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# Passive House for the Public
# Glenroy Community Hub

Kieran Leong

(Bldg.Eng) WSP TTW Turner & Townsend OUTLINES DETAIL GREEN

Merri-bek City Council

DesignInc

**Budget** $30M
**Area** 4,533m²
**Opened** May 2022

Photography: Dianna Snape

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# Contents

- Building Overview
- Passivhaus:
  - How
- Challenges & Lesson's Learnt
- Once Open*


Photography: Dianna Snape

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Passivhaus Institut

LIVING BUILDING CHALLENGE℠

ZERO ENERGY CERTIFICATION

Photography: Dianna Snape

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## What is a living building?

It is self-sufficient and limits the use of external resources.
It connects people to light, air, food, nature, and community.

## How we made the Hub a living building:

### Energy

The roof is covered in 561 solar panels. This allows all of our energy use to come from the sun. It is a net positive energy building that means it generates more energy than it consumes.

### Water

Underground water tanks have been installed and connected to our roof. They can capture up to 120 kilolitres of water! The collected water is used to flush our toilets and water our gardens.

### Rain Garden

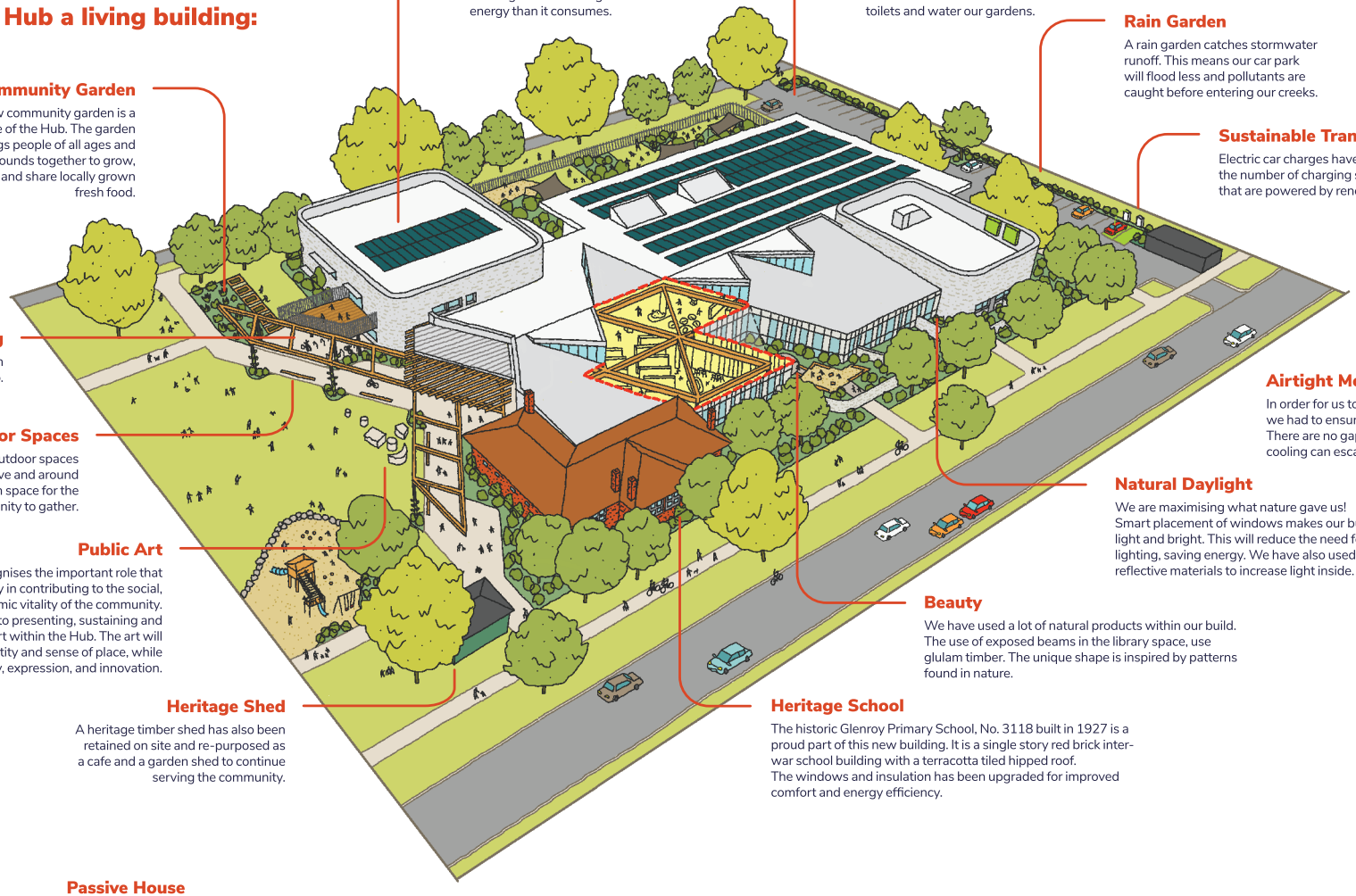
A rain garden catches stormwater runoff. This means our car park will flood less and pollutants are caught before entering our creeks.

### Sustainable Transport

Electric car charges have been installed. This grows the number of charging stations within the Council that are powered by renewable energy.

### Community Garden

A new community garden is a feature of the Hub. The garden brings people of all ages and backgrounds together to grow, harvest and share locally grown fresh food.



### Bike Parking

Bike parks have been provided at both entrances of the Hub.

### Seating + Outdoor Spaces

We have included seating and outdoor spaces throughout the Bridget Shortell Reserve and around the Hub. This allows plenty of open space for the community to gather.

### Public Art

The Council recognises the important role that public art has to play in contributing to the social, cultural and economic vitality of the community. We are committed to presenting, sustaining and supporting public art within the Hub. The art will promote local identity and sense of place, while stimulating creativity, expression, and innovation.

### Heritage Shed

A heritage timber shed has also been retained on site and re-purposed as a cafe and a garden shed to continue serving the community.

### Airtight Membrane

In order for us to be a certified Passive House, we had to ensure our building was airtight. There are no gaps where our heating and cooling can escape, reducing energy use.

### Natural Daylight

We are maximising what nature gave us! Smart placement of windows makes our building light and bright. This will reduce the need for electric lighting, saving energy. We have also used a lot of reflective materials to increase light inside.

### Beauty

We have used a lot of natural products within our build. The use of exposed beams in the library space, use glulam timber. The unique shape is inspired by patterns found in nature.

### Heritage School

The historic Glenroy Primary School, No. 3118 built in 1927 is a proud part of this new building. It is a single story red brick inter-war school building with a terracotta tiled hipped roof.
The windows and insulation has been upgraded for improved comfort and energy efficiency.

### Passive House

The building is Passive House certified. Passive House is an international building and energy standard. The primary goal of the standard is to provide the best comfort and air quality for people with the least amount of energy. The Hub has achieved this through a well constructed airtight building with energy efficient appliances, high levels of insulation, and high performance windows and doors.

Photography: Jacinta Keefe

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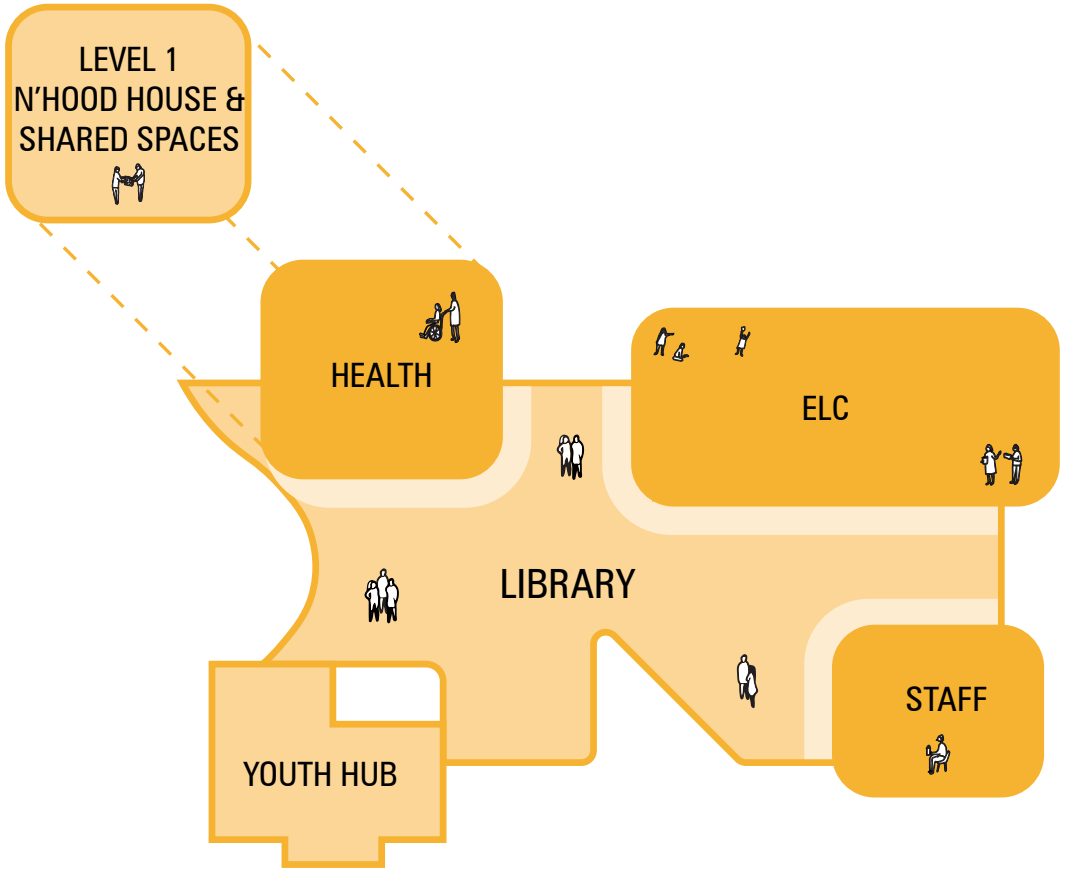



Photography (above + below): Dianna Snape

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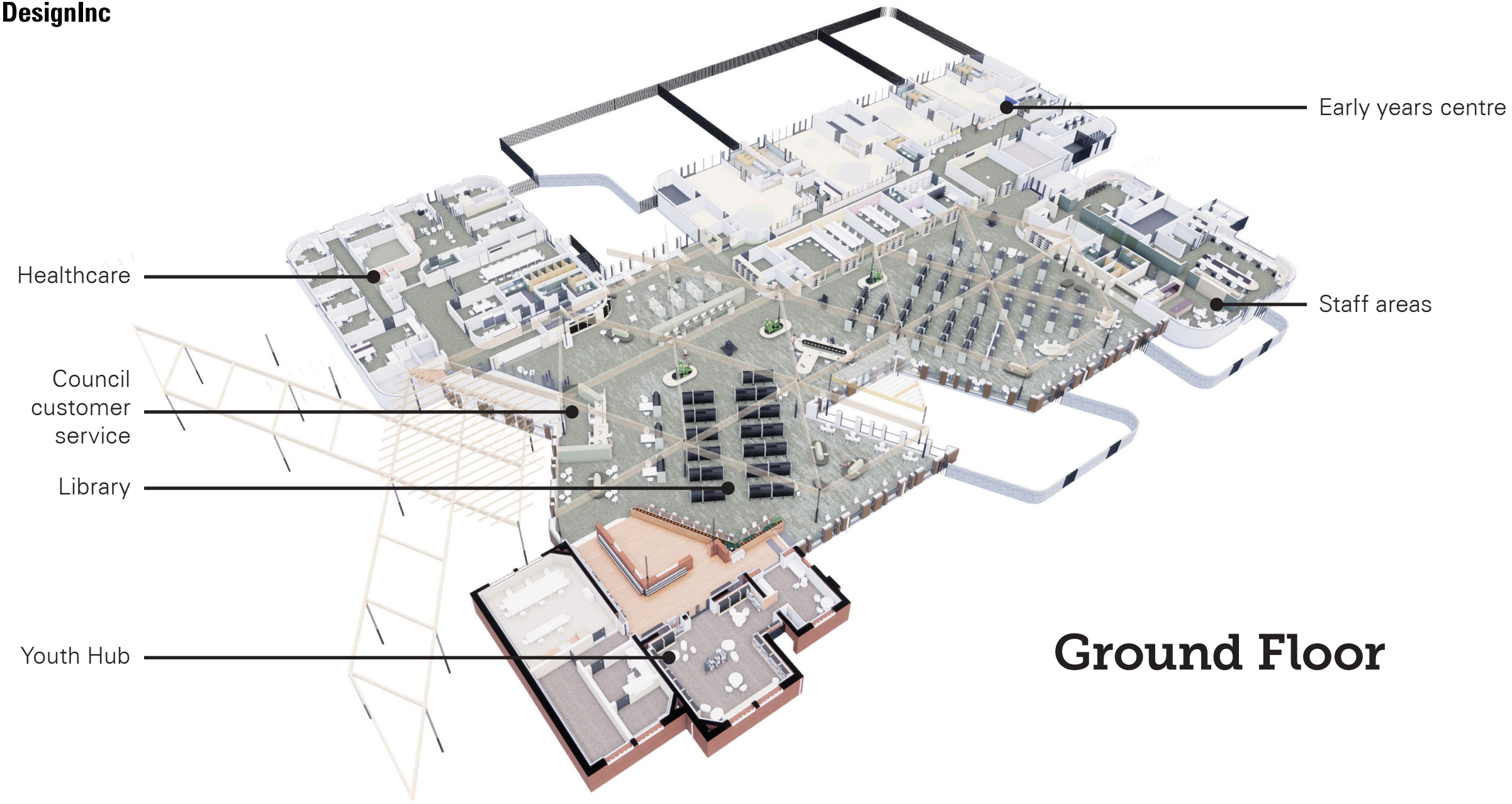


