



The Greenest Home for the Most Vulnerable



Salus Clementine / Karen's Place
Ottawa, ON, Canada

Authors:

Lisa Ker, Ottawa Salus Executive Director
Sonia Zouari, Salus Clementine Co-project Architect,
PH Designer for CSV Arch



Presenter:

Sonia Zouari, M.Arch (Hons) OAA, OAQ, CPHD



#PassiveHouseSalus
@salusottawa

Wellington, NZ - February 09, 2019

Agenda

- **Motivation** for the project
- **Goals**
- Key building **features**
- **Lessons learned** and **Performance** to date
- **Discussion** and **Q&A**



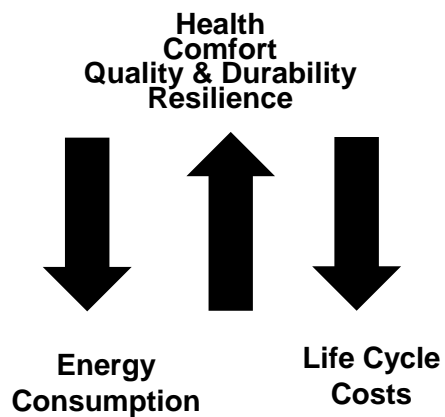
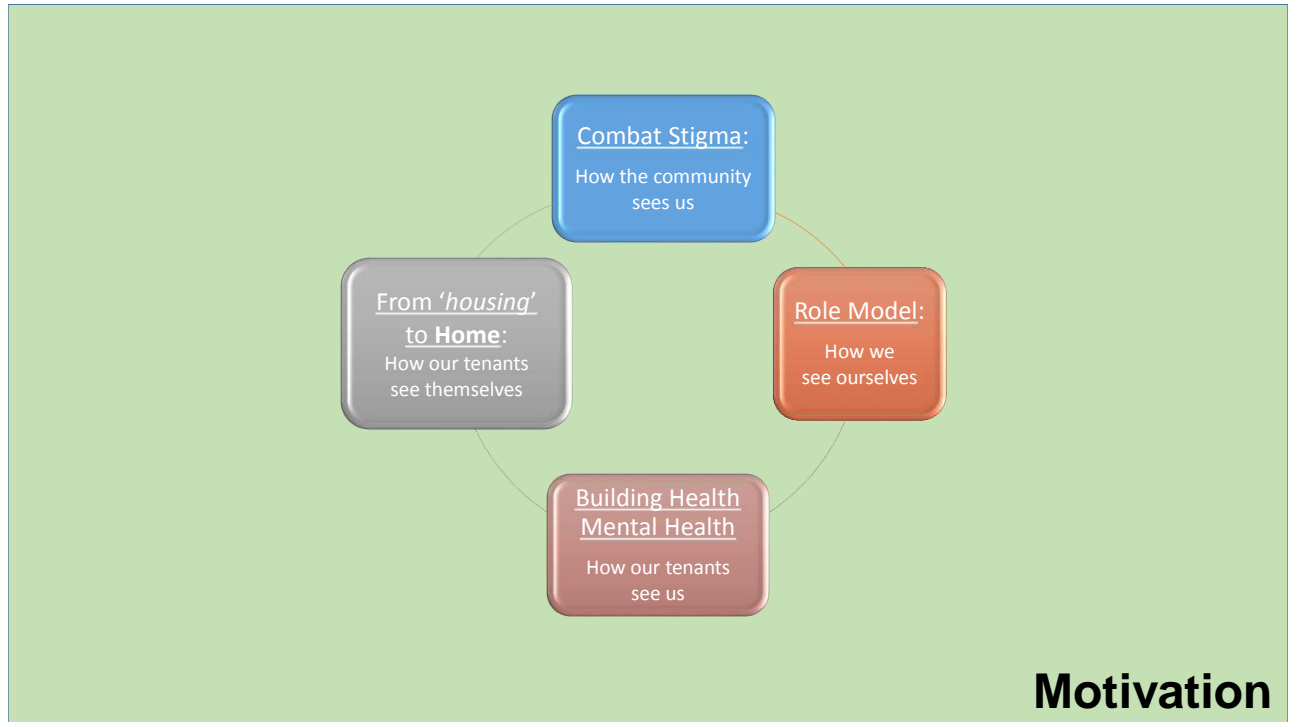




Motivation



Motivation



Passive House Metrics Annual Heating Cost

\$27/yr per apt*

*: 570 kWh per year per 45 m2 apartment (average) @ 4.5 cents/kWh natural gas heating, no night setback

Goals



CSC
OTTAWA CHAPTER
COMMUNICATE
EDUCATE
COLLABORATE



PASSIVHAUS
SOLUTION



metro
1070



CBCradio
92.1



CSC
OTTAWA CHAPTER
COMMUNICATE
EDUCATE
COLLABORATE



CSC
OTTAWA CHAPTER
COMMUNICATE
EDUCATE
COLLABORATE



CSC
OTTAWA CHAPTER
COMMUNICATE
EDUCATE
COLLABORATE

Offices & Action Venues
Systems for Residential Buildings

Passivhaus Solution

...the process and the results of the process...

