



KOKA ARCHITECTURE + DESIGN

# THE ENVELOPE AND PASSIVE HOUSE

MARKEN DESIGN + CONSULTING

An Architect's Visual Design Process

## Slide 1

---

- 1 Let us know when you are ready with any revisions and we will download the ppt again and send it off. thx.  
Herman Kao, 2016-09-15
- 1 Thanks, Herman! I have finished updating the PH slides and they should be ready to export to ppt and send off.  
Marybeth Welty, 2016-09-15
- 2 Just exported to powerpoint on windows and it seems to work with the fonts.  
Herman Kao, 2016-09-15
- 3 Hi Marybeth  
Herman Kao, 2016-09-15
- 5 Herman, is this generally a simple enough diagram?  
Chenyue Zhang, 2016-09-15
- 4 Yes looks good. I'll add in some captions.  
Herman Kao, 2016-09-15
- 5 Marybeth, if you can provide the name, designer, year, and location of the reference projects, that would be great!  
Herman Kao, 2016-09-15
- 6 Marybeth, please let us know if the proposed formatting works for you as we are thinking we may not need the grey bar on the bottom.  
Herman Kao, 2016-09-15
- 7 Team, this is a draft, all content can be modified.  
Herman Kao, 2016-09-15

## **Koka architecture + design**

Herman Kao, Architect AIBC LEED AP and Joseph Kardum, Architect AIBC LEED AP are Principals in the Vancouver studio of KOKA Architecture and Design Inc, an architectural practice in British Columbia with a special interest in sustainable architecture and healthy living environments. Committed to contemporary, innovative and sustainable architecture, the team focuses on creating healthy and cost-effective architecture, including the Passive House concept, with the ultimate goal of positively impacting the lives of each person within the community.

**koka** architecture + design inc.

## **Marken Design + Consult**

Marybeth Welty, B.Sc., DID, LEED AP.

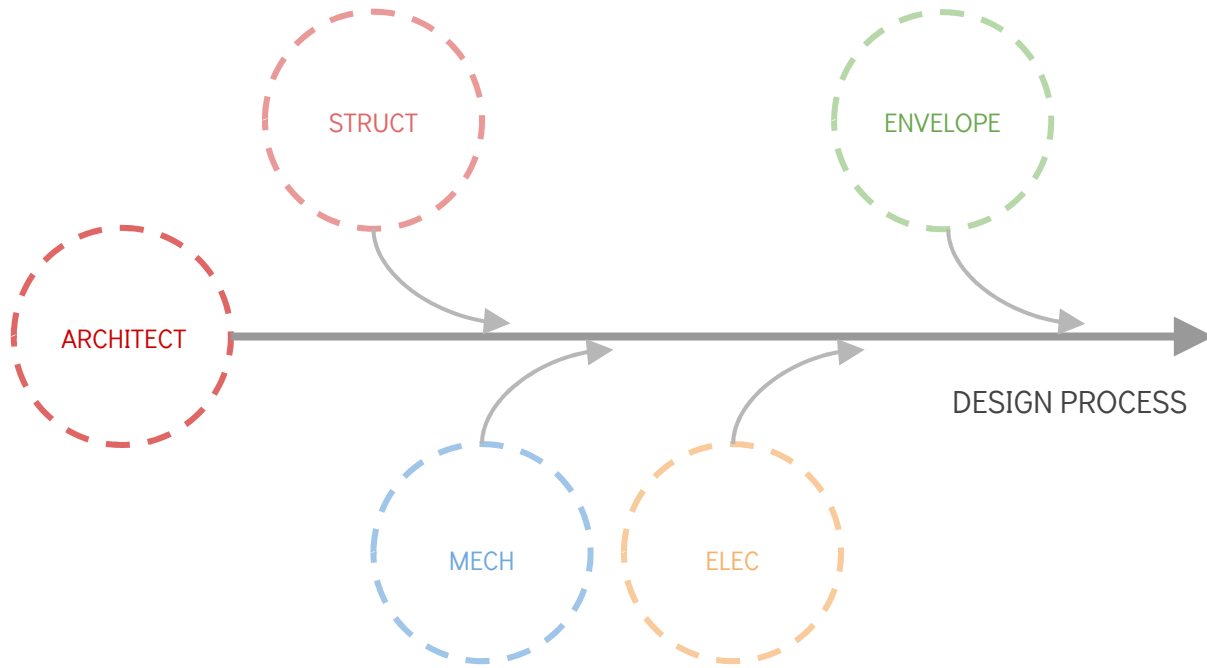
Drawing on her mathematics and pure science background, Marybeth aims to bring optimization, efficiency, and a respect for nature into all of her projects. Combining her art, design, and sustainability experience, Marybeth creates beautiful, healthy spaces in the most environmental, cost efficient, and aesthetically creative way possible. She has worked on several LEED and Passive House projects from both a design and consulting aspect.



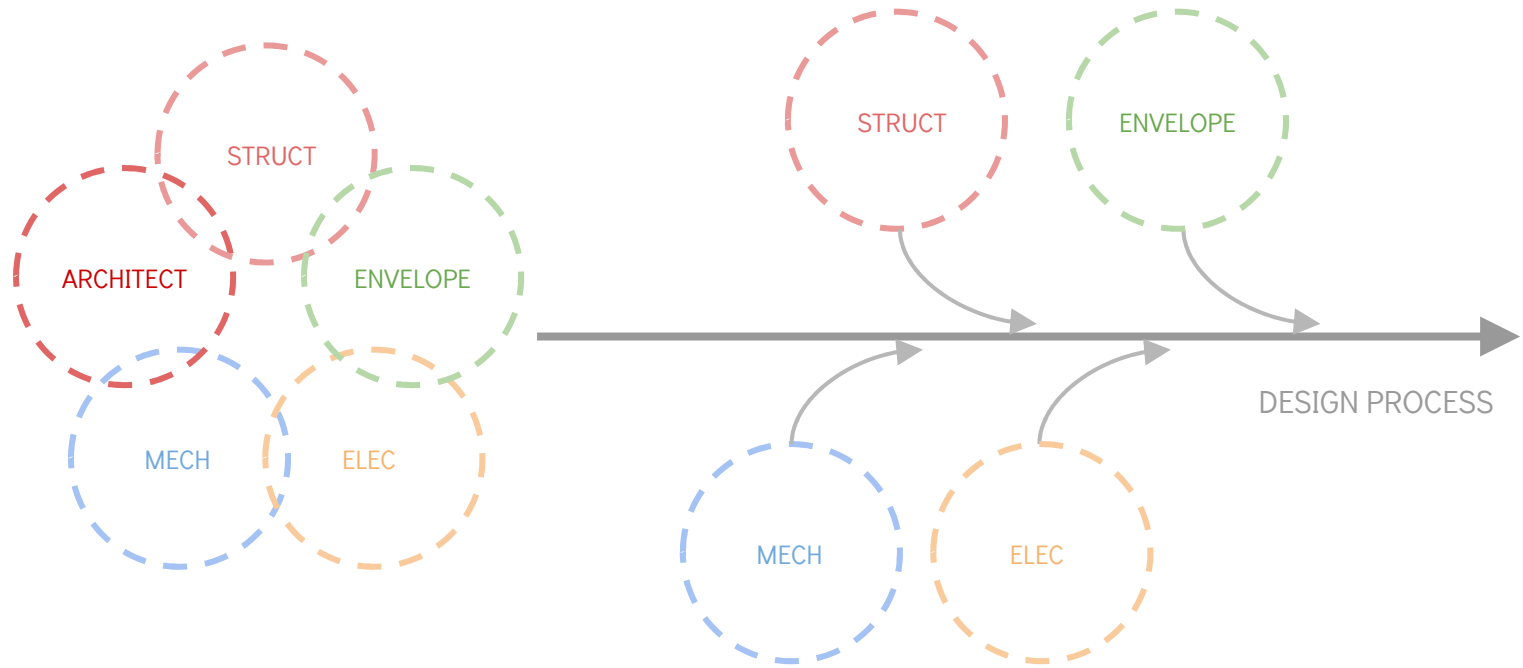
## **The Envelope and Passive House: An Architect's Visual Design Process**

Ideas, Problems, and Collective Solutions... These are the basis of each sustainable building project.

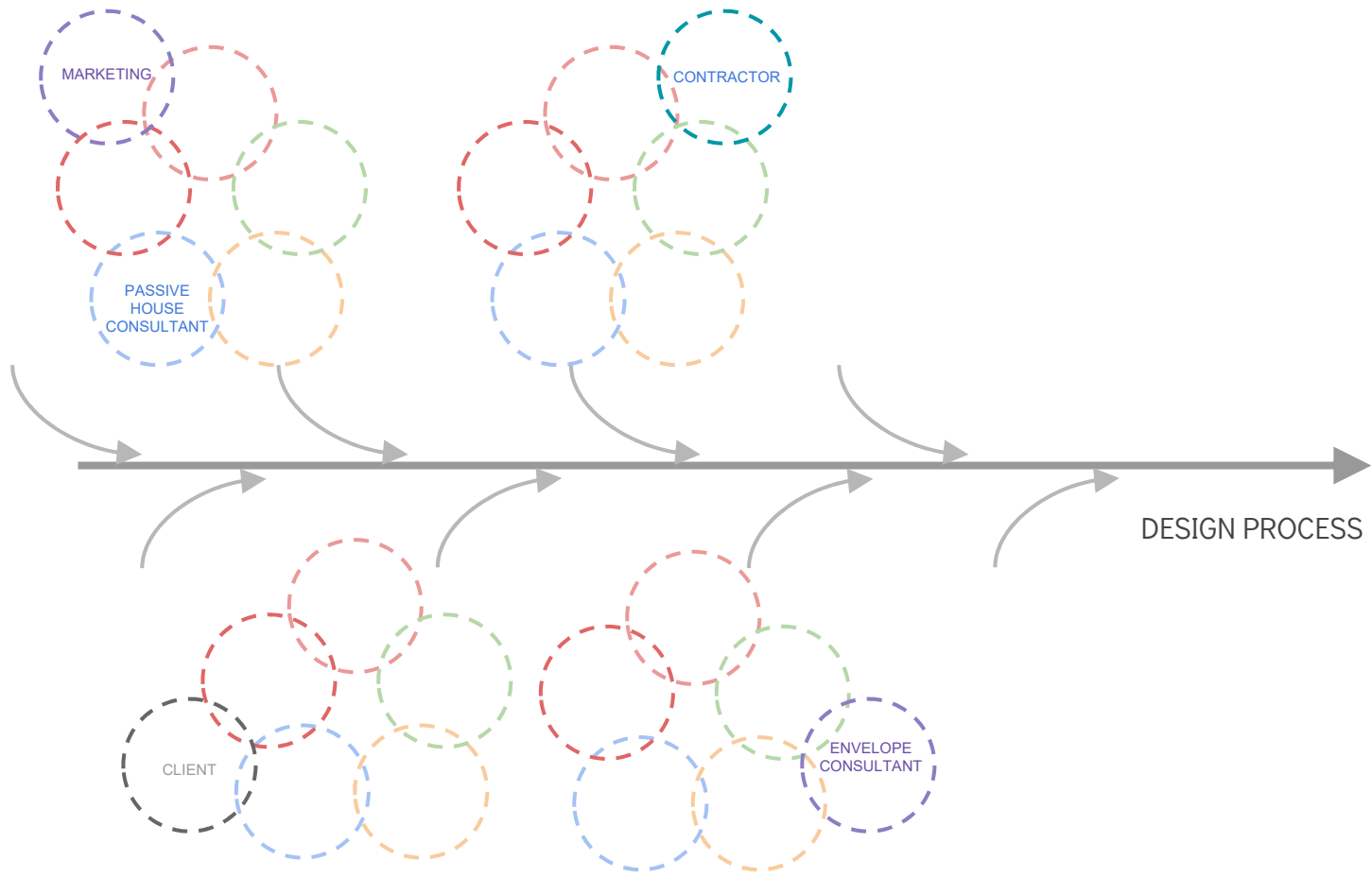
Built forms are being designed with tighter envelopes to address the growing interest in energy savings within single-family and multi-family homes, such as the Passive House standard in Canada. While many factors come into play when designing a sustainable building, all are not evident to all parties during the design process. Therefore this presentation will take a team approach to identify some aspects of the architectural design process as it relates to various building envelope challenges associated with sustainable architecture, and it will pose the question: How can you contribute to the creative commons for sustainable building?



Conventional Approach



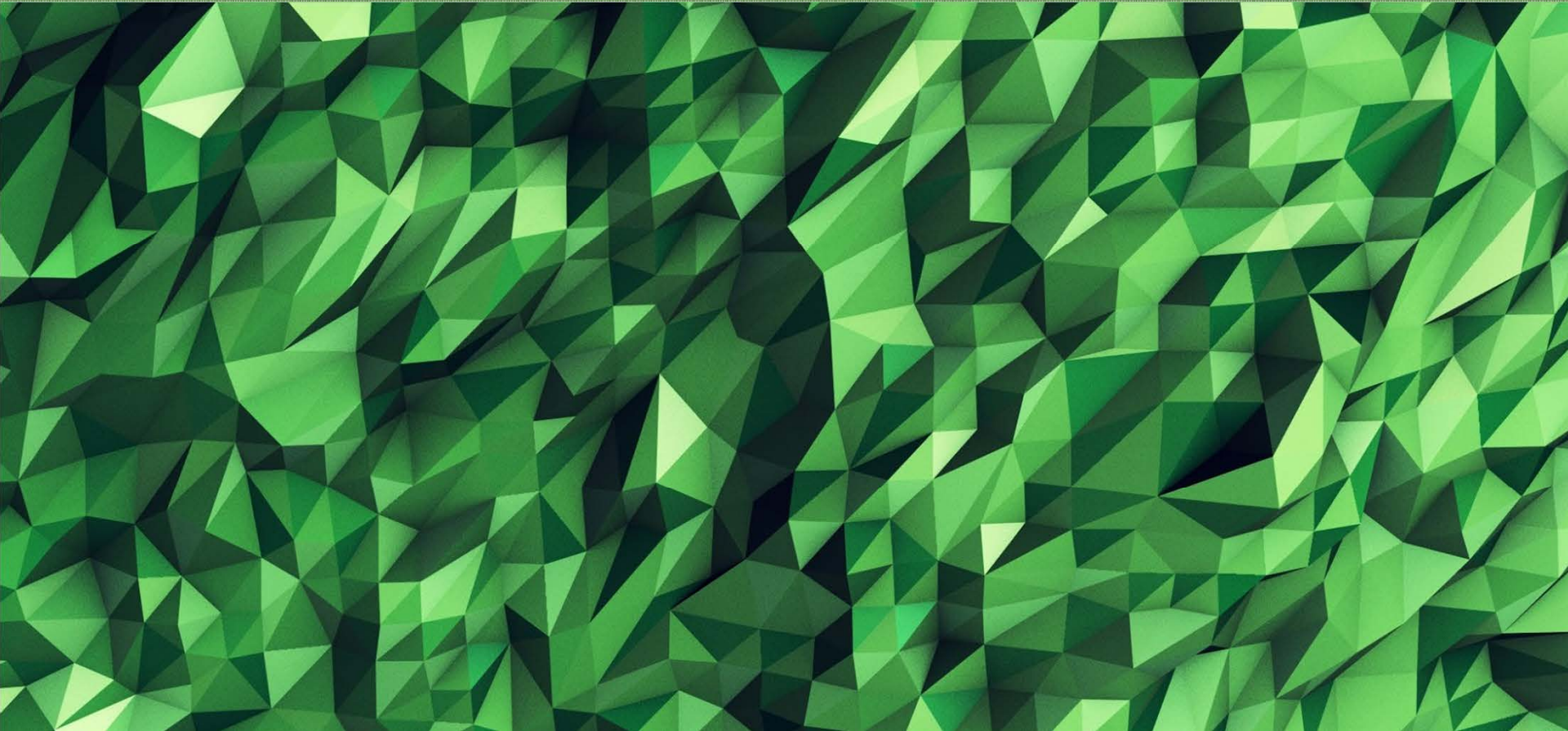
Integrated Approach



Alternative Approaches

# PASSIVE HOUSE OVERVIEW

## Introduction to Passive House







Location : Regina

Year : Completed in 1977

Designer : Saskatchewan Research Council and Harold Orr

## Saskatchewan House

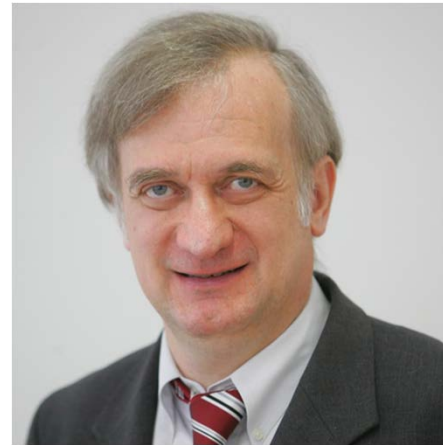
## Slide 8

---

- 1** Marybeth: Do you like these photos or do you prefer the photo on the left?  
Chenyue Zhang, 2016-09-15
- 2** Just the photo on the left, please.  
Marybeth Welty, 2016-09-15



*Prof. Bo Adamson  
Sweden*



*Dr. Wolfgang Feist  
Germany*

Passive House Founders



Designer: Bott, Ridder and Westermeyer  
Location: Darmstadt, Germany  
Year: 1990

# First Passive House



Passive House Institute Founder

Dr. Wolfgang Feist  
Darmstadt, Germany

Passive House Institute

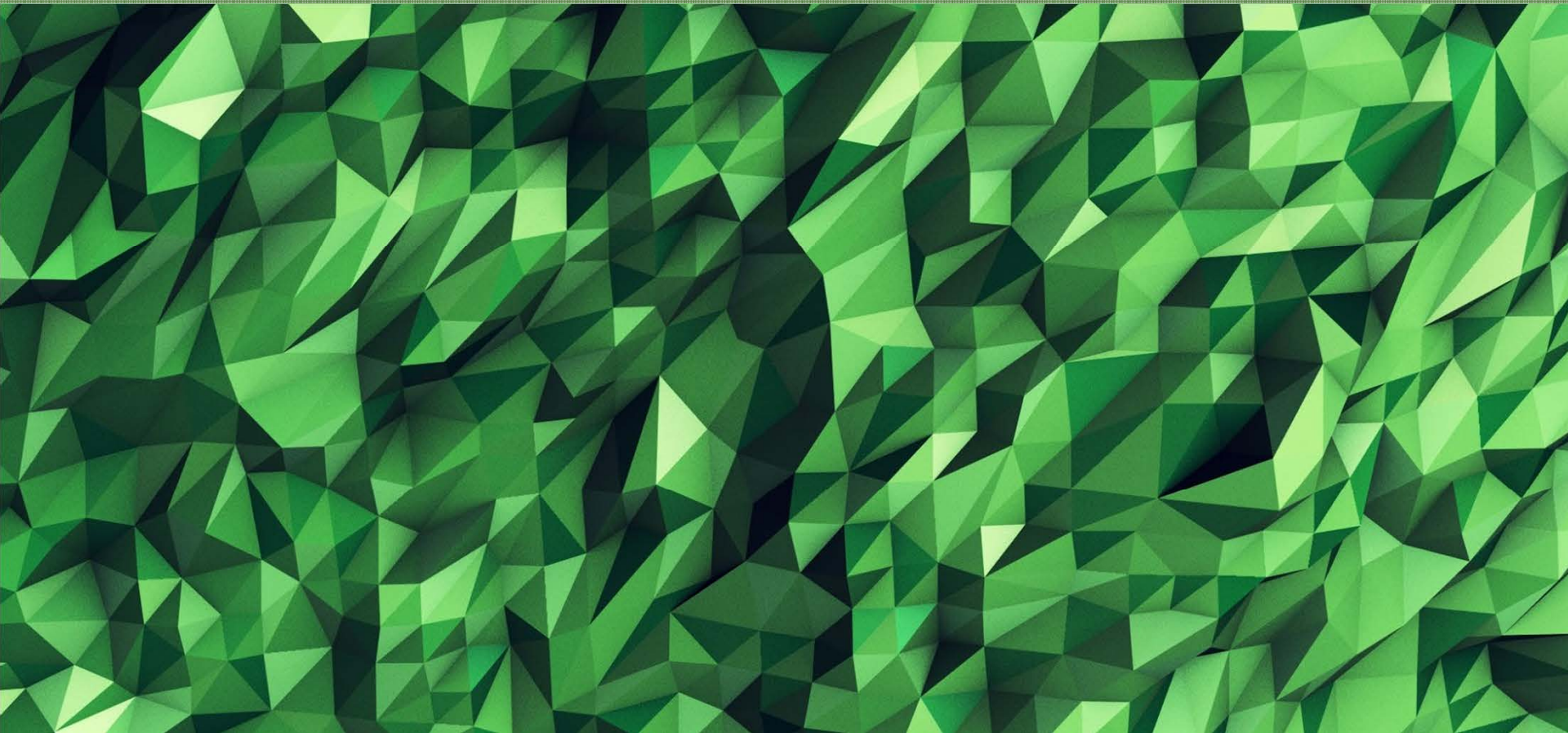


(original image source: <http://www.indiawrites.org/tag/pope-francis-white-house-visit/>)

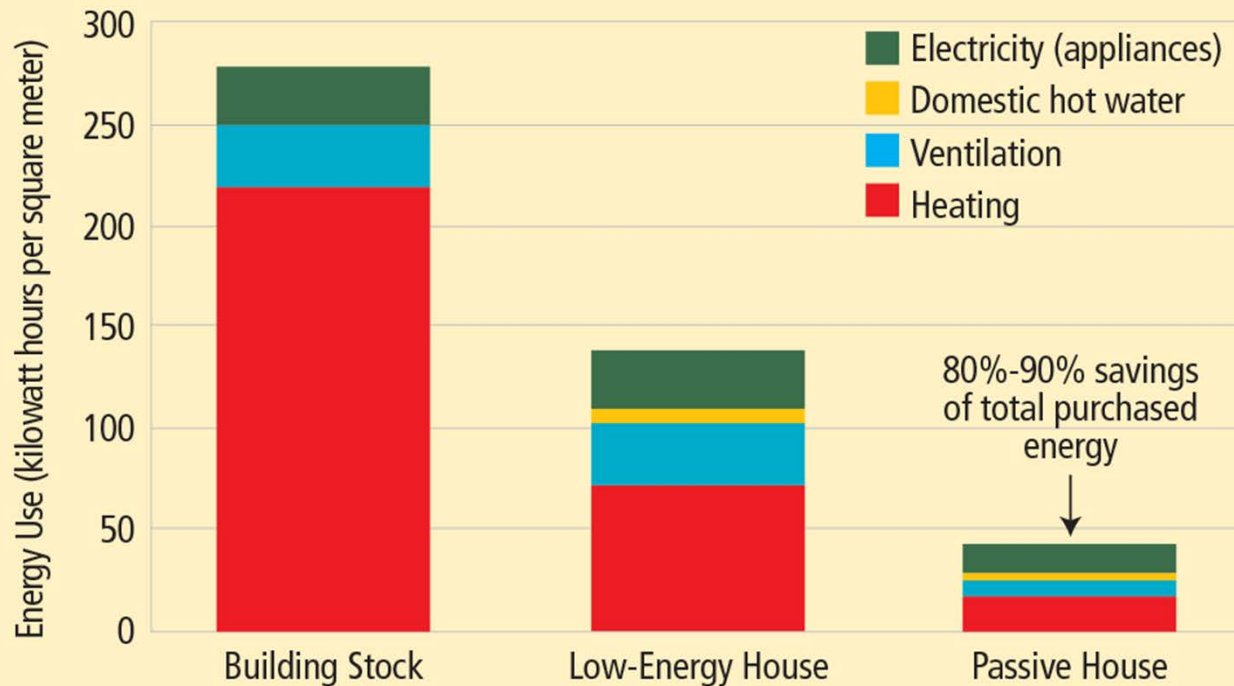
# The Passive House Pope

# PASSIVE HOUSE OVERVIEW

What is Passive House?



