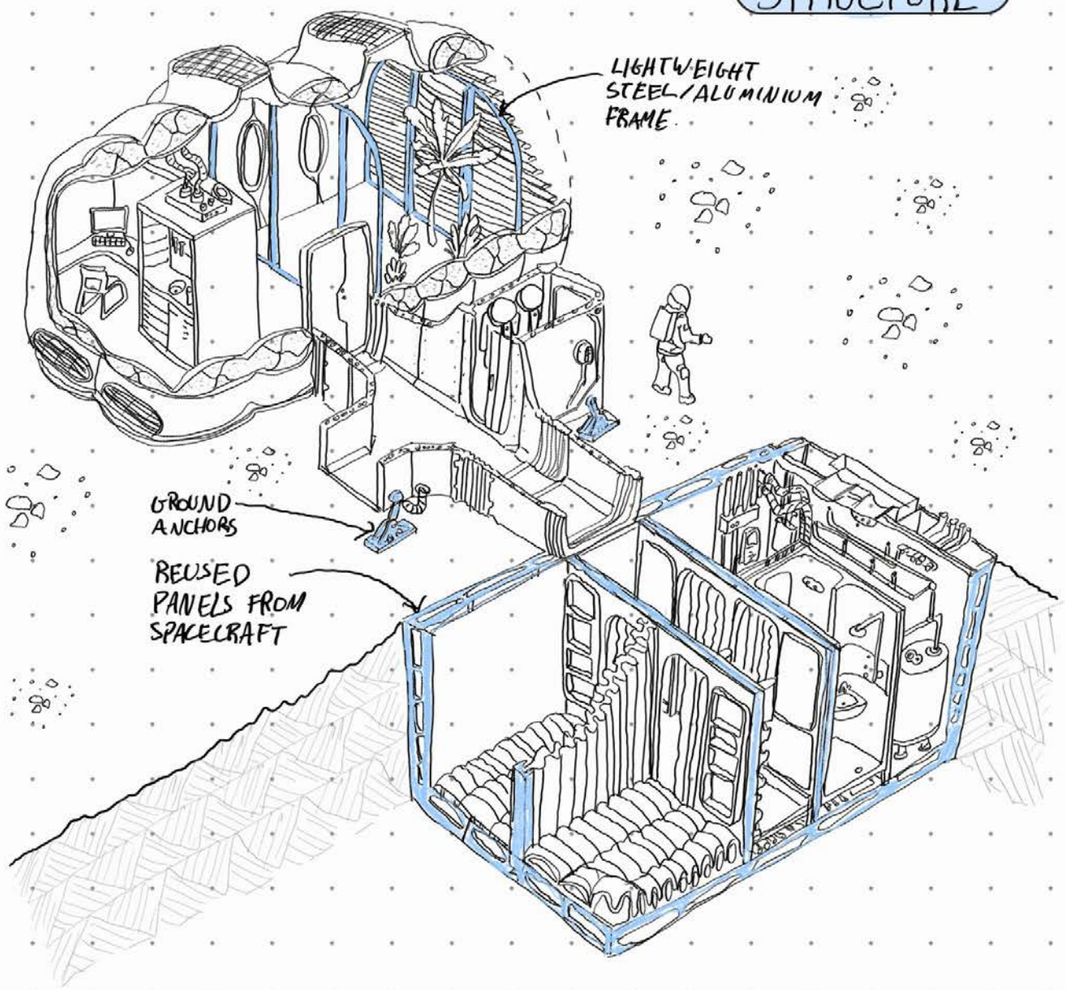
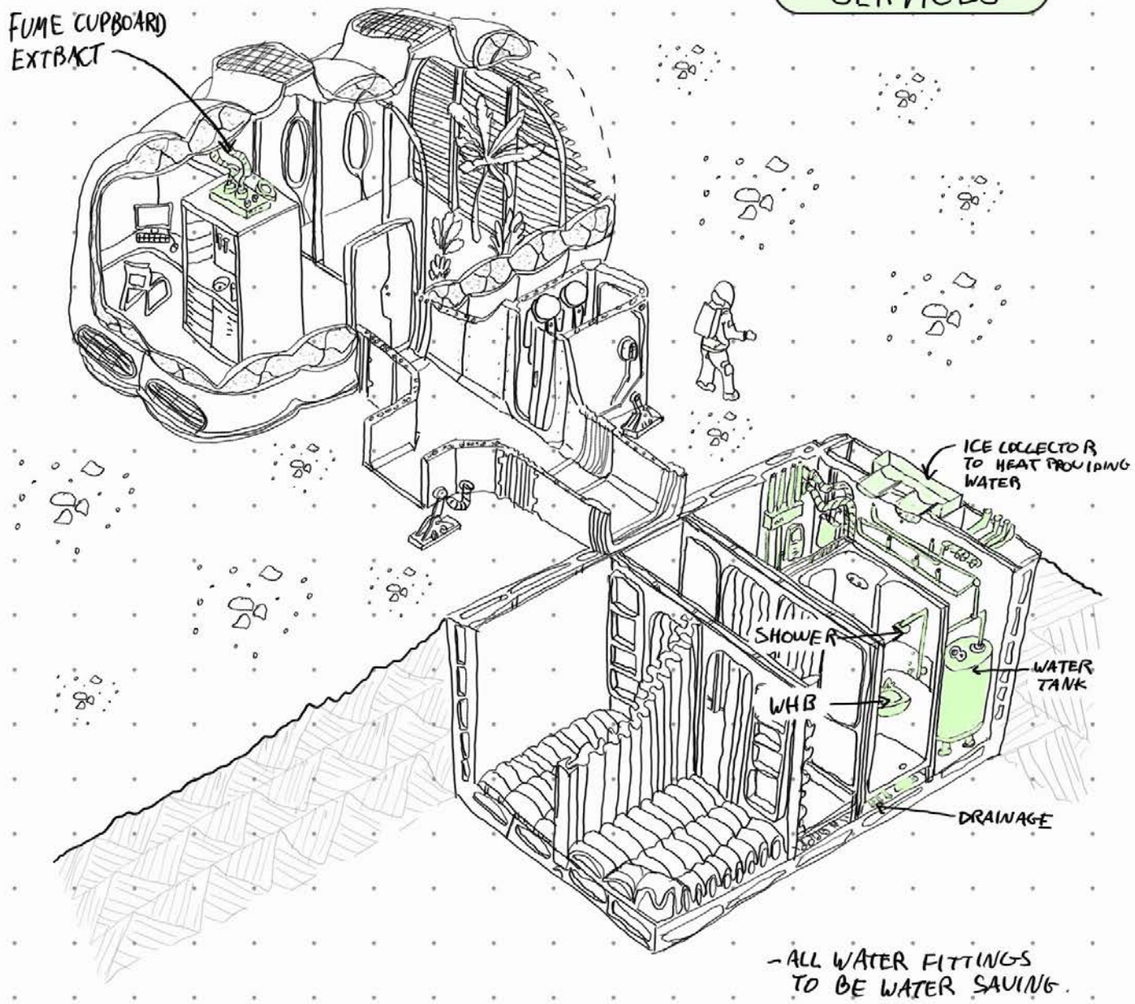
STRUCTURE



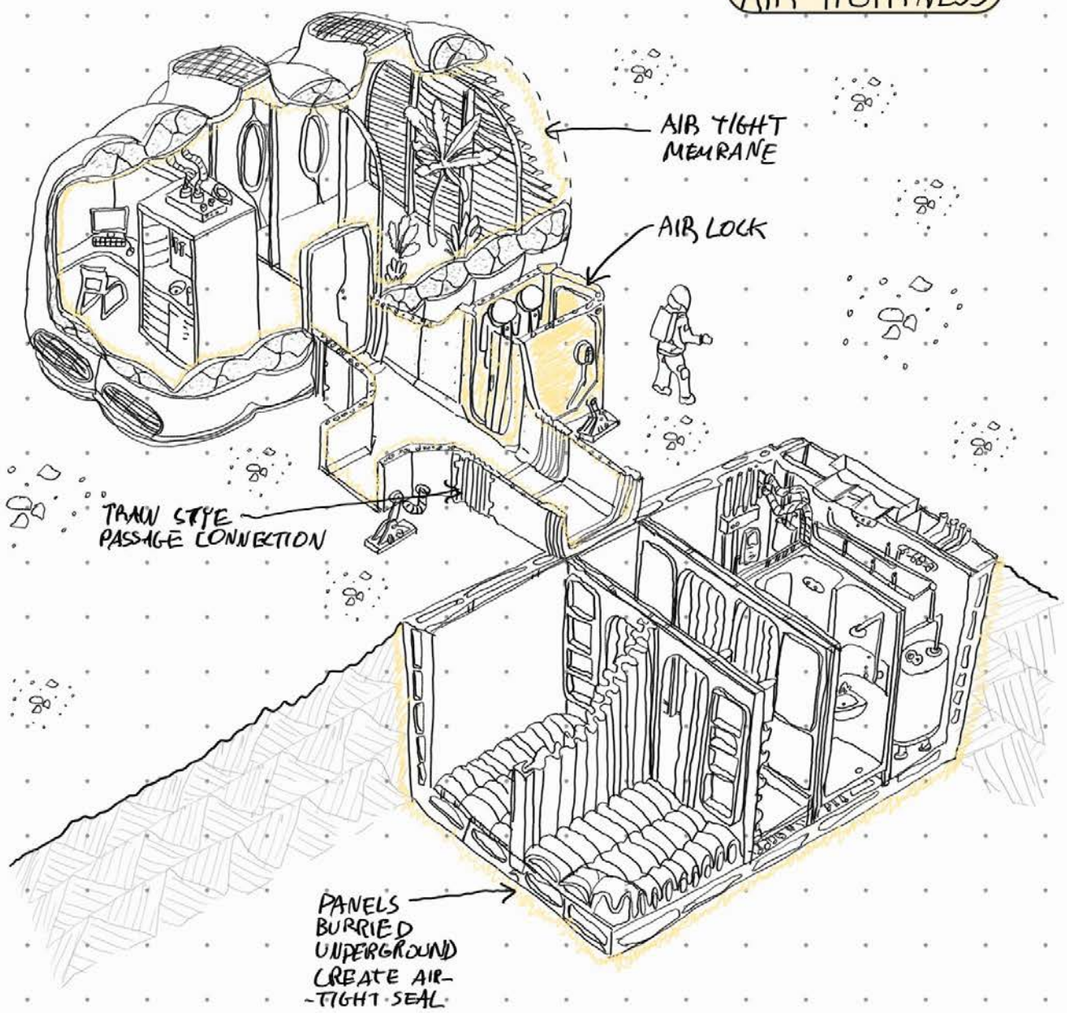
SERVICES



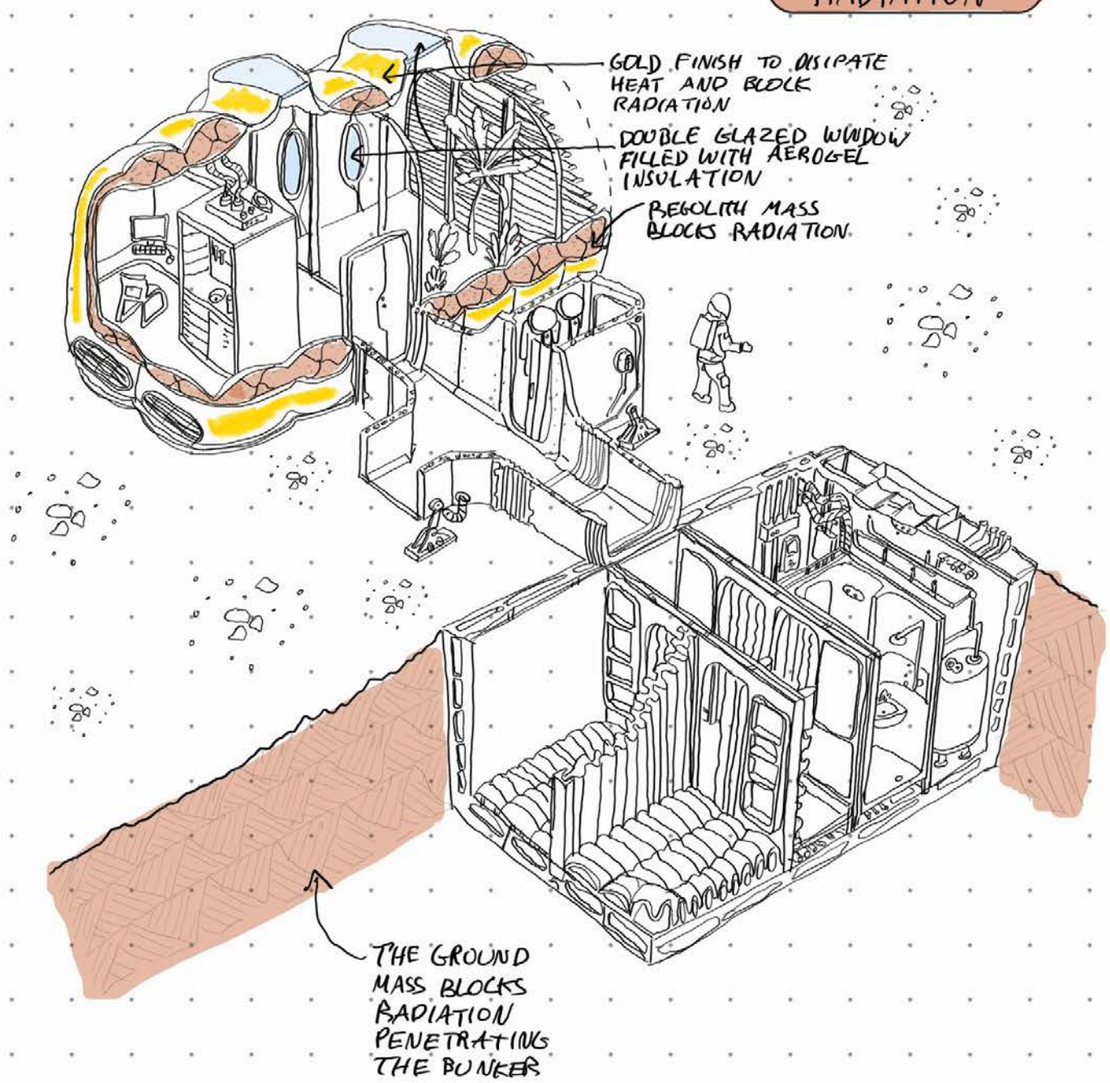
- ALL WATER FITTINGS TO BE WATER SAVING.
- VACUME DRAINAGE SYSTEM.

