Cre8 Barn, Stirley Community Farm Yorkshire Wildlife Trust

PENDING

From derelict barn to highly energy efficient education facility

Bill Butcher
Director, Environmental Construction Products Ltd
(Green Building Store & Green Building Company)

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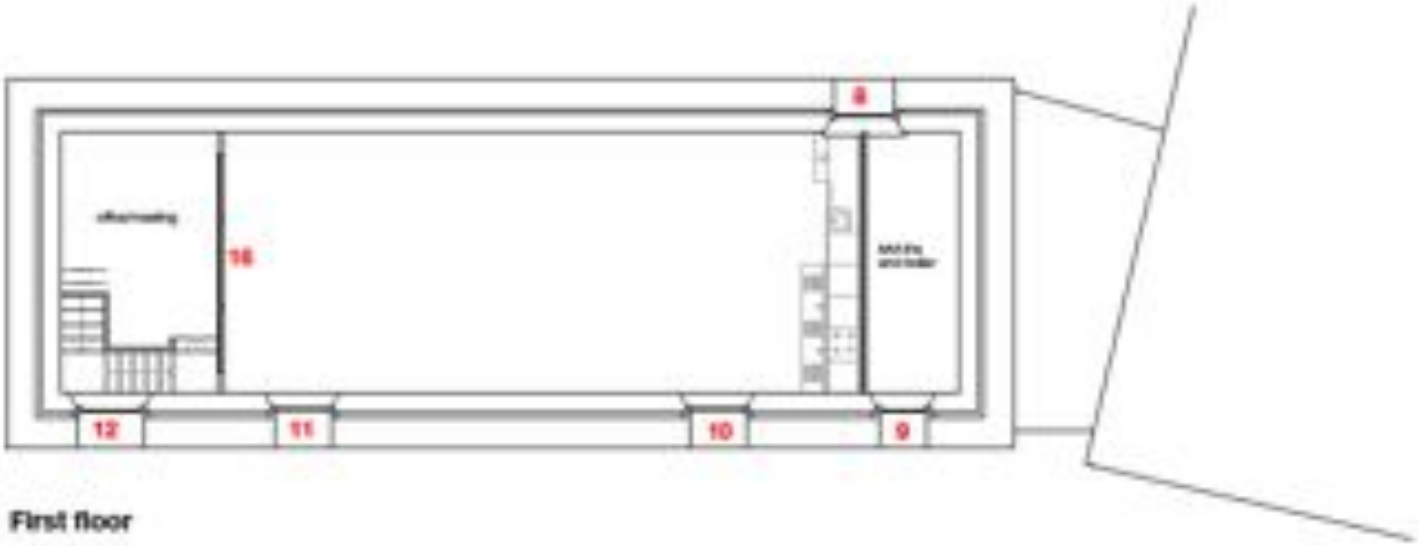
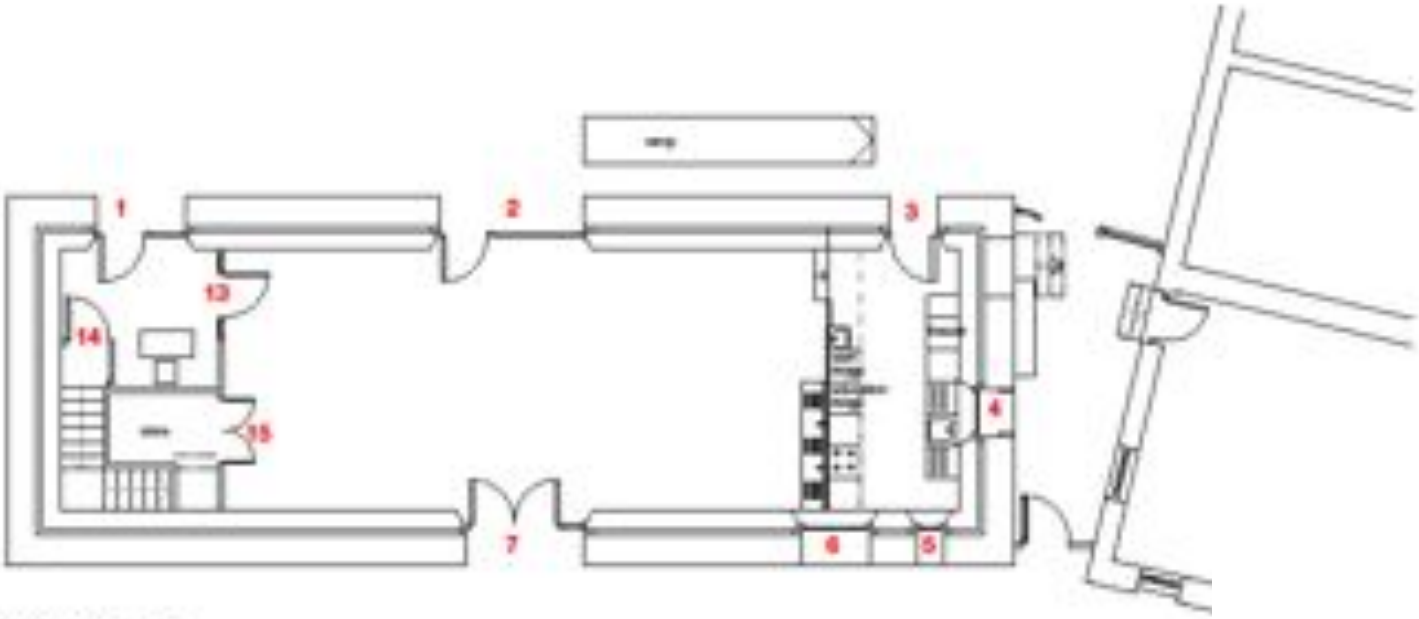
Key features

