

Building study

Complementary new volumes

Níall McLaughlin Architects has created a state-of-the-art library for Magdalene College, Cambridge, that still fits in with the college's traditional identity



The New College Library contains a study space and library, college archive and art gallery. It appears as an arrangement of simple brick volumes which echo the typical gabled architecture of the existing college. The main library is a suite of interconnecting rooms lined with bookcases, reading desks and galleries, arranged on a tartan grid between interconnecting passageways. Three main reading rooms organise the principal circulation route through the library from the three-storey entrance hall, to a double-height central reading room and up to a long single-height room overlooking the garden.

Words Harriet Jennings
Photography Nick Kane

Walk through a small archway in a stone wall and you emerge in the shadow of a pair of ancient yew trees. To your left is the New Library of Magdalene College, Cambridge, an elegant



verticality of brickwork enticing you through its large wooden doors into a tiered, timber interior, bathed in light. 'The building had to be a journey from the darkness under the shade of the yew trees up into the light of the building,' says Níall McLaughlin, principal of Níall McLaughlin Architects. 'Everything else was structured around that kind of journey.'

The building provides the college with a purpose-built library with 50 per cent more capacity for books and much-needed study space for students. It stands in the Fellows' Garden in a 'semblance of alignment' with the Grade I-listed Pepys Building, made of brick with an elaborate Neoclassical Ketton stone façade (described by McLaughlin as looking 'like it was designed by a gaggle of over-enthusiastic academics and architects'). It is home to the precious Samuel Pepys library collection and formerly contained the entire college library and undergraduate study space, which had long outgrown it.

Magdalene decided to provide its student body of around 350 undergraduates with a new, state-of-the-art library and workspace, as well as a climate-controlled archive and an art gallery. Níall McLaughlin Architects won the commission following a competition in 2014, and today project architect Tim Allen-Booth is retracing the practice's design journey with me as we walk around the college.

It started in the college's First Court, one that feels like an ancient place with the passage of time stitched into its fabric – 'a brickwork tapestry', as McLaughlin puts it, with generations of repair visible. It dates to the 1470s when the college started out as a hostel for Benedictine monk students, located across the river to separate the college's holy inhabitants from the temptations of town.

Central to the practice's design approach was that it responded to the simplicity of the



brickwork and the shared language of the old college buildings – pitched roofs, chimneys, and stone tracery around windows. This is what gives the completed building a distinguished character, at home in its eminent setting without being deferential to the historical.

For the college, commissioning a new building required a delicate traversing of its traditional identity as an ancient community with a conservative character (it was the last Oxbridge college to admit women, in 1988, true to its monkish origins!) and its contemporary aspirations as a forward-thinking place of learning. The desire, articulated by Rowan Williams, the master at the time, was that the building needed to feel ‘settled’.

The New Library’s hand-moulded bricks, crafted by York Handmade, contain unique folded textures that achieve a naturally weathered tactility. The team responded to the brick palette of the Pepys Building with colour variations – from bright terracotta to a deep, dusty, purple – and matching large mortar joints, achieved with bricks 5mm smaller than standard on all sides. The wall patterns result from a close collaboration between architect and craftsmen, with careful Tetris-like drawings setting out each individual brick’s placement.

The building has an anticipated 400-year lifespan, so its oak window frames, currently bright and golden, should weather to a silvery grey to match the old buildings’ stone tracery.

A challenge of the brief was to keep down the operational energy use of a library that is open to students 24 hours a day. The architects worked with engineering firm Max Fordham on low-tech solutions: the archive within the building’s core passively uses the ground temperature to regulate its climate; the building is thermally insulated; and daylight

is maximised through large windows and roof lanterns with a folded, origami-like geometry that allows glazing on four sides and gives the building’s exterior complex pitched forms that rhyme with the old college buildings.

‘I think that as a practice generally, our approach to sustainability is to keep it simple,’ says Allen-Booth.

