

Project Documentation

Gebäude-Dokumentation

Abstract | Zusammenfassung



Hiberna Strawbale House

Data of building | Gebäudedaten

Year of construction Baujahr	2020	Space heating Heizwärmebedarf	10.53 kWh/(m ² a)
U-value external wall U-Wert Außenwand	0.154 W/(m ² K)		
U-value basement U-Wert Kellerdecke	0.171 W/(m ² K)	Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER)	76 kWh/(m ² a)
U-value roof U-Wert Dach	0.136 W/(m ² K)	Generation of renewable Energy Erzeugung erneuerb. Energie	59 kWh/(m ² a)
U-value window U-Wert Fenster	0.9 W/(m ² K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	34 kWh/(m ² a)
Heat recovery Wärmerückgewinnung	86.1 %	Pressurization test n Drucktest n ₅₀	0.6 h ⁻¹
Special features Besonderheiten	Low embodied energy materials. Reclaimed materials. Solar PV. No combustion. Low VOC finishes. Niedrig verkörperte Energiematerialien. Aufgearbeitete Materialien. Solarphotovoltaik-Module. Keine Verbrennung VOC-arme Oberflächen		

Brief Description

Hiberna Strawbale House

A two storey family home in Wanaka, NZ. One of the few two storey strawbale structures in NZ, it is the first strawbale certified Passive House in NZ. The structure is an isolated slab on 200mm of polystyrene, post and box beam hybrid strawbale wall structure on both storeys and a framed roof. Internal and external wall finishes are earth/lime plasters. The windows are triple glazed timber frame. The internal floors are earth floor on concrete(ground) and native red beech on posistruts (upper). Internal walls are timber frame with earth/lime plasters and timber sarking. The house is heated by 2x 1kW radiators which are fed via a 'scavenging' coil in the hot water cylinder which is heated using a hot water heat pump. The house has solar photovoltaic panels which will power the house and also charge the family's electric car.

Kurzbeschreibung

Hiberna Strohballenhaus

Ein zweistöckiges Einfamilienhaus in Wanaka, Neuseeland. Es ist eines der wenigen zweistöckigen Strohballengebäude in Neuseeland und das erste Passivhaus in Strohballenbauweise mit Passivhaus Zertifizierung in Neuseeland. Die Struktur besteht aus einer isolierten Beton-Platte mit 200 mm starkem Polystyrol, einer Hybrid-Strohballen-Wandstruktur mit Pfosten- und Kastenbalken auf beiden Etagen und einem (gerahmten) Giebel Dach. Innen- und Außenwände sind Lehm(Erd)- / Kalkputze. Die Fenster sind dreifach verglaste Holz und Holz-Aluminium Fenster. Die Innenböden sind Erdboden(Lehm/Kalk Boden) auf Beton (Erdgeschoss) und Rotbuche auf einer Holz-/Metalkonstruktion (1.OG). Innenwände sind Holzständer mit (Erde) Lehm / Kalk Putz und Holz Verkleidung. Das Haus wird von 2x 1kW-Heizkörpern beheizt, die über eine Austausch-Spirale im Warmwasserspeicher gespeist werden, der mit einer Warmwasserwärmepumpe beheizt wird. Das Haus verfügt über Solarphotovoltaik-Module, die das Haus mit Strom versorgen und das Elektroauto der Familie aufladen.

Responsible project participants Verantwortliche Projektbeteiligte

Architect Entwurfsverfasser	Hiberna Ltd www.hiberna.co.nz
Implementation planning <u>Ausführungsplan</u>	Hiberna Ltd www.hiberna.co.nz
Building systems	Fantech NZ Ltd, http://www.mvhr.c
Structural engineering	Ezed Ltd http://ezed.co.nz/
Building physics	Hiberna Ltd www.hiberna.co.nz
Passive House project planning Passivhaus-Projektierung	Hiberna Ltd www.hiberna.co.nz
Construction management <u>Bauleitung</u>	Hiberna Ltd www.hiberna.co.nz

Certifying body Zertifizierungsstelle

Sustainable Engineering Ltd
www.sustainableengineering.co.nz

Certification ID Zertifizierungs ID

6264

Project-ID [6264] (www.passivehouse-database.org)
Projekt-ID (www.passivhausprojekte.de)

