



# Pinky + perky

*Duggan Morris's new offices in King's Cross  
PLUS Three projects using offsite construction  
by Waugh Thistleton, HKR and Eric Parry*





*Building study*

## High density, low carbon

With its Dalston Works mixed-use scheme, Waugh Thistleton Architects has created one of the world's largest CLT structures





*Dalston Works provides 121 new affordable and PRS homes alongside 3,500m<sup>2</sup> of commercial space. Designed in 2011 at the early stages of the area's regeneration, the brief was to provide high-quality, high-density housing on this brownfield site over the route of the proposed Crossrail 2 train line.*

Words Jay Merrick  
Photography Daniel Shearing

The most innovative thing about Waugh Thistleton's large, mixed-use building at the junction of Dalston Lane and Martel Place in London is that it's the world's largest cross-laminated timber (CLT) structure, reaching a high point of nine storeys. There is nothing in the general appearance or detailing of the scheme that indicates its unusual Austrian-made skeleton. As the practice's Dave Lomax puts it: 'It's the excitement of ordinary – it looks like any other apartment building.'

The massing, elevations, fenestration and 'brickiness' have produced a composition that would probably attain an alpha-minus if assessed via Boris Johnson's 2009 London Housing Design Guide and the New London Housing Vernacular guidance that followed in 2012, both of which have encouraged the neo-Victorian-cum-Georgian housing edifices that are currently *à la mode*.

The scheme is a continuous composition embodying four segments set out asymmetrically in plan. The highest portion, on the west side of the slightly sloping site, continues the skyline of tallish buildings on Tyssen Street, which runs along the south-west of the site. Most of the 121 apartments are in this part of the development, which has a gated central courtyard and sits on a double-height concrete base structure. This, in turn, rests on a concrete raft, isolating the building from the HS1 tunnel (and forthcoming Crossrail 2) beneath it.

There are more rental apartments in the seven-storey segment on the west side,

facing into the central public realm space. On the west side of these, facing Dalston Lane, are five storeys of affordable and shared ownership apartments, and this grouping also sits on a concrete podium and raft. The east and west parts of the scheme are connected across the south side of the site by the five-storey Dalston Studios office block, whose east end faces Dalston Lane.

A four-storey portion of the back wall of the Studios wing is no more than 300mm away from the flank wall of another apartment building – so bricklaying was impossible. The solution: high-pressure laminate cladding sections were attached to CLT panels in the factory, craned into the gap and there fixed to the superstructure.

A building of this size with a reinforced concrete structure would weigh approximately 10,700 tonnes – too heavy to build above underground rail lines. The CLT structure used, composed of 140-200mm floor slabs and 100-140mm wall slabs, weighs 2,300 tonnes and allows 35 per cent more accommodation. It's clear that CLT structures would also support higher-density buildings on sites with problematic geology or underground watercourses.

The building's structural CLT panels are precisely machined, with prepared window openings, vapour and fire barriers and M&E channels. Once the structure is up, internal walls can be fitted immediately. This seems a



## Architect's view

We conceived of the scheme as a village within a city, with the plan carefully modulated to break the large site into discernible volumes, orientated to maximise daylight into courtyards and living spaces. The building's intricate brickwork references the surrounding Victorian and Edwardian housing and the detailing of local warehouses, and provides a contemporary addition to the local streetscape. Similarly, the landscaped courtyards provide calm spaces within an otherwise hard urban environment.

Designed and built in solid timber, Dalston Works demonstrates how the innovative use of sustainable materials like CLT can help deliver high-quality, high-density housing to the capital without compromising the environment. We used over 4,500m<sup>3</sup> of timber within the structure, which has less than half the embodied carbon of an equivalent concrete frame. On top of this, the carbon stored within the timber structure amounts to 3,750 tonnes of CO<sub>2</sub>. So Dalston Works acts a carbon store, in contrast to the pollution caused by almost all other buildings.

Weighing a fifth of a comparable concrete structure, the use of timber enabled us to unlock the site constrained by the proposed Crossrail 2 train line running below. With a minimal raft foundation, we were able to design 55 more homes than would have been possible using orthodox construction methods. The result: a viable scheme for our client, more homes for London and the proper re-use of a brownfield site.

The equivalent of 2,325 trees were used to build Dalston Works. This much timber can be regrown in three hours in German and Austrian forests, and is equivalent to fewer than three trees for each person living or working in the building.

Andrew Waugh, director, Waugh Thistleton Architects



A building of this size with a reinforced concrete structure would weigh approximately 10,700 tonnes

considerable advantage in Design and Build situations. The only unusual details are the concrete grout-plugs sunk into the edges of the floor panels, which the vertical panels bear down upon.

