

# GREENHOUSE, MIXED USE DEVELOPMENT LEEDS WEST AND MACHELL ARCHITECTS

## Selected products

### Insulated render system

WBS External Wall Insulation Render System incorporating 130mm Kingspan Kooltherm K5 External Wall Board Insulation  
www.wbs-ltd.co.uk  
www.insulation.kingspan.com

### Roof insulation

Kingspan Insulation Thermataper TT47

### Roof membrane

Sarnafil G410-12EL membrane. Finish light grey  
www.sarnafil.com

### Acoustic flooring to new upper timber floor

Regupol 7210C  
www.regupol.com

### Acoustic flooring to new concrete floor

Regupol 4515

### Frame

GGBS concrete

### Acoustic insulation to party walls

Isowool Glass Quilt  
www.isowool.com

### Floor Slab Insulation

Kingspan Thermafloor TF70+65mm screed

### Acoustic Ceiling System:

Lafarge Acoustic MF Ceiling System  
www.lafargeplasterboard.co.uk



- |                            |                              |
|----------------------------|------------------------------|
| 1. Office courtyard facade | 7. Courtyard before retrofit |
| 2. New entrance facade     | 8. Interior before retrofit  |
| 3. After                   | 9. Courtyard allotment       |
| 4. Before                  | 10. Office                   |
| 5. Archive photo           |                              |
| 6. Original entrance       |                              |



## Project data

**Name of Project** Greenhouse, Leeds

**Name of client** Citu

**Main contractor** Clegg Construction

**Quantity surveyor** Sum

**Structural engineer** Thomasons

**Services engineer** Woods Environmental

**Procurement route** Design and Build

**Gross internal floor area** 12,623 m<sup>2</sup>

**Construction cost** £12.5 million

**Start on site** December 2008

**Completion** April 2010

**Estimated annual CO<sub>2</sub> emissions for a typical flat** 0.5 tonnes

Insulation has helped this pioneering mixed-use refurbishment to achieve a 60 per cent increase in overall energy efficiency, using high specification insulation and the latest renewable energy technology.

The seven-storey development has been refurbished and extended to provide 172 one, two and three-bedroom eco-apartments, plus office space, transforming the original 1930s Art Deco brick-and-concrete former workers' hostel.

Compared to a standard approach, it is expected to save 169 tonnes of carbon and 3.8m litres of water each year and it has achieved Level 4 of the Code for Sustainable Homes.

The thermal performance of all building elements has been considered to create an airtight building envelope with the following U-values: walls, 0.15; windows, 1.32; roof, 0.1; floor, 0.15 W/m<sup>2</sup>K.

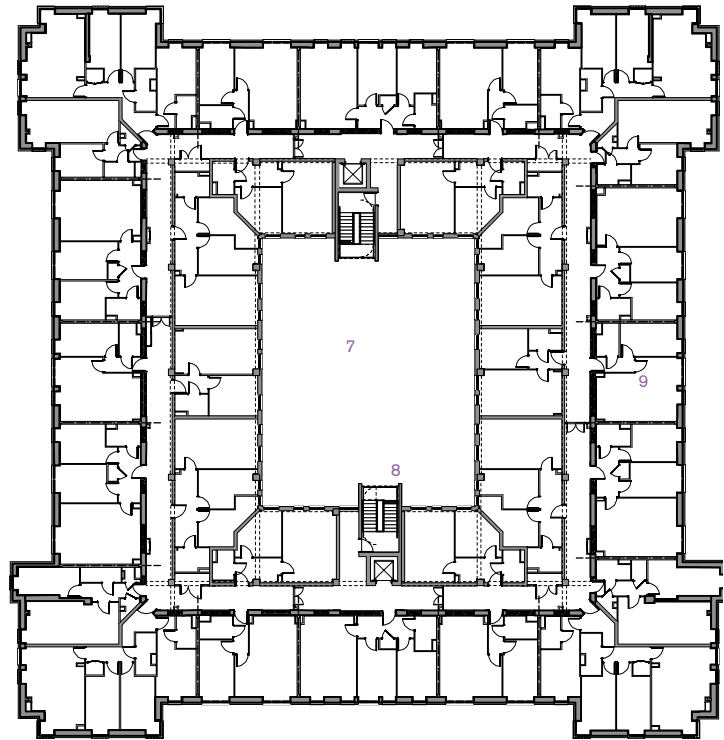
The existing building was wrapped in a new high-performance insulated skin. The new roof has now achieved a U-value of 0.10 W/m<sup>2</sup>K.