Author of project documentation Verfasser der Gebäude-Dokumentation

Jessica Eyers
www.hiberna.co.nz

Date
Datum

04/02/2020

Signature
Unterschrift



1. Exterior photos - Ansichtsfotos



north west



East



South-west

2. Interior photos - Innenfoto exemplarisch

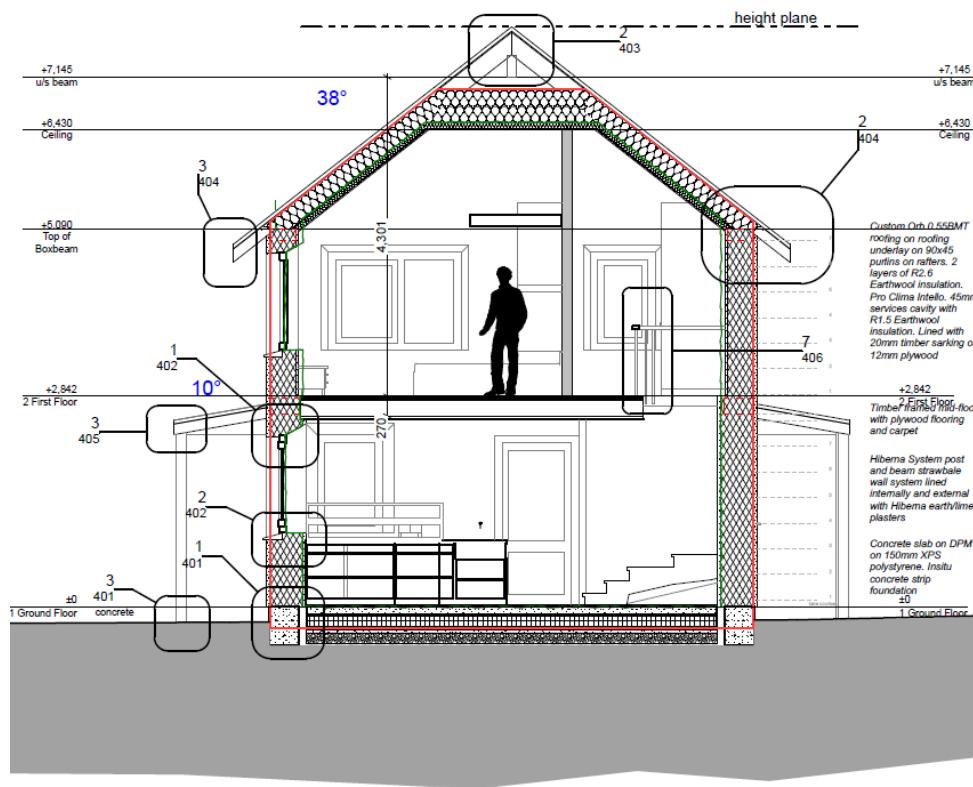
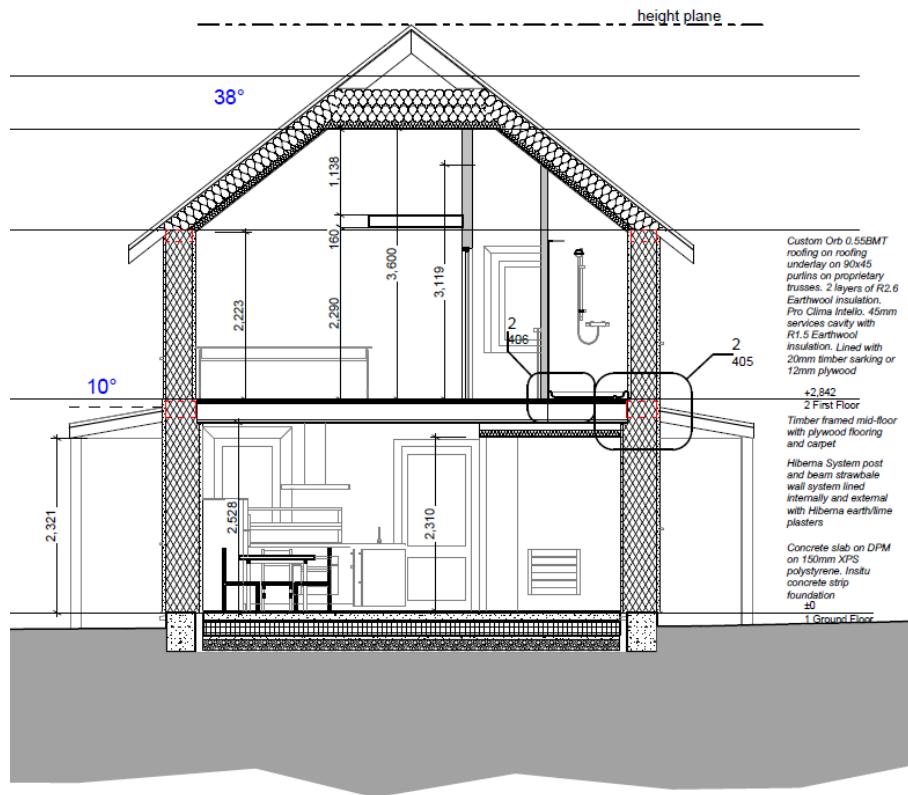


