

CHAPEL WHARF, MANCHESTER

PROJECT VALUE - £110M
CLIENT - DANDARA
COST CONSULTANT - RIDGE PARTNERS
MEP - WSP
MAIN CONTRACTOR - SIR.ROBERT MCALPINE
ARCHITECT - AXIS MASON
STRUCTURAL ENGINEER - WSP & CIVIC
DESIGN, MANUFACTURE AND
CONSTRUCTION OF 4NO. BTR
RESIDENTIAL TOWERS CONSISTING
OF -

- COMPOSITE RECONSTRUCTED STONE SANDWICH PANELS
- PRECAST CONCRETE CORES AND SHEAR WALLS
- PRESTRESSED PRECAST CONCRETE ‘SCREEDLESS’ LONG SPAN SLABS
- PRECAST CONCRETE CANTILEVER BALCONIES
- PRECAST CONCRETE STAIRS AND LANDINGS
- ARCHITECTURAL RECONSTRUCTED STONE FIN WALLS
- STRUCTURAL STEELWORK FRAMING

PCE CONTRACT VALUE - £26M
PCE DESIGN - CURTINS CONSULTING



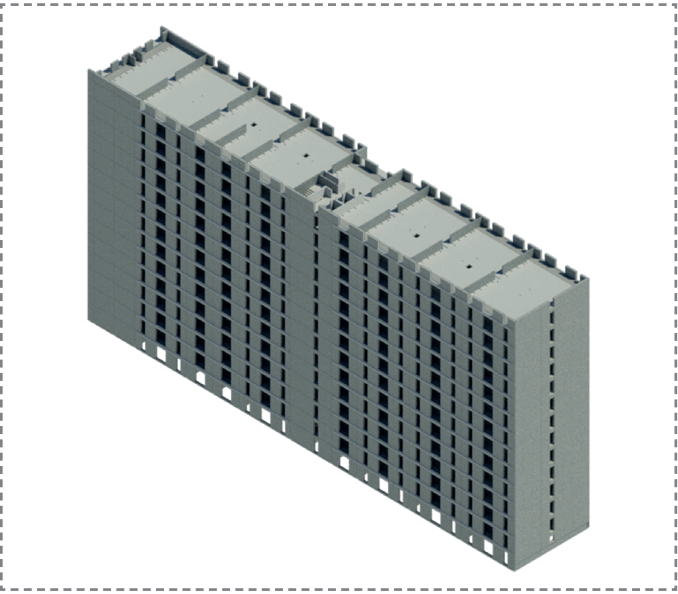
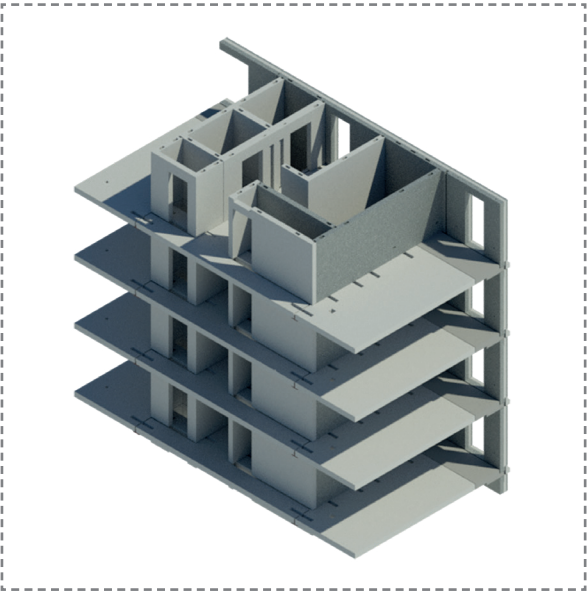
Introduction

Construction of the 995 apartment high-rise residential development known as Chapel Wharf, located in Manchester was completed using PCE Ltd’s hybriDfMA hyTower® system. Developed by Dandara, the build to rent project consists of four towers that vary between twelve and twenty two storeys high which contain one, two and three bedroomed apartments. PCE Ltd. Worked with the developer, Dandara, through the concept development stages to identify an optimised system based approach. Once the ‘kit of parts’ concept was fixed, a short phase of structural engineering and design validated the concept and allowed PCE to provide a detailed cost plan and delivery programme for the scheme. The main contractor, Sir Robert McAlpine was then appointed and the offsite solution was developed further into a detailed delivery plan with an integrated construction programme which saw ‘fit-out’ activities linked to the superstructure construction programme with just two floors between activities. This collaborative approach resulted in the four precast concrete structures, costing approximately £24million, being erected on site over a 22month programme. Dandara’s build to rent apartment scheme is located at Chapel Wharf, a 4.2 acre site adjacent to the Lowry Hotel and between the River Irwell and Chapel Street in Salford, Manchester. The scheme was designed by Architect Axis Mason with WSP as the client’s consulting engineers.



