SMART CONSTRUCTION

Construction Leadership Council

Y:CUBE

YMCA London South West has developed a new housing solution called Y:Cube, which provides self-contained and affordable starter accommodation for first-time buyers or people unable to afford private rent.

Developed in partnership with architects Rogers Stirk Harbour + Partners and project manager AECOM, the offsite construction method provided high quality accommodation, which was built faster and cheaper than using traditional methods of construction.

Y:Cube uses a pre-constructed 'plug and play' volumetric modular system. This means the streamlined units can stack easily on top or alongside each other, making it completely adaptable to the size and space available and perfect for tight urban sites.

DESIGN FLEXIBILITY

Modular construction is simplified by nature, but as long as designers understand the boundaries they can still deliver the project to satisfy the client's brief.

In this case, each module was carefully designed to maximise the use of space while taking advantage of the simple, straightforward design parameters.

CAPITAL COST

The total project cost came to £1.6 million, for a 36 unit development. The cost of build was compared to other methods and this was the most effective solution at a total cost of £1,400 per m2, or £1,000 excluding the land. This compares to an average of £1850 per m2.

SPEED AND EFFICIENCY

From start to finish the build was quicker than traditional build, reducing disruption for neighbours.

PRODUCTIVITY

Build speed was enhanced compared to traditional build with an approximate build value of £95 per man hour – considerably higher than the average of £25.60 per man hour.

RISK

Because this is a new building method, a PROTOTYPE product was delivered to the YMCA team to highlight any potential long-term issues and solutions for these. This helped to make changes and improvements to help avoid any future problems with the homes.

This is a significant advantage of modular building and not easy to match using other build methods. By nature, mock-ups are not usually relocatable, as was the case with this project.

QUALITY AND DEFECTS

Each apartment is built under controlled conditions in a factory in Derbyshire, increasing precision and quality control while minimising waste.

These are then delivered to site and craned into place, with services already installed, while air tightness and acoustic performance optimised.

HEALTH AND SAFETY

The reduction of work on site had a dramatic effect on the project. No accidents were reported, which is a key success – especially when you consider the 2015 RIDDOR report, which indicates that 4% of construction workers suffered a work-related illness and 3% sustained an injury, most from slips, trips, and falls.

IN-USE ENERGY PERFORMANCE

The level of insulation and airtightness means bills for heating and electricity are expected to be as low as £10 per month, while the cost-saving in construction means the units can be rented for £150 per week – 65% of the local market rate.

Energy consumption for heating/cooling predicted at 22kWh/m2 annually, and total emissions (including regulated use) approximately 27kgCO2/m2. The flats achieve an EPC rating of B.

CIRCULAR DESIGN

The development has been described as: "A permanent solution in a temporary location."

Each unit has a lifespan of around 60 years, during which they can be dis-assembled, moved and re-installed up to five times.

This provides ultimate flexibility for future use and allows reconfiguration and redesign with little or no waste created on site.

AVERAGE/REGULATIONS	
Capital cost	£1850/ m2
Speed	0.17
Productivity	£25.60/ man-hour
PMV	40%
Quality (defects)	99.4%
Health and safety	2.24 injuries per million hours worked
Embodied carbon	875 Kg / m2
In-use energy	EPC Rating B

Y:CUBE	
Capital cost	£1,000/m2
Speed	N/A
Productivity	£95 / man-hour
PMV	N/A
Quality (defects)	N/A
Health and safety	0
Embodied carbon	35% less than traditional
In-use energy	EPC Rating B

The data is separated in a different table as some of the measures were collected using different methods, therefore not strictly comparable like-for-like.

CONTRIBUTORS

CASE STUDY CONTRIBUTORS

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Construction Leadership Council

THE CONSTRUCTION LEADERSHIP COUNCIL

The Construction Leadership Council (CLC) works with industry and government with the objective to identify and deliver actions supporting UK construction in building greater efficiency, skills and growth. It draws together business leaders from across the sector to identify how to promote solutions to meet the ambitious government Construction 2025 targets. This is being delivered via a number of workstreams.

The Construction Leadership Council's Innovation in buildings workstream is embedding innovative construction techniques to improve productivity and capacity in the construction industry, and the quality and whole-life performance of buildings. The work stream is initially focussing on homes, taking action to overcome some of the key barriers to the take up and the commercialisation of Smart Construction; it will expand to all building types later.

To find out more about the Construction Leadership Council, please visit the website: **www.constructionleadershipcouncil.co.uk**