Bedroom 1



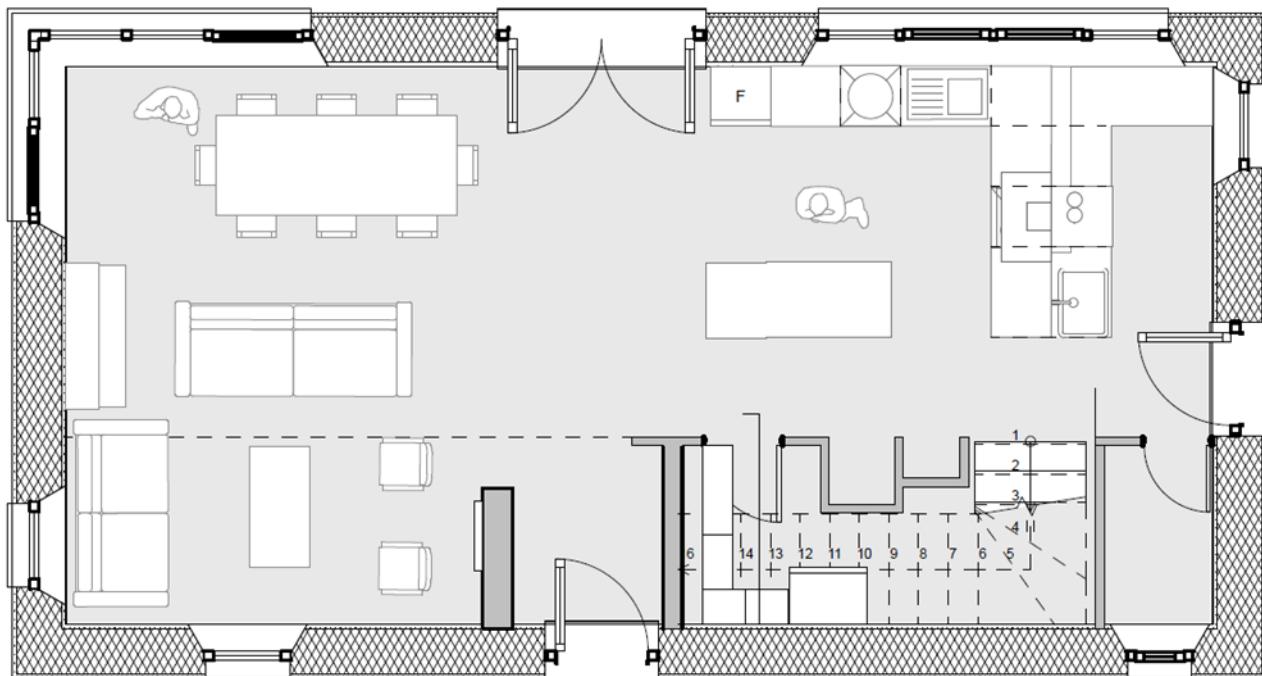
Stairwell

3. Sections - Schnittzeichnung

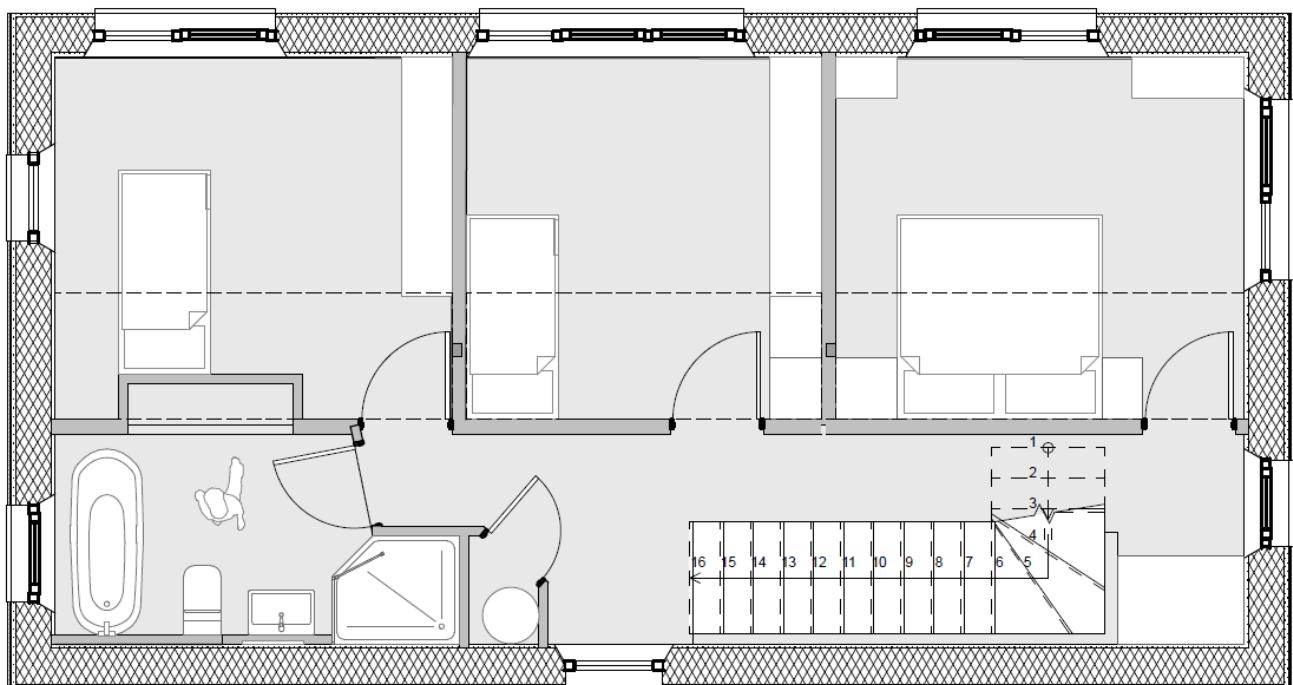


0 1 2 3 4 5

4. Floor plans - Grundrisse

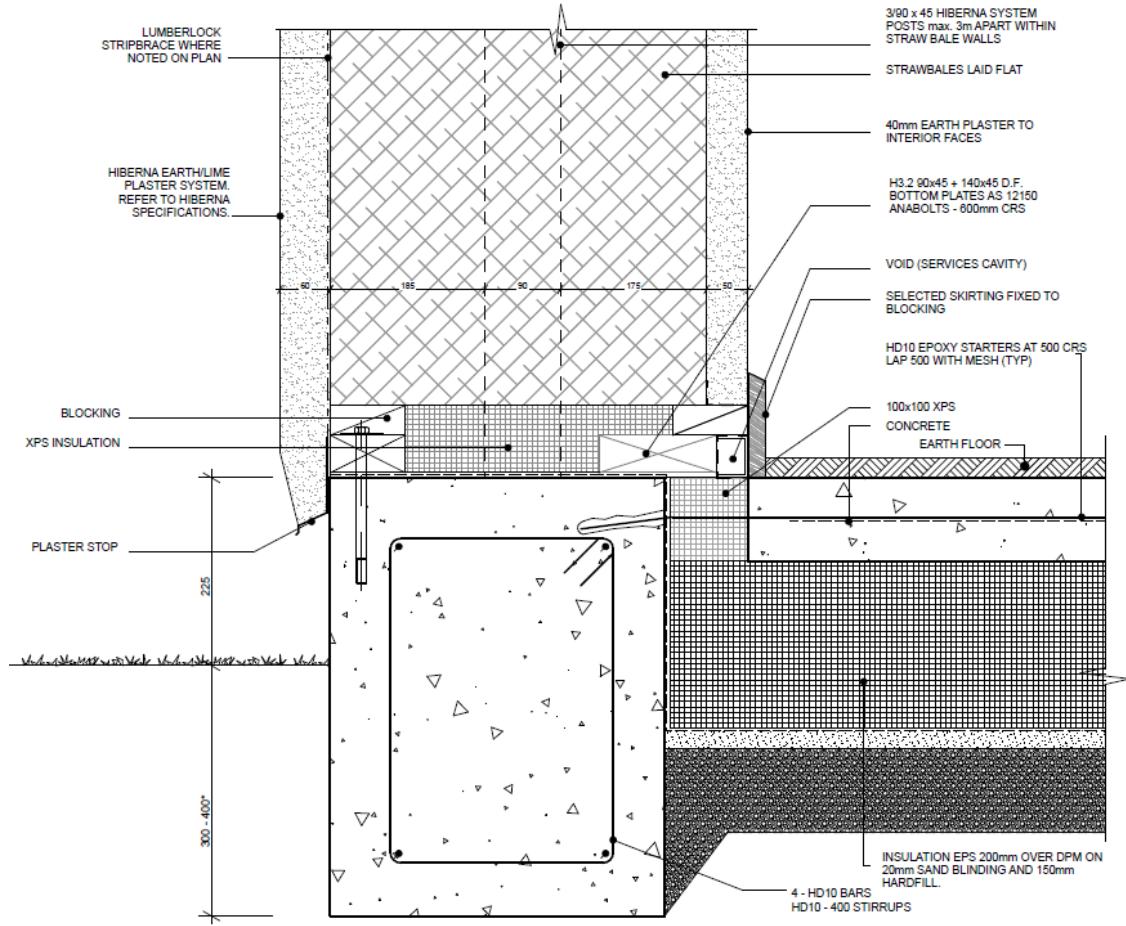


Ground Floor Plan