A ground source heat pump supplements heating and solar panels provide hot water. Roof wind turbines provide electricity for communal lighting and lifts and water is recycled. Residents can control their energy and CO<sub>2</sub> emissions using the IPTV energy-monitoring system, which allows them to view utility bills and CO<sub>2</sub> output on their televisions.

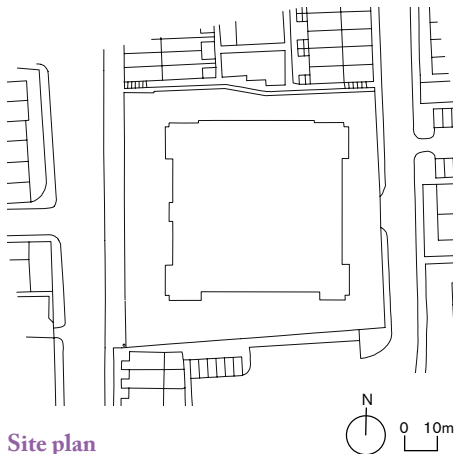
**Craig Bolton**, architect, West and Machell Architects

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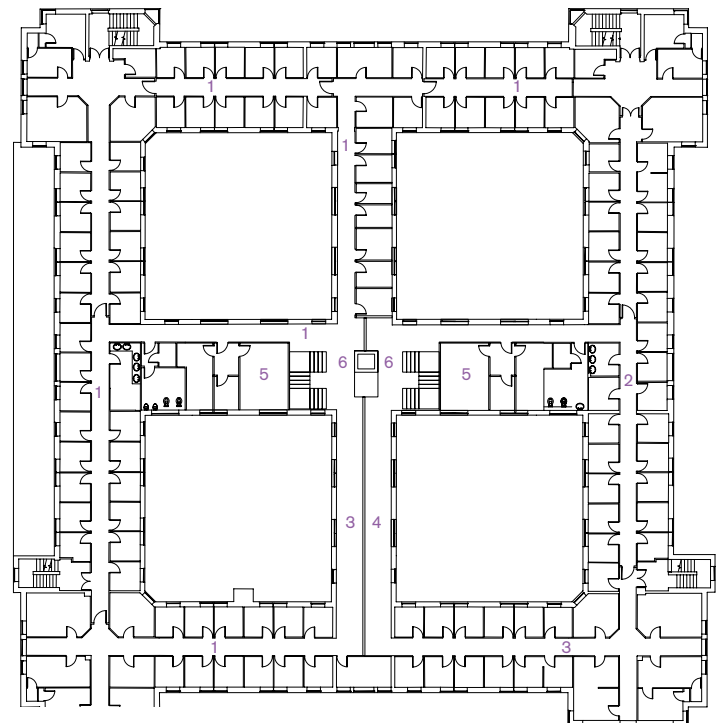
- 1. Male bedrooms
- 2. Female bedrooms
- 3. Male side
- 4. Female side
- 5. Staff
- 6. Main stair
- 7. Courtyard
- 8. Escape stair
- 9. New apartment



