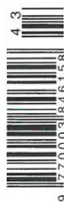




# Building with care

*People-centred design by Waugh Thistleton,  
Walters & Cohen and RSHP*



£6.99



*On site*

# Waugh Thistleton Architects Bushey Cemetery









*The brief from United Synagogues for the extension of the Jewish Cemetery at Bushey was to provide two new prayer halls and separate buildings to house the mortuary and reception. These buildings were to be sited on land adjacent to the existing cemetery, which had been part of a neighbouring farm. The location within the green belt required the prayer halls to have minimal visual impact and to use materials sensitive to the environment. Routes through the new buildings connect to the existing cemetery. The new cemetery will serve the local orthodox community for at least two generations.*

Appraisal Laura Mark  
Photography Lewis Khan

Rammed earth is a little-used construction technique in the UK. Despite having a history of building with earth in this country, many of these buildings have failed to survive and the environmentally friendly building technique is rarely used in modern British architecture.

Set within London's green belt, Bushey Cemetery is one of the UK's most significant Jewish burial sites and it is about to become home to a series of rammed earth buildings designed by East London-based Waugh Thistleton. The practice was brought onto the project almost five years ago when plans were afoot to extend the 16-acre burial ground, which was first established in 1947.

Waugh Thistleton's plans, which will see a new ceremonial space with two prayer halls and a series of service buildings completed next year, were heavily influenced by the processional nature of the Orthodox Jewish practice of burial. The buildings are laid out to facilitate the movement from arrival, to congregation, to prayer, procession to the graveside and then a return to pray. Mourners arrive at the site through a timber reception building which opens out onto a timber colonnade forming the processional route to the prayer halls. These are entered from the west and exited to the east before the mourners head through a narrowing path between the buildings and on towards the graveside.

It was in order to build these 7m-tall prayer rooms that Waugh Thistleton turned to rammed earth, a choice of building material that echoes the return to earth of those being interred at the cemetery.

In time the cemetery will outgrow this site, says practice co-founder Andrew Waugh. When that day comes the buildings will return to the earth.

The buildings have in fact been formed

Sleek and sophisticated examples prove that rammed earth can be as accurate as in-situ concrete – yet in the UK the technique struggles to catch on

from the site. The ecological construction material is made up of earth mostly excavated from where the buildings stand and which had to be removed to landscape the area. The earth was mixed with limestone, sand and a small quantity of cement and water to create what is better-known as stabilised rammed earth, or SRE. At first Waugh was uneasy about the addition of cement but it means the walls, with similar properties to concrete, have greater structural strength and will withstand the elements better.

The rammed earth walls are quick to construct. It took an eight-man team just 46 days to construct the 400mm-thick walls using formwork which could be reused in sections. But the UK is lacking in these construction skills: the rammed earth project team, Earth Structures, came over from Australia to work with the scheme's main contractors.

Other rammed earth projects in the UK have suffered from a lack of such expertise. The WISE building at the Centre for Alternative Technology, which has a large rammed earth drum forming its main lecture theatre, suffered a collapse part-way through its construction as a result of discrepancies in the mix and ramming process.

But here the quality of the construction is good. As with all rammed earth walls, there are imperfections in the finish typical of the material but they add character and interest, and show the 150mm layers of each ramming session.

The rammed earth will be left exposed externally and in the ceremonial spaces of the prayer halls, while in the congregational areas the prayer halls are lined with English oak, continuing the theme of natural, tactile surfaces. A simple single oak bench will line the wall. The floor, which will be paved in brown earthen tiles, slopes east in the direction of the procession.

Using rammed earth here has given the project an earthy character, with the different colours of the materials visible in the stratification across its surface. It is a material you want to touch and which also feels calming and in some ways sombre. It possesses a beauty not unlike a perfectly poured and detailed concrete wall.

The challenges of perception that face the modern rammed earth industry are still considerable – people need to be assured the walls will be durable, sustainable and beautiful in their humble but monumental way, says Rick Lindsay of Earth Structures.