- The conversion of a 19th century barn to a multi purpose educational centre
- ‘Fabric first’ - to meet the PassivHaus EnerPHit standard for retrofit
- ‘Box within a box’, internal timber frame structure for structural stability, thermal performance, and air tightness
- Major underpinning of foundations and partial rebuild of masonry walls
- Detailing of key junctions and windows
- MVHR ventilation strategy



First floor



Ground floor

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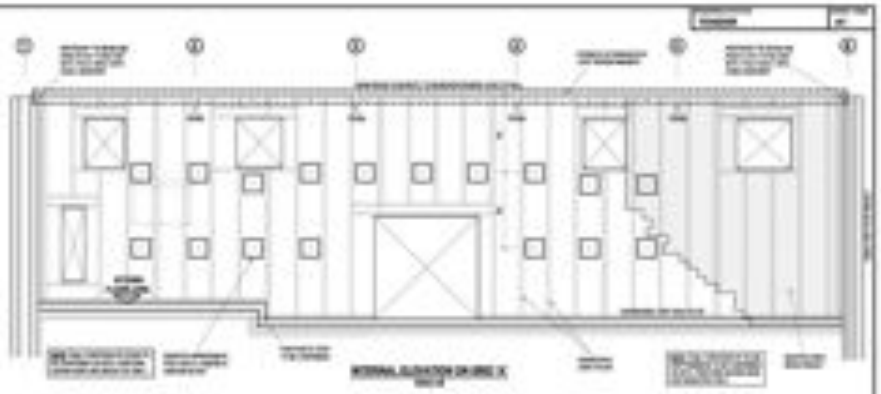
