# Energy Step Code

## Architectural Case Studies for Step 3

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01 Key Architectural Considerations

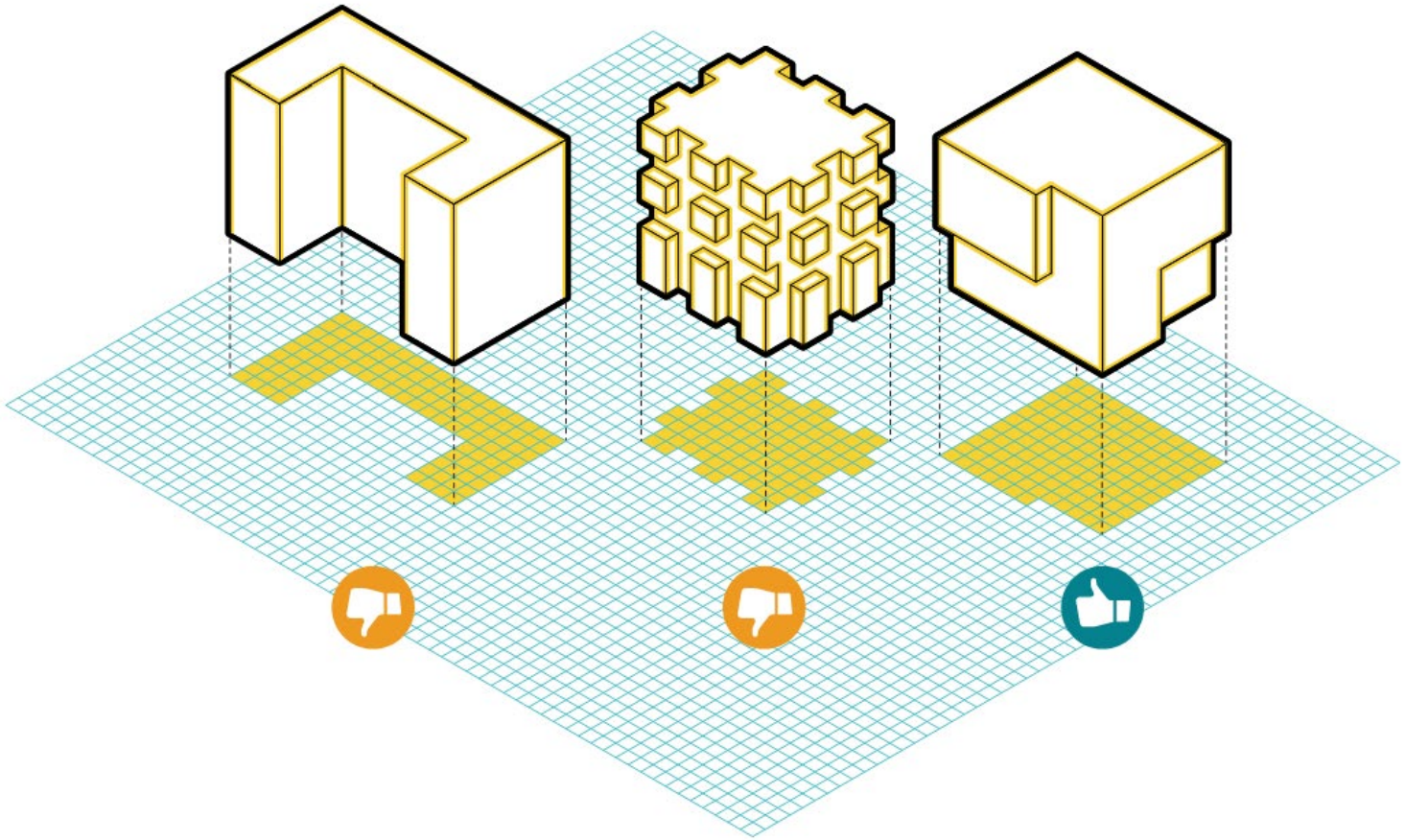
02 Case Study #1: Rental Housing, Okanagan, BC