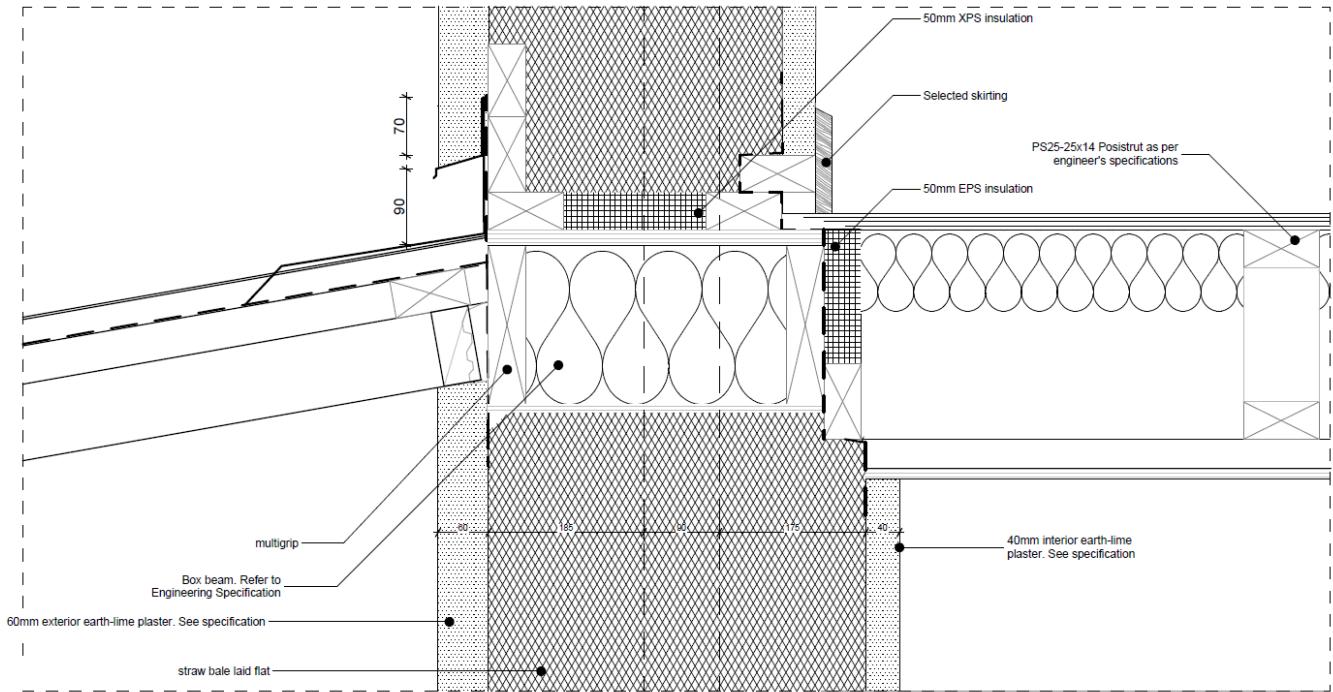
First Floor Plan

5. Floor slab/ basement ceiling construction including insulation Konstruktion der Bodenplatte



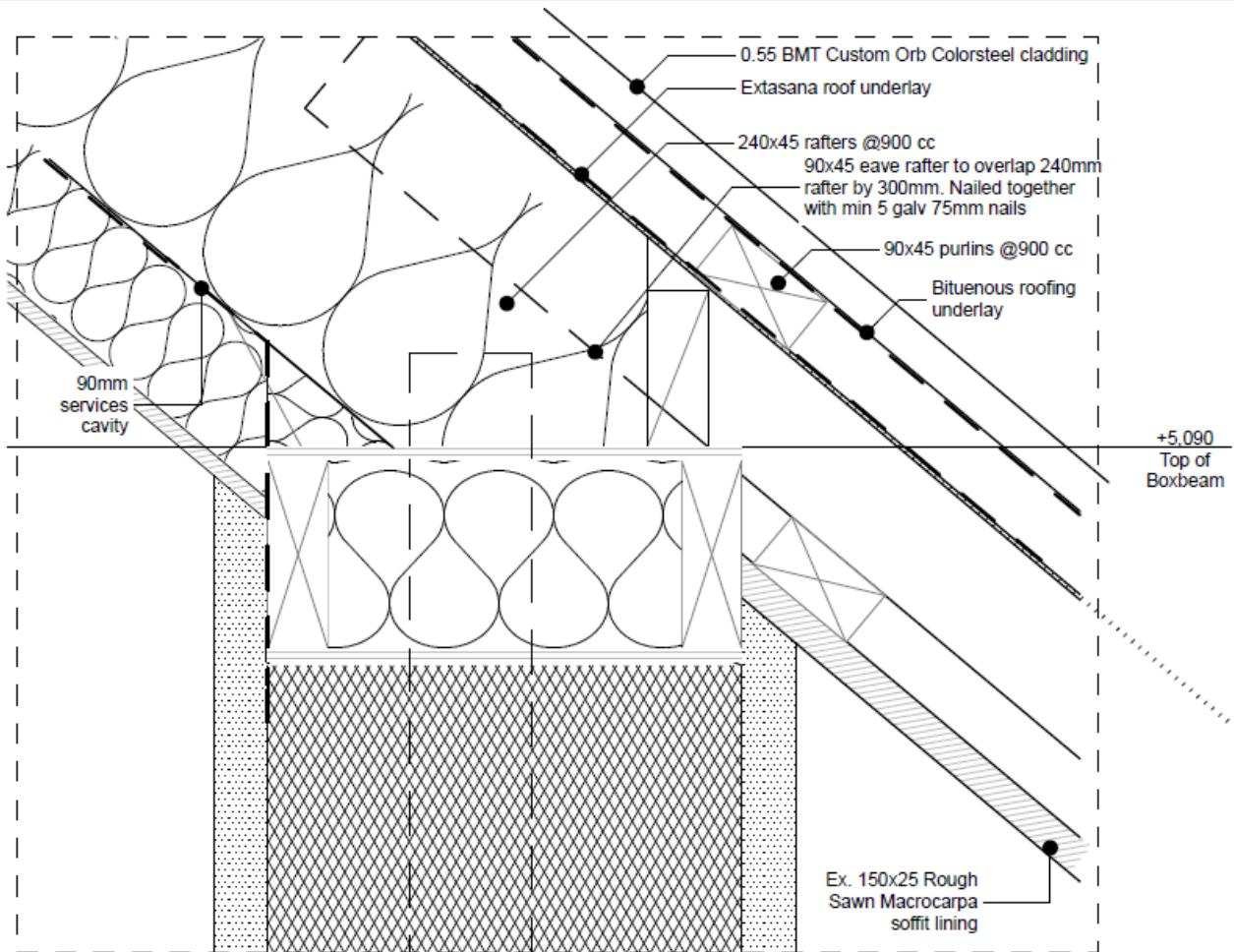
25mm earth floor on 100mm concrete slab, 200mm EPS polystyrene

