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U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

SOLAR ENERGY DESIGN PHILOSOPHY

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MEANS	DESIGN STRATEGY	DESIGN INTENTION
ACTIVE USE	**AS LITTLE AS NECESSARY**	**MAINTAIN COMFORTABLE LIVING ENVIRONMENTS**
PASSIVE USE	**AS MANY AS POSSIBLE**	**REDUCE RUNNING COSTS + ENHANCE USER EXPERIENCE**

FIRST LIGHT NZ

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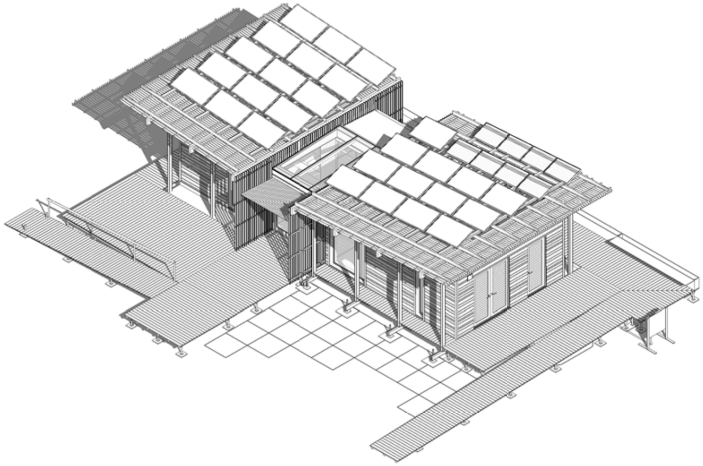
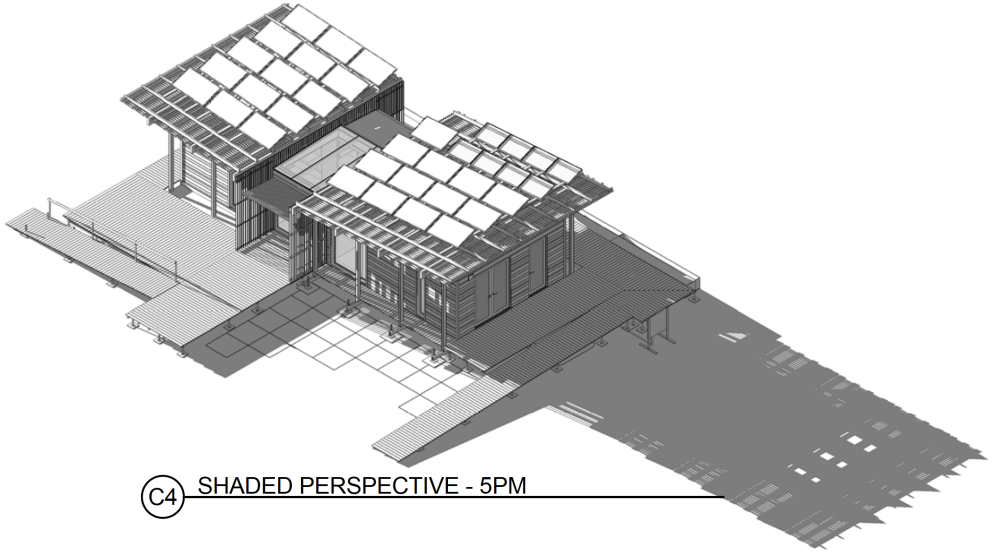
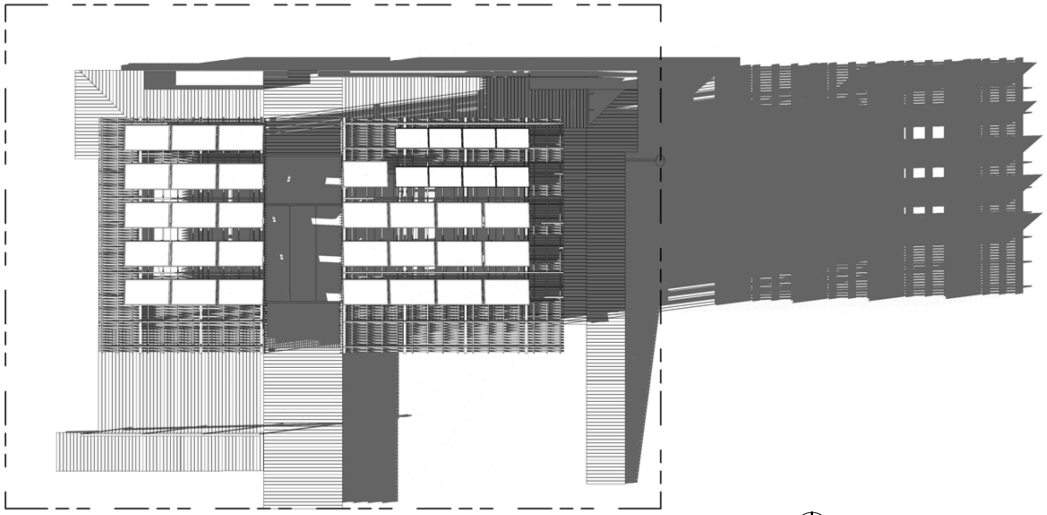


