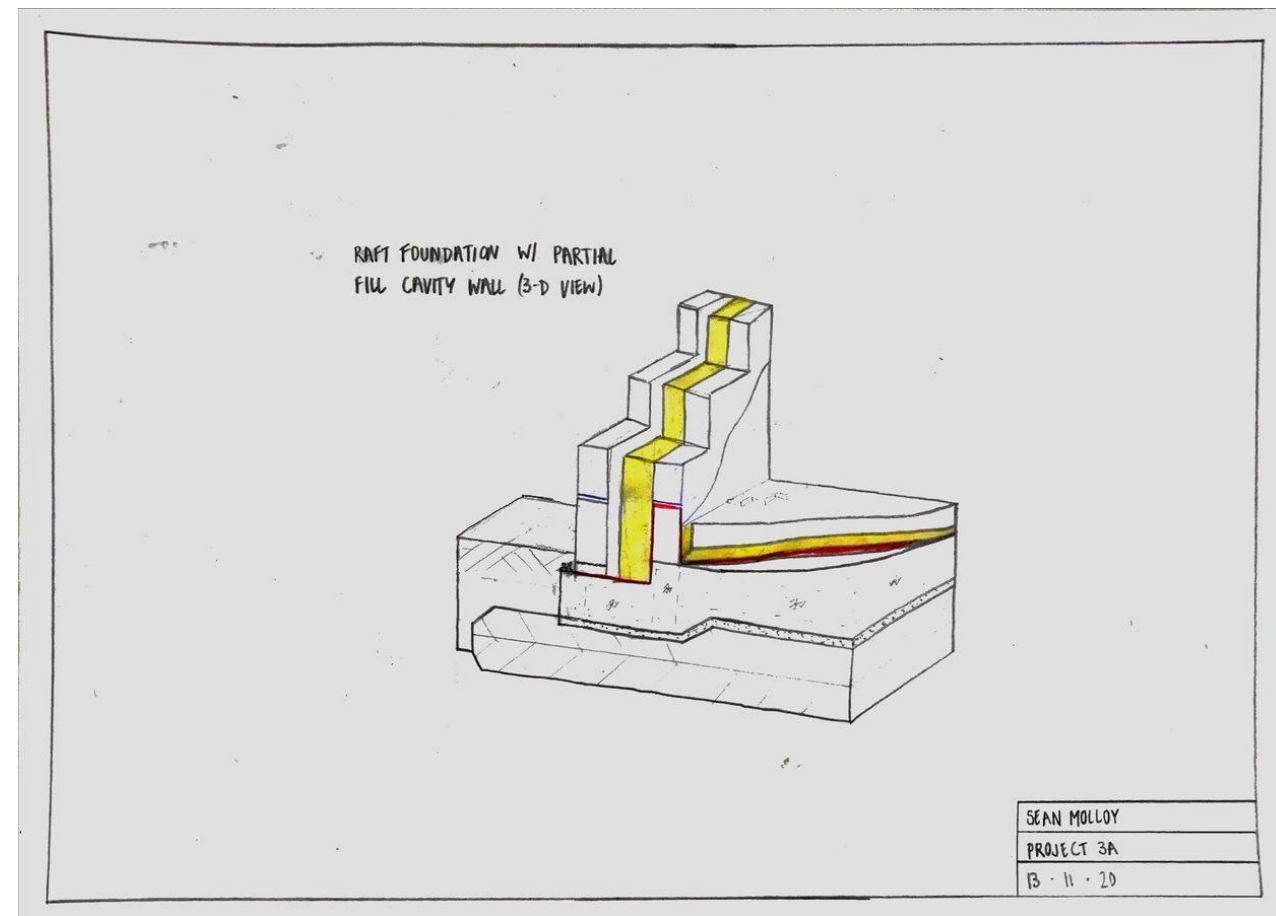
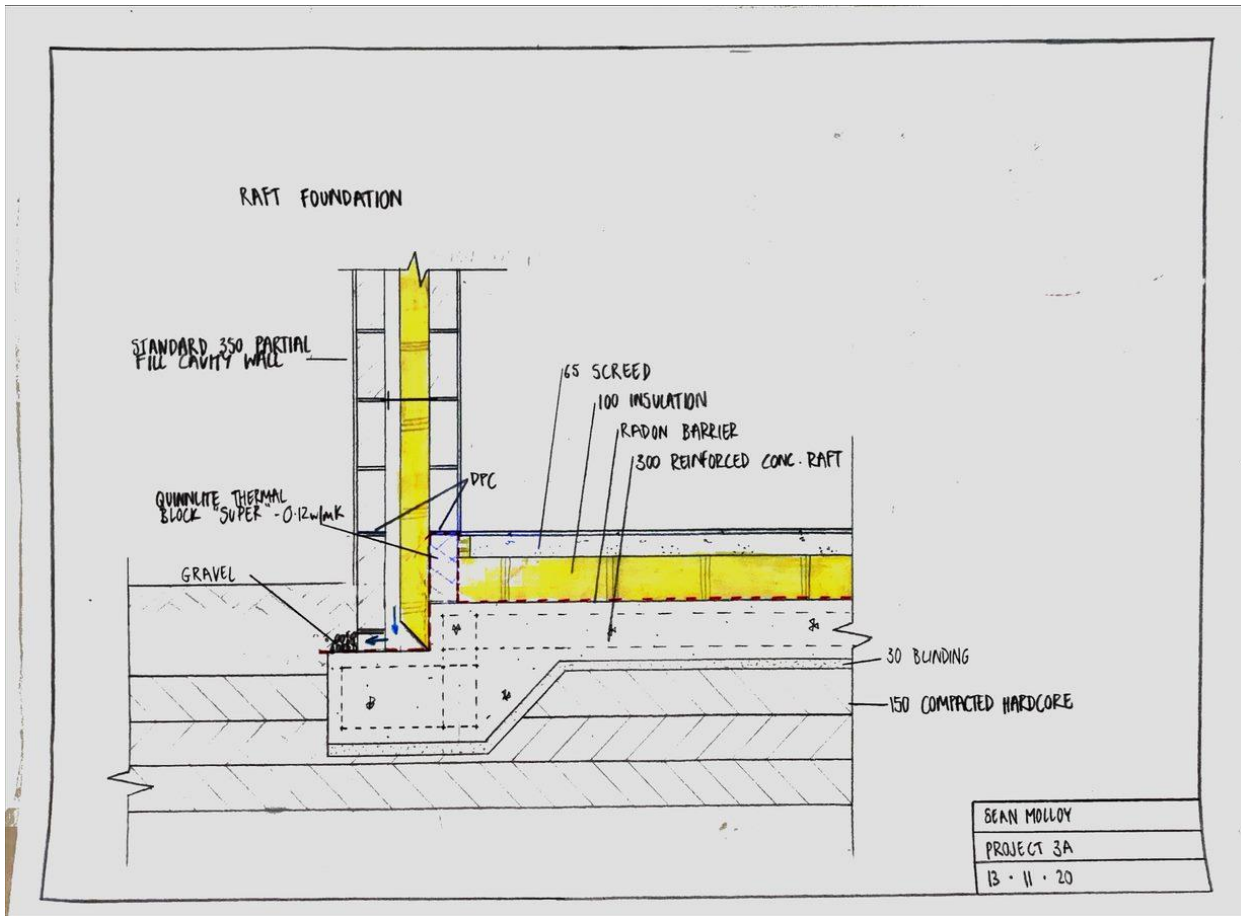


# TU831 TECH1106 TDS

*Project 3 Part A: Foundations and  
Ground Floor Analysis*

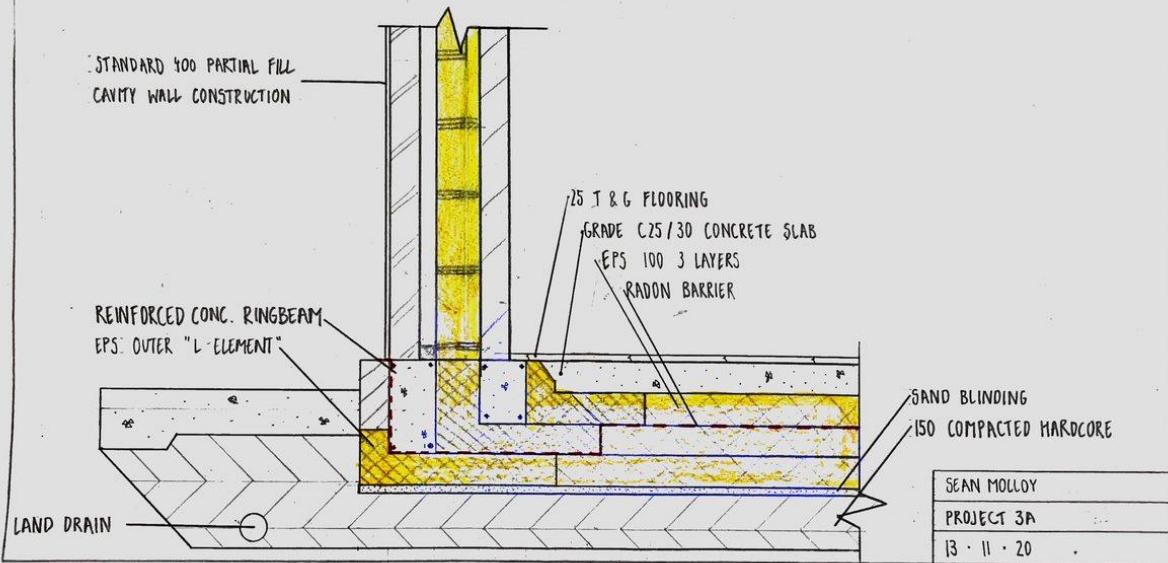
Group B1 – Sean Molloy, Emma Byrne, Odeta  
Gudonyte, Sultan Muhammed, Ling Zhao,  
Jack Vaughan.