A decade ago, the use of CLT structures in Britain was hampered by the relative difficulty in sourcing suitable structural ancillaries – metal flanges, angles, brackets – but this is no longer the case; and in terms of structural performance, there is no difference between concrete and CLT, except that CLT appears to be significantly more airtight. Lomax suggests that CLT's prepared-package aspect could ultimately reduce the management role of main contractors in the structural erection process.

The architectural qualities of the scheme reflect two main aims. The first was to design a multi-part building that drew on the manner of Victorian industrial buildings that appeared in the area after the opening of the North London Railway in 1848; one touchstone is the nearby 1902 Shannon Factory, later occupied by Marconi and now known as Springfield House. The second aim was to demarcate the different segments of the scheme clearly, but without undue drama.

Both aims have been dealt with via three different brick types, the regular ordering of fenestration and blind windows, projecting black metal balconies, and a degree of surface embellishment. This creates a general (and now very familiar) impression of neo-warehouse architecture.

Waugh Thistleton is a little precious in suggesting a connection between the Petersen bricks and Mark Rothko's paintings. They have previous on painfully arty allusions: their pioneering nine-storey CLT tower at Murray Grove (2009) carried a crudely abstract pattern of grey, black and white panels supposedly reminiscent of Gerhard Richter's profoundly ethereal painting, *Les gris entre ciel et mer du nord*.

However, the design of the balconies on the rental segments is adroit: they manage to look no-nonsense tough, yet strangely elegant and, seen in perspective from Tyssen Street, they emphasise the shifts in plan of the street-facing façades. The most interesting shift is the compressed asymmetrical cut-back where the affordable apartments meet the seven-storey rentable segment – an attractive rumple in the plan which turns the building around the corner into Dalston Lane characterfully, adding to its townscape quality.

Two aspects of the design seem unnecessarily timid. The ground floor reception space sits in the angle between the tall western block and the Dalston Studio

wing. Seen from Tyssen Street, it is a glazed, tucked-away something-or-other, rather than a decisively modelled point of entry. And, while the detailing on the elevations – soldier course brick lintels, projecting brick sills – generally works well, the angled and staggered soldier courses heading the parapets are too shallow; their three-dimensionality is vague.

The Dalston Lane building remains an estimable piece of architecture, formally, structurally, and in its energy-use credentials. The practice calculates that a concrete structured version of the building would produce additional carbon emissions equivalent to those produced by 1,703 cars in a year. One query: they say a concrete structured version would have required 550 lorry-loads, presumably delivered from within London. The CLT was brought in 111 lorry-loads from Austria, which adds up to about 150,000 road-miles. Discuss.

We might also ponder the virtue of a substantial CLT building being based on looking no different to a concrete building designed in the New London Vernacular manner. Waugh Thistleton has proved an important point for CLT in terms of scale and a familiar kind of architectural deftness. But I can't help recalling a 2007 planning-approved CLT office scheme in Victoria by Lynch Architects. It had a projecting and skewed baldacchino, a deep, angularly façeted entrance undercroft, and a cranked façade.

Since then, dRMM's proposed Charlton Workstack and its completed Rundeskogen Tower scheme have pushed CLT beyond the New London Vernacular bubble. CLT buildings must regularly pass this kind of formal test to be considered completely interchangeable with concrete structures in the minds of imaginative developers.