C1 SHADED PERSPECTIVE - 9AM



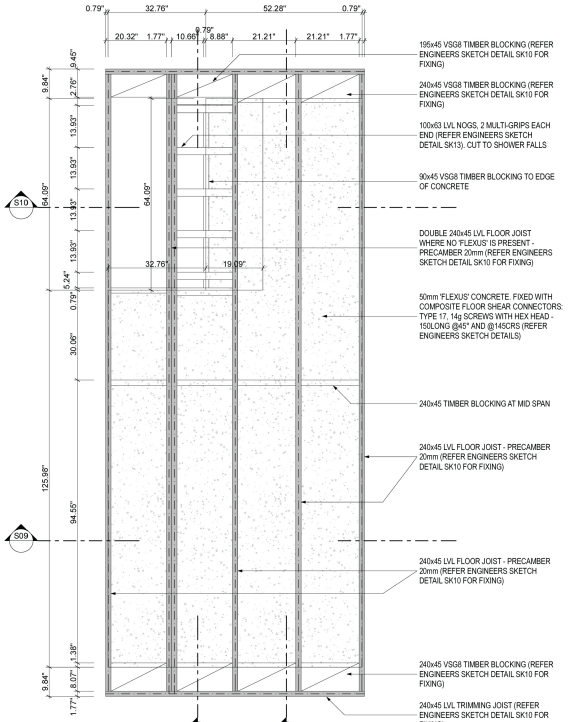
C4 SHADED PERSPECTIVE - 5PM

A1 SHADED PLAN VIEW - 9AM
1/8" = 1'-0"
0 4' 8' 16'

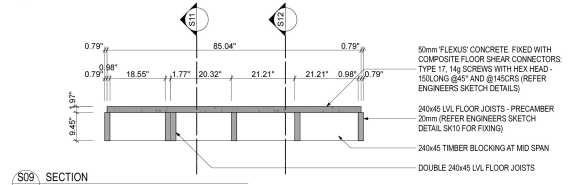


A4 SHADED PLAN VIEW - 5PM
1/8" = 1'-0"
0 4' 8' 16'