# Raft Foundation / Partial Fill Wall

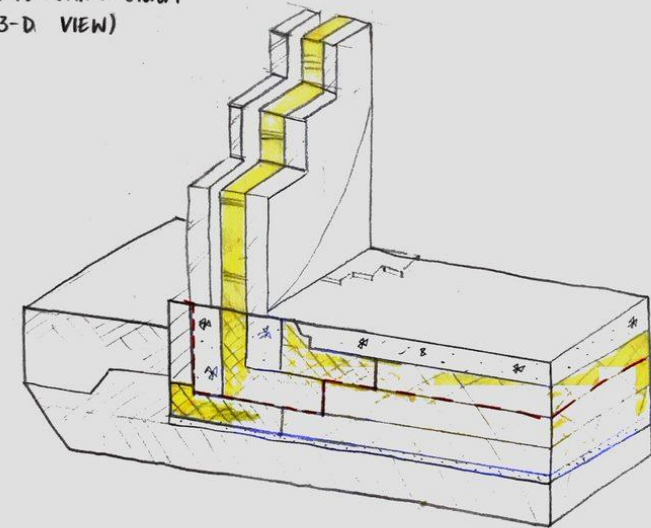


# Viking Triple L / Partial Fill Wall

VIKING TRIPLE L INSULATED FOUNDATION SYSTEM W/ PARTIAL FILL WALL



VIKING TRIPLE L INSULATED FOUNDATION SYSTEM  
PARTIAL FILL WALL (3-D VIEW)



SEAN MOLLOY  
PROJECT 3A  
13.11.20

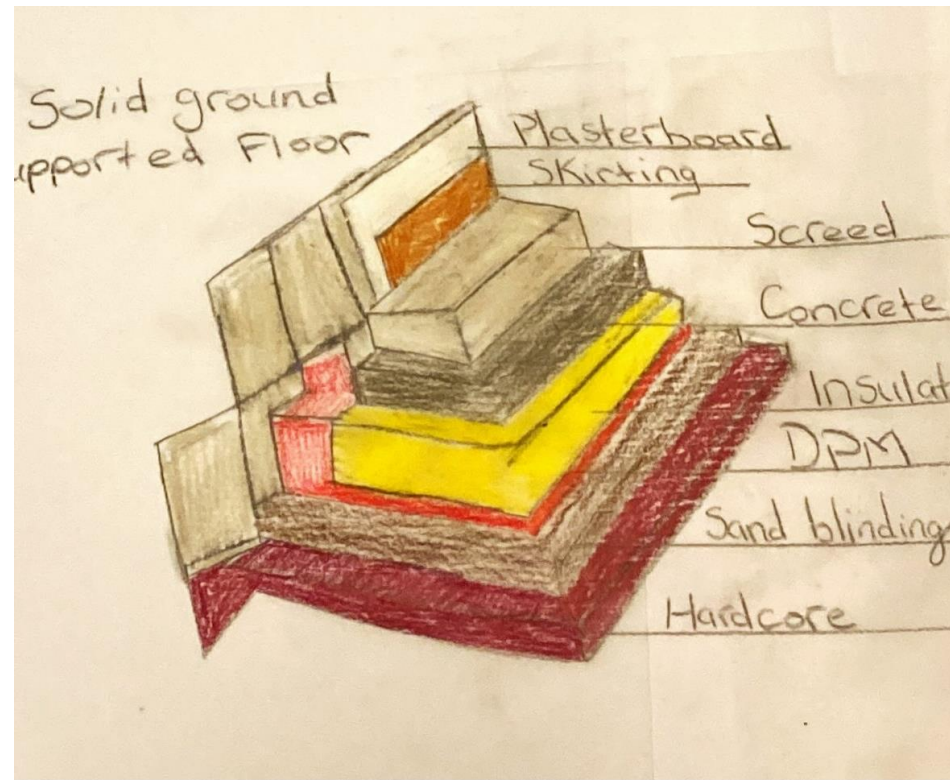
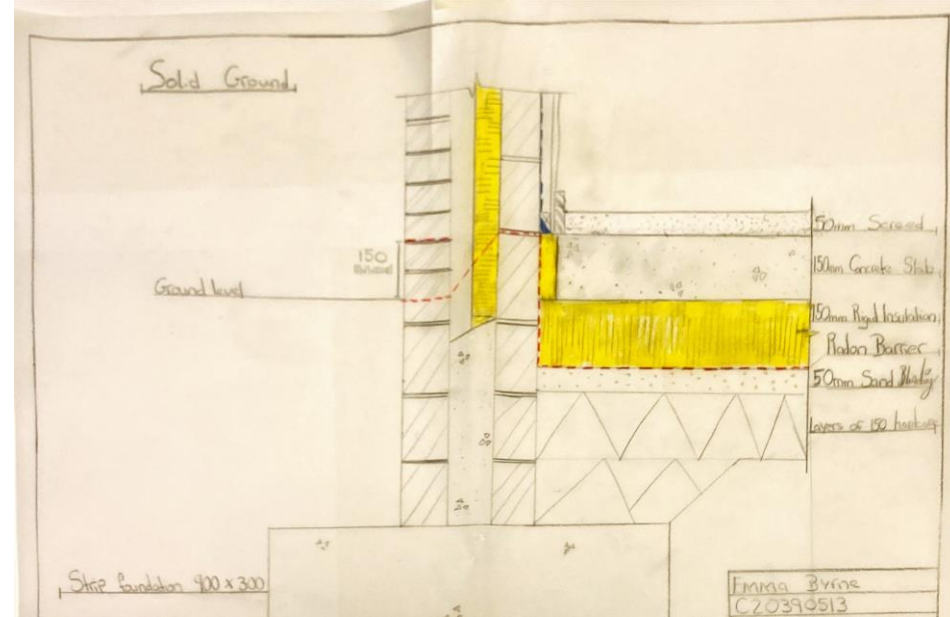
# Partial Fill Wall U-Value

- Partial Fill (on Viking Triple L): 400mm Wall, 150mm Insulation  
- U-Value: 0.19w/m<sup>2</sup>K
  
- Partial Fill (On Raft Foundation): 350mm Wall, 100mm Insulation  
- U-Value: 0.26w/m<sup>2</sup>K

# Strip foundation with solid ground and a partial fill cavity

- Hardcore, Sand Blinding, Radon Barrier, Rigid Insulation, Concrete Slab, Screed.
- Hardcore, Sand blinding and D.P.M (TGD C, section 3.1.4)

Emma Byrne



# Calculation of Thermal Performance

	Thickness (In metres, d)	Thermal Conductivity (W/mK, $\lambda$ )	Thermal Resistance (M <sup>2</sup> K/W) $R = d/\lambda$
XPS Insulation	0.160		4.20
Concrete	0.150	0.16	0.9375
Screed	0.075	0.41	0.182
Total Resistance			5.3195
U-value= 1			0.18 (W/m <sup>2</sup> ·K)