03 Case Study #2: BC Housing Mixed Use, Vancouver, BC

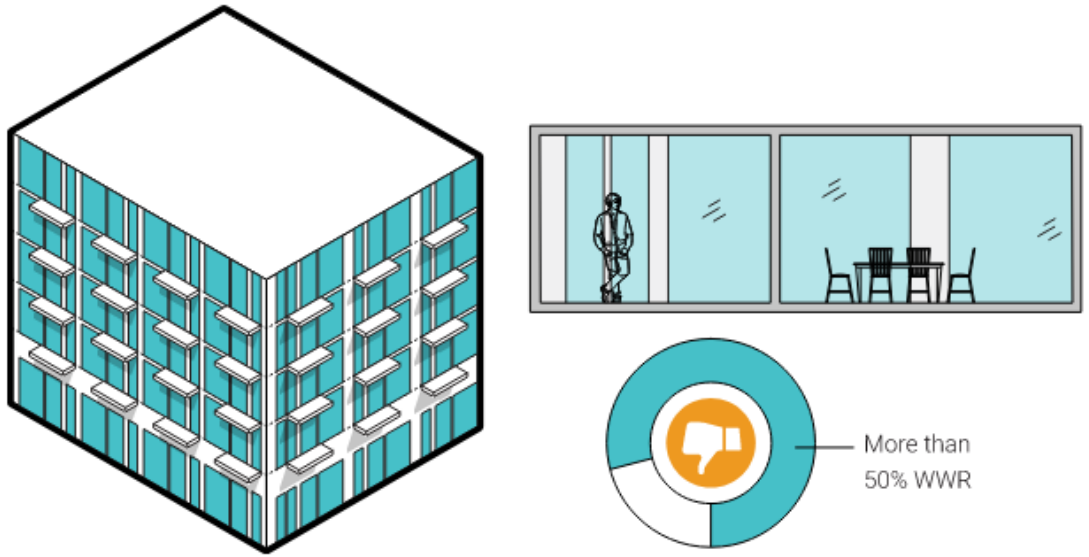
04 Conclusions

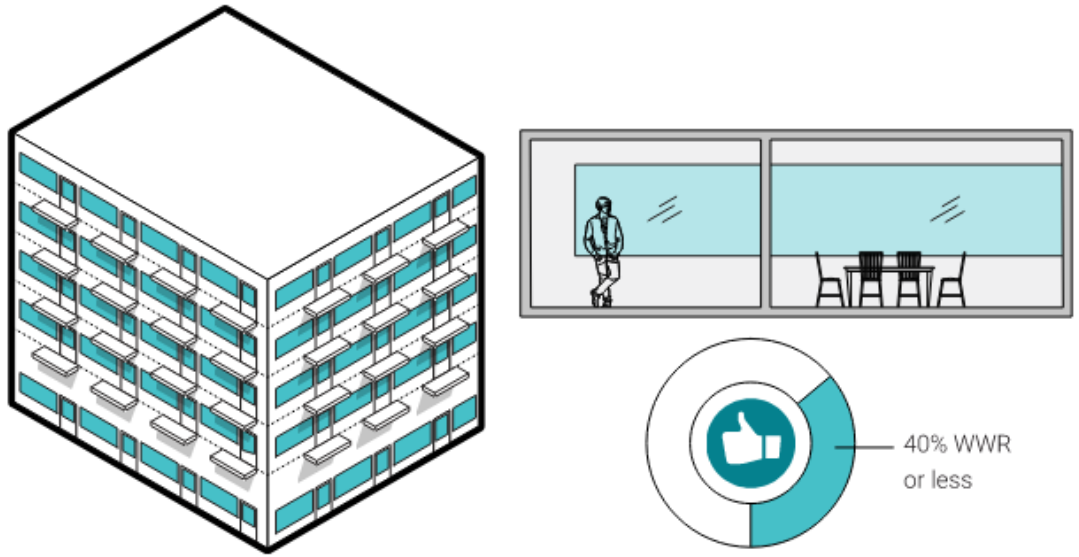
# Simple forms and envelopes

- Vertical Façade to floor Area Ratio (VFAR)