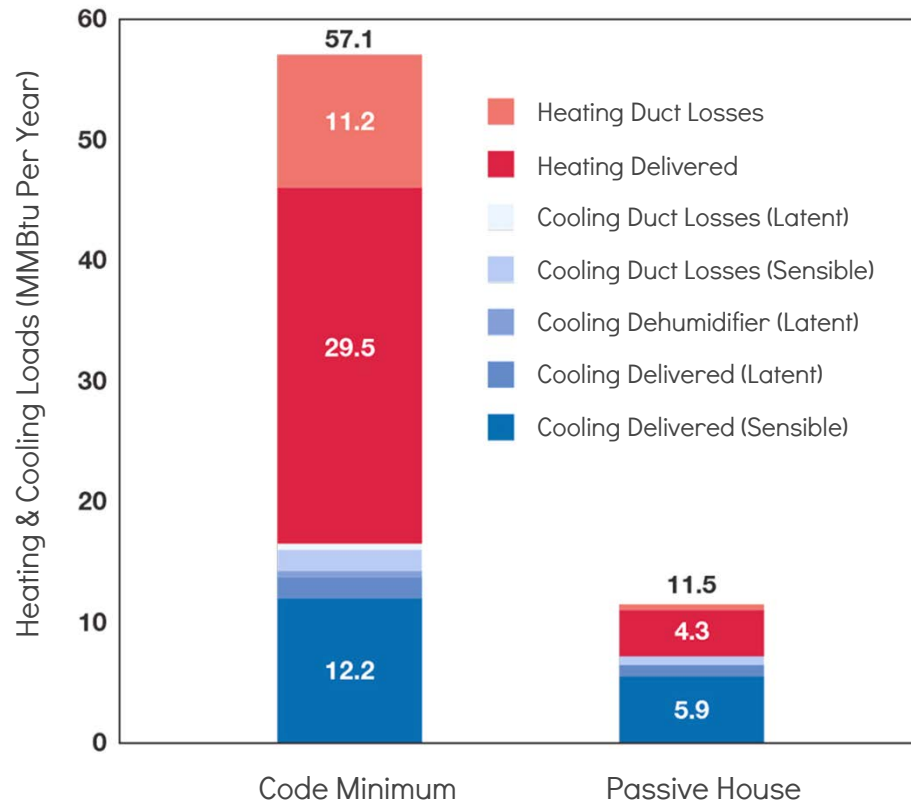
## Passive House Reduces Energy Used by 80-90%



Passive House is the Leading Standard in Energy Efficiency

Energy Efficient



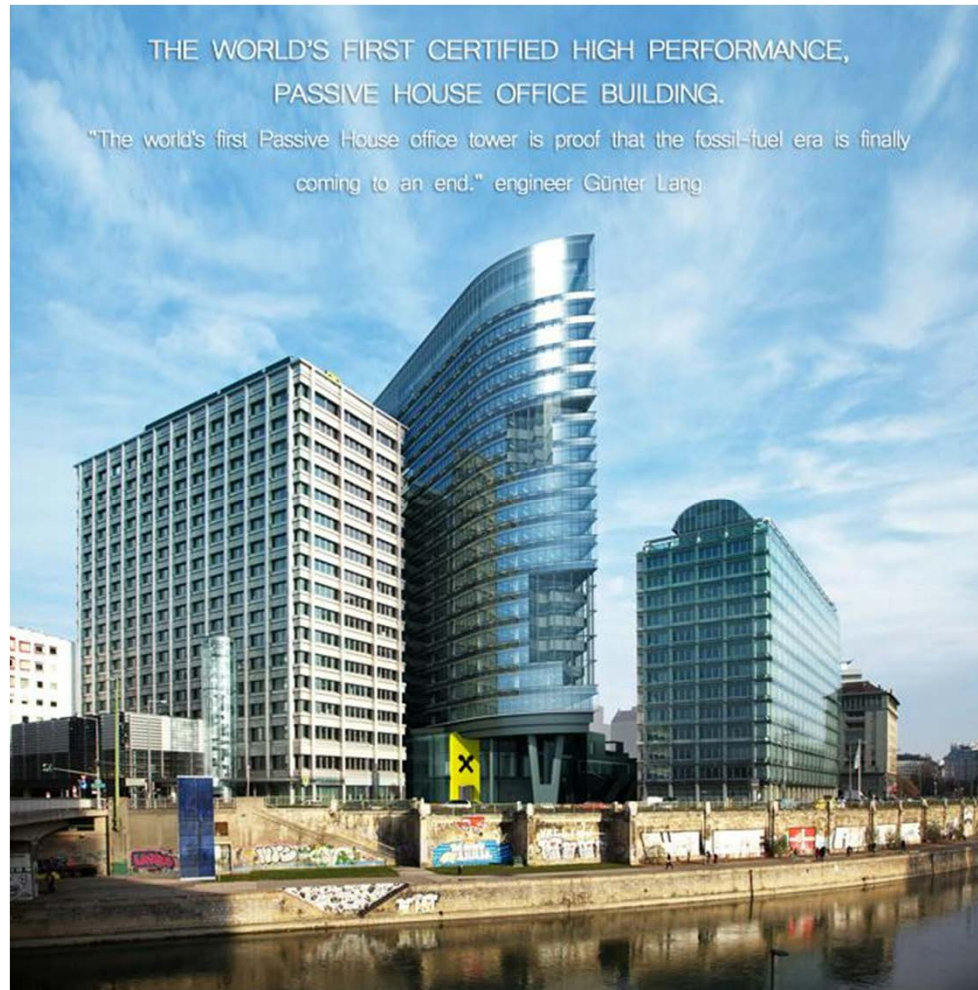


Code-Minimum vs. Passive Houses



Name of Project : LCT ONE Location : Dornbirn, Austria  
Designer : Cree GmbH Year : 2012

PassivHaus =  
Passive Building



## Austrian Raiffeisen-Holding

Designer: ARGE Atelier Hayde Architekten und Architektur Maurer

Location: Vienna, Austria

Year: December 2012



## Cornell Tech Residential

Designer: Handel Architects

Location: New York City

Year: To be Completed 2017



*Image source <http://www.sto.de/>*

## The Bugginger Strasse

Location: Freiburg, Germany  
Year: 2011



## Rewe Supermarket Hannover Wettbergen

Designer: Spengler + Wiescholek

Location: Hannover, Germany

Year: 2013



## Explorer Hotel Oberstdorf

Designer: Arch. Sieber-Renn  
Location: Oberstdorf, Germany  
Year: 2010



## New Rocking House Nursery

Designer: BMJ Architects  
Location: Aberdeen, Scotland  
Year: 2015





## Klinikum Frankfurt Höchst

Coordinated by the Federal Government of the State of Hesse

Location: Frankfurt, Germany

Year: to be Completed in Early 2019

# PASSIVE HOUSE OVERVIEW

## Benefits of Passive House

Thermal Comfort

Sound Insulation

Minimal Maintenance

Resilience

Sustainability

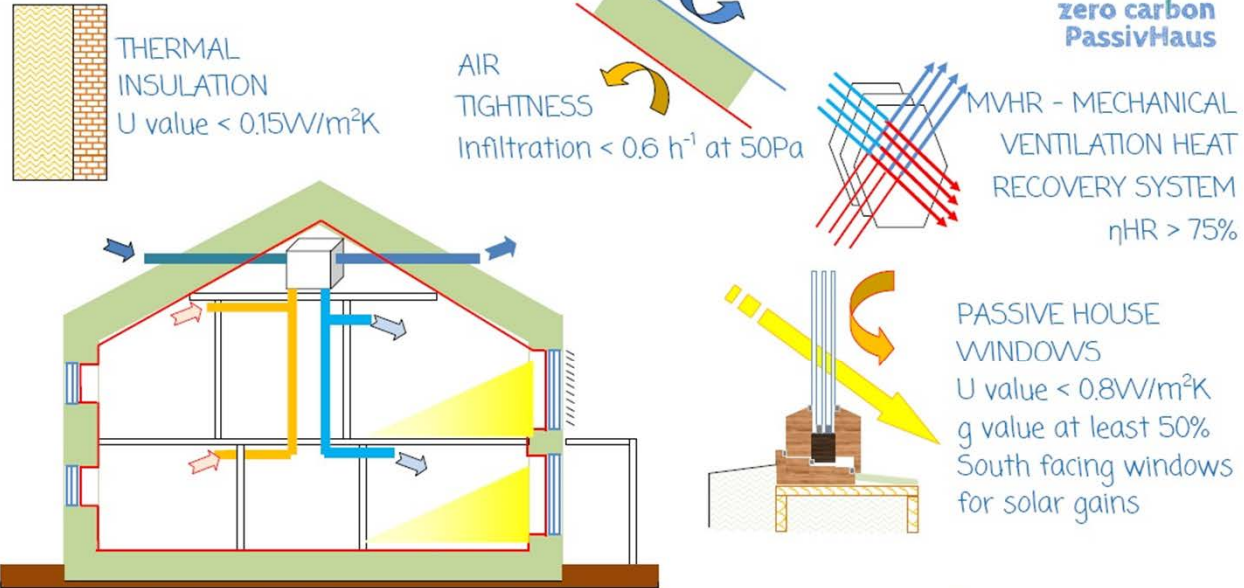
Internationally Embraced



FLORENCIO  
MOLINA CAMPOS  
MUSEO NACIONAL DE BELLAS ARTES  
7 de Abril - 13 de Mayo 2009

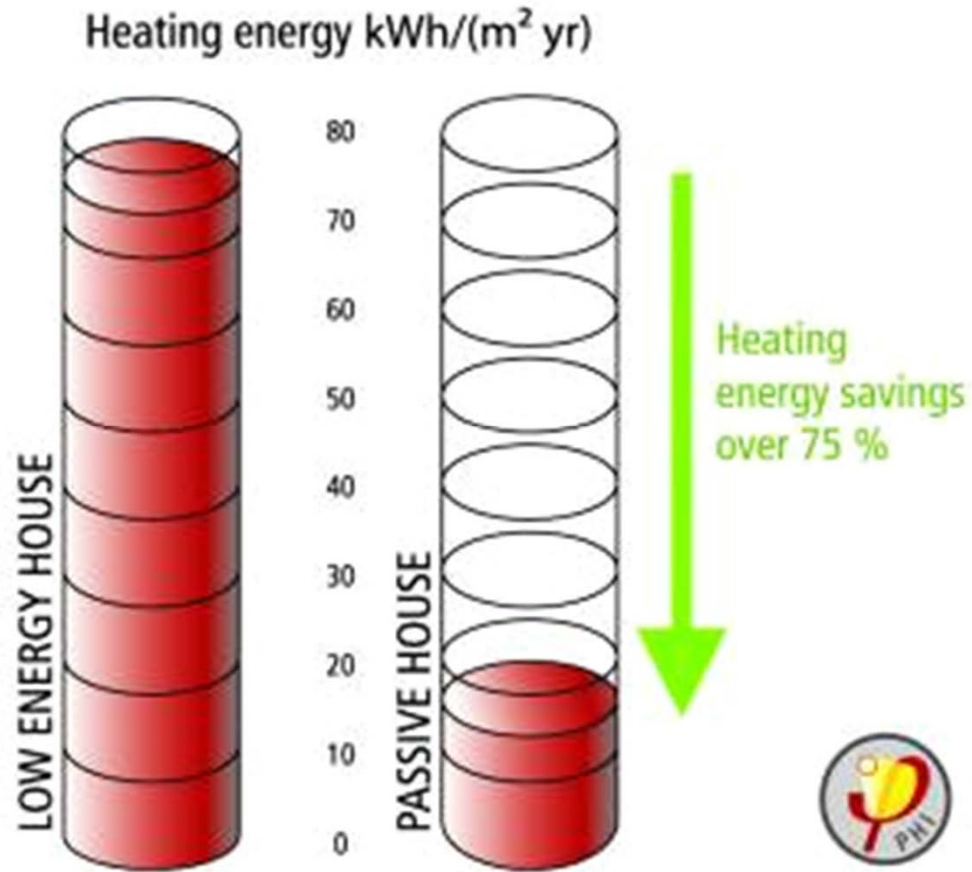
Designed for Thermal Comfort

# PassivHaus basics



"PassivHaus (Passive House) buildings are very well insulated, draught-proofed buildings whose annual space heating is so low that the conventional heating system can be omitted. The small amount of heat still can be delivered to the individual rooms by heating the air supplied by the ventilation system." - PHPP





(Image source: Passive House Institute)

Energy Efficiency



Designed for Minimal Maintenance



Name of Project : Rainbow Passive  
House  
Designer : Marken Design + Consulting

Location: Whistler, BC  
Year: 2012

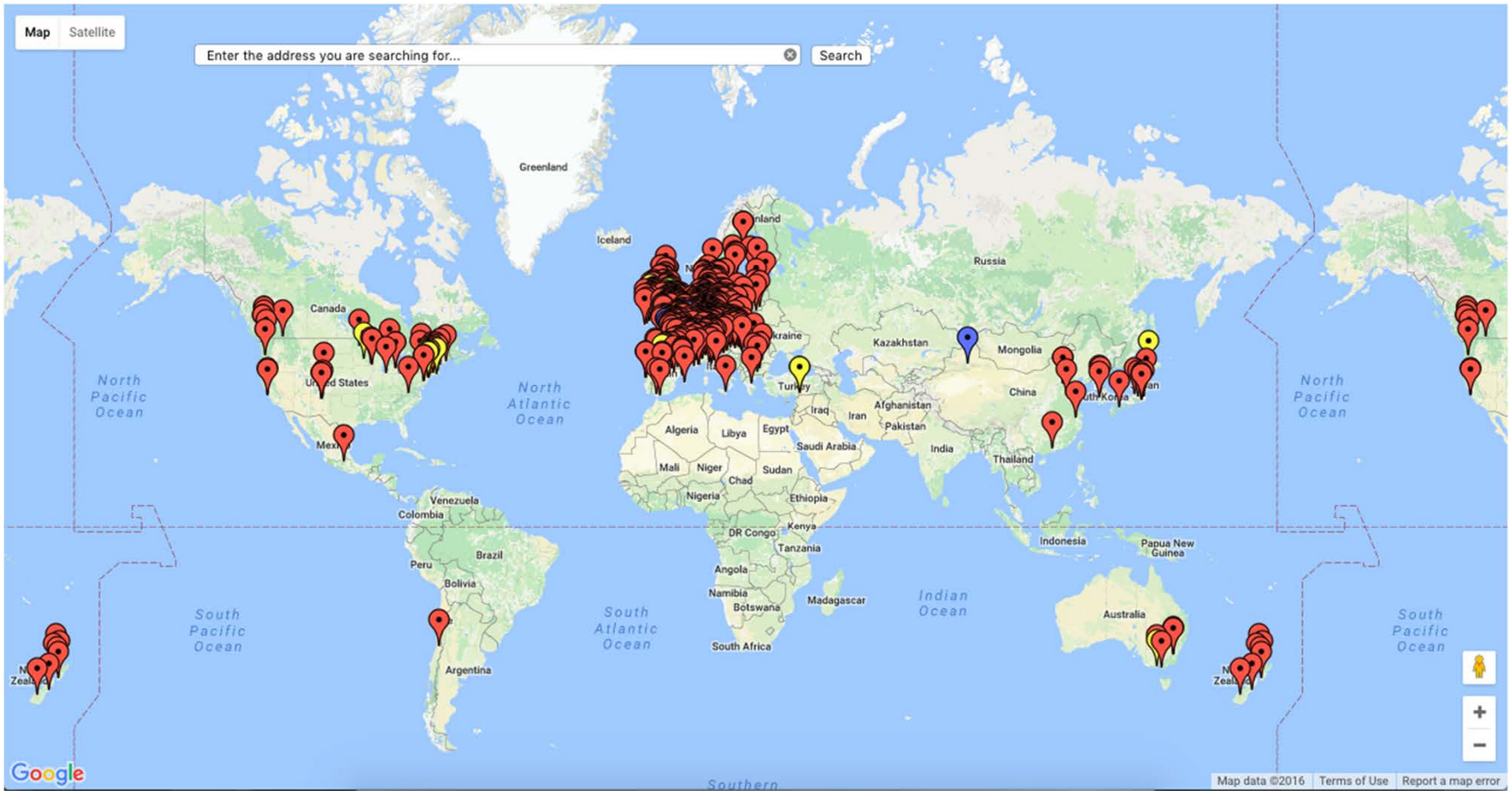
Designed for Resilience



*Name of Project : South Surrey Passive House* Location: Surrey, BC  
*Designer : Marken Design + Consulting* Year: 2013

**Designed for Sustainability**





(Image source: database.passivehouse.com)

# Internationally Embraced

# PASSIVE HOUSE OVERVIEW

## Passive House Design Criteria

Building Shape

Orientation

Shading

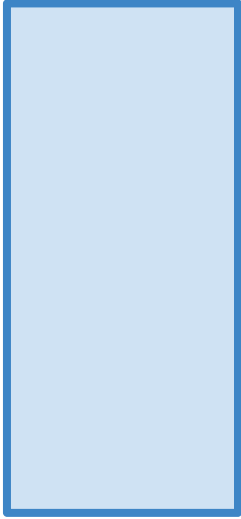
Envelope/Airtightness

Passive Heating/Cooling

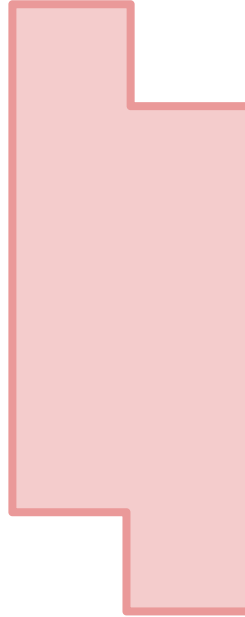
Insulation

Windows

Thermal Bridges



Floor area = 1000sf  
Length of walls = 130'

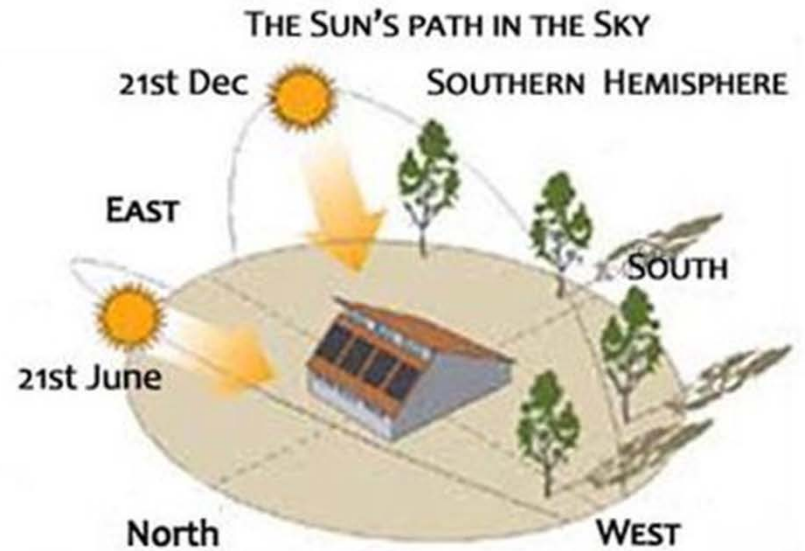
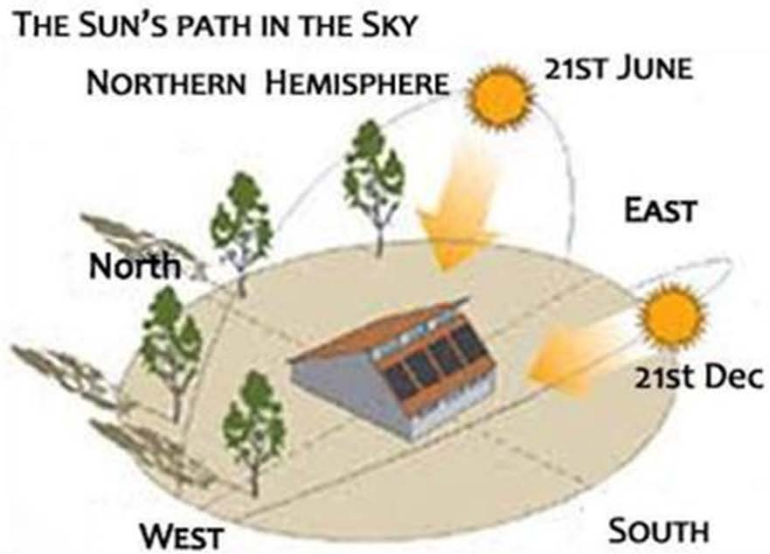


Floor area = 1000sf  
Length of walls = 146'  
12% increase in wall length



Floor area = 1000sf  
Length of walls = 162'  
25% increase in wall length

# Building Shape



## Building Orientation in the Northern and Southern Hemisphere

(Image source: Albert, Righter and Tittmann Architects)