Hybrid Living Structure

PCE’s hybriDfMA Living system was used throughout the concept stage allowing the architectural design to be developed around a standard ‘kit of parts’ that were then interchangeable and reconfigurable to create multiple layout iterations. This approach maximised efficiency in each of the hybriDfMA stages and produced an extremely cost-effective solution along with all the other benefits an offsite system brings to a complex inner-city project, such as significant reductions in onsite man hours, vehicle movements, noise, dust, general disruption and most importantly programme. The frame structure for this project consisted of flat pack and volumetric cores, fair faced cross walls, gable walls, façade sandwich panels, stairs, landings, prestressed solid slabs and cantilever concrete balconies.



Project Features

The development which is situated on a tight, city centre site in Manchester, consists of 4 ‘Build to Rent’ high rise residential blocks which range from 15 to 23 storeys. Blocks A, B and C which are 17, 15 and 17 storeys respectively are situated over a 2 storey insitu concrete podium which transfers to vertical loads of the building above and Block D which is 23 storeys is founded at ground floor level. The buildings are constructed using a ‘crosswall’ structural concept where the vertical loads within the building are transferred through dividing walls between each apartment demise. These crosswalls or party walls also act as shear walls contributing to the stability system resisting lateral loads which act in the same as these walls. The main stability system is the structural cores which are configured as a series of precast concrete volumetric modules and 2D panelised walls. Precast concrete stairs and landings with an integrated balustrade permanent system are assembled within the cores progressively to provide safe vertical circulation through the structures as they are constructed. The façade is delivered as a composite, precast concrete sandwich panel consisting of an inner ‘structural’ concrete leaf, an insulative core and an outrer decorative, textured concrete leaf which provides the finished façade of the building. All glazing was preinstalled within the sandwich panels offsite at the precast works removing the need to deliver windows to site and then subsequently undertake these works in a site environment. Suspended floor construction is a long span (upto 10m) 225mm thick prestressed solid slab which requires only a nominal latex levelling compound prior to directly applying floor finishes.



Key Metrics

- **30%** reduction in programme compared to an onsite insitu concrete build
- **Zero** reportable accidents
- **1st** fix M&E integrated into structural components during their offsite manufacture
- **No** requirement for any external scaffolding
- Development of a ‘long span, screedless’ prestressed solid slab allowed the removal of over **50,000m2** of levelling screeds
- Installation of over **1250no.** ensuite Bathroom Pods concurrently with the build of the superstructure
- Removal of plasterboard finishes to apartment diving walls with directly decorated precast concrete finishes
- Site man hours reduce by over **100,000** compared to traditional delivery methods



which ‘see saws’ over the structural external wall. This innovative idea allowed cantilever balconies to have the glass balustrades to be fitted offsite at a preassembly facility prior to the balcony being delivered to site and then assembled form within the building footprint resulting in the removal of external access and the risk of operatives having to access the outside edge of the structure.

Finally, each apartment as a continuous cantilever balcony which is formed from a ‘bespoke’ reinforced concrete element which has an integrated structural thermal break running full length between an inner supporting slab and an outer cantilever balcony slab

Project Delivery

PCE’s method of Offsite manufacture helped to significantly reduce the carbon footprint of the project with a number of significant benefits including a reduced on-site workforce, enhanced Health and Safety, a greater speed of construction and a higher quality build. In total over 8000 structural elements and 1450 Ensuite Bathroom Pods were installed by PCE’s specialist assembly teams over a 22month build programme creating the 56,000m2 development. At peak this busy city centre site was taking up to 30 deliveries per day from five manufacturing locations and four tower cranes were installing over 550 tonnes of concrete per day. This huge logistical challenge was planned and coordinated by PCE’s delivery team working closely with main contractor Sir Robert McAlpine and the projects extended supply chain. The successful delivery of this showcase development is a testament to the benefits of DfMA, particularly when aggregating the opportunities across multiple delivery disciplines through a drive for optimised integration.