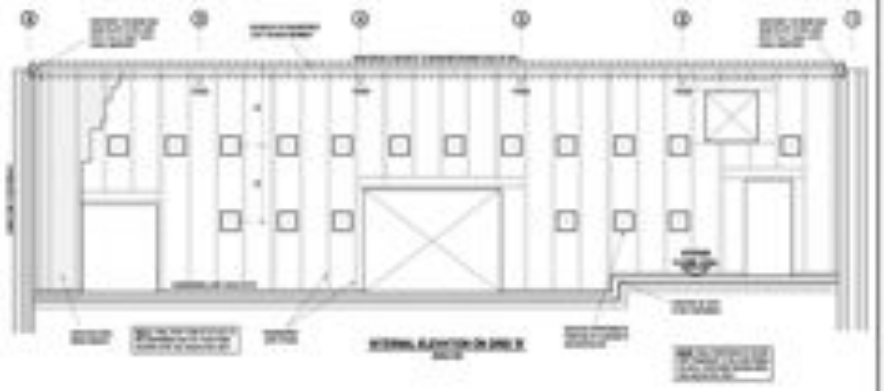
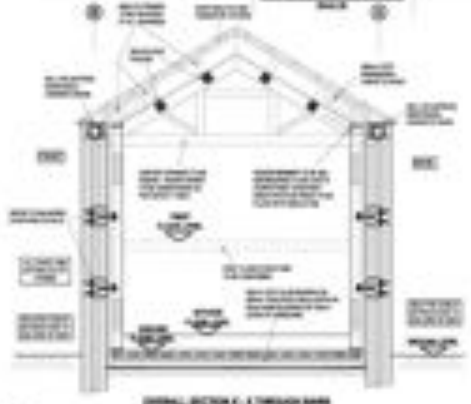
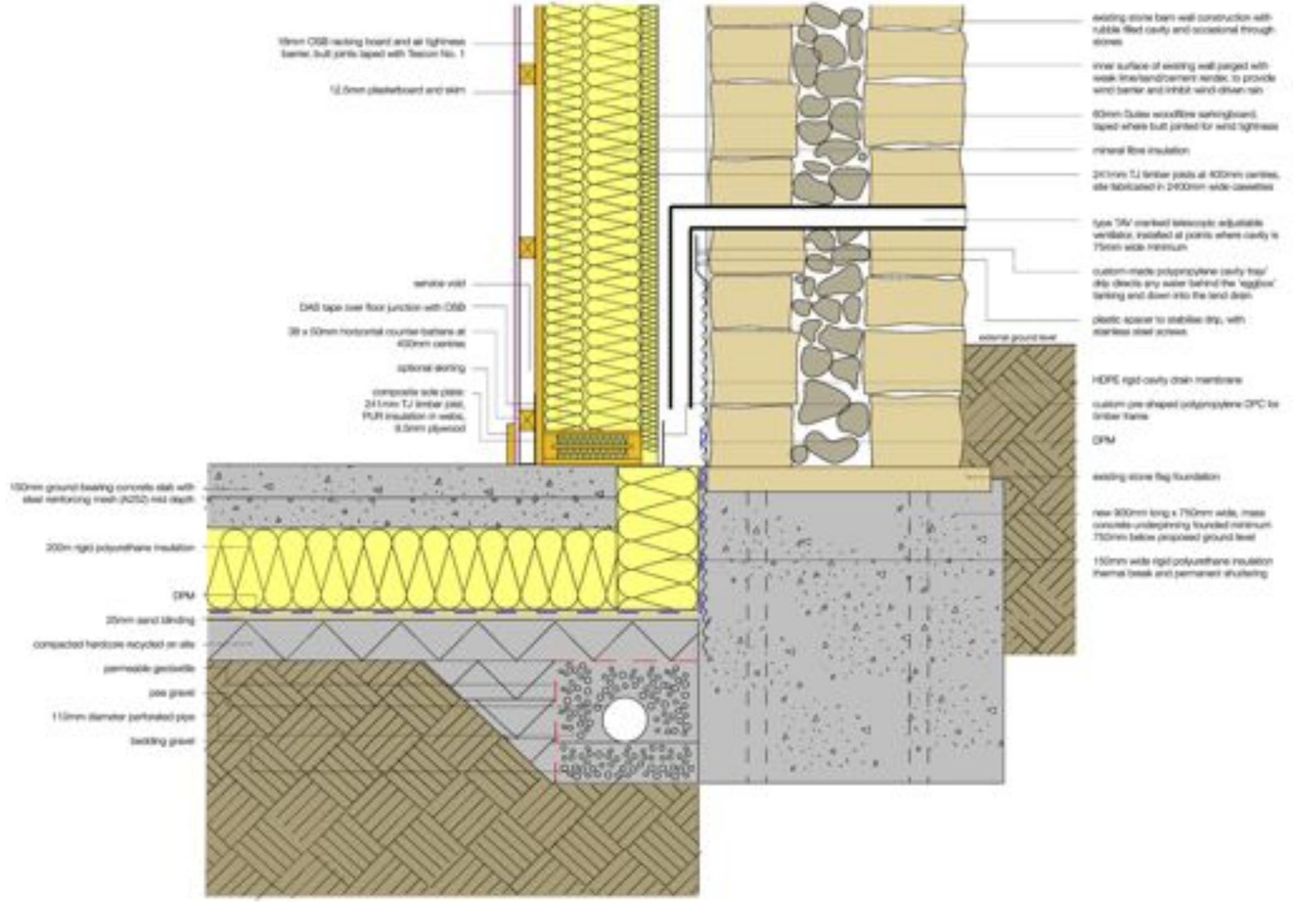
Internal wall insulation considerations

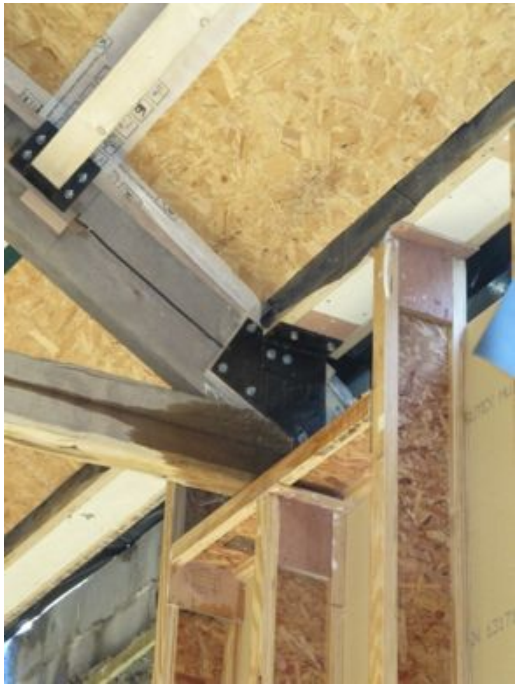
- Thermal performance
- Structural stability
- Airtightness
- Wind tightness
- Elimination of any interstitial moisture risk
- Integration of tanking
- Draining the cavity of any rain ingress
- Ventilation of cavity to eliminate risk of solar driven moisture