Shading Strategies



## Overhangs

Bruck

Designer: Peter Ruge Architekten

Location: Changxing, Zhejiang Province, China

Year: 2013



## Shading Screens

Loenareal

Designer: Din A4

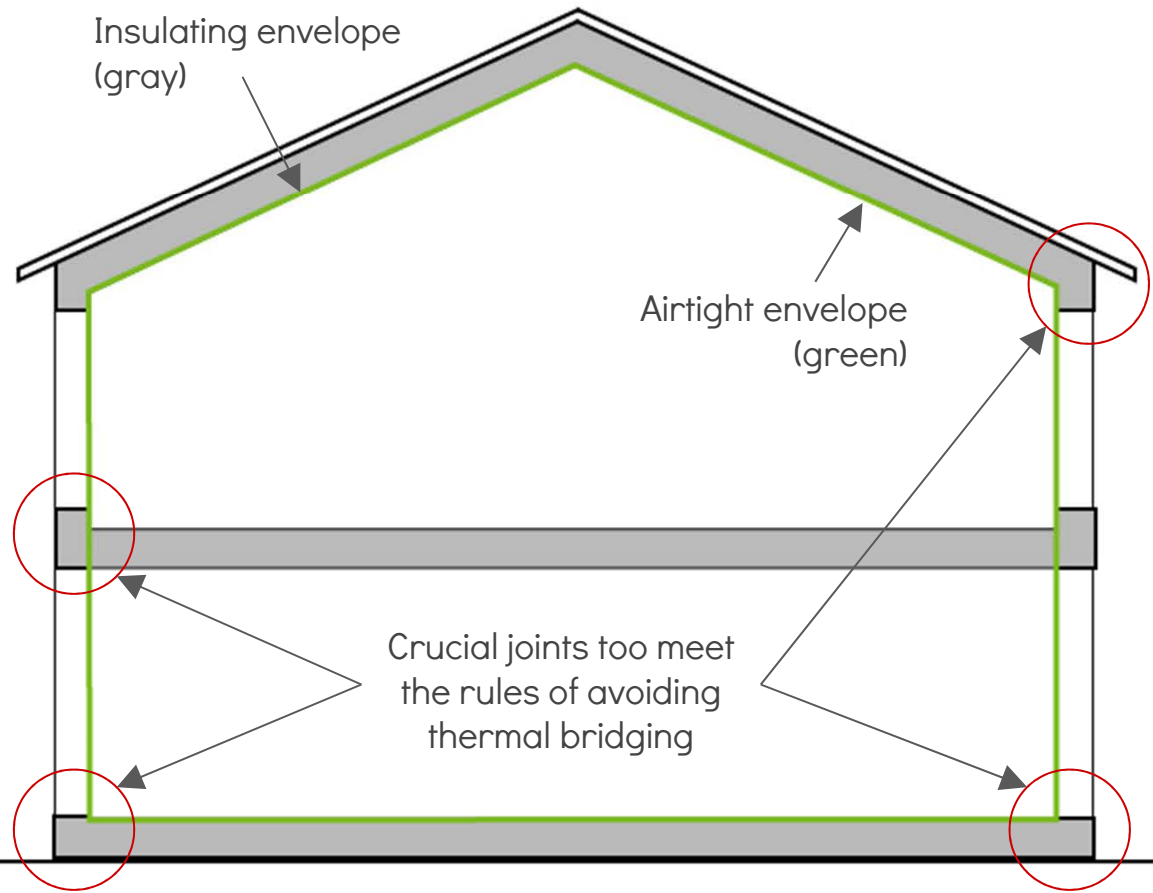
Location: Innsbruck, Austria

Year: 2010



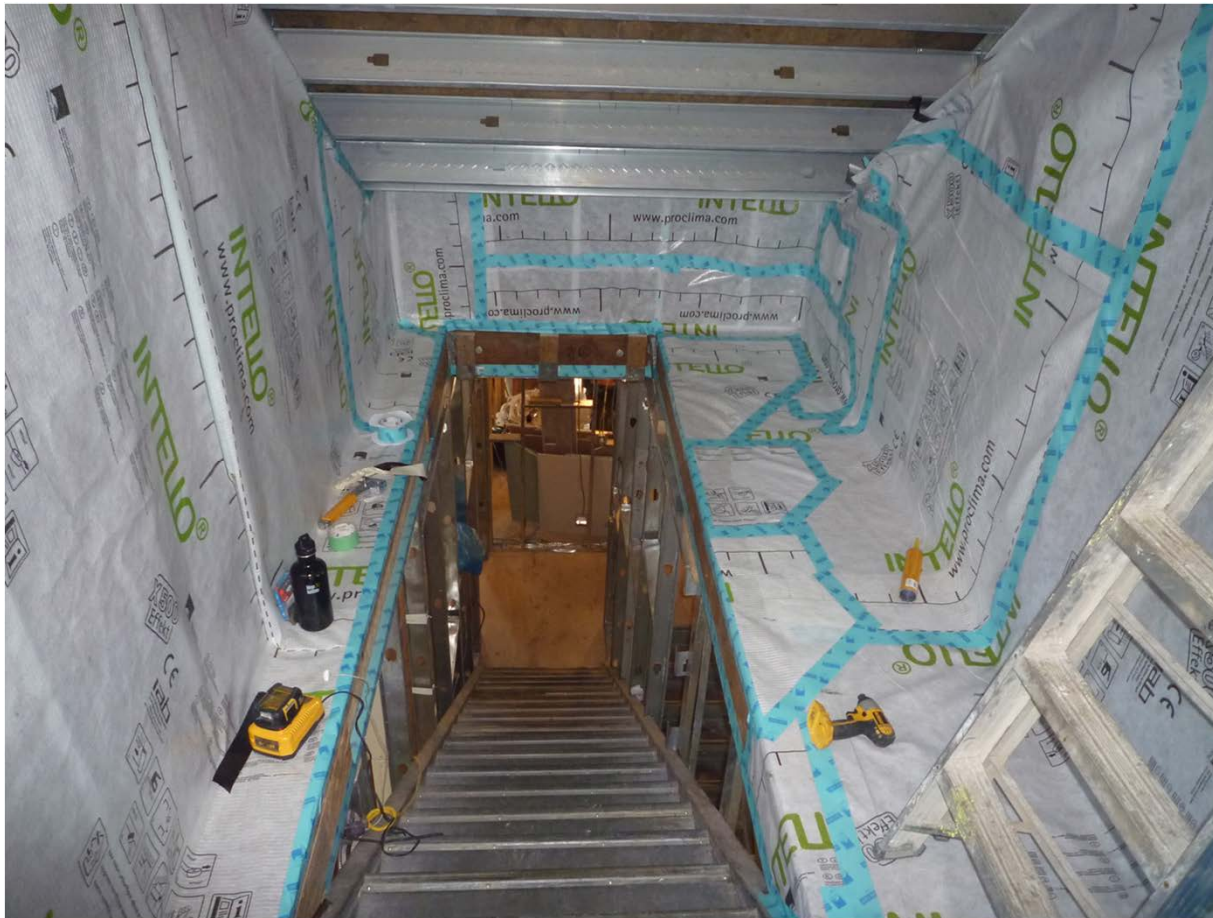
Envelope + Airtightness





## Envelope + Airtightness

Design Phase



**Envelope + Airtightness**  
Construction Phase  
Permeable Vapour Layer



## Envelope + Airtightness

Construction Phase

Sealing



**Envelope + Airtightness**  
Construction Phase  
Products + Technologies

Window Reveal Tape

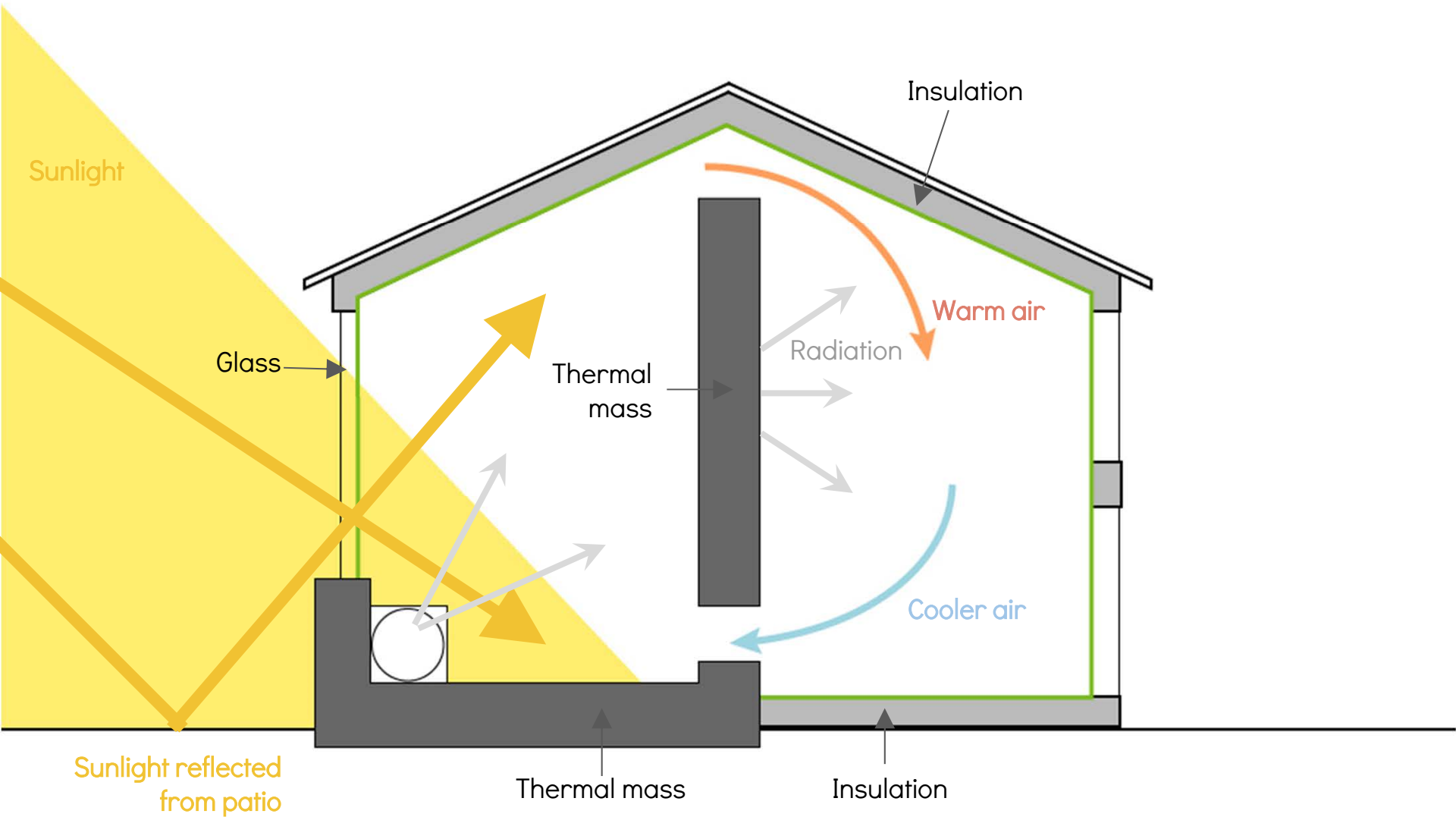
(Image source: [passivehousesystems.co.uk](http://passivehousesystems.co.uk))



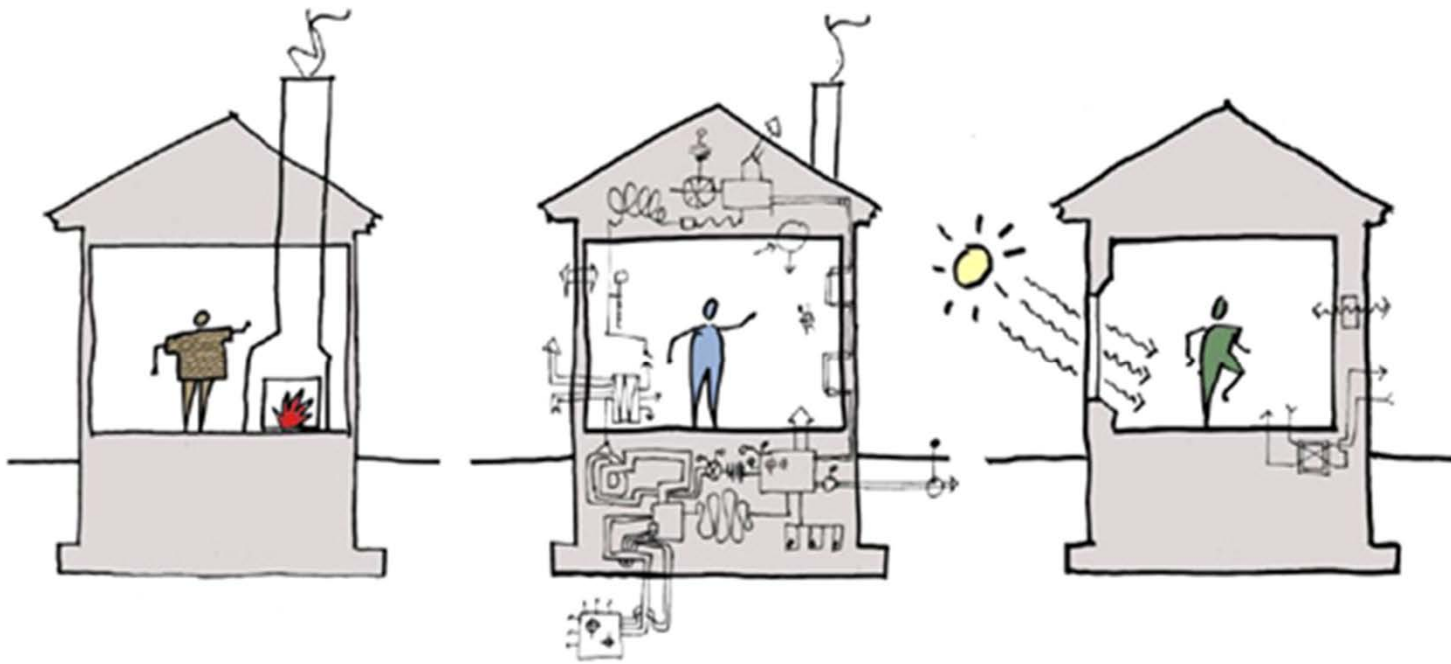
## Envelope + Airtightness

Construction Phase

Blower Door Test



# Passive Heating + Cooling



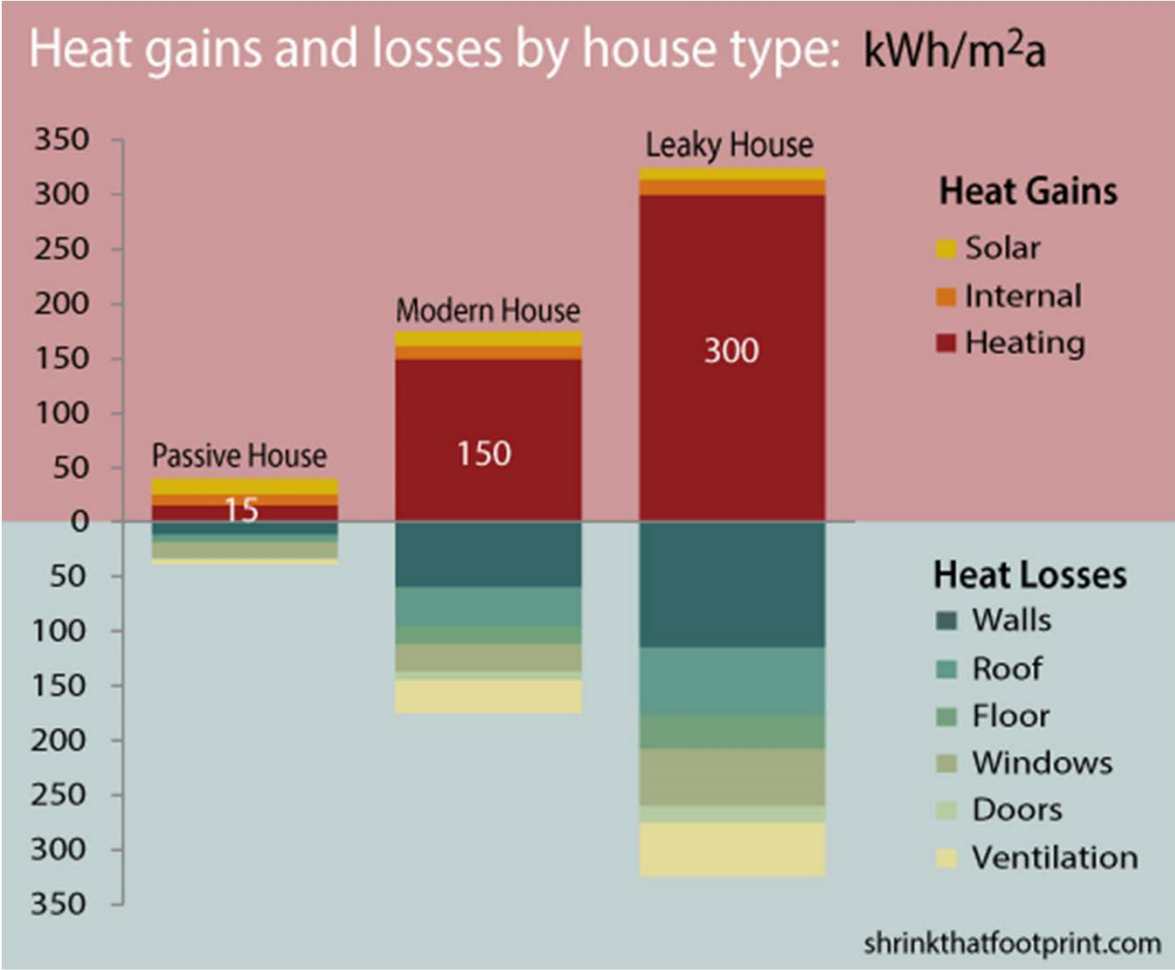
19th Century

20th Century

21st Century

## Historically

(Image source: Albert, Righter and Tittmann Architects)



Passive Heating + Cooling  
Heat Gains + Losses





Capturing Heat:  
**People**



Capturing Heat:  
**Equipment**

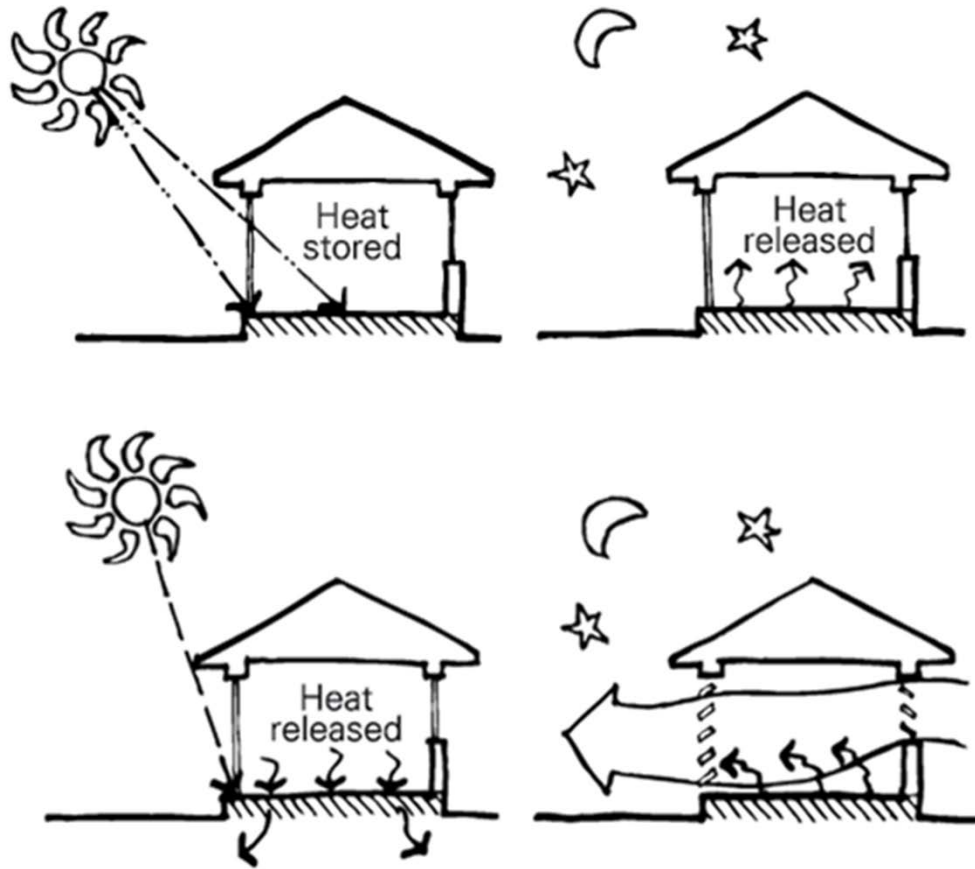


Capturing Heat:  
**Solar Energy**

## Passive Heating + Cooling

Passive House Internal Heat Gains

(image source: Albert, Righter and Tittmann Architects)



## Passive Heating + Cooling

Thermal Mass and Night Convection

(image source: <http://www.yourhome.gov.au/>)



Minimize Heat Loss in Winter/Nighttime.

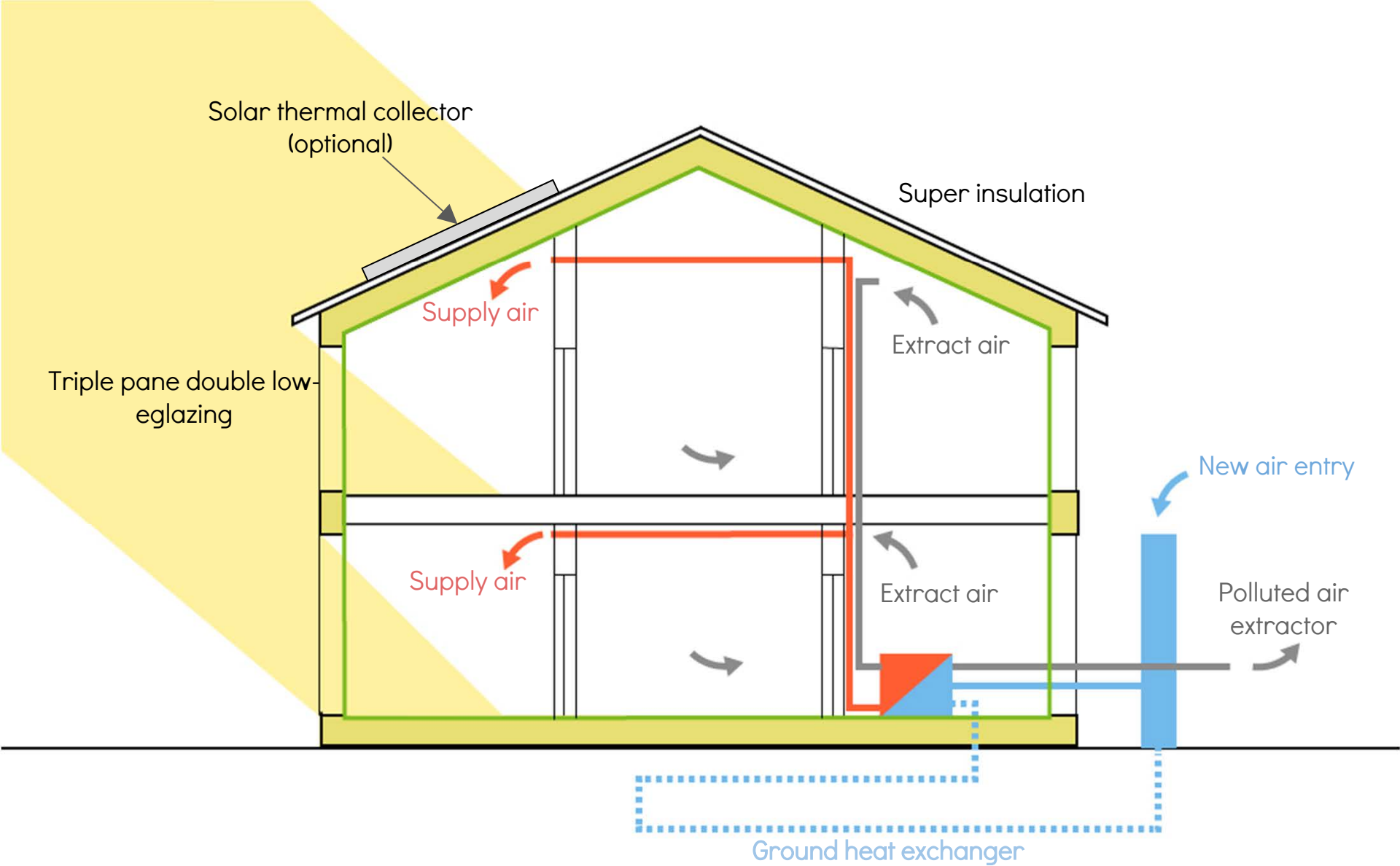


Shelter from Outdoor Heat in Summer/Daytime.