Spaces are naturally ventilated with shutters that individuals can open themselves. Carved niches neatly accommodate the handles within the wooden walls so that open shutters can sit flush. Fresh air is also brought into the library at the lower level and then carried up through structural brick columns that vent through pairs of slender brick chimneys.

Embodied carbon is further reduced by the use of exposed structural glulam, cross-laminated timber and load-bearing brick piers, which rise up to support lintels that span in two directions. These create what the architects call ‘the hashtag’ – an expression of the structural load of the timber floor beam brought down on to the column.

The library’s exposed structure, described by McLaughlin as ‘cascading down in a series of critical dimensions’, demanded an exacting approach to its construction. Thankfully the contractor, Cocksedge, already had good relationships with both the client and the architect. McLaughlin calls the collaboration ‘a proper dialogue – with real teamwork and ownership of the project you can get fantastic results’. This relationship has been

The architects have delighted in generating lots of unique work spaces to suit the students’ varying needs



memorialised by a plaque within the building stating ‘Faber sum’ (‘I am a craftsman’) to honour the artisans who constructed it.

The building is designed around a lattice-like plan that Allen-Booth describes as a ‘tartan grid’, influenced by Louis Kahn’s Richards Medical Center and its major/minor rhythm. There is a rotation that takes place through the plan between vertical and horizontal bays, creating variations between open and closed spaces. You enter into a soaring triple-height atrium (looking up to the lantern feels like gazing up at the transept of a particularly elegant parish church) – a space one bay in plan and three bays high – before you move up to a room two bays long and two bays high. The top floor above is one bay high and four bays long with more intimate rooms and corridors connecting between them.

The college was clear that the function of a college library is to be a domestic place of study rather than an institutional cathedral of learning, and the architects have taken delight in generating lots of unique work spaces to suit

the students’ varying needs. There are desks for the introverts, in nooks, or down a cul-de-sac passageway. There are large communal tables (affectionately referred to as the ‘Medieval Mead Hall’ by librarian Tom Sykes), benches looking out over the river, and the ‘prima donna’ desk with its own balcony suspended out over the void of the atrium. Sykes has enjoyed watching the library fill with students post pandemic, and is receiving abundantly positive feedback. Even the acoustics are a success with noise captured by acoustic mounts on the CLT slabs and by absorption behind wooden slatting in the roof lanterns.

The rare chance to have helped shape the building for future generations is certainly appreciated by Sykes. ‘There are not that many libraries built in a lifetime in Cambridge!’ he says. The New Library feels a welcome part of the college’s brickwork tapestry, with its reverence to materials and structure ensuring it will pass from modern to timeless. Harriet Jennings is public programme curator at The Building Centre

Project data

Start on site October 2018
Completion January 2021
Gross internal floor area 1,525 m²
Construction cost Undisclosed
Architect Níall McLaughlin Architects
Client Magdalene College Cambridge
Structural engineer Smith & Wallwork
MEP consultant Max Fordham
Acoustic consultant Max Fordham
Quantity surveyor Gleeds
Project manager Savills
Principal designer Savills
Approved building inspector MLM
Main contractor Cocksedge
CAD software used Vectorworks

Performance data

Percentage of floor area with daylight factor >2% and >5% Not provided
On-site energy generation 0%
Heating and hot water load 54.7 kWh/m²/yr (space heating only)
 Hot water is generated via instantaneous electric, so is not able to be separated from the general electricity
Total energy load 116.43 kWh/m²/yr (measured electricity, estimated gas)
Carbon emissions (all) 23.12 kgCO₂/m²
Annual mains water consumption 80.4m³/occupant (total building)
Airtightness at 50pa 2.564 m³/hr/m²
Overall thermal bridging heat transfer coefficient (Y value) Not supplied
Overall area-weighted U-value Not supplied
Embodied / whole-life carbon 605 kgCO₂eq/m²
Predicted design life 200-plus years