6. Wall construction including insulation - Konstruktion der Außenwände



Post and beam hybrid strawbale structure with earth/lime plasters inside and out.
Ground floor (bales on flat): 0.154
First floor (bales on edge): 0.128

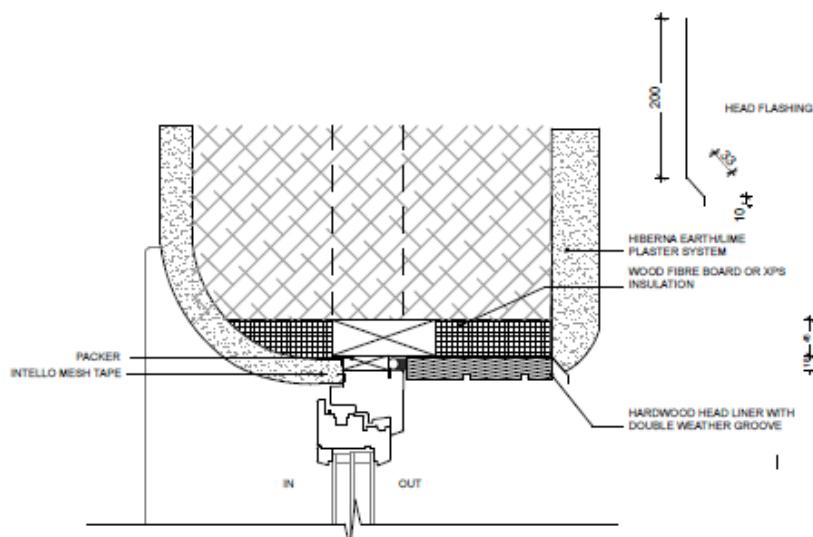
7. Roof construction including insulation - Konstruktion des Daches



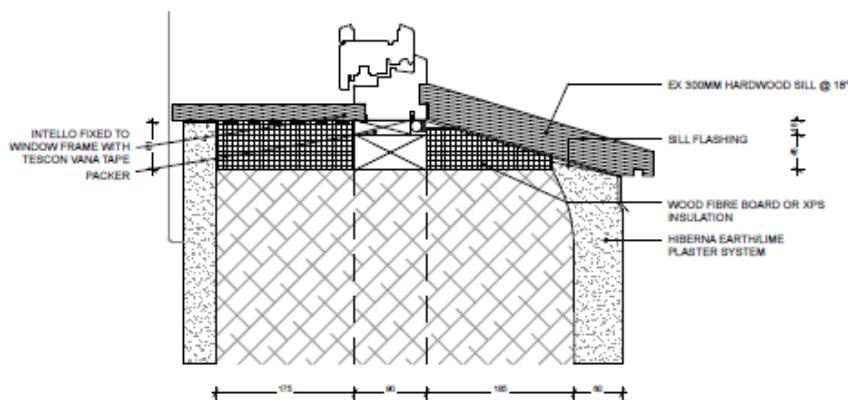
Skillion roof: 240mm rafters insulated with sheeps wool, 90mm insulated services cavity internally U=0.136

Flat ceiling: 380mm sheeps wool, 90mm insulated services cavity internally U=0.099

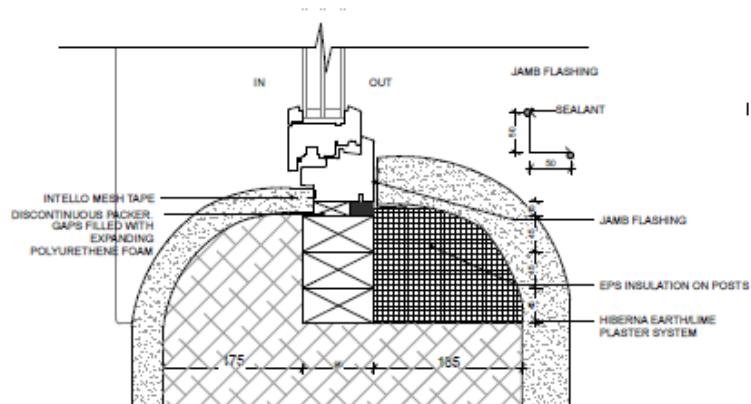
8. Window and window installation including glass Ug / g-value and frame performance - Fenster und Fenster-Einbau



