

TECHNICAL: BRICK

Project

LSE Students' Centre



"Cuts" in the brick facade will reveal the glazed elements.

Architect
O'Donnell & Tuomey
Location
Sheffield Street,
London, WC2
Completion date
April 2013

By Amanda Birch

O'Donnell & Tuomey's competition-winning proposal for the London School of Economics' new Students' Centre is striking not only for its crumpled form, but its unusual perforated brick facing.

The practice proposed the perforated brick treatment to allow daylight and cross-ventilation while maintaining the integrity of the building's sculptural form. Most of the building is to be naturally ventilated to achieve a Breeam "outstanding" rating.

The £21.5 million six-storey building plus two basement levels is to be built in London's Aldwych at the junction of Sheffield Street and Portsmouth Street, and will replace a Victorian building once used by St Philip's Hospital but more recently by the LSE.

Site plan



The 6,100sq m centre will provide space for the student union and will have an event space in the basement, a bar at ground level, a "Learning Cafe" perched within the glazed corner of the building on the first floor and, higher up, student TV and radio stations. On the top floor, a juice bar will lead to an open terrace.

The building will use a combination of on-site concrete shell and slabs and steel columns for its main structure. Two types of frame to the triple-glazed windows will be employed in the elevations: the visible glazed elements revealed in the "cuts" to the envelope will use Jatoba, a sustainable Brazilian hardwood for the mullions and transoms, while behind the perforated brick facades, aluminium frames will be employed.

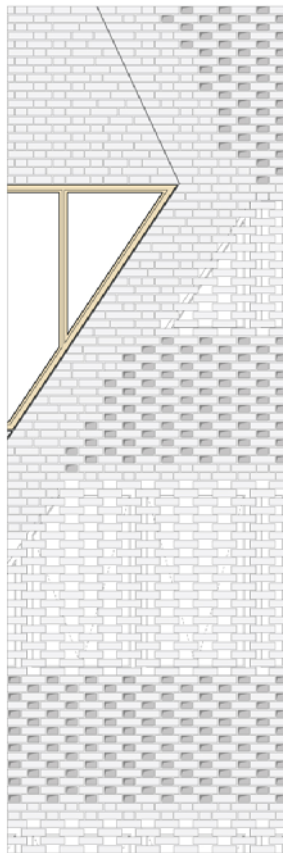
"The folded, chamfered, canted and faceted facade is tailored in response to specific lines of sight along approaching vistas and from street corner perspectives," says John Tuomey.

"Like a Japanese puzzle, the design is carefully assembled to make one coherent volume from a complex set of interdependent component parts."

Using brick, whether perforated or solid, for the building's faceted facade was the architect's instinctive response to the site.

"London is a city of bricks. The existing buildings on and adjacent to the site are built in bricks of varied and lively hue," says Tuomey.

"Our design relates to the resilient characteristic of the city's architecture with familiar materials made strange. The exterior walls will be clad in brick, used in a new way, wrapping the walls in a permeable blanket that will create dappled daylight. And at night, when the lights are on inside, the building will be seen from the streets like a glowing lattice lantern."

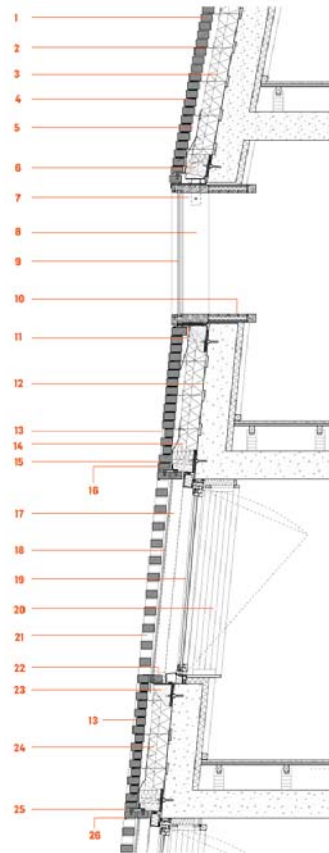


Facade elevation

- 1 Full brick 102.5mm-deep Flemish bond, 10mm joints
- 2 Ancor S021 wall ties at 450mm vertical centres
- 3 170mm insulation dimensions ex 25mm x 300mm, finished size 68mm x 282.5mm
- 4 Mortar
- 5 DPC mechanically fixed to insulation
- 6 Ancor MDC brackets at 300mm horizontal

- centres; S/S angle bracket to top of wind post
- 7 Fully concealed and sealed joinery connection
- 8 H/W Jatoba timber window section dimensions ex 25mm x 300mm, finished size 68mm x 282.5mm
- 9 Curtain wall
- 10 Solid insulated panel

- with untreated FSC Jatoba tongue-and-groove boarding
- 11 Zinc flashing mechanically fixed and sealed to insulation on bituminous membrane waterproofing
- 12 Waterproof membrane
- 13 Recessed brick (ie header of Flemish bond)