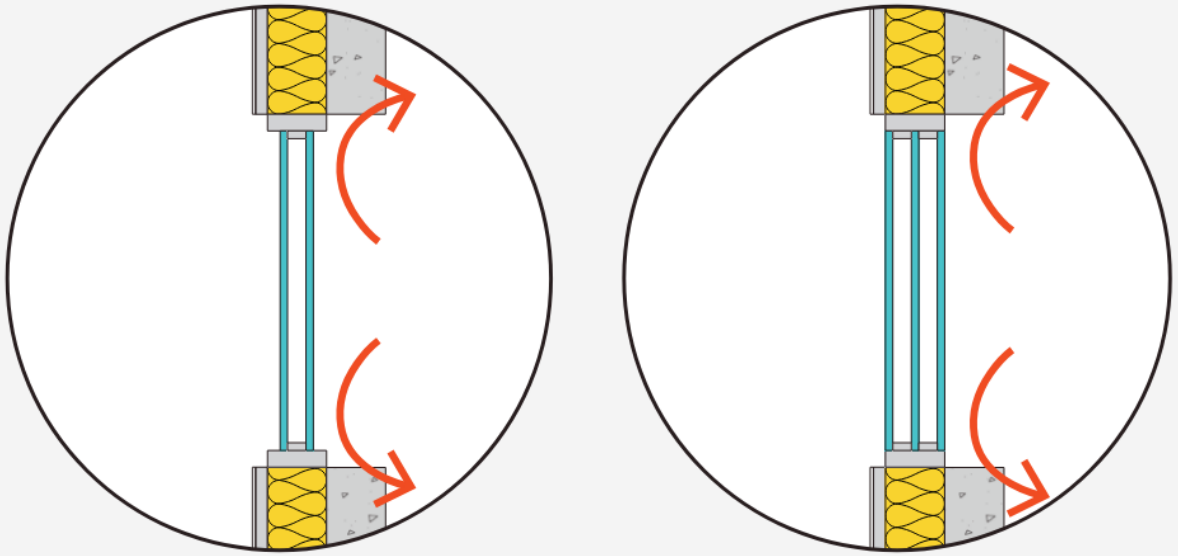


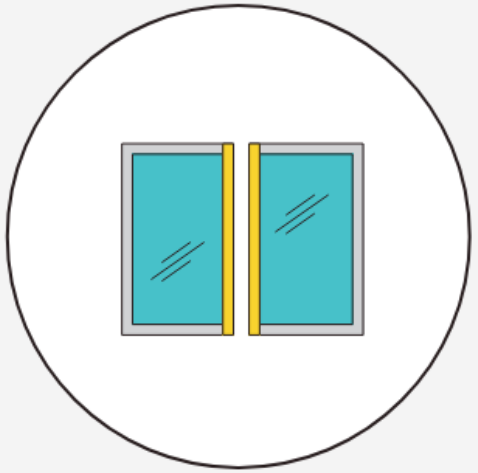
# Window to wall ratio



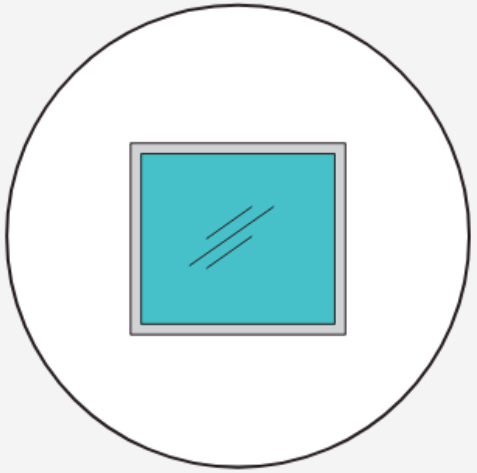



# Glazing performance





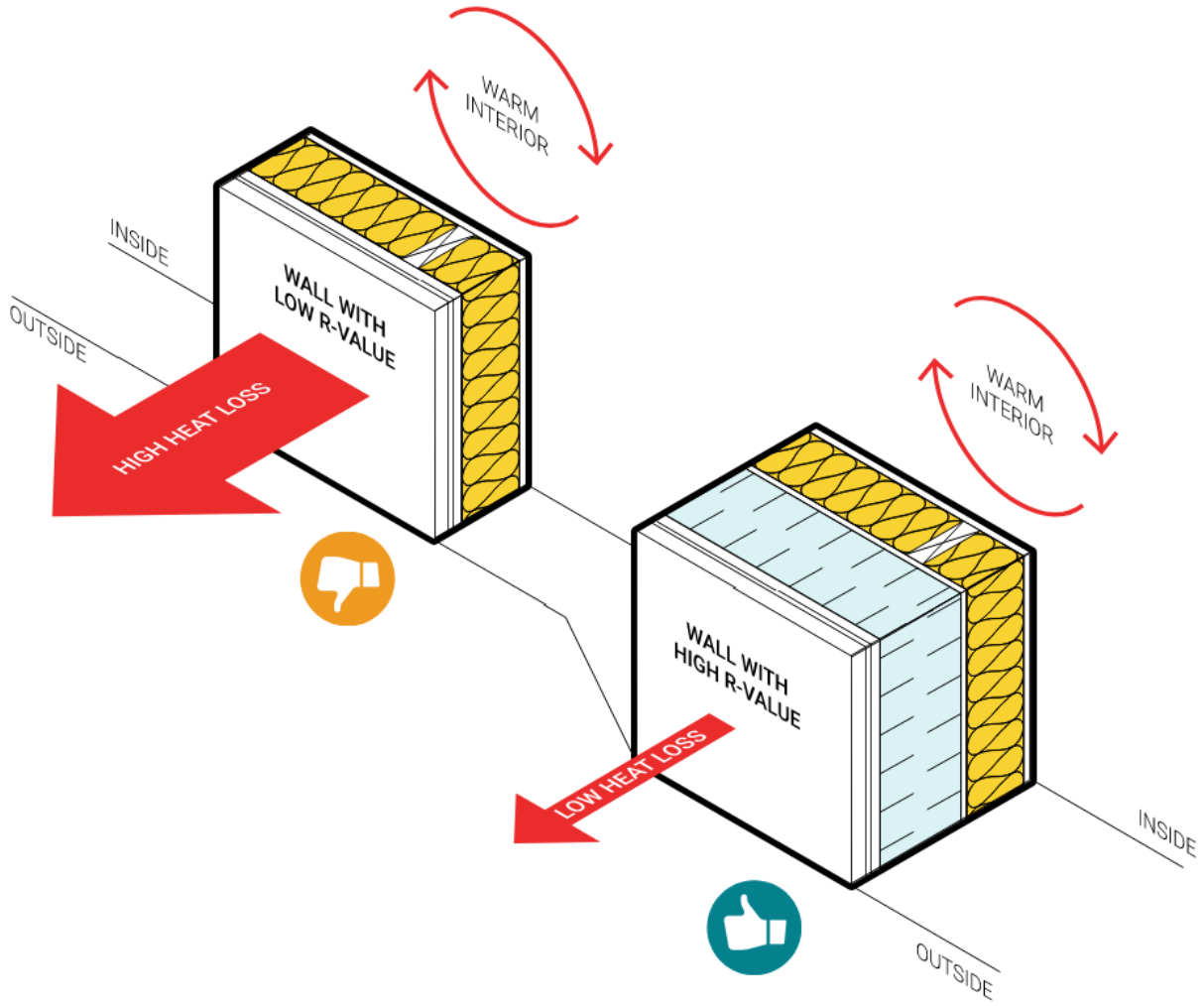
The greater the number of window framing elements, the greater the opportunities for thermal bridging.