1 Window Head Detail 1:5



2 Window Sill Detail 1:5



3 Window Jamb Detail 1:5

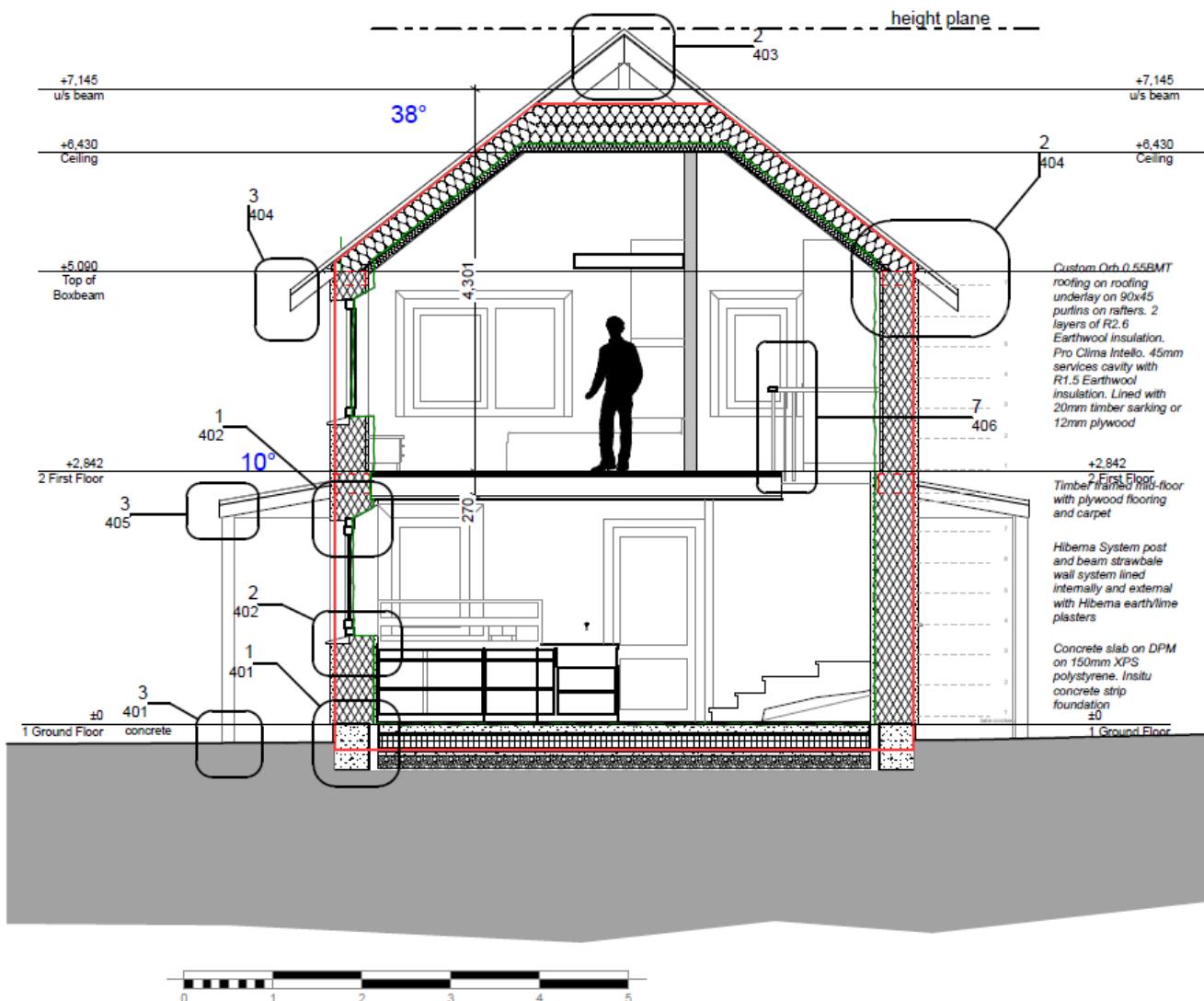
The windows are 90mm larch frames with triple glazing. The windows on upper storey have an aluminium facing.

U g-value = 0.53 W/(m²K)

g -value = 53 %

Uf values (average) = 1.17 W/(m²K)

9. Air leakage testing - Beschreibung der luftdichten Hülle



The air control layer is marked in green. It is formed by the concrete slab, internal plaster and air control membrane in the roof. Around the midfloor the plaster is connected with a strip of membrane. The plaster is connected to windows and other airtight elements with tape connected to mesh.



Mesh/tape ready for plastering



BUILDING LEAKAGE TEST

Seechange NZ Ltd
PO Box 4
Clyde, Central Otago 9330

Date of Test: 11/11/2019 Test File: Hiberna house Final 2019 11th Nov4

Technician: NR Murray
Project Number: 1909

Customer: Hiberna
10 Pisa Road
RD 3
Luggate, Otago
Phone: 022 047 5585
Fax:
Email: ben@hiberna.co.nz

Test Results at 50 Pascals:

	Depressurization	Pressurization	Average
q ₅₀ : m ³ /h (Airflow)	212 (+/- 0.3 %)	218 (+/- 1.3 %)	215
n ₅₀ : 1/h (Air Change Rate)	0.58	0.60	0.59
Q _{F50} : m ³ /(h·m ²) Floor Area)	3.27	3.36	3.31
Q _{E50} : m ³ /(h·m ²) Envelope Area)	0.69	0.70	0.69

Leakage Areas:

ELA ₅₀ : m ²	0.0065 (+/- 1.3 %)	0.0066 (+/- 1.3 %)	0.0066
ELA _{F50} : m ² /m ²	0.0000998	0.0001023	0.0001010
ELA _{E50} : m ² /m ²	0.0000209	0.0000214	0.0000212

Building Leakage Curve:

Air Flow Coefficient (C _{env}) m ³ /(h·Pa ⁿ)	10.1 (+/- 1.6 %)	10.6 (+/- 6.5 %)
Air Leakage Coefficient (C _L) m ³ /(h·Pa ⁿ)	10.2 (+/- 1.6 %)	10.6 (+/- 6.5 %)
Exponent (n)	0.777 (+/- 0.005)	0.772 (+/- 0.018)
Coefficient of Determination (r ²)	0.99995	0.99915

Test Standard:

ISO 9972

Test Mode:

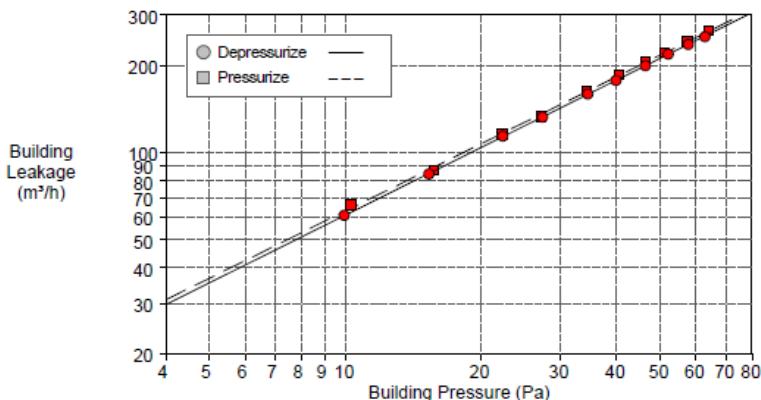
Depressurization and Pressurization

Type of Test Method:

Method 1 - Test of Building in use

Purpose of Test:

Passiver House verification test



BUILDING LEAKAGE TEST Page 2 of 5

Date of Test: 11/11/2019 Test File: Hiberna house Final 2019 11th Nov4

Building Information

Internal Volume, V (m ³) (according to ISO)	364.78
Net Floor Area, A _F (m ²) (according to ISO)	64.86
Envelope Area, A _E (m ²) (according to ISO)	309.38
Height (m)	6.43
Uncertainty of Dimensions (%)	2
Year of Construction	2019
Type of Heating	none
Type of Air Conditioning	none
Type of Ventilation	MVHR
Building Wind Exposure	Partly Exposed Building
Wind Class	Moderate Breeze

Equipment Information

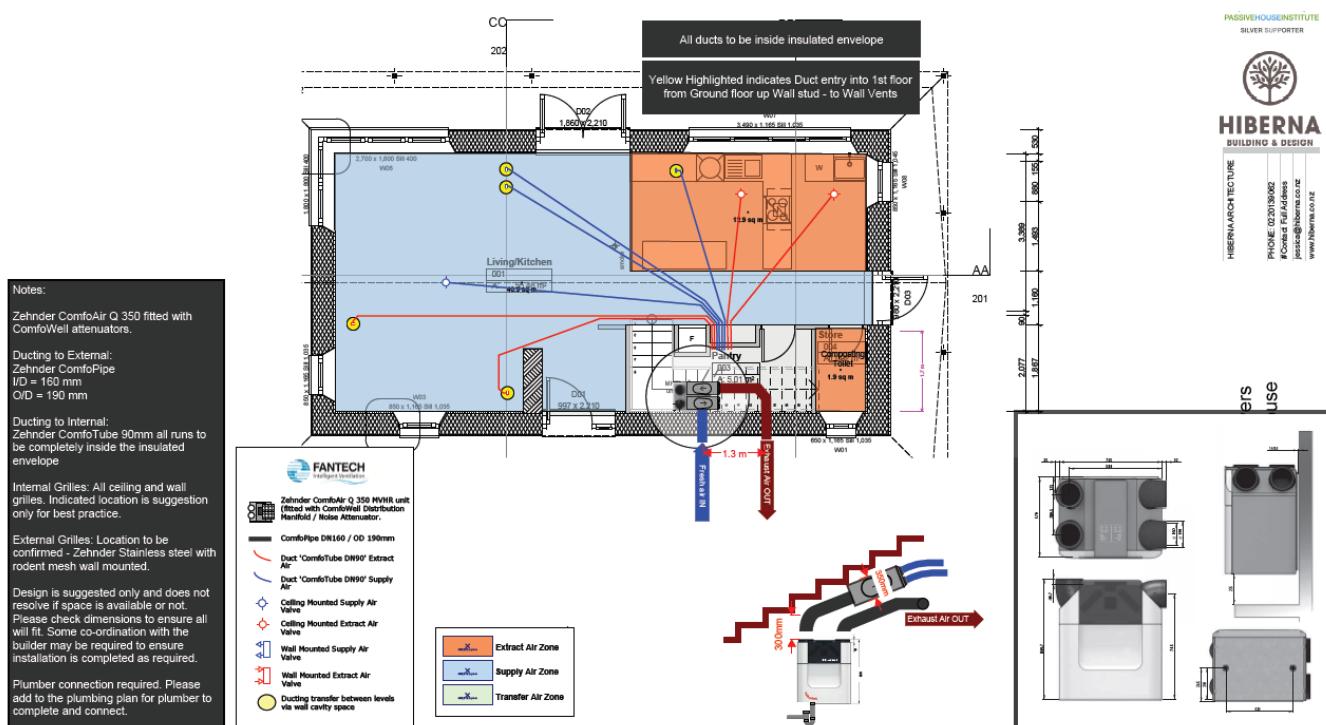
Type	Manufacturer	Model	Serial Number	Custom Calibration Date
Fan	Energy Conservatory	Model 4 (230V)	GE230	-
Micromanometer	Energy Conservatory	DG700	44098	13/03/2017