# Ground Floor

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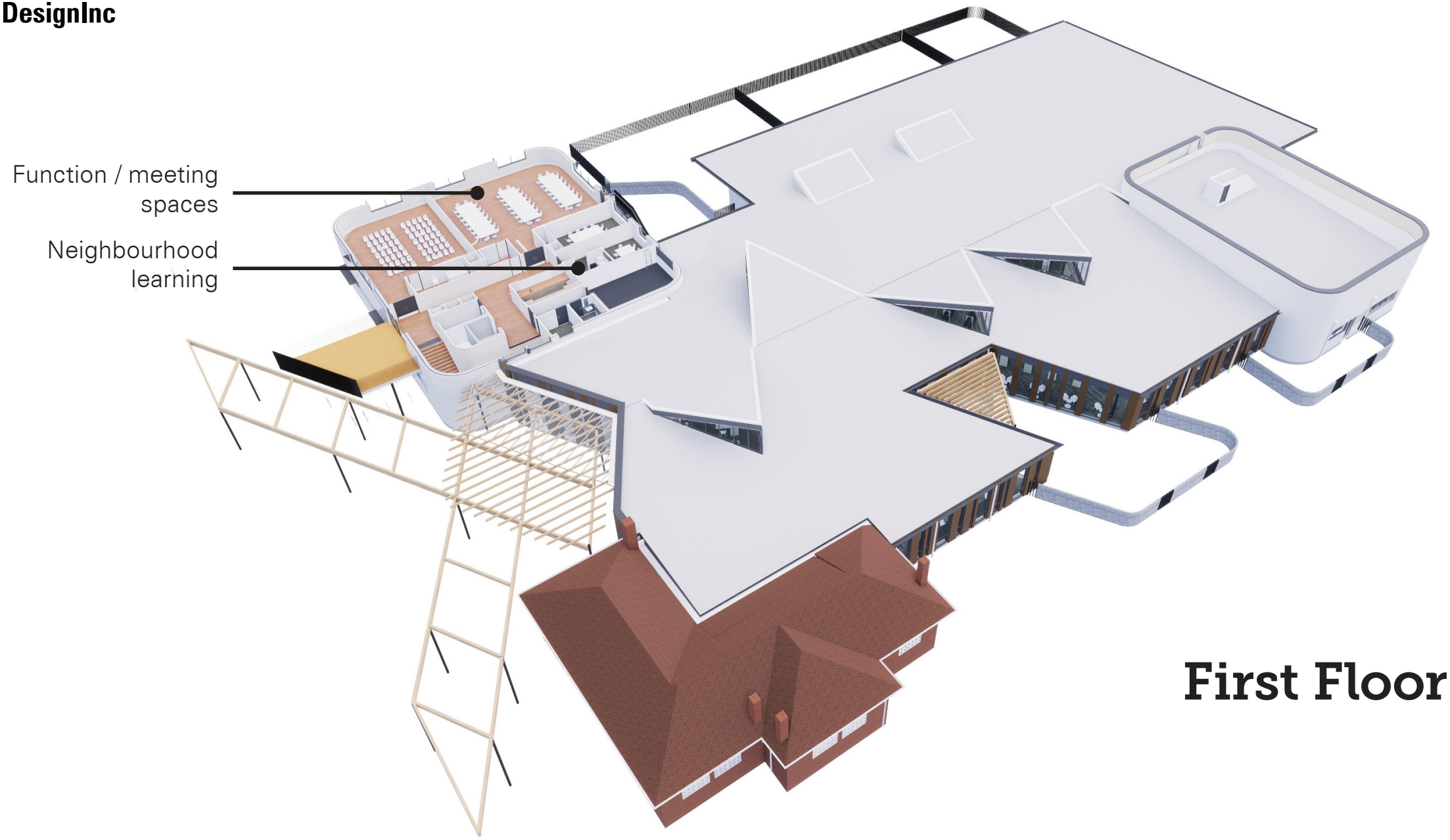


# First Floor

Photography: Dianna Snape


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Fiction
Photography: Dianna Snape

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Photography: Dianna Snape

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Photography: Dianna Snape

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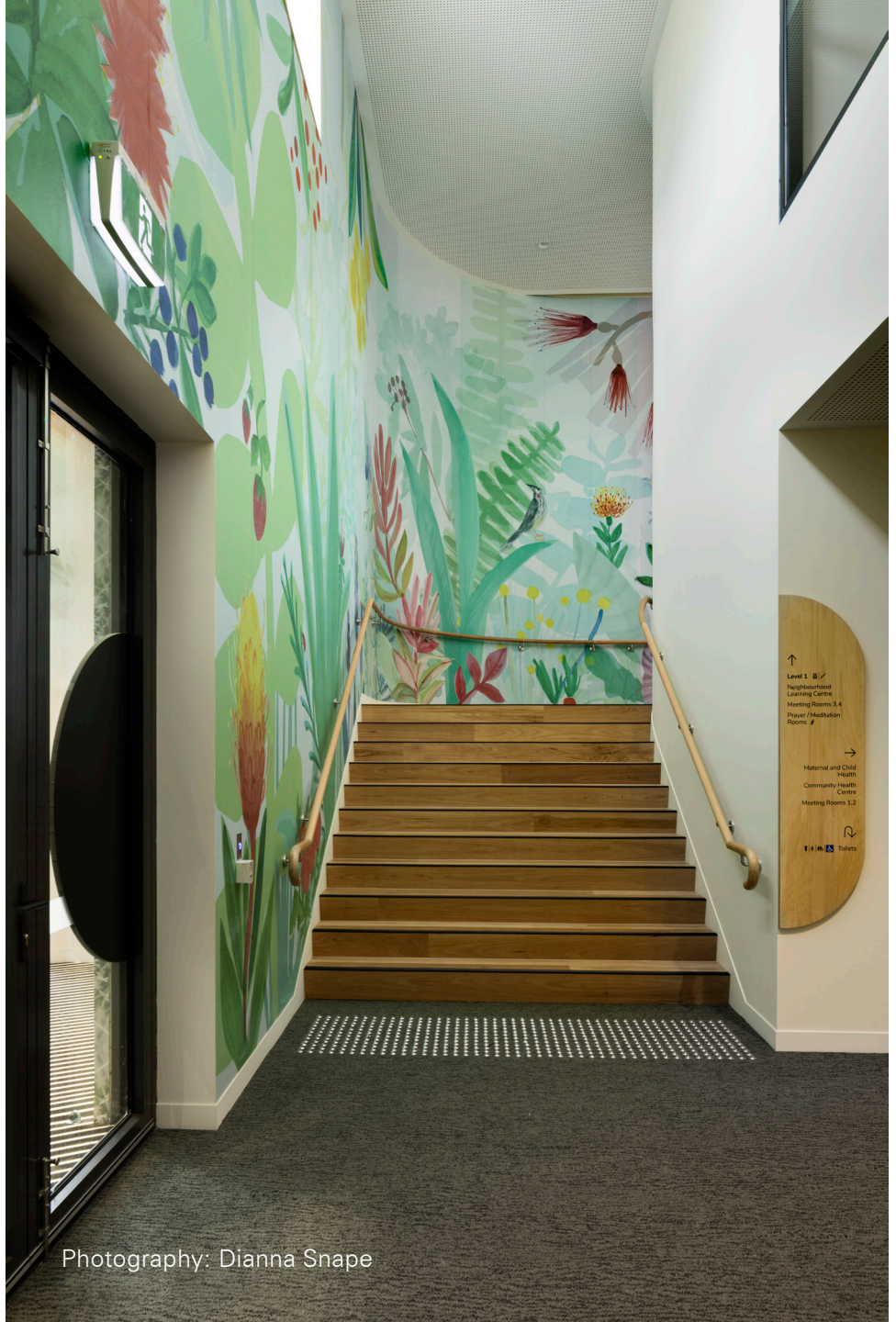
**DesignInc**




Photography: Dianna Snape

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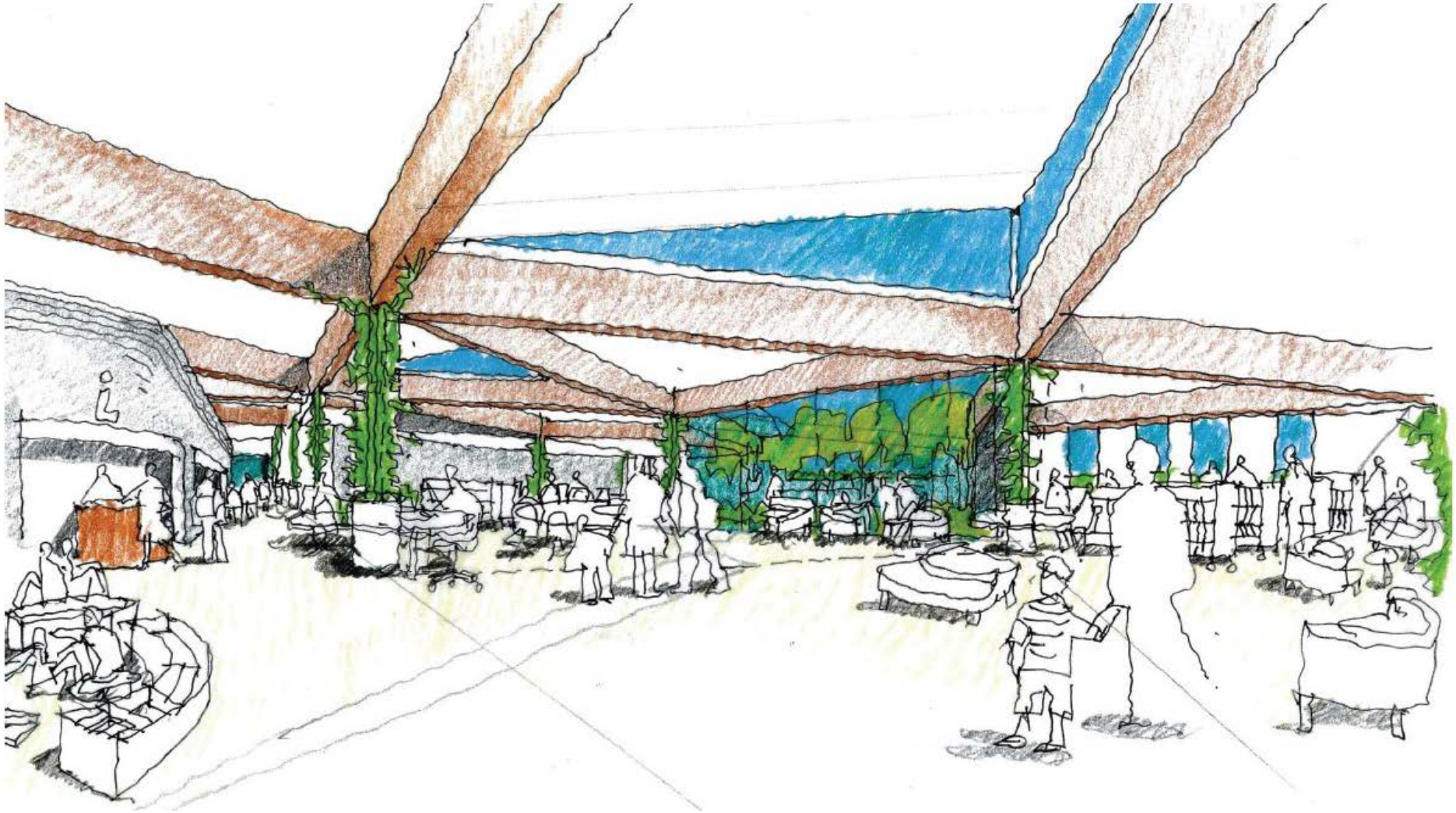
Photography: Dianna Snape