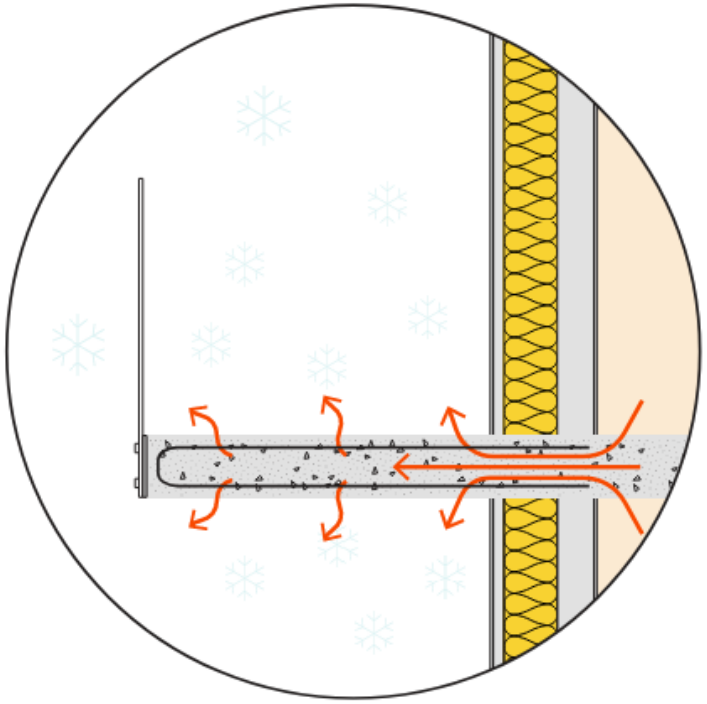
Minimize the number of framing elements to reduce heat losses through the building envelope.

Wherever possible, window design should emphasize fewer, larger windows in lieu of a greater number of smaller windows.

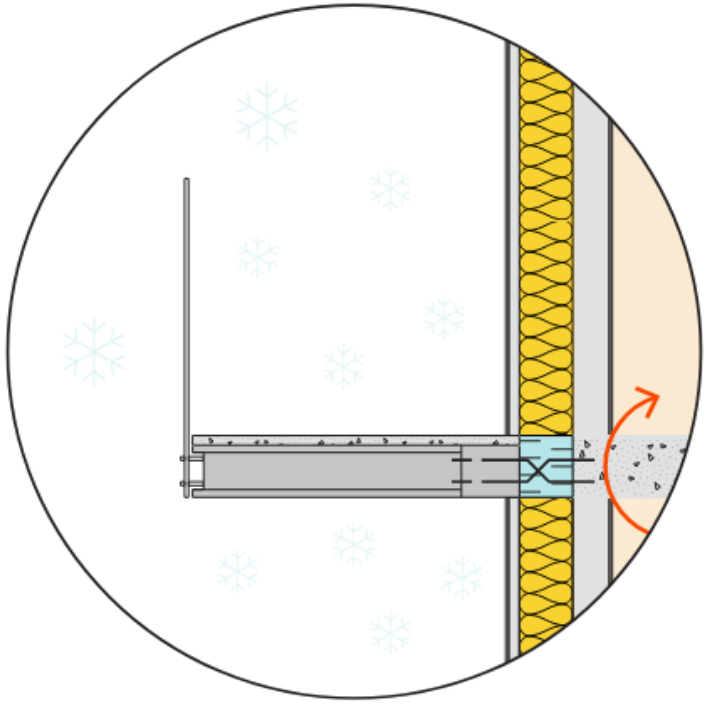
# Effective RValues consider Thermal Bridging



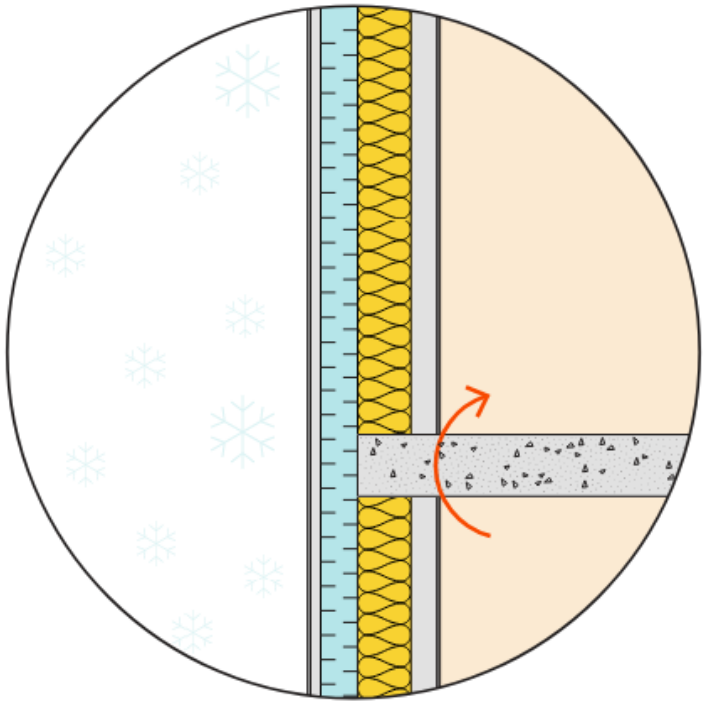
# Effective RValues consider Thermal Bridging