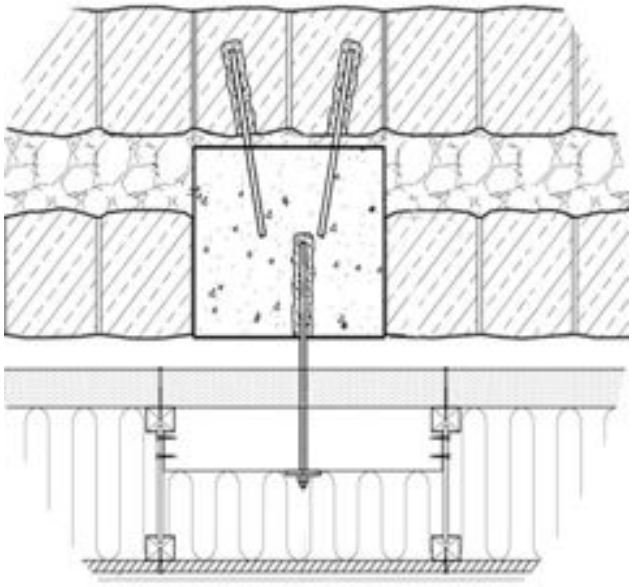





existing stone barn wall construction with rubble filled cavity and occasional through-stones
inner surface of existing wall parged with weak lime/sand/cement render, to provide wind barrier and inhibit wind-driven rain
60mm Gutex woodfibre sarkingboard, taped where butt jointed for wind tightness
mineral fibre insulation
241mm TJI timber joists at 400mm centres, site fabricated in 2400mm wide cassettes
type 'SN' cranked telescopic adjustable ventilator, installed at points where cavity is 75mm wide minimum
custom-made polypropylene cavity tray/drip directs any water behind the 'eggbox' tanking and down into the land drain
plastic spacer to stabilise drip, with stainless steel screws
external ground level
HDPE rigid cavity drain membrane
custom pre-shaped polypropylene DPC for timber frame
DPM
existing stone flag foundation
new 900mm long x 750mm wide, mass concrete underpinning founded minimum 750mm below proposed ground level
150mm wide rigid polyurethane insulation thermal break and permanent shuttering
18mm OSB racking board and air tightness barrier, butt joints taped with Tescon No. 1
12.5mm plasterboard and skim
service void
DAS tape over floor junction with OSB
38 x 50mm horizontal counter battens at 400mm centres
optional decking
composite sole plate: 241mm TJI timber joist, PUR insulation in webs, 9.0mm plywood
150mm ground bearing concrete slab with steel reinforcing mesh (A252) mid depth
200m rigid polyurethane insulation
DPM
25mm sand blinding
compacted hardcore recycled on site
permeable geotextile
pea gravel
110mm diameter perforated pipe
bedding gravel

