Quick delivery

Flexible long-span office spaces, coupled with a fast erection programme are two of the reasons why a steel-framed option was chosen for Dublin's latest landmark commercial development.

Dublin's commercial sector is set to receive a significant boost with the development of Harcourt Square; two interconnected steel-framed buildings, topping out at nine and seven storeys respectively, that will provide 31,866m² of Grade A office space.

Designed by Henry J. Lyons for developer Hibernia REG, this best-in-class building has been described as an exemplar office scheme and will primarily be occupied on completion by KPMG, as the company's new headquarters.

The 1.9-acre city centre plot is located on the south side of the River Liffey, and was previously occupied by Dublin's Garda (police) headquarters.

The old building was demolished as part of the initial works for the current scheme. Once the site was cleared and a new basement level excavated, piled secant walls and raft foundations were installed in advance of the main steel frame erection.

Choosing a steel-framed solution for a large city centre job can provide a number of benefits. On this project, the requirement for a quick delivery, something that steelwork can always provide, was paramount.

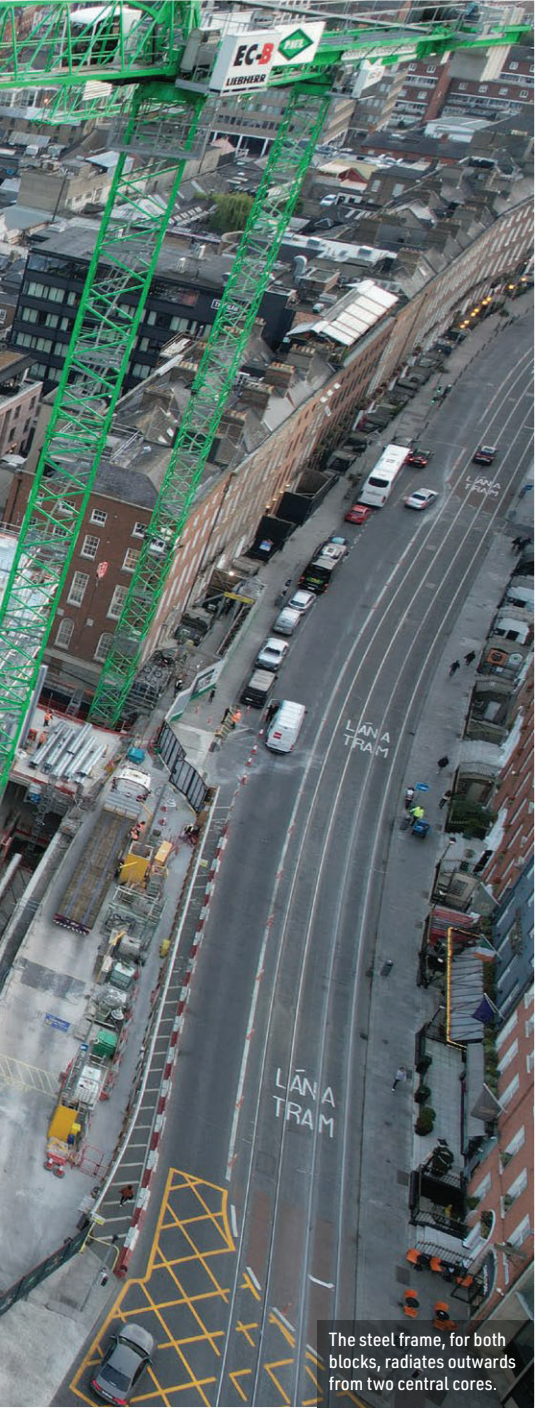
"A number of options were looked at, including a full reinforced concrete (RC) frame as well as a hybrid design with an RC structure converting to steel for the upper levels," says CS Consulting Group Associate, Darren Mullins.

"In the end, a full steel-framed building with two slip-formed RC cores was chosen as it was the only credible option that could achieve the desired construction programme timeline."

Predominantly based around a regular 9m × 9m column grid pattern, the steel frame starts at basement level throughout the scheme. Above this level sits the lower ground, which accommodates a double-height auditorium in building A (the taller nine-storey block). Linking into the ground floor, this large space will be able to accommodate an audience of up 600.

Creating this column-free space is one of the project's largest single steel elements, a 17m-long truss. Weighing approximately 30t, the storey high truss is positioned behind the area's terrace seating and extends from ground floor level up to the underside of the first floor.

Alongside this large space, the ground floor will also offer collaboration workspaces, a wellness/yoga room and an innovation hub. The lower



The steel frame, for both blocks, radiates outwards from two central cores.