The Martian House 3D sketch study

AIR-TIGHTNESS

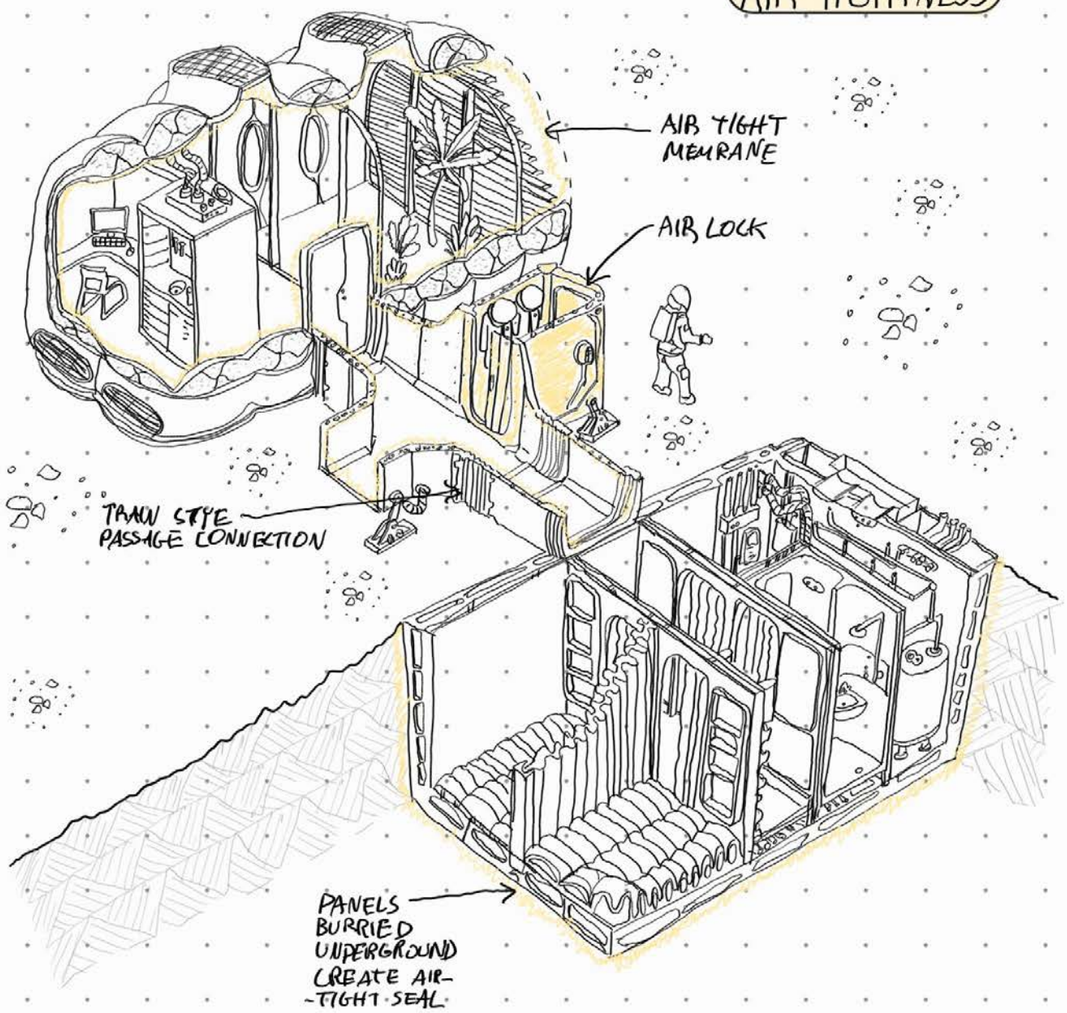


RADIATION

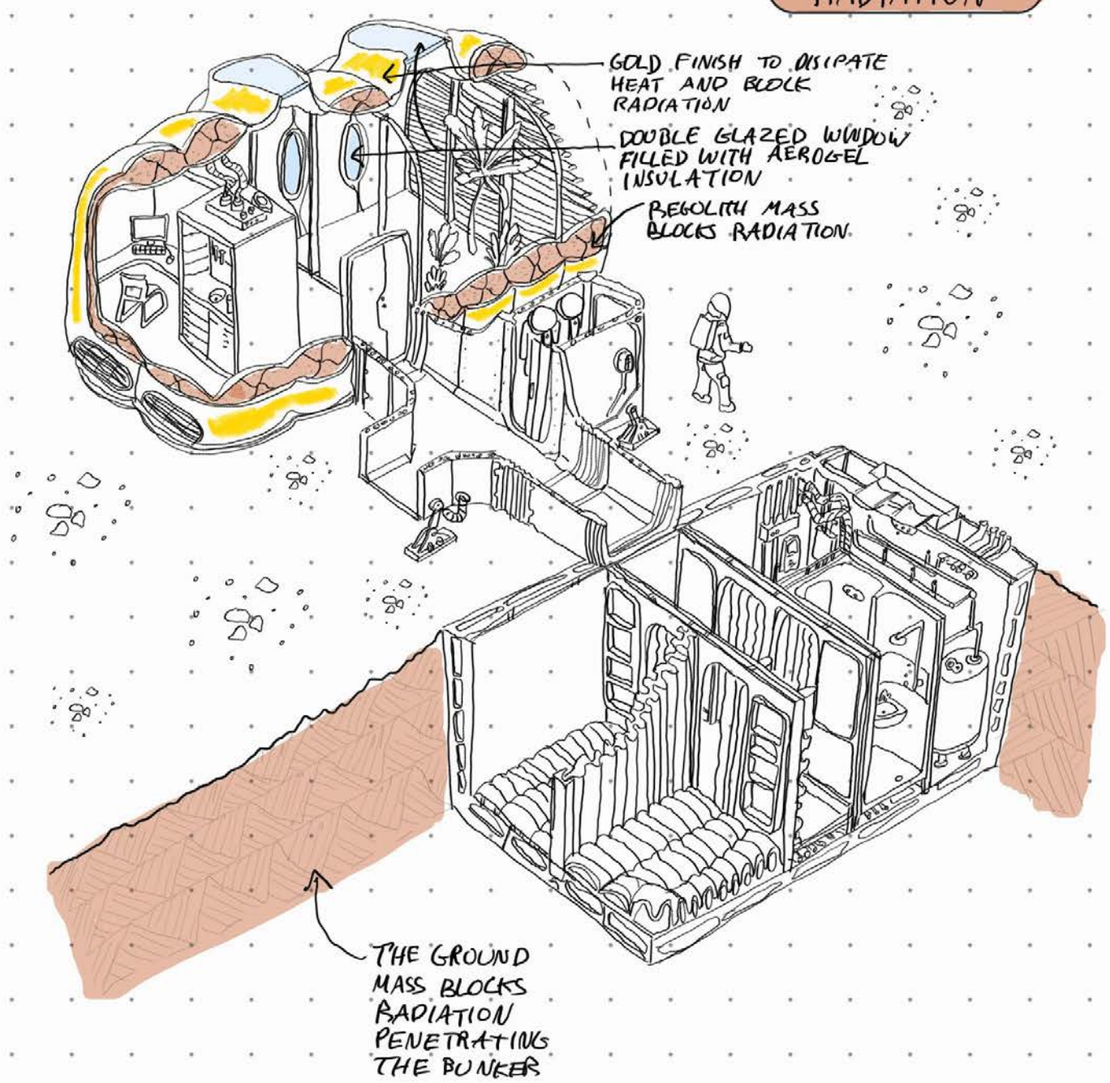


The Martian House 3D sketch study

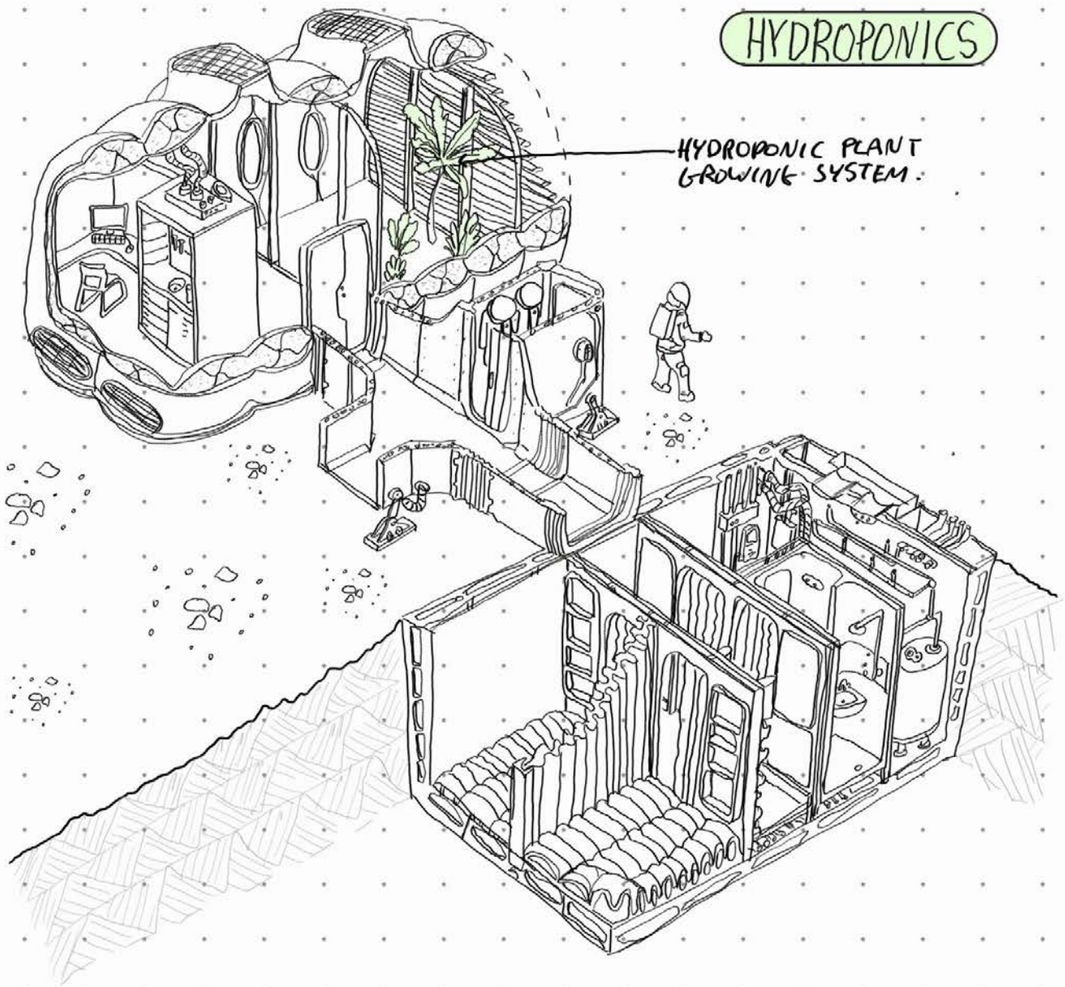
AIR-TIGHTNESS

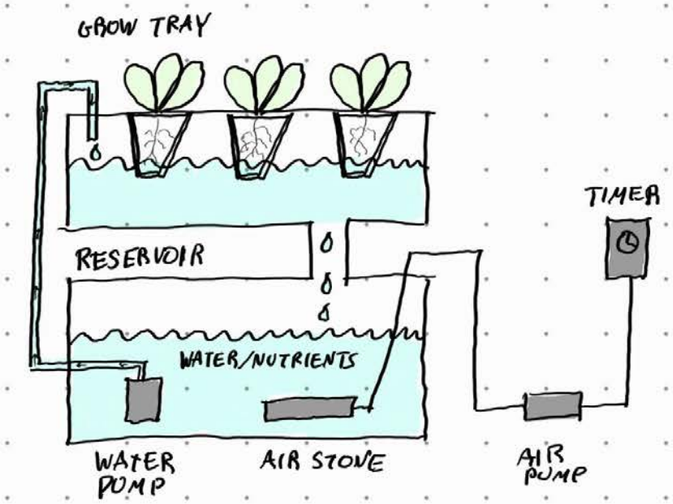


RADIATION

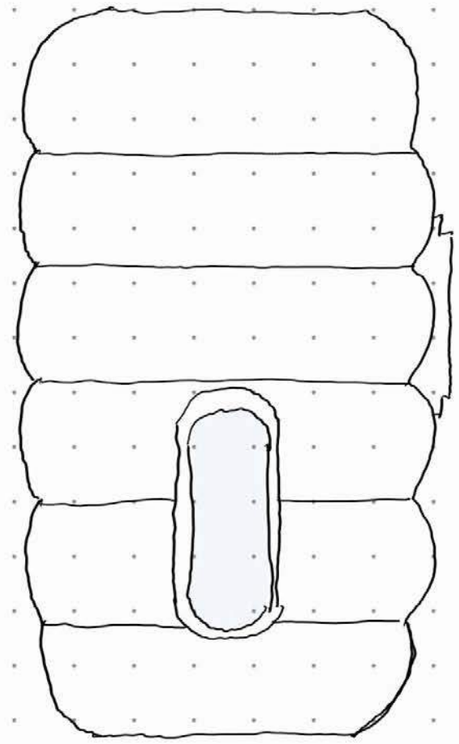


The Martian House 3D sketch study