Balcony with high thermal bridging

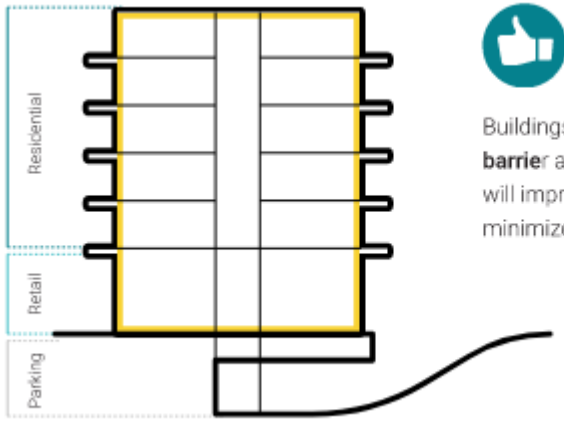


Thermally broken balcony

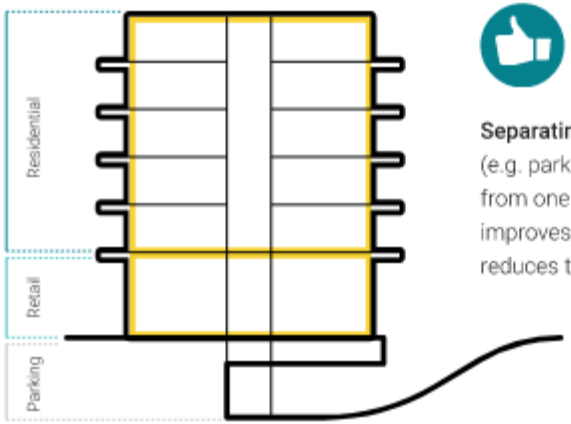


Continuous insulation

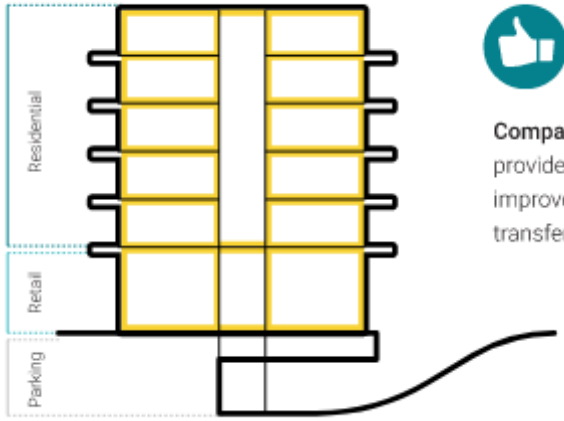
# Air tightness




Buildings with a **continuous air barrie**r around the entire facade will improve airtightness and minimize heat losses




**Separating building uses** (e.g. parking, retail, residential) from one another further improves airtightness and reduces the stack effect




**Compartmentalizing individual units** provides the highest level of airtightness and improve occupant comfort by reducing the transfer of noise and smells between units

# 01 Rental Housing

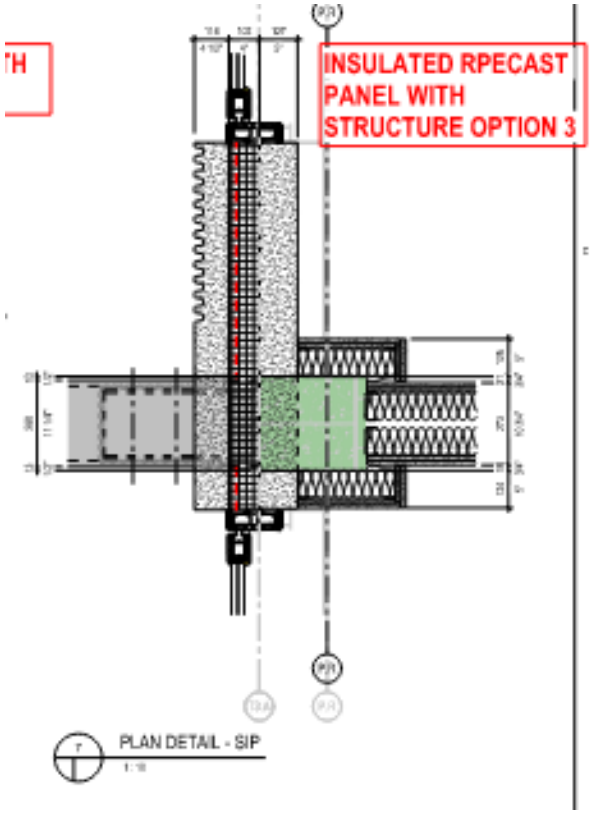
Client owned rental housing // Central Okanagan, BC