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Steelwork aids architectural intent

"Steel was chosen on this project to deal with a number of design considerations. The first was programme, and the benefit with steel lies in the capacity for manufacture off site. This, coupled with a very swift erection process, made steel a more desirable option than a concrete frame," explains Henry J. Lyons Associate Amy Murphy.

'The use of steel also allows more freedom in the architectural form. Harcourt Square sits in a unique junction between Georgian Dublin and a modern context, and the buildings design sought to bridge the gap between the two. This resulted in tiered forms, addressing the Georgian scale at one end and the nine-storey context at the other, setting back where needed to allow sensitivity to the streetscape."

The tiers take the form of set-backs on floors four, five, six, seven and eight. They are up to 4m deep (approximately half a column bay in the majority of the building) and are formed with plate girders. These large fabricated beams act as transfer structures by supporting a perimeter column line that does not exist on the floors below.

Another nod to its surroundings is created by the perimeter columns, which are all stone-clad. This layered, ordered façade of limestone, alongside expanses of glass, references both Georgian Dublin and nearby historic buildings such as the National Concert Hall.

Fabricated at Severfield's Enniskillen facility, along with the rest of the steelwork, the columns were initially delivered to the cladding contractor, where they were encased, before arriving on site to be erected. ■

FACT FILE
Harcourt Square, Dublin
Main client: **Hibernia REG**
Architect: **Henry J. Lyons**
Main contractor: **John Paul Construction**
Structural engineer: **CS Consulting Group**
Steelwork contractor: **Severfield**
Steel tonnage: **3,500t**

ground will also have canteen facilities for 450 people along with further wellness spaces and a gym.

In the adjacent and slightly lower building B, there is another large truss. Similar in weight and measuring 16m long, this truss also extends from ground floor to the underside of first floor and creates a column-free zone for the building's loading bay.

Because of their size, each of the trusses were delivered to site in transportable sections, which were then lifted into place individually, by one of the site's tower cranes.

Although Harcourt Square is essentially one ▸ 20


The taller block has an auditorium at lower ground level.

A 17m-long truss helps form the column-free space for the auditorium.

▸19 structure, with both buildings separated by a movement joint, they do have their own main entrances and foyer spaces along the Harcourt Street elevation.

Both entrances are accessed via link bridges that span 8m from the pavement level over a terraced and landscaped void, which allows natural light into the lower ground floor.

Gaining its structural stability from the centrally-positioned cores, the steel frame comprises of UB sections containing bespoke cellular openings that accommodate the building's services within their depth. Some of these beams are up to 12m long, creating the long column-free office floor spaces that give maximum flexibility to the future tenant.

As well as keeping the services within the structural void, the beams, which are typically 533 sections, also support metal decking and a concrete topping to form a composite flooring solution.

Harcourt Square is due to be completed in early 2026. ■

Large Trusses

When very large column-free space is required, a steel truss is an obvious solution. The Harcourt Square project uses storey-height trusses to carry substantial loads. David Brown of the SCI comments on the design and detailing of large trusses.

The storey-height trusses at the Harcourt Square project have a number of interesting features. Firstly, the basic design is a Pratt truss, with all diagonals in tension. Making this simple choice to avoid compression in the longer members is always recommended. The verticals are subject to compression, of course, but are shorter in length than the diagonals. Pratt trusses have less space to pass through the truss itself compared to a Warren truss, but if access through the truss is not required, a Pratt truss is perhaps the first choice.

The photographs show that the truss was delivered not as many separate elements, but in two large halves. The truss was not halved vertically, which is often the case, but horizontally, meaning that every vertical and every diagonal had to be spliced on site. This approach requires very precise fabrication, as all members must meet correctly at the same time – there is no room for adjustment. This necessary accuracy in fabrication is a testimony to what can be achieved with steelwork and very capable steelwork contractors. There must still have been a few anxious moments as the top half of the truss was lowered to meet the already erected lower part of the truss.

Slip in any of the joints in a truss of this size would be unwelcome, so preloaded assemblies and non-slip joints are recommended. Higher slip coefficients mean less fixings, so faying surfaces (the mating surfaces where the friction is developed) are generally prepared, masked and left unpainted, as they were at the Harcourt Square project. BS EN 1090-2 describes different surface treatments and slip factors in Table 17, which should be used when calculating the resistance of the preloaded fixings in accordance with BS EN 1993-1-8. Disappointingly, BS EN 1993-1-8 refers to the friction surface by class, but has no description of what the classes are – and hence the reminder that these descriptions are in BS EN 1090-2.

Despite the widespread awareness that the slip coefficient is all-important in a non-slip joint completed with preloaded assemblies, SCI still receive regular questions about what to do if the friction surfaces have been painted. Since most designers select the most advantageous slip coefficient, often there is no alternative but to restore the intended surface condition. ■