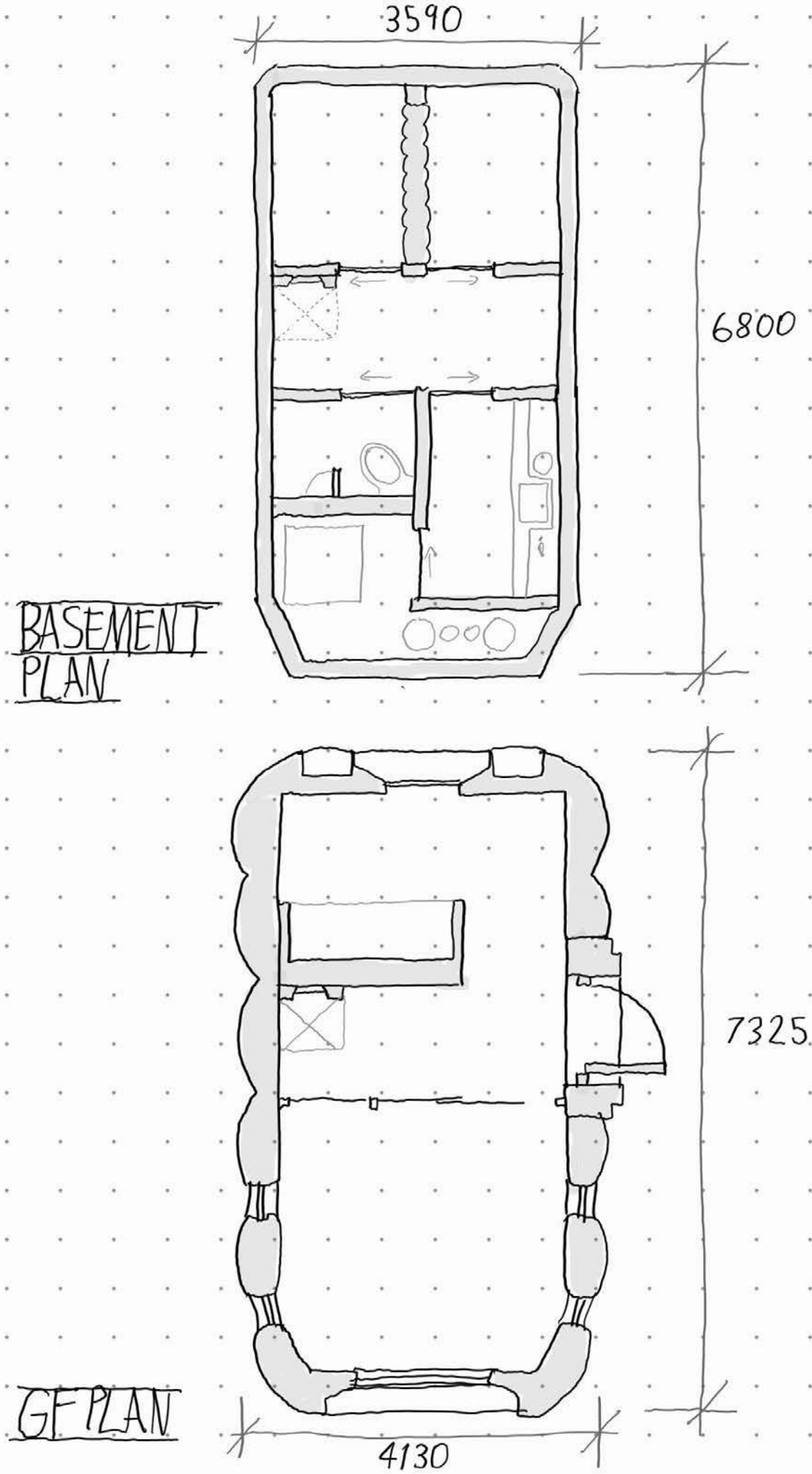


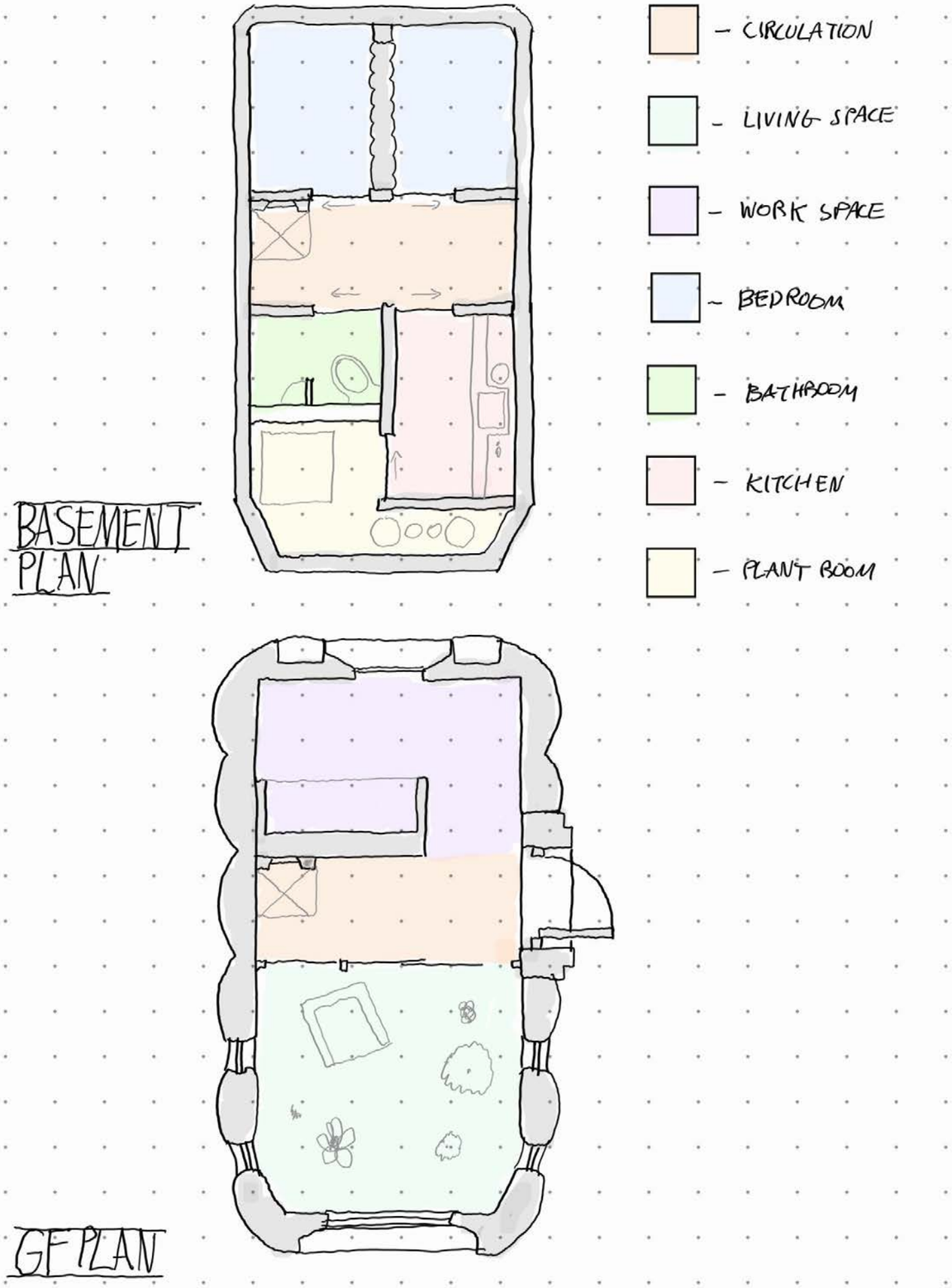


HYDROPONICS SYSTEM

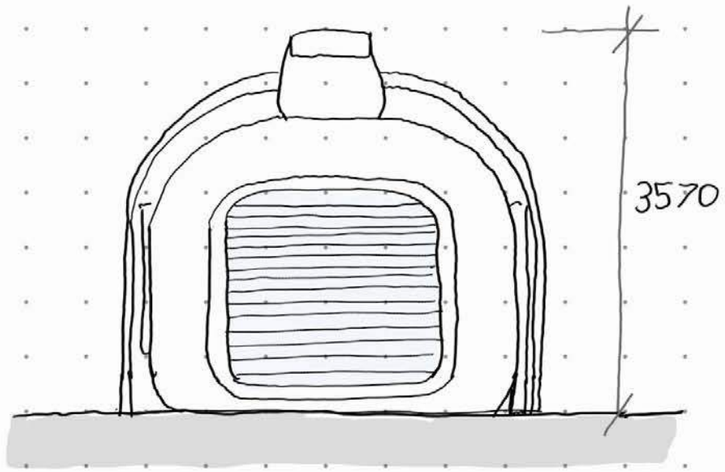


ROOF PLAN

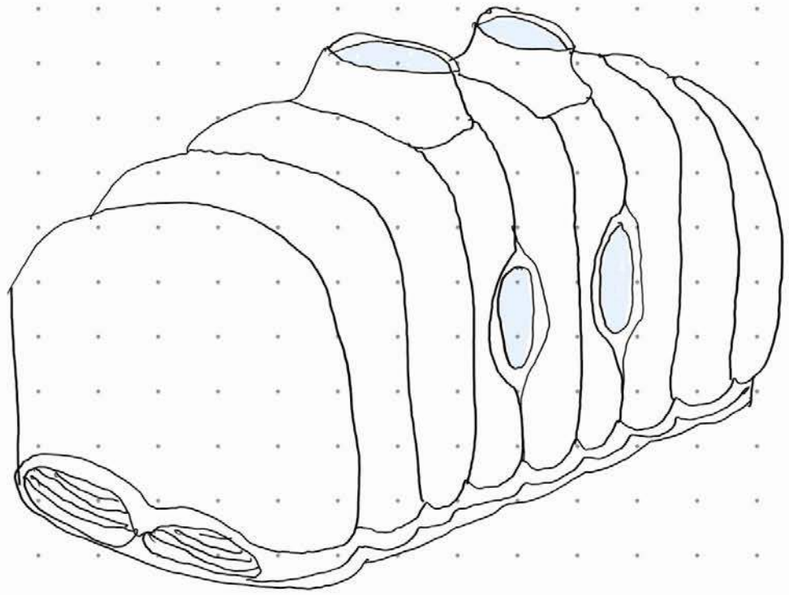




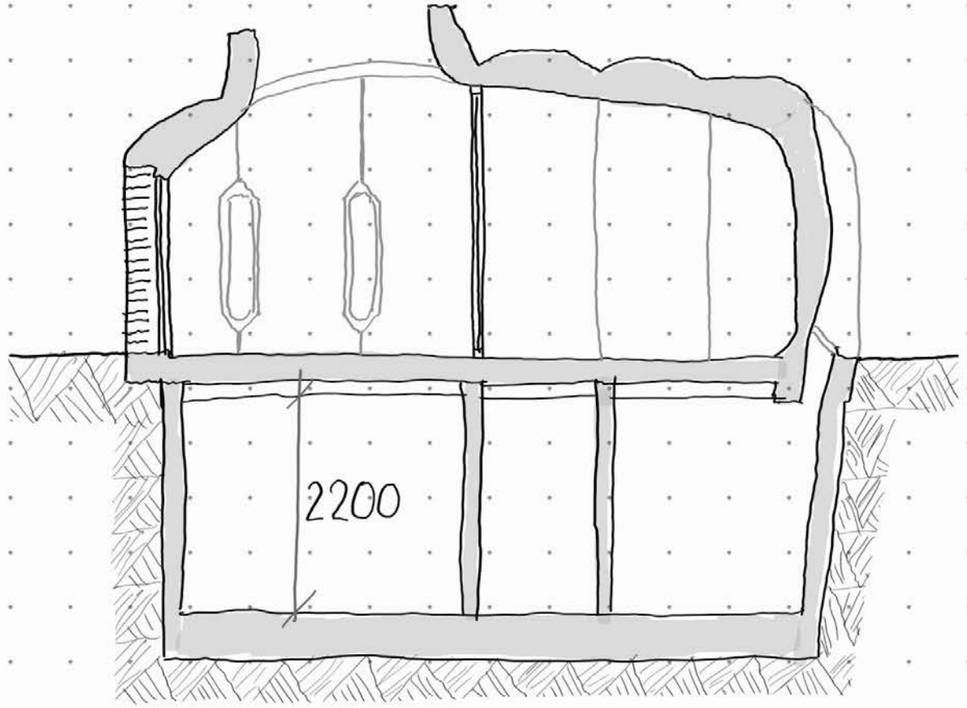
The Martian House plans



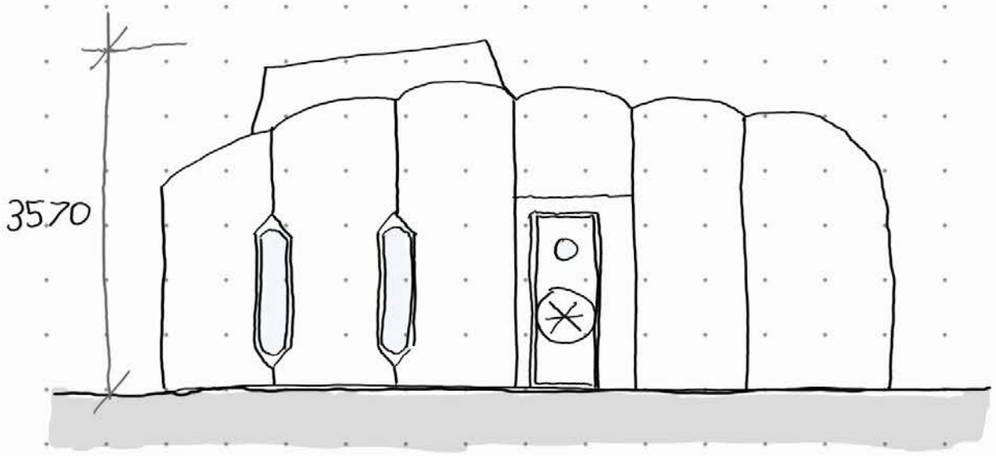
ELEVATION



3D



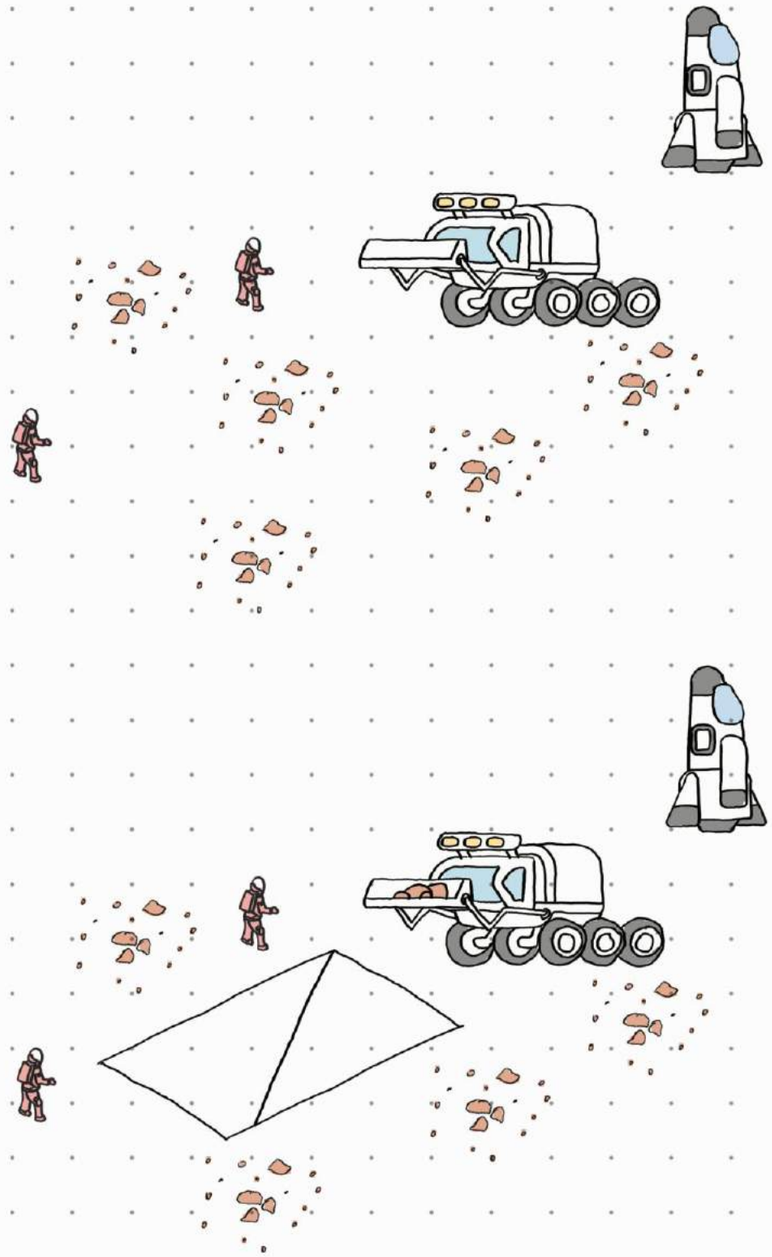
SECTION



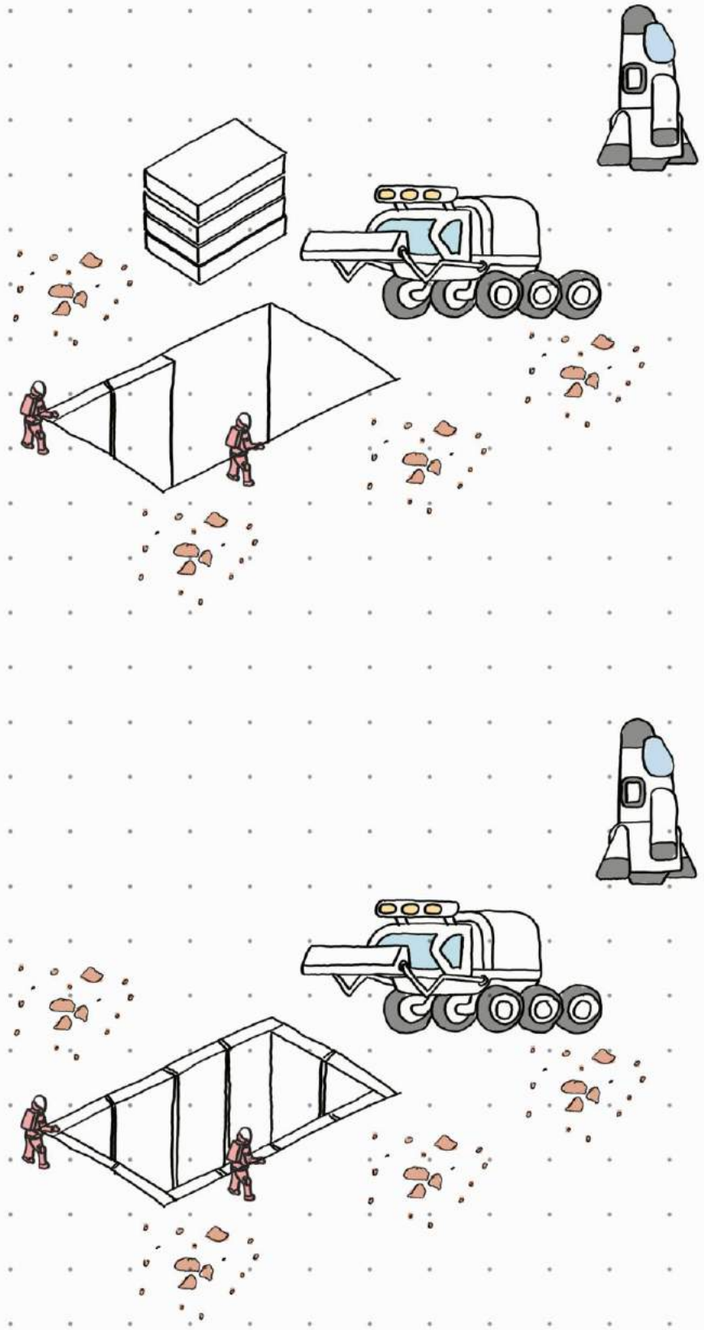
