Case study

High density concrete counters hydrostatic pressure

When construction of a cutting-edge development in central London hit a snag, MagnaDense high density concrete was the ideal solution.

VolkerFitzpatrick

RG Reef Group

GDP

CAPITAL

LKAB Minerals

Tribeca, adjacent to London's Regent's Canal, is London's largest purpose-built life sciences development. This landmark waterside quarter at the heart of the biotech cluster features one million square feet of state-of-the-art laboratories, offices and apartments. It is a redevelopment of an old Post Office sorting building, previously known as the "Ugly Brown Building". It blends cutting-edge science with sophisticated city living.

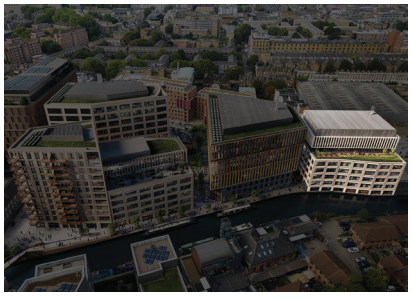
Apex, the first of six buildings that make up the development, opened in spring 2024. It consists of over 112,000sqft of laboratory and purpose-built life sciences space on the upper sixth floors, while the ground and basement floors accommodate support and amenity spaces.

Apex celebrates its relationship with the canal via a café on the ground floor that sits flush with the water.

Hydrostatic pressure + limited space = big problem!

A sewer that ran directly under, and close to, Apex's proposed basement was identified as an issue during construction. Excavations to create the new basement floor level would result in a reduction in the overburden pressure above the sewer crown. Once completed, the weight of the building would be sufficient to counter the hydrostatic pressure from the sewer. However, the overburden pressure would need to be compensated by the introduction of a capping slab.

A capping slab, using standard concrete, would have had a prohibitive depth. It would have significantly impaired the height available in the basement.



Apex, right, is the first completed building in the Tribeca complex.

Pump pipe (rear centre) delivering MagnaDense concrete to cover the sewer (front left).

Due to the position of the sewer and the proposed location of core aspects of the building - eg the stairwell and plant equipment - a deep capping slab could potentially have resulted in significant design changes which, in turn, would have had a huge impact on costs and time. A solution needed to be found that would allow adherence to the original design, resulting in the construction of a fully functioning basement.

"I was thrilled to discover that MagnaDense high-density concrete provided the solution to overcome the technical challenges and secure approvals for constructing over the existing Trunk Sewer at Apex."

Jason Russell, Design Director, Reef Group

High-density concrete provides the ideal solution

GD Partnership team were tasked with finding alternatives to standard concrete.

Heavyweight concrete became the main consideration. MagnaDense high density aggregate was proposed and, following comprehensive presentations and trials, accepted. Using MagnaDense ensured sufficient weight of concrete was achieved to allow construction of the basement within the original design.

"Using standard materials would have required a mass pour for the area in excess of 250m³ of concrete. The resulting thickness of the capping slab would have caused significant headroom issues in the basement. MagnaDense enabled us to use only 150m³ of concrete - a reduction of 40% that kept the project on course."

Pawel Partyka,
Projects Director, GD Partnership

MagnaDense is produced by processing the natural iron ore mineral magnetite. Certified to EN 12620 it is ideal for the production of high-density concrete.

To enable effective capping of the sewer, concrete with a density of 4.0t/m³ was produced. This gave the right weight for the space available.

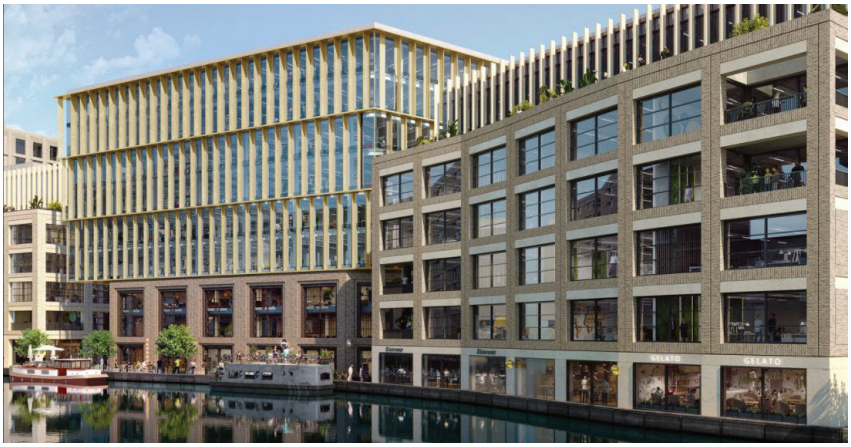
"LKAB Minerals' assistance was invaluable in enabling us to confidently come to the speedy conclusion that MagnaDense would provide the solution we required."

Pawel Partyka,
Projects Director, GD Partnership

Tribeca delivers modern, flexible space alongside vibrant restaurants and cafés.

Easy installation

MagnaDense concrete was supplied by Capital Concrete from their Silvertown plant in east London - chosen to provide Ready-mix due to their experience in supplying heavyweight concrete.



Tribeca is at the heart of London's Knowledge Quarter where thousands of bioscience and advanced technology innovators and academics collaborate and compete.

Testing regimes and operational controls were critical in ensuring the concrete was supplied in accordance with the required specification.

No specialist training or equipment was required to mix or deliver the concrete, either at plant or on site.

Standard equipment being used to pour MagnaDense concrete.

We worked closely with the main contractor, VolkerFitzpatrick, to ensure they were conversant with the handling and application of high density concrete.

"Not many of our team had worked with high density concrete before. LKAB Minerals' support was invaluable in giving us reassurance about working with this innovative solution. They put our minds at ease and we will be confident in working with it, and them, again in the future."

Rakesh Chavda,
Operations Manager, VolkerFitzpatrick

A detailed design mix was drawn up. Density was a crucial factor. GGBS was required to help with heat of hydration and sustainability. MagnaDense concrete can be supplied with GGBS, fly ash and other cementitious binders. Laboratory and plant trials were undertaken to ensure the correct mix for the required strength and density.

We were on hand for the first pours and worked with the groundwork sub-contractor to advise when necessary.

We are always available to help and take an active interest throughout a project. We liaise with all parties to ensure the final product is exactly what was required and expected.

"With a robust strong mix design we were able to meet the specification requirements fully for density and strength and able to pump the concrete successfully over 50m. The MagnaDense concrete had an extended open life to facilitate the travel and placement time and the concrete was delivered on time. The service we received from LKAB Minerals with their delivery of product gave us full reassurance throughout the project."

Jack Sindhu,
Technical Director, Capital Concrete

Facts

Tribeca is the largest purpose-built life sciences development in London *(Apex alone is over 112k sqft).*

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Learn more at
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