...the process and the results of the process...

...the process and the results of the process...

Platinum Sponsors

pinwheel

...the process and the results of the process...

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CSC CONNECTIONS CAFÉ...
ECONOMICS OF SUSTAINABILITY

"An engaging evening of information sharing, networking and expert panel discussion to explore the Economics of Sustainability"

You are invited to join the conversation and get

SABMag

...the process and the results of the process...

SABMag

...the process and the results of the process...

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SABMag

...the process and the results of the process...

SALUS CLEMENTINE

Learn more about Passive House energy efficiency certification and the innovative Salus Clementine project that is seeking to be Canada's first multi-unit residential project to achieve this.

THE TYEE

NEWS. CULTURE. SOLUTIONS.

THE TYEE

NEWS. CULTURE. SOLUTIONS.

THE TYEE

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THE TYEE

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NEWS. CULTURE. SOLUTIONS.

OTTAWA CONSTRUCTION NEWS

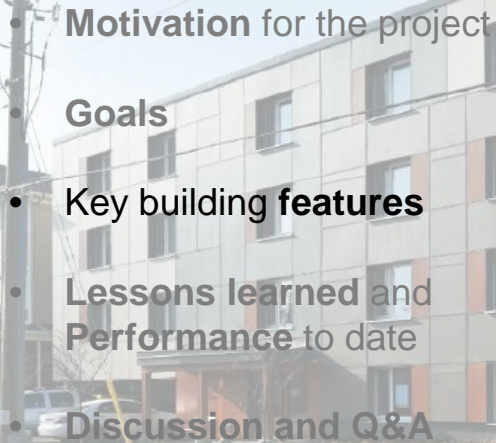
disrupting DESIGN

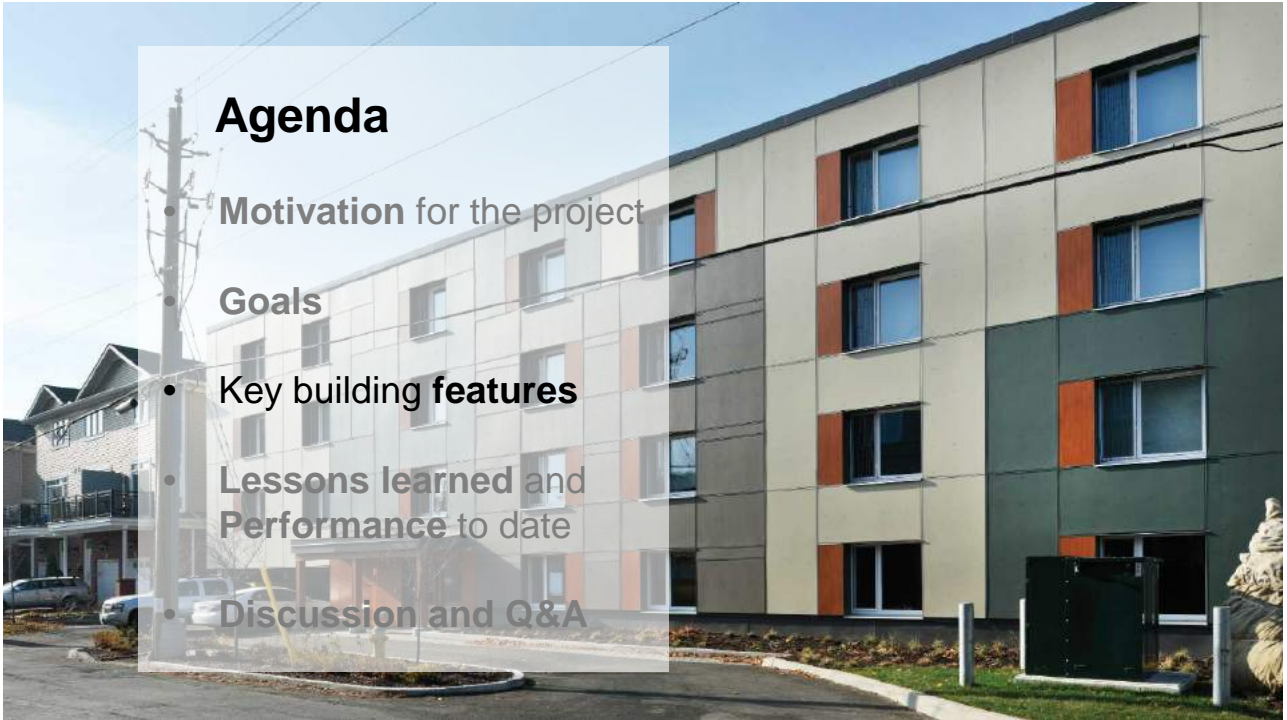
Passive House Residents Quickly Learn: Open Their Homes.