## Passive Heating + Cooling

Buffer Zones

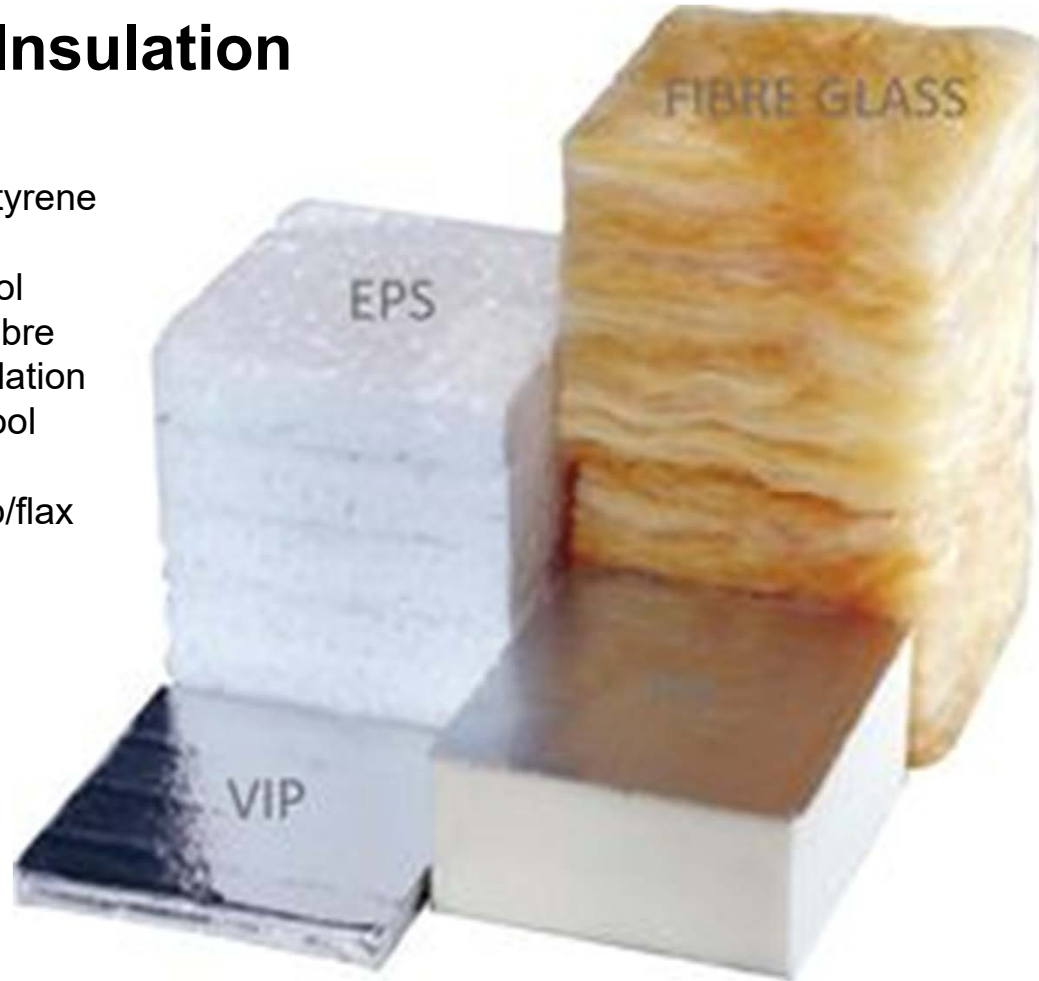
(image source: Passive House Institute)



**Passive Heating + Cooling**  
Heat Recovery Ventilation (HRV)

# Types of Insulation

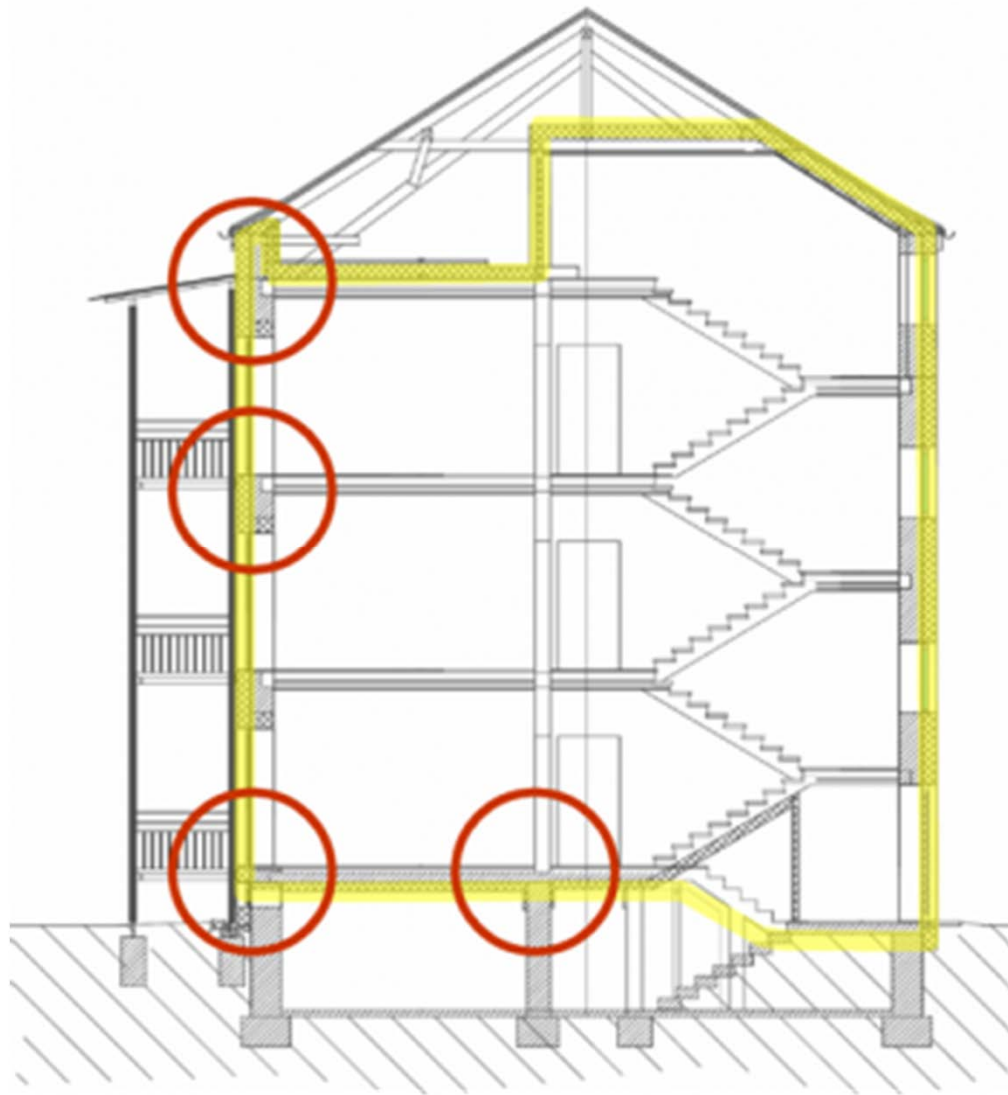
- Fibreglass
- Sprayfoam
- Rigid Polystyrene
- Aerogels
- Mineral Wool
- Cellulose Fibre
- Cotton Insulation
- Sheep's Wool
- Wood Fibre
- Straw/hemp/flax



South Surrey Passive House  
Designer: Marken Design + Consulting  
Location: Surrey, BC  
Year: 2013



# High Performing Windows



(image source: passive.de)

# Thermal Bridge Free



# Passive House Planning Package

# PHPP

© Passive House Institute

**Energy balance and Passive House Design Tool**  
for quality approved Passive Houses and EnerPHit retrofits



PHPP - Passive House Planning Program

Passive House with PHPP Version 9.3

Arden/Yee / Climate: Vancouver / TFA: 222 m<sup>2</sup> / Heating: 10.1 kWh/(m<sup>2</sup>a) / Freq. overheating: 0 % / PER: 30.9 kWh/(m<sup>2</sup>a)

Interior temperature: 20.0 °C  
Building type: Wood Frame  
Treated floor area A<sub>int</sub>: 221.6 m<sup>2</sup>

Building assembly	Temperature zone	Area [m <sup>2</sup> ]	U-Value [W/(m <sup>2</sup> K)]	Temp. factor f	Q <sub>t</sub> [W]	Q <sub>t</sub> [kWh/a]	Per m <sup>2</sup> of treated floor area [kWh/(m <sup>2</sup> a)]
External wall - Ambient	A	249.4	0.147	1.00	68.6	2513	11.34
External wall - Ground	B	46.5	0.147	0.55	68.6	255	1.15
Roof/Ceiling - Ambient	A	114.5	0.075	1.00	68.6	588	2.66
Floor slab / Basement ceiling	B	99.5	0.132	0.55	68.6	493	2.22
Windows	A	46.1	0.852	1.00	68.6	2693	12.15
Exterior door	A	2.3	0.720	1.00	68.6	115	0.52
Exterior TB (length/m)	A			1.00			0.00
Perimeter TB (length/m)	A			0.55			0.00
Ground TB (length/m)	B			0.55			0.00
Total of all building envelope areas		588.2				6658	30.0

Transmission heat losses Q<sub>t</sub>

Ventilation system:  
Effective heat-recovery efficiency η<sub>eff</sub>: 83%  
Efficiency of subsoil heat exchanger η<sub>sub</sub>: 0%  
Heat recovery efficiency of DRK η<sub>DRK</sub>: 0%

Energically effective air changes nV: 0.300  
V<sub>eff</sub>: 554.0 m<sup>3</sup>/h  
R<sub>reducer</sub>: 0.83  
C<sub>air</sub>: 0.33  
Q<sub>v</sub>: 1155 kWh/a  
Q<sub>v</sub>: 5.2 kWh/(m<sup>2</sup>a)

Ventilation heat losses Q<sub>v</sub>

Total heat losses Q<sub>t</sub>: 6658 + 1155 = 7813 kWh/a  
Q<sub>t</sub>: 35.3 kWh/(m<sup>2</sup>a)

Orientation of the area	Reduction factor	g-Value (see reduction)	Area [m <sup>2</sup> ]	Radiation HP	Q <sub>g</sub> [W]	Q <sub>g</sub> [kWh/a]
North	0.56	0.55	5.44	115	193	193
East	0.34	0.55	9.10	241	416	416
South	0.45	0.55	21.78	425	2329	2329
West	0.43	0.55	9.75	254	569	569
Horizontal	0.00	0.00	0.00	390	0	0
Total					3525	15.9

Available solar heat gains Q<sub>g</sub>

Internal heat gains Q<sub>i</sub>: 0.024 \* 206 \* 2.33 \* 221.6 = 2551 W  
Q<sub>i</sub>: 11.5 kWh/(m<sup>2</sup>a)

Free heat Q<sub>f</sub>: 27.4 kWh/(m<sup>2</sup>a)  
Q<sub>f</sub> + Q<sub>g</sub> = 60.76 kWh/(m<sup>2</sup>a)

### Energy balance heating (annual method)

Heat flows [kWh/(m<sup>2</sup>a)]

- Non-useful heat gains
- External wall - Ambient
- External wall - Ground
- Roof/Ceiling - Ambient
- Floor slab / Basement ceiling
- Windows
- Exterior door
- Ventilation
- solar heat gains
- internal heat gains
- heating demand

Losses: 2.2, 11.3, 1.2, 2.7, 2.2, 0.0, 12.2, 5.2

Gains: 10.1, 11.5, 2.2, 2.7, 11.3, 2.2

# PHPP - Passive House Planning Program

(Image source: database.passivehouse.com)

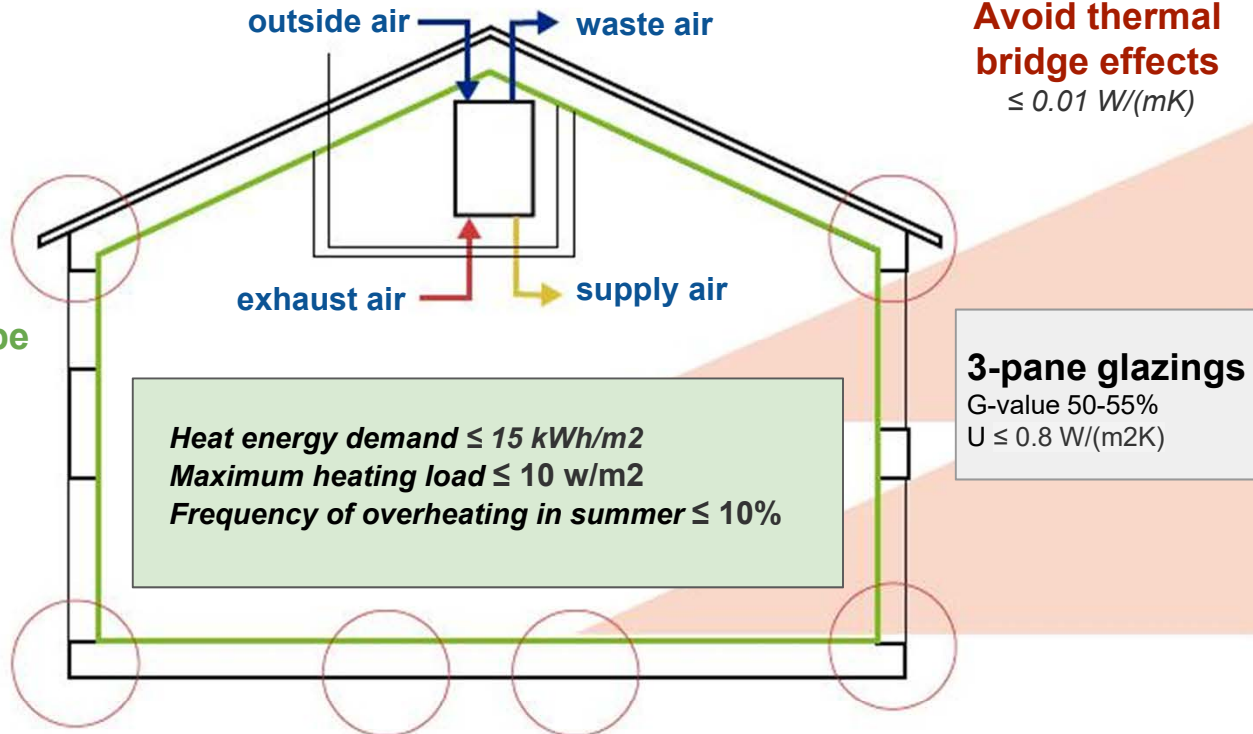
**Mech, ventilation system with heat recovery  $\geq 75\%$**

**Thermal insulation**

$U \leq 0.15 \text{ W/(m}^2\text{K)}$   
 $U \leq 0.8 \text{ W/(m}^2\text{K)}$

**Avoid thermal bridge effects**  
 $\leq 0.01 \text{ W/(mK)}$

**Air tight envelope**  
 $\leq 0.6 \text{ ACH}$



(Image source: Passive House Institute)

# Passive House Requirements

# City of Vancouver

## Rezoning Requirements for MURBs

	<i>Current Rezoning Policy - Typical Design</i>	<i>Passive House</i>
<u>TEDI</u>	46kWh/m <sup>2</sup>	✓ ≤ 15 kWh/m <sup>2</sup>
<u>Envelope</u>	R-4.5 effective walls U-0.36 windows	✓ U ≤ 0.15 W/(m <sup>2</sup> K)
<u>Direct Ventilation with HRV</u>	52% efficient	✓ ≥75%

2020 - All buildings to be *carbon neutral* in operations.

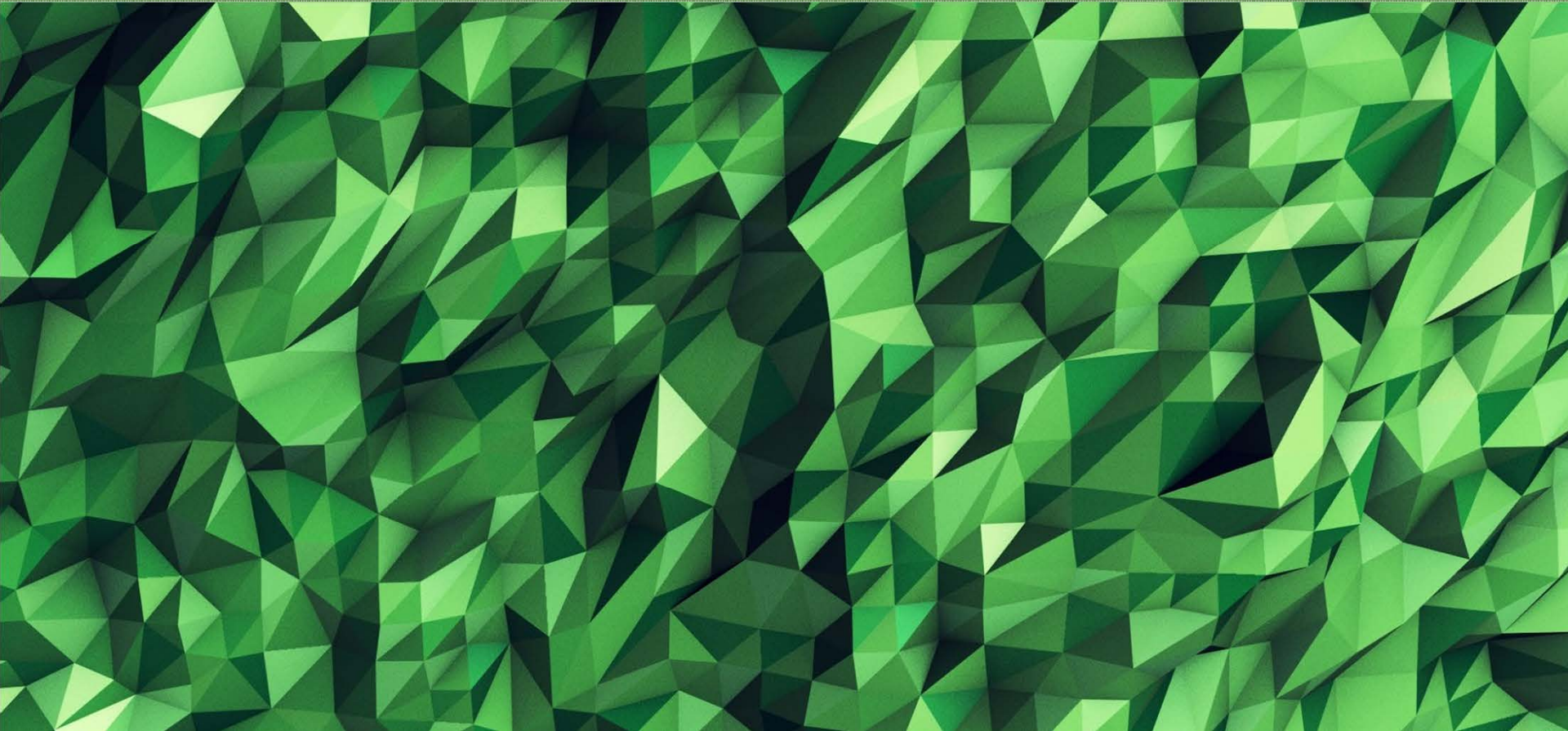
2030 - New buildings required to use 100% renewable energy - *Zero Emissions*

## Slide 57

---

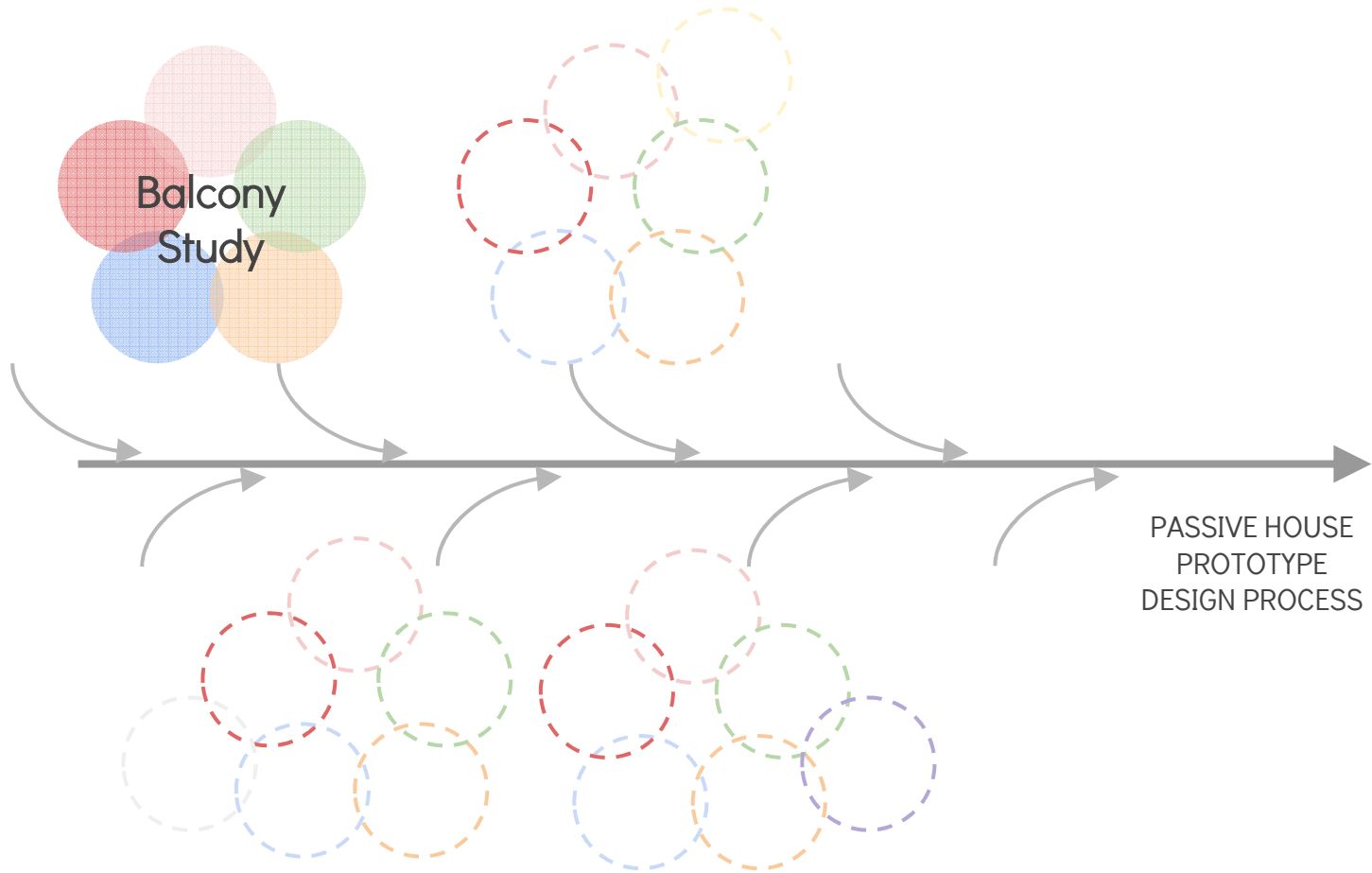
- 1 Hi, Marybeth. I converted the image into a table, does it contain all the information you want?  
Weiwei Fan, 2016-09-15
- 2 \_Marked as resolved\_  
Chenyue Zhang, 2016-09-15
- 3 \_Re-opened\_  
Chenyue Zhang, 2016-09-15
- 4 Also I could not find the window/wall ratio for Passive House  
Chenyue Zhang, 2016-09-15
- 3 It's ok. I removed the window:wall ratio because PH doesn't really have one. it's depending on the climate, wall assemblies, etc.  
Marybeth Welty, 2016-09-15