# Strip foundation with Raised Timber Floor and a partial fill cavity.

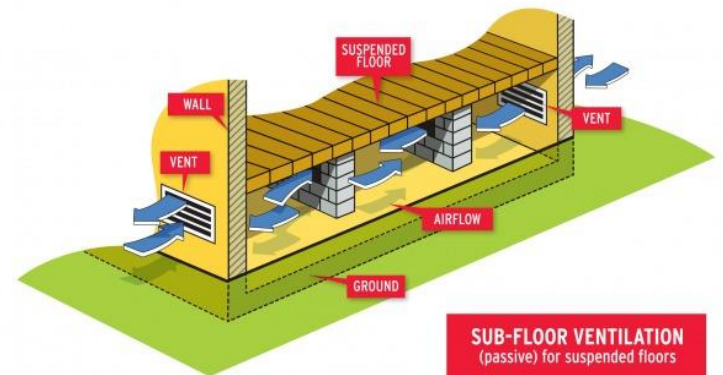
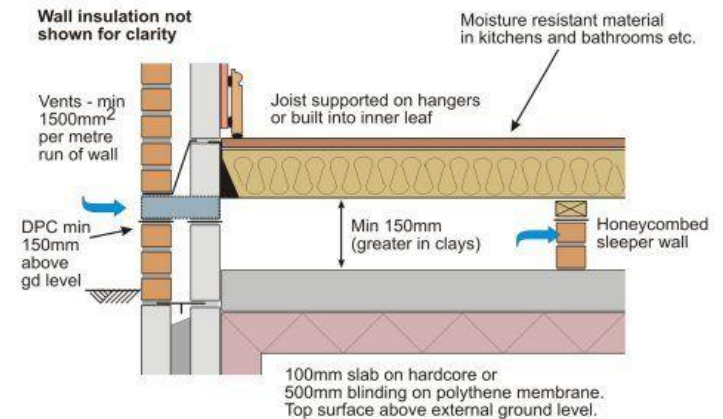
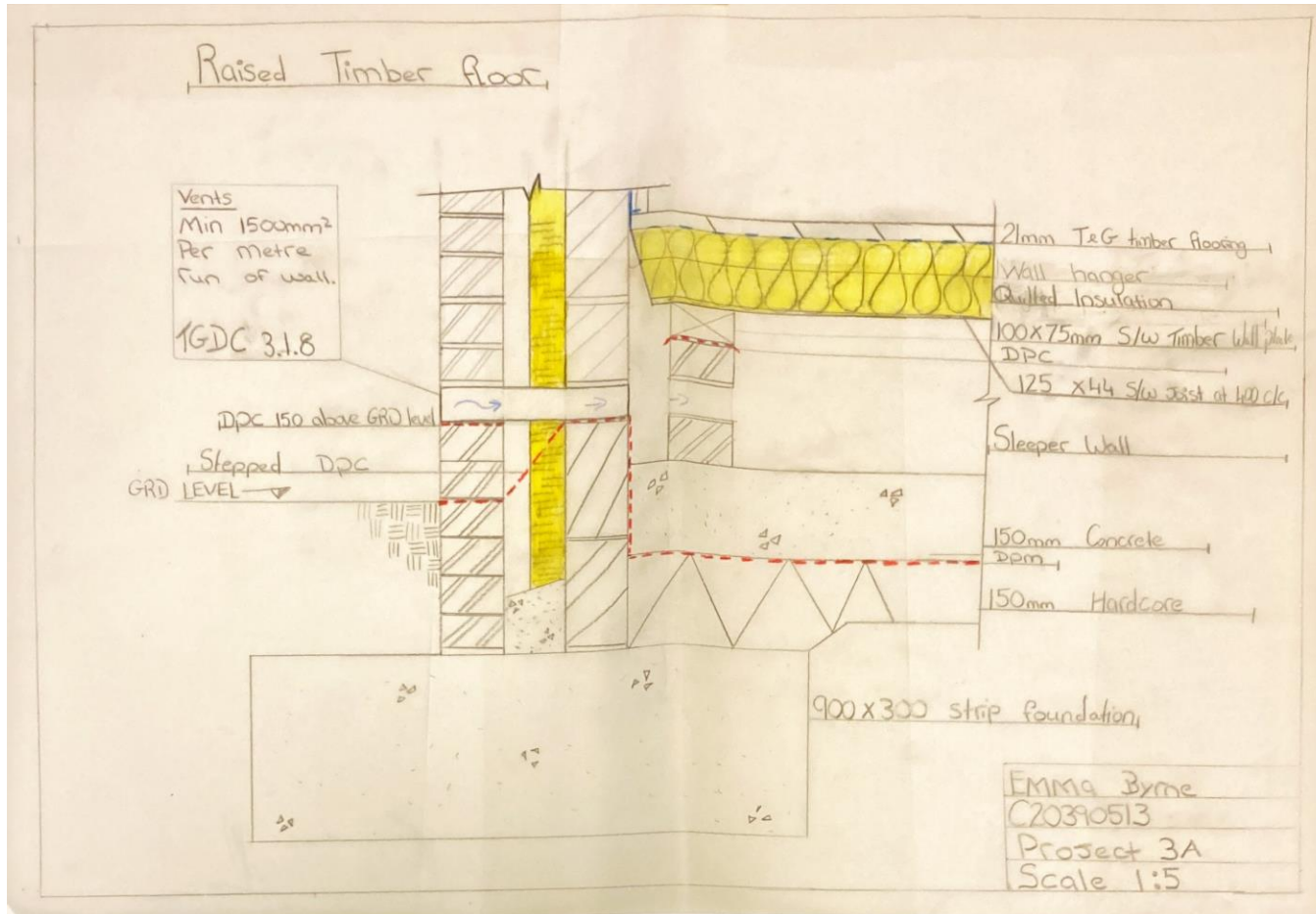


Image courtesy of The Environmental Protection Agency, Ireland. Used with permission.

# Partial Fill Wall U-Value

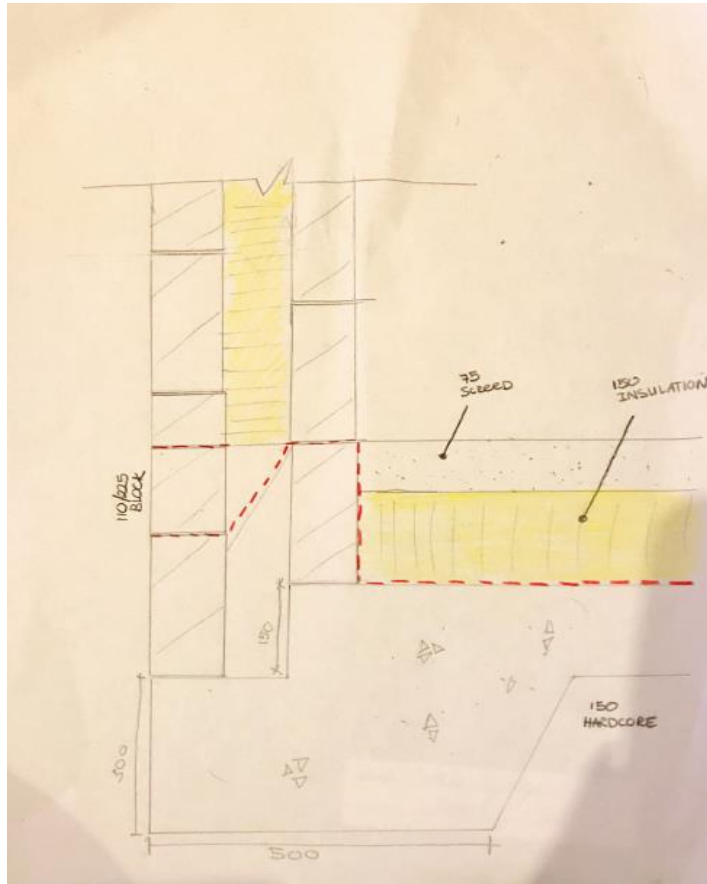
Partial Fill wall:

U-Value= 0.26 (W/m<sup>2</sup>·K)

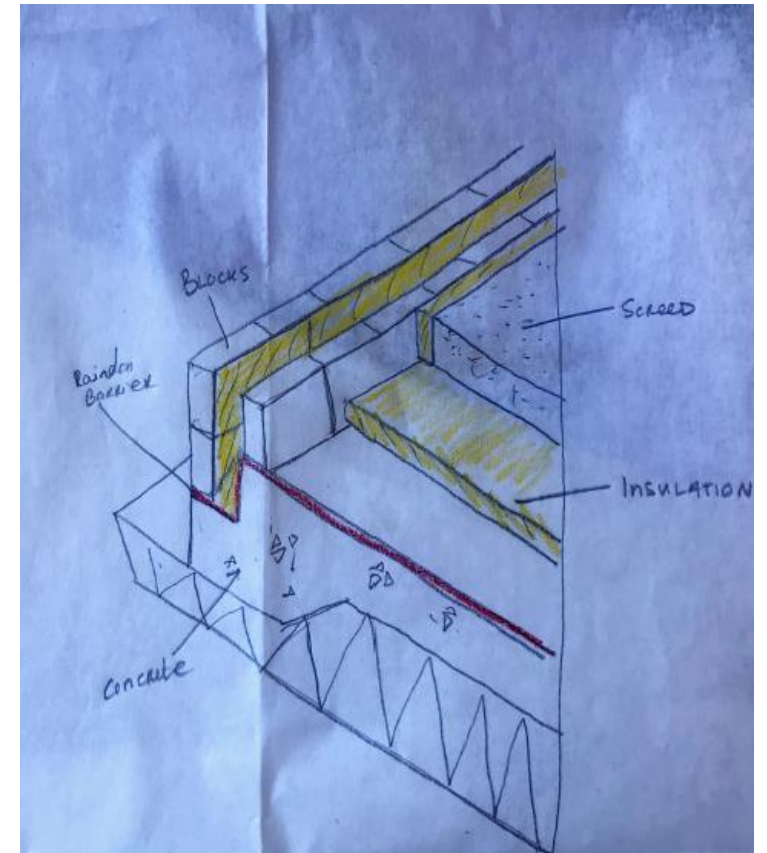
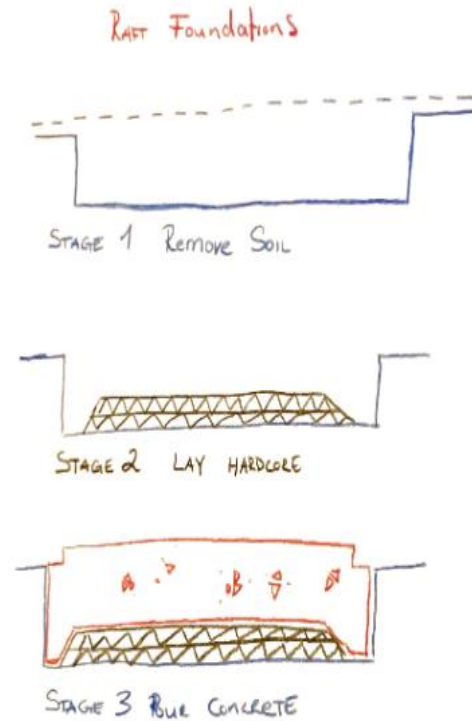
Emma Byrne