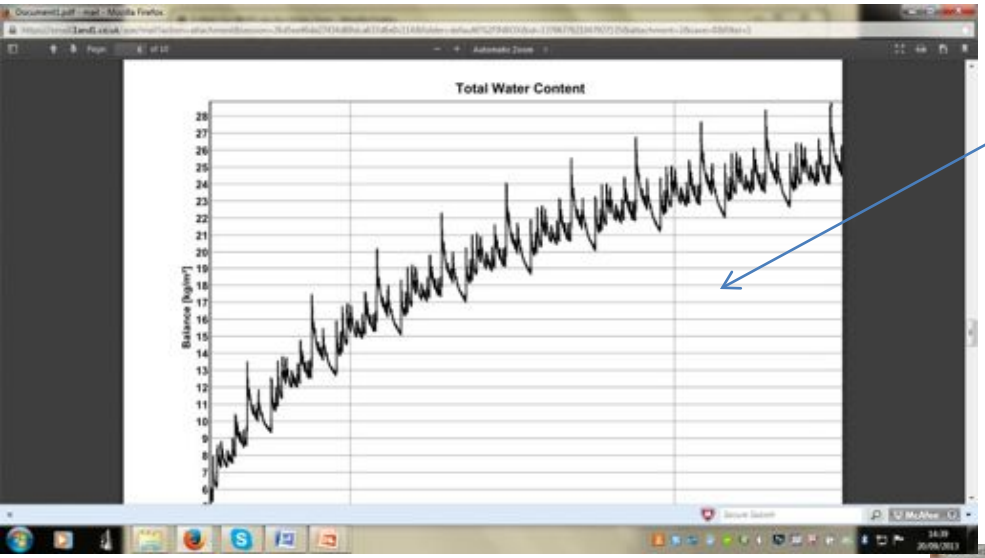



VAPOUR BLOCK



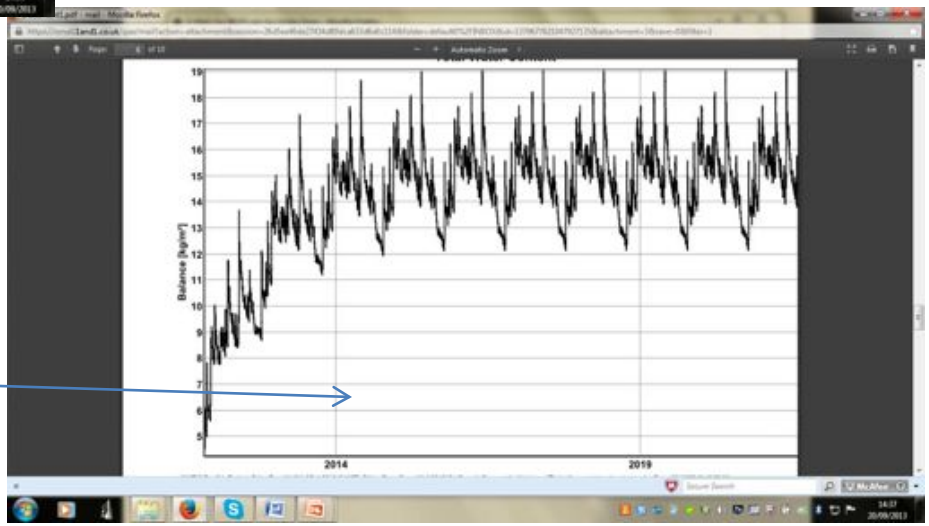

Multitherm DIN EN

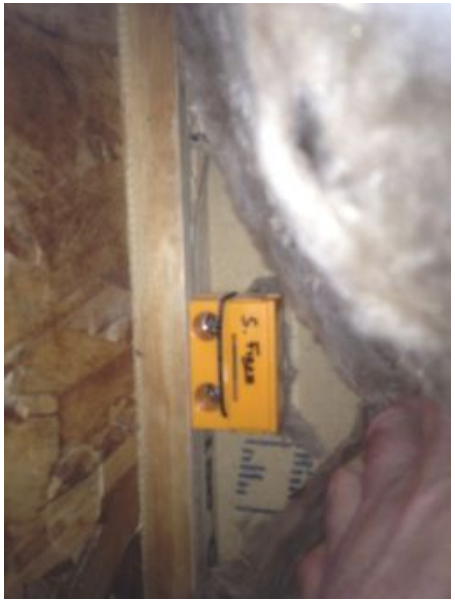
Risks of moisture within the wall structure, WUFI analysis

