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# CONCRETE MIX

**Azman Owens' home front**  
**Liverpool's culture queen**  
**PLUS: CQ relaunched**



# Clean living

**Azman Owens Architects' courtyard house is wrought from planes of finely honed concrete, using simple textured volumes to create a secluded family home**

By Barrie Evans. Photographs by Keith Collie







### Concrete finish

The ply panels were fixed from their backs to keep the contact face free of potential blemishes or splits. In addition, the strongbacks (primary structural members) and walings (secondary structural members) that frame the inner wall formwork were designed with no tie-bolts over the body of the formwork. The adjustable props in the mid-span, the close-centred walings over the lower half and the double row of strongbacks, kept the formwork rigid and true under the 3m head of concrete.

The birch-faced ply was used three times before being scrapped. After each use the contact face was lightly sanded, recoated with lacquer and then oiled with the specified release agent. The external 150mm wall was cast against the 75mm-thick cavity insulation panels, with the outer form-face tied to the 200mm inner concrete wall using threaded bolts. The walls were poured in three lifts to reach the overall height of 6.5m.

Formwork panels were removed 24 hours after concreting and came away effortlessly from the hardened concrete with hardly a trace of cement paste on the ply. High frequency, constant-amplitude electric internal vibrators for the compaction were specified to minimise blow holes and produce a uniform compaction effort.

The coarse aggregate in the concrete mix was proportioned to reduce the 5mm and smaller stone content, the slump was maintained between 125mm and 135mm for workability and the mix constituents kept constant from one batch to the next, particularly the cement and water content, so as to maintain the same surface colour. (The more water that is added to a mix the lighter the tone.) The hardened concrete face was later sealed with a transparent siloxane coating to make the concrete surface water-repellent and stain-resistant.

**David Bennett**



Textured concrete in the en suite bathroom to the master bedroom. Below: planting is beginning to establish itself; to the right is a wall of stores along the flank wall of the garage. Opposite page: opening louvres reveal a small balcony at nearest point of the house

work rather than deliberate intervention.

Concrete consultant David Bennett likens concrete-making to baking a cake: the same ingredients each time but an element of wait-and-see about the results. The budget did not stretch to a special concrete mix, so samples were taken over a few months from a ready-mix contractor to establish consistency. (Casting the walls took place over a long period.) Structural engineering also played its part in this very clean-lined design – for example, the floor beams are around 1m wide, making them shallow enough to disappear into the depth of the floor (see *Structure box*). This expression of the concrete (see also *Concrete finish box*) makes walls and floors read more as prismatic elements, not blending and receding as they would in a white paint job.

On the ground floor, the principal spaces open on to the main garden through storey-height glazing, while the offsetting of the two cubes on plan leaves a small secluded garden space to the north-east, immediately outside







## Structure

The architectural starting point for the structure was the notion of two interlocking cubes, of internally and externally exposed reinforced concrete, entirely open along one side.

This became a series of in-situ concrete planes: horizontal flat slabs with double cantilever overhangs (ie a cantilever in one direction supporting a cantilever at right angles) and planar walls. The external walls are essentially reinforced-concrete cavity walls. They consist of an inner load-bearing leaf with two layers of reinforcement, a layer of rigid foam insulation and a thinner outer wall with one layer of reinforcement. The latter is tied back at base, first floor and roof levels only.

The challenge lay not in innovating but in designing a structure that could achieve the architectural ambition but could be built without a concrete specialist, instead using a London building firm with which we had a relationship and which was keen to construct it, within a tight budget. Wall thicknesses were based on the requirement for good, blemish-free surfaces which could be poured and properly compacted using standard concrete batching materials (to ensure consistency within the budget). Systems were sought for constructing the two leaves of the external walls around the insulation in one process. But the pragmatic solution used was to build the inner structure first and bring up the external wall afterwards, casting it against the insulation.

Some rigour was needed during design, and on site with the formwork suppliers, to ensure that construction joints, formwork board joints and temporary ties were all controlled, as they were all potentially visible. The plywood against which the concrete was cast was in given sizes – 3 x 1.2m maximum. However, ply sheets were just butt-jointed, not expressed, though you do see the joints. (The plywood should not be cut any more than necessary as it becomes less reusable.)