New floor plan



Site plan



Existing floor plan of workers' hostel



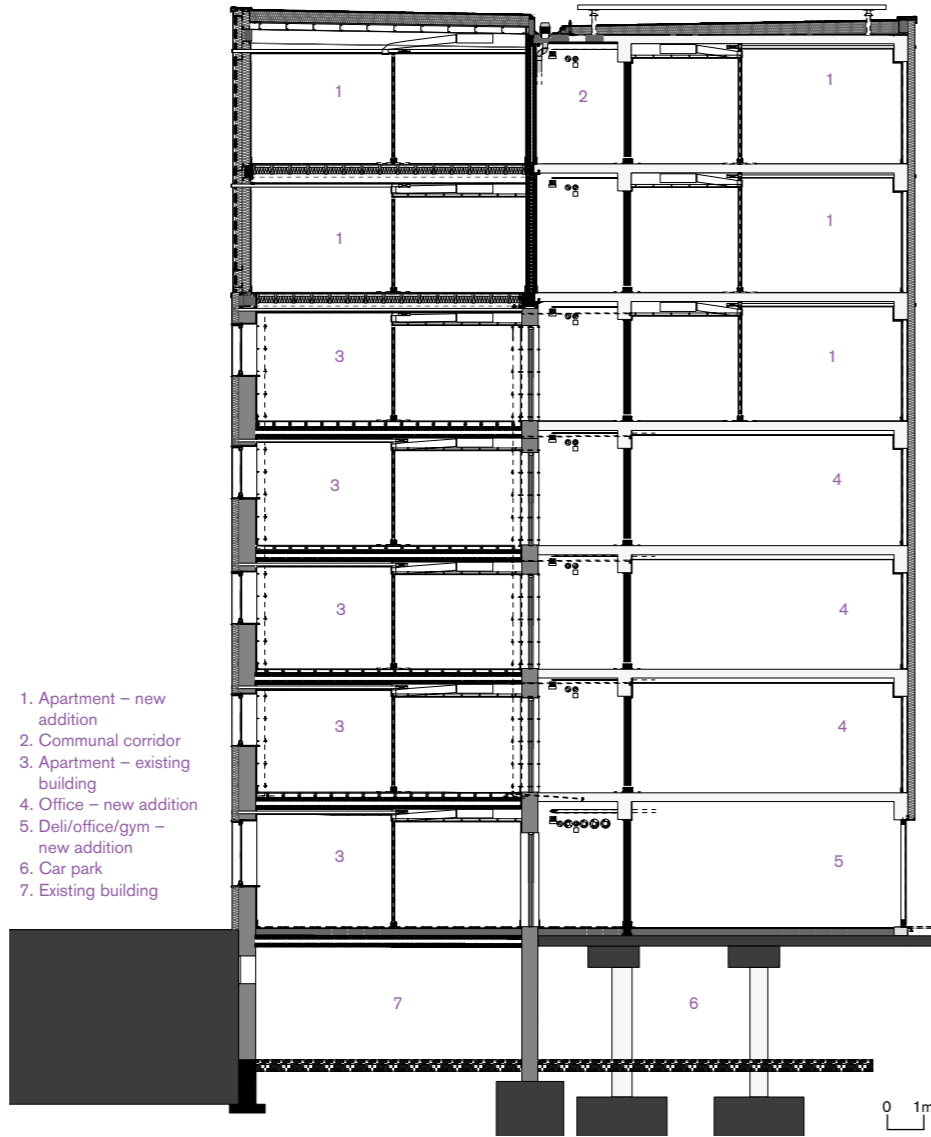
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**Clockwise from top right** Wind turbine and solar panels on roof; show flat; district hot-water tanks; courtyard