PASSIVE HOUSE MURB  
COLLABORATIVE PROTOTYPE





Passive House MURB: Collaborative Prototype



COLLABORATIVE PROCESS

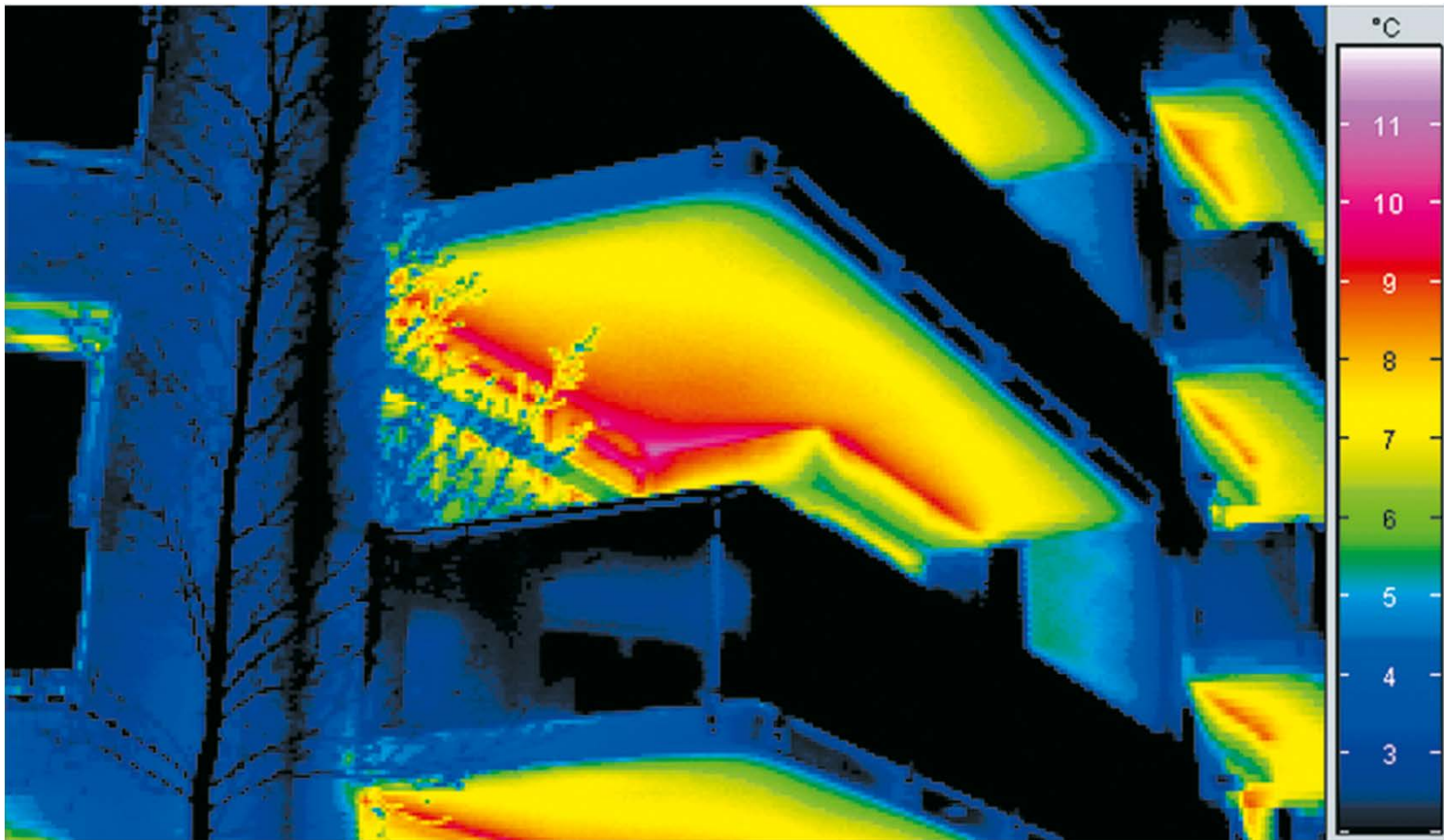


Articulated Slab Cantilevered Slab Edge

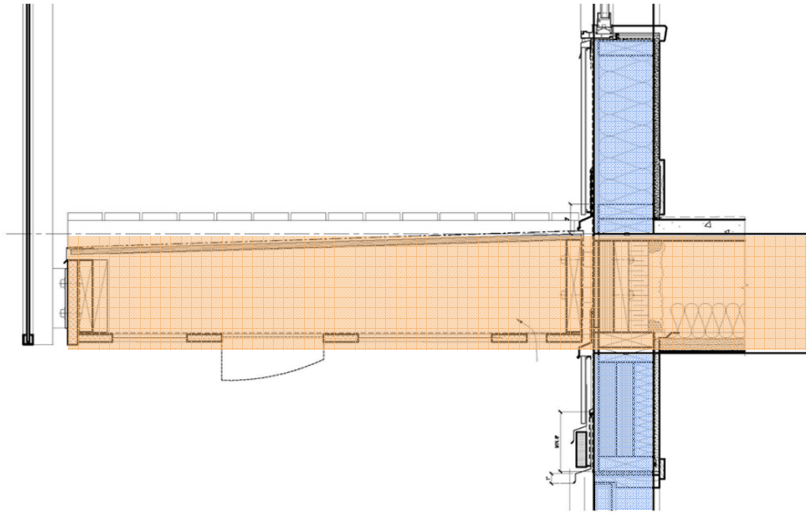


Heat Sink

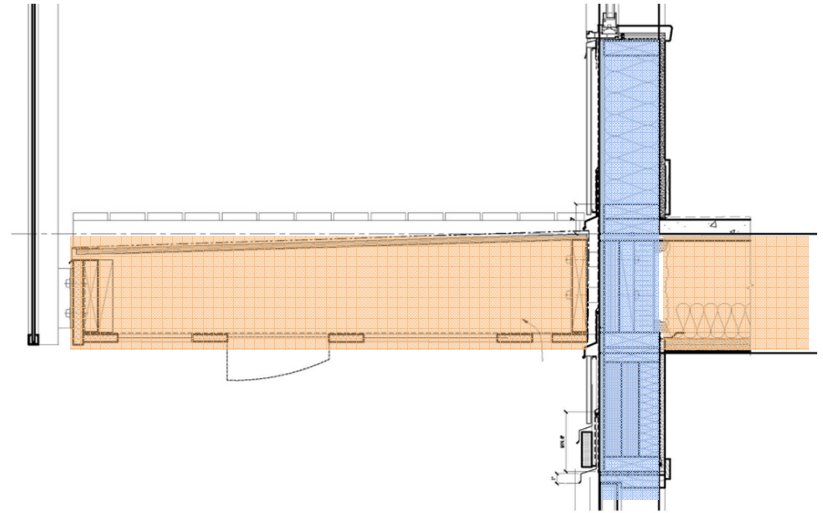




Thermographic Imaging of Heat Loss Through Cantilevered Balcony



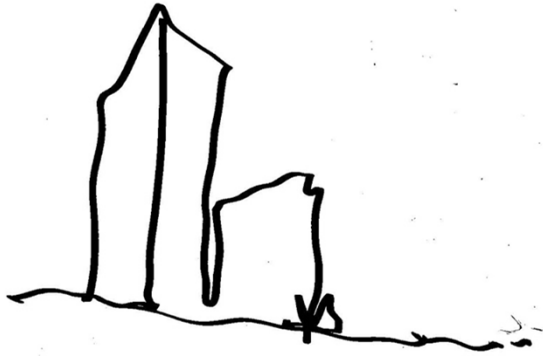
CONVENTIONAL CANTILEVERED



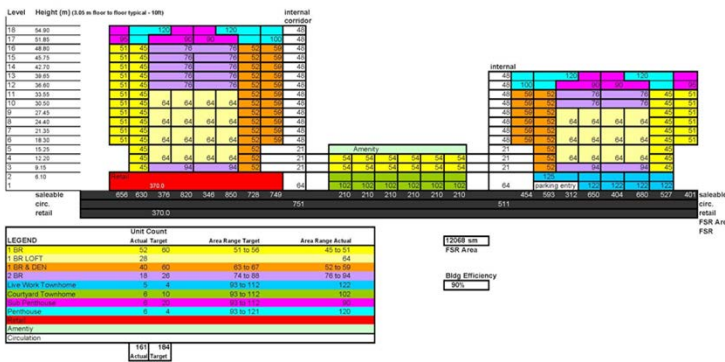
THERMALLY BROKEN CONNECTION

## Building Projections





Process



Excel



Sketchup



Revit

A Visual Process - Share Information

	2 Bed	2 Bed	2 Bed	2 Bed	2 Bed	2 Bed	2 Bed	Circulation	1 Bed	1 Bed	1 Bed	1 Bed	Residential Area	Circulation Area		
Level 6	875	875	875	875	875	875	875	1030					6125			1030
Level 5	875	875	875	875	875	875	875	1360	642	642	642	642	8693			1360
Level 4	875	875	875	875	875	875	875	1360	642	642	642	642	8693			1360
Level 3	875	875	875	875	875	875	875	1360	642	642	642	642	8693			1360
Level 2	875	875	875	875	875	875	875	1360	642	642	642	642	8693			1360
Level 1		300	875	875	875	875	875	1360	642	642	642	642	8693			1360
P1	BIKE	LOBBY											6943			1660
													Subtotal	47,840		8130
													Target Residential	46,155	Residential Difference	1,685
													Target Circulation	8145	Circulation Difference	-15
														(over)	(over)	-1.57%
													Target Residential	47,339	Residential Difference	501
													Target Circulation	8354	Circulation Difference	-224
														(over)	(over)	2.7%
Count									5	5	5	5	20	33%	1 Bedroom	
	5	5	6	6	6	6	6	6					40	67%	2 Bedroom	
													Total Units	60	Average Unit Size	797
													Parking Factor	1.30	1.25	
													Stalls Required	78.0	75.0	

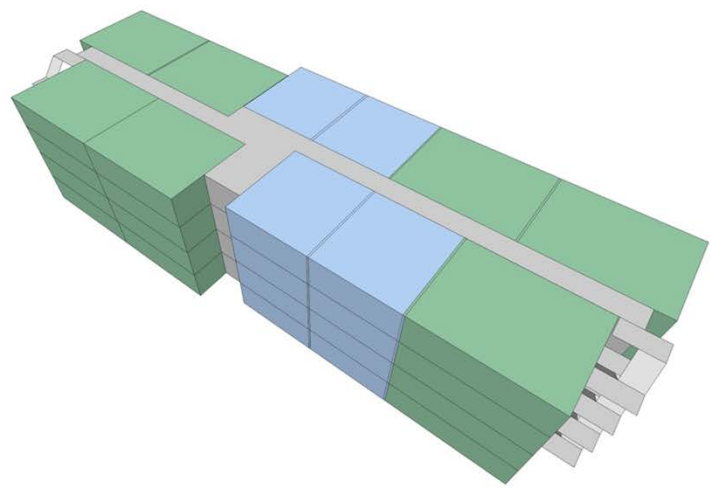
Notes: all units are imperial (F and SF)

Unit Sizes are approximate and may vary with refinement of layout

Circulation Area is based on the exclusion of exterior stairs

Parking count is based on max 79 stalls on P1 ( parking factor 1.3 equates to 60 units max / 58 units with 75 stalls)

Calculations Assumes portion of Level 1 is used for Bike Storage

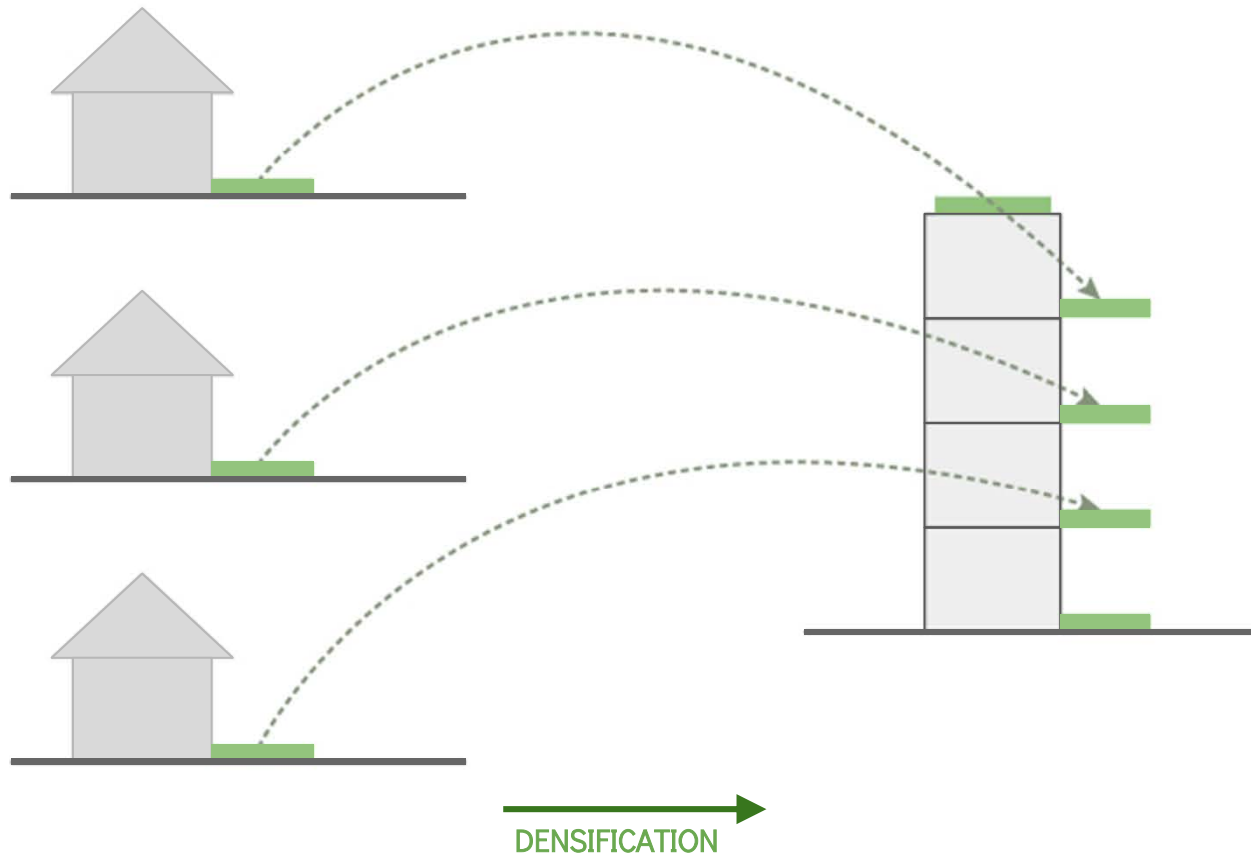


A Visual Process - Share Information



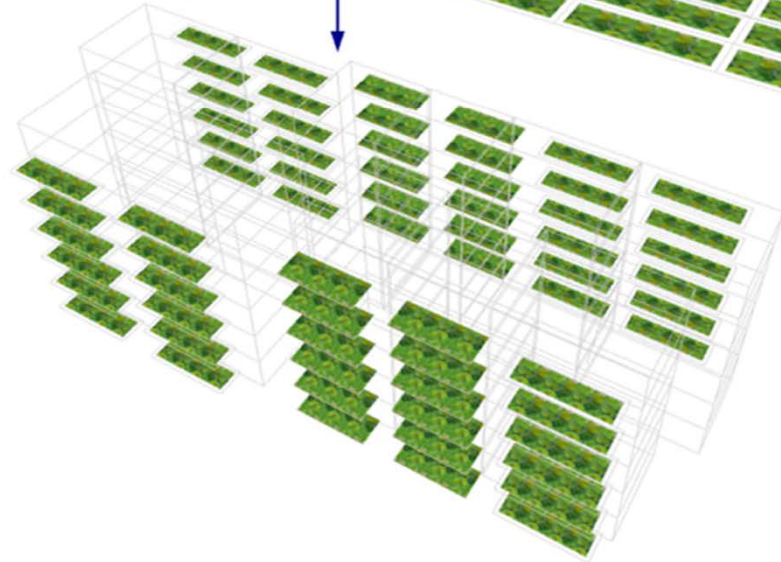
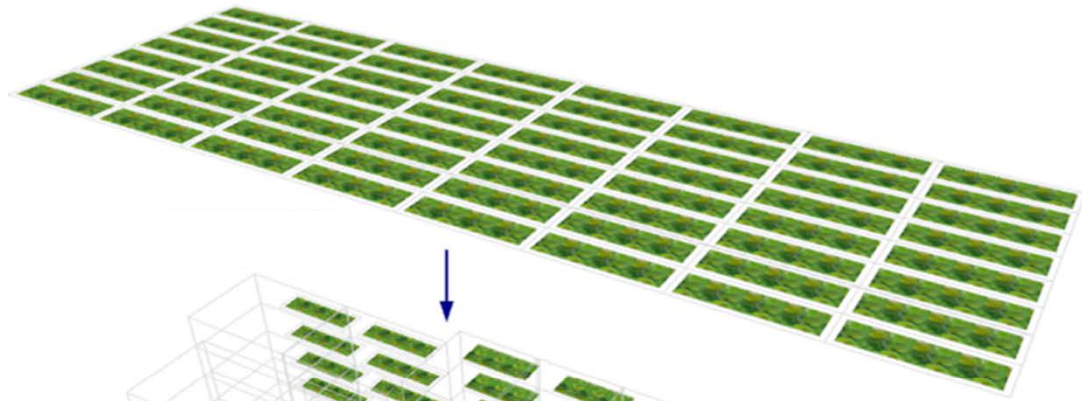
## External Factors / Variables that Impact a Project

Client Program  
Sustainability Goals  
Community and Social Impact  
Health and Well Being  
Energy Performance  
Zoning Regulations  
Marketing and Economics