Externally, the joints between the three pours were expressed as two 20mm horizontal recesses; internally, these horizontal joints disappear in the floors. We tried to get away without the bolted ties holding together the formwork panels, but this was not possible without using enormous (and so expensive) temporary props. So these few tie holes are visible.

The stair has concrete treads which were precast on site and simply resin-bonded to the reinforced concrete walls to cantilever, with a glass wall then bolted into the free ends of the treads.

Generally, structural detailing and setting out were kept as straightforward as possible to maximise the contractor's chances of getting it right. And it did a wonderful job.

**Brian Eckersley**





View from the  
entrance aligned  
with a distant  
window. To the  
right, a concrete  
wall supports  
cantilevered  
concrete stair  
treads

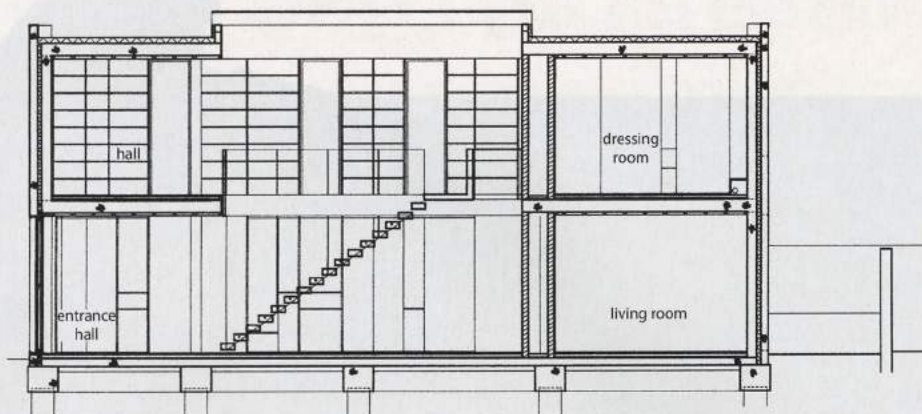


The road on which this house stands is unadopted, rough-surfaced and narrow, with no pavements. Though close to normal, busy north London streets, it feels like a remote enclave where you would not be too surprised to meet a working farm tractor. Some of its houses are behind walls. Here and there are signs of something recent and a bit different architecturally. It seems a context where the rules might be a bit relaxed, innovation possible – which suited the clients, who were looking for something special (and had visited Anthony Hudson Associates' Baggy House, AJ 13.4.95, as part of the process of widening their horizons).

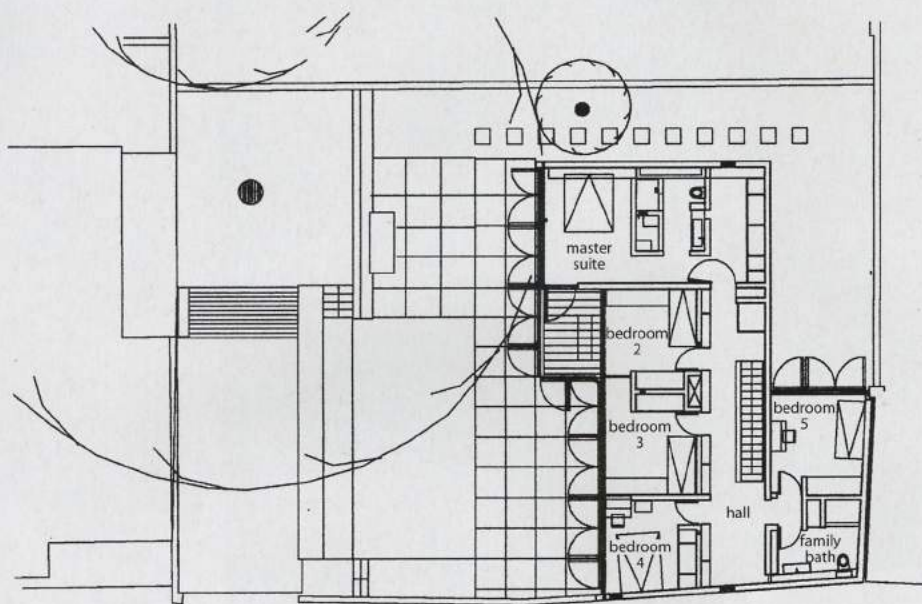
When the project began, the normal rules applied. The site abuts a short mews terrace fronting the north side of this east-west road and the planners looked for the terrace footprint to be extended by the new house, which would have produced a north-facing garden. Architect Azman Owens wanted to turn the building footprint 90°, making it end-on to the street, facing west on to an enclosed garden. In time, discussions became more open, with talk of relaxation if the building was of architectural interest and, with a change of staff, the atmosphere became supportive. Permission was granted. The risk to the client, of buying the right site with the wrong planning permission, had passed.