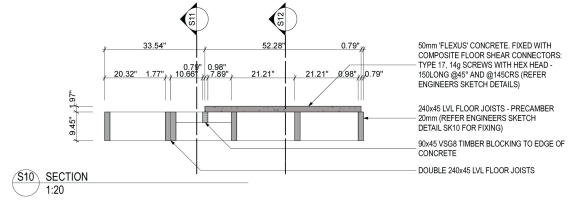
FIRST LIGHT NZ



FLOOR PLAN
1:20



S09 SECTION
1:20



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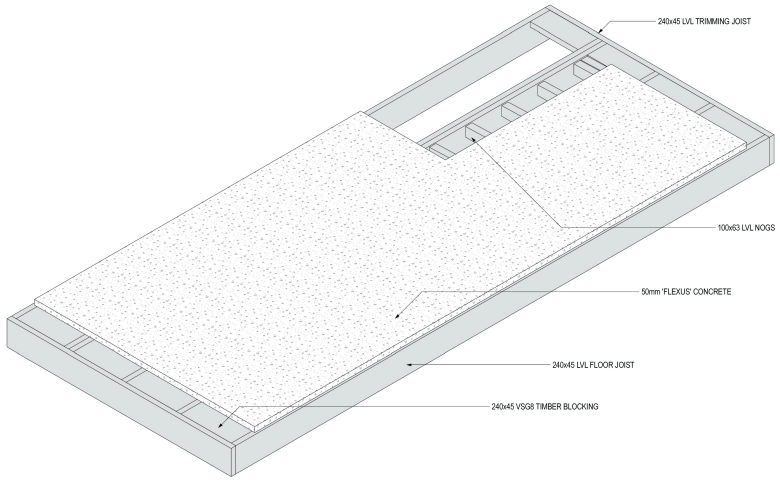

GENERAL NOTES

Do not scale off drawings.

All dimensions to be checked on site.

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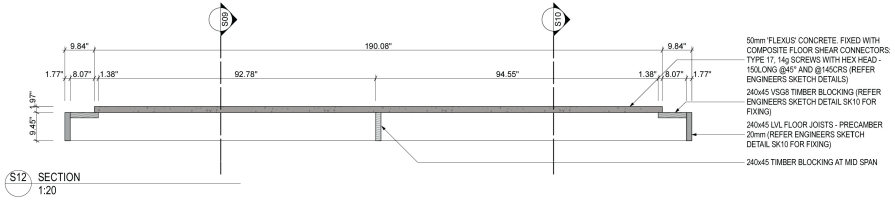
All drawings to be read in conjunction with relevant Specifications and supplementary documents.

1. CCA OR LOSP TREATED TIMBER MUST NOT BE USED. REFER SPECIFICATION FOR CORRECT TREATMENT



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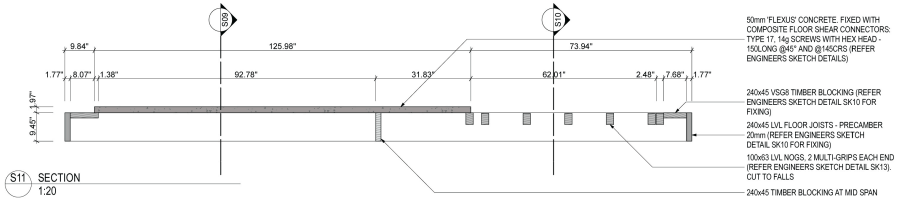

S11 SECTION
1:20

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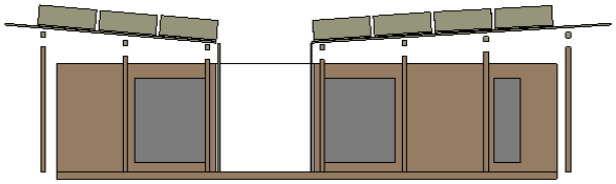