Facade section detail

- 77.5mm deep, 10mm joints
- 14 30-min fire-rated seal, max width 65mm
- 15 Proprietary pendul weeps to be spaced evenly at 600mm centres
- 16 Piston brick course 17 100mm x 40mm x 5mm R/S S/S windpost
- 18 28mm x 15mm Ancor

- channel to front of wind post
- 19 Aluminium windows
- 20 Painted S/W frame, sill and headboard to acoustic lining to window surround
- 21 Solid bricks, 255mm x 102.5mm x 65mm without frogs, perforate Flemish bond
- 22 Brick window sill

- 23 Stiffening gusset plate, aligns with C/L of wind post
- 24 External grade rigid insulation 0.02W/mK
- 25 Continuous Ancor 28mm x 13mm channel fixed to underside of MDC bracket
- 26 Compressible expansion joint

PERFORATED BRICKWORK

The proposed building has a faceted facade that consists of solid brickwork, open latticed brickwork and glazed timber screens.

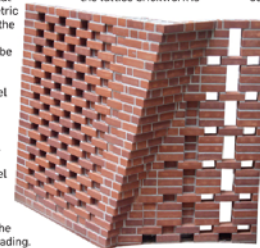
The open lattice is achieved by a punctured Flemish bond with headers removed to allow light and ventilation to the accommodation behind. This also provides solar shading and maintains the continuity of the taut brick outer skin.

O'Donnell & Tuomey notes that lattice brickwork is not an uncommon form of construction. It is found locally in the construction of traditional brick barns throughout the UK, but more often in warmer countries where it is used as a climate control mechanism. Nevertheless, applying this

technique at such an ambitious scale has been a challenge.

A full-size test panel of the perforated brick wall was constructed on site to demonstrate the visual effect and the geometric complexities behind the building form. The brick skin will be supported at storey height intervals with Ancor perimeter steel angles bolted to the concrete superstructure. The lattice brickwork will be tied to regularly spaced stainless steel windposts using Ancor channel fixed wall ties providing required support to the screen under wind loading.

The whole building is set out to brick dimensions, which govern floor to floor heights and glazing design. The secondary steel structure to the lattice brickwork is



designed to precise parameters, coordinated to the dimensions of brick overlap, steel posts and window mullions. Inward and outwardly sloping facade planes have added an extra level of complexity to this ambitious construction.

A full-size trial sample brick panel was constructed on site early in the design process to explore different-sized panel openings in the brickwork and to show what a perforated brick panel looks like.



East-West section

- 1 Entrance foyer and reception at ground floor level
- 2 Basement/plant
- 3 Activity centre
- 4 Media centre
- 5 LSE residences
- 6 Gym
- 7 Cafeteria centre
- 8 Exercise studio

SOLID BRICK ELEMENTS

More traditional solid brickwork is employed where day lighting and ventilation behind are not required. The concrete structure is clad in a single leaf of Flemish bond facing brick with an insulated cavity. Solid brick lintels and heads are used throughout.

The architect is seeking a handmade, crafted character to the building, and to this end all of the brick cladding, including the perforated brick, will be manually laid.

To reduce site wastage, consistent with a Breeam "outstanding" rating, there will be no cutting of bricks. The bricks will be set out course by course, with suites of special bricks completing each wall plane.

Three types of brick will be used: a standard brick, half bricks made with their own specific angle to avoid any

cutting, and filler brick of between 10 and 12 different sizes. The practice has specified an extremely robust handmade brick to achieve the required durability, strength and frost resistance, while meeting its visual requirements.

Laura Harty, architect in charge of the building envelope with O'Donnell & Tuomey, notes that the most challenging aspect of the brick-faced elements is the geometric intricacy of the building form.

"To accurately realise the brickwork geometry together with the tolerances of the concrete superstructure has been one of the most difficult tasks to get right," she says.

"The geometry is determined from the outside in. As such, the planes of the brickwork and the concrete superstructure often have different geometric conditions."



Creases in the folded brick envelope are filled with timber-framed glazed sections.

TIMBER-FRAMED GLAZING

If the aluminium windows behind the perforated brick skin are thought of as an internal lining to the brick skin then the timber framed curtain walling, spliced between the brick folds, is an integral part of the taut crafted facade.

"The strong grain of the timber and complex matrix of stepped mullions are intended to provide a differently textured open quality of natural materials to be read against the brickwork," says John Tuomey. The creases in the folded brick envelope are filled with 282.5mm-deep timber framed triple glazed sections featuring Jatoba, a Brazilian hardwood

chosen for its durability, density and resistance to warping and splitting.

The strategy for supporting the ground floor windows involves splicing a steel plate at the foot of the mullion, bolting it through and restraining it from the top.

On the other floors, the windows are hung from the slab above and restrained at the bottom. The windows can either be manually opened or computer activated. Small opening sashes within the timber curtain walling system will open inwards behind vertically louvred timber screens.