The house's presence along the road is predominantly of a high fairfaced concrete garden wall, which merges into the house entrance (the narrow side of the house) as that meets the existing brick terrace. In this modest but monolithic concrete frontage there is a tall timber door. And despite, at the behest of the planners, bigger windows than the architect would have chosen, this is a very private house. Windows of the upper-floor rooms facing the courtyard garden, part-visible over the garden wall, are only glimpsed behind horizontal timber louvres. This privacy and the choice of concrete suggest something special within. The quality of detail raises expectations.

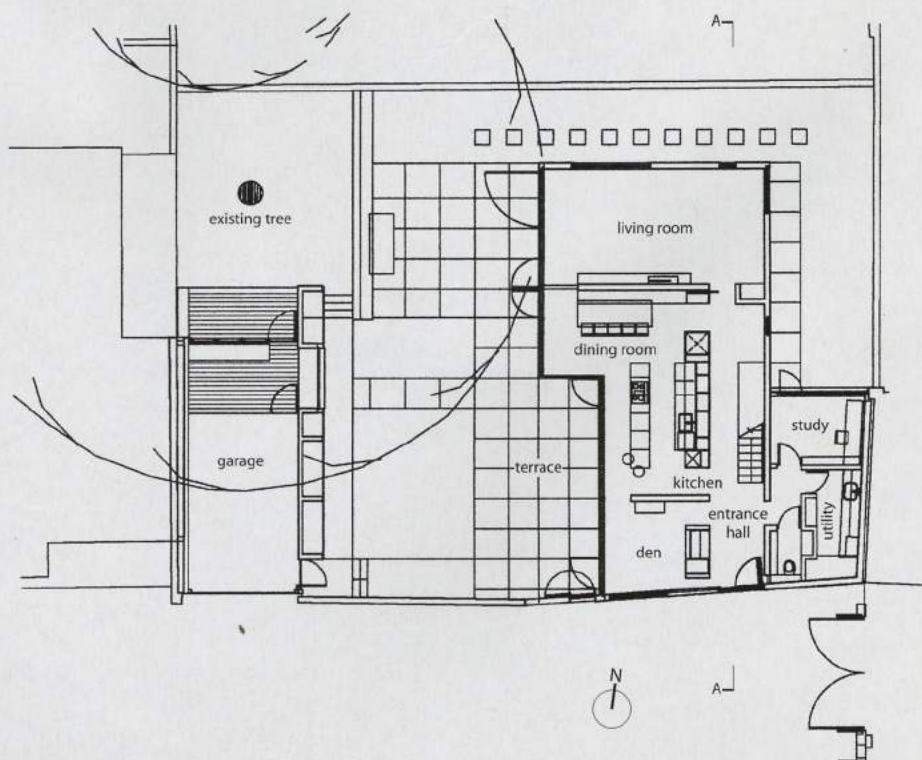
In plan the house is two abutting cubes, offset a little, essentially a relatively long, thin volume, almost totally glazed to the west where it faces its enclosed garden. This elongation is made more pronounced by a spine corridor running from the front door and terminating in a window, as axes often do in this house. (The only questionable move in this house is that, stepping through the front door, the entrance space is a little knot of circulation and the end of a corridor.) Once you enter, visual texture is the first sensation. To the left of the corridor is a simply detailed timber storage wall. Opposite is a wall of in-situ concrete – as walls are throughout – with a cantilevered concrete-tread stair and glass balustrade. Viewed close to and in the biggest spaces, the soft-sheen lacquered concrete walls show off their composition like a figured stone, reading well at all the different scales. Their colour shifts through the house, from the natural variability of controlled in-situ



section aa



first floor plan



ground floor plan





the study. On the first floor the long landing corridor is top-lit, wide enough to be lined with shelving for the clients' extensive book collection. A run of children's bedrooms ends in an en-suite bedroom for the parents. Fitted furniture is by the architect, such as the storage beds and shelving in the children's rooms. Floors are elm. At the front of the house is a family bathroom, which breaks out (a little) from the highly consistent palette with a red rubber floor and use of Iroko. It has a rooflight rather than a window, which would have been an opening in the street facade.

