SPACE HOUSE RESTORATION, LONDON

PROJECT VALUE - £110M
CLIENT - SEAFORTH LAND
MAIN CONTRACTOR - BAM CONSTRUCTON
ARCHITECT - SQUIRE & PARTNERS
STRUCTURAL ENGINEER - PELL FRISCHMANN
PCE SCOPE OF WORKS -
- PRECAST CONCRETE CRUCIFORM REPLICAS

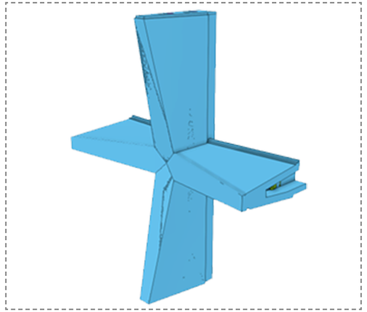
PCE CONTRACT VALUE - £763,500

Introduction

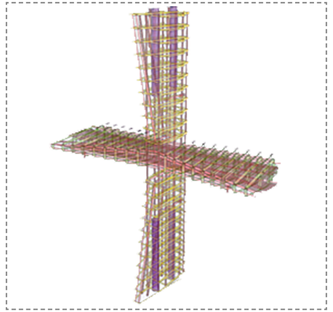
PCE Ltd were appointed as specialist contractors for the design, manufacture, and construction for the refurbishment of the iconic Covent Garden landmark building, Space House. The sustainably-driven Space House project saw PCE once again work with Main Contractors BAM Construction, on behalf of London-based real estate developer Seaforth Land, bringing new life to the landmark Grade II listed building in London. PCE designed and delivered the structural solution for the new cruciform units. This involved manufacturing level 15, whereby the cruciform components spanned across levels 15 and 16, plus the re-installation of the refurbished roof T parapet units at level 17. The iconic Space House, designed by Richard Seifert & Partners and known for its innovative architecture and a striking concrete cruciform façade, dates back to 1968 where it was first occupied by the Civil Aviation Authority. This historic landmark underwent a comprehensive redevelopment in a project that aimed to transform the building into a highly sustainable, smart structure designed to BREEAM's Outstanding standards.

HybriDfMA Bespoke System

The modular nature of PCE's HybriDfMA system build approach ensures construction of the highest efficiency, quality, and control. The Space House project demonstrated just how effective this approach is, showcasing what can be achieved with minimal resource, reduced environmental impact, and vastly reduced logistical disruption.
To intricately replicate the geometry of the original cruciform components, PCE utilised its offsite expertise and the latest digital design software. This involved applying the latest design standards to ensure reliable, seamless, and smart connectivity between the new and existing levels. As part of the installation of the additional levels, the top structural layer needed to be detached, repaired offsite, and expertly reattached to the structure. This was achieved by attaching 48 offsite manufactured reinforced precast concrete cruciform components to the original connections. Utilising the principles of PCE's systemised smart connectivity helped bridge past with present with seamless precision and structural synergy.
The inherent modularity of both the original structure and PCE's system solution played a crucial role in determining the optimal connections, facilitating a well-defined framework that embraced the HybriDfMA Bespoke solution's smart connectivity features.



Cruciform component digital model



Cruciform component reinforcement

Project Features

The project saw the removal, repair, and reinstallation of Space House's existing top layer, plus the introduction of level 15. This required the offsite manufacture of 48 reinforced precast concrete cruciform components, which spanned from level 15 to level 16. Forming a crucial feature of the project, it was imperative to manufacture the new cruciform components with absolute precision, creating an exact replication of the originals.
Once manufactured, the cruciform components were connected to the structures existing components using the PCE HybriDfMA approaches' 'smart connectivity', aiding in the ease, efficiency, speed, and quality of installation.
To help achieve this, the structures' reinforcing bars were strategically placed to coordinate with the existing structures constraints with predictability and efficiency. The absence of back propping, a common feature across PCE's different system build solutions, improved access, reduced risk, and increased the speed and ease of installation.
Throughout all phases of the structural solution, attention to detail was pivotal to ensuring success. With a meticulous design solution and high level, in-depth quality assurance and control, the PCE team ensured everything came together with assured precision. Doing so ensured the structures key features complimented the original designs.
Space House's modular origins are poignant to the success of the refurbishment. Modular construction facilitates easier changes by providing greater flexibility for design modifications. The existing modular nature of the structure highlighted the adaptability, longevity, and sustainability modular construction provides. Coupled with PCE's MMC expertise, modular construction unlocks exciting and innovative opportunity.

Key Metrics

- **2** storey HybriDfMA Bespoke solution
- **6** week construction programme
- **48** off-site manufactured components
- Reduction in H&S risks with **0** RIDDOR incidents
- Significant reduction in waste
- Addition of off-site quality control
- Assembled by PCE's **4** multi-skilled site operatives
- Deliveries to a busy restricted city centre site
- Creation of highly accurate bespoke moulds
- Smart structure designed to BREAM Outstanding standards
- Sustainably-driven DfMA solution
- Significantly reduced disruption to area

Pursuit of such high levels of detail and accuracy is testament to PCE's unwavering pursuit of the achieving highest standards. A longstanding partner of PCE's expansive and versatile supply chain, Techcrete, were instrumental in working alongside PCE to successfully overcome the challenge of creating components that closely replicated the original cruciforms, demonstrating what can be achieved through effective collaboration. With strong supplier relations and PCE Precast Coordinators supporting the supply chain with quality control and monitoring, the project benefitted from the opportunity to check, review, and validate components offsite, ensuring every element was manufactured to the highest quality standards.

Project Delivery

Reattaching the top layer posed significant challenges due to the circular geometry of the structure. Integration of the new levels and reconnection of the removed top structural layer was aided by clearly designed load paths, helping effectively distribute the load of the new structure. Once the design phase was complete, production of the cruciform replicas commenced. The existing cruciform details, originally designed by Pell Frischmann in 1965, were made available to aid in a direct replication of the original intent. To produce an accurate cruciform replica, PCE first created unique moulds that exactly matched the 1965 originals. This required the consideration of several factors, including weathering and elemental exposure, as well as general ageing impact on the original concrete. The material testing and sampling process was rigorous; ensuring an exact replica required fastidious depth of detail, from materiality to textural characteristics. Drawing on its expertise in modular construction and standardised methodologies, PCE were able to diligently map out the safest, fastest, and most efficient installation plan, with a well-considered, predetermined strategy ensuring assembly adhered strictly to design drawings and content, whilst navigating logistical complexities. Extensive experience delivering superstructures within tight logistical constraints aided the meticulous planning and preparation; the project team were well prepared and well equipped to execute the plan with precision and minimal disruption, achieving a just-in-time delivery schedule. PCE were able to complete the construction phase of Space House with just 4 multiskilled operatives, delivering each level in only 2 weeks whilst recording 0 incidents. Installing with such speed, accuracy, and quality demonstrates what can be achieved when effectively utilising standardised, refined construction techniques, high-level planning, and Modern Methods of Construction (MMC) methodologies.