GOLCAR PASSIVHAUS

Rural Category

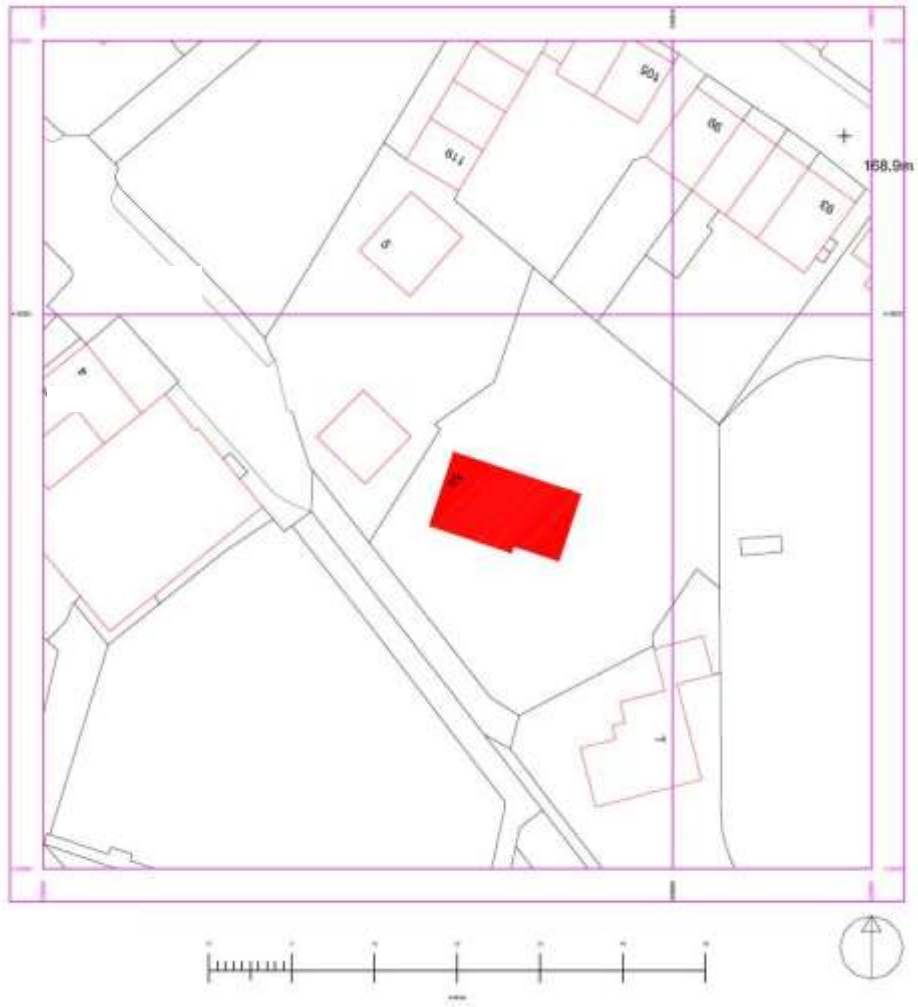
Green Building Store

UK PASSIVHAUS AWARDS 2016

7th JULY - LONDON

DESIGN PHILOSOPHY

- House did not start off as a Passivhaus and evolved into one during the planning process
- Original design rectangular in form with large bay window
- Main changes needed:
  - Turning the orientation of the building towards south
  - Removal of some windows from the north elevation
- Drawing on our Denby Dale Passivhaus experience
- Offers advancements in cavity wall Passivhaus construction detailing
- Template for cavity wall construction to Passivhaus levels of performance



DESIGN PHILOSOPHY

- Newbuild 4 bed detached 296m^2 home
- Clean, simple lines & contemporary aesthetics
- Planning constraints in Conservation area
- Bringing up-to-date contemporary look to the Yorkshire vernacular style of houses surrounding the building.
- Yorkshire stone with timber cladding on certain aspects
- Upside-down house with bedrooms on ground floor
- True ‘self-build’ with client working on site

AESTHETICS

ENERGY PERFORMANCE

Primary Energy 52 kWh/m^2/a	Heating Demand 8.7 kWh/m^2/a
Air Changes/Hr 0.25 @50pascals	Heating Load 8 W/m^2

Reasons for low space heating demand:

- Airtightness test result was much better than we had modelled for.
- Change of window and door specification quite far along the design process, with PROGRESSION range offering lower U value and a virtually invisible frame.
- Used quite conservative Psi value estimates in initial PHPP calculations, which we were eventually able to improve upon.