International Passive House Days

13-15 November 2015

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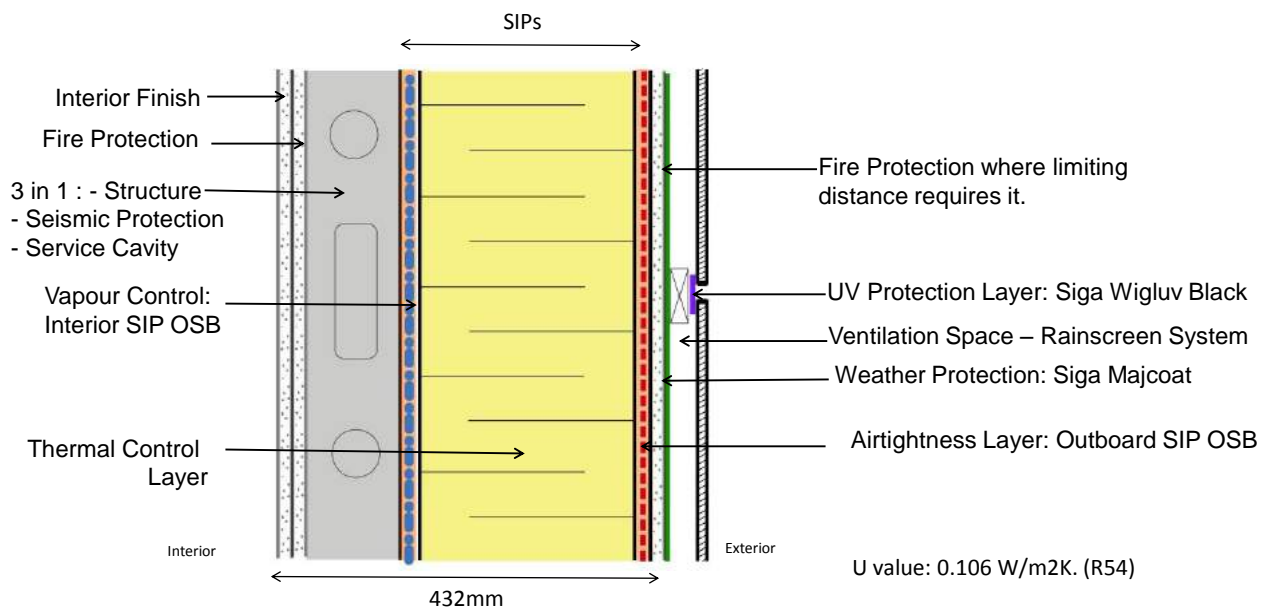
A LIGHT STEEL STRUCTURE ! for:

- Easier Fireproofing
- Lower Weight on the Foundations
- Stronger Seismic Resistance
- Possibility of a panelized system
- Overall more cost effective
- Lower insurance long term



Foundations: Tray slab foundation and concrete foundation wall

Insulation Strategy

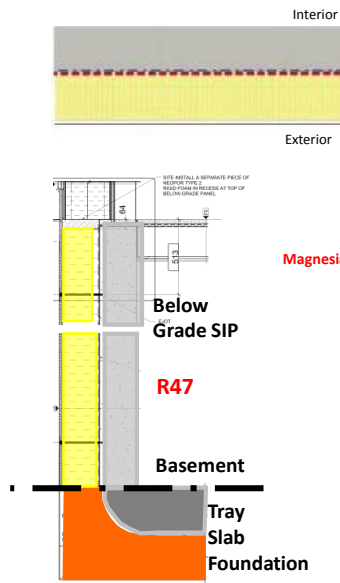


Typical Exterior Wall Assembly

SIPs... Below Grade Above Grade & on the Roof



Locally manufactured SIPs outboard of the steel frame for affordability, speed of construction and a prefabricated system.