All the main rooms look out onto the garden enclave that wraps around the house, its structure also an essay in minimalism-with-

texture, the planting beginning well. Helping ground-floor spaces flow into this garden are floor-to-ceiling glazing and glass doors, the use of the same joinery timber inside and out, and the continuous limestone flooring which is polished inside and sanded outside.

For the happy clients, there were initial doubts about facing concrete. But now they don't see it as a concrete house, rather as one in which concrete is part of the composition. They like it so much they can't yet bring themselves to hang their pictures.

#### WEBLINKS

Azman Owens Architects  
[www.azmanowens.com](http://www.azmanowens.com)

**Top left: the main living space opens fully onto the garden, the room walled in concrete planes. Note the eye-level window to the left looking north onto the side garden. Above left: the choice of limestone flooring – sanded outside, polished inside – helps create the inside/outside flow of space.**

**Above: indoor and outdoor planes of concrete overlap in the views into the garden**





## COST SUMMARY

Cost data based on final account, for gross external area

	Cost per m <sup>2</sup> (£)	Percentage of total
External works	23,750	4.46
Piling and ground beams	29,600	5.54
Concrete	107,000	20.03
General fixtures, joinery items	76,600	14.34
Doors, windows, rooflights, ironmongery	83,000	15.54
Insulation	7,500	1.40
Balustrading	3,500	0.66
Roof	23,000	4.31
Internal finishes	46,000	8.61
Decorations	12,000	2.25
Services	87,250	16.33
Preliminaries	35,000	6.55
<b>TOTAL</b>	<b>534,200</b>	<b>100</b>

Cost data provided by the architect

## CREDITS

**TENDER DATE**  
September 2001

**START ON SITE**  
November 2001

**CONTRACT DURATION**  
13 months

**GROSS EXTERNAL AREA**  
239m<sup>2</sup> (ground floor  
105m<sup>2</sup>, first floor 96m<sup>2</sup>,  
garage 38m<sup>2</sup>)

**CONTRACT**  
JCT Minor Works

**TOTAL COST**  
£534,200

**ARCHITECT**  
Azman Owens  
Architects

**STRUCTURAL ENGINEER**  
Brian Eckersley

**SERVICES ENGINEER**  
Fergus Traynor

**CONCRETE CONSULTANT**  
David Bennett

**LANDSCAPE ARCHITECT**  
del Buono-Gazerwitz

**MAIN CONTRACTOR**  
Varbud Construction Co

**SUBCONTRACTORS**  
Formwork A-Plant  
Acrow; furniture Davis  
Haworth Jacob;  
audiovisual Design  
Logistics;  
telecommunications/  
data Specialist

Telecommunications;  
timber flooring Arden  
Hodges; underfloor  
heating installation Eco-  
Systems; roof membrane  
installation MW

**SUPPLIERS**  
Contracts (Roofing)

Ready-mixed concrete  
Hanson Pre-Mix;  
ironmongery Allgood, TS  
Sampson; blinds RJS  
Interiors; garage door  
Crusader Door Systems;  
alarm and fire system  
ADT Fire & Security;  
underfloor heating  
Wirsbo; specialist

concrete dpm Vandex  
(UK); roof membrane  
Alwitra; rooflights Vitral  
UK; sanitaryware Vola,  
Sissons; rubber sheet  
Dalsouple; tiles Reed  
Harris; lighting Modular  
Lighting Instruments,  
Aktiva, Louis Poulsen,  
Erco Lighting, Delta  
Light



**Timber louvre  
shutters to a glazed  
timber-framed wall**

The two-storey house is L-shaped in plan, creating a private courtyard. Although the walls generally comprise a double skin of cast in situ concrete, the two walls that face the courtyard are largely glazed, with windows at first floor level and glazed doors at ground floor level.