Gas consumption data

Feb 2015 – Feb 2016: 654 m^3 gas = 7316 kWh

7316 kWh divided by Treated Floor Area: 230m^2

= **32 kWh/m^2/ annum** (including cooking, water heating costs and energy consumption used for 'drying out' the house)

NB House occupied from May 2015 but utility bill information gathering has been problematic. Prior to May 2015, the house was being heating to dry out the house, while decoration and other internal works were going on.

- We are really enjoying the pleasure of living in a house with a consistent and even temperature. It never drops below 19 degrees and varies by about 3 degrees above that. The house is not at all fusty-smelling. There is always a fresh and comfortable warmth in the atmosphere with no wet or moist patches anywhere in the house. Clothes dry quickly and almost straight away. There's no need for extras - like underfloor heating, a glut of radiators, real fires - it just offers constant, economical comfortable living.
- The house is also very peaceful and quiet, thanks to the insulation and triple glazing. The MVHR system has been hassle-free and it just gets on with ventilating the house and we are not able to hear it (unless it is in boost mode).
- We've not had any problems with overheating, we have a good shading strategy with the mature trees outside our south facing glazing. It is easy to regulate the temperature in the house by opening the appropriate windows if needed.

Angela Dallas, owner, Golcar Passivhaus

Why cavity wall construction?

If the UK is going to successfully adopt the Passivhaus standard on a wide scale it will be necessary to use construction methods common to UK contractors and builders:

"Building passive houses in other countries is not a matter of straightforward copying the German concepts. For the building tradition, architecture, building technologies and climate differ from country to country.

Architects and contractors must be shown the specific solutions for passive houses for the specific building technology, building tradition and climatic conditions of their countries."

Henk F. Kaan & Bart J. de Boer

Energy Research Centre of the Netherlands, 2005

Cavity wall is currently the most widely used and recognised technique in the UK (approximately 88% of dwellings built post 1990 in the UK).

English Housing Survey (DCLG, 2008)

CONSTRUCTION APPROACH

Improving cavity wall construction

- Building on and improving the detailing originally developed at the team's Denby Dale Passivhaus project, the UK's first cavity wall Passivhaus.
- Unique cavity wall detailing developed for the Golcar project
- Improving cavity wall detailing for both Passivhaus and non-Passivhaus projects

Cavity wall construction:

- Familiar
- Buildable
- Economic

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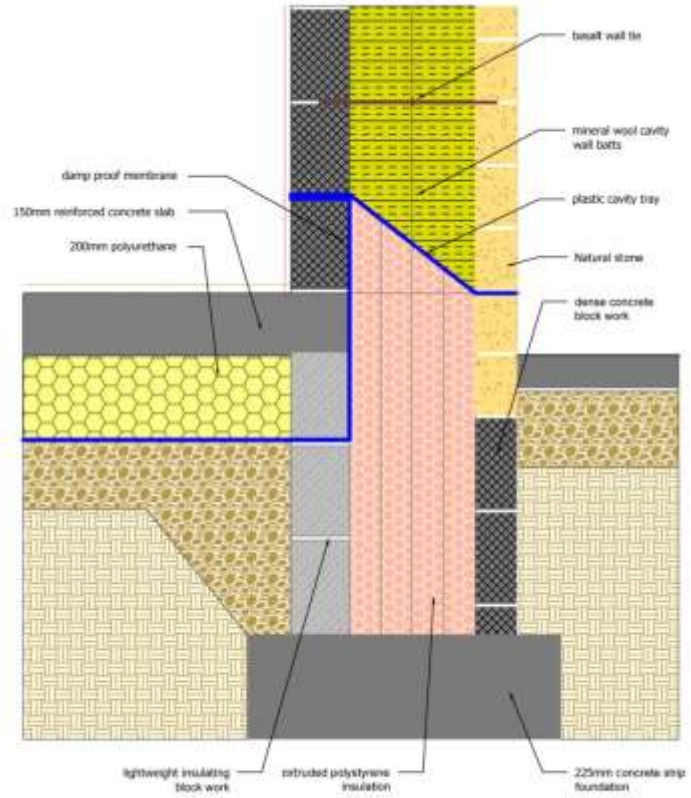
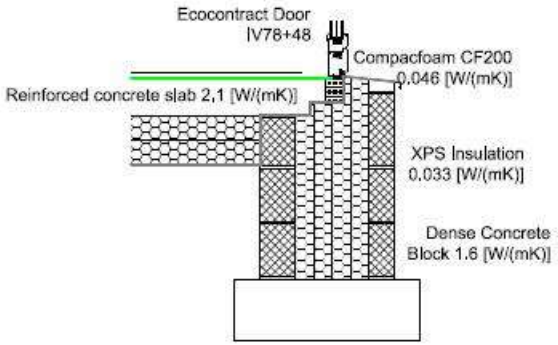
Ground floor & foundations