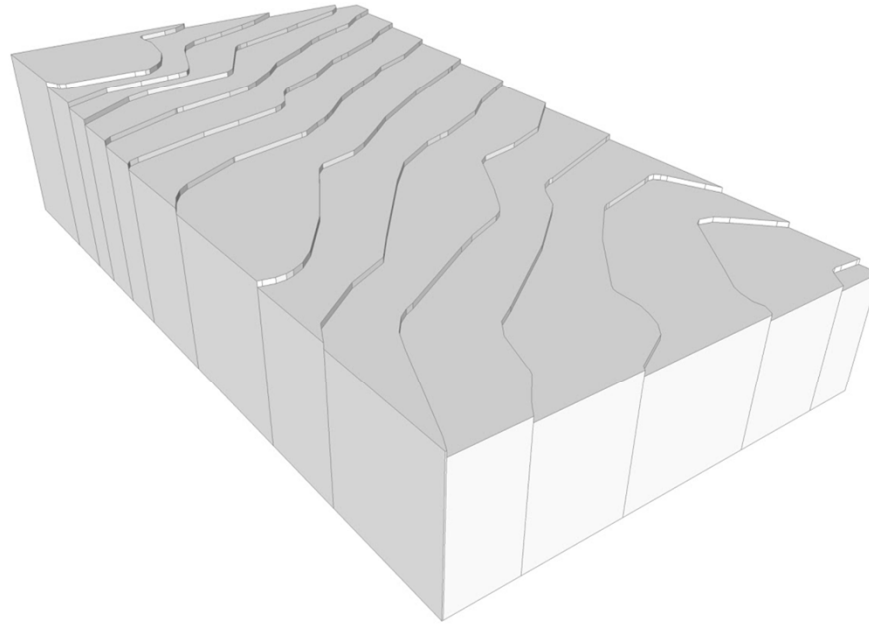
Balcony Gardens Concept



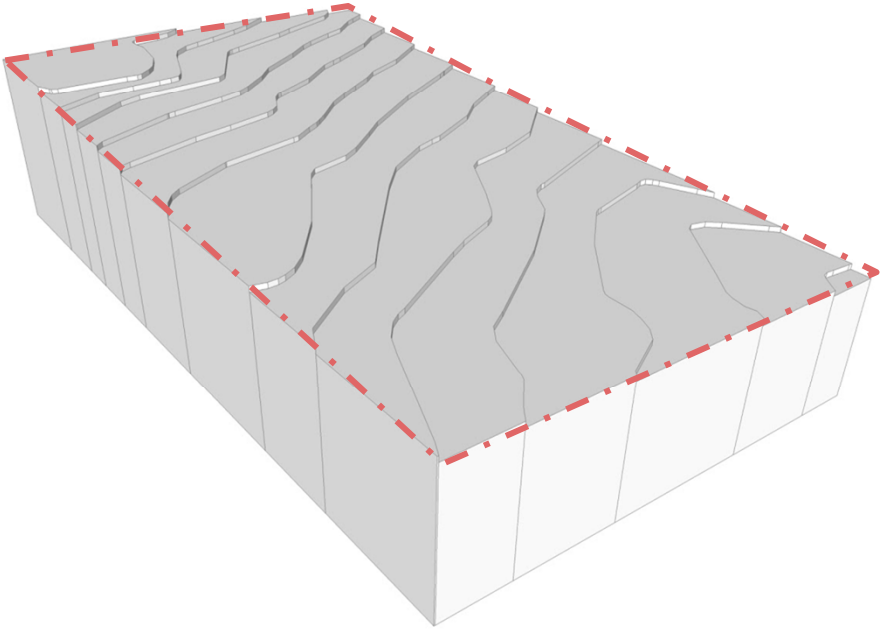


# Communicating a Visual Process

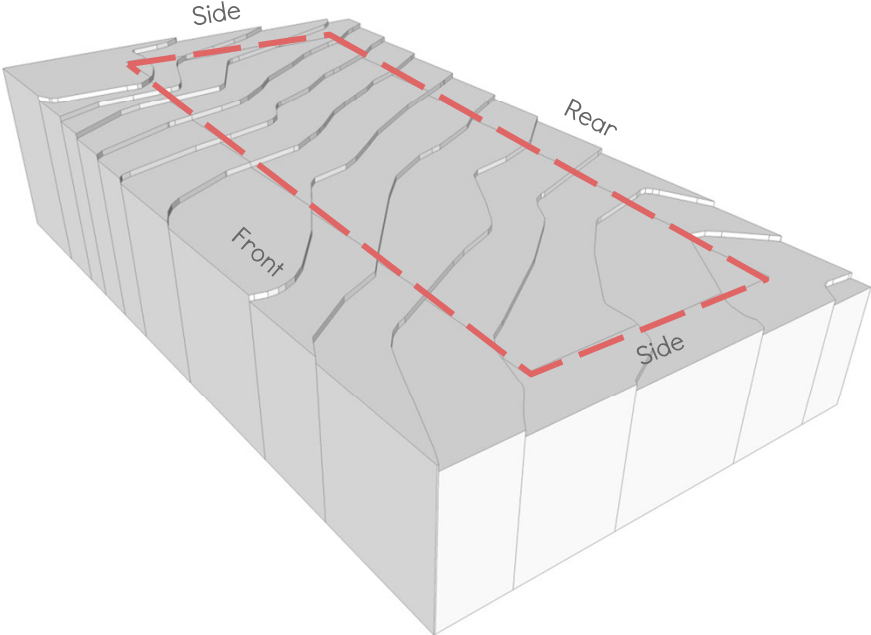
## Zoning Envelope



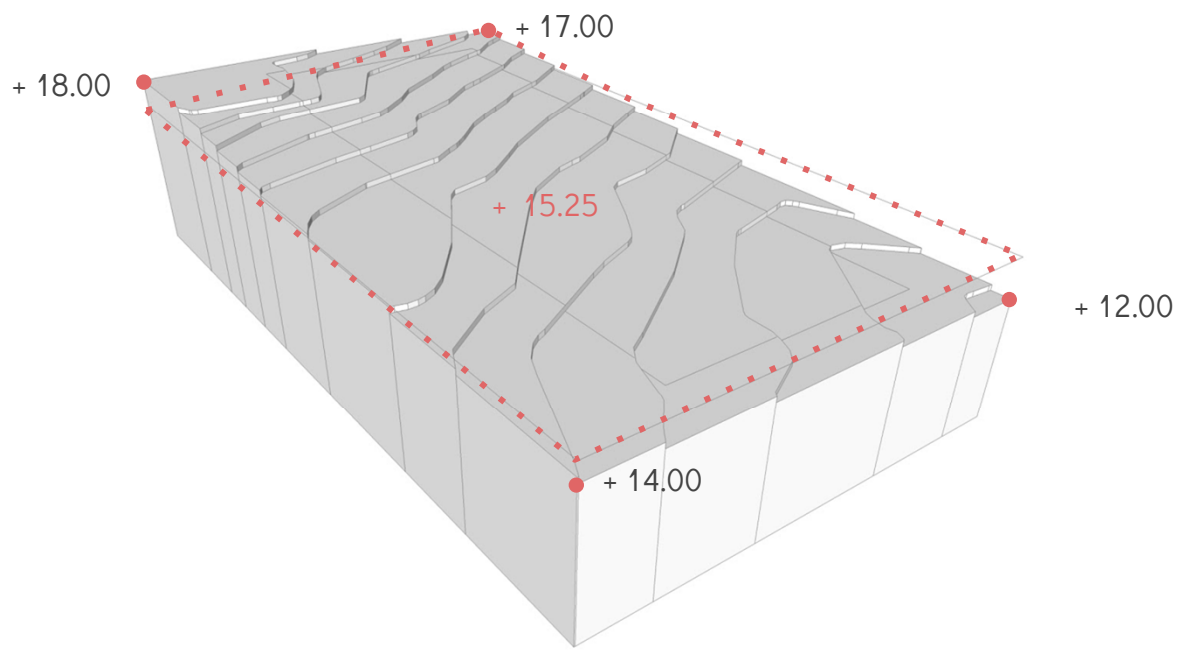
Site



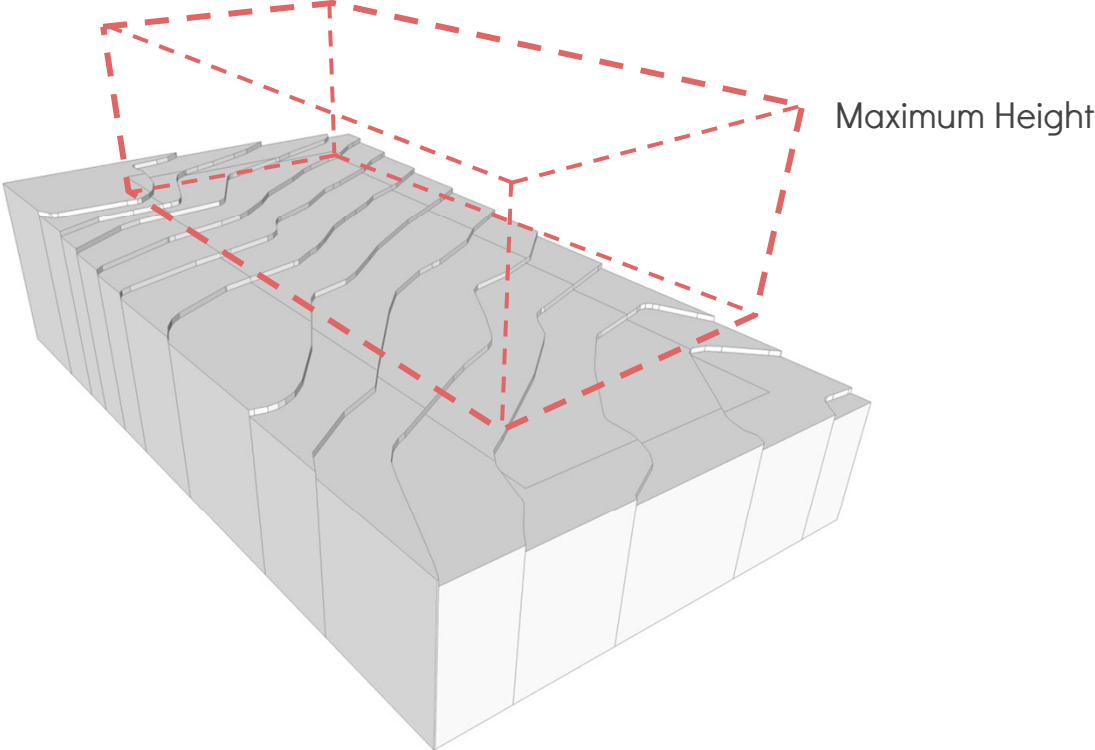
Property Line



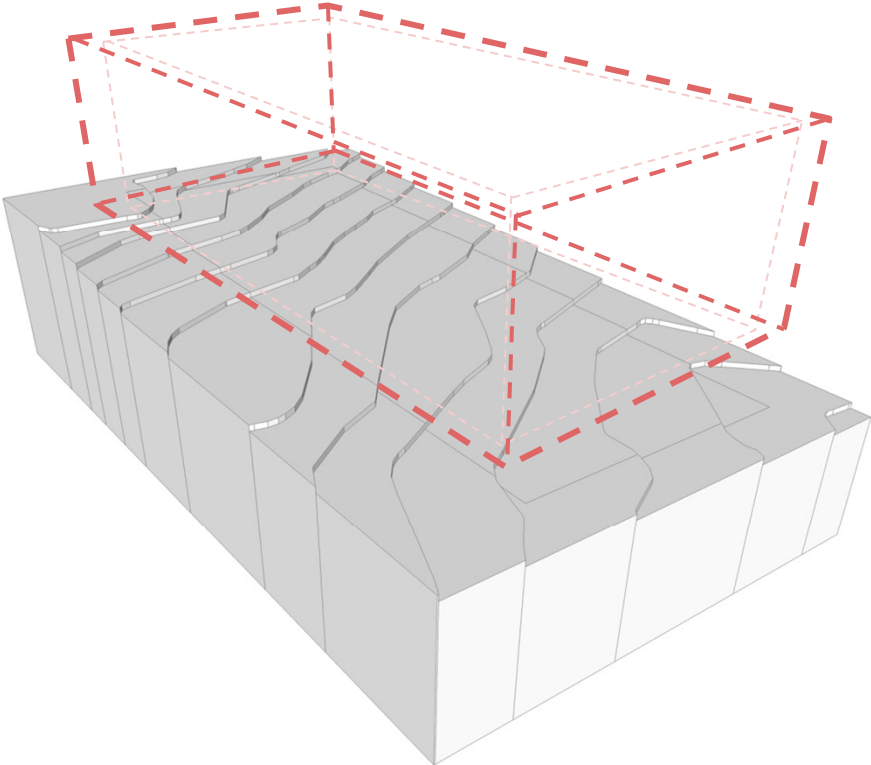
Setback



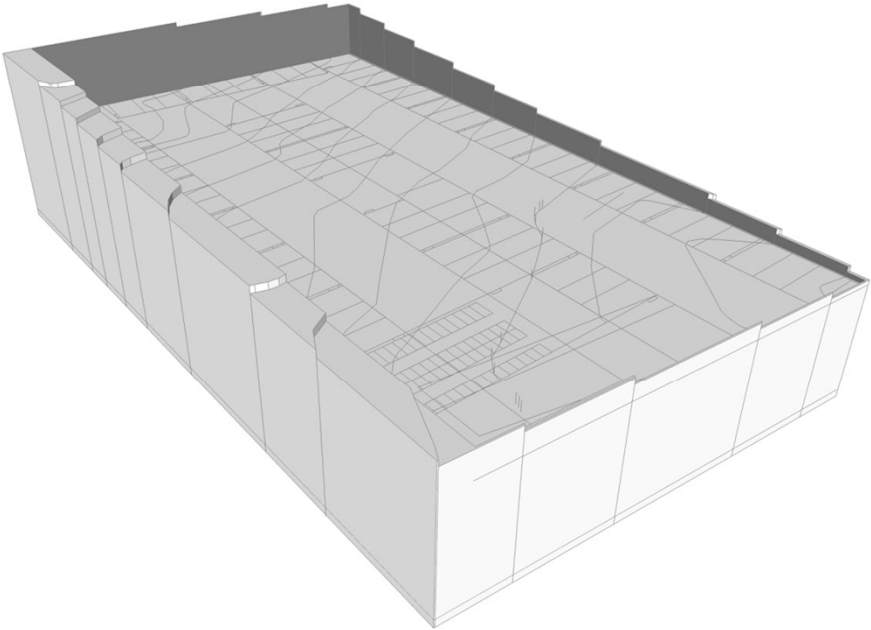
Average Grade



Height

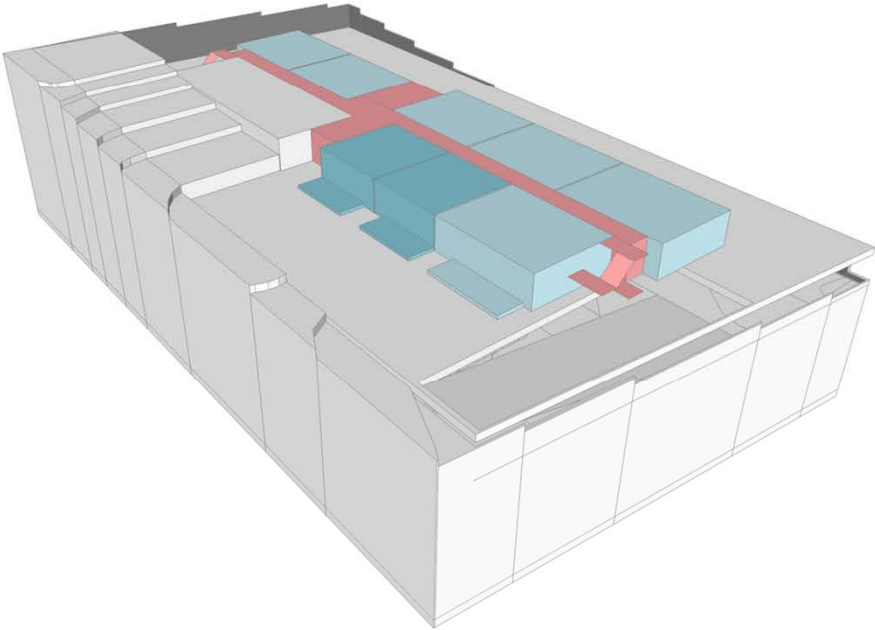


Balcony Setback

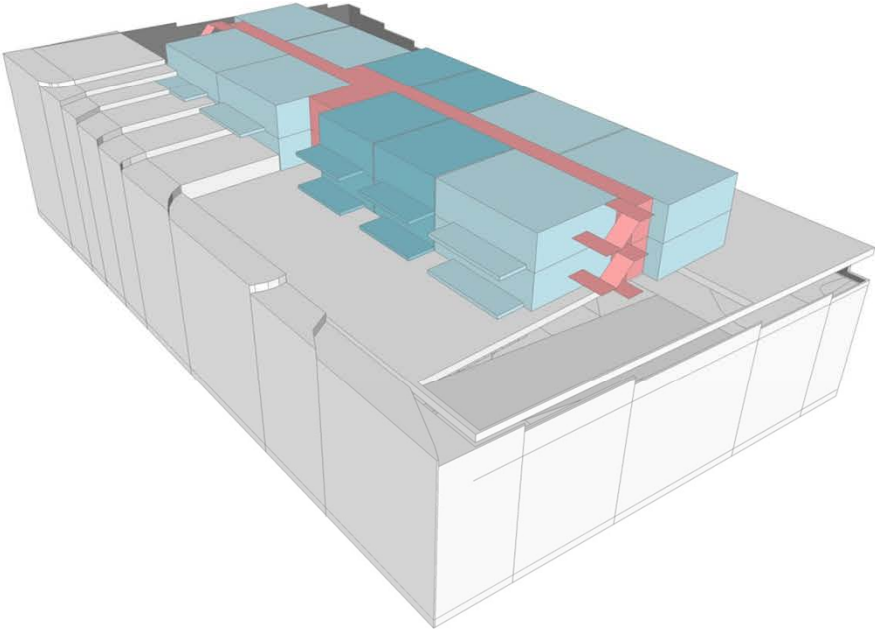


Parking

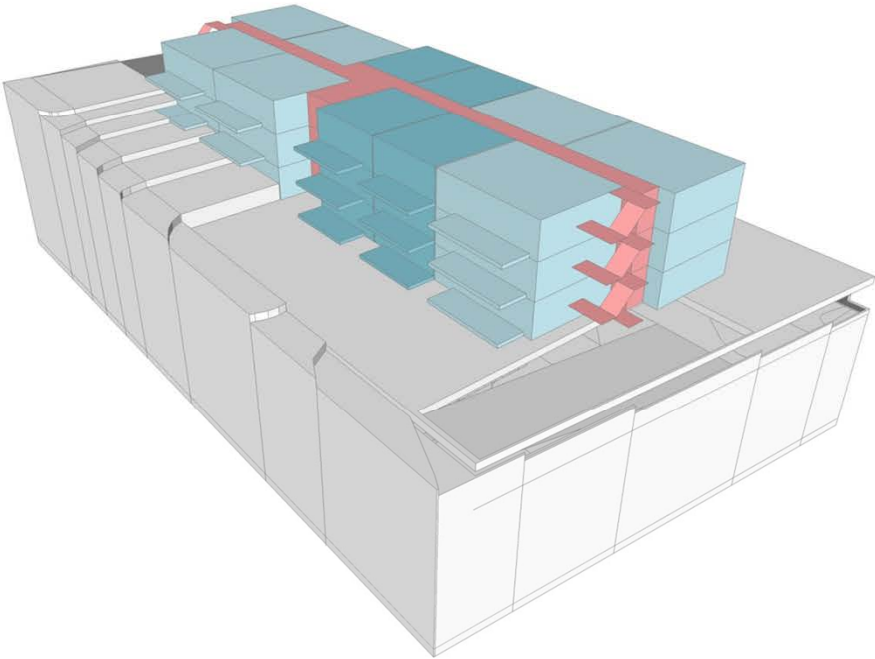




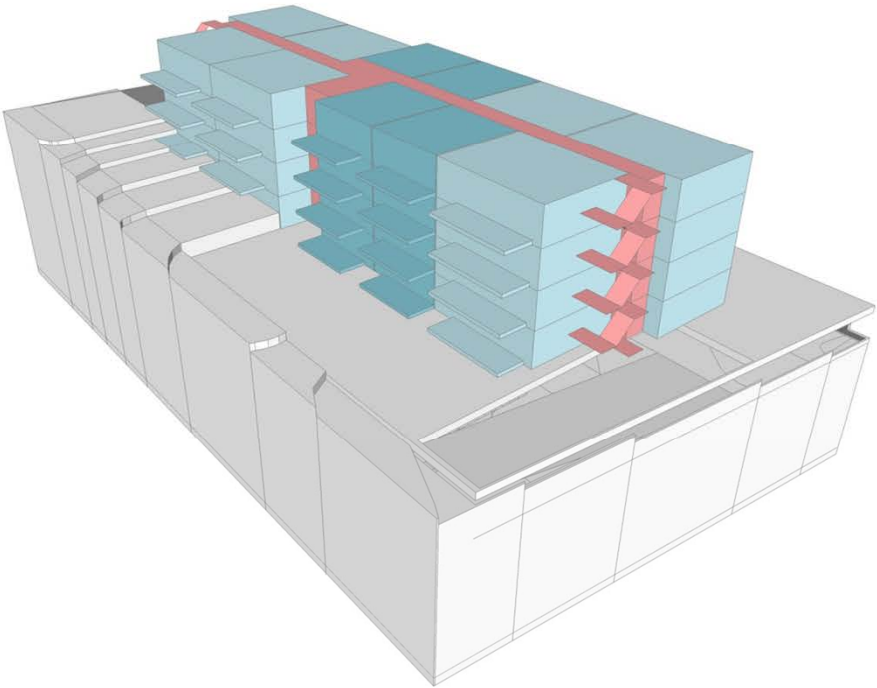
Level 1



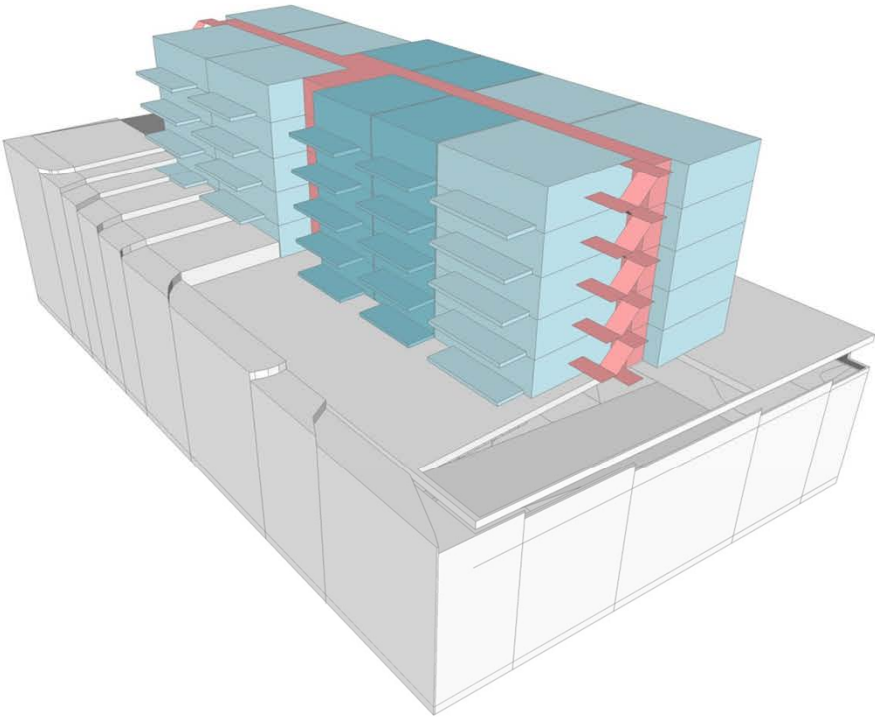
Level 2



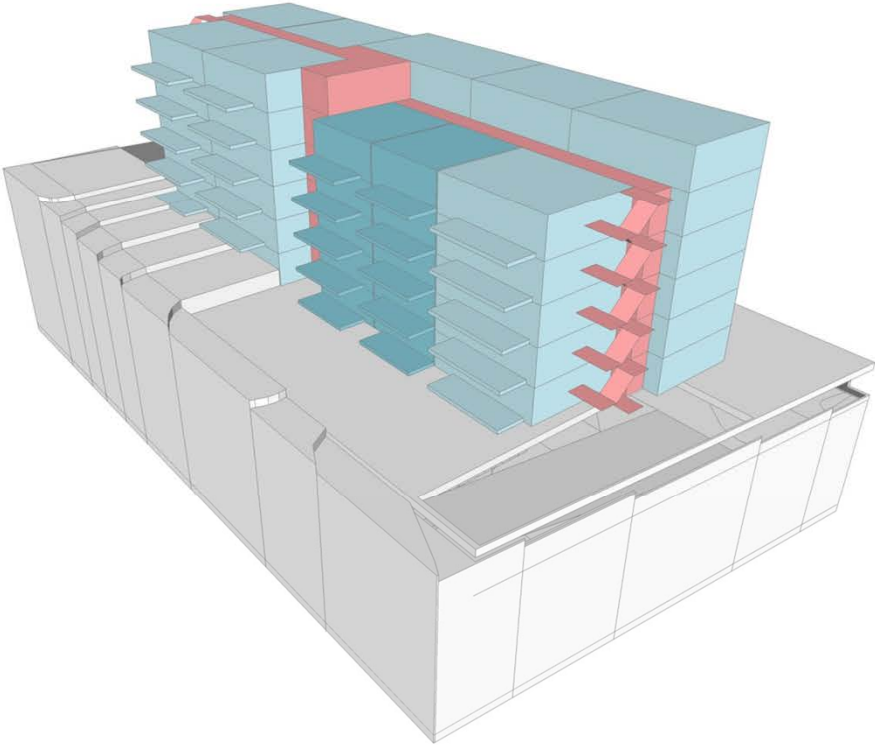
Level 3



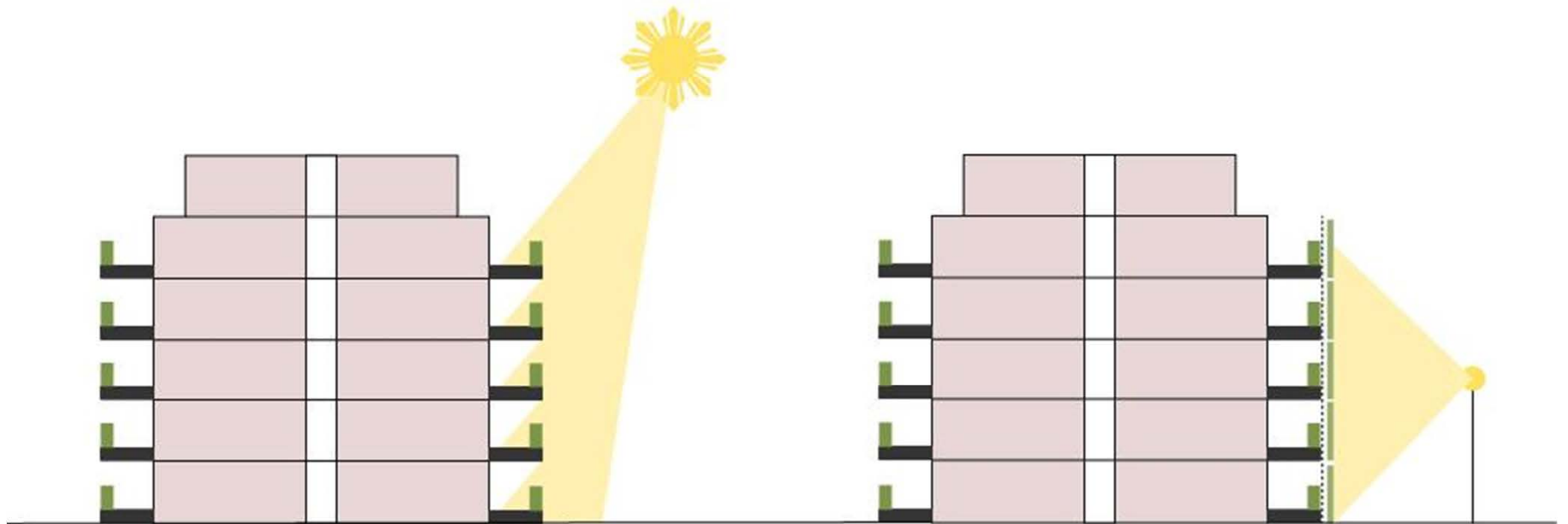
Level 4



Level 5



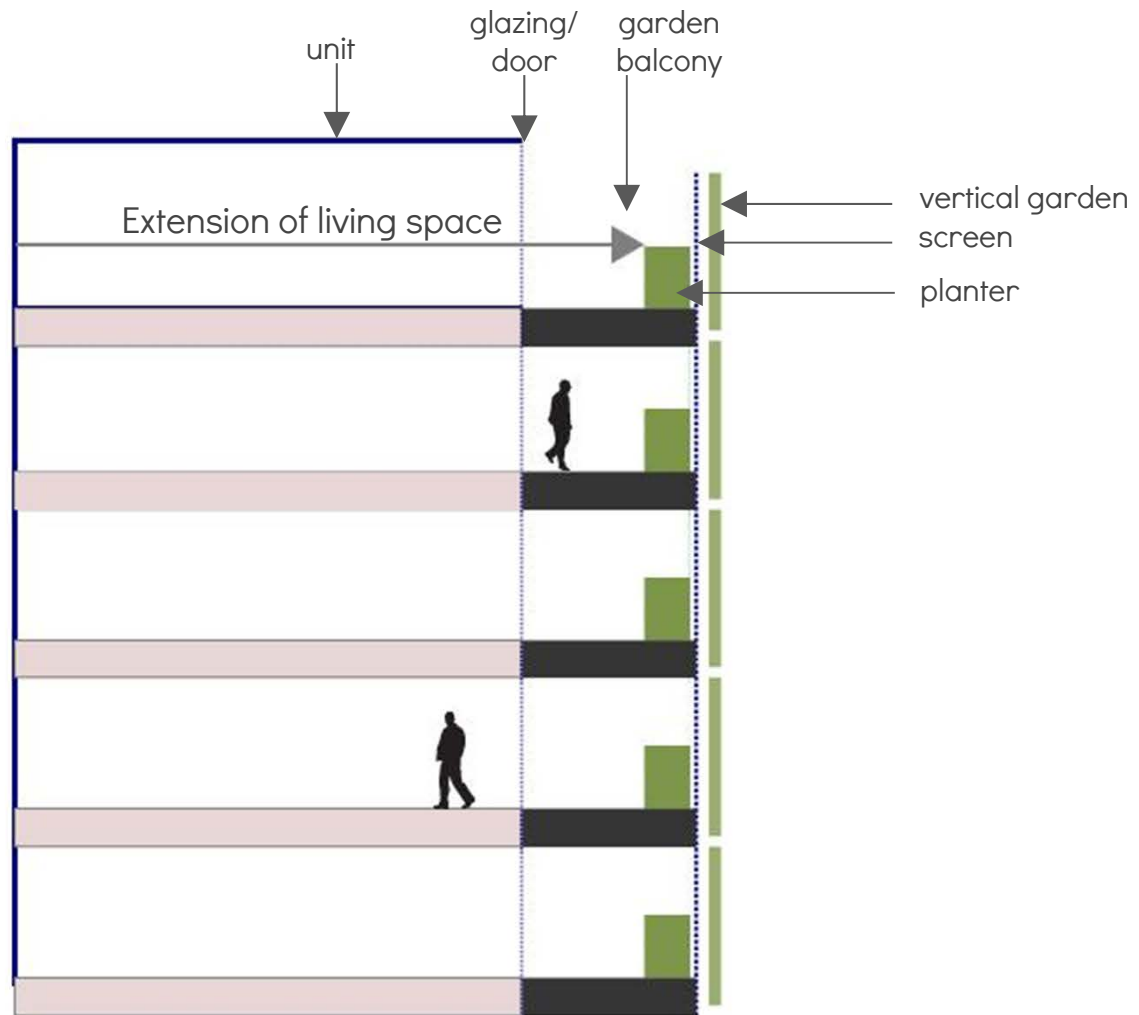
Level 6



Sunshading

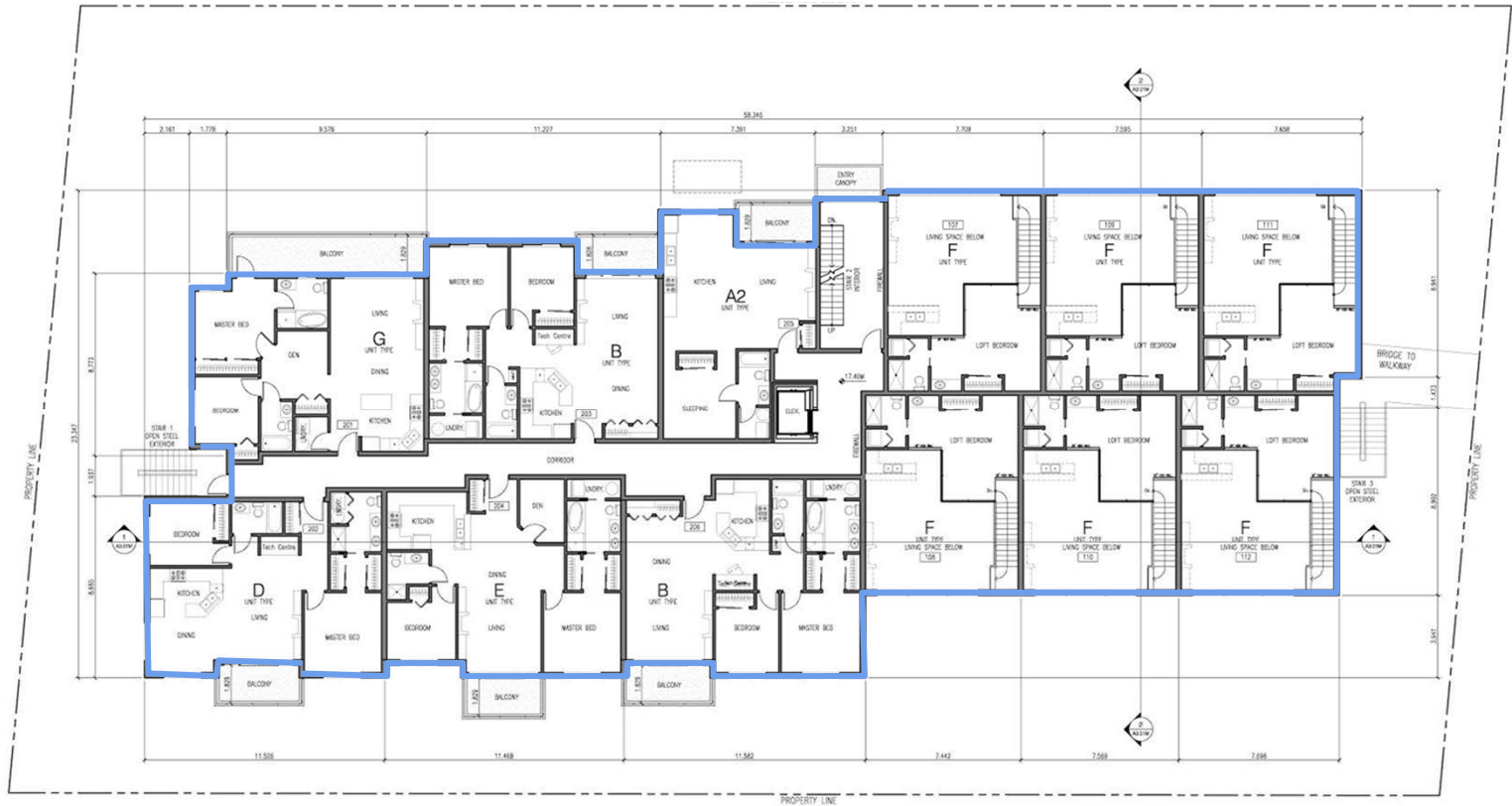
Light Control

## FUNCTIONS OF BALCONY

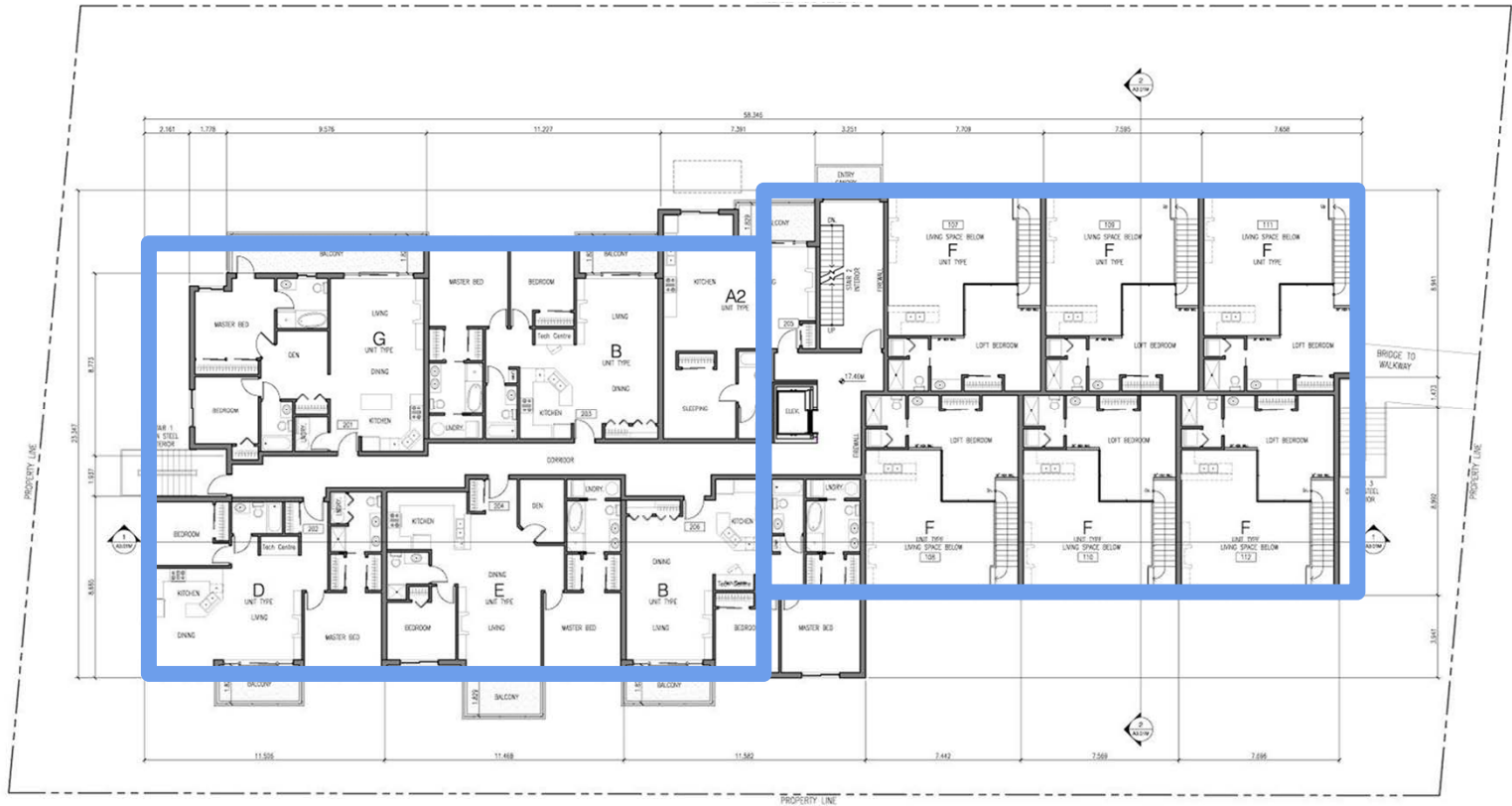


## EXTENSION OF LIVING SPACE

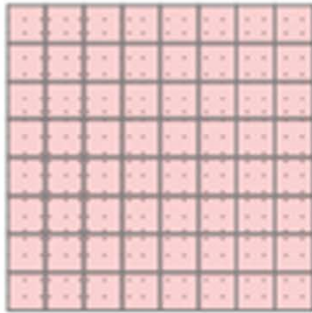