# Passivhaus

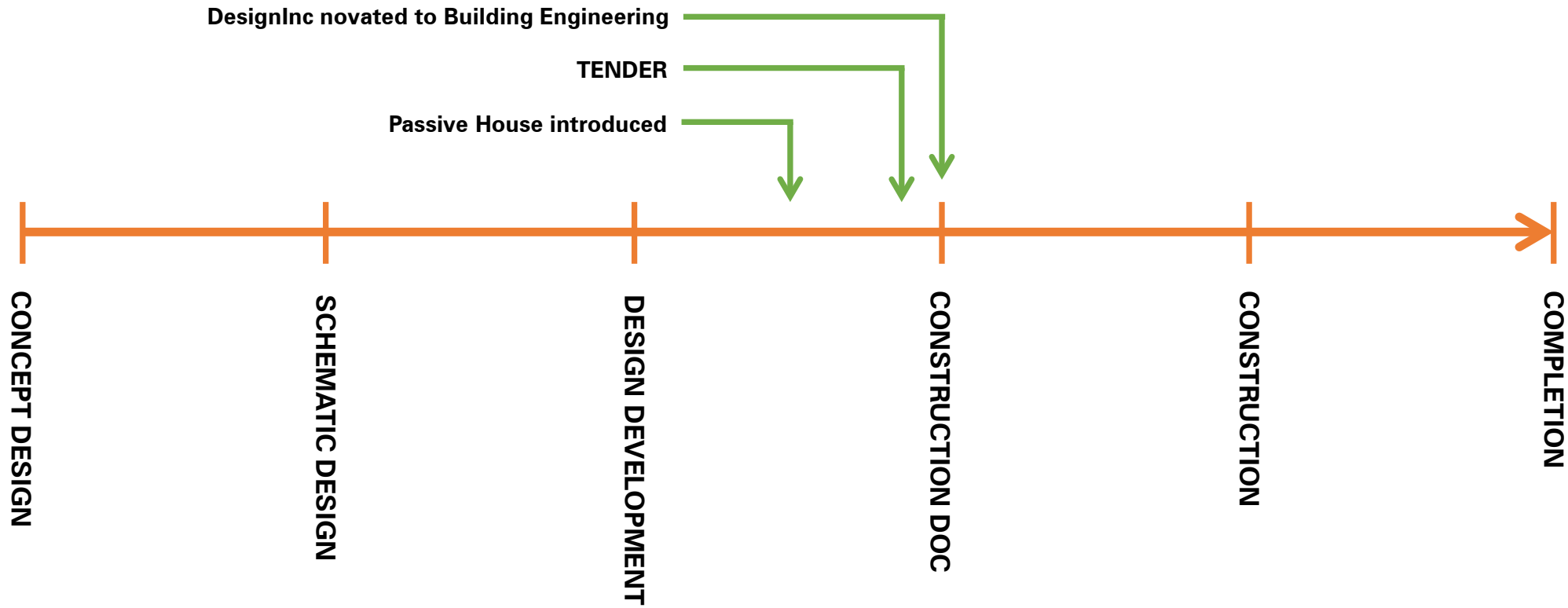
# Passivhaus

— Passivhaus Classic Certified
— 0.6 ACH
— ‘Retrofitted’ hybrid construction

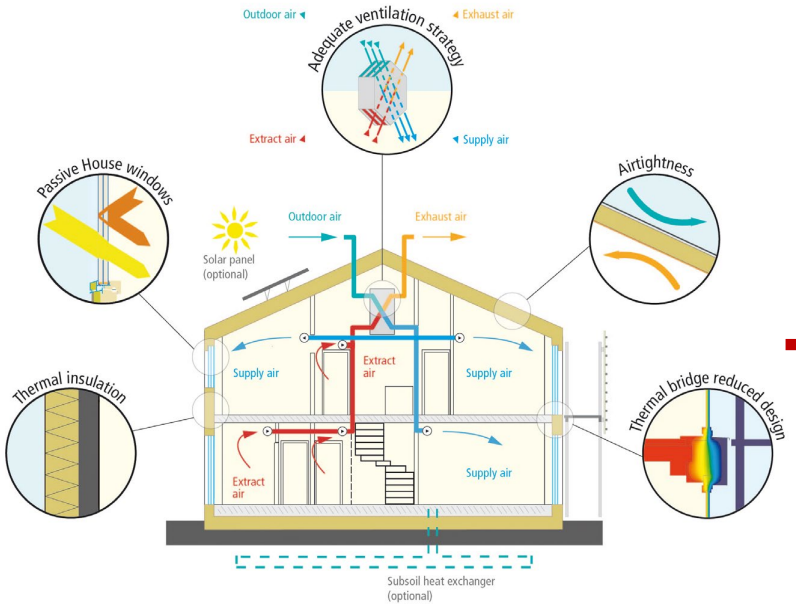
# Not designed to be a Passivehaus building!



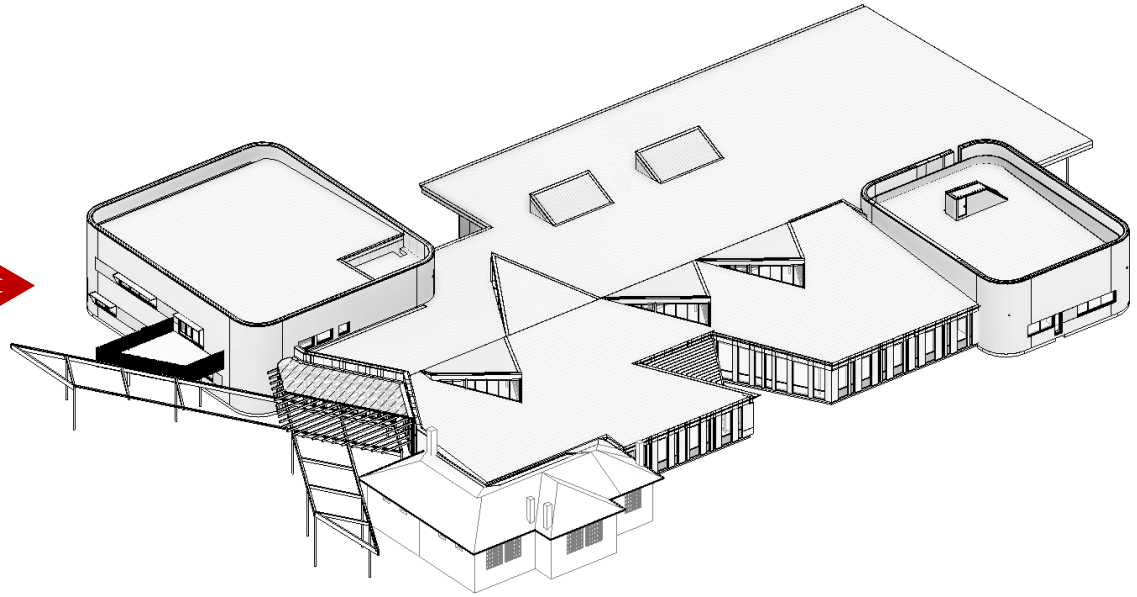
# Timeline


DesignInc novated to Building Engineering
TENDER
Passive House introduced
CONCEPT DESIGN
SCHEMATIC DESIGN
DESIGN DEVELOPMENT
CONSTRUCTION DOC
CONSTRUCTION
COMPLETION

# Retrofitting Passivehaus




Passive House Institute



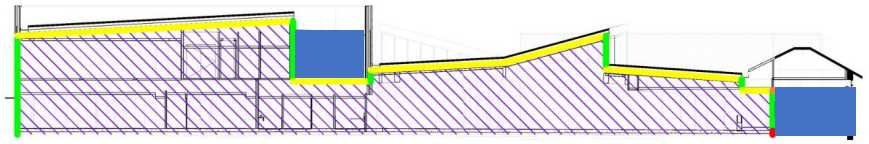
# Form Factor

— Normally between 0.5 – 5
— PH aims to achieve 3 or less

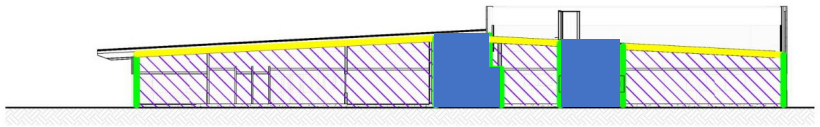
Heat Loss Form Factor = Heat Loss Area / Treated Floor Area

**Form Factor = 11,542 / 4533 = 2.54**

# Form Factor



A | SECTION A-A



D | SECTION D-D

**NOTE:**

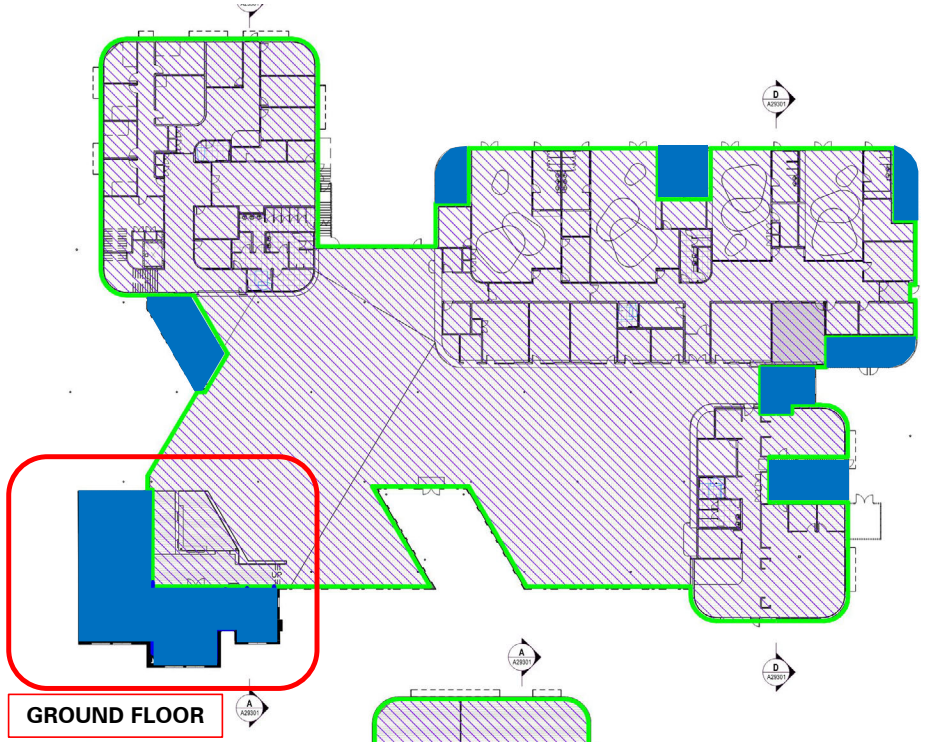
***THERMAL LEGEND***

- R5.59 m².k/W
- DENOTES EXTERNAL WALL CLADDING:
  R2.56 m².k/W TO BLOCKWORK CLADDING
  R2.63 m².k/W TO WEATHERGROOVE CLADDII
- R4.0 m².k/W
- R2.1 m².k/W
- R2.9 m².k/W
- R5.59 m².k/W TO ROOF
- R4.0 m².k/W TO CEILING