Drainage Layer
Below Grade SIPs
Airtightness & Vapour Control layers
Damp-proofing/ Hydrofugation
Concrete Foundation Wall



Magnesia Board

Below Grade Wall Assembly:

U-Value: **0.122** W/(m²K)

R47



100 mm



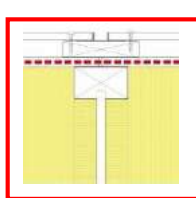
Magnesite Board laps 100mm onto adjacent panel

Foundation walls – Below Grade SIPs

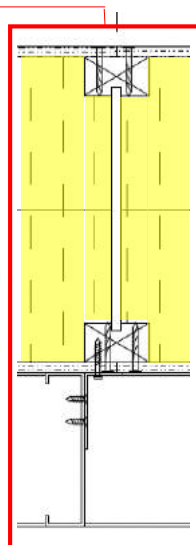
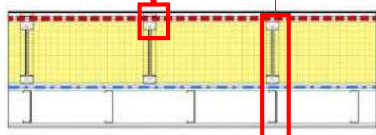


Foundation walls – Below Grade SIPs

KOTT
LUMBER



SIP Connection to
Strapping



SIP Connection to St Studs

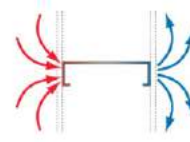


A Non Conventional Wall



Roof Panels

**Continuity of the Insulating Layer
Thermal Bridge Free Design Strategy**



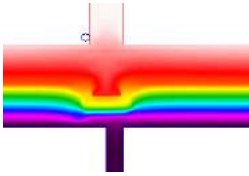
Thermal conductivities:

Neopor Insulation: 0.032 W/mK

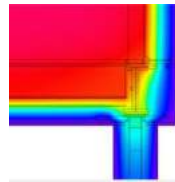
Wood: 0.13 W/mK (x)3 times !

Concrete: 2.3 W/mK (x) 50 times !

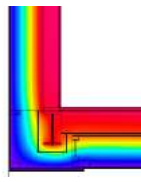
Steel: 50 W/mK (x) 1562 times !



Garbage room
partition



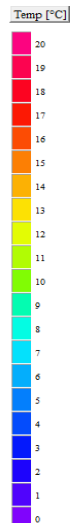
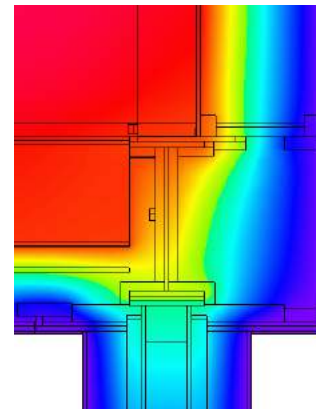
Column connection



Beam

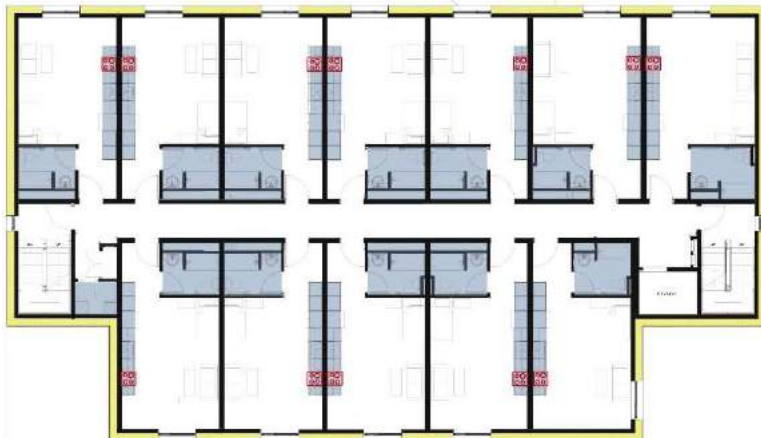


Psi value: 0,024 W/(mK)