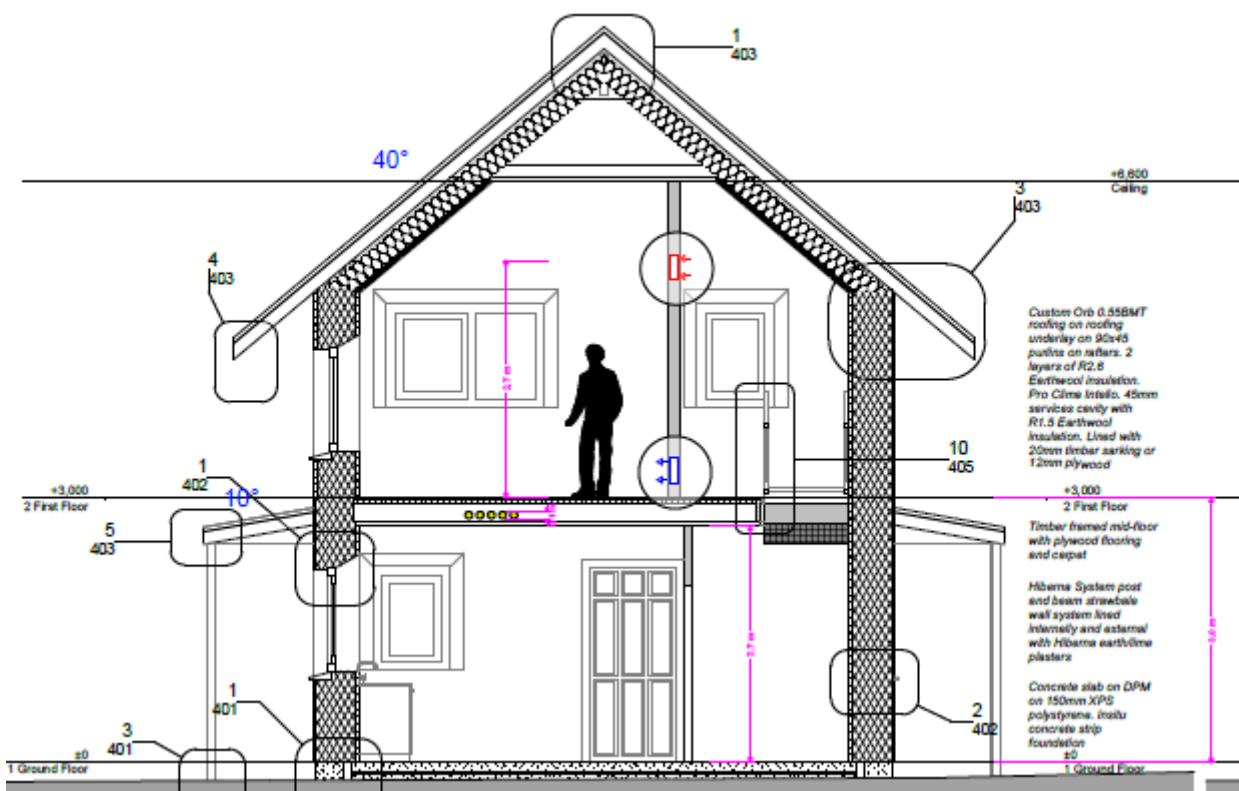
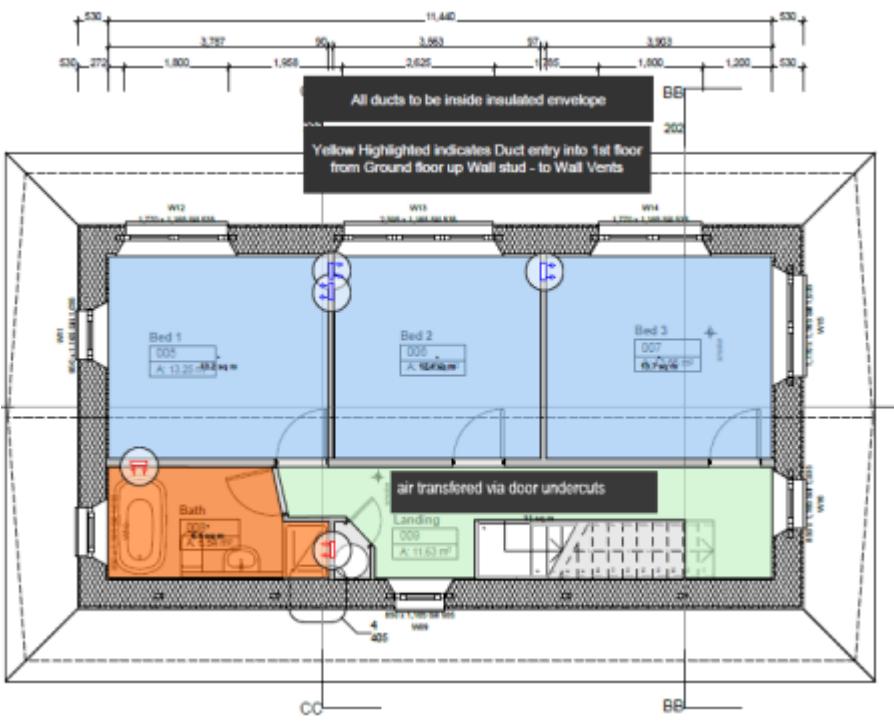
10. MVHR - Lüftungsgerät



Zehnder Q350
86.1%
Pel,spec=0.24 Wh/m³

11. Ventilation ductwork - Lüftungsplanung Kanalnetz





12. Heating systems - Wärmeversorgung

Domestic hot water is heated by an Exceed heat pump. The two radiators are fed from a scavenging coil in the HWC.



Hot water cylinder



Heat pump external unit



Upstairs radiator

13. Building costs - Baukosten

Not provided

14. Publications featuring the building - Literatur

- <https://www.odt.co.nz/lifestyle/resilient/made-straw>

15. PHPP-Ergebnisse

Passive House Verification

Architecture: Hiberna Ltd Street: 10 Pisa Road Postcode/City: 9383 Wanaka Province/Country: Otago NZ-New Zealand	Building: Hiberna Strawbale House Street: 10 Pisa Road RD3 Luggate Postcode/City: 9383 Wanaka Province/Country: Otago NZ-New Zealand		
Mechanical engineer: Hiberna Ltd Street: 10 Pisa Road, RD3 Luggate Postcode/City: 9383 Wanaka Province/Country: Otago NZ-New Zealand	Certification: Sustainable Engineering Ltd Street: 76 Virginia Road Postcode/City: 4500 Whanganui Province/Country: Whanganui NZ-New Zealand		
Energy consultancy: Hiberna Ltd Street: 10 Pisa Road, RD3 Luggate Postcode/City: 9383 Wanaka Province/Country: Otago NZ-New Zealand	Year of construction: 2019 No. of dwelling units: 1 No. of occupants: 2.6	Interior temperature winter [°C]: 20.0 Internal heat gains (IHG) heating case [W/m ²]: 2.5 Specific capacity [Wh/K per m ² TFA]: 180	Interior temp. summer [°C]: 25.0 IHG cooling case [W/m ²]: 2.5 Mechanical cooling:

Specific building characteristics with reference to the treated floor area					
Space heating	Treated floor area m ²	118.4	Criteria	Alternative criteria	Fulfilled?
	Heating demand kWh/(m ² a)	10.53	≤	15	yes
	Heating load W/m ²	12.26	≤	-	-
Space cooling	Cooling & dehum. demand kWh/(m ² a)	-	≤	10	yes
	Cooling load W/m ²	-	≤	-	yes
	Frequency of overheating (> 25 °C) %	0.0	≤	20	yes
	Frequency of excessively high humidity (> 12 g/kg) %	0	≤	0.6	yes
Airtightness	Pressurization test result n ₅₀ 1/h	0.6	≤	-	-
Non-renewable Primary Energy (PE)	PE demand kWh/(m ² a)	76	≤	45	yes
Primary Energy Renewable (PER)	PER demand kWh/(m ² a) Generation of renewable energy (in relation to projected building footprint area)	34 59	≤	34	-
			≥	60	44

² Empty field: Data missing; '-': No requirement

I 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 verification.					
Task: 2-Certifier	First name: Jason	Surname: Quinn	Passive House Plus? yes	Signature: 	
Certificate ID: 25149_SENZ_PH_20200114_JEQ	Certificate ID: 14/01/20	Issued on: Whanganui	City: 		