Refurbishment resource efficiency case study: Manchester Central Library

Using BIM and achieving resource efficiency benefits

Building Information Modelling (BIM) is being used on the transformation of Manchester’s Grade II* Listed city centre library.

Business benefits
- Reduced the volume of required concrete through design efficiencies.
- BIM avoided costly remedial works through early clash detection providing cost and time savings.
- Transport mileage is being reduced through local procurement and employment.
- Onsite energy efficiency measures reducing the embodied carbon of delivering the project.

Building background
Manchester Central Library is an iconic building within its Town Hall Complex in the city centre’s St Peter’s Square. The Library contained numerous under-ground book stacks and above-ground reading rooms. The Great Hall, a grand circular domed reading room in the centre, contains much of the original furniture, a glass domed roof lantern light and ornate detail - the preservation of which is of great importance.

Manchester Central Library has undergone many piecemeal changes since its construction; however, the building now has to accommodate services very different to those envisaged in 1934. Manchester City Council will provide residents and visitors with a range of state-of-the-art accessible services as part of the Town Hall Complex Transformation project. Manchester Central Library will be completely refurbished.

Project details
- Client: Manchester City Council
- Contractor: Laing O’Rourke
- Architect: Ryder Architecture
- Project cost: Approximately £40m

Planning for resource efficiency
In close association with the transformation of the adjoining Town Hall Extension, Manchester Central Library provided the opportunity to evaluate the benefits of using BIM. The immediate co-ordination and design improvements prompted the swift adoption of BIM across the entire project.

BIM was used to generate detailed information in the form of 2D and 3D outputs. These enabled greater cooperation between the client and design team, design facilitation and deployment of clash detection and construction sequencing functionalities. The client is continuing to explore the use of BIM for building management and FM delivery on completion.

Materials quantity
- BIM was used to minimise the number of joints in the concrete soffit (reducing material demands) whilst maintaining the feasibility of construction.
- The internal column structure was altered which enabled the thickness of the ground slab to be reduced by 50% over an approximate area of 1,100m². This avoided the use of an additional 300m³ of concrete (equivalent to 81 tonnes CO₂) and 49,500 litres of water.
Materials wastage
On site waste management strategies have been implemented to achieve waste targets of:
- 90% of waste to be diverted from landfill;
- 75% of waste to be recycled or reused.

The use of detailed 3D modelling enabled cost and waste reductions through clash detection at the design stage. By identifying and resolving errors, the likelihood of costly onsite remedial works has been reduced.

Recycled content
Laing O'Rourke's ensured:
- All structural elements (where possible) had to include recycled material in line with WRAP Recycled Content guidance.
- 25% of high grade aggregate used had to be recycled/secondary aggregate.

Embodied carbon
Further embodied carbon reductions were achieved following client led specification through procurement.
- Manchester City Council specified that at least 50% of the construction spend should be with Manchester based suppliers.
- Manchester City Council encouraged recruitment of local labour for the construction.

These specifications served to reduce the embodied carbon of the construction whilst providing local employment opportunities. This integrated the project’s social and economic regeneration benefits.

The embodied carbon of the project was also addressed by Laing O'Rourke who committed to an onsite CO₂ emission reduction of 15%. Numerous actions were taken to improve on-site energy efficiency and hence reduce the embodied carbon.
- Early connection to the grid, avoiding the use of generators where possible.
- Provision of high efficacy light fittings in temporary accommodation.
- Use of lighting circuits that maximise day light saving.
- Commitment of staff to switch off lights and terminals when not in use.

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