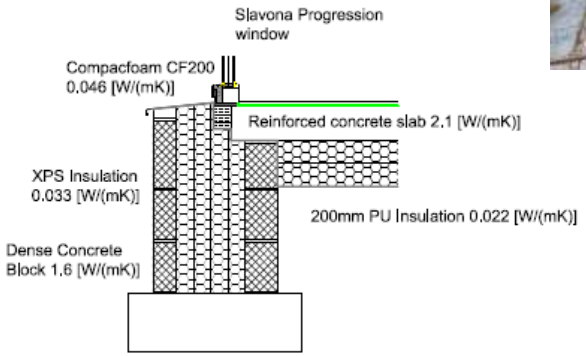
- Explored different ground floor options but returned to Denby Dale detailing, for economic and buildability reasons.
- Lessons learnt from Steel Farm Passivhaus: Damp proof membrane around the first course of Celcon block below the groundfloor slab, so that the block will stay dry and maintain its thermal performance.
- Thermal bridge free detail.



Minimising thermal bridging at thresholds

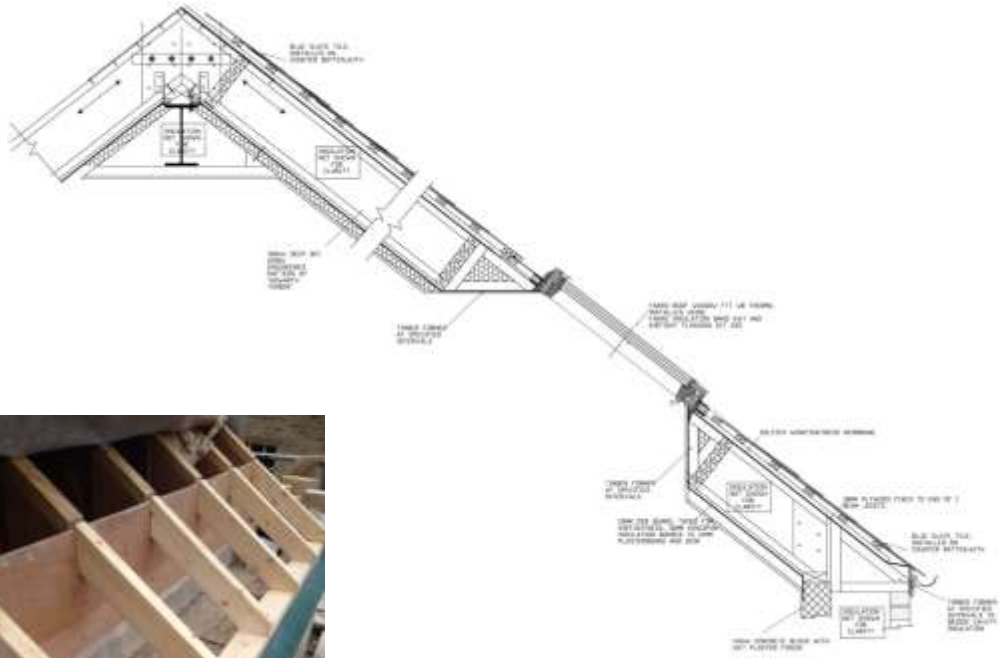
- At the Denby Dale project the team used a fiberglass box section, filled with expanding foam, at the door thresholds to minimise thermal bridging.
- At the Golcar project the team used the Compacfoam CF200 rigid insulation, with high compressive strength, on the door thresholds and underneath bay windows, to minimise thermal bridging, offering a more robust, buildable and cost-effective solution.