*Jay Merrick is architecture critic of The Independent*



## Engineer's view

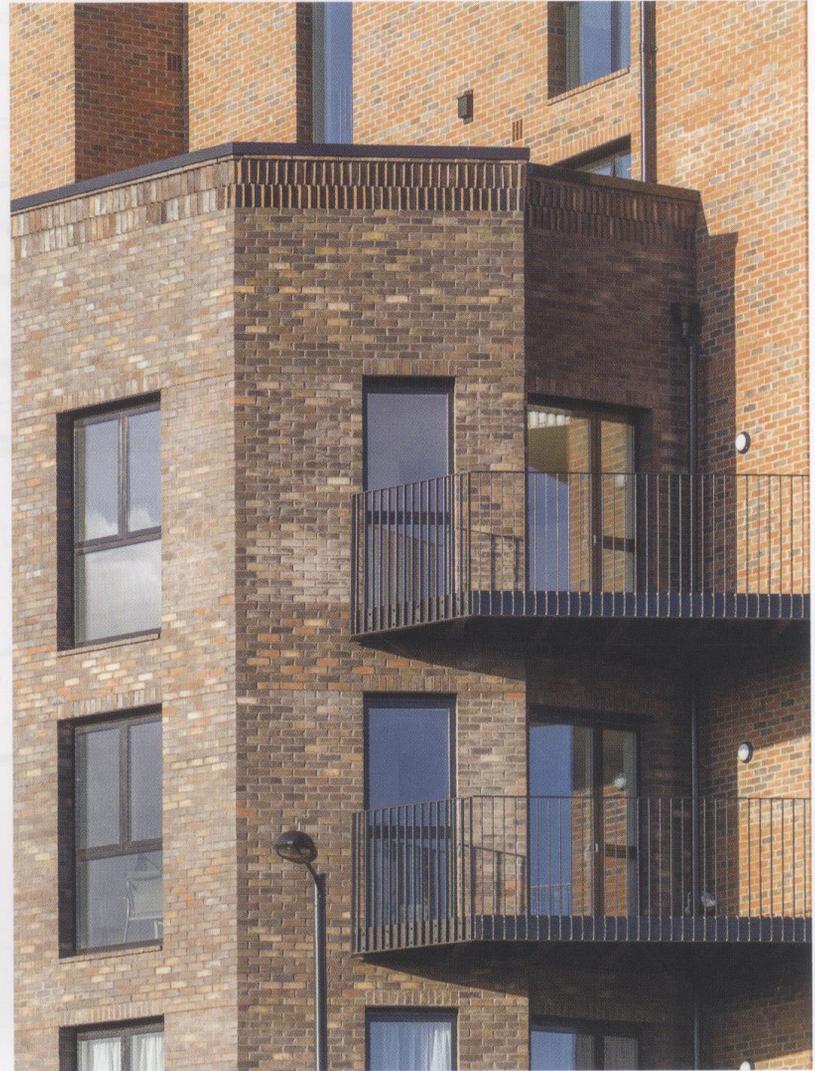
Dalston Works is a truly landmark project, and a testament to the versatility of CLT. It showcases what can be achieved when a forward-thinking client helps you to demonstrate the benefits of offsite construction methods. The height and size of the building is a perfect example of the 'sweet-spot' for CLT design. We predict the majority of inner-city housing provision over the next five to 10 years will be of this type; high-quality, affordable mid-rise accommodation of six to 10 storeys.

Given the national skills shortage, a widening productivity gap and increasing concerns around safety, CLT as one of the methods of offsite construction is increasingly presenting a compelling option. It brings important benefits, such as: time compression from design to delivery,

especially when combined with digital design; improved onsite safety with fewer workers on site; improved productivity, helping to deliver more schemes faster; and increased sustainability, with the timber acting as carbon storage.