# Raft foundation with full fill cavity wall

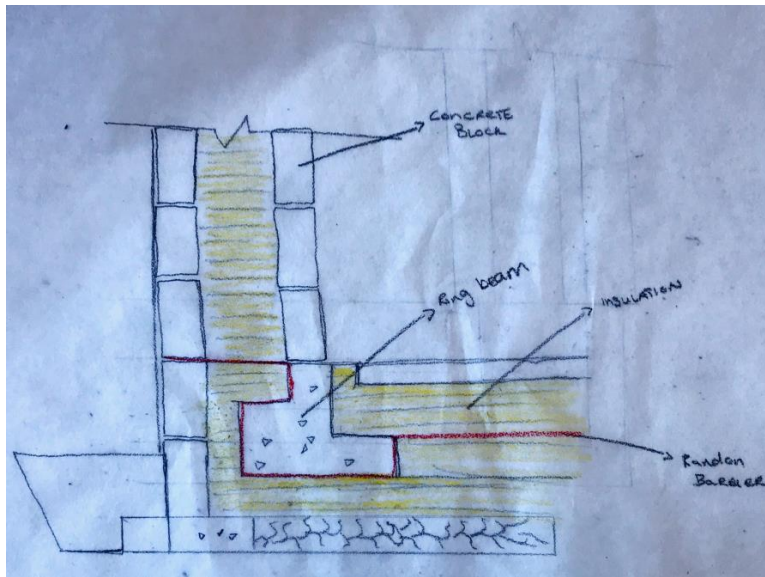


2D drawing of raft foundation with full fill cavity wall

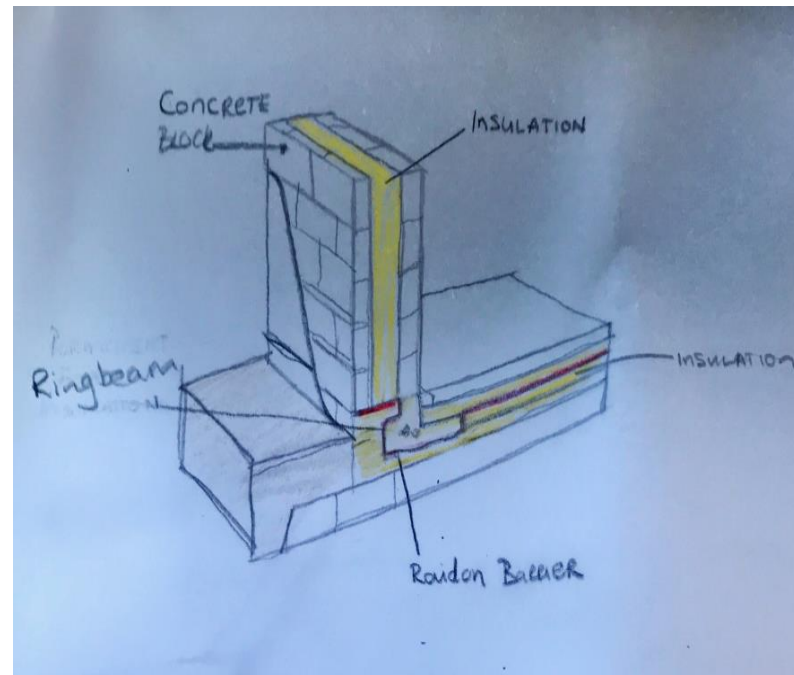


3D drawing of raft foundation

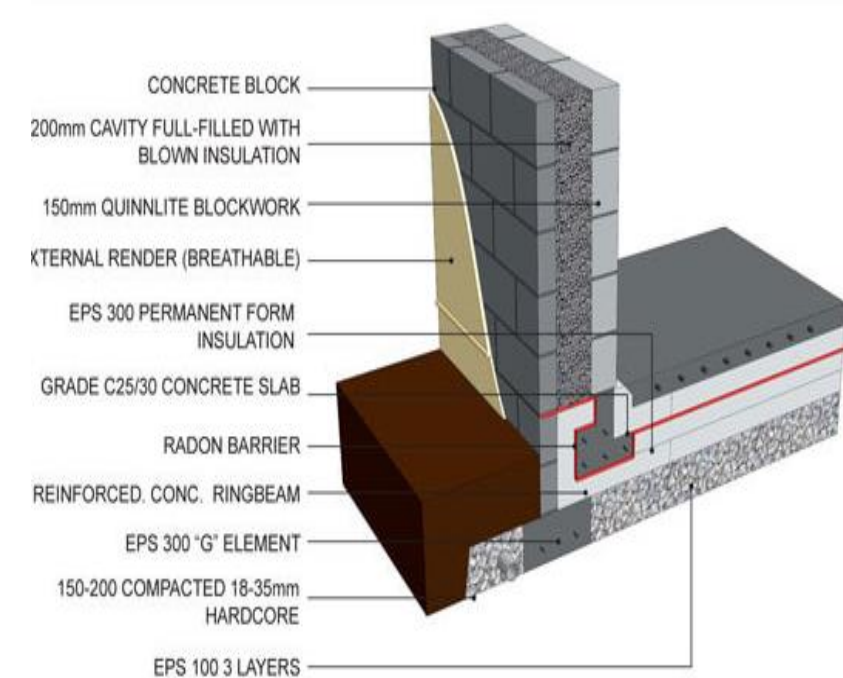
# Full fill cavity wall with insulated foundation