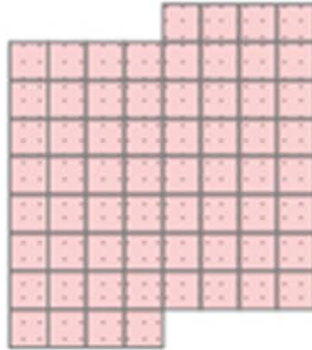
FLOOR PLAN WITH JOGS



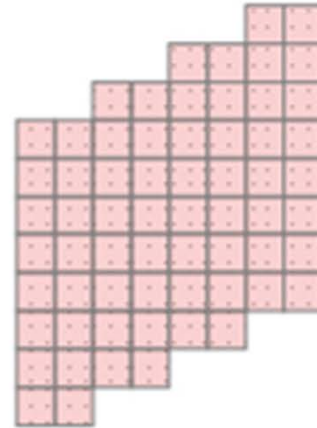
SIMPLIFY SHAPE



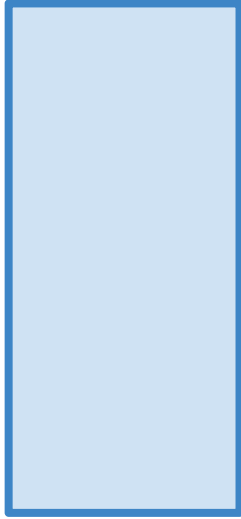
64 square units  
Perimeter 32 units  
100%



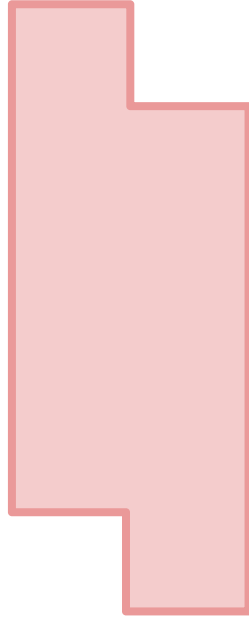
64 square units  
Perimeter 34 units  
106%



64 square units  
Perimeter 38 units  
119%



Floor area = 1000sf  
Length of walls = 130'



Floor area = 1000sf  
Length of walls = 146'  
12% increase in wall length



Floor area = 1000sf  
Length of walls = 130'  
0% increase in wall length

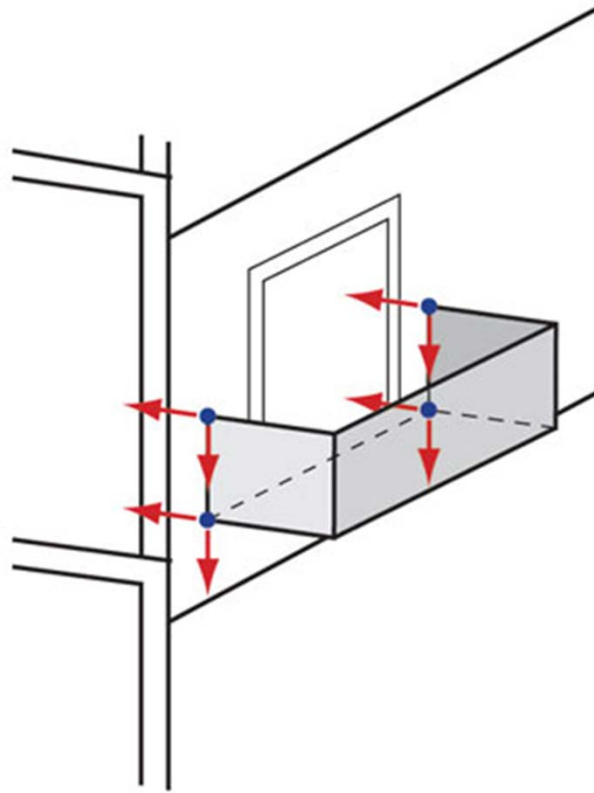


Cantilevered Balcony



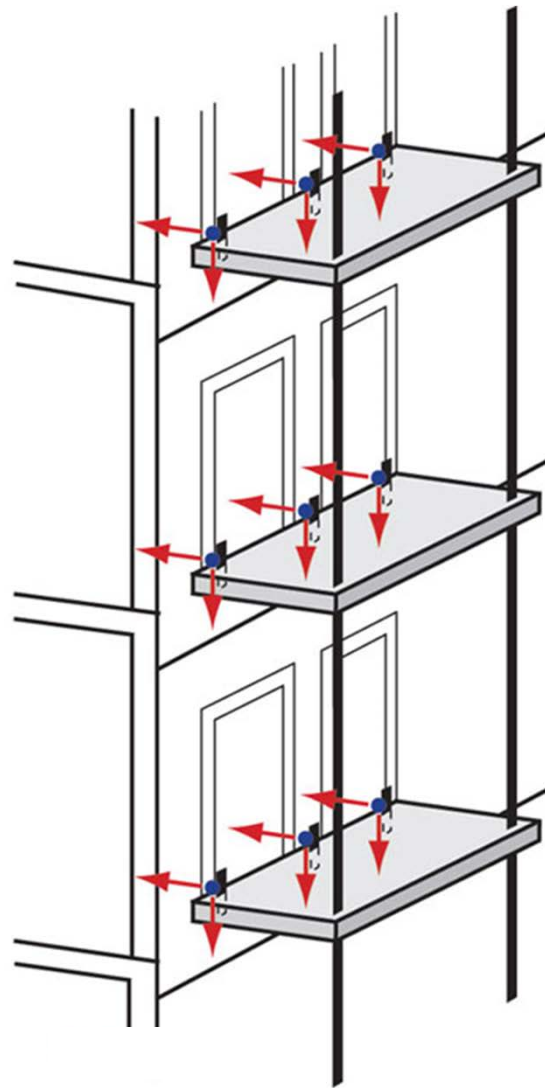
Thermally Broken Balcony

Thermal Comfort



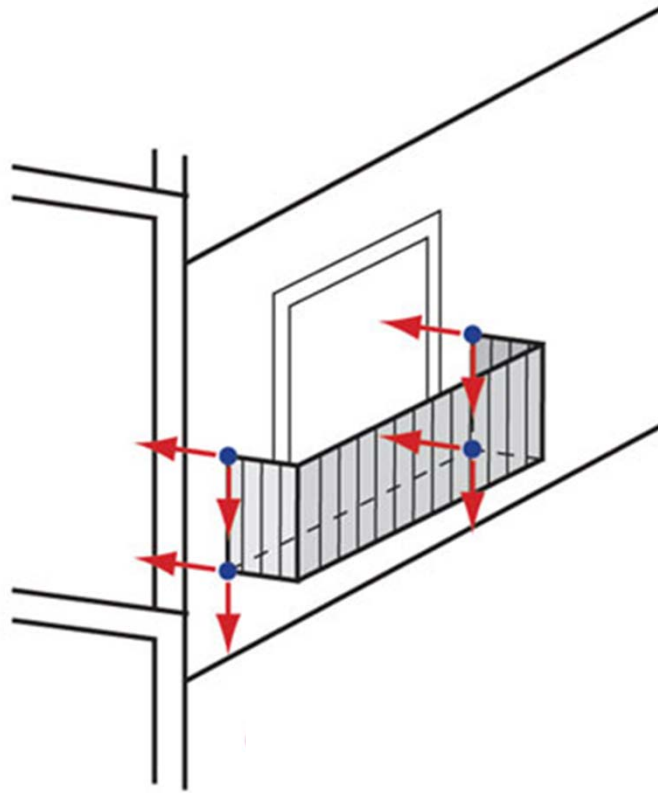
## Four Point Connection

(image source: buildingscience.com)



## “Clip-on” Balcony

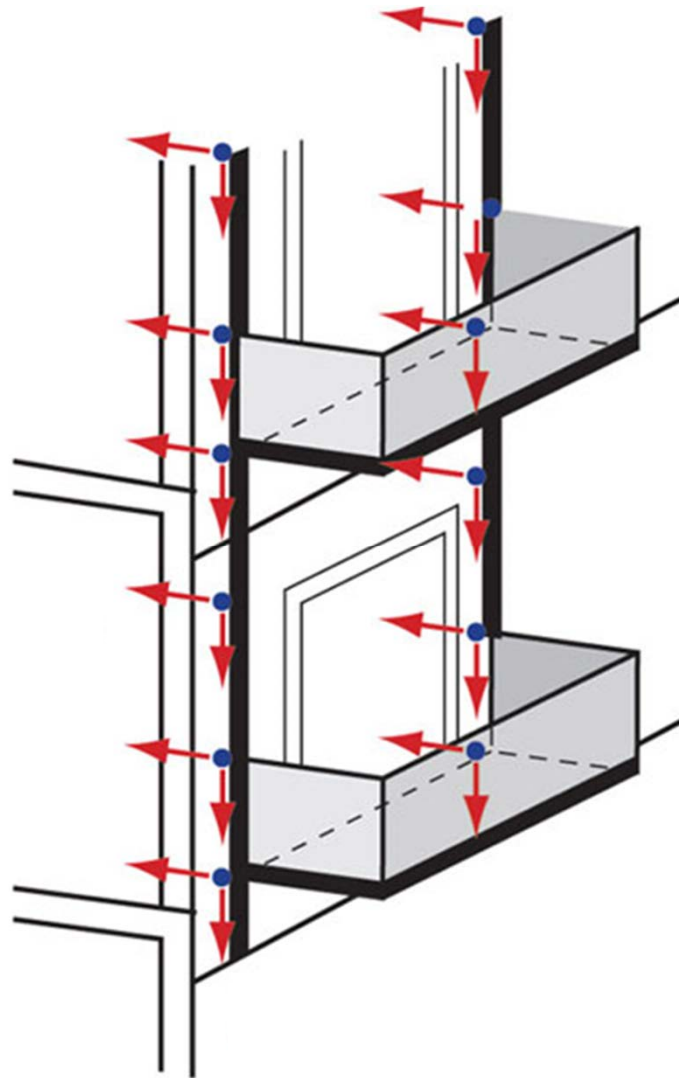
(image source: buildingscience.com)



## “French” Balcony

(image source: buildingscience.com)





## “Rail” Balcony

(image source: buildingscience.com)