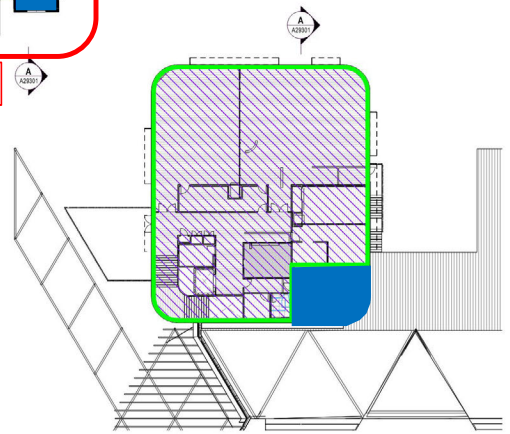
***BUILDING SEALING LEGEND***

- SEALED AIRTIGHT BUILDING ZONE

**EXCLUDED FROM PH ENVELOPE**

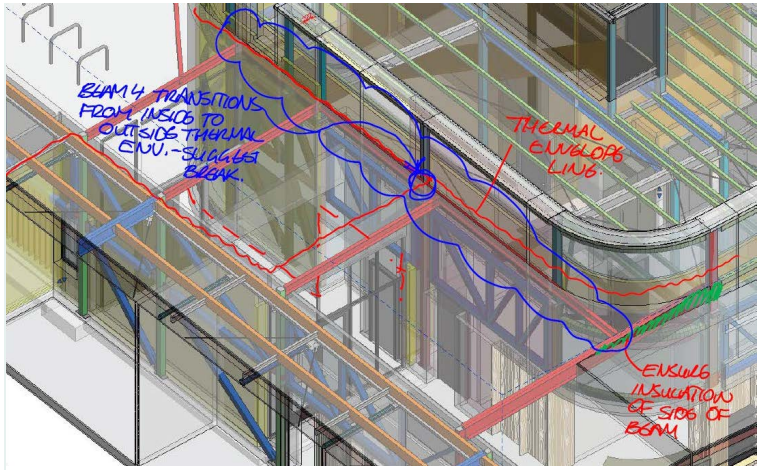


**GROUND FLOOR**

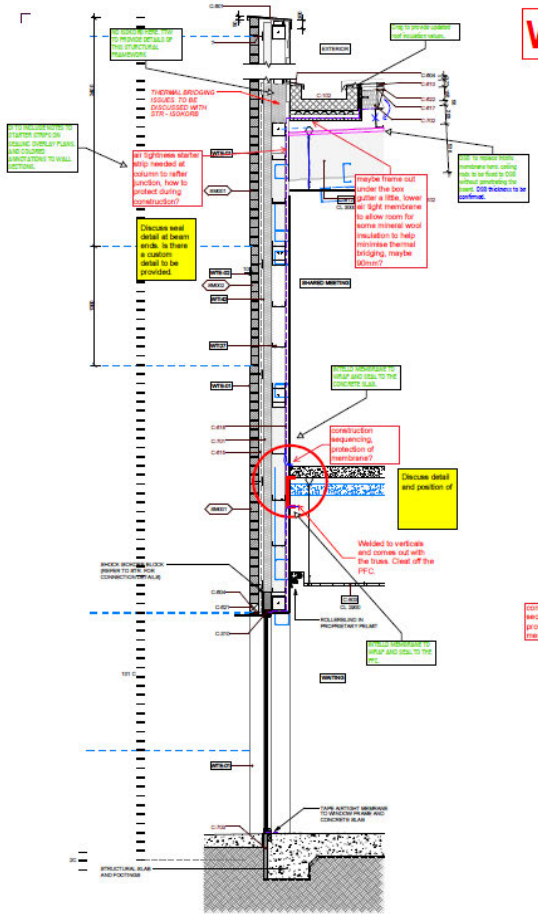


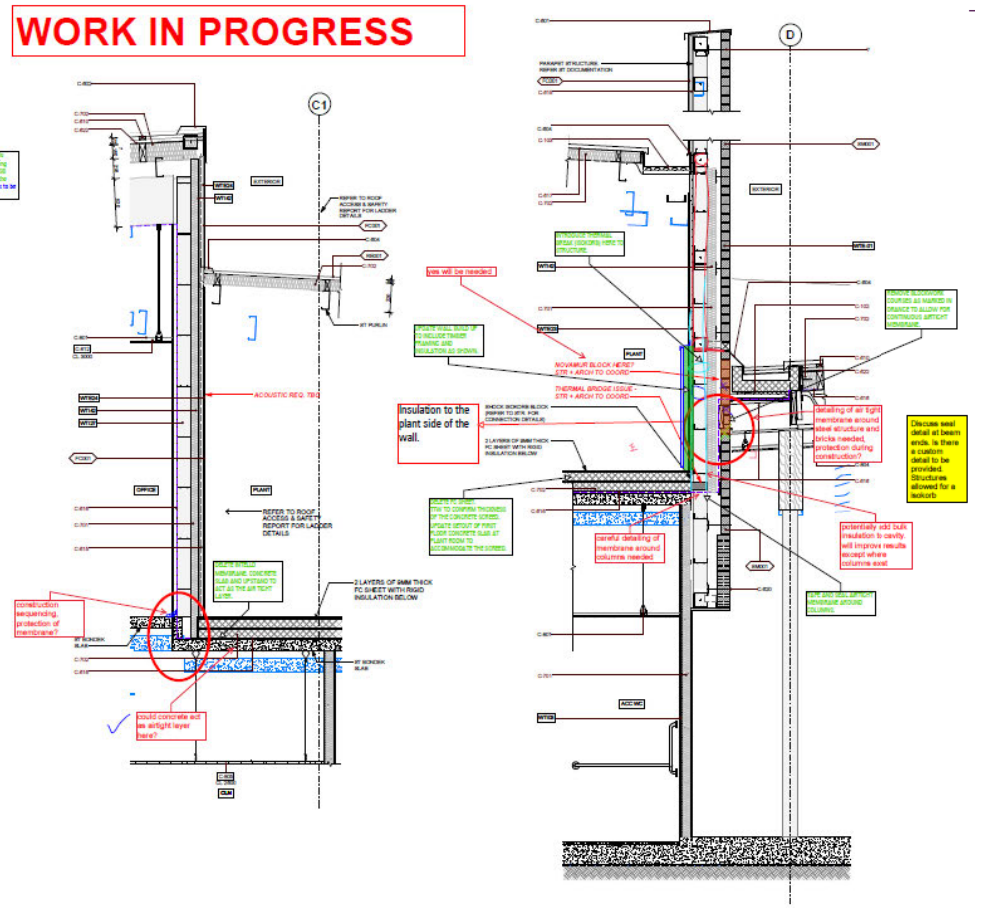
**FIRST FLOOR**

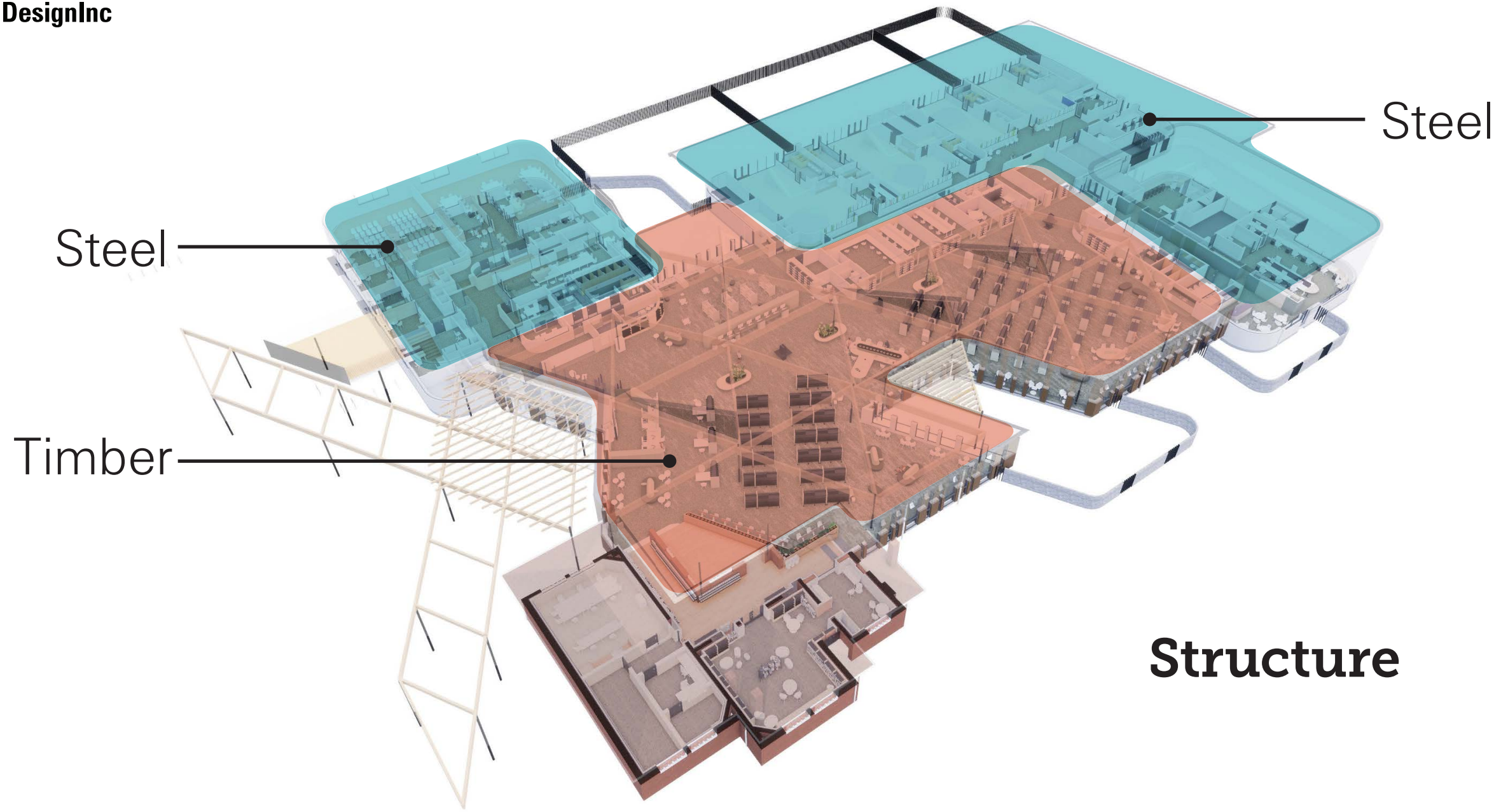
# Design workflows












# Structure

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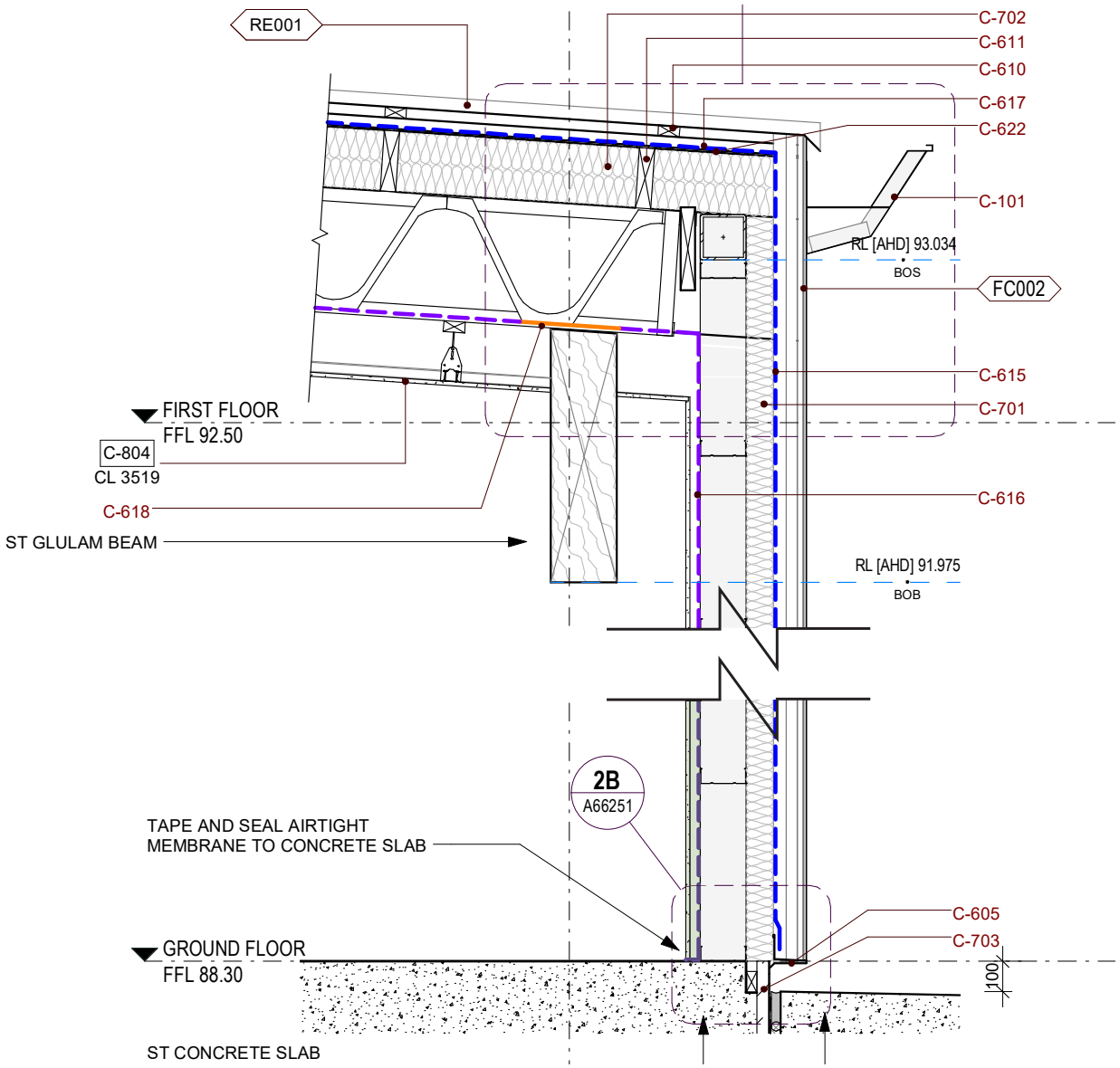
# Building Envelope

## Timber Structure



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# Building Envelope

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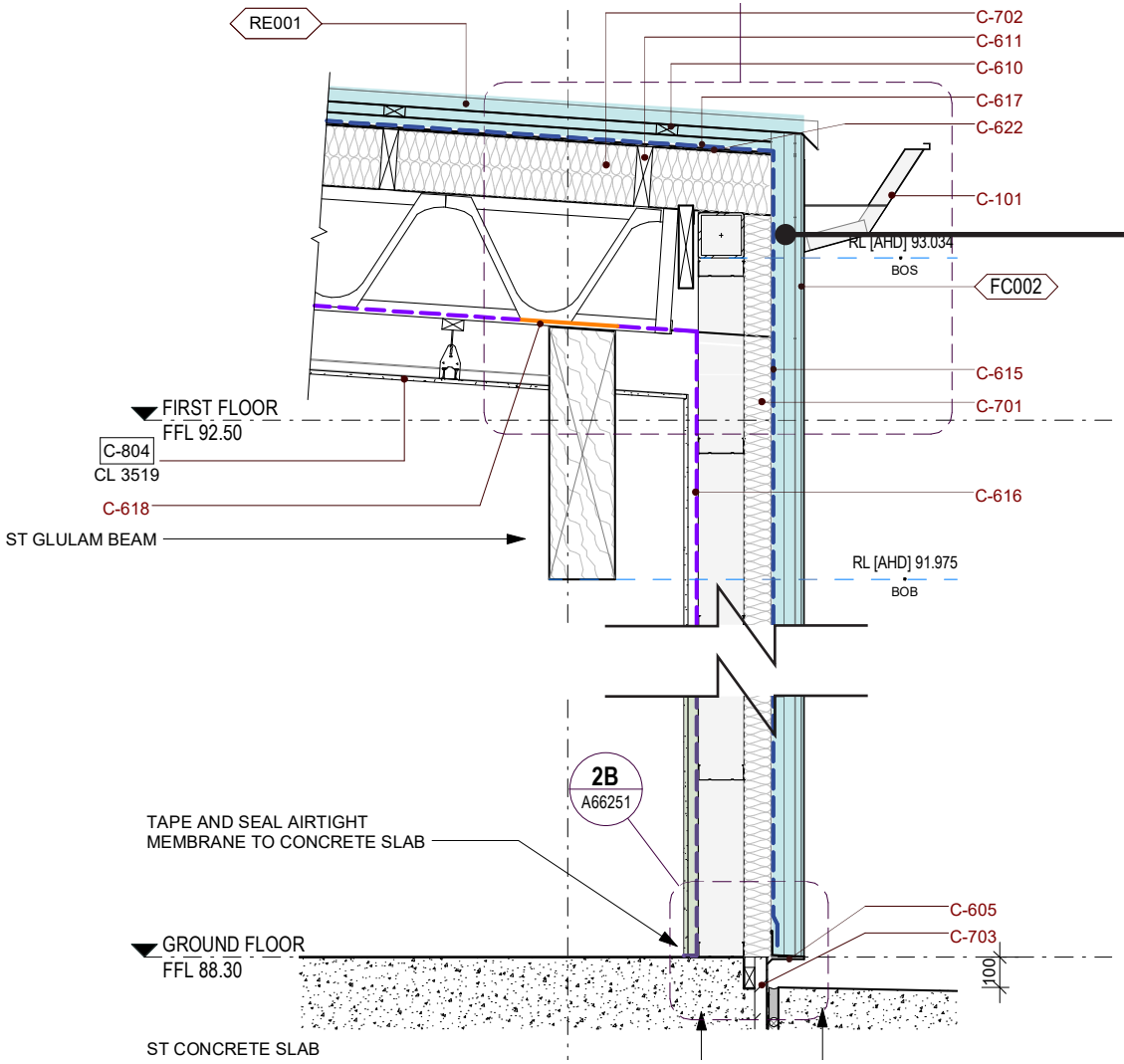