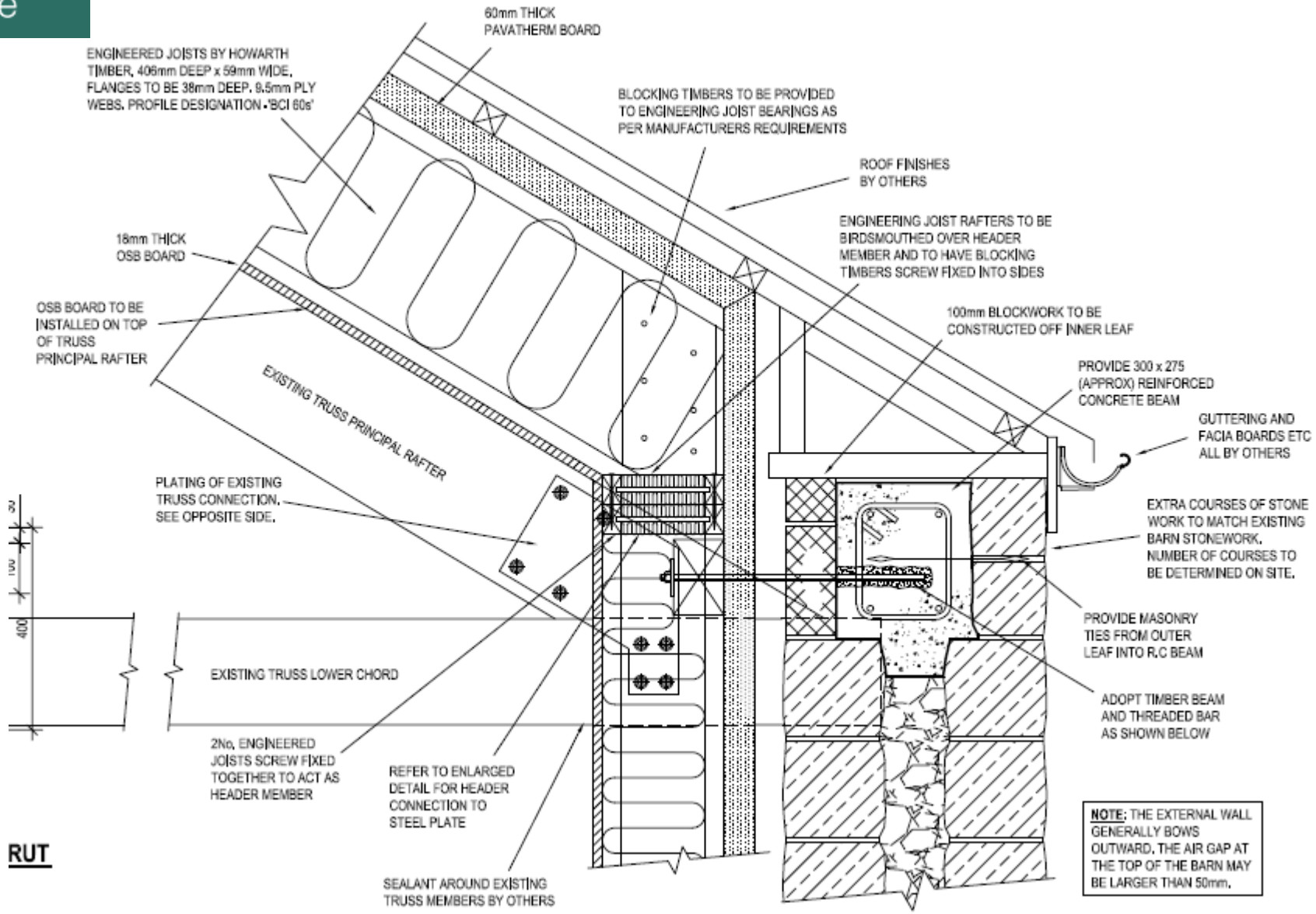


Unventilated cavity

Ventilated cavity







RUT

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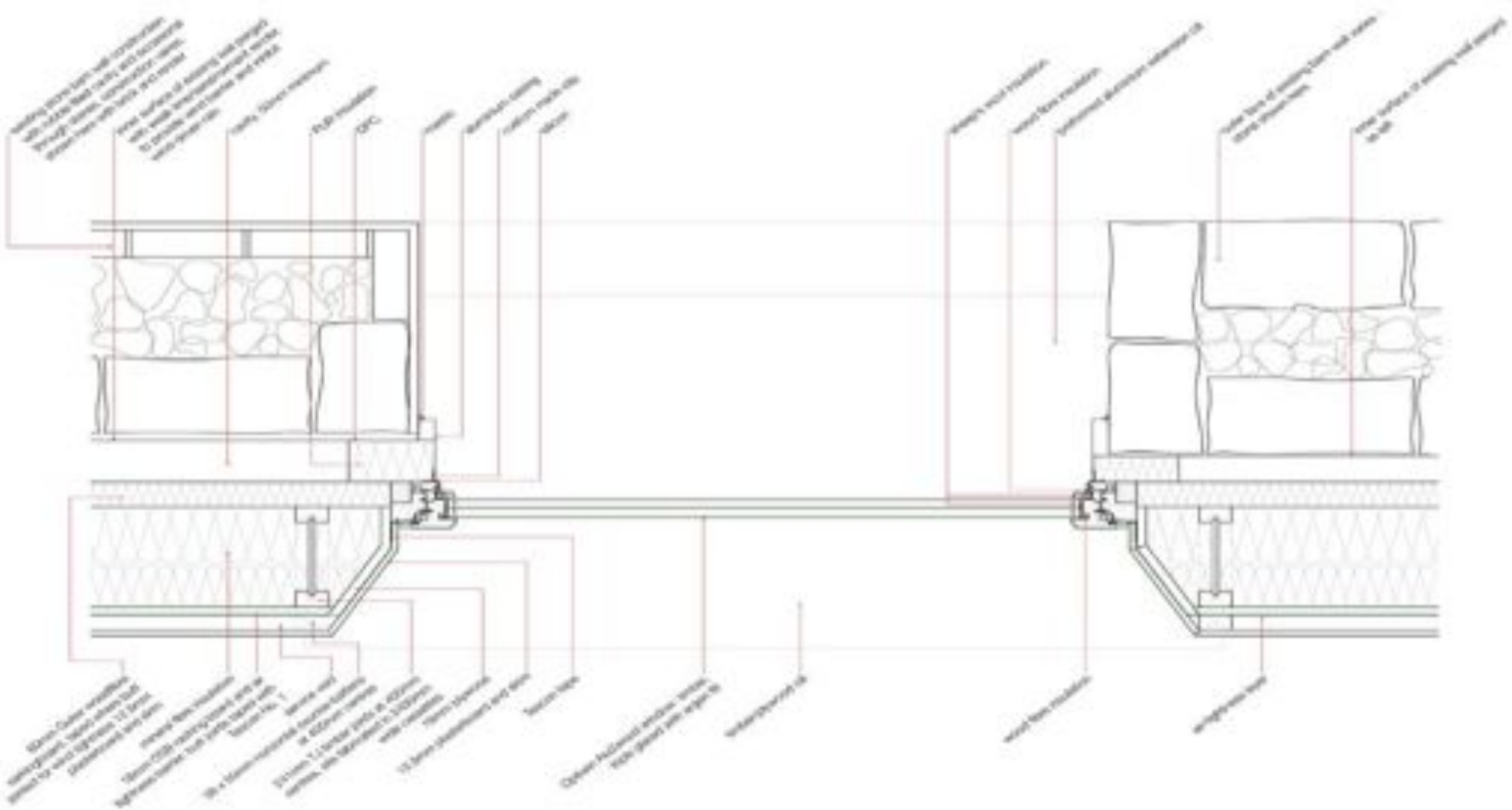
Window & door installation



