



# CAMPBELL

REGISTERED ARCHITECTS LTD

## H1 CALCULATIONS

15/06/2023

Ref 21015

### MARKET SHEDS @ 362 MATAKANA VALLEY ROAD

#### AREAS:

|                      |                      |
|----------------------|----------------------|
| Shed 1               | 381.6 m <sup>2</sup> |
| Area/perimeter ratio | 4.5                  |

#### WALL AREAS:

|             |                            |
|-------------|----------------------------|
| North       | 49.74 m <sup>2</sup>       |
| South       | 50.07 m <sup>2</sup>       |
| East        | 87.58 m <sup>2</sup>       |
| West        | <u>77.55 m<sup>2</sup></u> |
| TOTAL walls | 264.94 m <sup>2</sup>      |

#### WINDOWS:

|                         |                            |
|-------------------------|----------------------------|
| North Windows           | 1.92 m <sup>2</sup>        |
| South Windows           | 0.96 m <sup>2</sup>        |
| East Windows and Doors  | 49.20 m <sup>2</sup>       |
| West Windows and Doors  | <u>34.50 m<sup>2</sup></u> |
| TOTAL windows and doors | 86.58 m <sup>2</sup>       |

|                               |                       |
|-------------------------------|-----------------------|
| TOTAL all walls (and windows) | 351.52 m <sup>2</sup> |
|-------------------------------|-----------------------|

#### SCHEDULE METHOD:

|                           |      |
|---------------------------|------|
| Climate zone              | 1    |
| R value walls             | 2.2  |
| R value roof              | 3.5  |
| R value floor             | 2.2  |
| R value windows and doors | 0.37 |

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## CONSTRUCTION:

|                                       |       |        |
|---------------------------------------|-------|--------|
| R value walls timber design navigator | 2.34  | OK     |
| R value roof design navigator         | 2.95  | not OK |
| R value floor design navigator        | 1.76  | not OK |
| R value windows and doors             | 0.341 | not OK |

## CALCULATION METHOD:

$$V = \frac{\text{SUM SC} \times A_{\text{glazing}}}{A_{\text{walls}}} = \frac{1 \times 86.58}{351.52} = 0.246 < 0.5 \text{ OK}$$

$$HL_{\text{ref}} = \frac{A_{\text{wallref}}}{R_{\text{wallref}}} + \frac{A_{\text{winref}} + A_{\text{doorref}}}{R_{\text{winref}}}$$

$$HL_{\text{ref}} = \frac{351.52/2}{2.2} + \frac{351.52/2}{0.37} = 79.89 + 475.03 = 554.92 \text{ HL}_{\text{ref}}$$

$$HL_{\text{prop}} = \frac{A_{\text{wall}}}{R_{\text{wall}}} + \frac{A_{\text{win}} + A_{\text{door}}}{R_{\text{win}}}$$

$$HL_{\text{prop}} = \frac{264.94}{2.34} + \frac{86.58}{0.341} = 113.22 + 254.00 = 367.22 \text{ HL}_{\text{prop}}$$

$$HL_{\text{prop}} < HL_{\text{ref}} \text{ OK}$$



## AREAS:

|                      |                      |
|----------------------|----------------------|
| <b>Shed 2</b>        | 100.2 m <sup>2</sup> |
| Area/perimeter ratio | 2.3                  |

## WALL AREAS:

|             |                            |
|-------------|----------------------------|
| North       | 36.68 m <sup>2</sup>       |
| South       | 48.31 m <sup>2</sup>       |
| East        | 26.77 m <sup>2</sup>       |
| West        | <u>26.77 m<sup>2</sup></u> |
| TOTAL walls | 138.53 m <sup>2</sup>      |

## WINDOWS:

|                         |                           |
|-------------------------|---------------------------|
| North Doors             | 13.55 m <sup>2</sup>      |
| South Windows           | 1.92 m <sup>2</sup>       |
| East Window             | 0.96 m <sup>2</sup>       |
| West Window             | <u>0.96 m<sup>2</sup></u> |
| TOTAL windows and doors | 17.39 m <sup>2</sup>      |

|                               |                       |
|-------------------------------|-----------------------|
| TOTAL all walls (and windows) | 155.92 m <sup>2</sup> |
|-------------------------------|-----------------------|

## SCHEDULE METHOD:

|                           |      |
|---------------------------|------|
| Climate zone              | 1    |
| R value walls             | 2.2  |
| R value roof              | 3.5  |
| R value floor             | 2.2  |
| R value windows and doors | 0.37 |

## CONSTRUCTION:

|                                       |       |        |
|---------------------------------------|-------|--------|
| R value walls timber design navigator | 2.29  | OK     |
| R value roof design navigator         | 2.95  | not OK |
| R value floor design navigator        | 1.00  | not OK |
| R value windows and doors             | 0.341 | not OK |