Facade / Roof

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# Building Envelope

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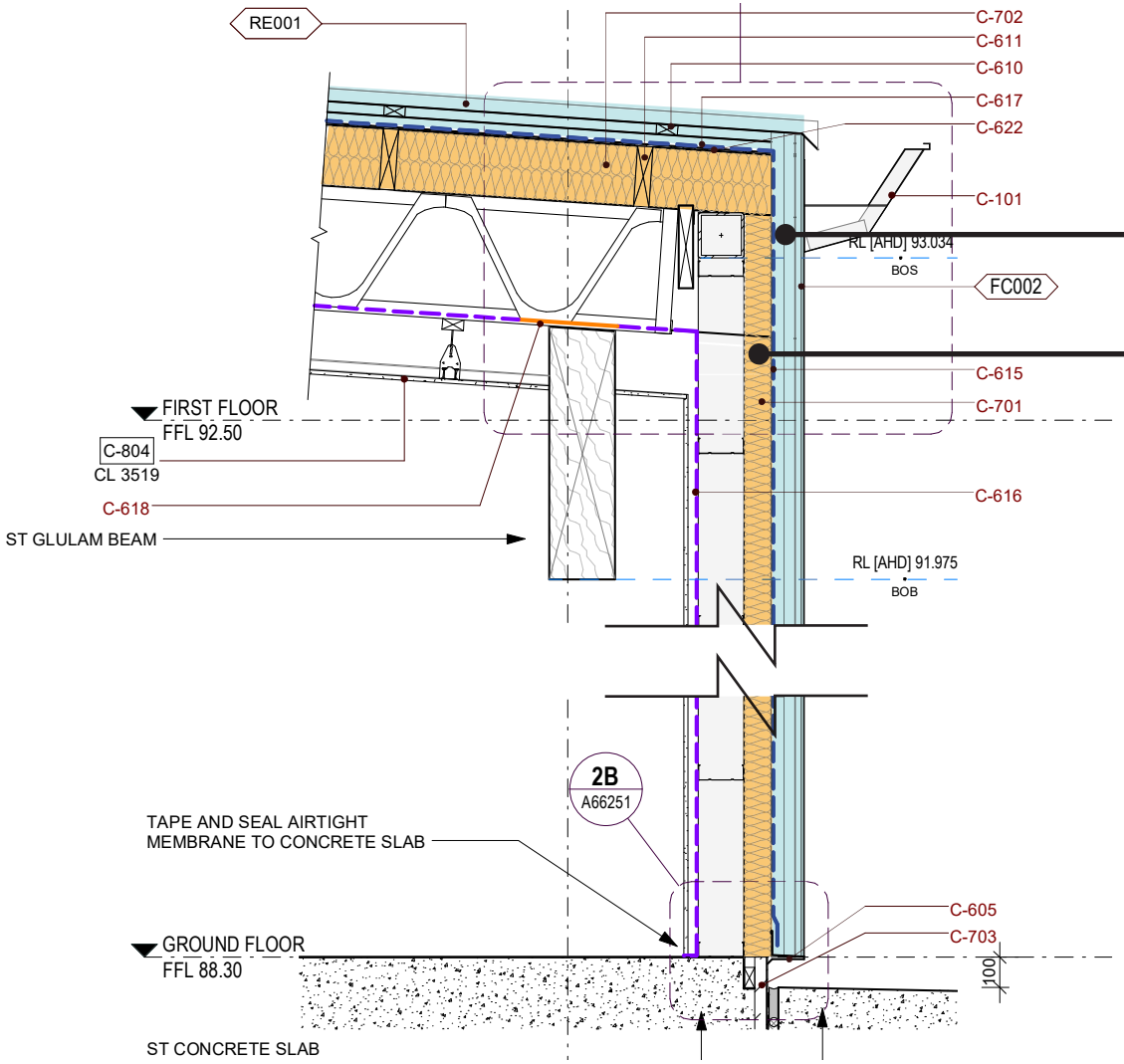


Facade / Roof

Insulation

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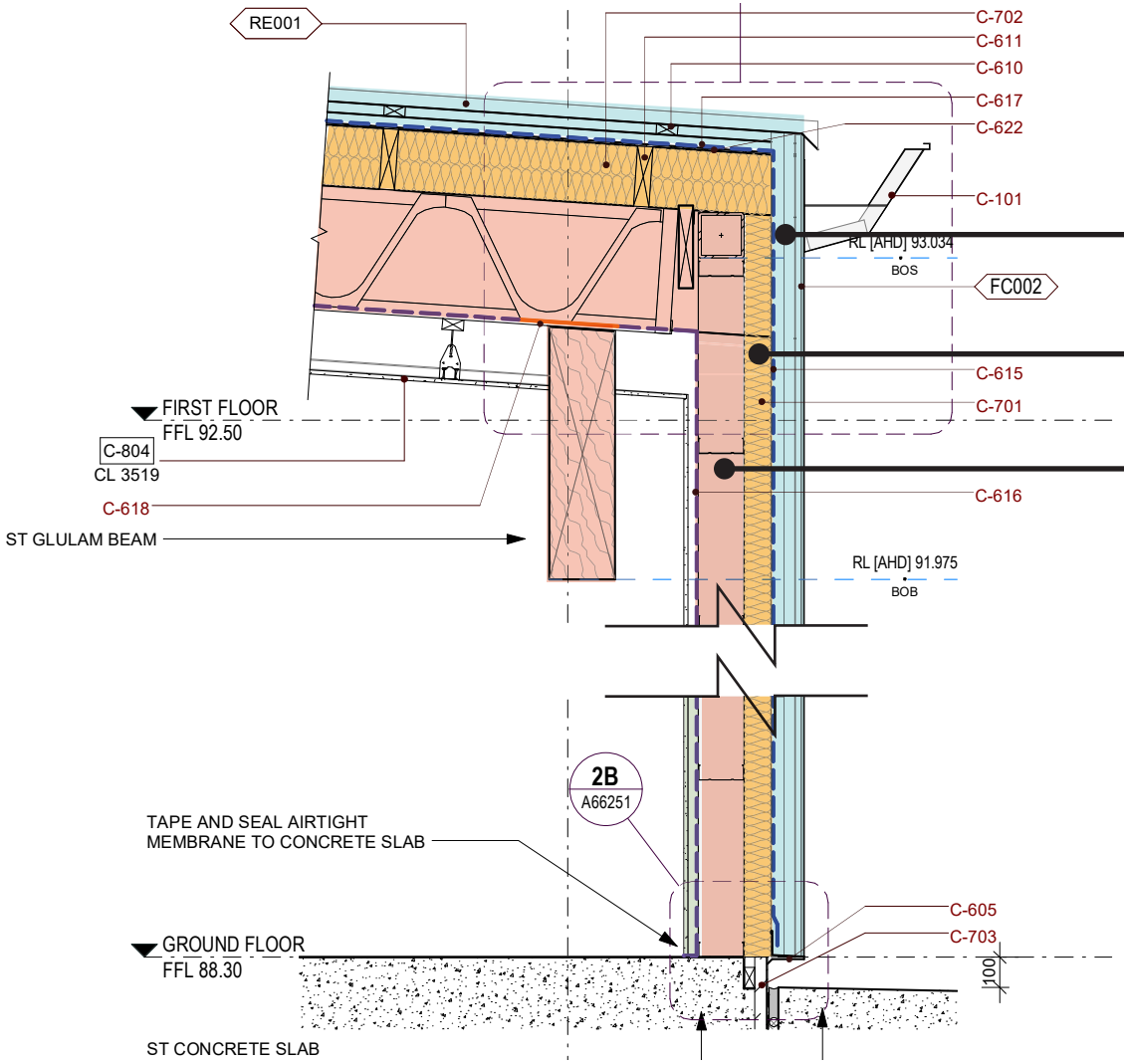
# Building Envelope

## Timber Structure




Facade / Roof

Insulation

Structure

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# Building Envelope

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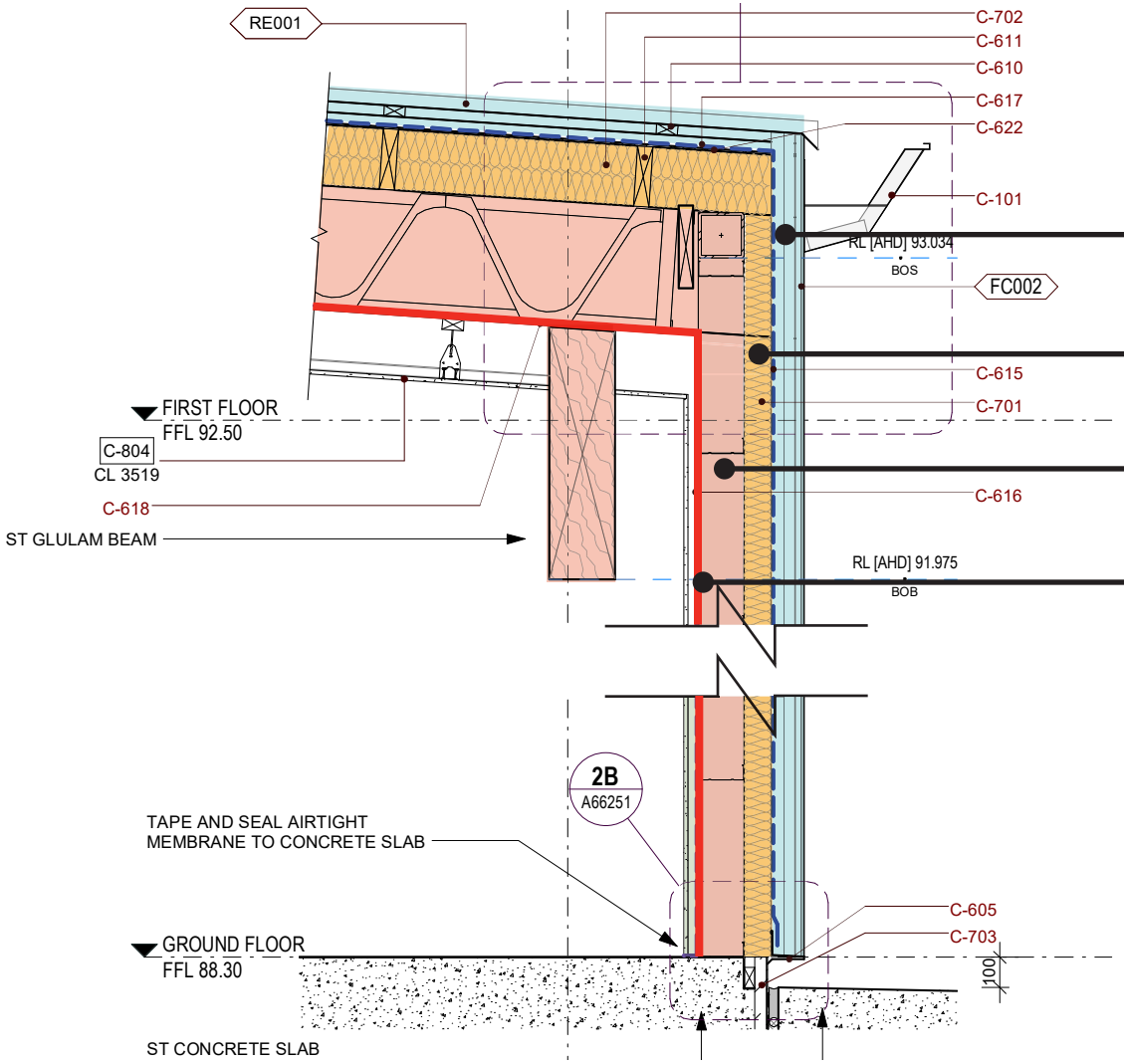