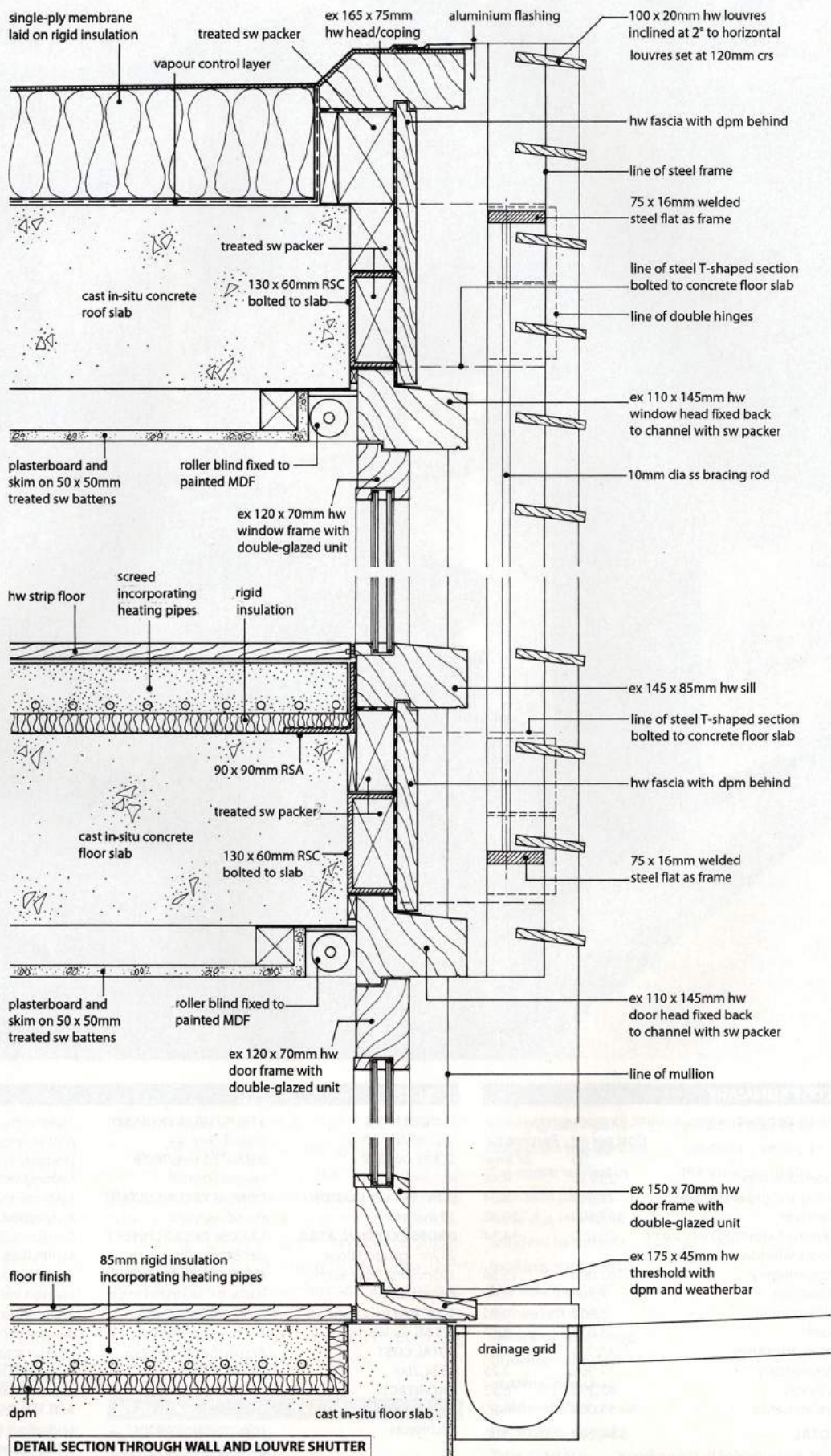
The glazing, set in robust hardwood frames, is screened with storey-high louvre shutters; they modify the quality of daylight entering the rooms, contribute to privacy and, with their fine detail and warm colour, act as a visual contrast to the plain solidity of the concrete walls. Roller blinds set behind the glazed walls provide privacy at night time.