ELEVATION

The Martian House elevation & 3D

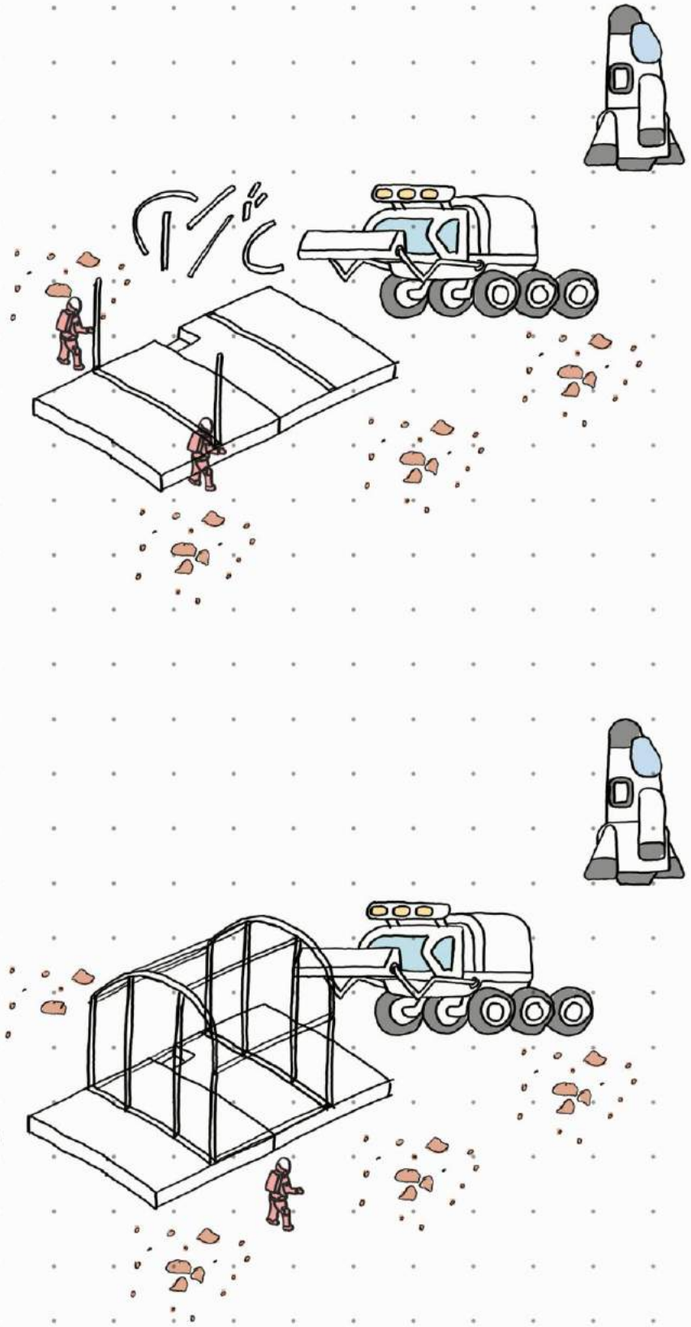
The Martian House section & elevation



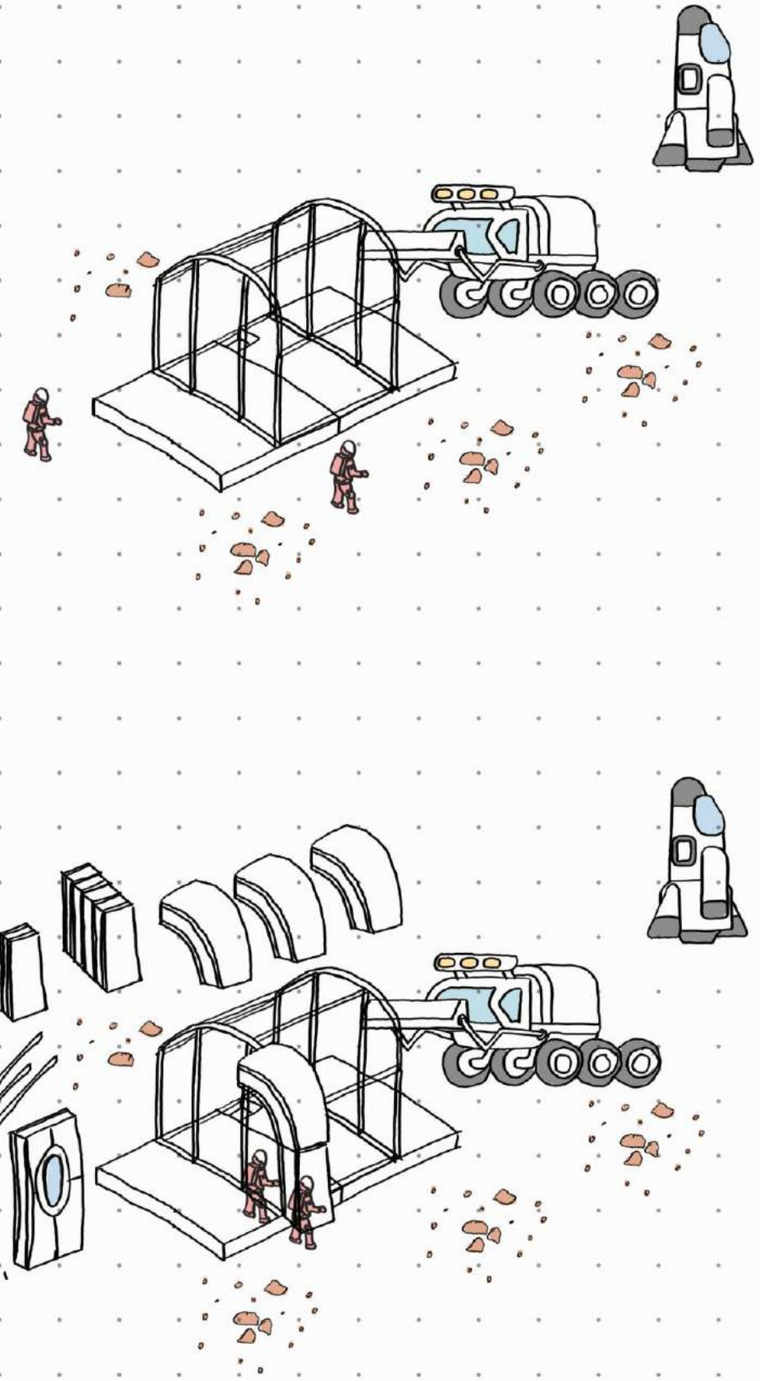
Martian house proposed modular construction sequence



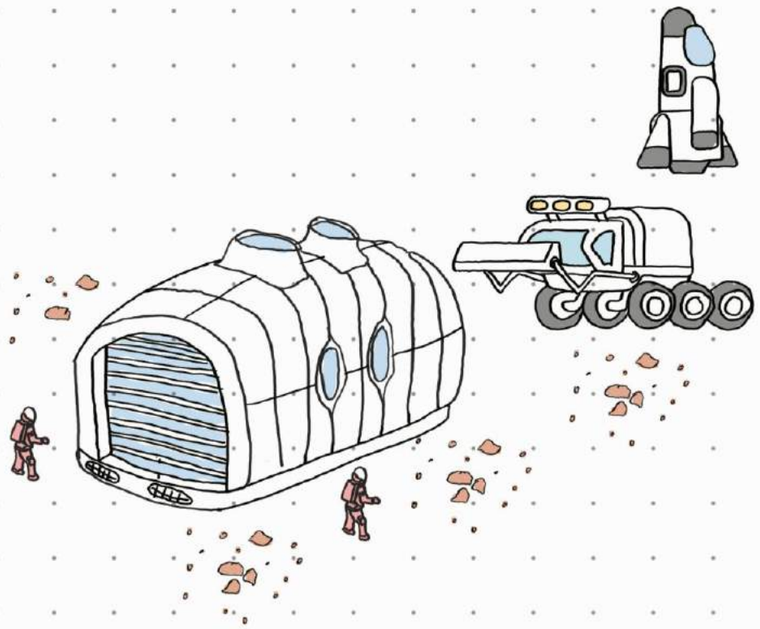
Martian house proposed modular construction sequence



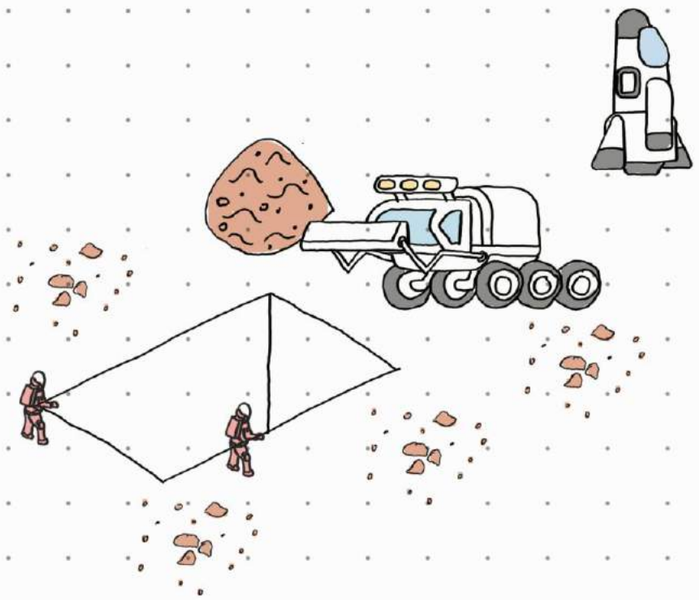
