Wellcome Trust HQ

Sophisticated structural design in steel

Space to breathe

Full-height atrium and extensive glazing bring the outside in

The landmark Gibbs Building, set on the busy Euston Road in the north of London, is the Wellcome Trust's prestigious new headquarters. Inside the sweeping glass and steel structure, the world's largest medical research charity has consolidated all of its administrative and public activities.

With 100 metres of frontage along Euston Road, the 28,000 m^2 building occupies a prime site, incorporating Euston Square underground station into its north-west corner. Office space is provided in two parallel internal blocks running the length of the building on either side of a full-height, 9 metre-wide internal thoroughfare.

The front, or north, block along Euston Road is ten storeys high, while the south block has six storeys. The two blocks are united by an overarching, sloping glazed canopy that envelopes the whole structure and forms an extensive glass roof over the central atrium. The roof slope faces south, flooding the building with natural light and offering uninterrupted views of the sky above. A row of large ficus trees planted along the centre of the atrium enhances the feeling of proximity to nature.

Linking the north and south office blocks are steel bridges, which span the main atrium at first to fifth floor levels. There is a ground floor café, and on the fifth floor of the south block there is a staff restaurant, providing stunning views over the atrium and the city to the south.

Architectural innovation

Open spaces and integrated offices encourage team working

Design challenges

The Wellcome Trust provides £400 million each year for medical and scientific research. For its new headquarters it wanted a prestigious building, but not an ostentatious one – and a building that would provide a flexible environment for the 500 people working there.

A key requirement of the brief was that the building should encourage staff – who were coming together from disparate offices – to work in teams. The new building was therefore designed with a variety of open-plan spaces, glazed meeting rooms and break-out areas throughout.

In the north block, the office space is divided into five column free bays of 12 metres x 18 metres, separated by the stair and lift cores. The internal columns are arranged on a 9 metre x 12 metre grid, but with façade columns spaced at 6 metre intervals to support the cladding. Composite floor panels measuring 130 mm thick are supported by steel plate floor girders, measuring 540 mm or 670 mm deep, allowing future service flexibility.

The eight floors housing offices in the north block are connected in pairs by four mini atria, each two storeys high, running the length of the building. These are designed to encourage interaction between teams on adjacent floors, and are formed by leaving out a floor section on alternate storeys to create the two storey high space.

Composite strength

Concrete-filled steel columns offer enhanced load-bearing capability

The south block comprises composite secondary beams on 9 metre long tapered plate girder primary beams, supported by columns at 6 metre intervals to match the grid of the north block.

A staggering 2,100 tonnes of structural steel was used in the main building, including 350 tonnes of hollow sections. These hot finished circular steel sections are the principle load bearing columns of the building. They are filled with concrete to improve their load-bearing capacity and extend their fire resistance.

The columns were delivered to site pre-filled with concrete and pre-coated with intumescent paint. They are connected at alternate floors by a machined collar, welded to the top of each lower column section. These collars feature elongated ‘spears’ that act as guides for the upper sections, which are then simply slotted over the collar and welded in place. This creates a clean, unfussy and robust connection.

The link bridges spanning the main atrium are formed from stiffened steel plates, which act as the permanent formwork for reinforced concrete slabs. These are supported on fabricated T-section secondary beams, which cantilever from twin primary beams.

Braced against the elements

Innovative exposed bracing provides exceptional stability

Structural cross-bracing is exposed on the building's north and west elevations, and internally on both sides of the main atrium. In the east-west direction it consists exclusively of high strength diagonal steel rods spanning a double storey height between horizontal tubular framing members and pairs of tubular columns. In the north-south direction, the bracing consists of vertical panels formed from steel shear plates and steel flat diagonals fixed in parallel between four pairs of columns. Together the columns and steel plates act as a large vertical beam. The building is almost fully glazed over the roof and on all four sides, with only the stairwells encased in solid cladding on the outside corners.

At more than 30 metres tall, the building would be expected to have a two hour fire rating. However, a fire-engineering study using time equivalent analysis showed that the rating of the key structural elements could be reduced to one hour, since little combustible material was present. Only the basement areas and the entrance lobby to the underground station needed a two hour fire rating.

Engineered for safety

Fire engineering approach achieves a one-hour fire rating

This allowed a thinner intumescent paint coating to be used on the exposed steelwork. The composite beams for the office floors are fire protected by this paint, which was applied off site to reduce on site delays and clean up costs.

The concrete filled columns are also protected by a thin layer of paint, sufficient to provide the required one hour's fire resistance. The concrete filling acts as a heat sink during a fire, which suppresses the temperature of the steel for longer. This means the intumescent paint coating can be more than 50 percent thinner than would be required if there were no concrete core.

The finished building is an exceptional example of its type, combining clear and logical design with sophisticated and meticulously planned detailing.

Key players

Client: The Wellcome Trust
www.wellcome.ac.uk

Architect: Hopkins Architects
www.hopkins.co.uk

Structural engineer: WSP Cantour Seinuk
www.wspgroup.com

Steelwork contractor: William Hare Ltd
www.williamhare.com

Project and construction manager: Mace Ltd
www.mace.co.uk

Fire engineer: Arup Fire
www.arup.com

Steelwork manufacturers: Corus Tubes
www.corusconstruction.com/tubes

Corus Construction and Industrial
www.corusconstruction.com/structuralsteel

www.corusconstruction.com

Corus Construction Centre
Moorgate
Rotherham
South Yorkshire
S60 3AR
T +44 (0) 1724 40 50 60
www.corusconstruction.com

Language English