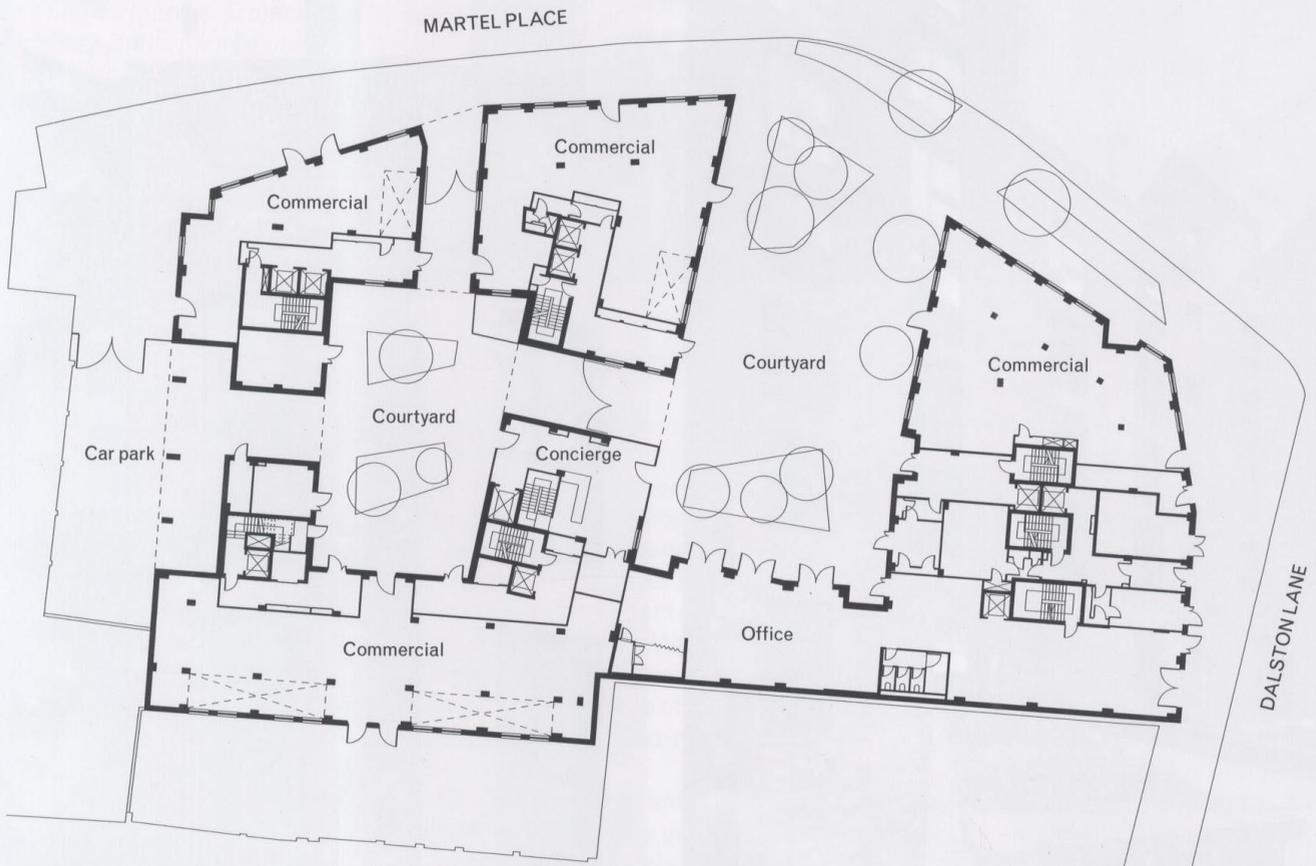
Furthermore, advances in what can be achieved with this dynamic material are spreading to façade optimisation. We are researching methods that use CLT panels to form an 'exo-skeleton' of CLT. This could see developments of around 20 storeys with pure CLT construction. It has been exciting to work with the Dalston Works team, who are as passionate about the benefits of offsite construction as we at Ramboll, and we look forward to seeing many more such schemes emerge across the UK.

*Gavin White, director, Ramboll*





Typical floor plan



Ground floor plan

## Client's view

In 2015 we delivered the multi-award-winning Cube building in Hackney, our first CLT development. Dalston Works followed. Partnering with Waugh Thistleton Architects for this project was an obvious choice, drawing on their expertise of designing environmentally conscious buildings.

Between us we have pushed our design and construction abilities to build the largest (by mass) residential structure in the world using CLT and off-site manufacturing. It has been an interesting and rewarding journey, involving great skill and determination from every single member of the project team,

including the engineers, Ramboll. The end result is something that we are very proud of.

The completion of Dalston Works is a pivotal moment in our history, marking our first project in the private rented sector. It acts as a beacon for how sustainable materials such as CLT can deliver high-quality, high-density housing without compromising the environment. We are passionate about a development that offers a genuine long-term rental and environmental solution for Londoners, whether it be local families or London professionals.