2D drawing of insulated foundation



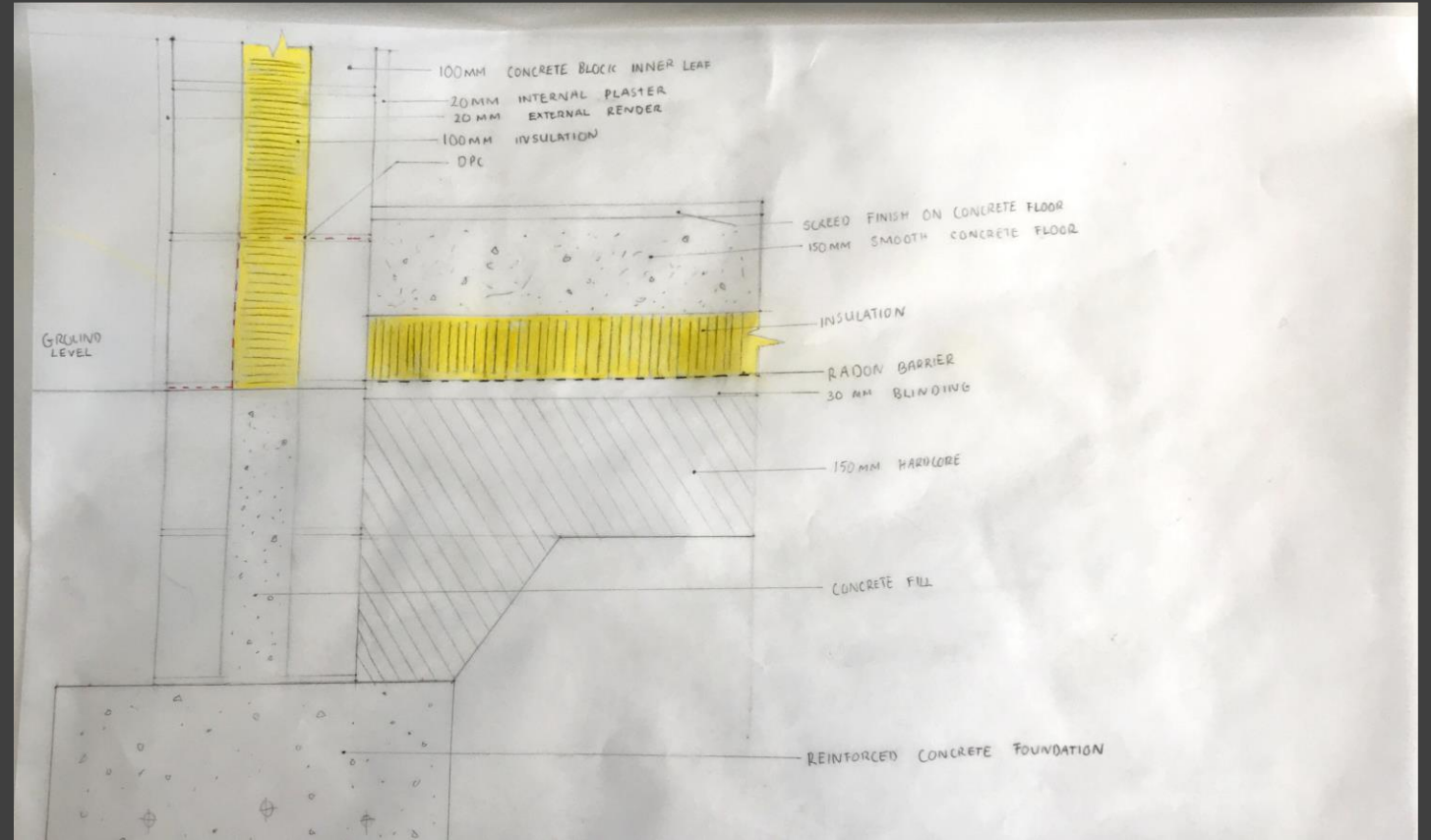
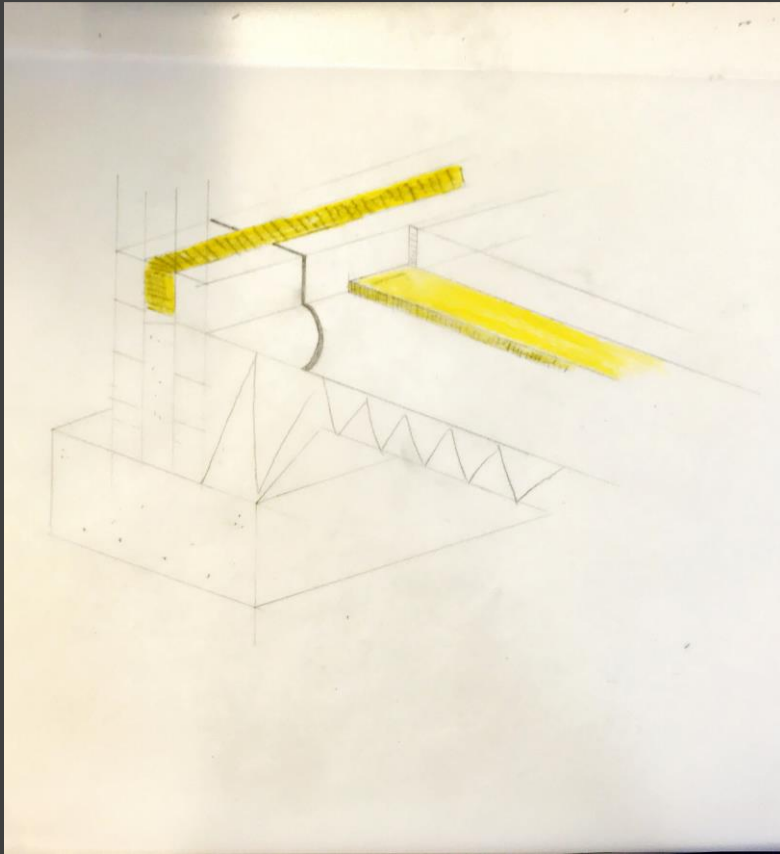
3D drawing of insulated foundation with full fill cavity wall



# Calculation of Thermal Performance

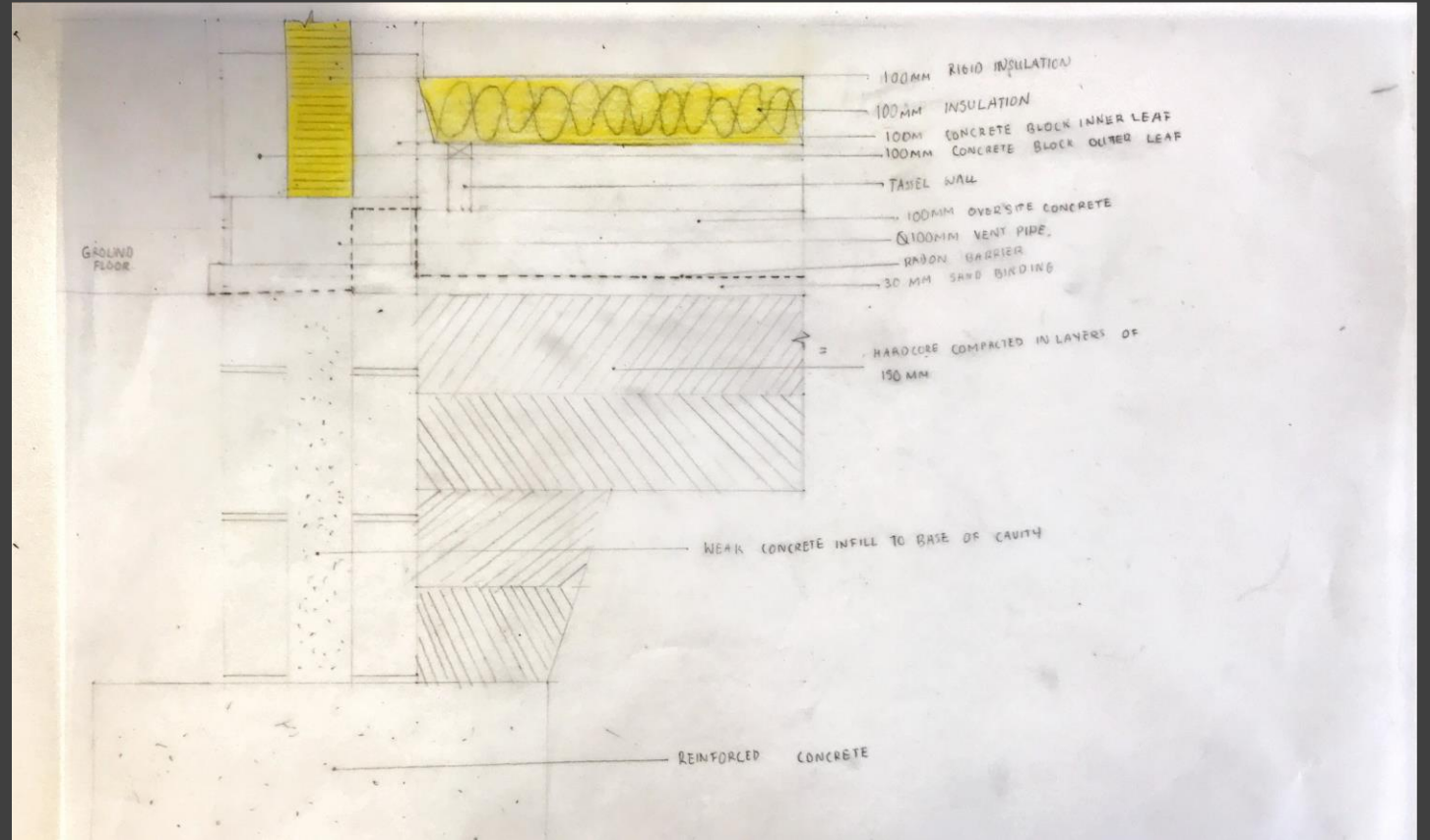
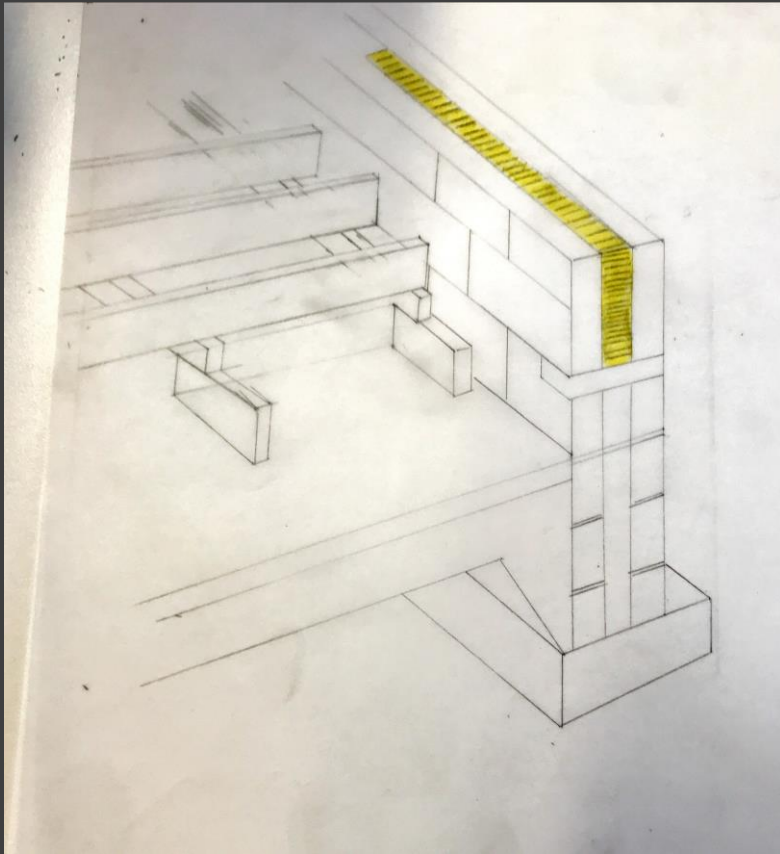
	<b>Thickness (In meters, d)</b>	<b>Thermal Conductivity (W/mK, <math>\lambda</math>)</b>	<b>Thermal Resistance (M<sup>2</sup>K/W) <math>R = d/\lambda</math></b>
Internal resistance			0.130
12.5mm internal plasterboard	0.0125	0.25	0.050
100mm block inner leaf	0.1	1.15	0.087
150mm Cavity insulation	0.15	0.018	8.333
100mm Block outer leaf	0.1	0.15	0.087
25mm external render	0.025	1	0.025
External resistance			0.040
Total thermal resistance			8.752
U value			0.114 W/m <sup>2</sup> K