Facade / Roof

Insulation

Structure

Air-tightness Membrane

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# Building Envelope

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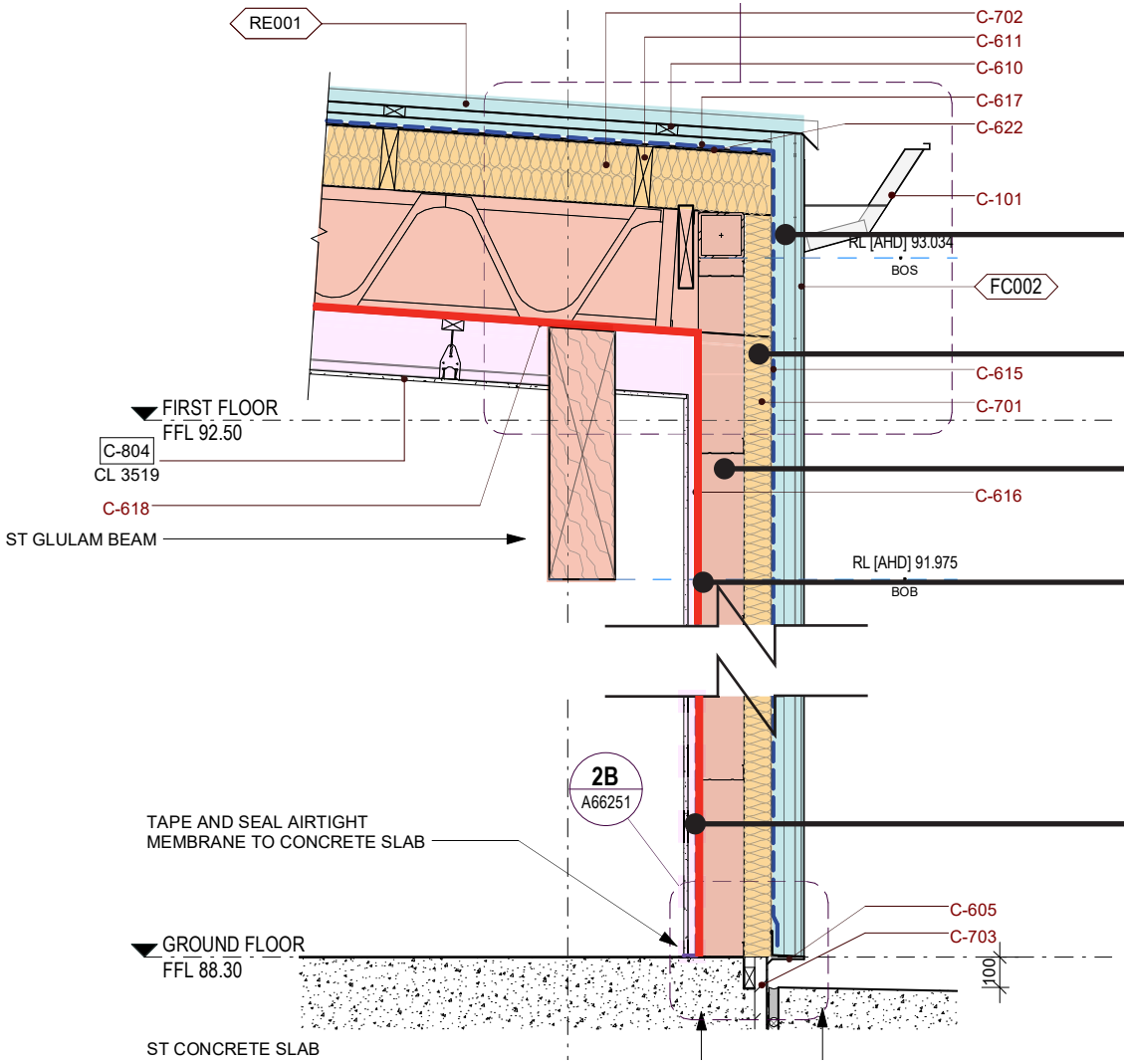


Facade / Roof

Insulation

Structure

Air-tightness Membrane

Services Cavity

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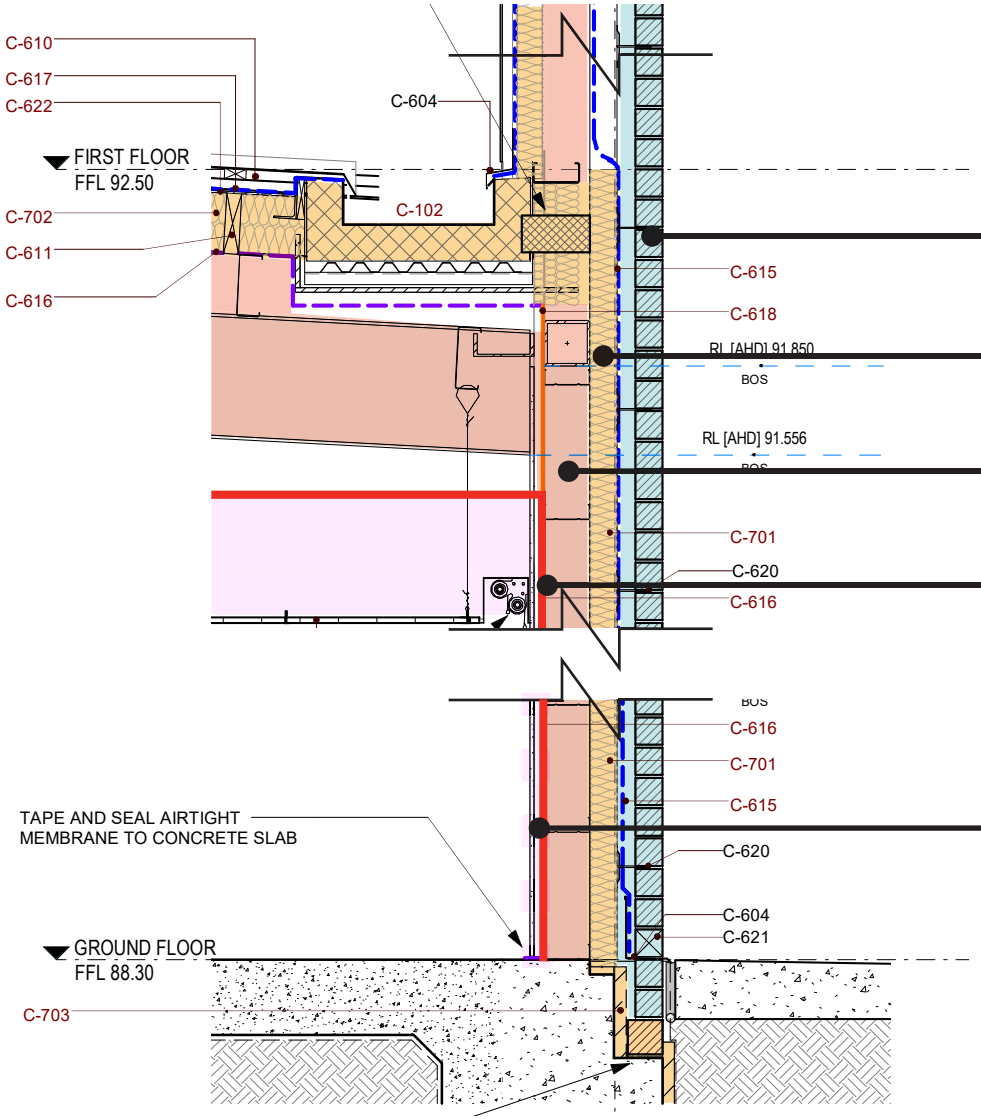
# Building Envelope