Martian house proposed modular construction sequence

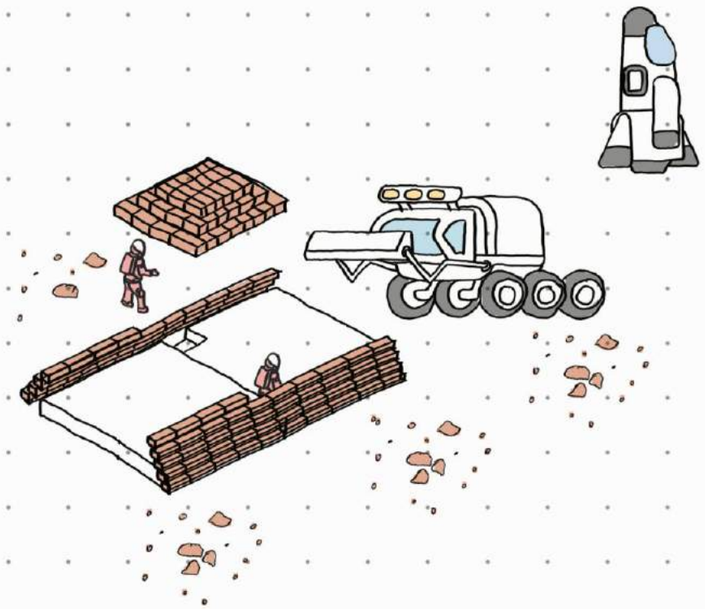


Martian house proposed modular construction sequence

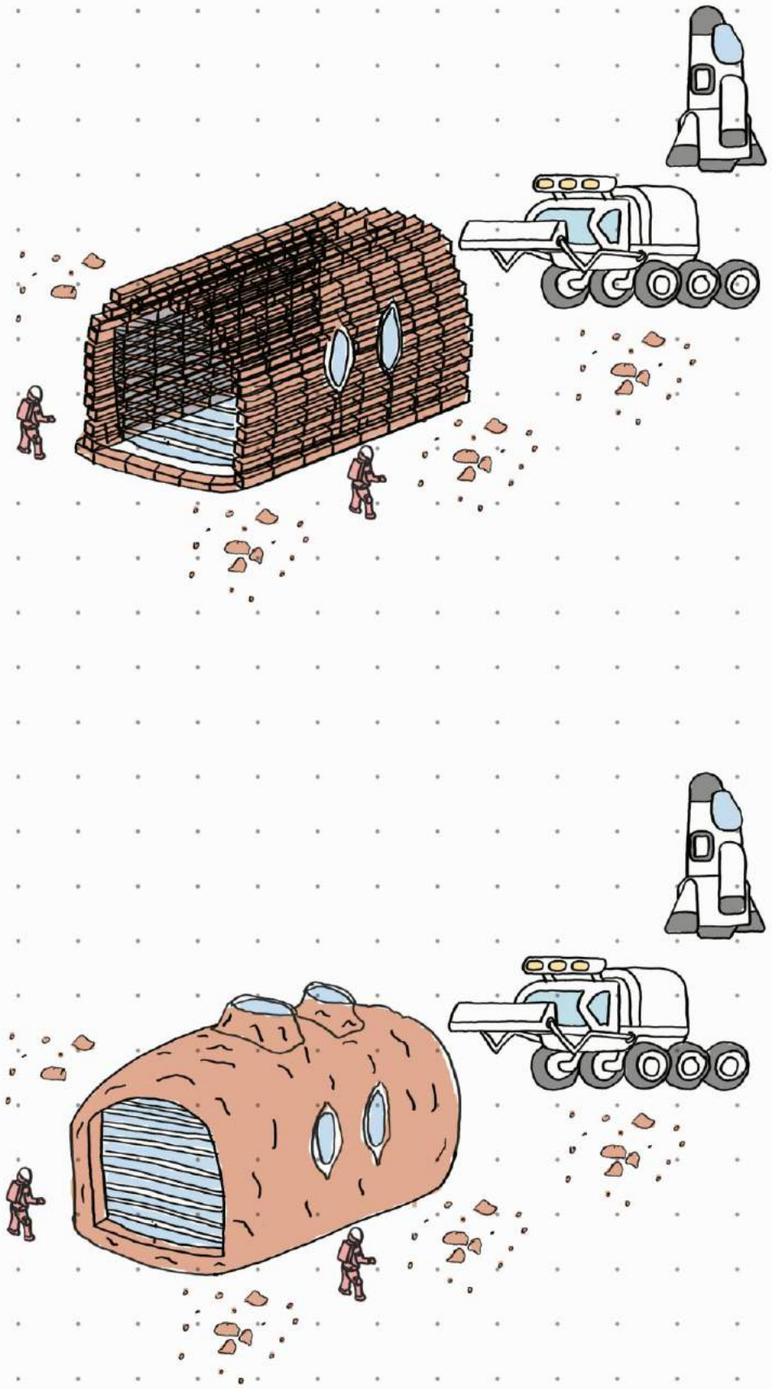


Martian house proposed modular construction sequence

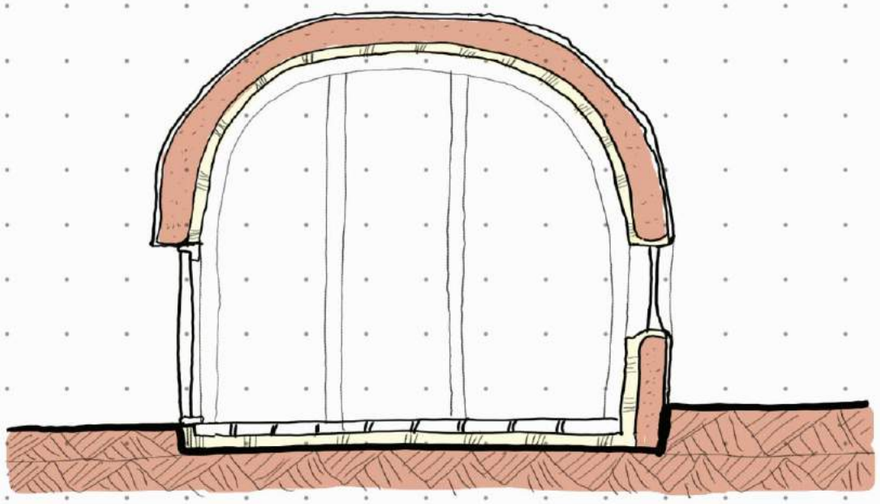




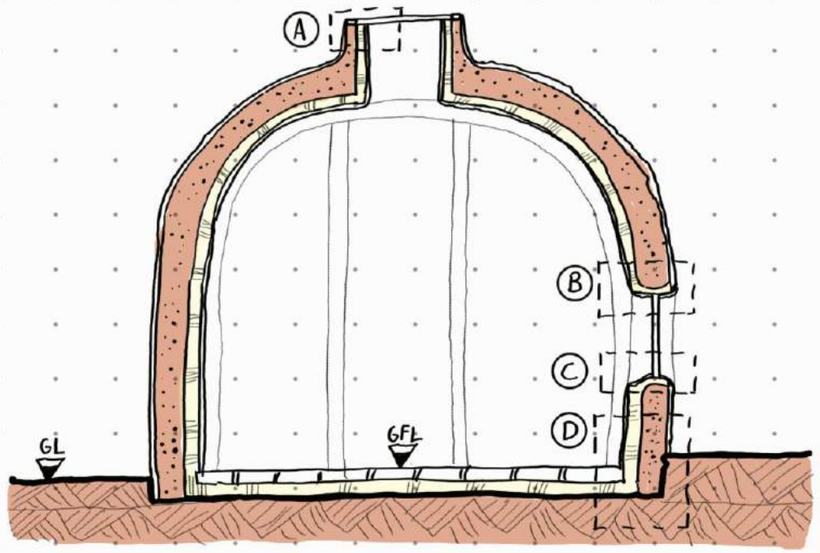
Martian house proposed on-site materials construction sequence