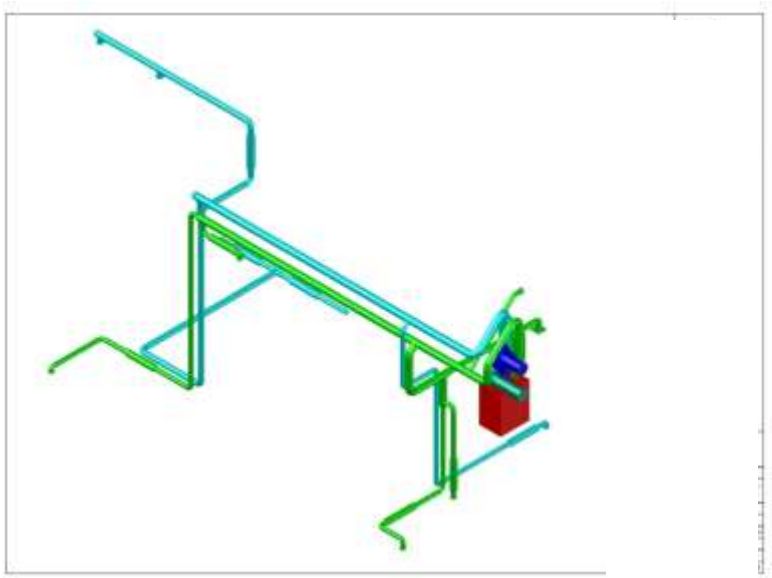


Roof

- Cathedral ‘warm roof’ detailing
- Roof wall junction: eaves detailing with ‘false extension’, to replicate vernacular detailing.
- Improving timber I-joist detailing with insulation in I-joist web so it forms a neat ‘square’ aperture to accept ‘off the shelf’ mineral wool quilt.



MECHANICAL SERVICES & SHADING



MVHR & Heating Strategy

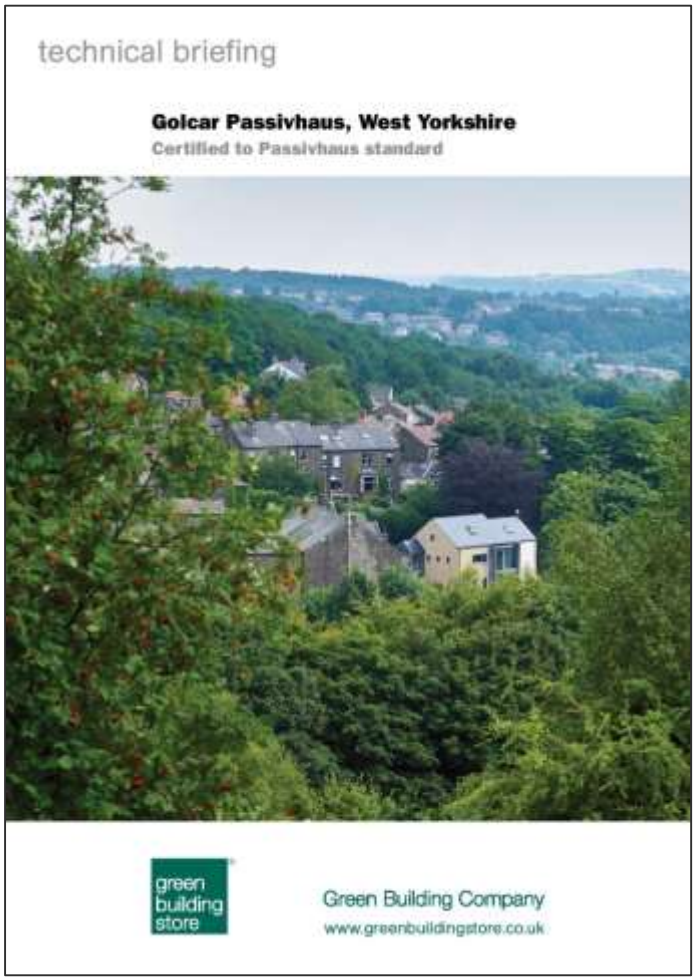
- Lessons learnt from previous projects
- Simplicity…keep MVHR and heating separate
- Mains gas 4kW ‘off the shelf’ system boiler, with thermal store, feeding minimal panel radiators and towel rails
- Solar thermal hot water heating

Shading Strategy

- Planning issues & roof overhang
- Mature trees
- Internal blinds
- Moderate night purging

FURTHER INFORMATION

Blogs & technical briefing:



Training:

FREE Technical resources on the project:

www.greenbuildingstore.co.uk/golcar