Therm Modeling by Peel Passive House Consulting

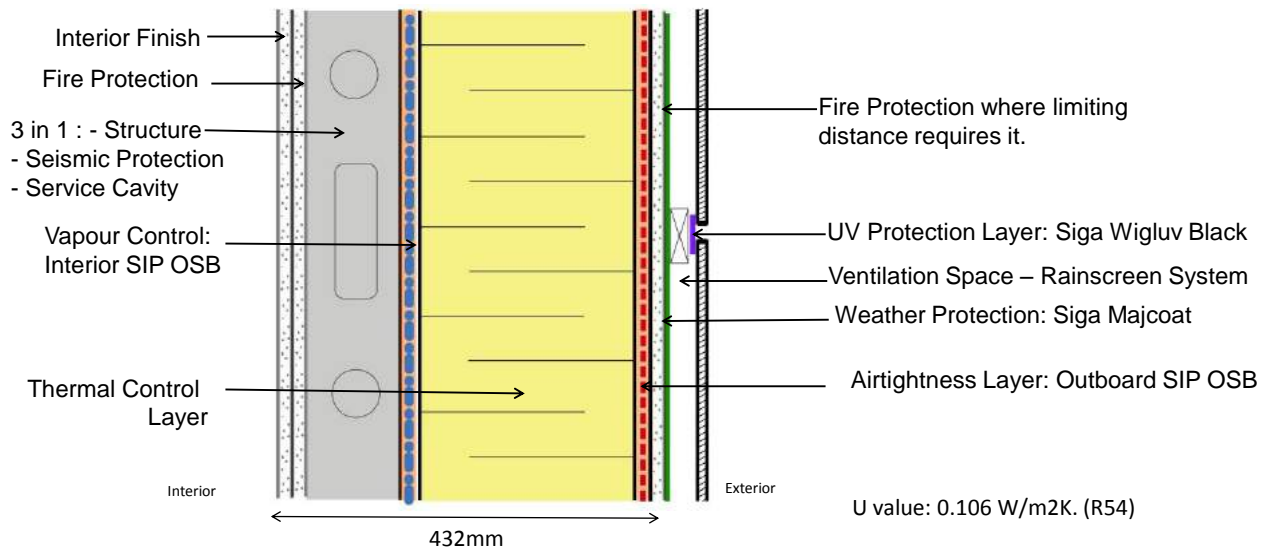
Airtightness Strategy



Air permeability q_{50}

0.60 $\text{m}^3/(\text{h}\cdot\text{m}^2)$

Airtightness by design



Typical Exterior Wall Assembly



All service penetrations are meticulously taped for state of the art airtightness



air tight installation at the Steel brackets with Siga Nail Seal Tape



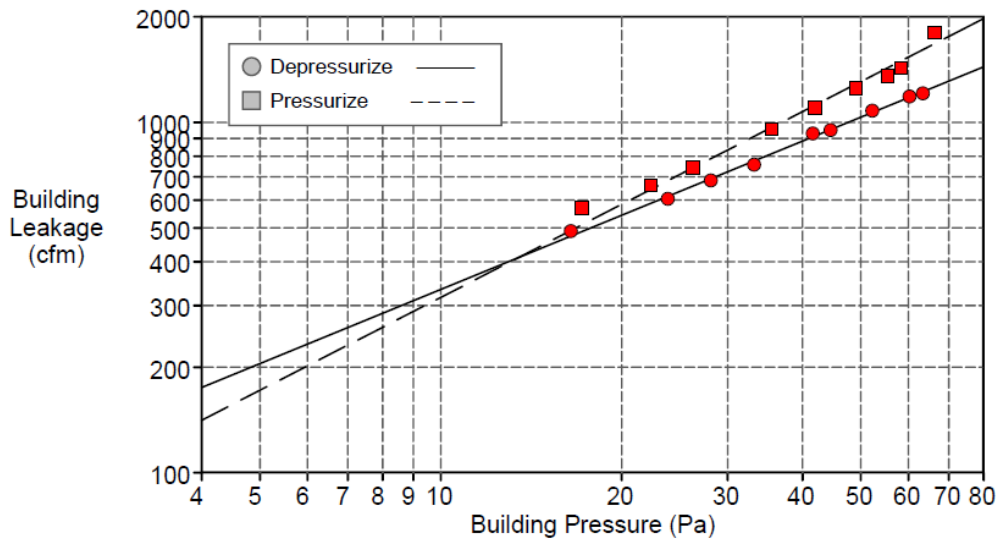
"It feels like I am back to high school dating for the first time"

Salus Clementine Air Tightness Champion



Dryer exhaust damper

Cool Fact:
17 Km of Siga tape!



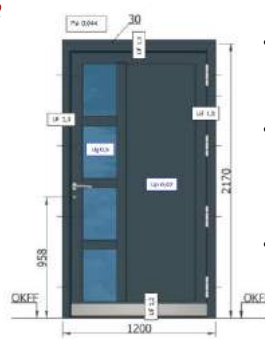
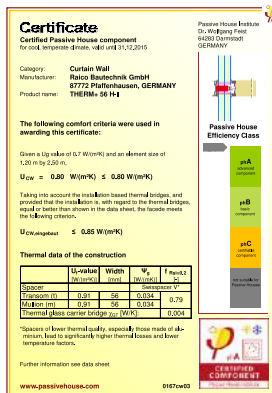
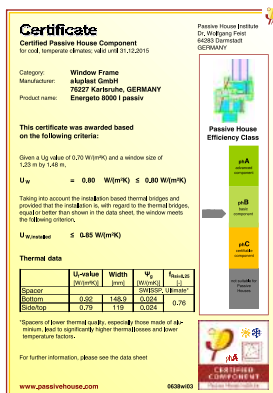
Final Blower Dr Test Results:

Depressurization: 0.30 n50

Pressurization 0.34 n50

Average: **0.32 n50**

Transparent Envelope Components



- Fenêtres:
 $U = 0.80 \text{ W/(m}^2\text{K)}$
- Triple Vitrage:
 $U = 0.57 \text{ W/(m}^2\text{K)}$
SHGC: 0.5
- Portes Exterieurs:
 $U = 1.1 \text{ W/(m}^2\text{K)}$



$U = 0.8 \text{ W/(m}^2\text{K)}, R7$

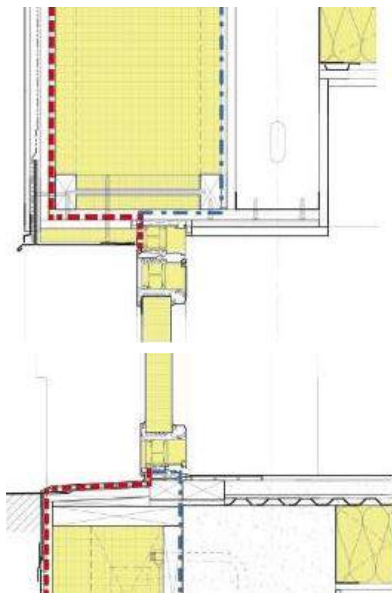
Windows Are Amenities!





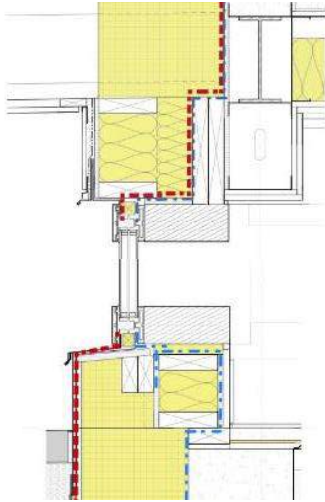
Easier drawn
than installed

PH Windows Installation: Auxiliary Insulation



Thermo-profile underneath doors

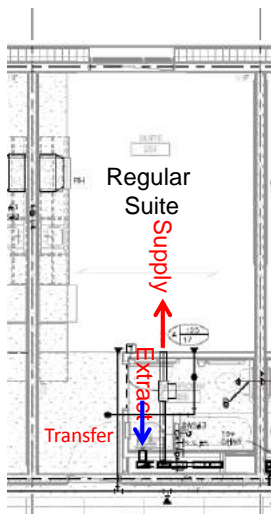
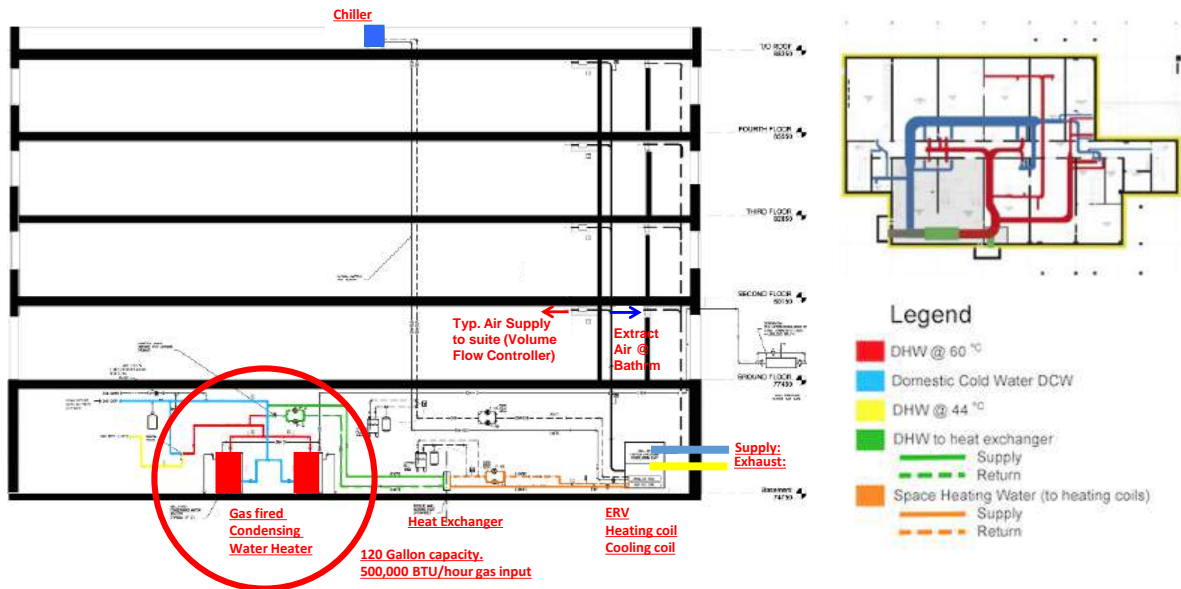
Exterior Doors