Europe has many examples of rammed earth structures, from the buildings for Swiss herbal sweet manufacturer Ricola by Herzog & de Meuron to the houses of Austrian architect Martin Rauch. These sleek examples prove the material can be as accurate as in-situ concrete and should usher away any thoughts of hairy hippy buildings. Yet in the UK it still struggles to catch on. When this building completes next year it will stand on its own merits as an example of earth building and hold an important place in changing the UK's construction landscape.

## Client's view

The United Synagogue is the main Synagogal body in the UK and operates the largest burial society in Europe. The new cemetery will accommodate burials for the next 50 years and, sadly, is probably the site most visited by the community.

The land adjoins our existing cemetery and was acquired some 20 years ago.

Being within the green belt, the scheme had to be sensitively designed, but with a clear understanding of the objective.

As well as knowing the physical requirements of the buildings, the architect also had to acquire a detailed knowledge of the religious requirements, which would impact on the design of the buildings, pathways and planting scheme.

From the very early stages Waugh Thistleton quickly mastered the brief.

The planning process was difficult, due to the sensitivity of the site within its green belt location. Waugh Thistleton suggested materials that would be appropriate to the environs – in particular the unusual and highly appropriate rammed earth structure – and worked in close co-operation with the appointed town planners. While challenging the advice to ensure the best possible outcome, they followed the guidelines given and planning was secured on the first application. Dealing with reserved matters was difficult but they showed great patience and struck up a good working relationship with the local authority.

It was important for the project to have the full support of the client organisation's trustees and as many of its members as possible. The architects attended numerous meetings to give presentations, always satisfying the questions that were raised. Throughout the construction period they remained focused, trying to ensure best practice and value at all times.

This has been a 10-year working relationship. We have become friends with the architectural team and inspired by their devotion to the project, which goes well beyond the boundaries of what we might have expected.

*Stephen Rajbenbach, former director of property, United Synagogues*





FORBES MASSIE



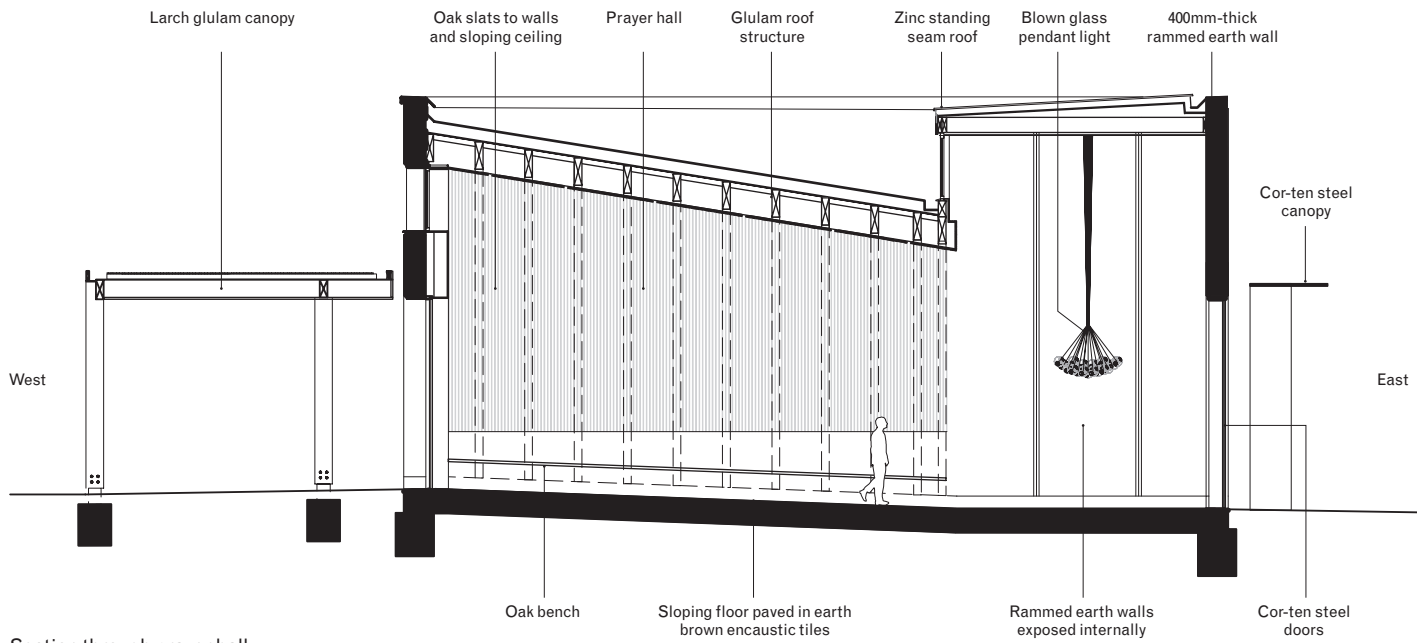
Above Steel goalpost structures were cast into the rammed earth walls to provide openings for the prayer halls large Cor-ten steel doors  
Top left Visualisation of the completed project Above right and below Construction of the 7m-high walls was completed in July