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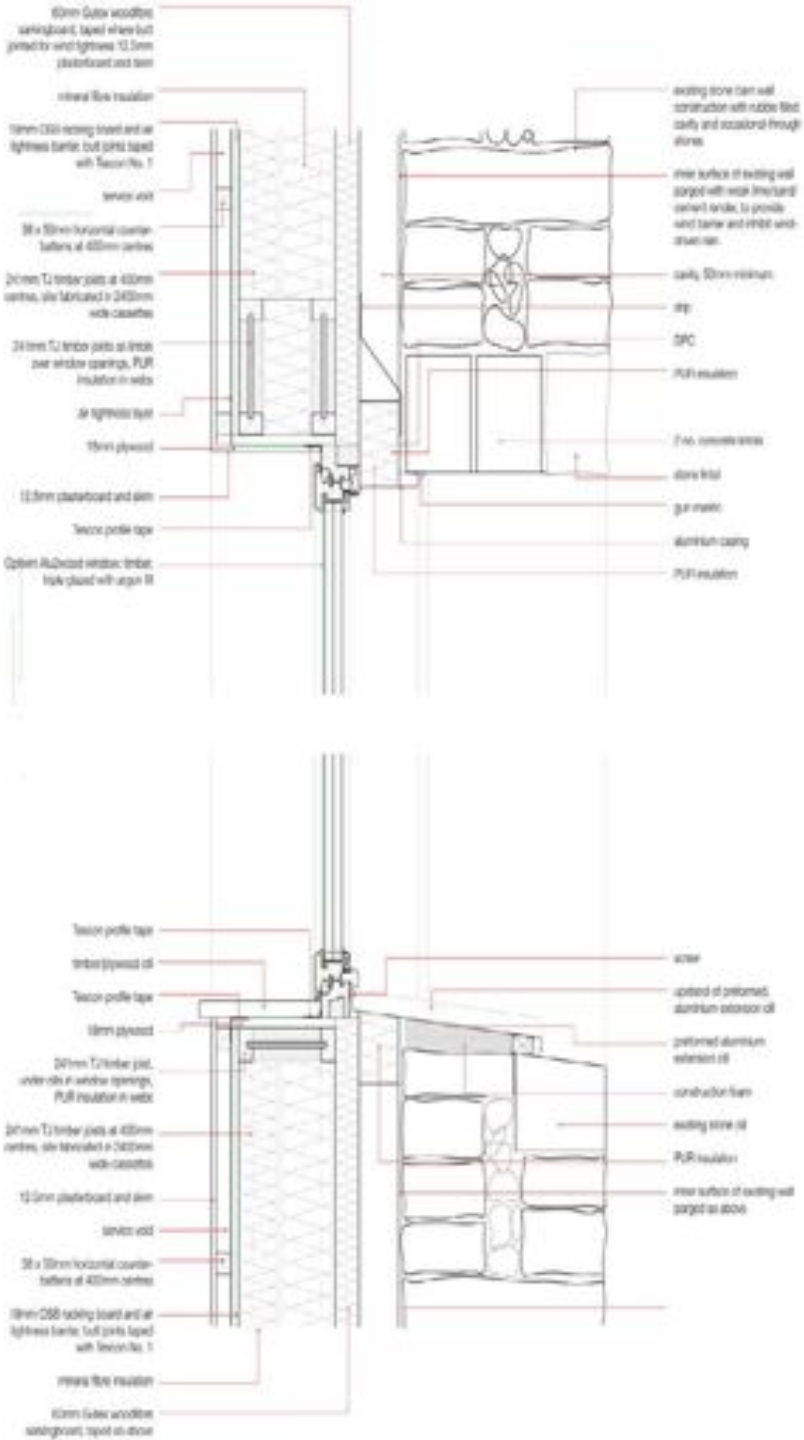
Window & door installation



