



Mace's Can of Ham brings party tricks to the City

16 May, 2018 By Binyamin Ali

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Curves, uninterrupted floorplans and a *Thunderbirds*-style roof are helping TH Real Estate's 70 St Mary Axe stand out in the battle of the skyscrapers.

Project: 70 St Mary Axe
Client: TH Real Estate
Contract value: £135m
Contract type: Design and build
Main contractor: Mace
Architect: Foggo Associates
Demolition subcontractor: Keltbray
Excavation and concrete superstructure: Morrisroe
Steelwork subcontractor: Victor Bouygues Hollanda
Cladding and glazing subcontractor: Focchi
Start date: May 2015
Completion date: December 2018

London's skyline is changing at breakneck speed, and with 18 tall buildings completed last year, there's competition to get noticed.

This battle of the skyscrapers is particularly pronounced in a cluster within the City, where an army of cranes is erecting the 62-storey 22 Bishopsgate and the 36-storey Scalpel, to name just two.

With neighbours like these, getting drowned out is a real possibility here.

Nevertheless, architect Foggo Associates has found some novel ways of creating a sense of occasion at the 90 m-tall 70 St Mary Axe, despite its crowded position amid the UK's undisputed high-rise catwalk.

Client [TH Real Estate appointed Mace to deliver the tower in January 2015](#) after years of delays.

Also known as the Can of Ham due its semi-elliptical design, the lower levels of 70 St Mary Axe have a smaller surface area than the middle floors, which are the largest. As the building goes further up, the floor sizes decrease again, with the cladding wrapping the whole building and meeting at the top.

On the roof, two butterfly doors will allow a cleaning cradle to emerge spectacularly from the building, avoiding the need to compromise its distinctive shape.

While these design features have posed a challenge, the obstacles to the project began underground before construction could even commence, as TH Real Estate head of development Geoff Harris explains.

Finding the Roman Wall

The 2,000-year-old Roman London Wall that once encased the city runs roughly underneath the site of the building. Site investigation operatives plotted the likely location before demolition began, with 22 trial holes dug in an effort to corroborate their analysis.

All 22 failed to find anything, however, and Keltbray was given the go-ahead in mid-2015 to begin demolishing 60 and 70 St Mary Axe, the two buildings that previously occupied the site.



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Cladding on the curved frame reaches the 15th floor

“We had a contingency plan in case we did find [the London Wall] because it might have changed our plans for the basement, but there was no problem with that,” Mr Harris says. “We only just found it last month [March] in the street.”

With no Roman archaeology to contend with and a Victorian sewer successfully diverted, Keltbray installed secant wall piles around the four walls of the site as the basement was excavated. The firm then put in 35 bored piles 1.8 m in diameter that went down 25-35 m.

“The interesting thing is the four gable columns, as we call them, they actually sit on top of the capping beam which sits on top of secant piled walls,” Foggo director David Warrender says. “The secant piled wall, as well as being the basement retaining wall, it’s actually the load-bearing support for the four columns, which is quite unusual.”

Precision, precision, precision

The building has a concrete slipform core that houses all the lifts, fire escapes and toilets.

Due to the shape of the building and the precision required with the steel beams that form the exterior frame, the core was built to a tolerance of just +/-12 mm.

“All the steel beams span off the core in the middle, so if the concrete in the middle is wonky, when you fix all your beams, you’ve instantly got a problem,” Mr Warrender says. “With the accuracy we got from [concrete subcontractor] Morrisroe, it was off and running very accurately.”

This gave VBH, a joint venture between Victor Buyck and Hollandia, a good base from which to build the Can of Ham’s arched steel frame. However, the nature of the building’s design meant having to correct unforeseen problems was not really an option.

“If the concrete in the middle is wonky, when you fix all your beams, you’ve instantly got a problem”

David Warrender, Foggo

The slipform core acts as the first building block onto which the steel vertical elliptical frame is anchored. Erected from the ground up on opposite sides of the building, these then rise the full height of the core and meet at the top to create the frame for the opening roof.

Critically, these huge vertical steel members must sit exactly where they’re supposed to and have precisely the right curvature, otherwise the curved glass cladding panels won’t fit ([see box](#)).

Cold curve cladding

Laying early groundwork with members of the supply chain was particularly important to deliver the building’s glass envelope correctly.

Italian facades contractor Focchi created a two-storey mock-up of the building that was tested relentlessly to ensure there would be no surprises on site. This came at a cost of £3m to TH Real Estate, but the result was a dependable cold-curved glass panel, which has 25 mm of curvature.

“The aluminium mullions that define the shape of the building are rolled on a very big radius – a 90 m radius if you rolled it on the ground,” Mr Warrender explains. “Then the glass is laid into the mullions and the glass actually settles to the curve.”

Looking at the structure, the depth of the building’s curvature is clear. Stood across the street, you can only see as high up as the ninth floor – the upper levels are completely obscured because of the convex curve beyond this point.

None of this easily allows for corrective action. The technical challenge was ensuring everything that was fixed into place was done so accurately.

Being mindful of this from the start, TH Real Estate and Foggo recognised the need to engage their supply chain at a very early stage, giving the various teams time to conduct tests and produce mock-ups.