## CALCULATION METHOD:

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$$V = \frac{\text{SUM SC} \times A_{\text{glazing}}}{A_{\text{walls}}} = \frac{1 \times 17.39}{155.92} = 0.11 < 0.5 \text{ OK}$$

$$HL_{\text{ref}} = \frac{A_{\text{wallref}}}{R_{\text{wallref}}} + \frac{A_{\text{winref}} + A_{\text{doorref}}}{R_{\text{winref}}}$$

$$HL_{\text{ref}} = \frac{155.92/2}{2.2} + \frac{155.92/2}{0.37}$$

$$35.44 + 210.70 = 246.14 HL_{\text{ref}}$$

$$HL_{\text{prop}} = \frac{A_{\text{wall}}}{R_{\text{wall}}} + \frac{A_{\text{win}} + A_{\text{door}}}{R_{\text{win}}}$$

$$HL_{\text{prop}} = \frac{138.53}{2.29} + \frac{17.39}{0.341}$$

$$60.49 + 51.00 = 111.49 HL_{\text{prop}}$$

$$HL_{\text{prop}} < HL_{\text{ref}} \text{ OK}$$



## Construction R-value Calculator

This webpage calculates the R-value of walls, roofs and suspended floors for most insulation material R-values. It uses the "isothermal planes" method, the same method as used in NZS4214:2006.

I have recently implemented some changes to the way assemblies with multiple adjacent insulation layers such as truss roofs with a second layer of insulation are calculated. Check out the details [here](#).

Some of the possible material combinations may not be suitable for actual constructions, i.e. EPS based claddings directly fixed on timber framing. Please make sure to select only appropriate material combinations.

If your construction is not listed, please send an e-mail to [designnavigator@gmail.com](mailto:designnavigator@gmail.com) with a description and a detail drawing (pdf) of it.

Please select the element type. Then choose the construction details and enter the R-value of the insulation either directly in the text box or by choosing a product from the right panel [i](#).

Floors ☒

Walls ☐

Roofs ☐

Date: 15/06/2023

Sawmill Market Shed 2

1.00 m<sup>2</sup>C/W

Type: Floor: Slab Floor - H1/AS1 Edition 5 and H1/AS2 Edition 1

Slab Floor - H1/AS1 Edition 5 and H1/AS2 Edition 1 [view detail](#)

Slab Insulation (H1 Edition 5) [i](#)

Slab floor area [m<sup>2</sup>]: 100.2

Perimeter length [m]: [i](#)

masonry veneer walls:

other walls: 43.6

External wall thickness [mm]: 140 [i](#)

Underslab insulation: None [i](#) Insulation : [i](#)

Slab edge insulation: no [i](#)

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Floors ☐

Walls ☒

Roofs ☐

Date: 15/06/2023

|                                                                                     |                                                                                     |                             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------|
| Sawmill Market Shed 2                                                               |                                                                                     | 2.29 m <sup>2</sup> C/W     |
| Type: Wall: Timber Frame with vented Cavity                                         |                                                                                     |                             |
| Timber Frame with vented Cavity                                                     |                                                                                     | <a href="#">view detail</a> |
| external surface 0.03                                                               |                                                                                     |                             |
| Cladding : generic - Metal weatherboard (corr. iron) facing still inside air        |                                                                                     |                             |
|                                                                                     |                                                                                     | R-value: 0.11               |
| Air Barrier : IBS RigidRAP 8mm                                                      |                                                                                     |                             |
|                                                                                     |                                                                                     | R-value: 0.08               |
| Timber Frame & Cavity : 140mm, studs @ 400mm, dwangs @ 1200mm                       |                                                                                     |                             |
| Wall Frame Area: 16.2%                                                              | Cavity Area: 83.8%                                                                  |                             |
| 15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08 | 15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08 |                             |
| Framing : R-value: 1.17                                                             | Insulation : 2.2                                                                    |                             |
|                                                                                     | still Airgap: none                                                                  |                             |
|                                                                                     | R-value: 0.00                                                                       |                             |
| Wall Lining : generic - gypsum Plasterboard 10mm                                    |                                                                                     |                             |
|                                                                                     |                                                                                     | R-value: 0.04               |
| internal surface 0.09                                                               |                                                                                     |                             |

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- Floors ☐
- Walls ☐
- Roofs ☒

Date: 10/02/2023

|                                                                    |                       |                                                                      |                   |
|--------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------|-------------------|
| Sawmill shed roof                                                  |                       | 2.95 m <sup>2</sup> C/W                                              |                   |
| Type: Roof: Timber framed skillion or flat Roof <a href="#">i</a>  |                       |                                                                      |                   |
| Timber framed skillion or flat Roof <a href="#">view detail</a>    |                       |                                                                      |                   |
| external surface 0.03                                              |                       |                                                                      |                   |
| Roofing :                                                          |                       | generic - Metal corrugate Iron with building paper <a href="#">i</a> |                   |
| R-value: 0.01                                                      |                       |                                                                      |                   |
| Timber Frame & Cavity :                                            |                       |                                                                      |                   |
| 140mm rafters or joists @ 1200mm, blocking @ 900mm                 |                       | <a href="#">i</a>                                                    |                   |
| Roof Frame Area: 8.5%                                              |                       | Cavity Area: 91.5%                                                   |                   |
| Framing :                                                          |                       | still Airgap :                                                       |                   |
| R-value: 1.19                                                      |                       | none <a href="#">i</a>                                               |                   |
| R-value: 0.00                                                      |                       | R-value: 0.00                                                        |                   |
| Thermal Break :                                                    |                       | Insulation :                                                         |                   |
| generic - none <a href="#">i</a>                                   |                       | 3.2                                                                  |                   |
| R-value: 0.00                                                      |                       |                                                                      |                   |
| Roof Lining : generic - gypsum Plasterboard 10mm <a href="#">i</a> |                       |                                                                      |                   |
| R-value: 0.04                                                      |                       |                                                                      |                   |
| internal surface 0.09                                              |                       |                                                                      |                   |
| Non-IC-rated recessed downlights                                   |                       |                                                                      |                   |
| Ceiling Area [m <sup>2</sup> ]:                                    | Number of downlights: | Clearance from lamp holder side [m]:                                 | <a href="#">i</a> |