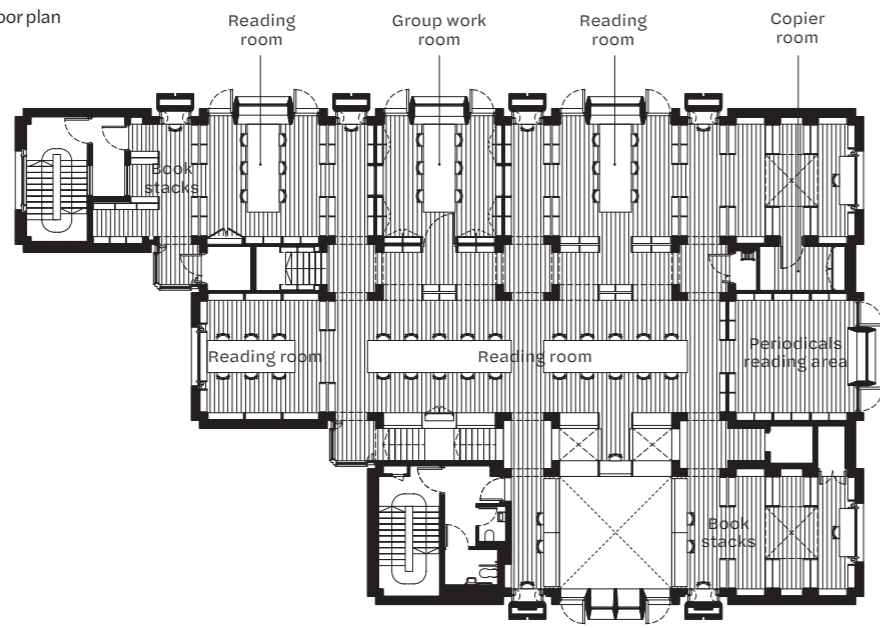
Client's view

Magdalene College's New Library fulfils an unusually challenging brief: to erect a building at the edge of one of Cambridge's most sensitive sites – an area of ancient meadow in full public view, overlooked only by the Grade-I listed Pepys Building – and to do so without committing an intrusion. Equally, the college wanted to avoid mere pastiche or a passive 'blending in'. It needed to be an inspiring structure – one that would encourage our undergraduates to aim high – that still respected collegiate traditions of domesticity and human scale. As if that were not difficult enough, the building would be multi-use, housing not only the college's working library but an archive centre (store and workroom), and the Robert Cripps Gallery. The result succeeds on all these fronts and more. In a spatially generative gesture, the building's orientation creates a new Garden Court around a yew tree that dates back to the 18th century. By occupying a previously overgrown area, it avoids encroaching on the garden. Stylistically, it borrows elements from its surroundings, notably, handmade brick walls pointed flush in a palette that is well matched to the Pepys Building, and passive ventilation columns that reimagine Jacobean chimneys. Materially, its generous use of oak recalls the vernacular panelling of older college interiors. And yet these elements are reconciled with clean lines and frank structural values. For similar reasons, the interior has proved a hit with students. Vaulted ceilings inspire a reverent hush while views across and between the stepped reading rooms create a sense of shared effort and community.

