

# Residential development, Deansgate Square, Manchester

Project case study



## Product

A range of high specification structural ready-mixed concretes

## Volume

110,000m<sup>3</sup>

## Client

Renaker Build Ltd

## Overview

Hanson has designed and supplied a range of different concretes to form the walls, floors, foundations and columns of Deansgate Square, a ground-breaking residential development in Manchester's city centre.

## Project description

Deansgate Square consists of four sleek, glazed, towers providing residential accommodation and leisure facilities in Manchester's city centre.

The development, designed by Simpson Haugh Architects for Renaker Build Ltd, dominates the skyline in Manchester's city centre. The tallest of the glazed towers stands at 67 storeys high and, at 200.5 metres, is the tallest building in the UK outside London.

The development has been constructed using 110,000m<sup>3</sup> of in-situ concrete to create the walls, floors, foundations and columns and Hanson's technical team were involved in the early-stage design discussions with the contractor and design engineers regarding the bespoke suite of

concrete mixes required.

Constructing buildings of such height, over a large, three-storey basement, brought many unique challenges, especially when placing and curing the concrete. To meet the engineering challenges, each composition was extensively explored months before construction began and optimised for rheology, consistence retention, reduced friction under extreme pumping pressures, mix stability, robustness and modulus of elasticity.

The four towers are built on large raft foundations, which were divided into five manageable pours of between 400m<sup>3</sup> and 900m<sup>3</sup> to ensure the concrete delivery was achievable within the strict working hours. These raft pours were up to three metres deep and used high specification watertight →

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# Deansgate Square, Manchester

## Residential development



concrete containing 70 per cent Regen GGBS to minimise the production of heat and reduce the risk of thermal cracking.

Regen GGBS (ground granulated blastfurnace slag) is a cement replacement product which enhances the durability of the concrete while adding to its sustainability credentials. It is a by-product of the iron-making industry and using it to replace one tonne of Portland cement reduces the embodied CO<sub>2</sub> of the concrete by around 820kg on the whole cradle to gate life cycle impacts. It also conserves natural resources and prevents the slag from going to landfill.

A range of concrete strengths was developed for the different structural elements of the project, primarily:

- C40/50 for most suspended slabs
- C50/60 for the raft foundations, tower slabs and core walls
- C70/85 ultra-high performance concrete for the columns/walls above podium level achieved strengths in excess of 120N/mm<sup>2</sup>.

Hanson supplied a dedicated mobile batching plant capable of supplying 100m<sup>3</sup> per hour adjacent to the site and supplemented supply at peak times from a static city centre plant. This ensured there was a short period of time between batching and placing the concrete, guaranteeing its quality.

The three-story basement car park, which covers the whole subterranean site and has parking for 671 cars, was constructed with a range of grade C50/60 concrete mixes using both pore-blocking and crystalline watertight concretes technologies, with over 5,000m<sup>3</sup> of watertight concrete supplied for the project in total.

Concrete pours of up to 1,000m<sup>3</sup> were delivered to two static pump locations, where the material was pumped more than 250 metres at the longest point across the site.

The central cores to the four towers were produced using an innovative jump-form system, which could be adapted

between cycles to compensate for floor plans that differ in shape or details, such as door openings. This approach allowed the towers to rise at a rate of 1.5 floors per week. The central core was C50/60 and designed to be pumped vertically more than 200 metres via static feeder lines distributed across site from the specially purchased pumps designed to cope with the immense pressure of the concrete.

Chris Underhill, principal engineer at Renaker Build Ltd, said: "Working in partnership with Hanson Concrete and utilising the project specific site batching plant provided many advantages to us as a client.

"It enabled us to collaboratively deliver a cost-effective project and gave a joint approach to ensuring quality at all times.

"The sharing of data and test results on a daily basis gave early confidence that the materials were performing in line with expectations and helped us progress in line with the schedule."