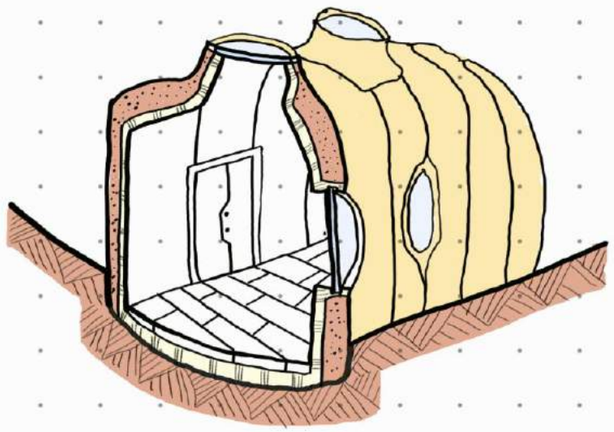


Martian house proposed on-site materials construction sequence

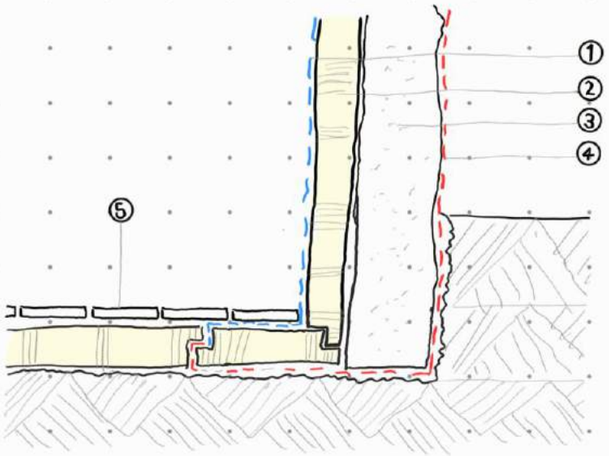


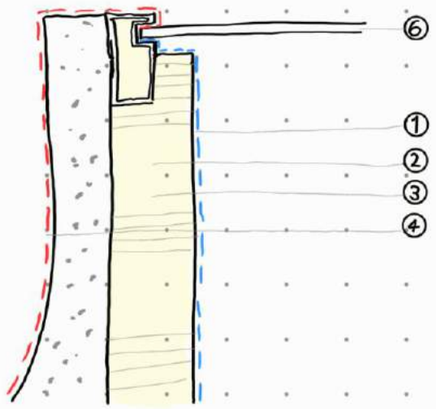
Martian house 2D section



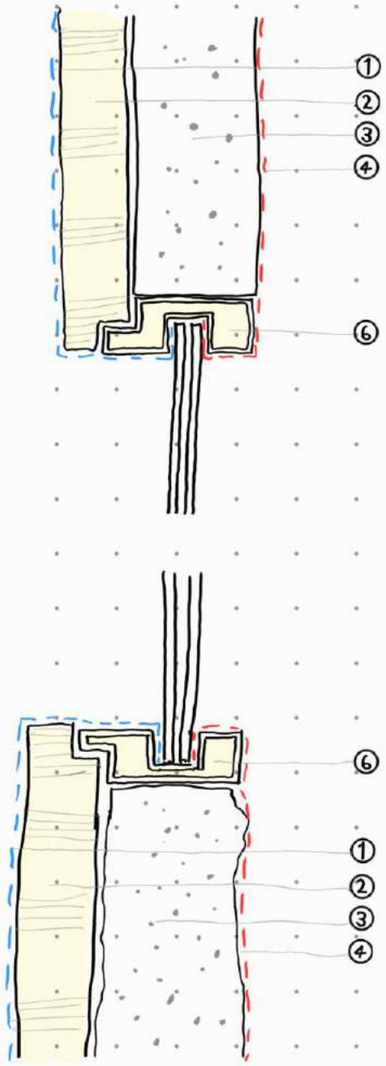


Martian house 2D and 3D section





Martian house proposed wall-floor and rooflight connection details



Martian house proposed 2D window head/cill details

OSOYOOS HEAT LOSS

AREA
TOTAL AREA = 8.72 m^2
WINDOW AREA = 0.81 m^2
PANEL AREA = 7.91 m^2

TEMPERATURE
OUT = 32°C (HIGH) -4°C (LOW)
IN = 20°C

U-VALUE
WINDOW = 1.2 Wm^2K
PANEL = 0.21 Wm^2K

SUMMER

FABRIC

$7.91 \times 0.21 \times (20-32) =$
$7.91 \times 0.21 \times 12 = 19.93\ W$

WINDOW

$0.81 \times 1.2 \times 12 = 11.66\ W$

$19.93 + 11.66 = \boxed{31.59\ W}$

WINTER

FABRIC

$7.91 \times 0.21 \times (20-(-4)) =$
$7.91 \times 0.21 \times 24 = 39.87 W$

WINDOW

$0.81 \times 1.2 \times 24 = 23.33\ W$

$23.33 + 31.59 = \boxed{54.92\ W}$

RAMMED EARTH CONDUCTIVITY = 1.25 W/K

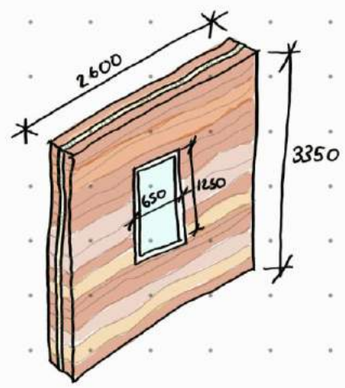
$0.250 \div 1.25 = 0.2$

$0.100 \div 0.023 = 4.35$

$0.250 \div 1.25 = 0.2$

4.75

$\frac{1}{4.75} = \boxed{0.21\ Wm^2K}$



HALLEY VI PANEL HEAT LOSS

(m²) (W/m²K) (°C) (W)

AREA X U-VALUE X TEMPERATURE DIFFERENCE = HEAT LOSS

SUMMER

FABRIC

7.91 X 0.113 X (20-6) =
7.91 x 0.113 x 20 = 17.88W

WINDOW

0.81 x 1.0 x 20 = 16.2W

17.88 + 16.2 = **34.08 W**

WINTER

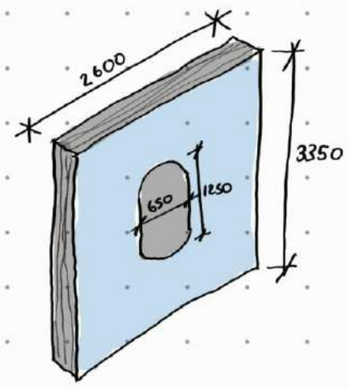
FABRIC

7.91 X 0.113 X (20-(-28)) =
7.91 x 0.113 x 48 = 42.9W

WINDOW

0.81 x 1.0 x 48 = 38.88W

42.9 + 38.88 = **81.78 W**



AREA
TOTAL AREA = 8.72 m²
WINDOW AREA = 0.81 m²
PANEL AREA = 7.91 m²

TEMPERATURE
OUT = 0°C (HIGH) -28°C (LOW)
IN = 20°C

U-VALUE
WINDOW = 1 W/m²K
PANEL = 0.113 W/m²K

MARS HEAT LOSS

FABRIC

7.91 X 0.12 X (20-(-65)) =
7.91 x 0.12 x 85 = 80.68 W

WINDOW

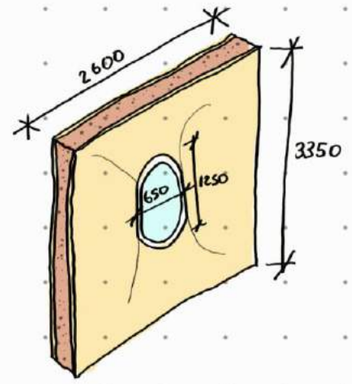
0.81 x 1.2 x 85 = 82.62 W

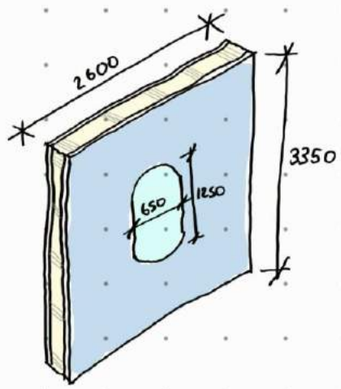
80.68 + 82.62 = **163.3 W**

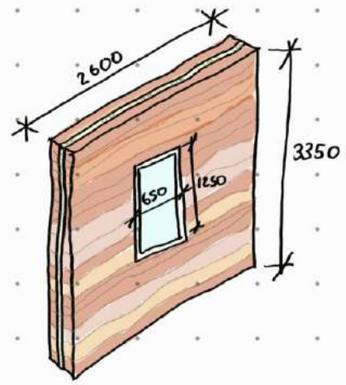
AREA
TOTAL AREA = 8.72 m²
WINDOW AREA = 0.81 m²
PANEL AREA = 7.91 m²