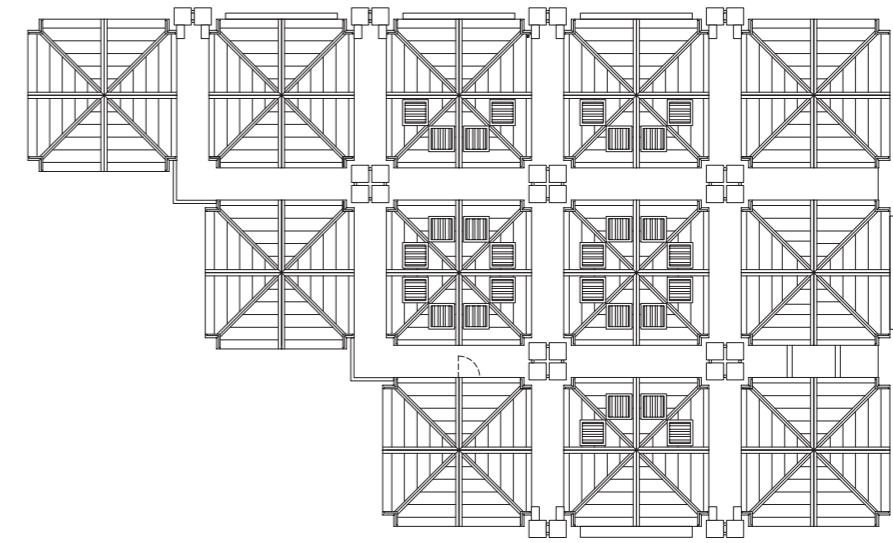
Marcus Waithe, associate professor, Magdalene College