<https://cavitytherm.com/what-is-cavitytherm/cavitytherm/>



Strip foundation solid ground supported concrete ground floor





Strip foundation raised timber floor

# 20th Century Full Fill Cavity Wall U- value

	Thickness (In meters, d)	Thermal Conductivity (W/m K, $\lambda$ )	Thermal Resistance (M <sup>2</sup> K/W) $R = d/\lambda$
Concrete block inner leaf	100mm	0.64	0.084
Rigid insultaion	100mm	0.22	0.033
Concrete block outer leaf	100mm	0.64	0.084
Plaster finish	20mm	0.5	

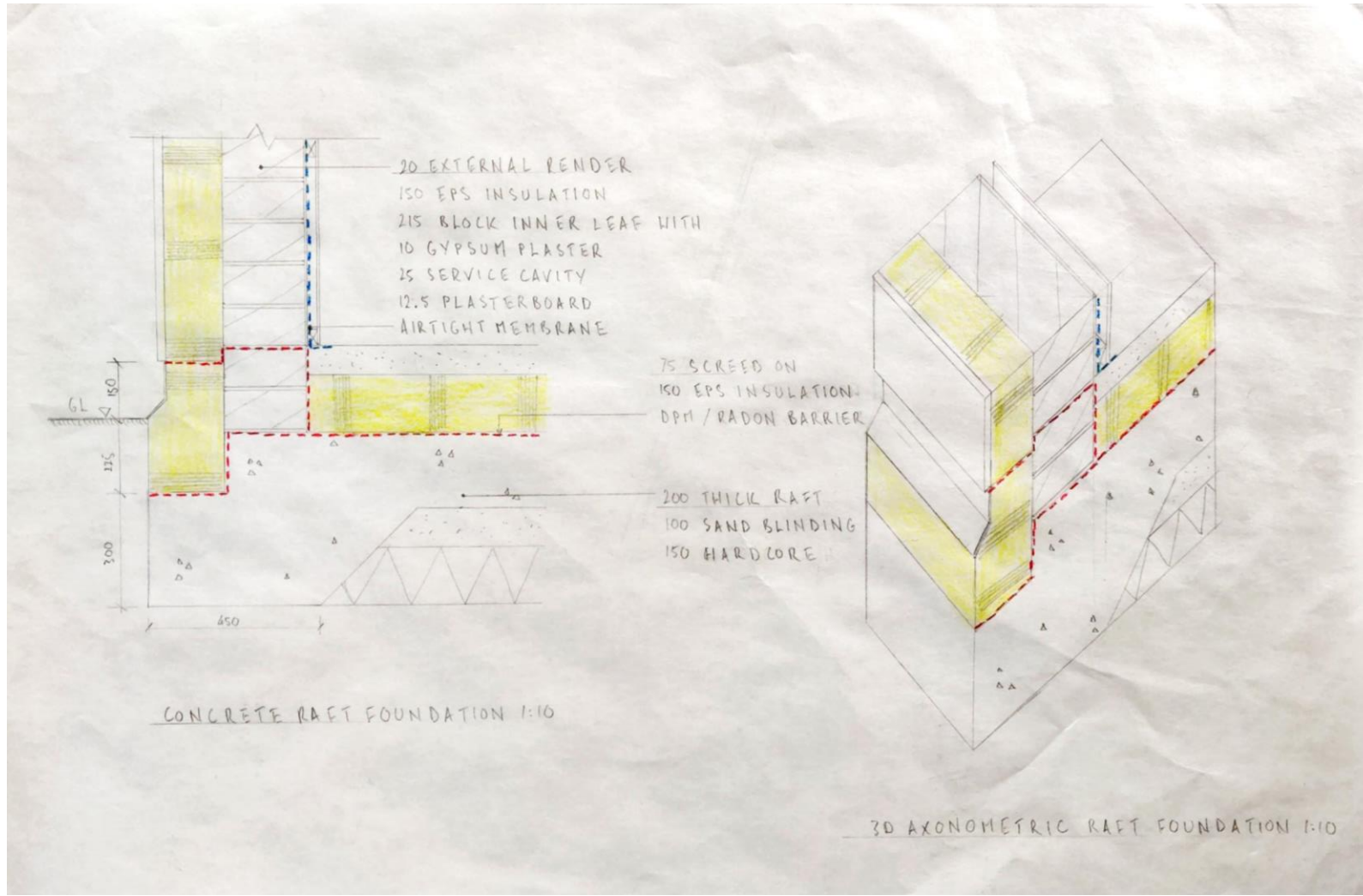


# 21<sup>st</sup> Century Solid Wall on Raft Foundations

- Raft foundations carry loads from walls and spreads them over a large area.
- Commonly used on surfaces of low bearing capacity.
- Used on strata of varying compressibility, e.g. soft clays and peat.
- The edges of the reinforced concrete slabs are thickened.

# 21<sup>st</sup> Century Solid Wall U-values

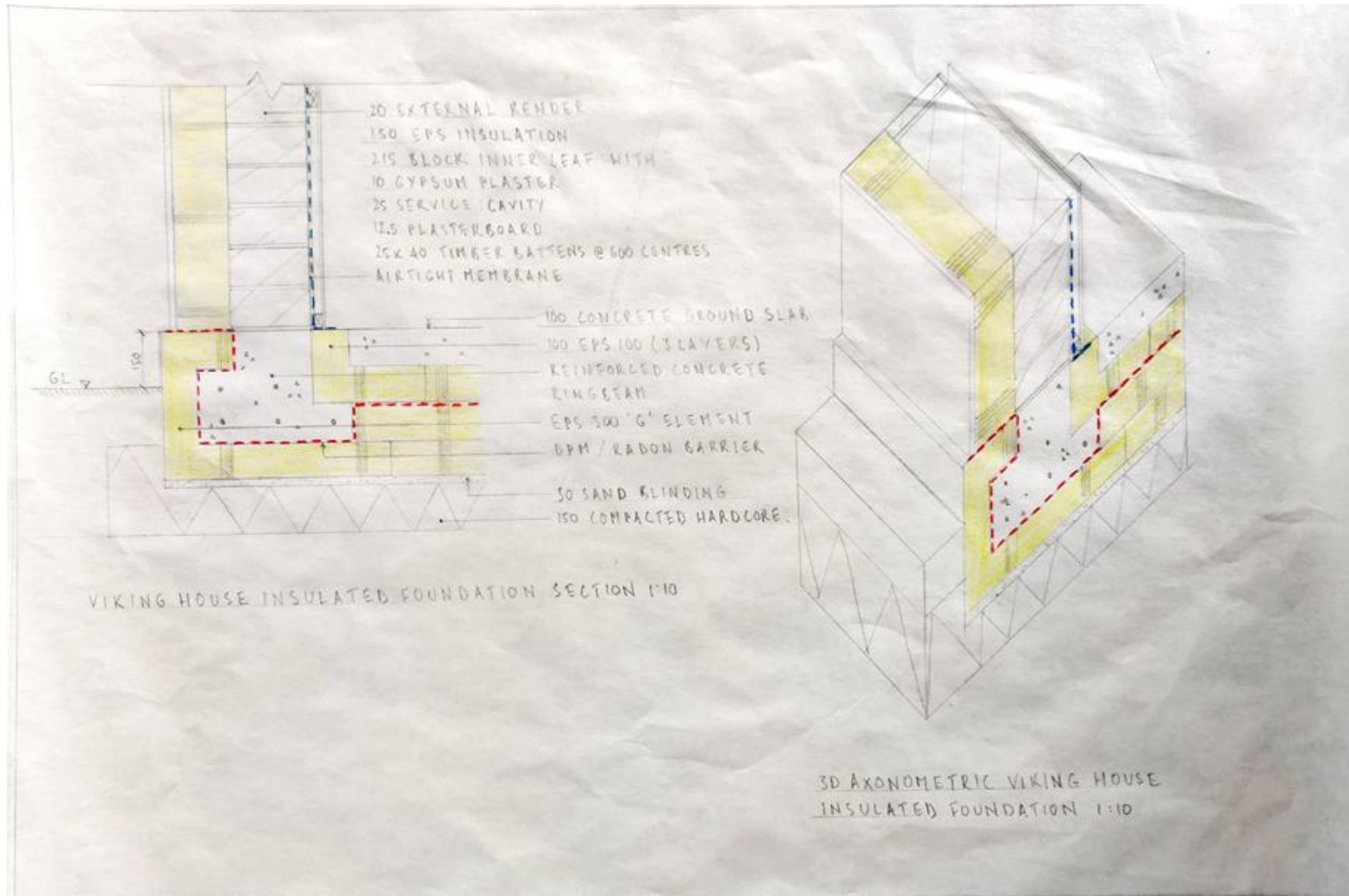
Wall Construction	Thickness (in metres, d)	Thermal Conductivity (W/mK, $\lambda$ )	Thermal Resistance (m <sup>2</sup> K/W) $R = d/\lambda$
External Resistance			0.06
External Render	0.02	1	0.02
EPS 100 Insulation	0.15	0.03	5
Block Inner Leaf	0.215	0.57	0.377192982
Gypsum Plaster	0.01	0.18	0.055555556
Service Cavity	0.025		0.18
Plasterboard	0.0125	0.25	0.05
Internal Resistance			0.06
Total Resistance			5.802748538
U-value W/m <sup>2</sup> K			0.172332127