Like the walls, the ground floor, first floor and roof are concrete slab cast in situ. On the glazed courtyard walls the edges of the first floor and roof slabs are covered with hardwood fascias, fixed back through packers to a steel channel and framed with hardwood sections that are similar to the window head and sill sections. The fascias maintain the consistency of the timber frame.

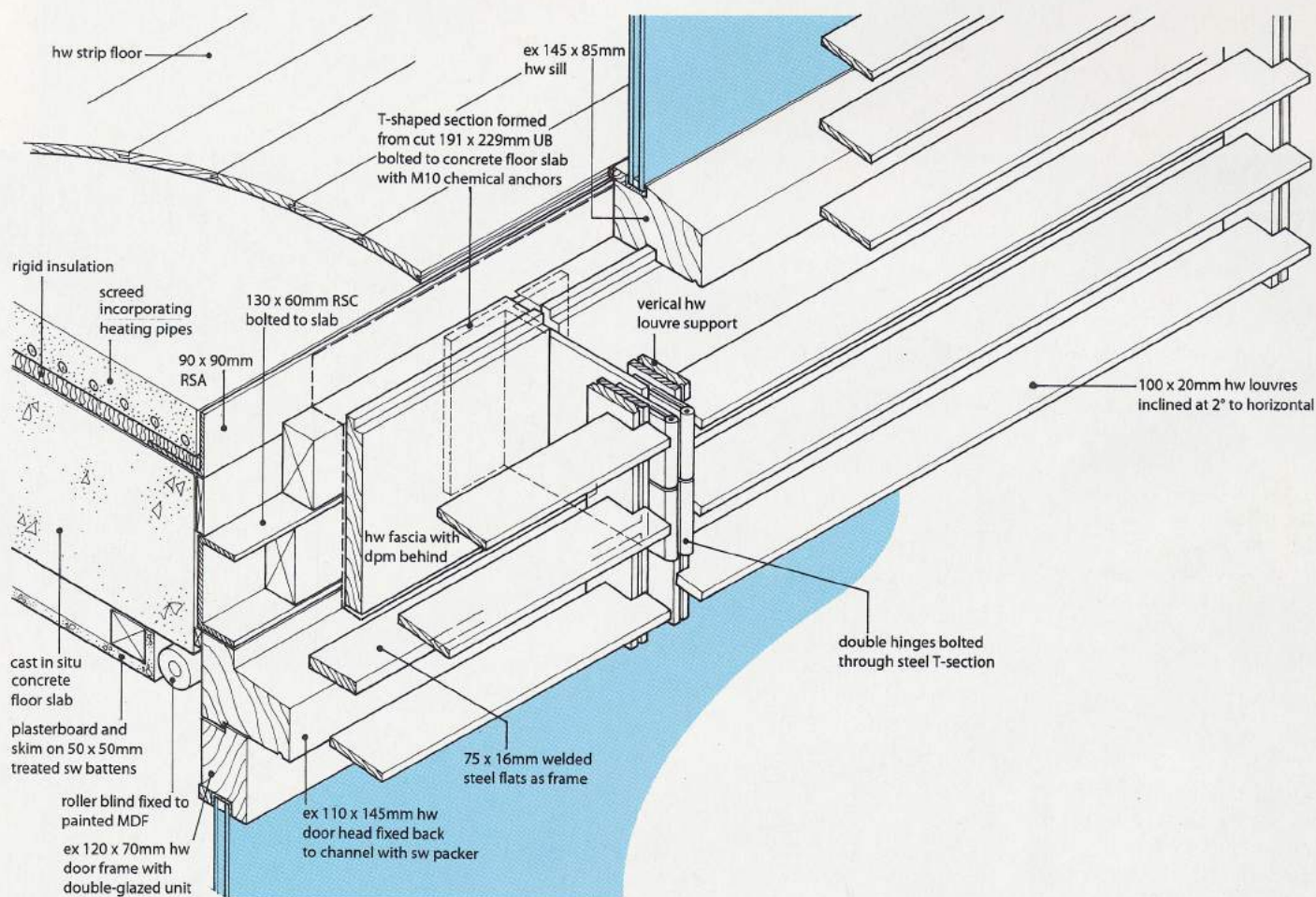
Each louver shutter is formed of 100 x 20mm hardwood louvres inclined at 2° to the horizontal and set at 120mm centres. They are framed at each side by hardwood supports and vertical 75 x 16mm steel flats, braced by a diagonal 10mm diameter stainless steel rod.