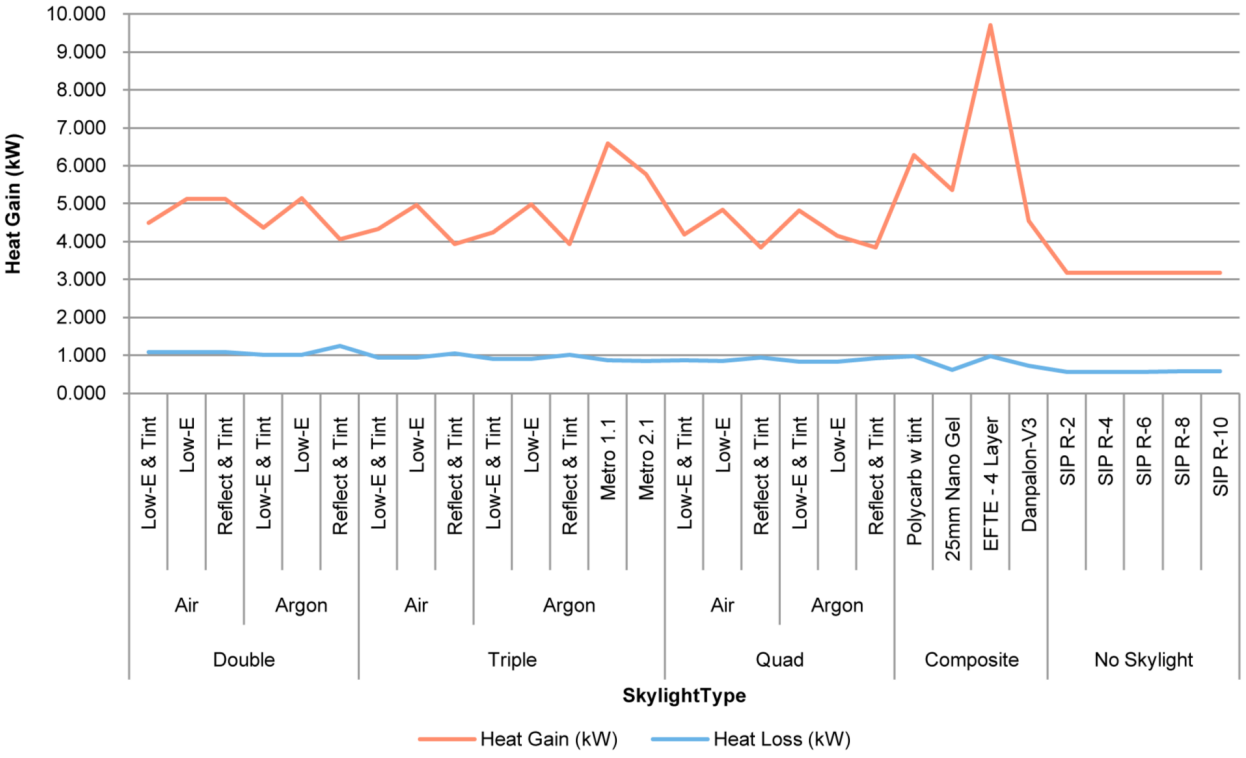

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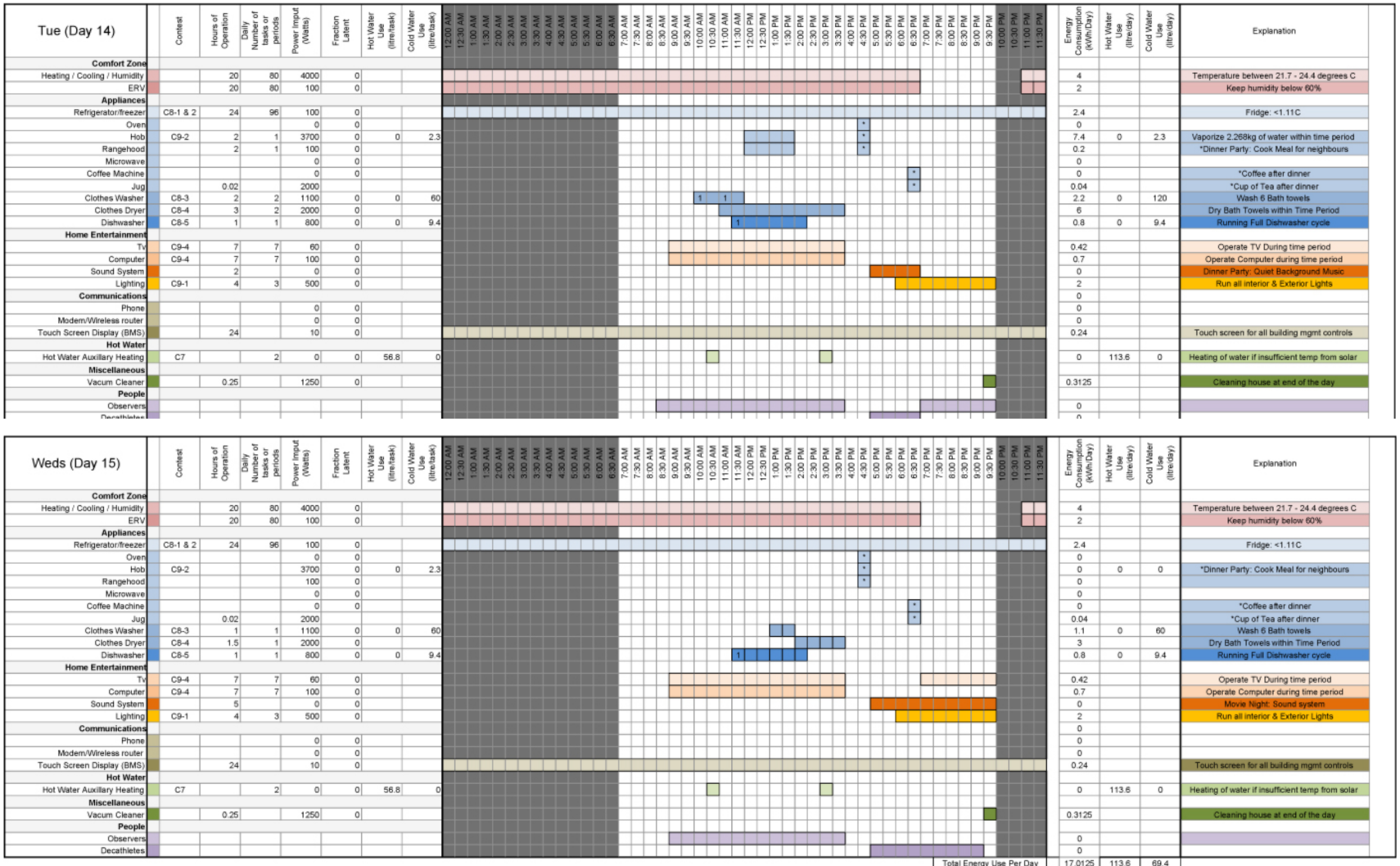

Tue (Day 14)	Contest	Hours of Operation	Daily Number of Uses or periods	Power Input (Watts)	Fraction Latent	Hot Water Use (litre/task)	Cold Water Use (litre/task)	Energy Consumption (kWh/Day)	Hot Water Use (litre/day)	Cold Water Use (litre/day)	Explanation
Comfort Zone											
Heating / Cooling / Humidity		20	80	4000	0			4			Temperature between 21.7 - 24.4 degrees C
ERV		20	80	100	0			2			Keep humidity below 60%
Appliances											
Refrigerator/freezer	C8-1 & 2	24	96	100	0			2.4			Fridge: <1.11C
Oven				0	0			0			
Hob	C9-2	2	1	3700	0	0	2.3	7.4	0	2.3	Vaporize 2.268kg of water within time period
Rangehood		2	1	100	0			0.2			*Dinner Party: Cook Meal for neighbours
Microwave				0	0			0			
Coffee Machine				0	0			0			*Coffee after dinner
Jug		0.02		2000				0.04			*Cup of Tea after dinner
Clothes Washer	C8-3	2	2	1100	0	0	60	2.2	0	120	Wash 6 Bath towels
Clothes Dryer	C8-4	3	2	2000	0			6			Dry Bath Towels within Time Period
Dishwasher	C8-5	1	1	800	0	0	9.4	0.8	0	9.4	Running Full Dishwasher cycle
Home Entertainment											
Tv	C9-4	7	7	60	0			0.42			Operate TV During time period
Computer	C9-4	7	7	100	0			0.7			Operate Computer during time period
Sound System		2		0	0			0			Dinner Party: Quiet Background Music
Lighting	C9-1	4	3	500	0			2			Run all interior & Exterior Lights
Communications								0			
Phone				0	0			0			
Modem/Wireless router				0	0			0			
Touch Screen Display (BMS)		24		10	0			0.24			Touch screen for all building mgmt controls
Hot Water											
Hot Water Auxillary Heating	C7		2	0	0	56.8	0	0	113.6	0	Heating of water if insufficient temp from solar
Miscellaneous											
Vacum Cleaner		0.25		1250	0			0.3125			Cleaning house at end of the day
People											
Observers								0			
Decathletes								0			