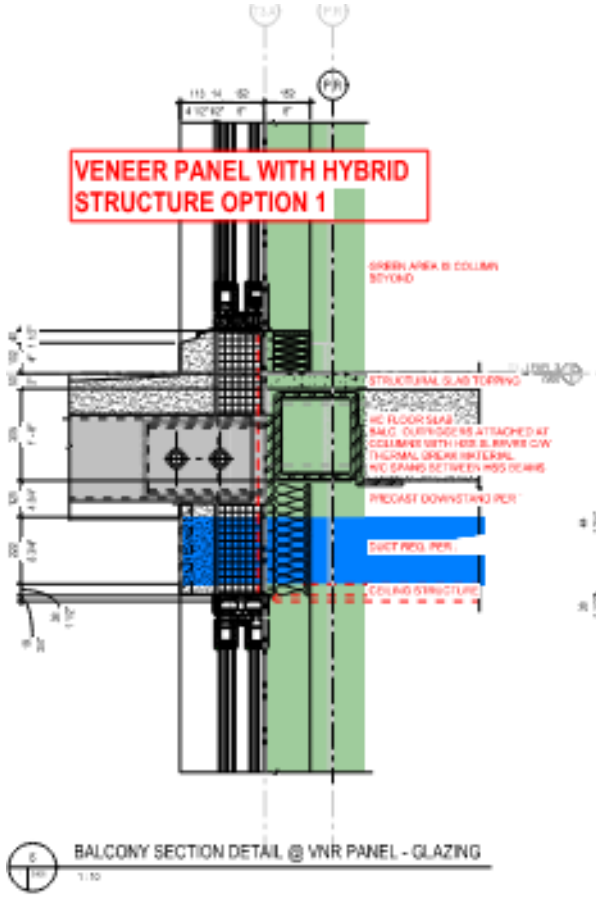
# Passive House inspired design

- Target less than Step Code
  - TEUI: 108 kWh/m2 (120 target)
  - TEDI: 31.5 kWh/m2 (35 target)
- Low VFAR
- 44% WWR
  - Double pane low-e glazing
- Sandwich panel façade
  - GC preference
  - Prefabrication = QC for air tightness
  - Focus on joints
- Individual suite ASHPs

# Thermally Broken Balconies

Collaboration with GC to adapt preferred precast balcony



# 02 BC Housing Mixed Use

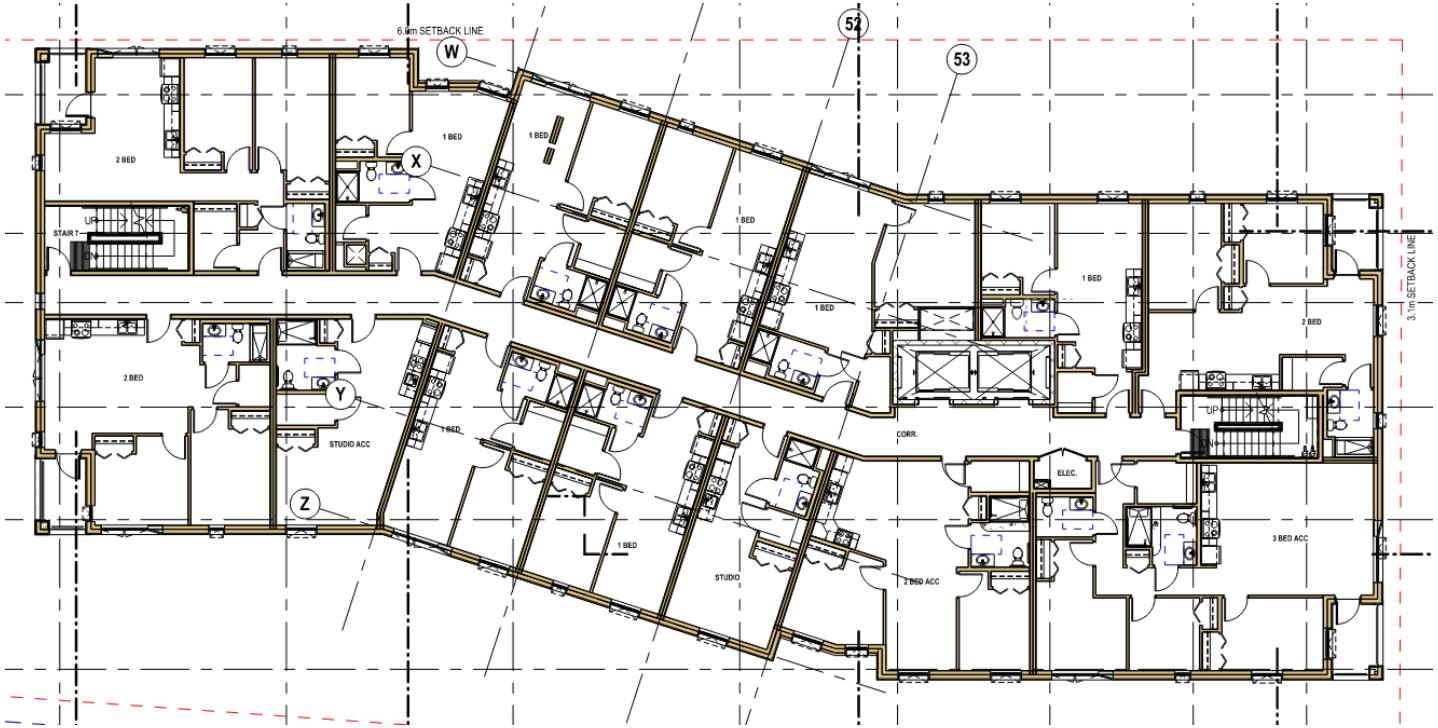
Clinic (podium) and rental housing // Vancouver, BC