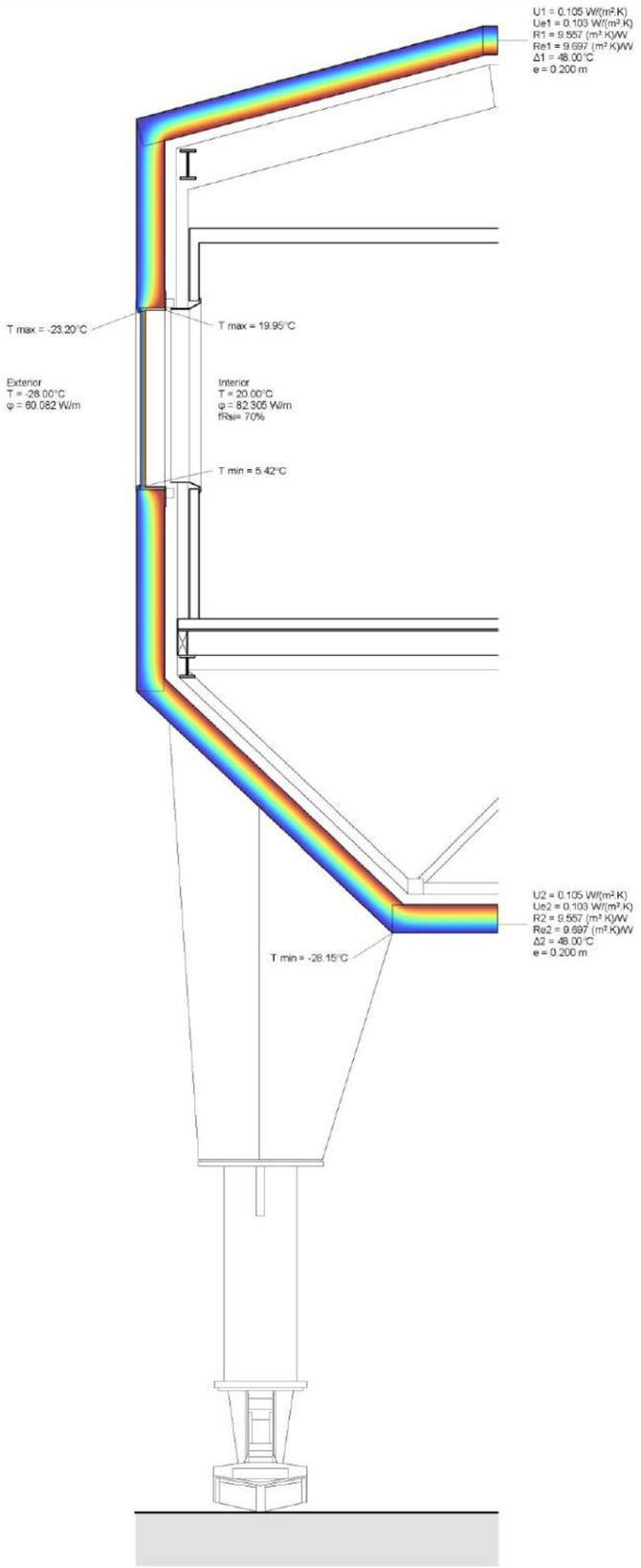
TEMPERATURE
OUT = -65°
IN = 20°C

U-VALUE
WINDOW = 1.2 W/m²K
PANEL = 0.12 W/m²K

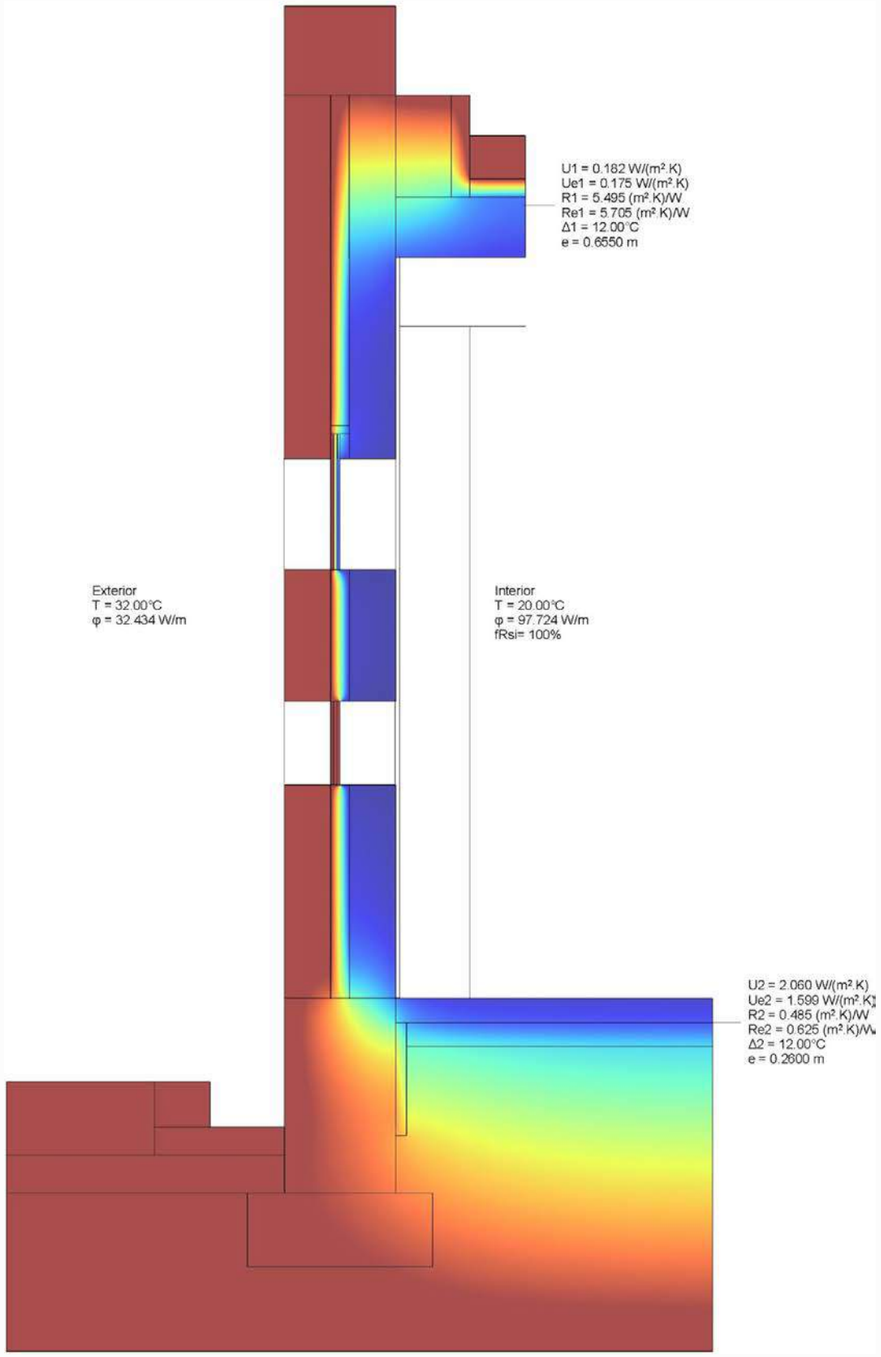




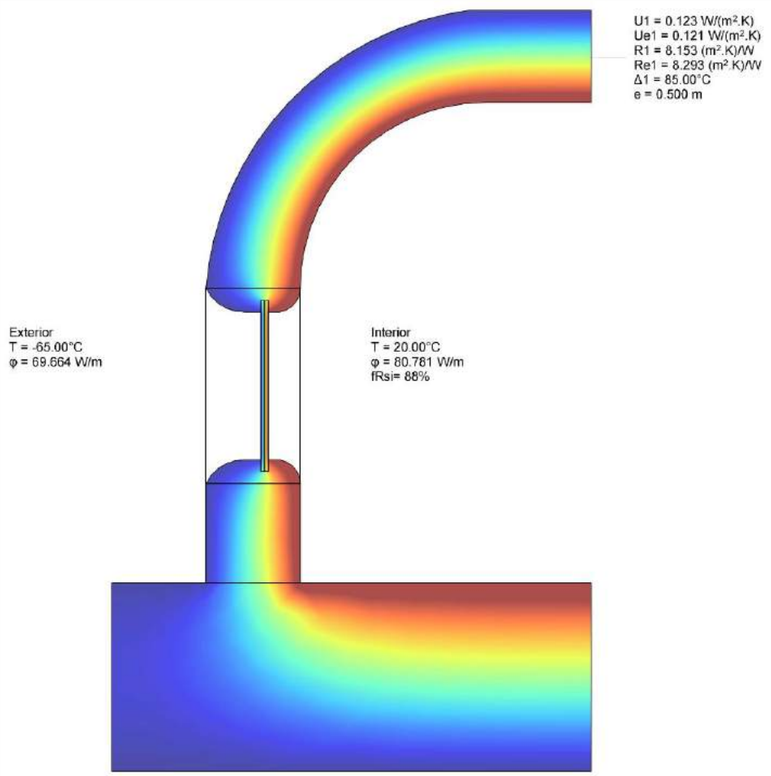




Halley VI 1:20 Section Thermal Analysis



Osoyoos desert centre 1:20 section thermal analysis



Martian house 1:20 section thermal analysis

Specific Demands with Reference to the Treated Floor Area

Treated Floor Area: 164,0 m²

	Applied:	Monthly Method	PH Certificate:	Fulfilled?
Specific Space Heat Demand:	157	kWh/(m²a)	15 kWh/(m²a)	No
Pressurization Test Result:	0,1	h⁻¹	0,6 h⁻¹	Yes
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):		kWh/(m²a)	120 kWh/(m²a)	
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):		kWh/(m²a)		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:		kWh/(m²a)		
Heating Load:		W/m²		
Frequency of Overheating:	0	%	over 25 °C	
Specific Useful Cooling Energy Demand:		kWh/(m²a)	15 kWh/(m²a)	
Cooling Load:		W/m²		

Halley VI PHPP Results

Specific Demands with Reference to the Treated Floor Area

Treated Floor Area: 164,0 m²

	Applied:	Monthly Method	PH Certificate:	Fulfilled?
Specific Space Heat Demand:	370	kWh/(m²a)	15 kWh/(m²a)	No
Pressurization Test Result:	0,1	h⁻¹	0,6 h⁻¹	Yes
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):		kWh/(m²a)	120 kWh/(m²a)	
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):		kWh/(m²a)		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:		kWh/(m²a)		
Heating Load:		W/m²		
Frequency of Overheating:	0	%	over 25 °C	
Specific Useful Cooling Energy Demand:		kWh/(m²a)	15 kWh/(m²a)	
Cooling Load:		W/m²		

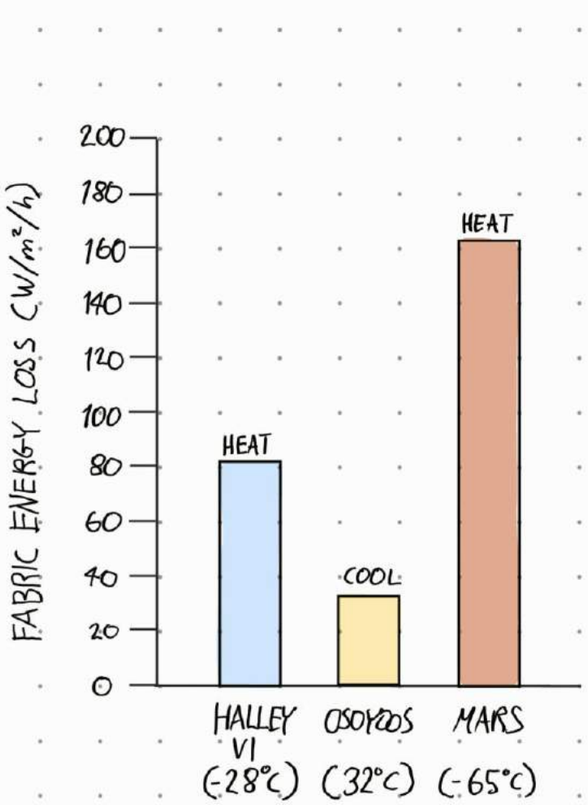
Martian House PHPP Results

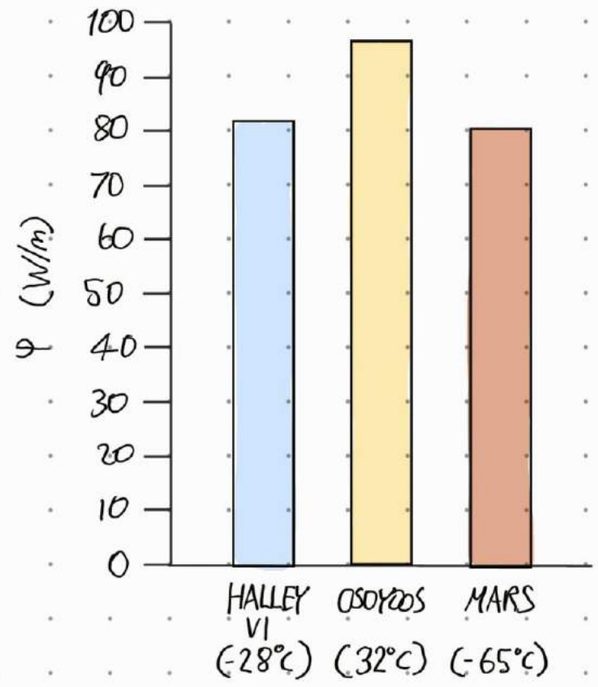
Specific Demands with Reference to the Treated Floor Area

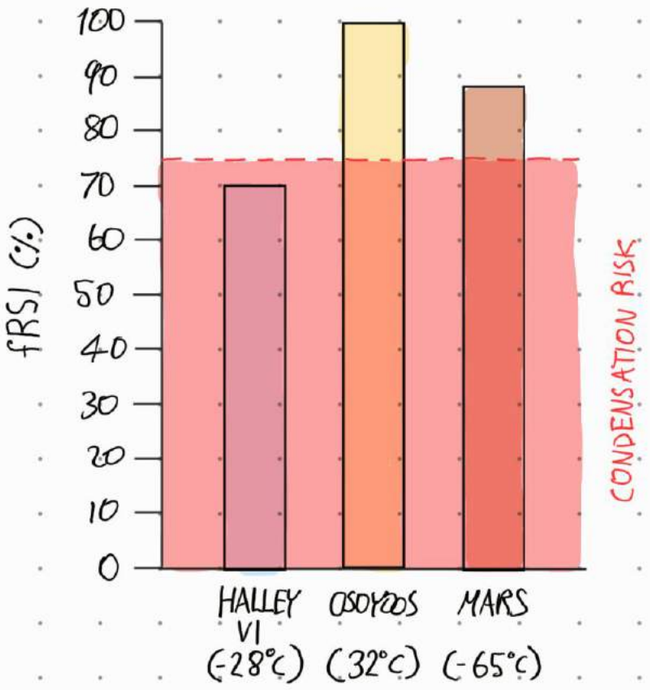
Treated Floor Area: 164,0 m²

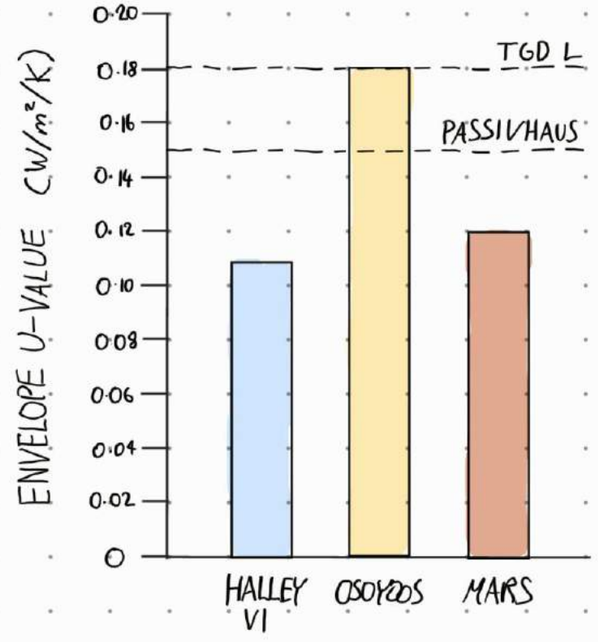
	Applied:	Monthly Method	PH Certificate:	Fulfilled?
Specific Space Heat Demand:	192	kWh/(m²a)	15 kWh/(m²a)	No
Pressurization Test Result:	0,1	h⁻¹	0,6 h⁻¹	Yes
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):		kWh/(m²a)	120 kWh/(m²a)	
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):		kWh/(m²a)		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:		kWh/(m²a)		
Heating Load:		W/m²		
Frequency of Overheating:		%	over 25 °C	
Specific Useful Cooling Energy Demand:		kWh/(m²a)	15 kWh/(m²a)	
Cooling Load:		W/m²		