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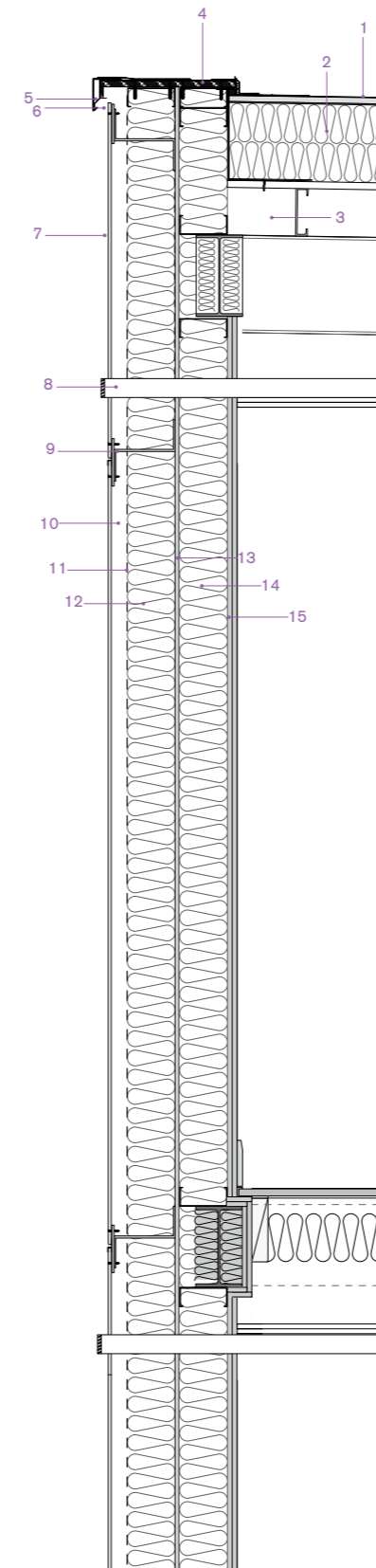
- 1. Apartment – new addition
- 2. Communal corridor
- 3. Apartment – existing building
- 4. Office – new addition
- 5. Deli/office/gym – new addition
- 6. Car park
- 7. Existing building