Each louvre is fixed to double hinges at top and bottom so that it can swing open. Adjacent hinges are bolted through the projecting flange of a T-shaped steel section bolted back to the edges of the first floor and roof slab with M10 chemical anchors. The T-shaped section is formed from part of a 191 x 229mm UB.

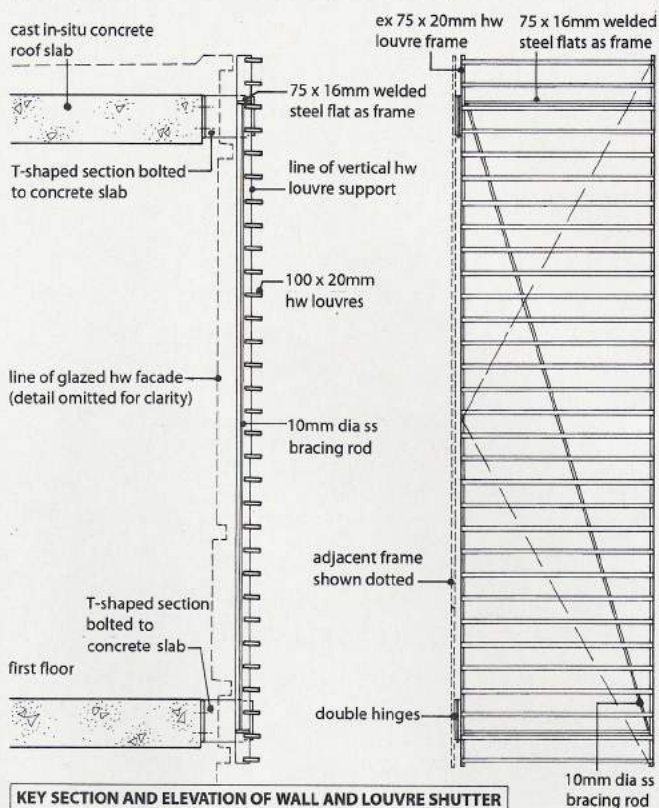
Susan Dawson



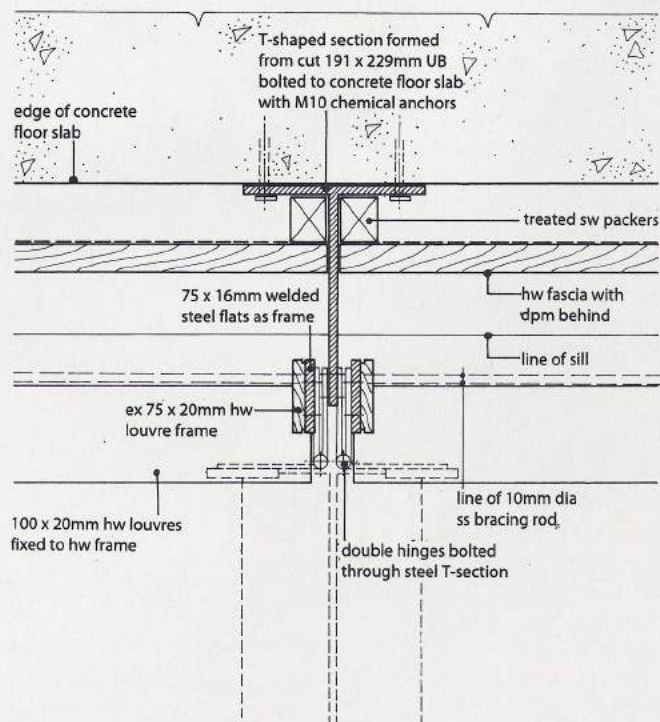




CUT-AWAY ISOMETRIC OF WALL AND LOUVRE SHUTTER



KEY SECTION AND ELEVATION OF WALL AND LOUVRE SHUTTER



DETAIL PLAN AT LOUVRE SHUTTER SUPPORT