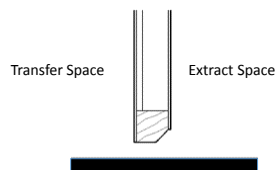
Curtain wall detail



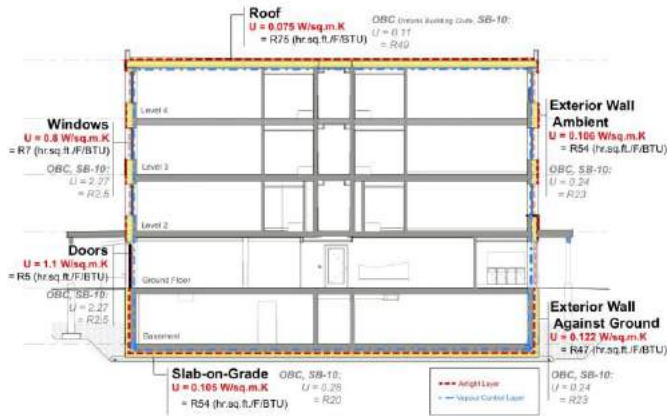
HVAC Strategy



SUITE:
 Supply air 52 m³/person/hr
 (17.7 cfm/person)
 Extract air 52 m³/hr @
 bathroom



Suite Ventilation

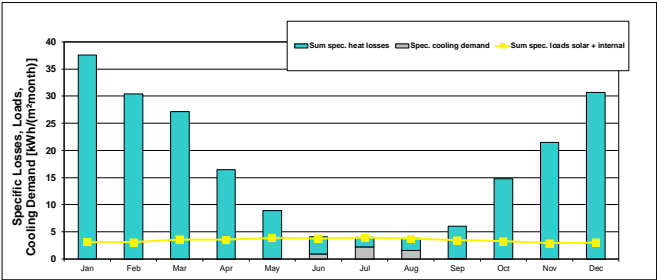
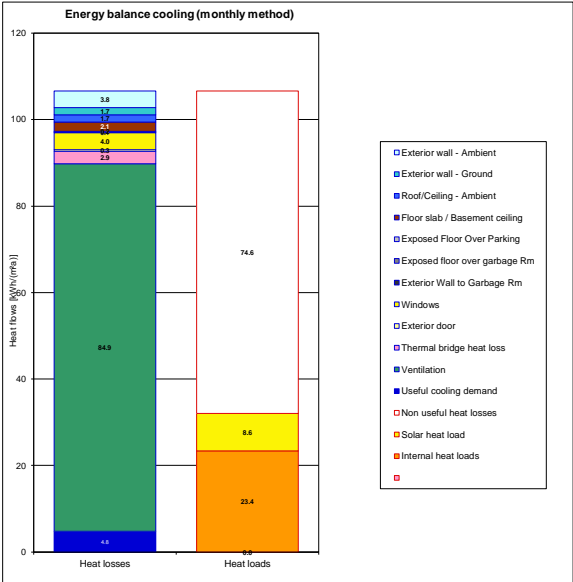
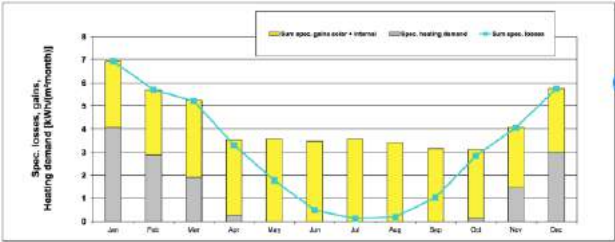
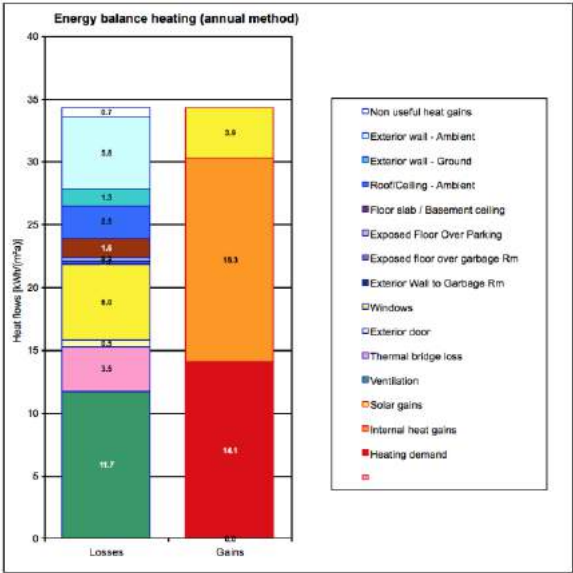


Roof R Value (1.5 x)
 Exterior Walls (2.3 x)
 Below Ground Walls (2.3 x)
 Basement Slab (2.7 x)
 Windows (2.8 x)
 Doors (2 x)

6.5 times More Energy Efficient than Ontario Building Code
 without accounting for all the thermal bridges effects waived in the OBC ...