*Simon de Friend, director, Regal London*

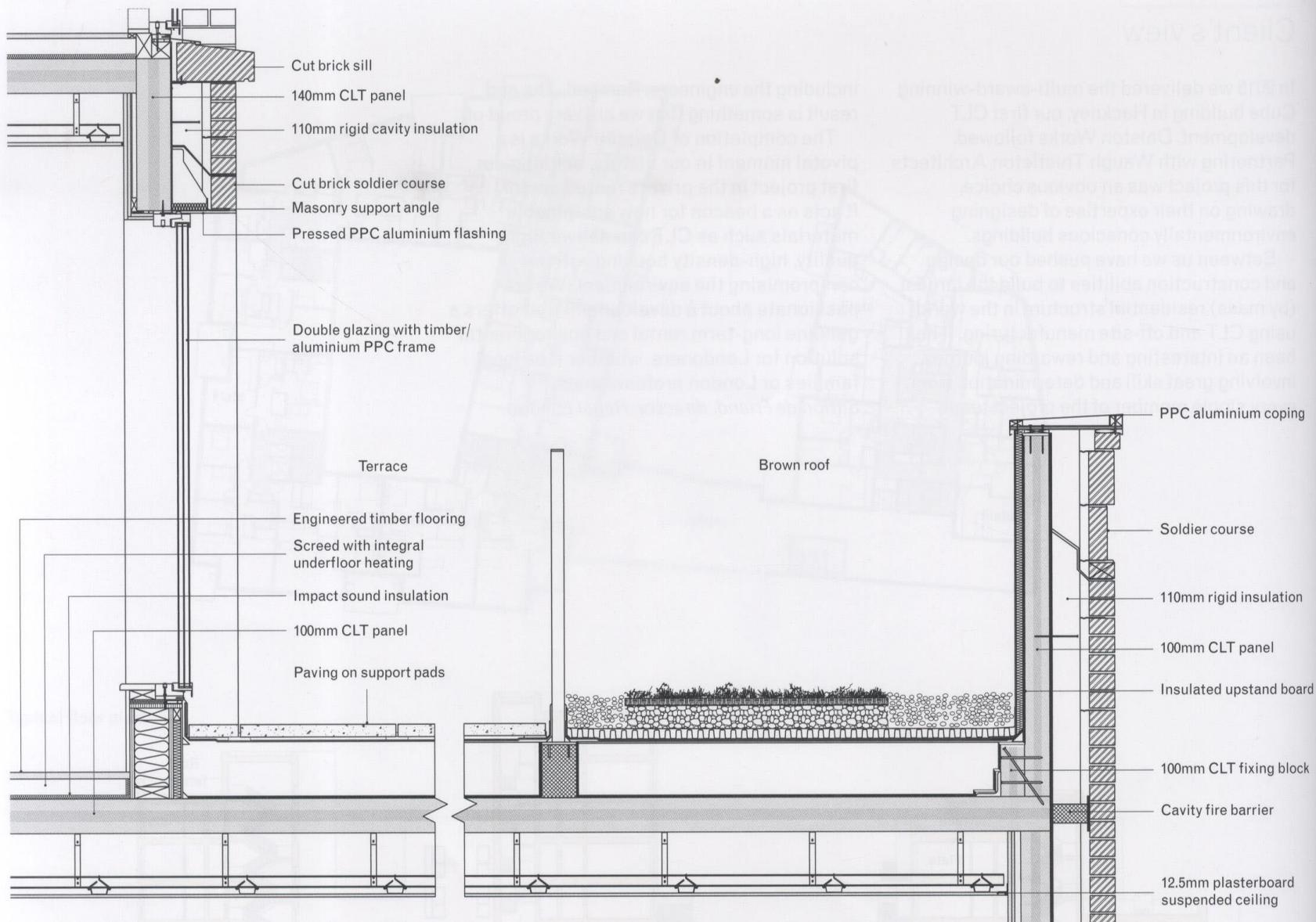


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Roof terrace detail section

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## Working detail

The CLT structure is wrapped with over 500,000 load-bearing brown and red Petersen-Tegl bricks, chosen to reflect surrounding Victorian and Edwardian housing. The two tones of brick emphasise the changing forms, giving a distinct appearance to each block.

The full-height apartment windows are recessed to visually differentiate residential spaces from commercial ones, where windows have flush finishes. Deep brick reveals help animate the façades, providing a sense of solidity.

The brickwork is carried by masonry supports located at every floor level aligned with the window heads. This addresses several issues. We were able to avoid the use of independent lintels, which saved time and reduced the risk of differential movement. Secondly, when building tall in CLT, it is beneficial to ensure that masonry supports are not fixed across the slab edge

junction, where movement of the CLT is most likely to occur. It is also at the slab edge that balcony brackets, cavity barriers and vent terminations are typically located, so installation of these components was simplified, while allowing us to incorporate typical 10mm horizontal movement joints throughout.

While the heads of the reveals are faced with aluminium flashings as a consequence, sills are finished with brick specials, supported by bespoke brackets, a nod to traditional details found locally.

The façade successfully exemplifies the compatibility of traditional facing materials and an innovative 21st century CLT structure. This building is a unique demonstration that CLT is a viable low-carbon alternative to concrete and steel in high-density urban housing.

*Kieran Walker, associate,  
Waugh Thistleton Architects*

## Project data

**Start on site** January 2015

**Completion** June 2017

**Gross internal floor area** 8,500m<sup>2</sup> (apartments only) plus 2,320m<sup>2</sup> (resi ancillary areas only) 3,600m<sup>2</sup> commercial

**Form of contract** JCT11 Design and Build with bespoke amends

**Architect** Waugh Thistleton Architects

**Client, QS cost consultant and main contractor** Regal Homes

**Structural engineer** Ramboll (CLT & façade), PJCE (concrete and civils)

**MEP consultant** XCO2 Energy

**Fire consultant** H+H

**Acoustic consultant** Ramboll

**Planning consultant** CMA

**Project manager** Regal Homes Construction

**CDM co-ordinator** BPM Group

**Approved building inspector** Greendoor

**CAD software used** Vectorworks and Solibri