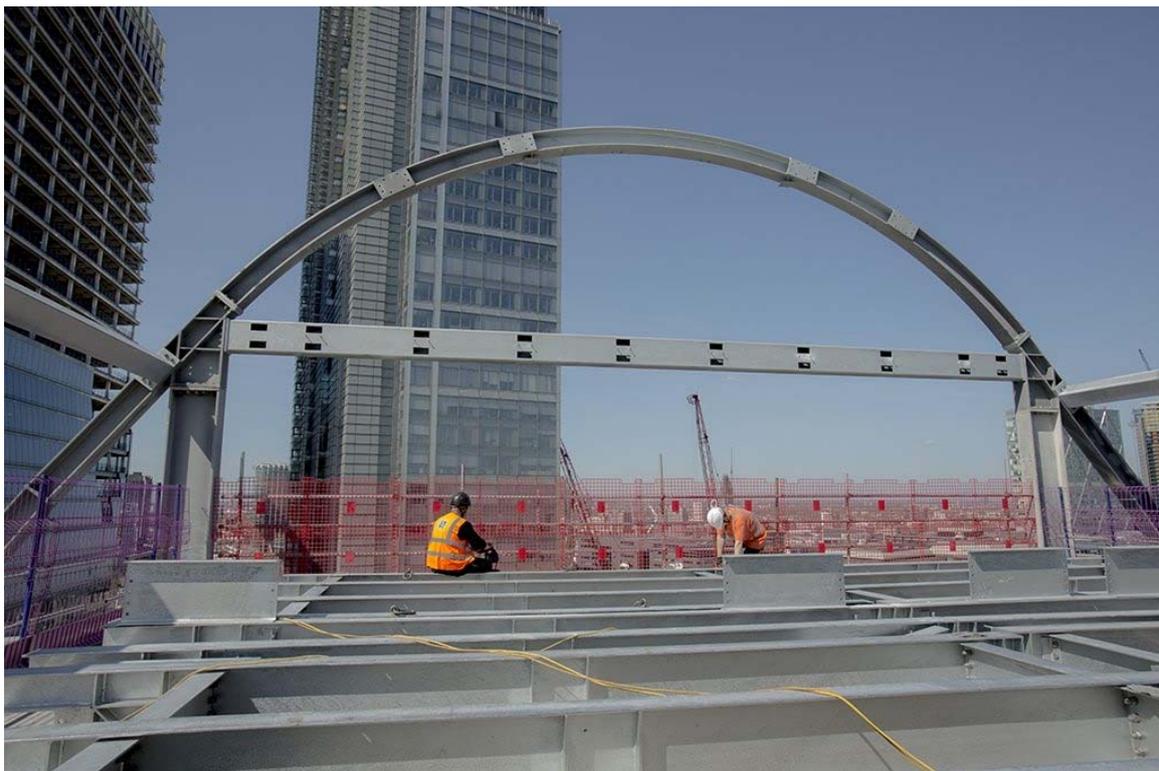
“We commenced demolition before we signed the building contract with the main contractor,” explains TH Real Estate’s Mr Harris. “We had a stage one price so that gave us fixity on some key elements such as prelim, overhead, profit and key supply chain, which we tendered separately to discussions with Mace as principal contractor.”

Party piece roof

CN’s tour of the site takes us up the 21st floor accompanied by Mace site manager Nick Moore. It’s a sunny day so the fact the steelwork and cladding is yet to go over the top of the building is welcome.

This is the highest floor of the tower and houses the majority of the plant, such as the cooling towers and boilers, that would often be found on the roof.

The floor has 1,769 sq ft of office space with a (gross internal area of 6,453 sq ft, however, as well as two private terraces and some fantastic views of the neighbouring high-rise cluster.



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“We can’t finish off the steelwork until we’ve landed the plant units, and we’ve got to find a way of putting the steelwork over the top of the units without damaging them,” Mr Moore says.

To prevent the required plant rooms from ruining its shapely form, the cleaning cradle is housed on its own structure on the 21st floor, just underneath the cladding on the ceiling. The roof has two butterfly doors that open up, allowing the cradle to emerge from the building like something out of *Thunderbirds*.

The cleaning cradle sits atop a plinth-like structure, from which it will emerge through the two 12 m x 4 m glass butterfly doors. Unfortunately, the roof's construction is not yet far enough along for *CN* to see it in action, but Mr Warrender assures us it will be a "fantastic" sight.

Following a short descent down the still-exposed steel prefabricated stairs, we arrive on the ninth floor.

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Nick Moore, Mace

The slipform core and bell-like curves of the building combine to create a wide-open space uninterrupted by columns. The ninth floor is more than three times bigger the top floor, with a gross internal area of 21,318 sq ft, while the 12th floor has the biggest usable office space with 17,594 sq ft.

Further down on the ground floor, the building's curvature sucks the floor sizes back in to a gross 6,202 sq ft. Out on the street, this will allow pavements 6.5 m wide and is a placemaking exercise aimed at giving something back to the public realm.

While 70 St Mary Axe may be dwarfed by its emerging City neighbours, its unique touches and party-piece roof should ensure it's not out of place on the high-rise catwalk.