Weds (Day 15)	Contest	Hours of Operation	Daily Number of Uses or periods	Power Input (Watts)	Fraction Latent	Hot Water Use (litre/task)	Cold Water Use (litre/task)	Energy Consumption (kWh/Day)	Hot Water Use (litre/day)	Cold Water Use (litre/day)	Explanation
Comfort Zone											
Heating / Cooling / Humidity		20	80	4000	0			4			Temperature between 21.7 - 24.4 degrees C
ERV		20	80	100	0			2			Keep humidity below 60%
Appliances											
Refrigerator/freezer	C8-1 & 2	24	96	100	0			2.4			Fridge: <1.11C
Oven				0	0			0			
Hob	C9-2			3700	0	0	2.3	0	0	0	*Dinner Party: Cook Meal for neighbours
Rangehood				100	0			0			
Microwave				0	0			0			
Coffee Machine				0	0			0			*Coffee after dinner
Jug		0.02		2000				0.04			*Cup of Tea after dinner
Clothes Washer	C8-3	1	1	1100	0	0	60	1.1	0	60	Wash 6 Bath towels
Clothes Dryer	C8-4	1.5	1	2000	0			3			Dry Bath Towels within Time Period
Dishwasher	C8-5	1	1	800	0	0	9.4	0.8	0	9.4	Running Full Dishwasher cycle
Home Entertainment											
Tv	C9-4	7	7	60	0			0.42			Operate TV During time period
Computer	C9-4	7	7	100	0			0.7			Operate Computer during time period
Sound System		5		0	0			0			Movie Night: Sound system
Lighting	C9-1	4	3	500	0			2			Run all interior & Exterior Lights
Communications								0			
Phone				0	0			0			
Modem/Wireless router				0	0			0			
Touch Screen Display (BMS)		24		10	0			0.24			Touch screen for all building mgmt controls
Hot Water											
Hot Water Auxillary Heating	C7		2	0	0	56.8	0	0	113.6	0	Heating of water if insufficient temp from solar
Miscellaneous											
Vacum Cleaner		0.25		1250	0			0.3125			Cleaning house at end of the day
People											
Observers								0			
Decathletes								0			
							Total Energy Use Per Day	17.0125	113.6	69.4	
							Total Water (Hot and Cold)		183		

