Carbon reduction

Triple-height column-free corners are created by two V-shaped trusses.

A sustainable design, using steelwork sourced from facilities powered by renewable energy, is delivering a desirable City of London commercial scheme.

Located a short walk from Moorgate Station, 2 Aldermanbury Square is a 13-storey office building that on completion, will provide over 27,870m² of commercial space, most of which has already been pre-let by developer Great Portland Estates (GPE).

With sustainability as a key element, this London commercial scheme is reducing its embodied carbon by 36%, from its initial design. This has been helped by having a structural steel frame sourced primarily from electric arc furnace (EAF) production facilities, as well as making use of reused steelwork.

EAF steelwork is considered to be much greener and more efficient in terms of energy consumption for the production process, as it can utilise renewable energy from wind farms, while the process relies on recycled content. To this end and as much as possible, the design team specified steel rolled sections that are readily available from EAF sources.

Lendlease Project Director Tom Walker, says: "2 Aldermanbury Square has the potential to push the boundaries of embodied carbon reduction while delivering a workplace that responds to major market trends and the desires of tenants in a post-Covid world."

The development sits on a plot previously occupied by City Place House, a steel-framed, 10-storey office block, which was demolished as part of the current scheme's early works.

This 1990s-built structure has played a significant role in 2 Aldermanbury Square's sustainable design, as a key achievement of the demolition programme, carried out by Keltbray, was the opportunity and ability to salvage 1,800t of the existing steel frame for reuse rather than recycling.

Around 80t of this steelwork has been reused on this project, with the remainder set to be utilised on another GPE central London development.

"The City Place steel frame included long-span beams without penetrations, making it an ideal opportunity for reuse," explains Arup Project Engineer Jamie Page.

To facilitate this sustainable and circular economy approach, the demolition process was planned and executed to allow for the steelwork to be removed at maximum length without damage.

William Hare subsequently re-fabricated the steelwork into trimmers which have been erected around the building's main core and risers, as well as beams and columns to form the rooftop plant deck.

A number of other items were also identified for re-use, including raised access flooring and carpet tiles.

As well as the demolition programme, Keltbray also constructed a new two-level basement box and a reinforced concrete core, which once completed, allowed the main steel frame erection to begin.

The centrally-positioned core provides the structural stability to the steel frame. Radiating out from the core, the steelwork is based around a 9m x 9m grid, which provides the required open-plan office floorplates with minimal internal columns.

Throughout the structure, steel beams support metal decking and a concrete topping to form a composite flooring solution.

From the third floor upwards, the majority of the structure follows this regular column grid, incorporating a number of set-backs that form outdoor terraces.

The terraces are staggered, as they are located alternately on the north and south elevations, and then on the east and western sides of the building. Most of the set-backs are the width of a bay, requiring no extra support as they follow the standard column pattern. However, a couple of deeper terraces on the north elevation do require transfer beam structures.

Visually, the most striking structural steel elements are in the lower parts of the building. The ground, first and second floor are all set-back from building's overall footprint, forming a public realm below the overhanging structure. Along the main north elevation and southern façade, the overhang is supported by a series of raking columns, each weighing up to 14t, that start at ground and extend to the underside of third floor.

"The City Place steel frame included long-span beams without penetrations, making it an ideal opportunity for reuse."

The scheme incorporates part of the Hlghwalks (see box below).

The east and west elevations also have an overhang creating a similar ground level public realm, but these areas of the building are supported by a series of vertical columns, positioned along the perimeter of the structure.

Within the eastern elevation's triple-height space, the project accommodates part of the Highwalks elevated pathway, (see box), which links the Barbican estate, on the opposite side of London Wall, and the City of London Guildhall that sits to the south of 2 Aldermanbury Square.

Freeing up some extra space for the pedestrian zone around the new building, the corner columns have all been omitted. This creates cantilevers, which are supported by 8m-high trusses, positioned at third floor, that transfer the loads back into the main frame. Because of their size, the trusses were all delivered to site piece-small and assembled in-situ.

2 Aldermanbury Square is due to be complete by the end of 2025. ■

The onsite tower cranes ensured the main steel frame was completed before Xmas.

FACT FILE
2 Aldermanbury Square, London
Main client: **Great Portland Estates**
Architect: **Allies and Morrison**
Main contractor: **Lendlease**
Structural engineer: **Arup**
Steelwork contractor: **William Hare**
Steel tonnage: **4,000t**

Bridges for the Highwalks

The eastern elevation of 2 Aldermanbury Square will accommodate part of the reinstated elevated Highwalks pedestrian system that connects large areas of the City of London in and around the Barbican estate.

This part of the Highwalks was knocked down during the project's demolition programme, although the connecting bridge that crosses the main London Wall thoroughfare was left in place.

As part of its steelwork package, William Hare has erected a new connection that links to the existing bridge and then extends through the footprint of the project to Basinghall Street, where the Highwalks system will again connect to the Guildhall.

Supported by a combination of the new building's steel frame, a two-storey podium connected to an adjacent structure and an existing staircase from the original Highwalks, the reinstated walkway consists of 10 weathering steel sections.

The sections vary in size, with the largest measuring 8.3m × 4.6m and weighing 9t.

"The install sequence was pretty ingenious for the first five sections," says William Hare Senior Project Manager Ryan Gordon. "They were hung from temporary works to assemble them into one bridge, lowered onto an SPMT and then driven up a temporary ramp and then installed with a mobile crane. We had 25mm to spare and used every millimetre of this!"

The five assembled sections weighed 28t and represented the heaviest individual lift of the entire steel programme.

Five further sections were then brought to site and individually lifted into place to complete the reinstated walkway. ■