# External Insulation Solid Wall on Raft Foundations 1:10

# 21<sup>st</sup> Century Solid Wall on Insulated Foundations

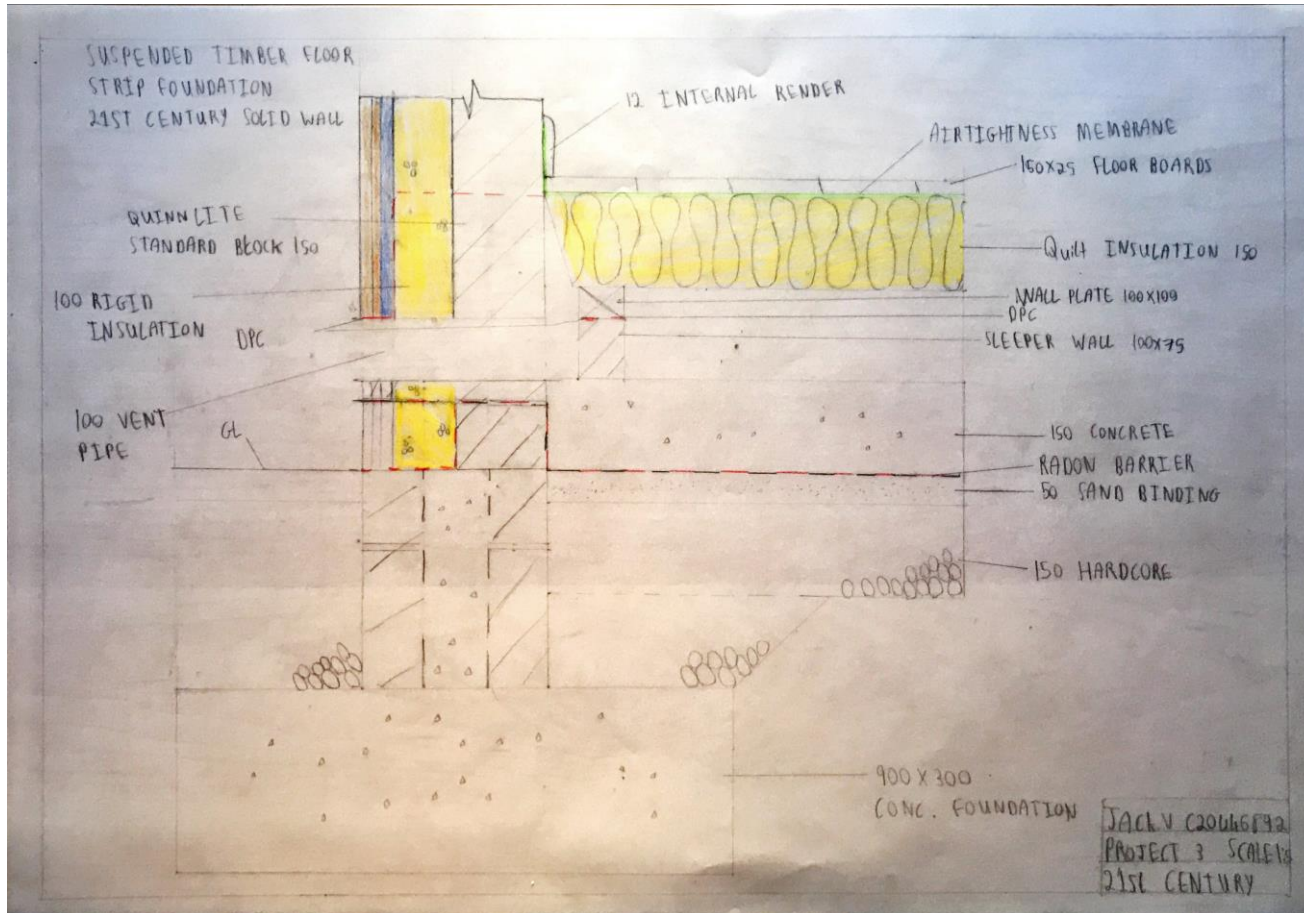
- Insulated foundations eliminates the critical wall-floor Cold Bridge.
- Much quicker to install (Passive Slab), reduced labour costs (20%).
- Reduces the amount of concrete being poured (60% less). This lowers the carbon footprint of the house.
- Example: Viking House, Passive Slab, 3 layers of EPS 100 U-value of 0.105W/m<sup>2</sup>K.



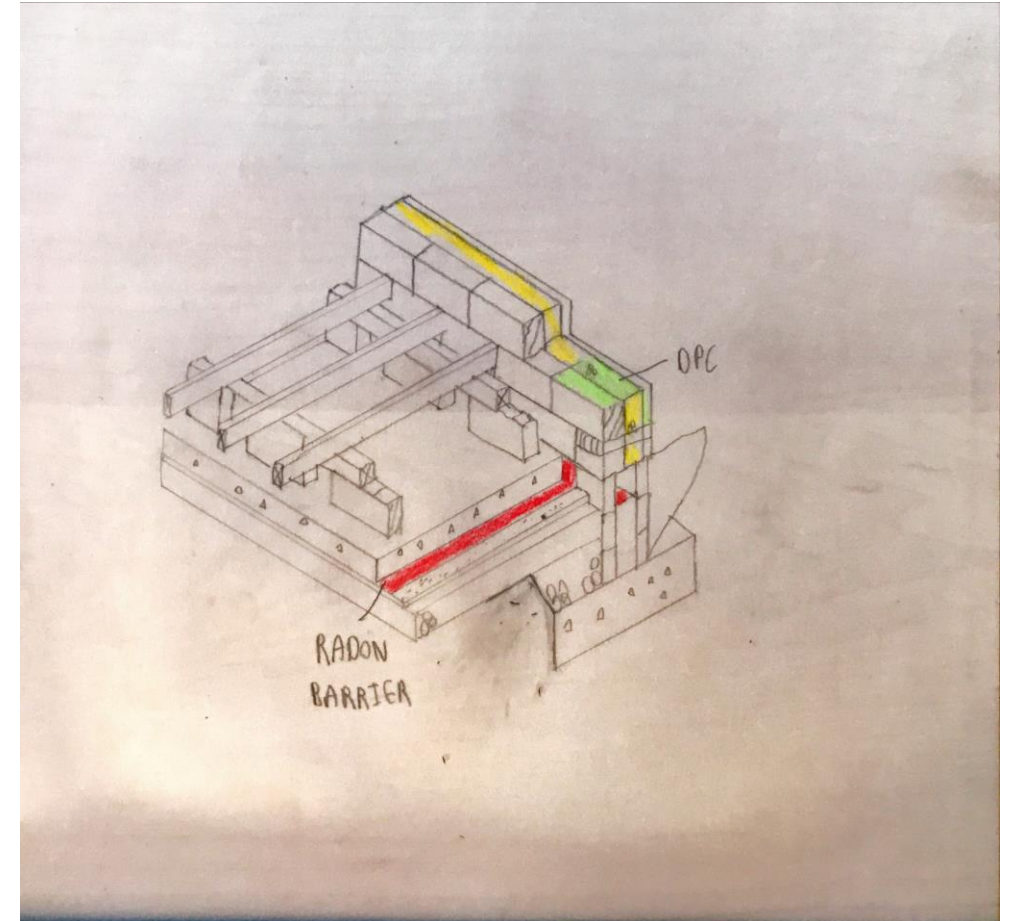
# External Insulation Solid Wall on Insulated Foundations 1:10



# External Insulation Solid Wall with raised timber floor on strip foundation



2D Construction of foundation floor and wall.



