Designing for deconstruction and flexibility case study: Arup Campus, Solihull

Considering “long life, loose fit, and low energy” to maximise material benefits at end of life

Arup consolidated its Birmingham and Coventry offices to a new campus on Blythe Valley Park.

Business benefits

- The buildings are adaptable to allow separate tenants to occupy the space should Arup vacate.
- Used dry construction to enhance the amount of materials recovered during deconstruction.
- Many materials were selected for ease of recovery for salvage, reuse or recycling.

Project background

Arup Group and BVP Developments wanted a stimulating, energy efficient and comfortable working space for approximately 750 staff. The space was to be well-equipped, socially cohesive and provide a productive and flexible environment. It also had to be commercially viable and cost effective.

The campus comprises of two workspace pavilions that are linked by a central area that contains the entrance, reception and toilet facilities. Other facilities include a 150 seat lecture theatre, meeting rooms, cellular offices, café and gym.

Project details

Location: Blythe Valley Park, Solihull, UK
Developer: BVP Developments
Tenant: Arup Group
Architects: Arup Associates

The campus was constructed over two phases.

- Phase 1 was completed in 2002. GIFA: 5,635m²
- Phase 2 was completed in 2007. GIFA: 3,694m²
- Total Gross Internal Floor Area: 9,329m²

The phasing allowed the team to undertake a complete review of the masterplan objectives before commencing Phase 2.

Designing for deconstruction and flexibility

The building was designed following the sustainability principle of “long life, loose fit, and low energy”.

- Deconstruction and flexibility principles were considered at concept stage and throughout during design team meetings.
- Dry construction solutions, such as pre-fabricated components in the timber facades, were preferred to enhance the potential for deconstruction.
- Additional space was designed into the service routes to enable air-conditioning to be installed at a later date - should climate change require it.
- The Metsec infill floors and internal staircases can be reconfigured allowing the building to have separate tenancies.

Embedding lessons learned from Phase 1

Alterations to the approach were adopted for Phase 2.

- The timber for windows frame was changed from cedar to tatajuba as tatajuba has a longer life.
- More robust window mechanisms were specified.
Materials quantity
- Avoided the need to use hardcore for the substructure because the ground was strengthened using lime stabilisation.
- Cost savings were achieved by stripping away unnecessary finishes including ceilings and encasements for steel works.

Recycled content
- 2,900 tonnes of recycled materials were used.
- 20% recycled content (by weight) overall.
- The steel frame had 19% recycled content.
- External steel roof coverings had 5% recycled content.
- Miliken carpet tiles had 27% recycled content.

Embodied carbon
Embodied carbon was analysed for the design options and used as a parameter for decision making.
- Embodied energy for phase 1 of the campus was 6.2Gj/m², including materials transportation.

Timber products were included because of their low embodied energy properties including:
- Western red cedar for the building cladding.
- Exposed timber including solid oak floors, steps and handrails.

Water use
- The project had a target for operational water use of less than 18l per person per day.
- The project currently achieves 17l per person per day (based on calendar days).

Life span (e.g. durability)
- The building was to have a design life of 60 years. The flexible design approaches have not impacted on achieving this.
- The timber for windows frames was changed from cedar to tatajuba as tatajuba has a longer life.
- The project team developed maintenance and operational manuals for the flexibility and deconstruction aspects of the design. It is hoped that these manuals will assist in managing the building so that its flexibility and deconstructability will not be compromised.

End of life potential
- Pre-fabricated elements that can be easily disassembled and reused are used in the steel frame, concrete planks to the first floor, metal roofing system, and the timber facades.
- The steelworks for the frame is non-composite, which allows for easier recovery.
- The timber floor planks have no structural topping, which allows for easier recovery.
- Modular carpet tiles from Miliken can be recovered at the end of their 10 year life.
- The Metsec infill floors and internal staircases can be dismantled or moved to suit future tenant needs and to extend their usable life.

Resource scarcity & security
- 100% of timber for both phases was FSC Certified.