Award

Aviva Studios, Manchester

PROJECT TEAM

Architect: **Office for Metropolitan Architecture**
Structural Engineer: **Buro Happold**
Steelwork Contractor: **William Hare Limited**
Main Contractor: **Laing O'Rourke**
Client: **Manchester City Council**

Aviva Studios in Manchester stands as a premier cultural venue, embodying the creative vision of Manchester International Festival (MIF). Led by the architect, the building occupies around 17,000m^2 and includes a large warehouse space and adjoining theatre that can be used independently or together. Set within the St. John's regeneration area and strategically positioned on the former ITV Granada Studios site, the building enhances the city's status as a hub for arts and culture, fostering skills development, talent retention and social change.

The warehouse serves as the central core of the facility, boasting an impressive internal volume measuring approximately 34m by 68m on the floor plan and standing 20m high. Its cuboid design creates a visually striking open space for audiences. This effect is achieved through the strategic use of long-span steel trusses, eliminating the need for floor columns.

Modified Pratt trusses are seamlessly integrated into the roof space, allowing for service distribution and rigging access across the entire roof area. The high strength-to-weight ratio of the steelwork ensures an efficient structural solution while supporting a robust load-bearing system. The warehouse can suspend a total rigging load of 200 tonnes across the full technical grid, providing the necessary flexibility to accommodate a wide range of events. Additionally, large movable partitions are suspended from the roof steelwork, allowing for smaller, acoustically sealed performances within this versatile space.

A steel framework forms the 'mega walls' either side of the warehouse. These elements provide support to the warehouse roof, floor and the theatre, whilst also facilitating circulation around the building. Due to the site constraints, there are only three localised zones along the wall length where a vertical structure can be located down to foundation. At the northern and southern ends of the wall, braced steelwork towers termed 'mega columns' support the mega wall structure. However, directly carrying the central mega column (bearing a load of 3,000 tonnes) vertically to foundation was not feasible due to utilities located below the Water Street footpath.

Initial design development involved a reinforced concrete transfer structure. However, further subsurface investigation revealed that utility services were located closer to the foundation than anticipated. This discovery rendered the original design unfeasible without diverting these services, which would have incurred high costs and a lengthy process. To address this challenge, an alternative solution was sought - one that could extend the cantilever over Water Street, mitigating the need for any diversions.

The breakthrough came when the construction material was changed to steel. Evaluating different options and geometries, engineers focused on balancing stiffness against tonnage. The goal was to find a solution that effectively controlled deflection, while remaining materially efficient, cost effective and sustainable. The shift to steel construction provided a feasible path forward.

The complex geometry of the theatre's steel frame emerged through intelligent computational design, leveraging the 3D surface provided by the architect. The backbone of the structure consists of four steel roof trusses. These trusses span between the theatre columns at the rear of the balcony and one of the warehouse's mega walls located above the proscenium arch, providing both vertical and lateral support.

A series of ribs play a crucial role in supporting both the inner and outer acoustic skins, shaping the faceted profile of the envelope. Additionally, the triangulated ribs on each side of the balcony structure form side trusses within the interstitial space.

Effectively controlling sound transmission out of the building and between internal spaces was the primary concern to enable concurrent performances, and a key planning condition that led to the box-in-box construction of both the theatre and warehouse.

The loading through installation of the precast concrete cladding on elements locally in areas, was found to be more onerous than the in-service condition covered in the permanent works design. The design checks performed needed to be representative of the full construction duration requiring a constantly changing set of support conditions and loading as the steel frame was erected and the load was applied. Through this design, the impact of the sequential installation of precast concrete cladding panels on the steel superstructure was better understood.

The movement of the superstructure as the cladding was installed could be estimated, and this movement was benchmarked against performance requirements, which could be accommodated by the precast concrete panel-to-panel junctions. The design significantly shaped the process that informed the magnitude for the setting/packing of the precast brackets for various superstructure elements.

The steel frame at Aviva Studios gains a competitive edge over other construction materials due to the utilisation of prefabricated components. The extensive collection of long-span trusses found in both the warehouse and theatre were meticulously produced, fabricated and protective coatings applied within a controlled environment. Erection of the structure set within tight tolerance limits was achievable through the high level of precision afforded through the offsite manufacturing.

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Judges' comment

A world class cultural venue housing a warehouse space capable of supporting 200 tonnes of rigging from long-span steel trusses, and adjoining theatre, to be used independently or together. The result is a visually striking space able to host a wide range of events with large audiences, enhancing the city's status as a hub for arts and culture.