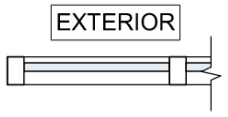
# Project Background

- BC Housing elected for Step 3
- Clinic at podium and rental housing above
- Concrete and wood frame construction
- Separate air compartments
- Low VFAR
- 21% WWR
- Individual suite HRVs and ASHPs

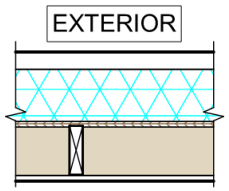
| Requirements | CoV Rezoning | BC Housing Step Code |
|---|---|---|
| TEDI (kWh/m²) | 29.8 | 30.0 |
| TEUI (kWh/m²) | 121.2 | 120 |
| GHGI (kg $CO_2$e/m²) | 6.0 | 6.0 |
| Overheating Hours | 200 | 20 |

# Wood frame housing



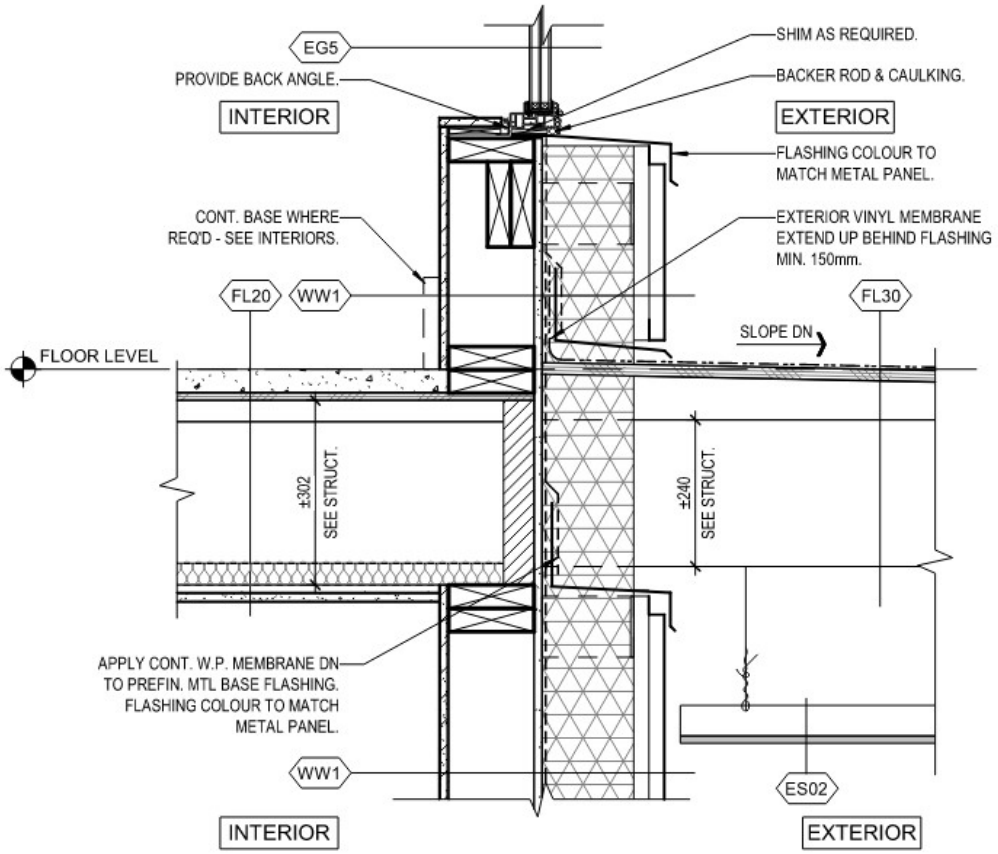




**EXTERIOR VINYL GLAZING SYSTEM**
- TRIPLE-GLAZED VISION PANEL IN PREFINISHED VINYL WINDOW SYSTEM.




**METAL CLADDING @ WOOD STUD**
- EXTERIOR PREFINISHED NON-COMPOSITE METAL CLADDING.
- GALV. METAL SUB-GIRTS (AIR GAP.)
- 150mm THERMALLY-BROKEN CLIP SYSTEM.
- SEMI-RIGID MINERAL WOOL INSULATION (150mm MIN.)
- FULLY ADHERED AIR/ VAPOUR/ MOISTURE BARRIER MEMBRANE.
- 15.5mm PLYWOOD SHEATHING.
- 38x140mm WOOD STUDS @ 600mm O.C.
- 15.9mm 'TYPE-X' GYPSUM BOARD.