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45.69 % HAVC

24.32 % Other

13. 38 % Water Heater

10.30 % Washer & Dryer

6.30 % Hot Water

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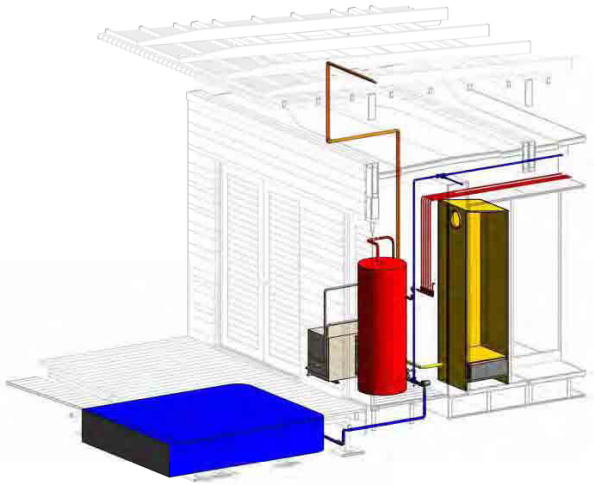
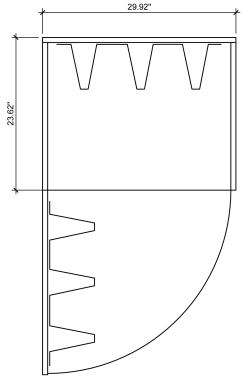
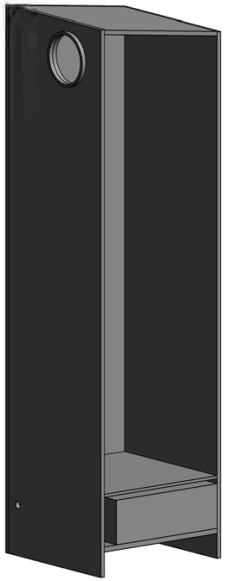
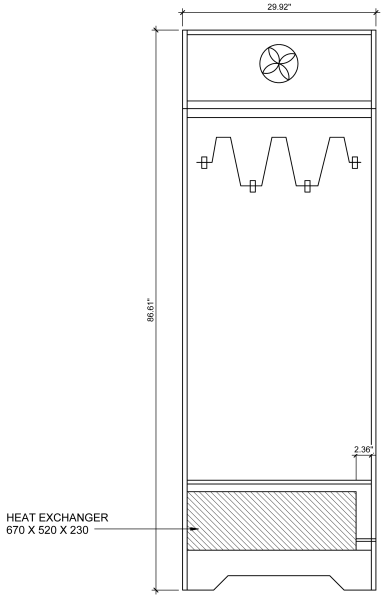
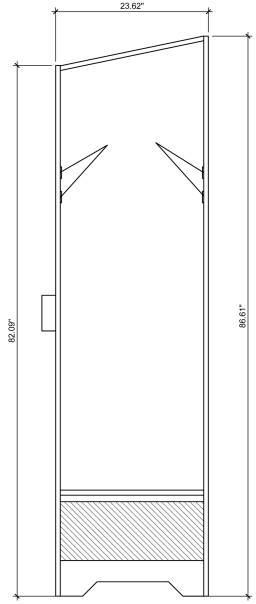




1 HYDRONIC DRYING ROOM ISO







3 HYDRONIC DRYING ROOM

2 HYDRONIC DRYING ROOM
1 : 10

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$$p_{\text{Stat}} = \frac{N_0}{((\tilde{A} - \tilde{B}x)^2 + g^2)^{\tilde{a}}} \times \exp\left(\tilde{d}\arctan\left(\frac{\tilde{B}x - \tilde{A}}{g}\right)\right) \times \exp\left(\frac{1}{\tilde{B}^4}\left(-\tilde{c}x^2 + \tilde{b}x\right)\right)$$

with $\tilde{a} = 1 + \frac{3\tilde{A}^2c - a\tilde{B}^2 - 2\tilde{A}b\tilde{B} - c\sigma_A^2}{\tilde{B}^4}$, $\tilde{b} = 2b\tilde{B}^2 - 4c\tilde{A}\tilde{B}$, $\tilde{c} = c\tilde{B}^2$, $\tilde{d} = \frac{2F\tilde{B}^3 - 2\tilde{A}^3c - 2\sigma_A^2 b\tilde{B} + 2\tilde{A}^2 b\tilde{B} + 6\sigma_A^2 c\tilde{A} + 2\tilde{A}a\tilde{B}^2}{\tilde{B}^4\sigma_A}$, $\tilde{A} = \frac{\sum_p \frac{\sigma_p}{\gamma_p} L_{1p} I_{1p}^M}{(\sum_p (\frac{\sigma_p}{\gamma_p} I_{1p}^M)^2)^{\frac{1}{2}}}$, $\tilde{B} = (\sum_p (\frac{\sigma_p}{\gamma_p} I_{1p}^M)^2)^{\frac{1}{2}}$, and $g = (\sigma_A^2 + \frac{\sum_p (\frac{\sigma_p}{\gamma_p} L_{1p})^2 \cdot \sum_p (\frac{\sigma_p}{\gamma_p} I_{1p}^M)^2 - (\sum_p \frac{\sigma_p}{\gamma_p} L_{1p} I_{1p}^M)^2}{\sum_p (\frac{\sigma_p}{\gamma_p} I_{1p}^M)^2})^{\frac{1}{2}}$.