## Steel Structure + Brick Veneer




Facade

Insulation

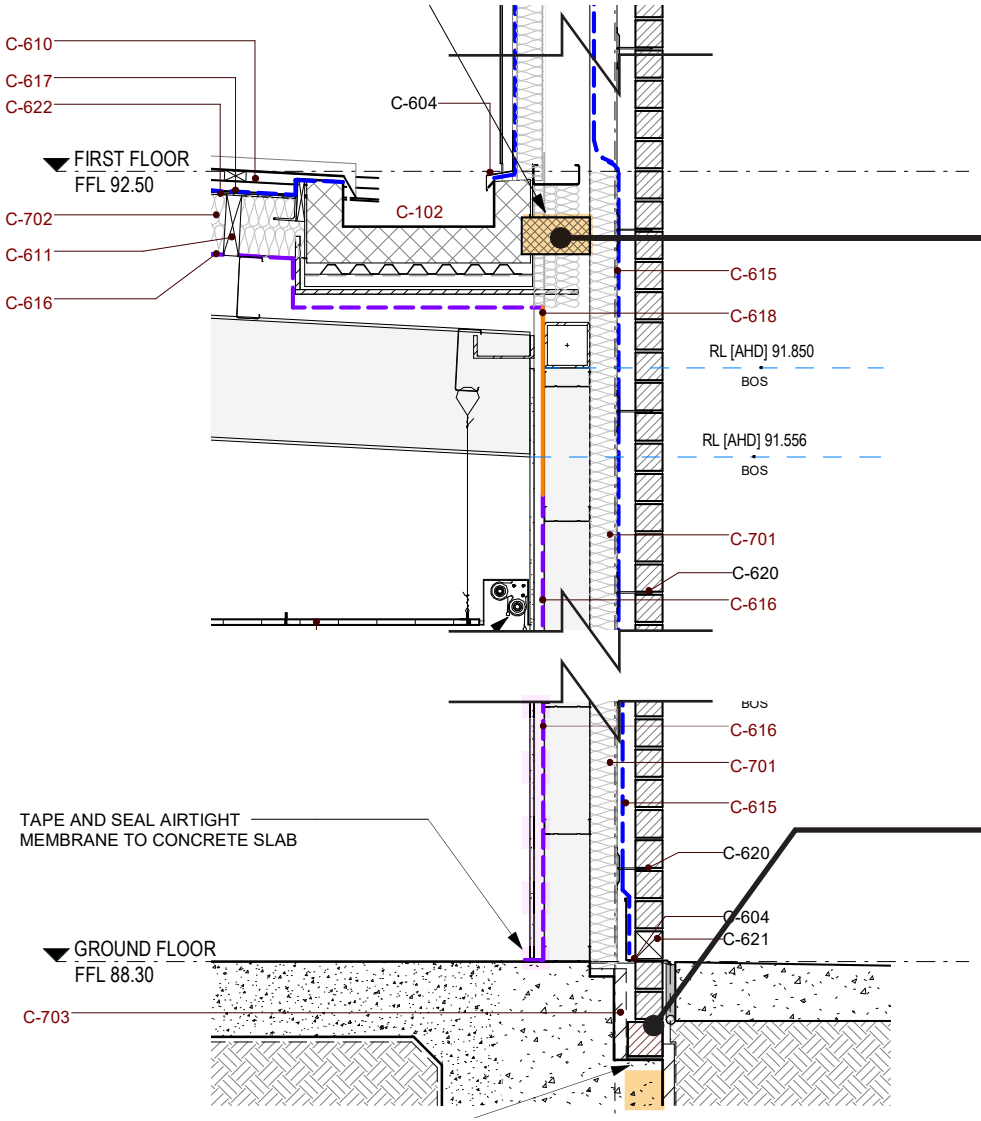
Structure

Air-tightness Membrane

Services Cavity

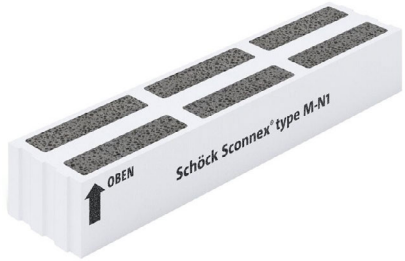
# Building Envelope

## Steel Structure + Brick Veneer

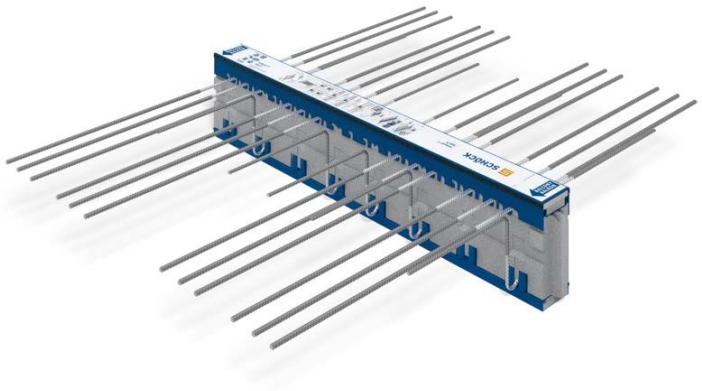



Schock Isokorb

Novomur Block



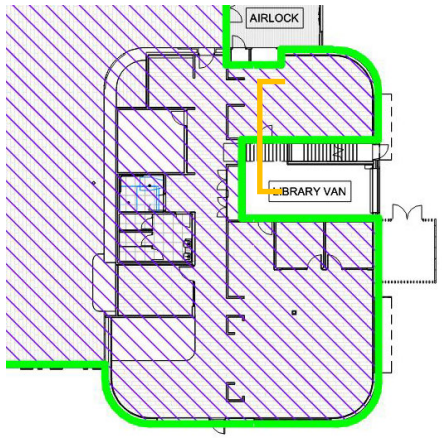
# Steel Structure

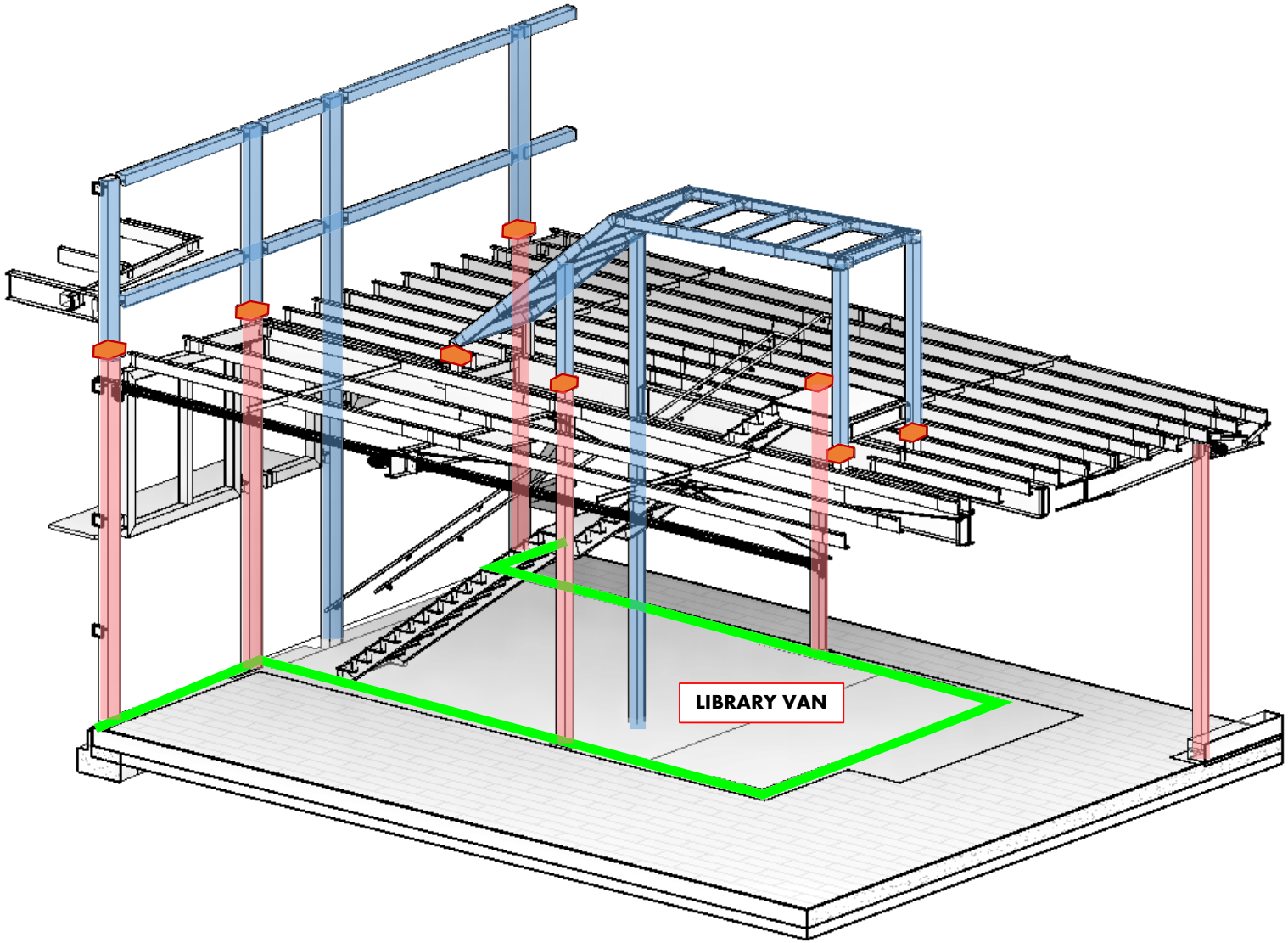


Schock Isokorb

# Steel Structure

- Airtight envelope
- “warm” structural steel
- Schock Isokorb (steel thermal break)
- “cold” structural steel



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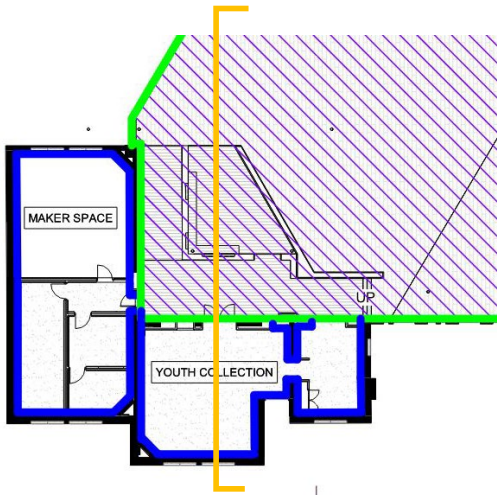
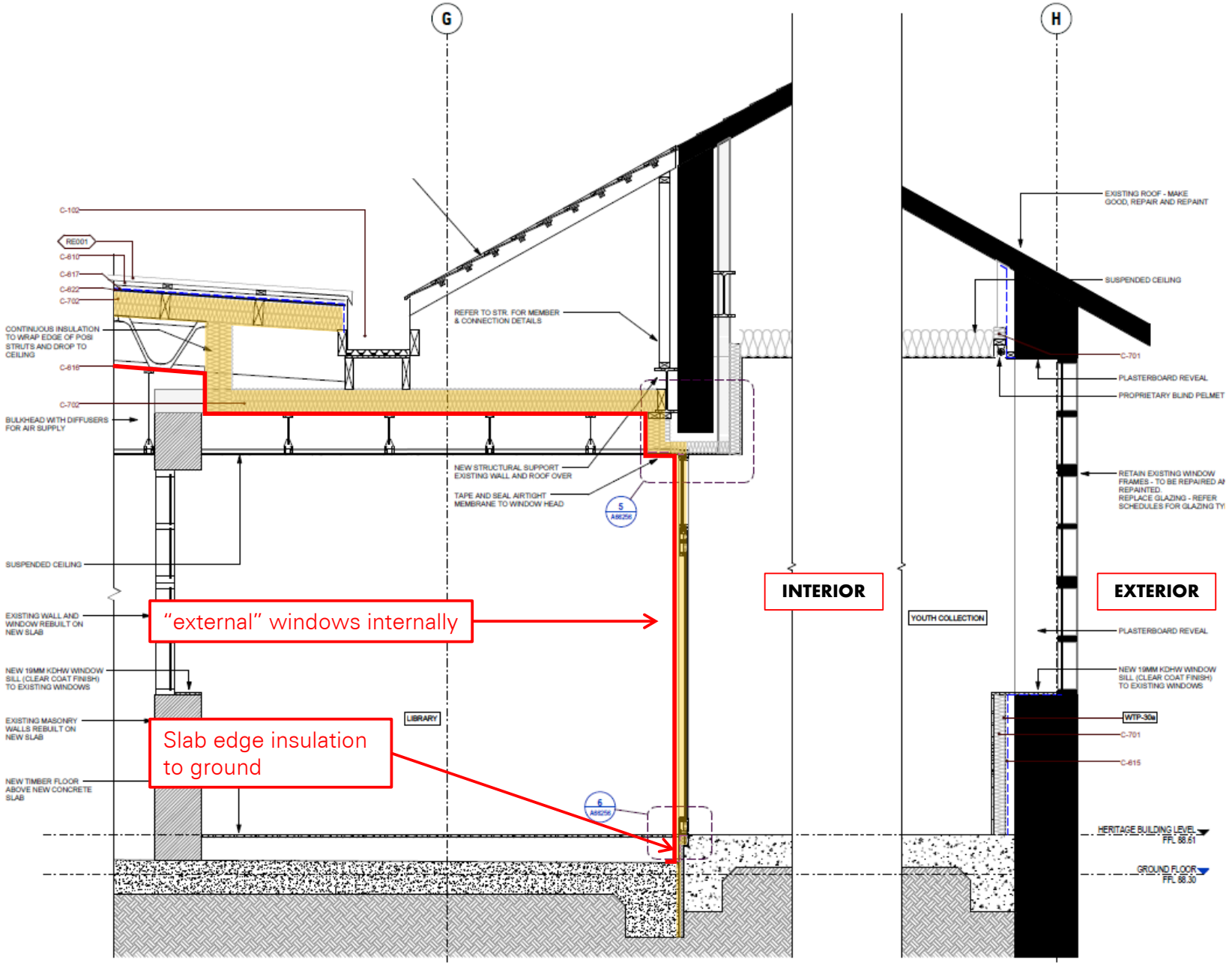
# Heritage Separation