Osoyoos desert centre PHPP Results

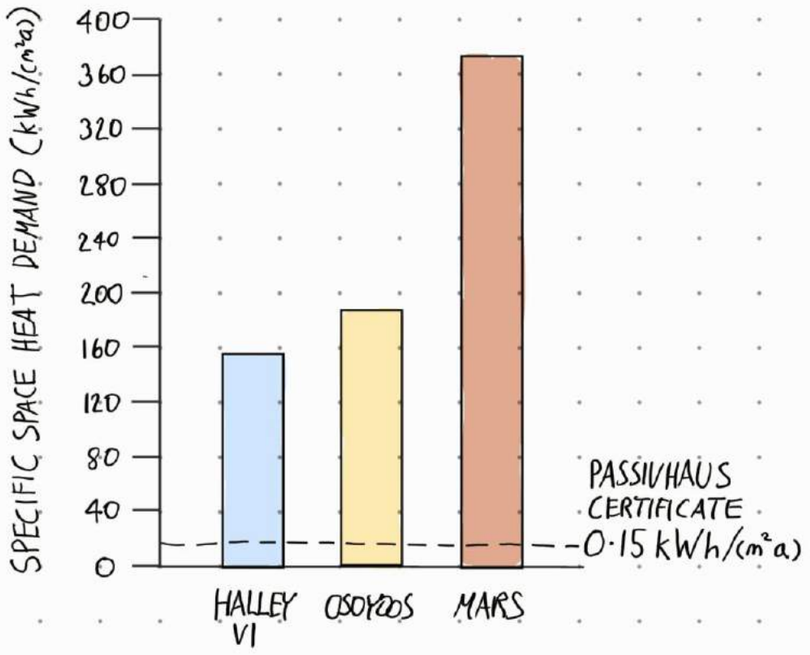




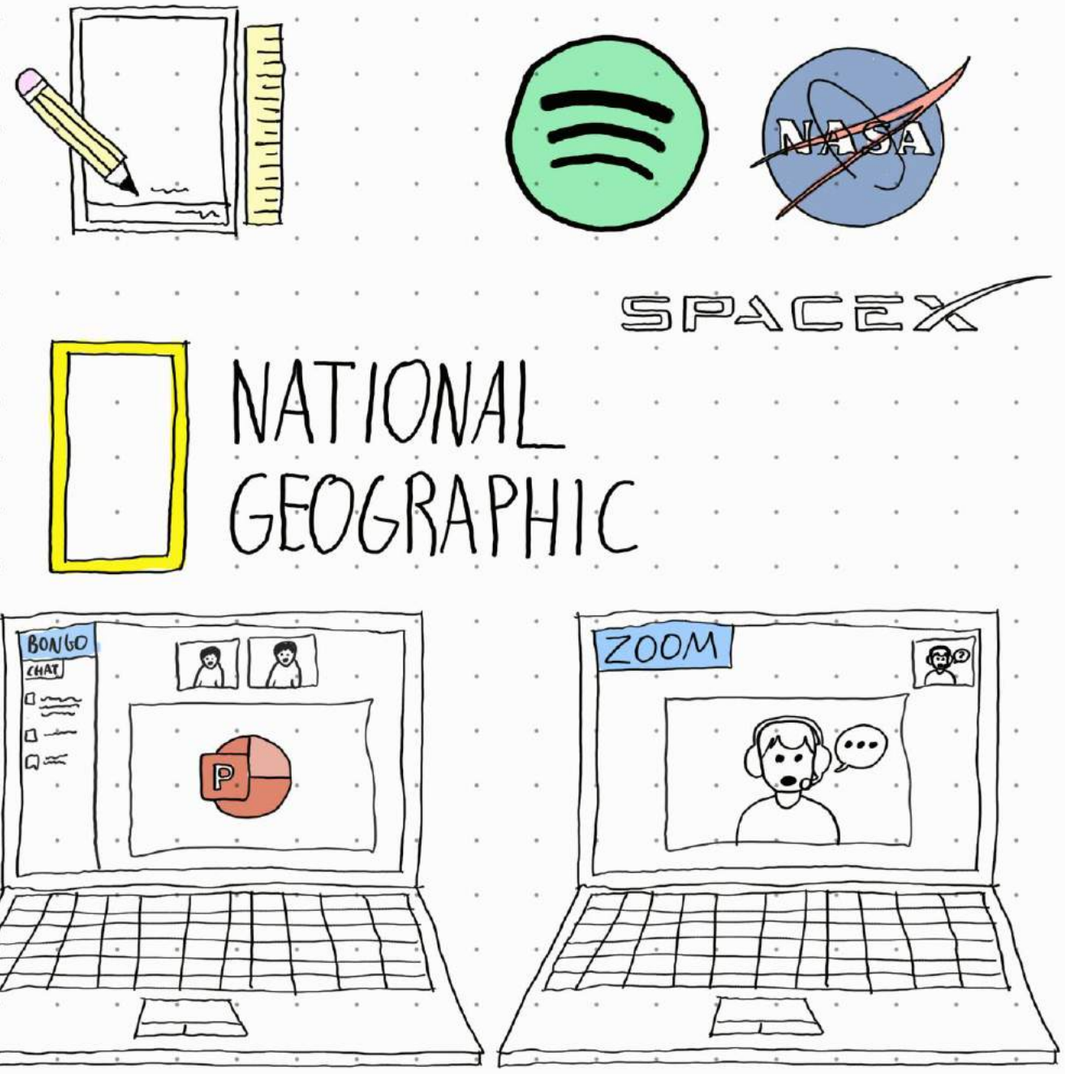




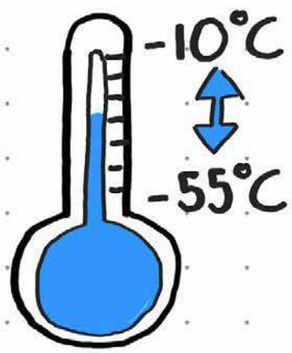
External envelope analysis graphs

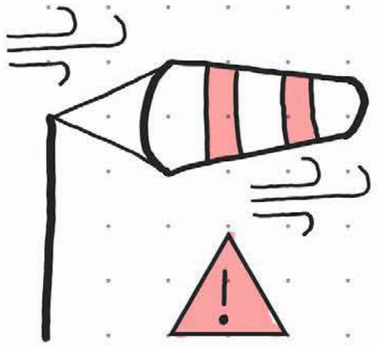


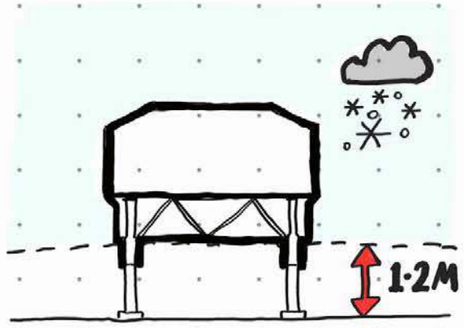
PHPP analysis graph



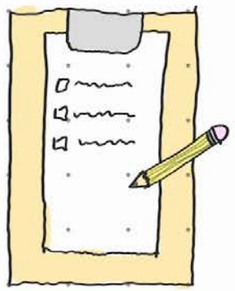
Infographic icon sketches

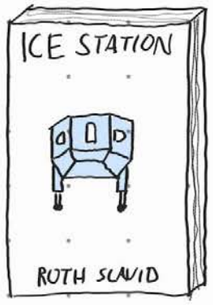


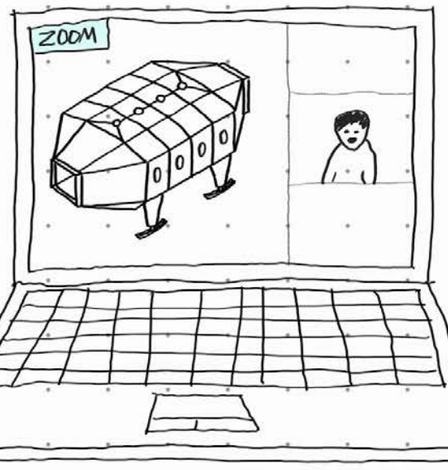




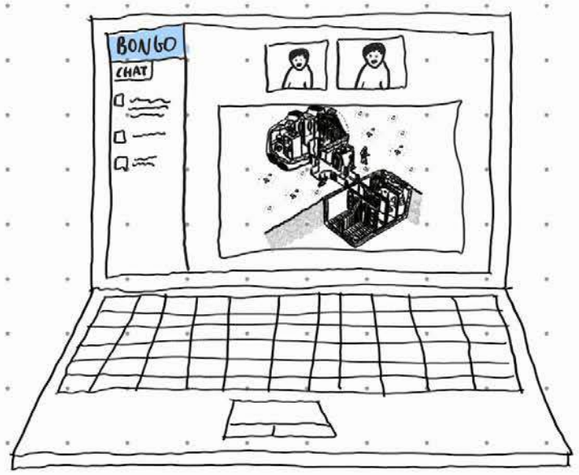
TED

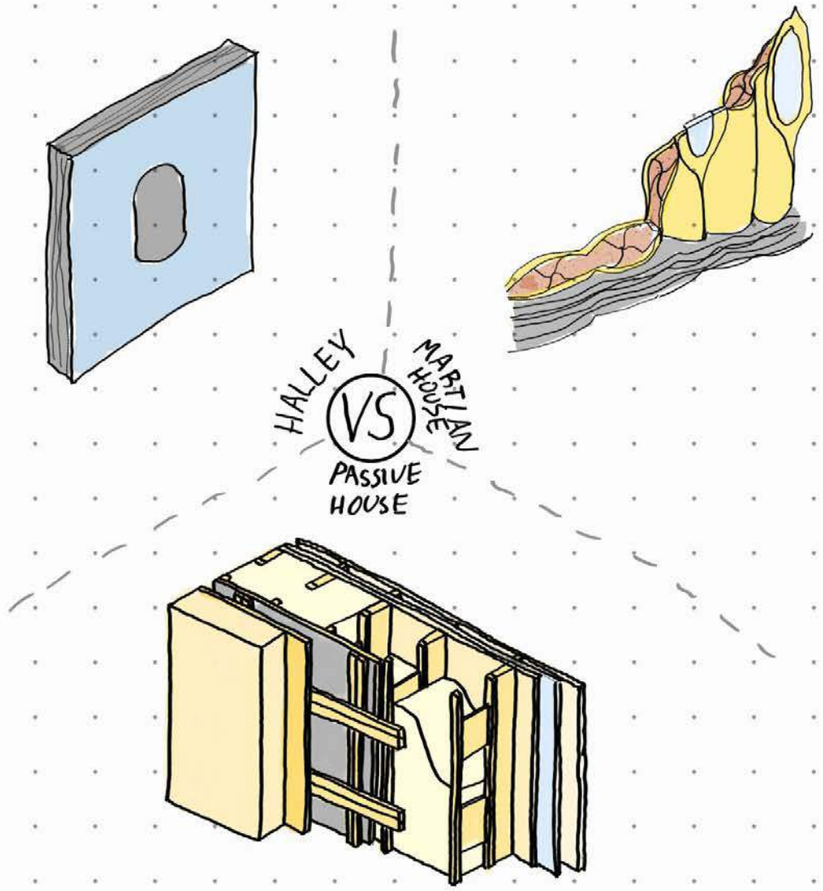




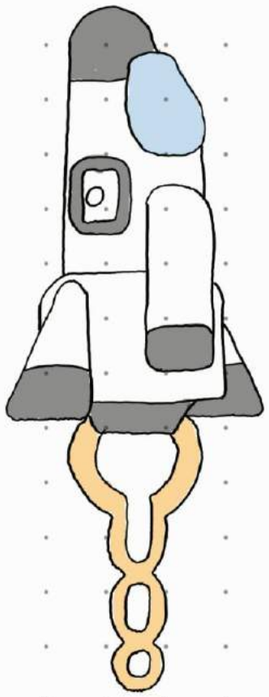


Infographic icon sketches





Infographic icon sketches



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