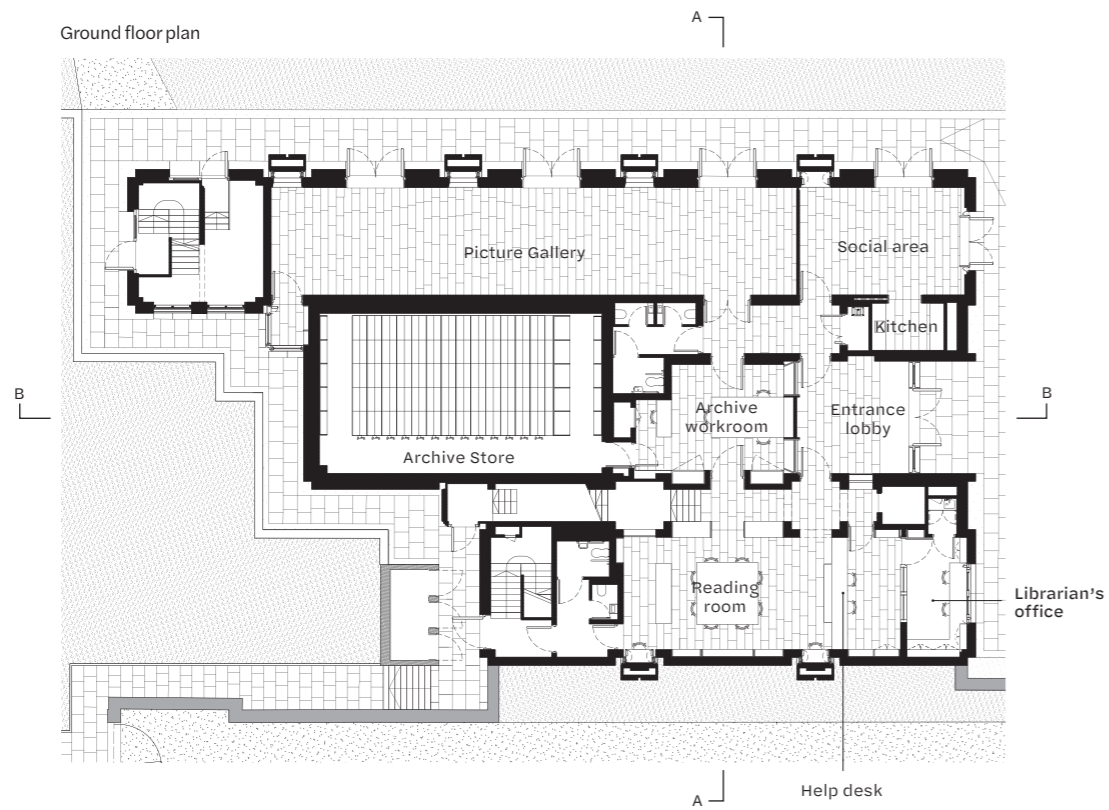
First floor plan



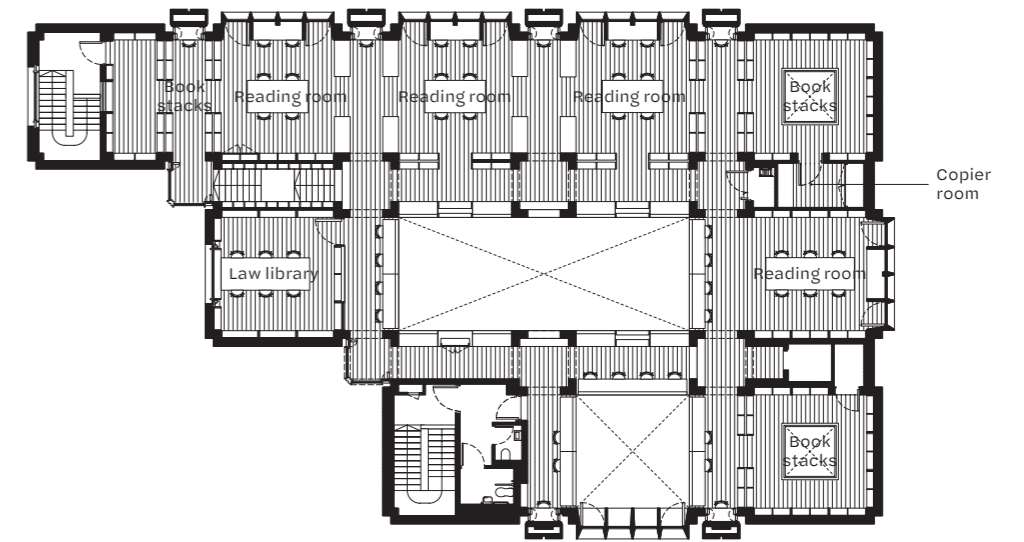
Roof plan

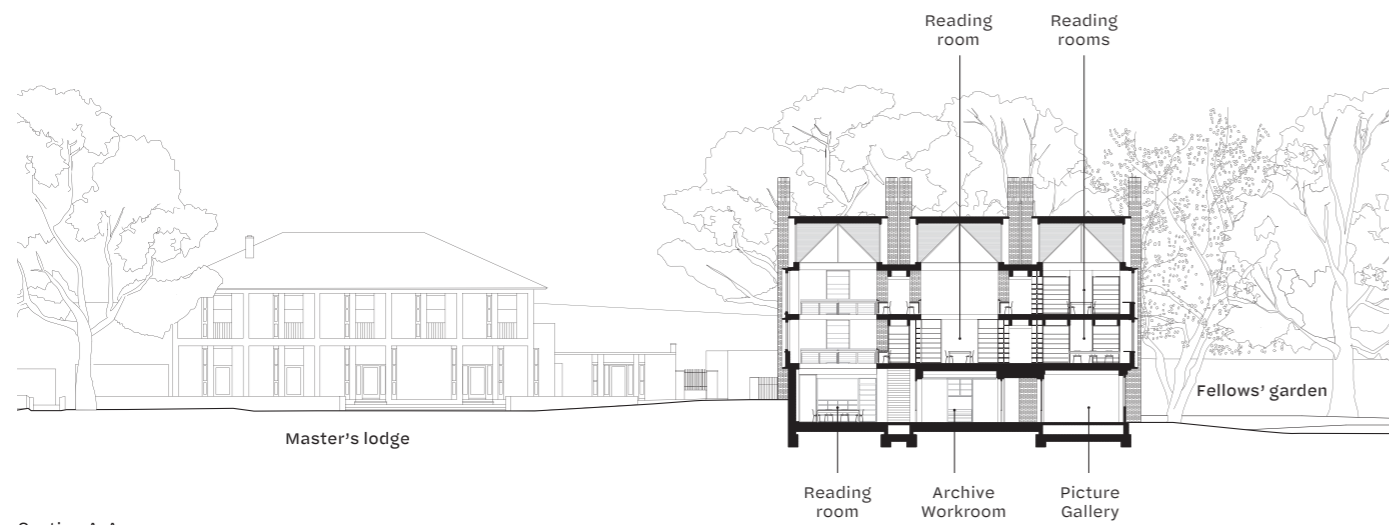


Ground floor plan

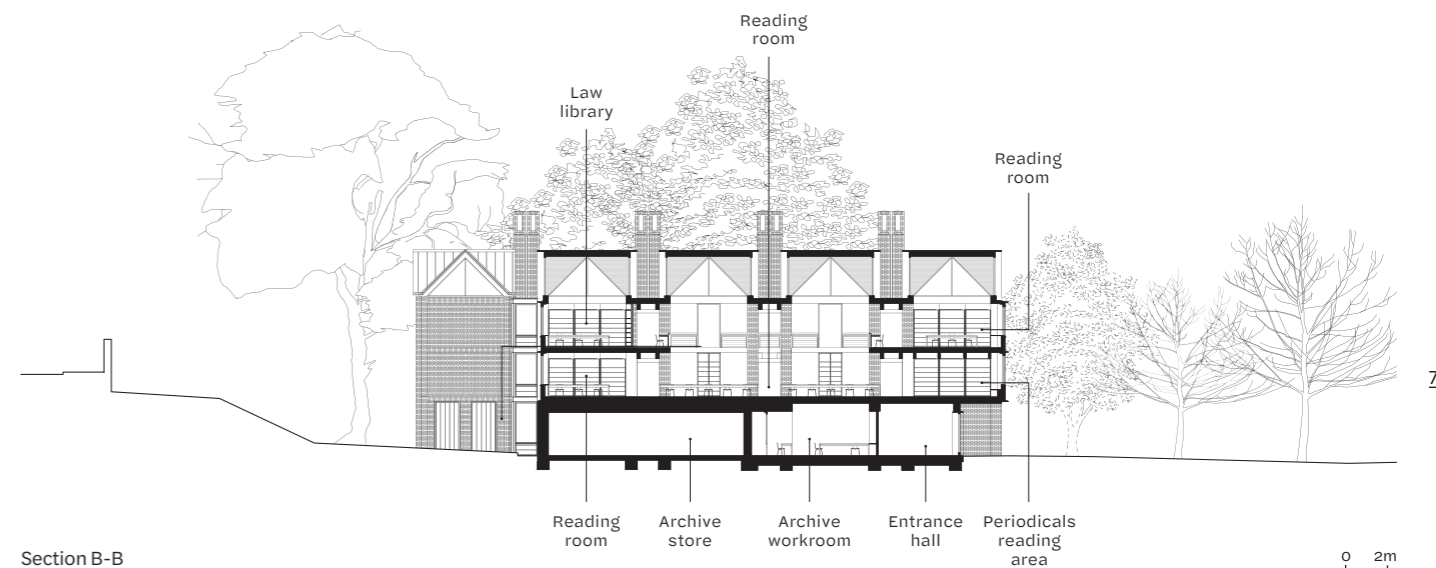


Second floor plan





Section A-A



Section B-B

Architect's view

The project brief required the building to have a forward-looking approach to sustainable design, maximising use of natural lighting and ventilation and minimising the reliance on energy-consuming systems.

The library is naturally ventilated rather than having mechanical cooling. Fresh air is provided through openings in the façade. Warm, stale air is extracted through the ventilation chimneys and openings in the roof using the stack effect. The open-plan nature of the library and interconnection of floors through large voids helps ensure all spaces

are ventilated. The openings in the roof and chimneys are automatically controlled by heat and CO₂ sensors to avoid excessive ventilation when the building is being heated.