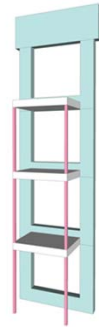
inset



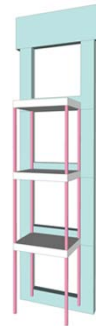
cantilever



corner



2 columns



4 columns



brace

## Balcony Types



## Balcony Detail Construction Sequence

Frame



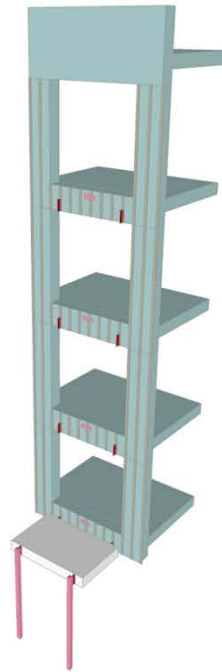
## Balcony Detail Construction Sequence

Strapping



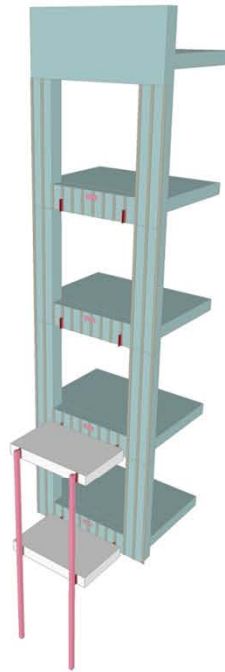
## Balcony Detail Construction Steps

Metal Work



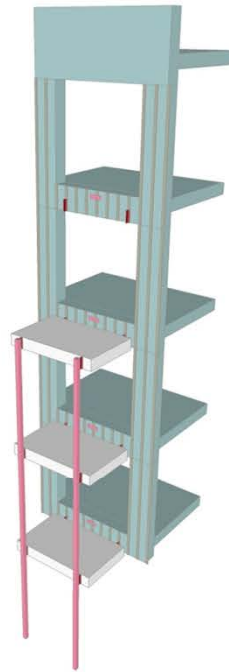
## Balcony Detail Construction Sequence

Structure - 1



## Balcony Detail Construction S Sequence

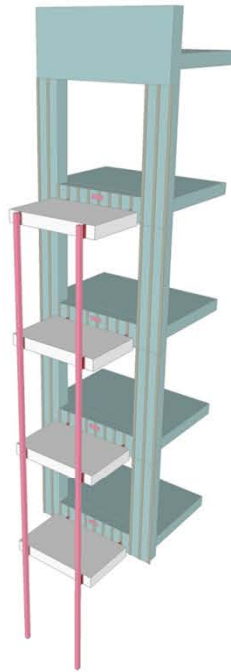
Structure - 2



## Balcony Detail Construction Steps

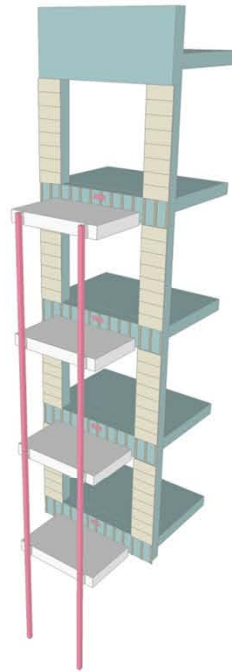
Structure - 4





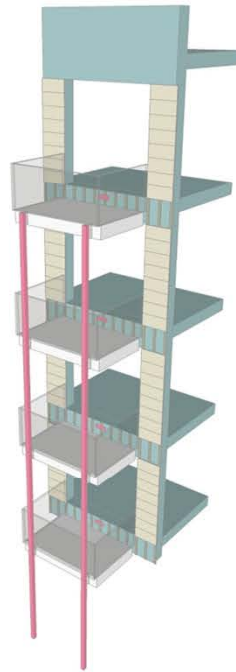
## Balcony Detail Construction Sequence

Structure - 4



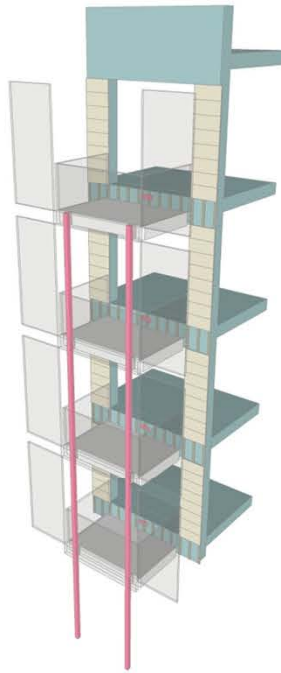
## Balcony Detail Construction Sequence

Cladding



## Balcony Detail Construction Sequence

Guards



## Balcony Detail Construction Sequence

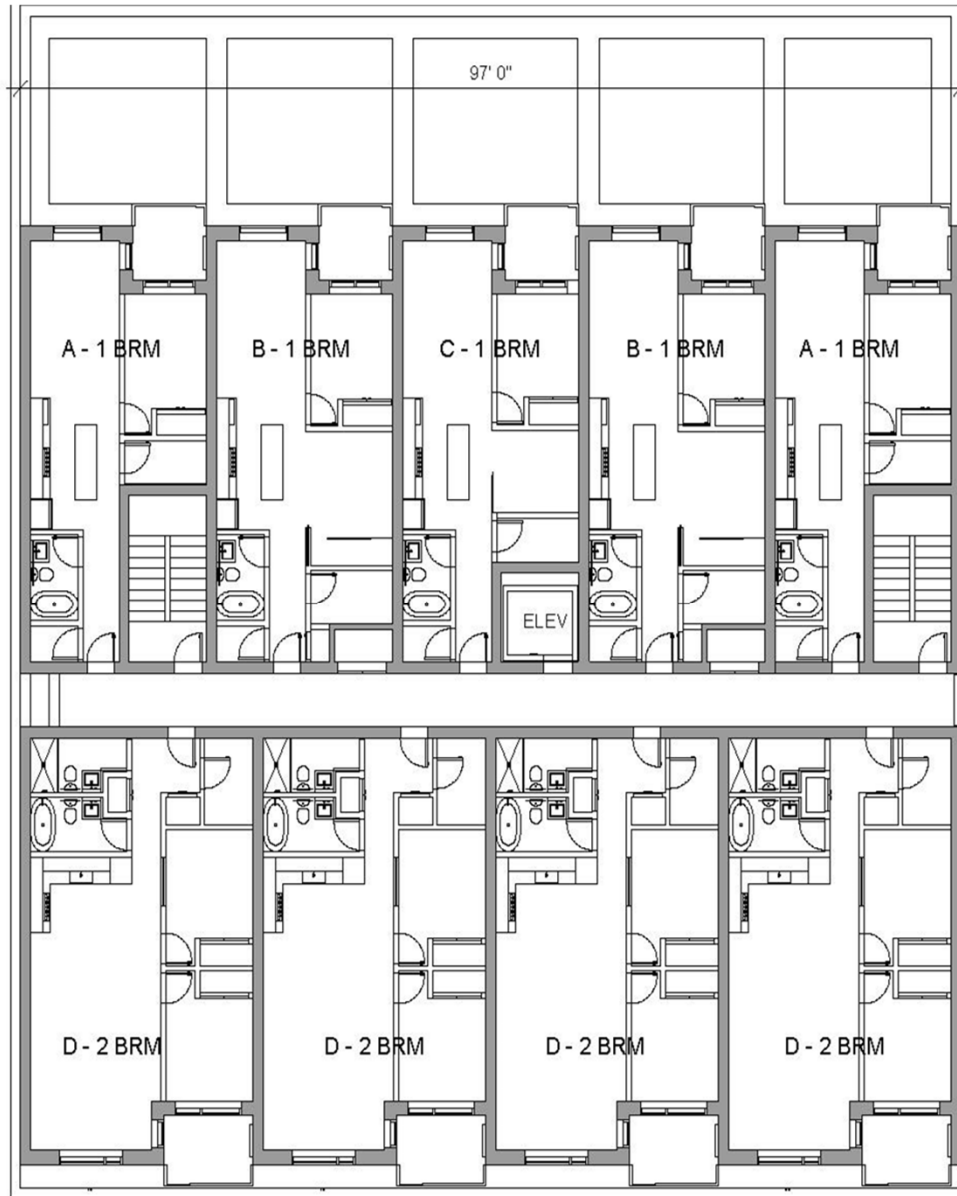
Screens

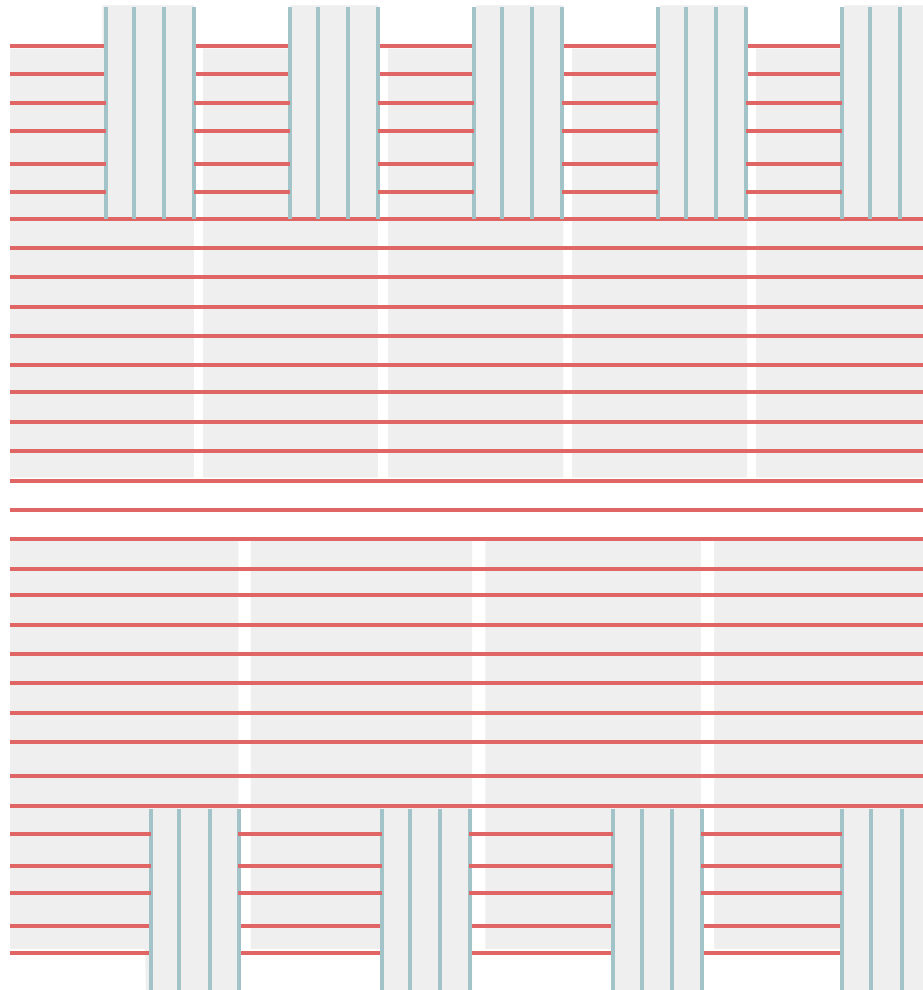


Balcony Detail Construction Sequence



PHMURB PROTOTYPE BALCONY

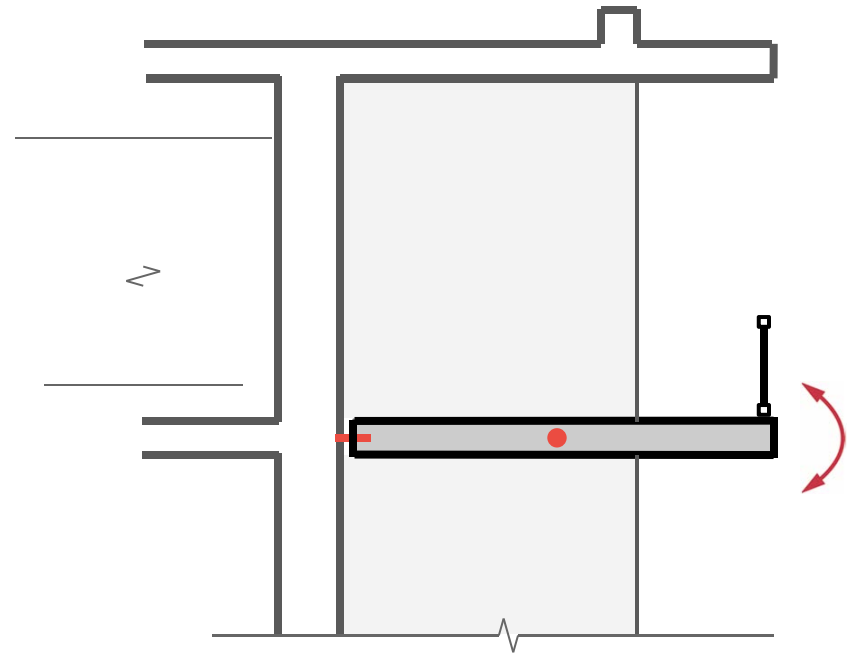
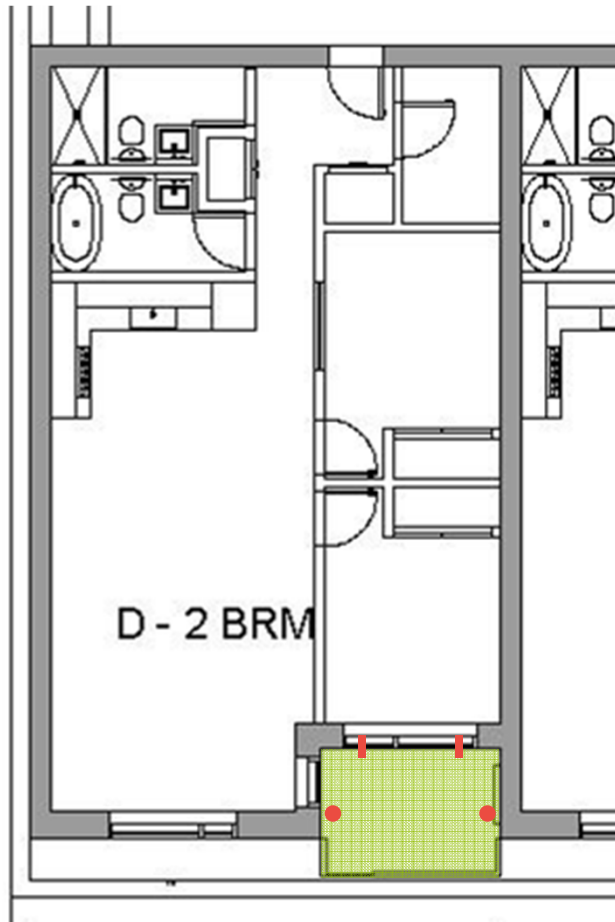




Overlay Structural Grid - Conventional

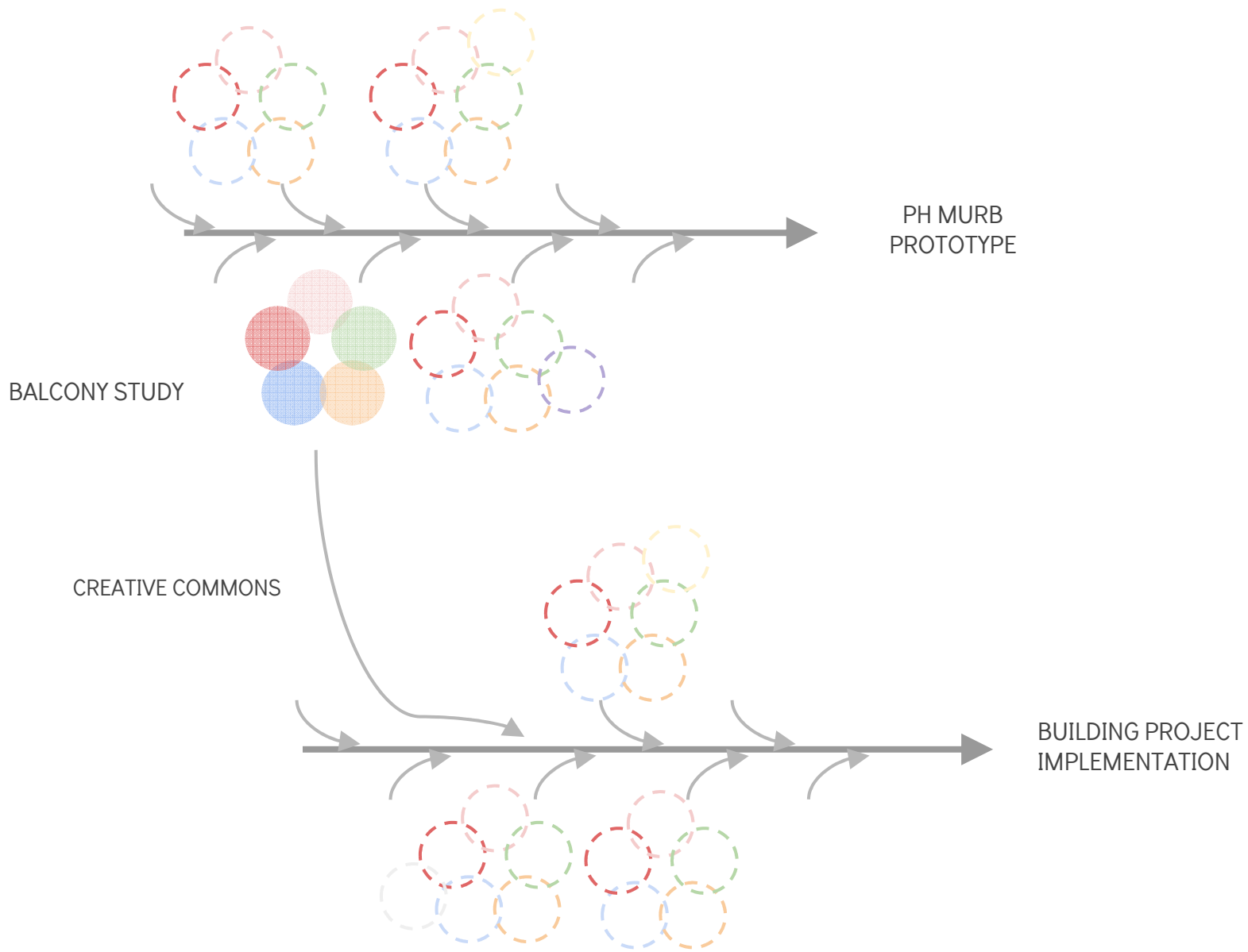




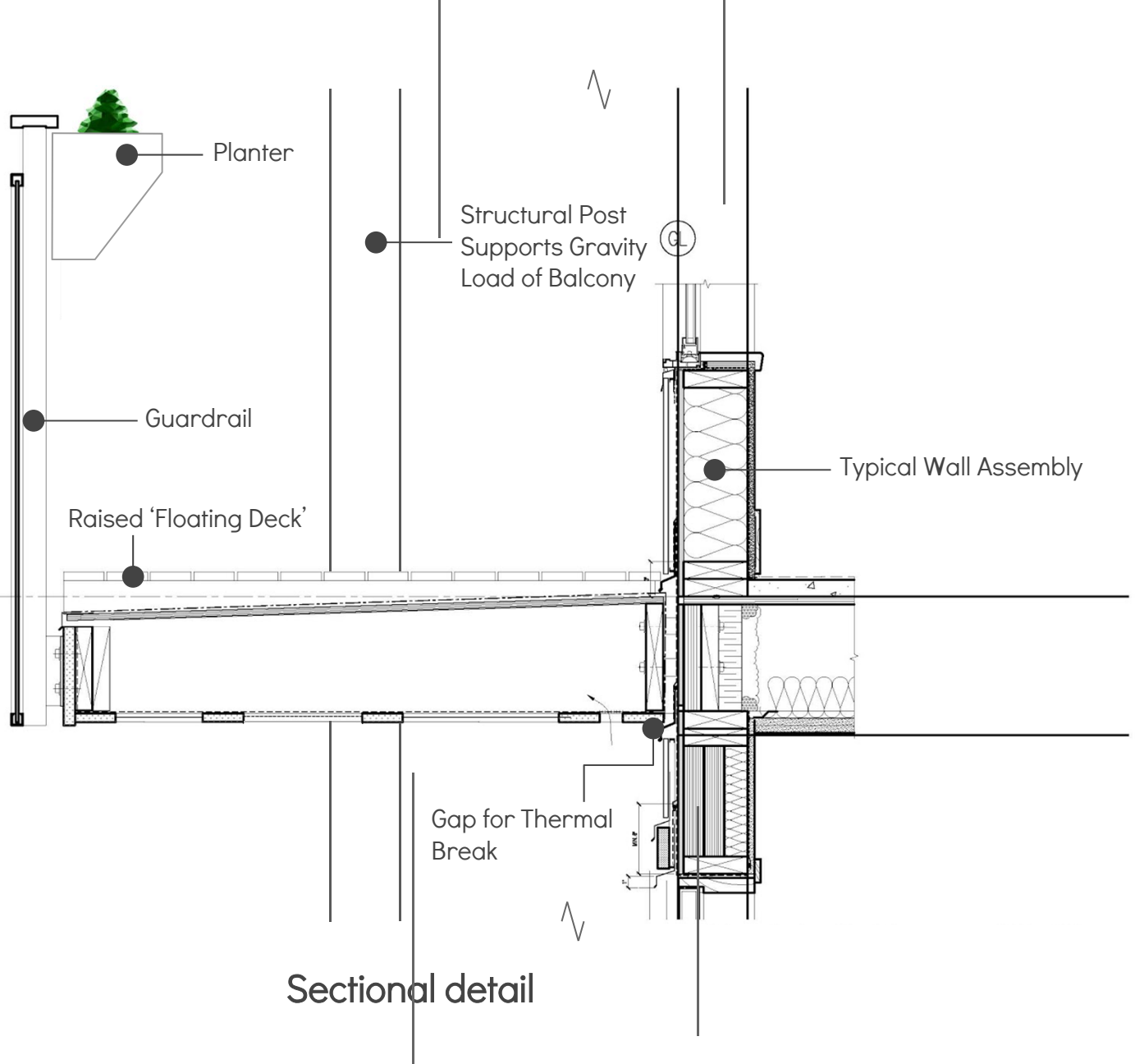


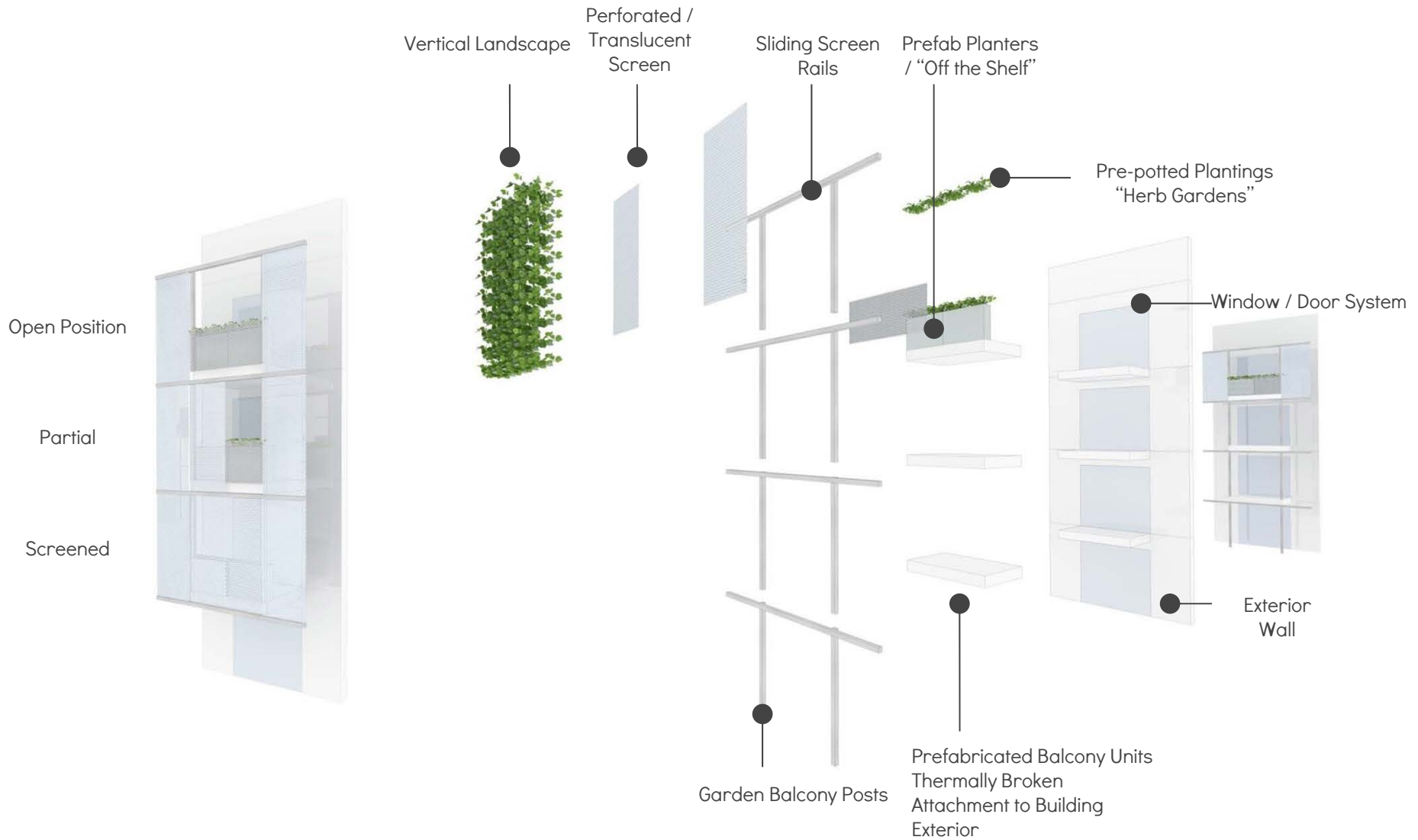
## BALCONY THERMAL BREAK STUDY

4-POINT CONNECTION, NOT CONTINUOUS CANTILEVER



Creative Commons for Sustainable Building





Variation/Layering

Kit of Parts
















How can you contribute to the creative commons for sustainable building?



## Resources

Koka architecture + design  
Marken Design + Consult  
Passive house institute  
International Passive House Association


[PHA](#) | [Passipedia](#) | [Passive House Conference](#) | [Professionals](#) | [Component Database](#) | [Passive House Buildings](#)


The independent institute for outstanding energy efficiency in buildings
DEUTSCH  
ENGLISCH


[Home](#) | [Passive House Institute](#) | [About Passive House](#) | [Certification](#) | [PHPP](#) | [Literature & Tools](#) | [Seminars](#) | [Awards](#) | [Networks](#) | [Press](#)


You are here: Home


The Passive House Institute (PHI) is an **independent research institute** that has played an especially crucial role in the development of the Passive House concept - the only internationally recognised, performance-based energy standard in construction. [Learn more about the Institute and its work.](#)






**Room with a view**  
 This New York City view will soon be enjoyed by students: A 27-storey highrise is being built to the Passive House Standard in Manhattan. A climate-friendly and affordable home in the middle of New York City.

**Passive House in Social Media**  


**Events**  

**International Passive House Days**  
 13th Passive House Days  
 11 to 13 Nov 2016, worldwide  
[read more](#)


**INTERNATIONAL PASSIVE HOUSE CONFERENCE 2017**  
 28 - 29 April 2017, Vienna  
[read more](#)

**Component Database**  
 Passive House Component Database  
[read more](#)


**Projects**  



# Passive House Institute

passivehouse.com



## iPHA The International Passive House Association

A global network for *Passive House knowledge* working to promote the *Passive House Standard* worldwide (see *Mission and values*)

### Step-by-step towards EnerPHit



[Press Release](#)

Many home and building owners carry out renovations in a step-by-step manner. To avoid unnecessary additional costs, all planned measures for energy retrofits should be coordinated with each other before the first step is implemented. For this advanced planning, the EnerPHit Retrofit Plan has recently been developed by the Passive House Institute.

### Operation Passive House Clinic

#### PASSIPEDIA



A wealth of Passive House knowledge.

#### FORUM



Where Passive House stakeholders meet.

#### BECOME A MEMBER ▶

##### iPHA Members

[Member Search ▶](#)

[Member Area Login ▶](#)

#### UPCOMING EVENTS ▶

##### Upcoming Events

[Mid-year Passive House days ▶](#)

24–26 June 2016

[Int'l Passive House Days ▶](#)

11–13 November 2016

[Int'l Passive House Conference](#)

Spring 2017

International Passive House Association

[passivehouse-international.org](http://passivehouse-international.org)



## CoV Passive Design Toolkit

<http://vancouver.ca/files/cov/passive-home-design.pdf>

# PASSIVE GREEN

A COLLECTION OF STORIES ABOUT BUILDING PROGRESSIVELY GREEN ON THE WEST COAST BY MARKEN DESIGN + CONSULTING

## A LIST OF PASSIVE HOUSE SUITABLE WINDOWS AVAILABLE IN CANADA & USA – BY MARKEN DESIGN + CONSULTING

August 3, 2015

**Seven years ago** we started designing high performance homes in Canada including to standards such as [Net Zero](#) and [Passive House](#). One of the biggest obstacles back then was the **lack of high quality, energy efficient products** we could use for those projects. Nowadays there is quite a good selection of products available in different price segments, both in the US and Canada, which are suitable for high performance building projects, including windows and doors.

Given the recent and ongoing discussion about the lack for **Passive House windows**, we thought this list of manufactures and dealers carrying windows that have been used (some of we have used) in ultra energy efficient projects including Passive House buildings (certified & non-certified one's) in North America, can be useful for your next project.



### PROFILE

---

Marken Design + Consulting – Who We Are

---

### BLOGROLL

---

Our Facebook Page

---

### WEBSITES

---

Marken Design Studio

---

### CATEGORIES

 Follow ...

## Passive House Design Features

(Image Source: PassiveGreen.Wordpress.com)



Thank you.

Presentation and PHMURB Prototype contributors:



Architectural



Passive House  
Consultant

Fast + Epp

Structural



Mechanical



LITTLE MOUNTAIN  
ENGINEERING CO.

Electrical

LDR | ENGINEERING  
GROUP

Envelope



Maza Interior  
Design

Interior Design

L M D G  
Building Code Consultants Ltd

Code



Quantity  
Surveyor

[Passive House Explained in 90 Seconds Video](#)