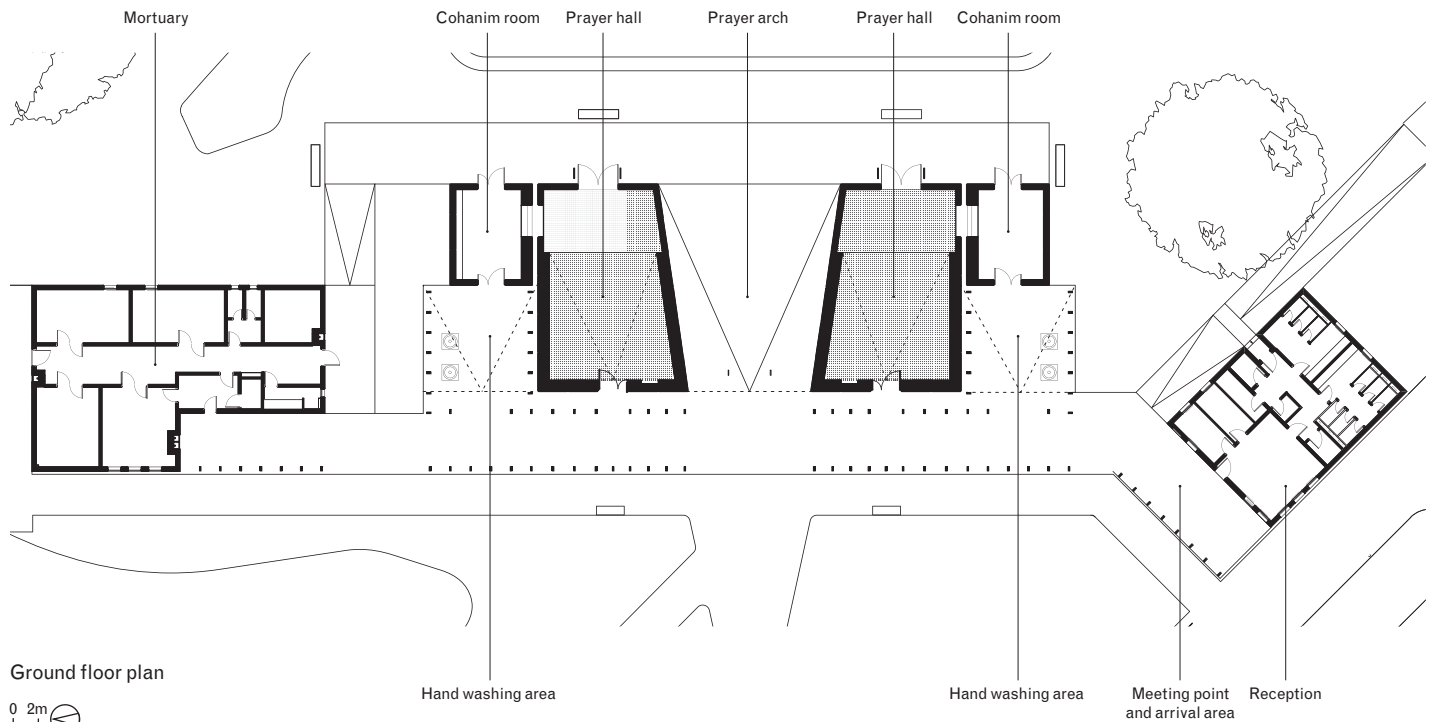


Above Prayer hall interior with rammed earth walls, which will remain exposed



Section through prayer hall

0 1m



Ground floor plan

0 2m

## Detail

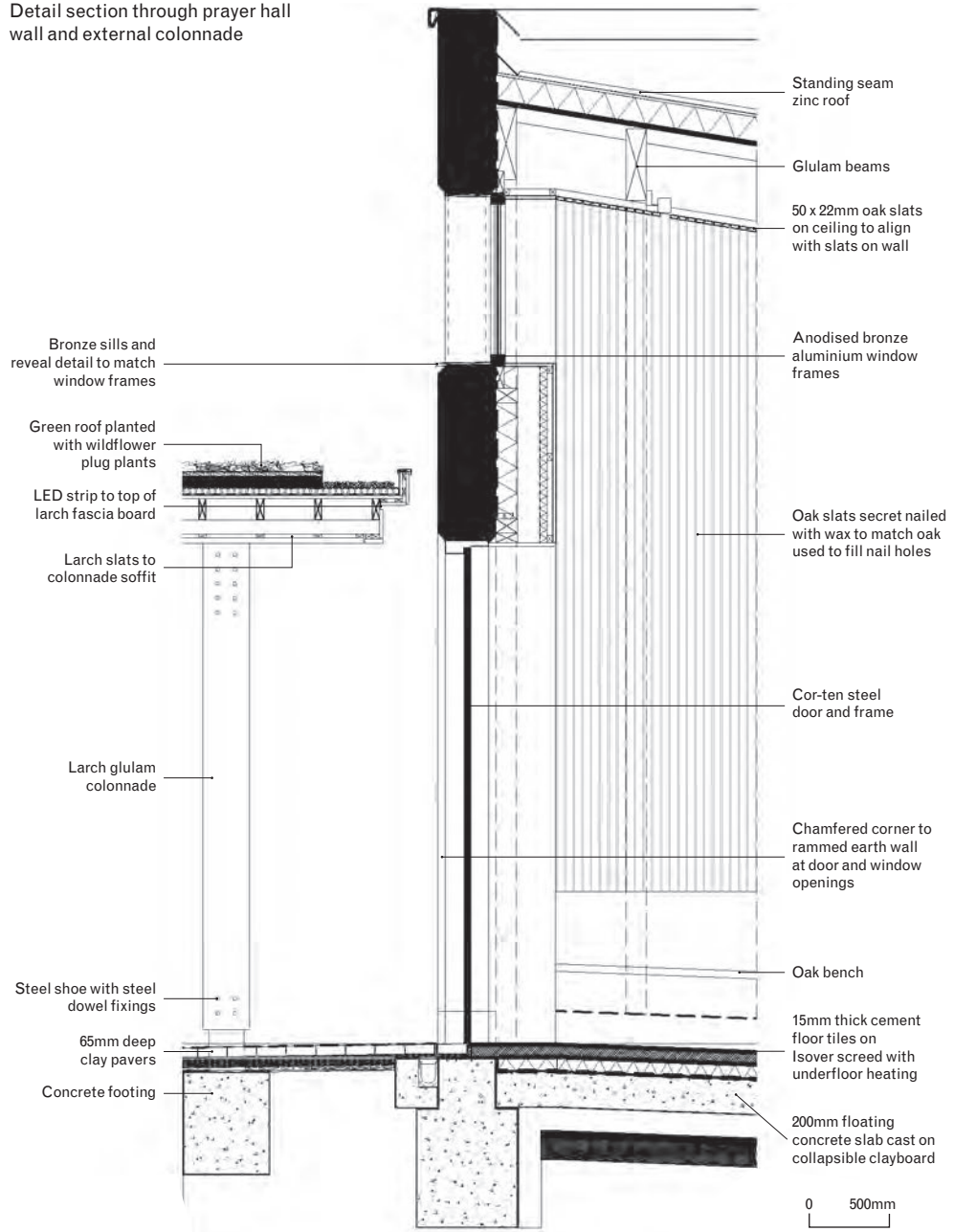
The colonnade's larch glulam columns, over 3.5m high, are connected to glulam beams with L-shaped steel plates, fixed with steel dowels to form a rigid joint. Steel shoes are bolted to concrete footings below ground to root the colonnade. A stained larch slatted soffit and stepped fascia echo the treatment of the cladding on the reception and mortuary buildings.