Treated floor area	2118.5 m ²	Requirements		Fulfilled?*
Heating demand	97 kWh/(m ² a)	= 6.5 x 15 kWh/(m ² a)		no
Heating load	69 W/m ²	10 W/m ²		no

Heating bill: 27\$/Apart/ Year





Lesson #1: A visionary, fully committed and Passive House educated Client



*Where Hope Finds a Home.
Là où l'avenir trouve un chez-soi.*

“why not the highest building standard for society’s most vulnerable people?”

Lesson #2: The Charrette Way

- | | |
|--|--|
| <ul style="list-style-type: none"> ▪ Outdated codes and standards ▪ Narrow financing conventions ▪ Fear of the new and associated risks ▪ Lack of vision | <ul style="list-style-type: none"> ▪ Educate ▪ Inspire ▪ Work collaboratively ▪ Design cross- functionally |
|--|--|



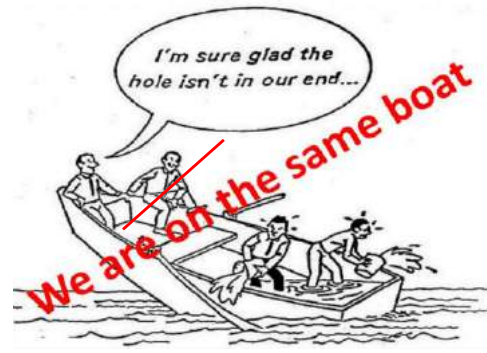
Co- create and innovate achievable solutions

Lesson #3: The “\$\$\$” Power of a Strong Vision



“We wanted to leave something in her memory... This was the best way to do it.” Brother of Karen Nesrallah.

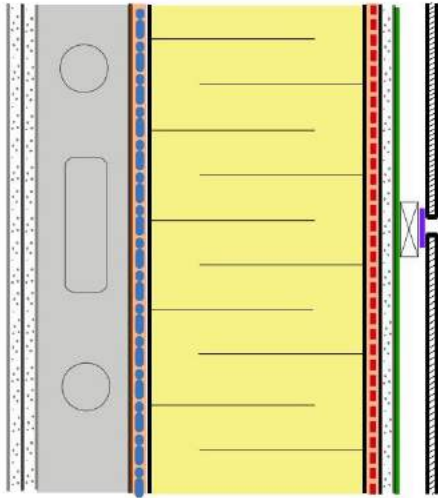
Lesson #4: A committed team can overcome many difficulties



Lesson #5: Integrated ~~Design Process~~ Project Delivery



Lesson #6: Keep it simple ... Airtightness/ Vapour control strategies

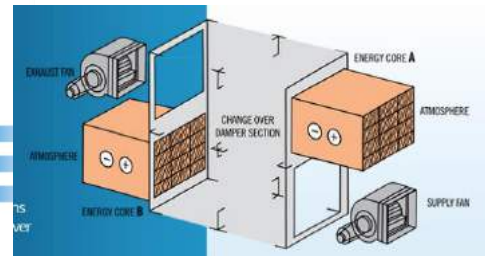


Lesson #7: Use Passive House certified components

TEMPEFF
NORTH AMERICA
Dual Core Energy Recovery

Temperature Efficiency

Tempeff North America products employ Dual Core regenerative technology that offers up to 95% temperature efficiency. Other available technologies offer a maximum of approximately 50% to 75% efficiency under ideal circumstances, and much lower real effectiveness in colder temperatures due to frost. The Dual Core design is significantly more energy efficient in all conditions, thus payback periods are extremely attractive.



Using non certified Ventilation unit (75%)

	kWh/a	kWh/(m²a)
Annual heating demand Q_H =	28305	14

Using PHI-Certified Ventilation unit (85%)

	kWh/a	kWh/(m²a)
Annual heating demand Q_H =	21625	10

PENALTY = 6680 kWh/y

Transmission Losses, Exterior Walls = 12281 kWh/y



42 formerly homeless people are enjoying a higher level of interior comfort and IAQ than residents of even the most expensive apartments in Canada!

Wrapping up



PH is the future...

Thank you...

Questions Welcome

Sonia Zouari
sonia@passivehouse.ca

#PassiveHouseSalus
@salusottawa