# Thermal bridges - Balconies

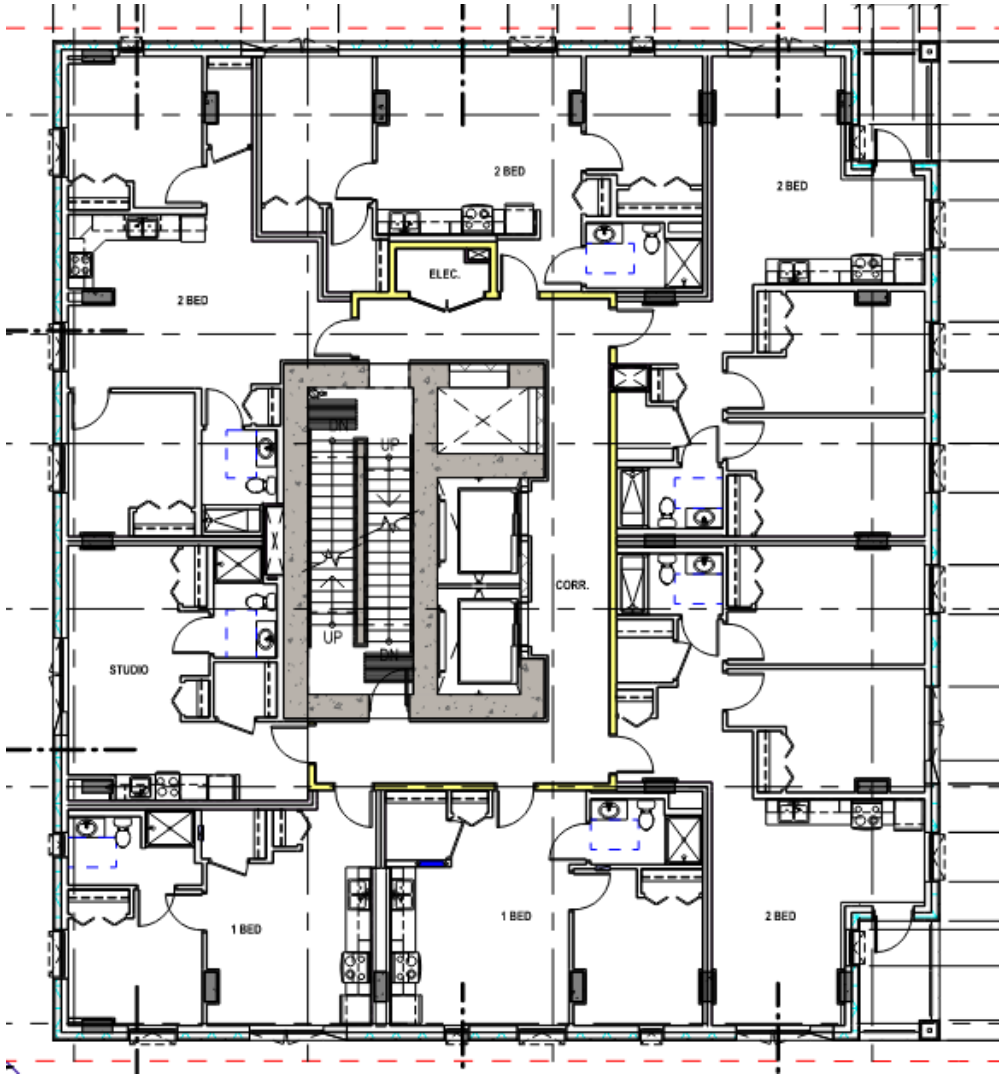


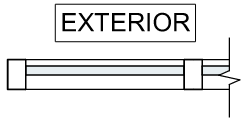

**16 | WOOD FLOOR @ EXTERIOR WALL / BALCONY**

A6.03 | SCALE = 1 : 10 *FIRST REFERENCED FROM:* A5.12

# Concrete tower

| Requirements | CoV Rezoning | BC Housing Step Code |
|---|---|---|
| TEDI (kWh/m²) | 29.8 | 30.0 |
| TEUI (kWh/m²) | 121.2 | 120 |
| GHGI (kg $CO_2e/m^2$) | 6.0 | 6.0 |
| Overheating Hours | 200 | 20 |

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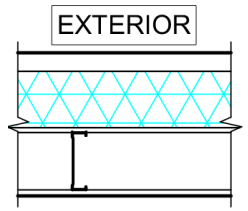


**METAL CLADDING @ STUD - HORIZONTAL**
- EXTERIOR PREFINISHED NON-COMPOSITE METAL CLADDING.
- GALV. METAL SUB-GIRTS (AIR GAP.)
- 150mm THERMALLY-BROKEN CLIP SYSTEM.
- SEMI-RIGID MINERAL WOOL INSULATION (150mm MIN.)
- FULLY ADHERED AIR/ VAPOUR/ MOISTURE BARRIER MEMBRANE.
- 12.7mm FIBRE REINFORCED EXTERIOR SHEATHING.
- 152mm METAL STUDS @ 600mm O.C.
- 15.9mm 'TYPE-X' GYPSUM BOARD.

# Conclusions

Energy model early and often

Construction feedback during design process = improved cost certainty and design decisions

Low form factor = efficient floor plate

Low form factor = reduced envelope

Low WWR = less expensive glazing and less of it

Improved glazing = better acoustics

Improved air tightness and suite HRV = better acoustics, odors

Improved performance = less cost to owners