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## Construction R-value Calculator

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Floors ☒

Walls ☐

Roofs ☐

Date: 10/02/2023

1.76 m<sup>2</sup>C/W

Type:

Slab Floor - Clause H1 Edition 5
 

Slab Insulation (H1 Edition 5) [i](#)

Slab floor area [m<sup>2</sup>]:

Perimeter length [m]: [i](#)

masonry veneer walls:

other walls:

External wall thickness [mm]:  [i](#)

Underslab insulation:  [i](#)

Slab edge insulation:  [i](#)

Insulation :  [i](#)

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- Floors ☐
- Walls ☐
- Roofs ☒

Date: 10/02/2023

|                                                                   |                       |                                                                      |                   |
|-------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------|-------------------|
| Sawmill shed roof                                                 |                       | 2.95 m <sup>2</sup> C/W                                              |                   |
| Type: Roof: Timber framed skillion or flat Roof <a href="#">i</a> |                       |                                                                      |                   |
| Timber framed skillion or flat Roof <a href="#">view detail</a>   |                       |                                                                      |                   |
| external surface 0.03                                             |                       |                                                                      |                   |
| Roofing :                                                         |                       | generic - Metal corrugate Iron with building paper <a href="#">i</a> |                   |
|                                                                   |                       | R-value: 0.01                                                        |                   |
| Timber Frame & Cavity :                                           |                       |                                                                      |                   |
| 140mm rafters or joists @ 1200mm, blocking @ 900mm                |                       | <a href="#">i</a>                                                    |                   |
| Roof Frame Area: 8.5%                                             |                       | Cavity Area: 91.5%                                                   |                   |
| Framing :                                                         |                       | still Airgap :                                                       |                   |
| R-value: 1.19                                                     |                       | none <a href="#">i</a>                                               |                   |
|                                                                   |                       | R-value: 0.00                                                        |                   |
| Thermal Break :                                                   |                       | Insulation :                                                         |                   |
| generic - none <a href="#">i</a>                                  |                       | 3.2                                                                  |                   |
|                                                                   |                       | R-value: 0.00                                                        |                   |
| Roof Lining :                                                     |                       | generic - gypsum Plasterboard 10mm <a href="#">i</a>                 |                   |
|                                                                   |                       | R-value: 0.04                                                        |                   |
| internal surface 0.09                                             |                       |                                                                      |                   |
| Non-IC-rated recessed downlights                                  |                       |                                                                      |                   |
| Ceiling Area [m <sup>2</sup> ]:                                   | Number of downlights: | Clearance from lamp holder side [m]:                                 | <a href="#">i</a> |

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Floors ☐

Walls ☒

Roofs ☐

Date: 10/02/2023

|                                                                                     |  |                                                                                     |                     |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|---------------------|
| Sawmill market shed                                                                 |  | 2.34                                                                                | m <sup>2</sup> °C/W |
| Type: Wall: Timber Frame with vented Cavity                                         |  |                                                                                     |                     |
| Timber Frame with vented Cavity                                                     |  | <a href="#">view detail</a>                                                         |                     |
| external surface 0.03                                                               |  |                                                                                     |                     |
| Cladding :                                                                          |  | generic - Metal weatherboard (corr. iron)                                           |                     |
|                                                                                     |  | R-value: 0.08                                                                       |                     |
| Air Barrier :                                                                       |  | generic - Building paper                                                            |                     |
|                                                                                     |  | R-value: 0.01                                                                       |                     |
| Timber Frame & Cavity :                                                             |  | 190mm, studs @ 400mm, dwangs @ 1200mm                                               |                     |
| Wall Frame Area: 16.2%                                                              |  | Cavity Area: 83.8%                                                                  |                     |
| 15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08 |  | 15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08 |                     |
| Framing :                                                                           |  | Insulation : 2.2                                                                    |                     |
| R-value: 1.56                                                                       |  | still Airgap: none                                                                  |                     |
|                                                                                     |  | R-value: 0.00                                                                       |                     |
| Wall Lining :                                                                       |  | generic - gypsum Plasterboard 10mm                                                  |                     |
|                                                                                     |  | R-value: 0.04                                                                       |                     |
| internal surface 0.09                                                               |  |                                                                                     |                     |

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