e =

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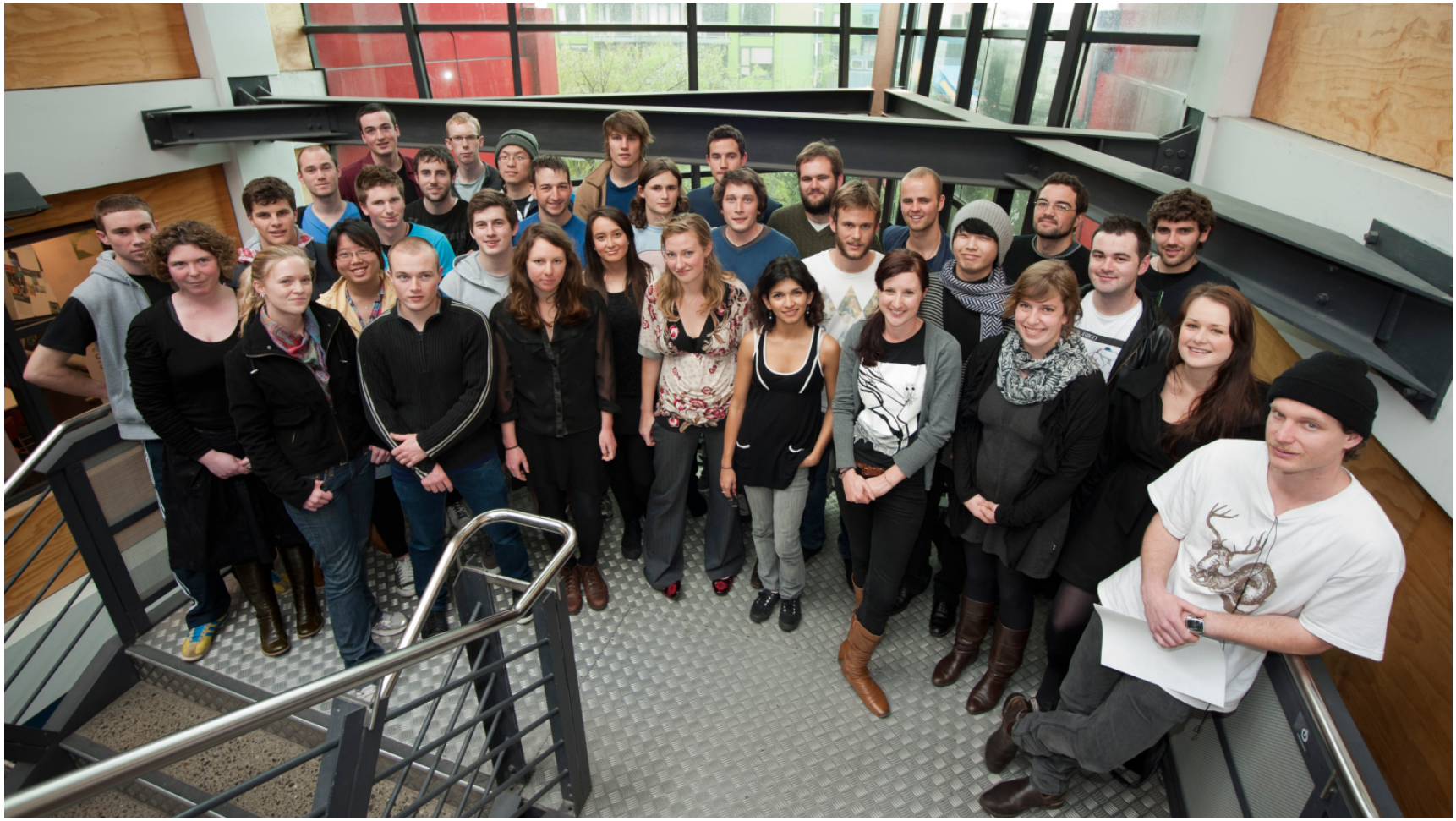

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