Section

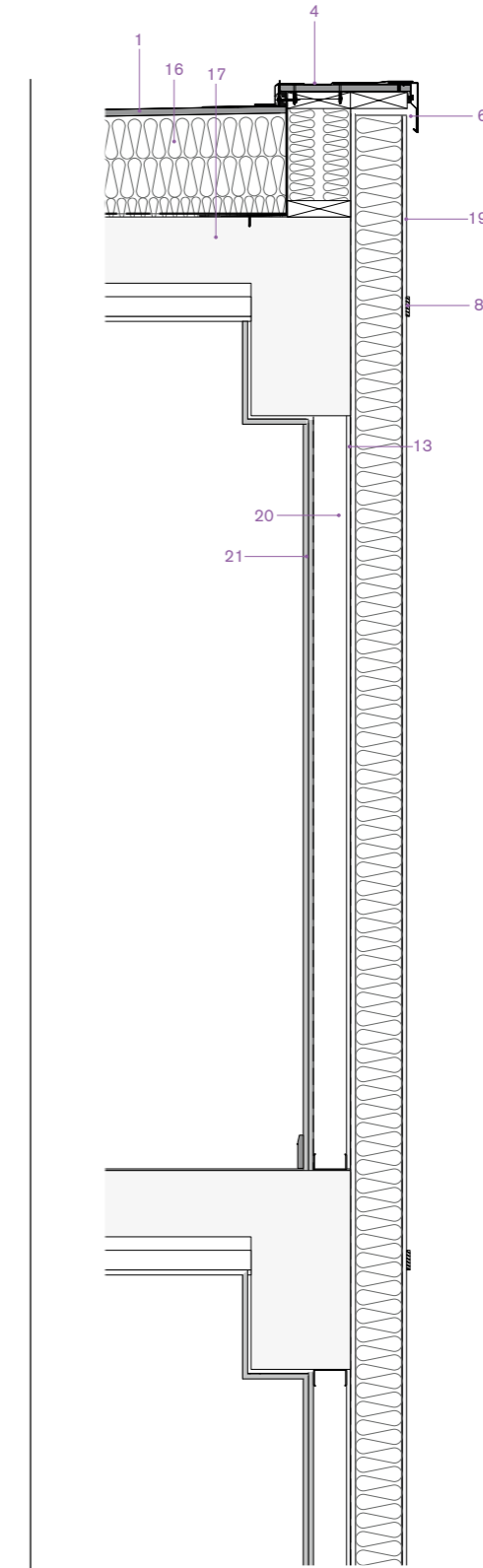


## Details

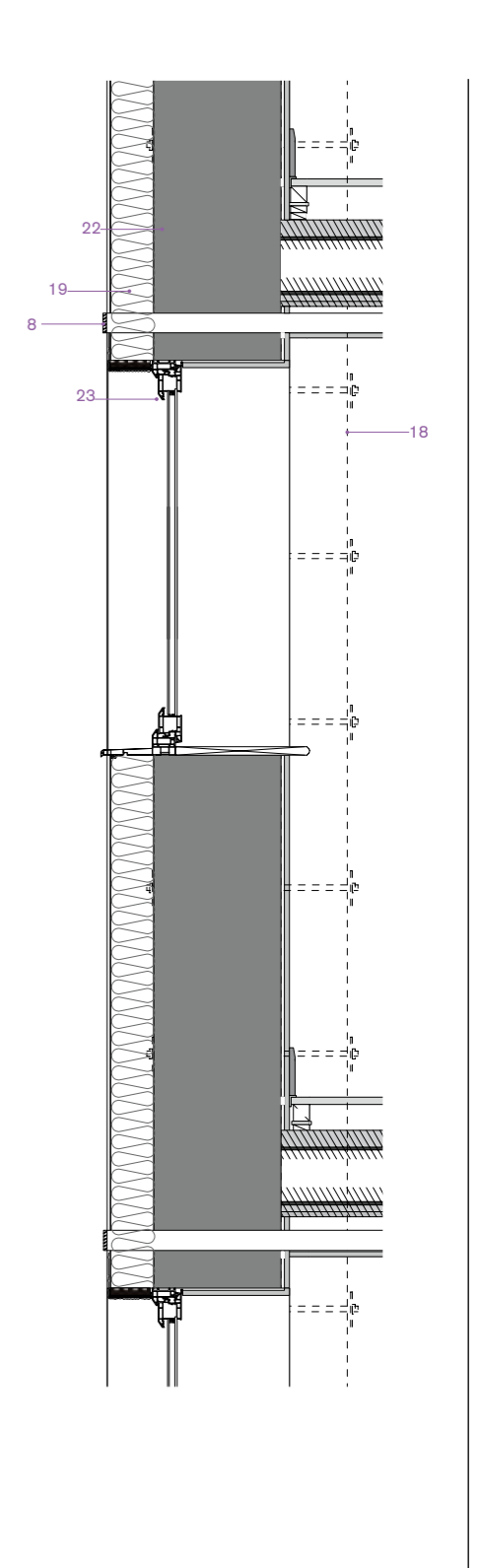
- |  |  |
|--|--|
| 1. Sarnafil G410-12EL membrane                                       | between SFS support systems and 152 x 152 support columns                                      |
| 2. Kingspan Insulation Thermaroof TR27 on proprietary vapour barrier | 15. Vapour control layer and two layers of 15mm soundblock plasterboard                        |
| 3. Pressed metal purlins at 600mm c/c                                | 16. Kingspan Insulation Thermataper TT47 on proprietary vapour barriers                        |
| 4. PPC pressed metal capping detail                                  | 17. Reinforced concrete frame  |
| 5. Drip detail   | 18. Progressive collapse steelwork   |
| 6. Continuous ventilation gap with insect mesh                       | 19. WBS External Wall Insulation Render System with 130mm Kingspan K5 and vapour control layer |
| 7. 8mm RockPanel Boards  | 20. SFS support system   |
| 8. Ventilation extract   | 21. Two layers of 15mm soundblock plasterboard   |
| 9. Proprietary steel support bracket system fixed back to SFS system | 22. c.380mm existing solid brick wall  |
| 10. 50mm ventilation gap   | 23. New high-performance window to achieve 1.32 U-value  |
| 11. Weatherproof membrane bonded to insulation face                  |  |
| 12. 150mm Kooltherm k15 fixed to CP board                            |  |
| 13. 15mm cement particle board                                       |  |
| 14. 150mm Kooltherm k12  |  |



Detail A



Detail B



Detail C

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**Below** View of the  
development looking  
west over Leeds