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MVHR strategy

Air tightness Strategy

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The Elemental method of certification

1) Building envelope

Exterior insulation: U ≤ 0.15 W/(m²K)

Interior insulation: U ≤ 0.35 W/(m²K)

2) Windows

Uw,installed ≤ 0.85 W/(m²K)

3) External doors

UD,installed ≤ 0.80 W/(m²K)

4) Ventilation

Heat recovery efficiency ≥ 75 %

More information and guidance on the EnerPHit 'Elemental method' is at:

http://passiv.de/downloads/03_certification_criteria_enerphit_en.pdf

ENERPHIT CERTIFICATION PENDING

EnerPHit verification

Building:	Stirley Barn
Street:	Off Ashes Lane
Postcode / City:	HD5 2TD / Huddersfield, West Yorkshire
Country:	UK
Building type:	Detached Barn Retrofit
Climate:	[UK] - West Pennines (Fairfield)
Altitude of building site [m above sea level]:	200
Home owner / Client:	Yorkshire Wildlife Trust
Street:	1 St George's Place
Postcode/City:	YO24 1GN / York
Architecture:	Green Building Company
Street:	Heath House Mill, Heath House Lane, Golcar
Postcode / City:	HD7 4JW / Huddersfield, West Yorkshire
Mechanical system:	Paul MVHR
Street:	Heath House Mill, Heath House Lane, Golcar
Postcode / City:	HD7 4JW / Huddersfield, West Yorkshire

Year of construction:	2013	Interior temperature winter:	20.0	°C	Enclosed volume V_e, m³: 465.0
No. of dwelling units:	1	Interior temperature summer:	25.0	°C	Mechanical cooling:
No. of occupants:	6.0	Internal heat sources winter:	1.6	W/m²	
Spec. capacity:	132 Wh/K per m² TFA	Ditto summer:	1.6	W/m²	

Specific building demands with reference to the treated floor area

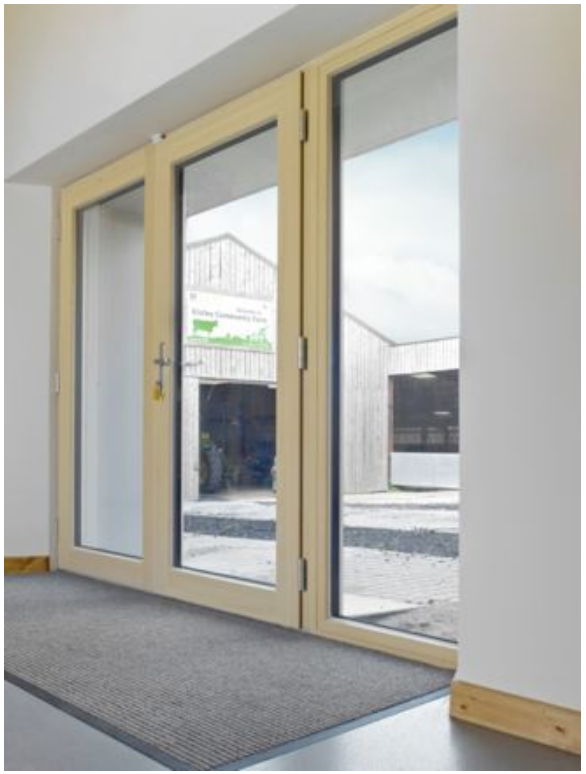
				Requirements	Fulfilled? *
	Treated floor area	98.3	m²		
Space heating	Heating demand	45	kWh/(m²a)	-	-
	Heating load	17	W/m²	-	-
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	0.0	%	-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances	107	kWh/(m²a)	156 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	99	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	0.4	1/h	1 1/h	yes

* empty field: data missing; "-": no requirement

EnerPHit building retrofit (according to component quality)?

We confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this application.

Name:	PHPP Version 8.4
Surname:	Registration number PHPP:
Company:	Issued on:
	Signature:




Yorkshire
Wildlife Trust
Welcome to
Stirley Community Farm

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More information

Free resources on the project are available at:
www.greenbuildingstore.co.uk/enerphit


Devon pasties are best!