The colonnade is separated from the buildings by 200mm, providing shelter outside the main prayer halls and the smaller halls set aside for the Cohanim, but as a separate structure, and with contrasting materials. The 400mm-thick rammed earth walls rise above the colonnade, with a 6.5m-long window admitting light to the congregation area from the west. Cor-ten steel doors, 3.5m high, open into the prayer halls. Window and door openings are framed with steel goalpost structures set in the rammed earth. The walls are built in vertical sections approximately 2.2m wide. The mix is rammed in 600mm-high increments and compacted to 150mm, with only the vertical joints expressed with chamfered joints and a chamfered corner around doors and windows where visible.

A standing seam zinc roof falls from the front of the prayer hall, and then steps up to define the area for the coffin, flooded with light from a clerestory window. The floor slopes gently down through the congregation area and the walls funnel the passage of people – focusing their view onto the coffin and the rabbi. A pendant light designed by Omer Arbel made up of 37 individually hand-blown glass spheres hangs in front of the massive Cor-ten doors.

*Rachel Crozier, architect, Waugh Thistleton*

Detail section through prayer hall wall and external colonnade



## Specification

**Structural rammed earth** Earth Structures

**Aluminium windows** Reynaers Windows, anodised bronze frames

**Prayer hall floor tiles** Solus Ceramics, 200 x 200mm grey cement tiles

**Zinc roof** VM Zinc, Pigmento Brown, plus standing seam roof

**Cor-ten steel doors, arch and canopies** Suffolk & Essex Joinery

**Glulam columns and beams** Constructional Timber, larch glulam

**Clay pavers** Hardscape Caron, 200 x 50 x 65mm

**Sliding doors to prayer halls** Spec 21, Alitherm, plus sliding doors, anodised bronze frames

## Project data

**Start on site** August 2015

**Completion** March 2016

**Gross internal floor area** Mortuary 218m<sup>2</sup>, reception/café ancillary space 130m<sup>2</sup>, prayer halls and Cohanim rooms 115m<sup>2</sup> and 31m<sup>2</sup> (two of each); 8.5ha of landscaped site

**Form of contract** JCT standard building contract with quantities

**Construction cost** £6.125 million

**Architect** Waugh Thistleton Architects

**Client** United Synagogues

**Structural engineer** Elliot Wood

**M&E consultant** P3r

**QS** Deacon & Jones

**Landscape consultant** J & L Gibbons

**Project manager** Deacon & Jones

**CDM co-ordinator** Vance Miller

**Approved building inspector** Assent

**Main contractor** Buxton

**CAD software used** Vectorworks

**Floor area with daylight >2 per cent**

Prayer halls: 5-10 per cent

**On-site energy generation**

Prayer halls exempt; reception 25 per cent; mortuary 22 per cent

**Airtightness at 50pa** Prayer halls exempt, not tested; reception and mortuary 6 m<sup>3</sup>/h.m<sup>2</sup>

**Heating and hot water load** Prayer halls

exempt; reception 50.75kWh/m<sup>2</sup>/year;

mortuary 59.78 kWh/m<sup>2</sup>/year

**Overall area-weighted U-value (W/m<sup>2</sup>K)**

Reception: walls 0.18, roof 0.11, windows

1.6, floor 0.14. Mortuary: walls 0.21, roof 0.11,

windows 1.6, floor 0.14