3D construction



# Advantages and Disadvantages

## Advantages

Easy to install services (water, electricity, etc.)

Convenient method to raise floor level if building

Is using a stepped foundation.

Excellent damp proofing against rising damp.

## Disadvantages

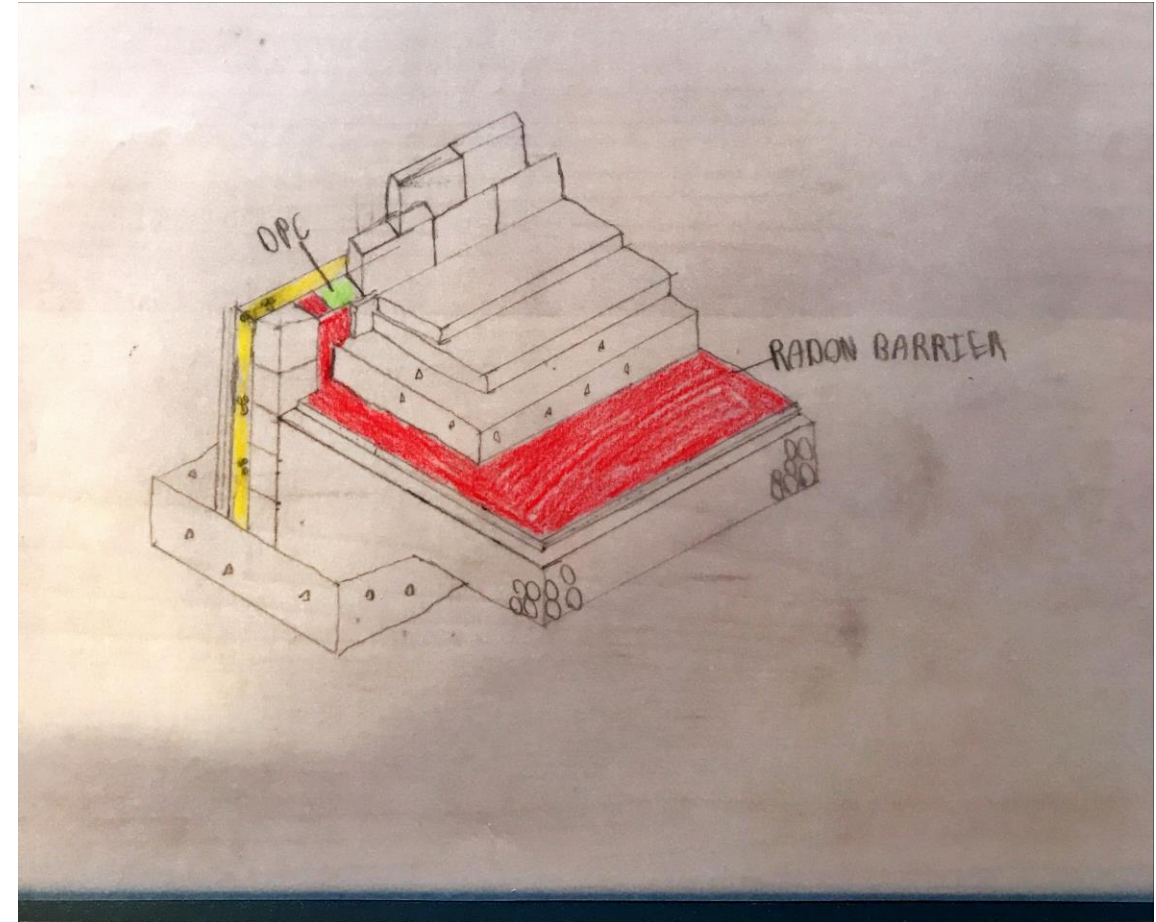
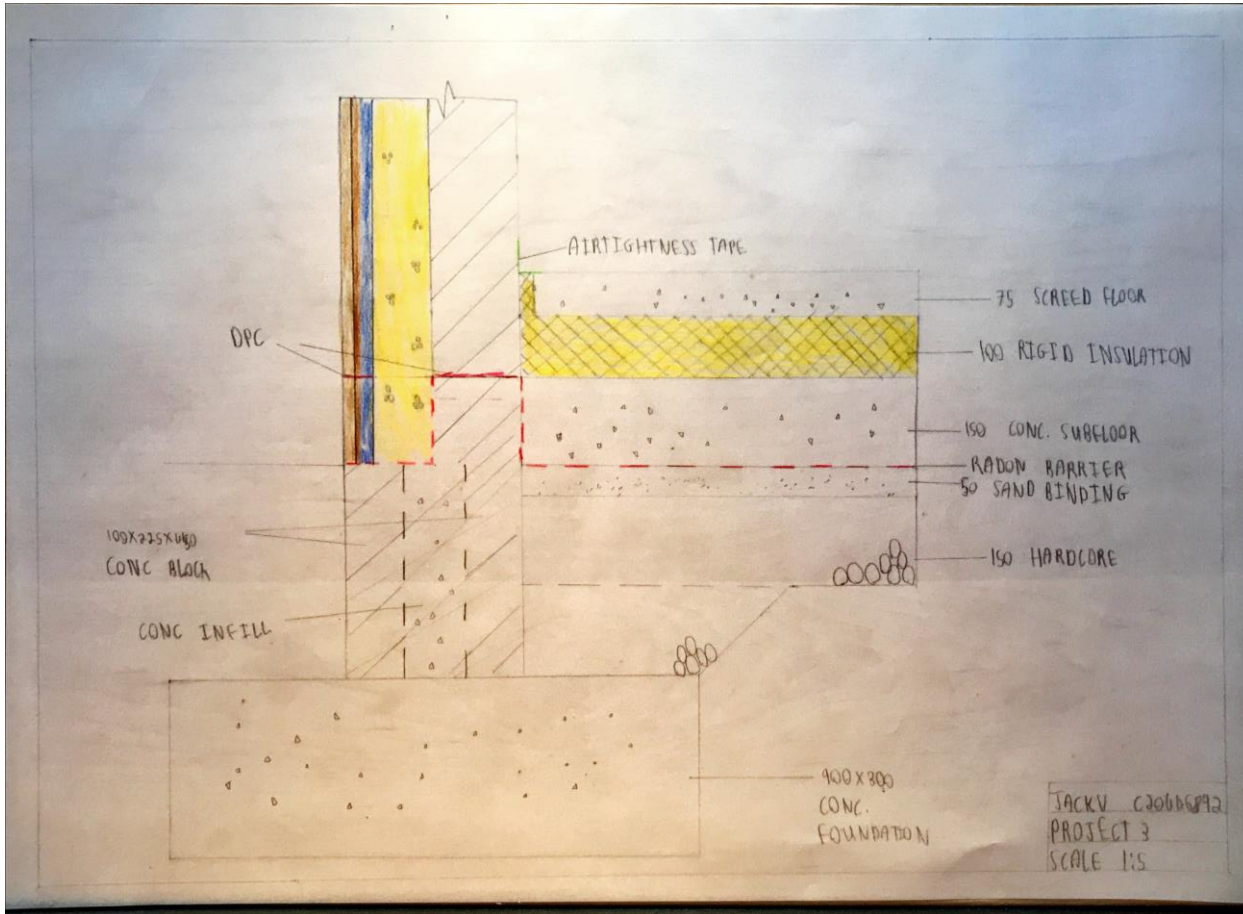
Expensive and labour intensive to install.

Require a high level of workmanship.

Carry noise between room.

Airtightness is difficult to achieve.

# External Insulation Solid Wall with solid ground concrete slab and strip foundation



# 21st Century Solid Wall on Strip Foundation

- Advantages

Easy to install services ( water, electrical ect.)

Provides excellent floor finish

- Disadvantages

Requires much labour to install

Typically quite expensive

# Solid ground floor thermal performance

	<b>Thickness (In meters, d)</b>	<b>Thermal Conductivity (W/mK, <math>\lambda</math>)</b>	<b>Thermal Resistance (M<sup>2</sup>K/W) <math>R = d/\lambda</math></b>
Concrete (subfloor)	1.50	1.28	1.171
Insulation(Thermafloor)	1.0	0.022	45.45
Concrete screed	.75	.41	1.83
Total Resistance			47.41
U-value			0.021

[http://dl.booktolearn.com/ebooks2/engineering/civil/9781118977163\\_Barrys\\_Introduction\\_to\\_Construction\\_of\\_Buildings\\_4th\\_Edition\\_0961.pdf](http://dl.booktolearn.com/ebooks2/engineering/civil/9781118977163_Barrys_Introduction_to_Construction_of_Buildings_4th_Edition_0961.pdf)

<https://www.kingspan.com/irl/en-ie/product-groups/insulation-boards/therma/thermafloor-tf70>



Thanks for  
listening.

- Any questions?