The archive store provides a secure and environmentally stable space for safe storage. It has been constructed as a passive archive. The enclosing walls and ceiling have a very low U-value (0.09 W/m²K), a highly airtight envelope (0.5 m³/hr/m²) and a slab in direct contact with the earth to regulate the conditions within the room, minimising the need for mechanical air conditioning.

To minimise the building's overall energy demand, the building fabric has a high degree of thermal performance and airtightness. We reduced embodied carbon by minimising the use of steel and concrete. The main vertical structure is brick and the horizontal structure is cross-laminated timber and glulam. These main materials were chosen for their relationship to the existing buildings, their relatively low embodied carbon and their durability.

*Tim Allen-Booth, project architect,
Níall McLaughlin Architects*

Engineer's view

The library is conceived as a loadbearing structure – traditional brick cavity wall construction with an arrangement of central brick chimney structures supporting an engineered timber roof and floor construction. Virtually all structure is on show, forming the final architectural finishes within the building.

Piled foundations support a suspended ground slab while an area of concrete slab is also provided at first floor to transfer the structural grid to allow the college archives to be accommodated within the heart of the new building.

Each of the five central chimney structures are formed with four L-shaped reinforced brick piers, tied together at each floor level and roof by bespoke high-quality precast concrete lintels. These lintels provide support to a grillage of glulam floor beams that in turn support thin CLT floor slabs. The reinforcement within the brick piers allows them to contribute to the structure's overall lateral stability.

The 12 roof forms created by the repeating arrangement of the plan are conceived as folded plate CLT structures that were fabricated on site at ground level and then

lifted into position. Patented connection details of the timber specialists (neue Holzbau and Urban) were key to the success of this build process and also to the reinforced timber beam bearing details required to support the heavy book stack loads.

Structural materials were used in the following quantities: concrete 1,284t; brickwork 689t; timber 96t; and steel 53t.

The building is in flood zone 2 and incorporates flood compensation works to restrict any loss of flood storage volume.
Simon Smith, director, Smith & Wallwork



Roof build-up: standing seam zinc cladding and underlay; rigid insulation; high performance vapour barrier; CLT structural slab; acoustic insulation with fabric facing; oak slats

Chimney: hand-laid brickwork 210mm thick with 15mm coursing joints

Window bays with glue-laminated oak surrounds; fixed and opening double glazing and insulated timber-clad shutters

Flat roofs between roof lanterns

Gable glazing

Purpose-made solid oak bookcases

Gallery ceiling: timber cladding to structural soffit, incorporating acoustic absorption

Gallery floor build-up: Portland stone slabs; floating screed; rigid insulation; beam and block suspended floor; in-situ concrete ground slab on piled foundation

Working detail

Our design explores the tectonic possibilities of brick and timber structure. The interior is conceived as an inhabited lattice of vertical stacks of brickwork, horizontally spanning glulam beams and CLT slabs, shelving and reading desks.

To meet the college's brief that users be 'amongst books', the building is set out on a tartan grid of square book-lined reading rooms 4.7m across, separated from each other by passages running in two directions and also lined with shelving. The shelving

zone also accommodates the vertical service distribution and the vertical structure at the crossing points of the circulation routes. At roof level each room is topped by a roof lantern composed of a cross-gabled pitched roof with four fully glazed triangular gables. These lanterns bring light into the depth of the plan. Their undersides are lined with acoustically absorbent material covered with timber slats that helps dampen reverberation.

At the corners of the roof lanterns, the brick structure carrying down the floor loads also

rises up to form 11 chimneys as part of the passive-stack ventilation system. Fresh air is drawn in on the lower floors through shutters and opening windows, displacing the hotter stale air. This mechanism of climate control is expressed externally through the articulation of the brick chimneys and projecting timber bay windows, which also allude to the architecture of the earliest buildings on the college's site.

Tim Allen-Booth, project architect, Níall McLaughlin Architects