the refurbishment of the Rubrics Building.

FABRIC PERFORMANCE

An extensive fabric performance study was completed by Passivate Energy Consultants and Carrig Conservation Architects to maximise the fabric improvements of the Rubrics Building.

The existing pebbledash on the rear of the building, installed in the mid-20th century, was stripped-back and replaced with an insulated cork lime render. The roof was insulated with vapour permeable insulation between the rafters. The ground floor was insulated with 250mm of loose fill recycled foam glass aggregate. For Conservation and hygrothermal risk reasons, it was not possible to insulate the front façade and the third floor of the rear facade. The existing single glazed windows were also retained for conservation reasons. However, the existing shutters were restored, which improves the overall window U-value by approximately 25%. Extensive draughtproofing was carried out throughout the building, in particular around the existing sash windows. Overall, the fabric upgrade strategy has improved the fabric thermal performance of the Rubrics Building by approximatley 40%.

HEATING SOLUTION

To select the optimum heating solution for the Rubrics 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 21nr 170m deep vertical boreholes in New Square, which give 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 building established using dynamic thermal simulations by AECOM.

Water from the collector system, with an initial temperature range of 9-12°C, 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 waste heat recovery to generate domestic hot water for 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.

KEY FEATURES

- 3570m of geothermal collector
- 21nr. 170m deep boreholes over an area of 2300m²
- 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 '21, with completion in Mar '23