Continuous insulation

Airtight membrane

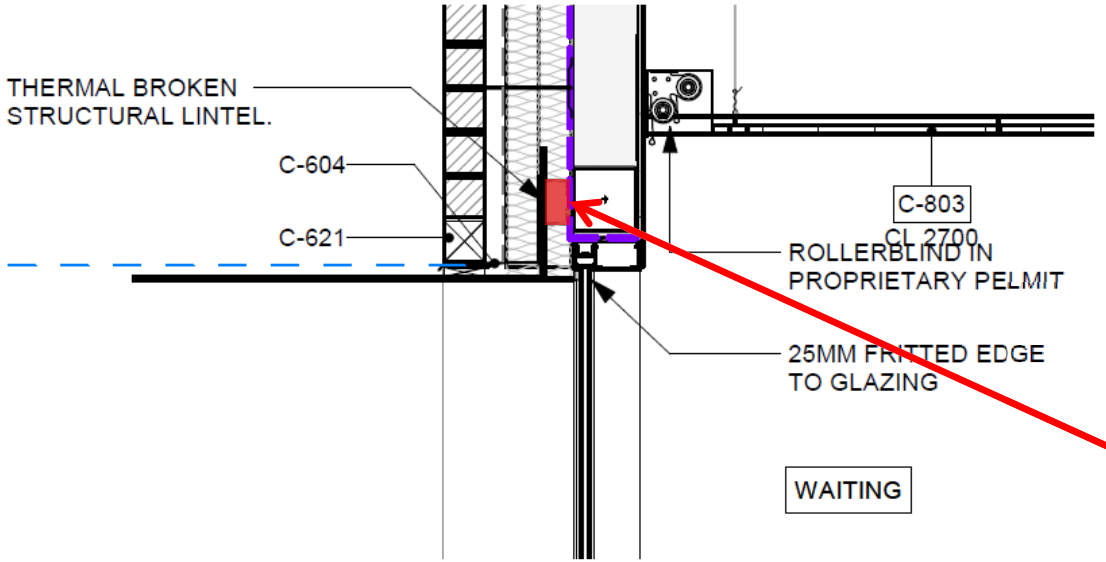


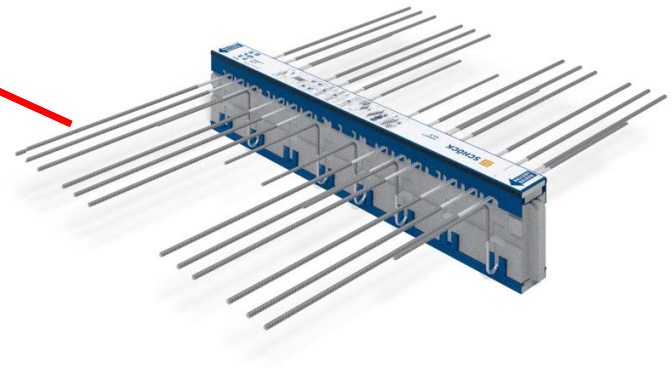
# Challenges

# Windows

## Blockwork wall details



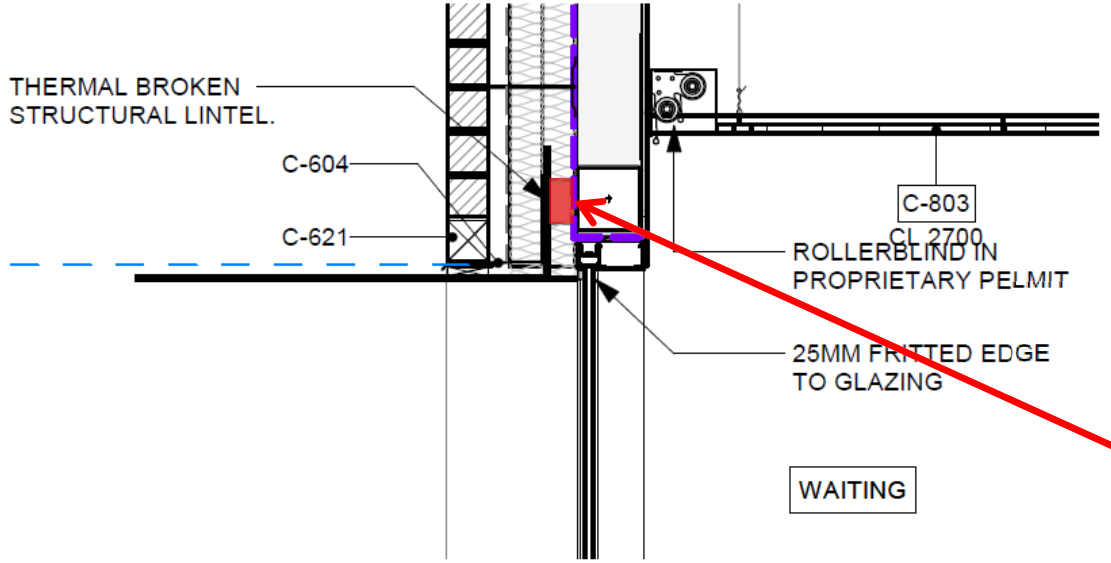

**DD Stage**



**Schock Isokorb**

# Windows

## Blockwork wall details




**DD Stage**

**Schock Isokorb**

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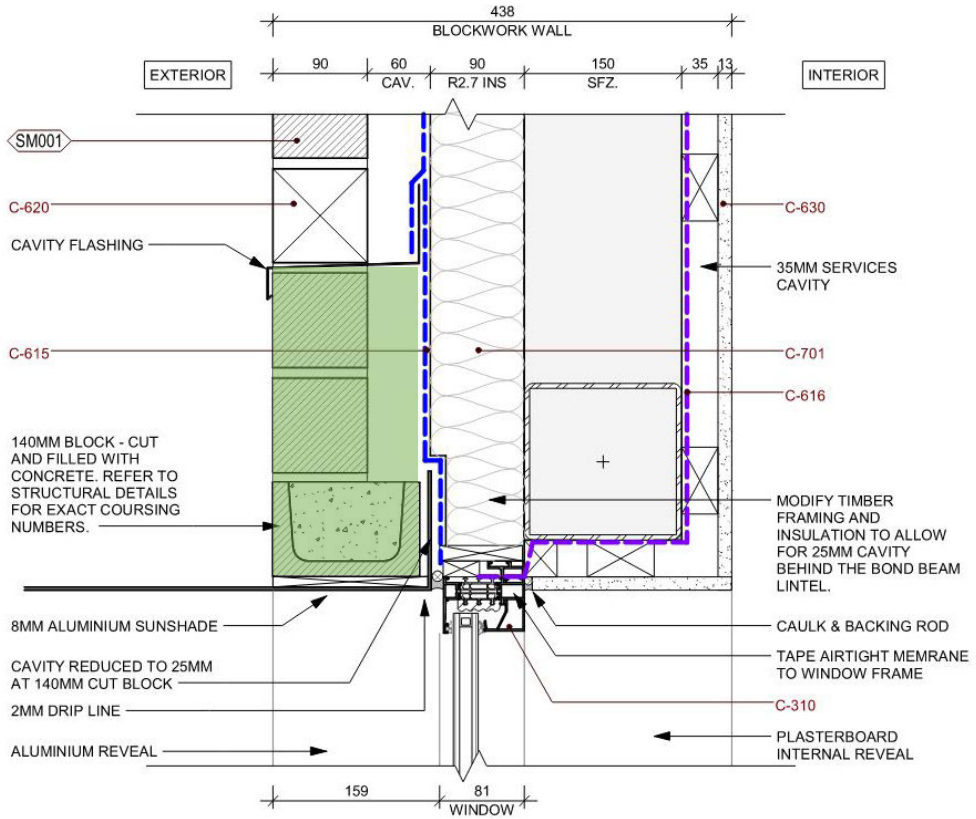
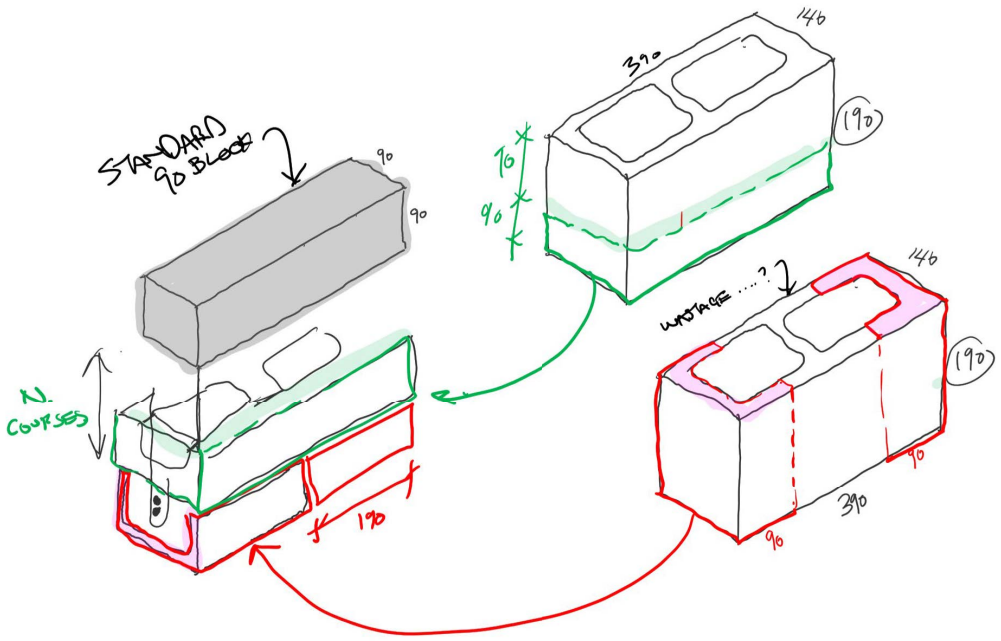
# Windows

## Blockwork wall details




2 | WINDOW HEAD DETAIL - BLOCKWORK WALL + SUNSHADE

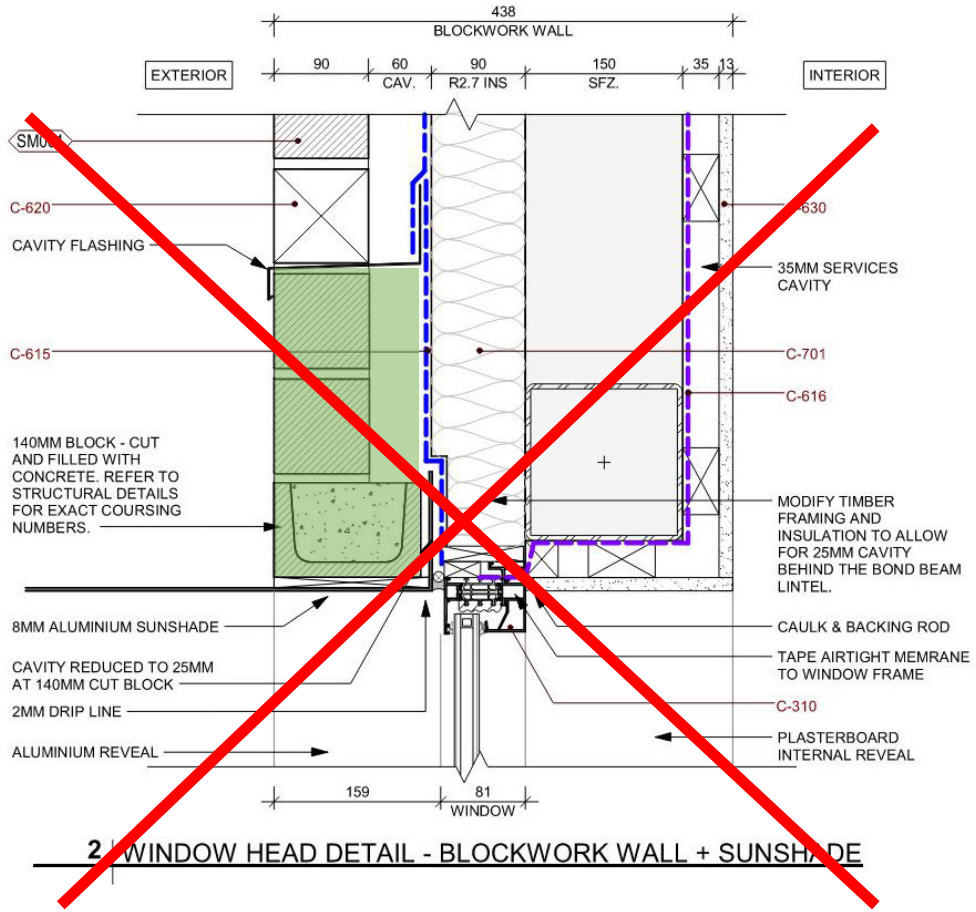



**Bond beam solution**

**IFC Stage**

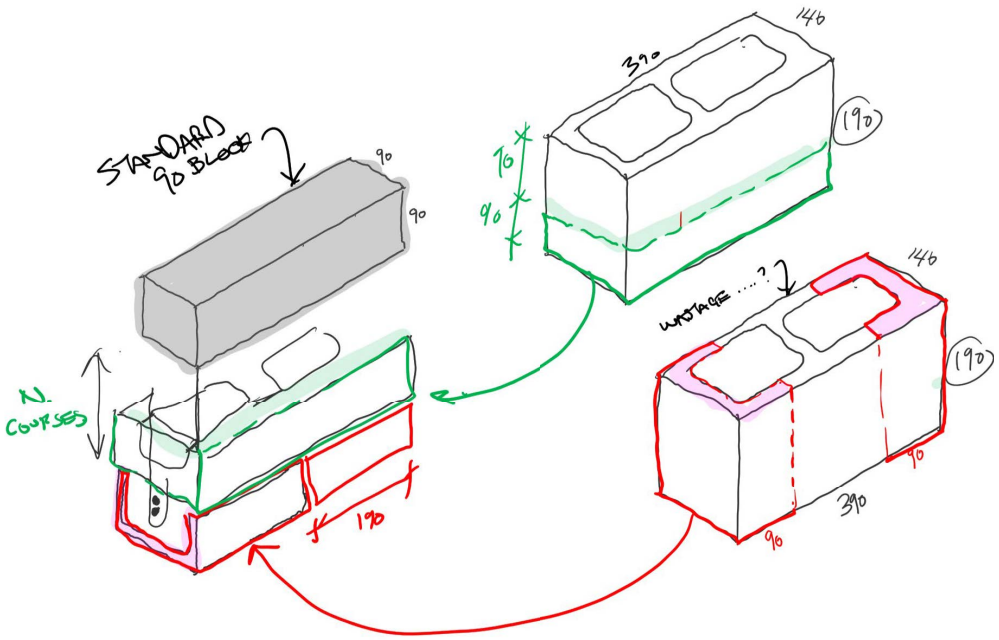
# Windows

## Blockwork wall details




**IFC Stage**

Blockwork not available in required size + finish




**Bond beam solution**

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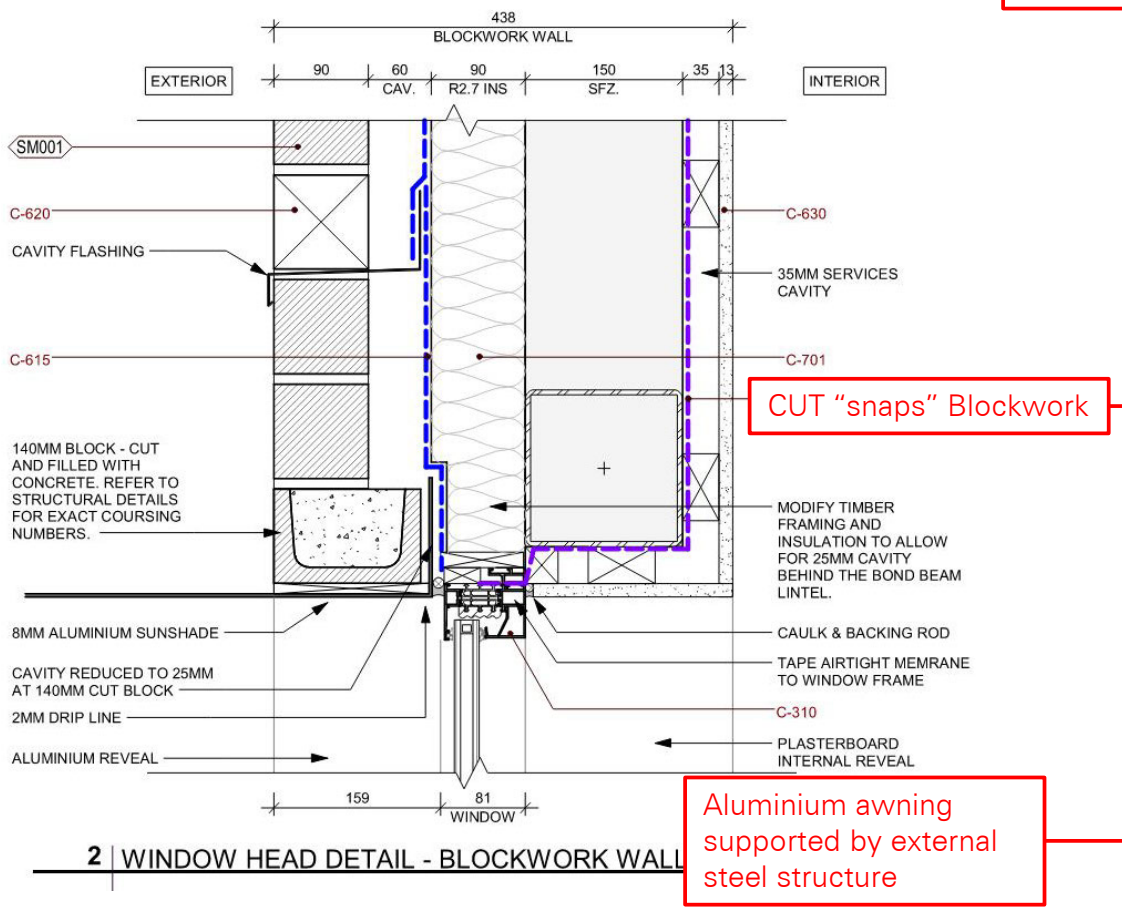
# Windows

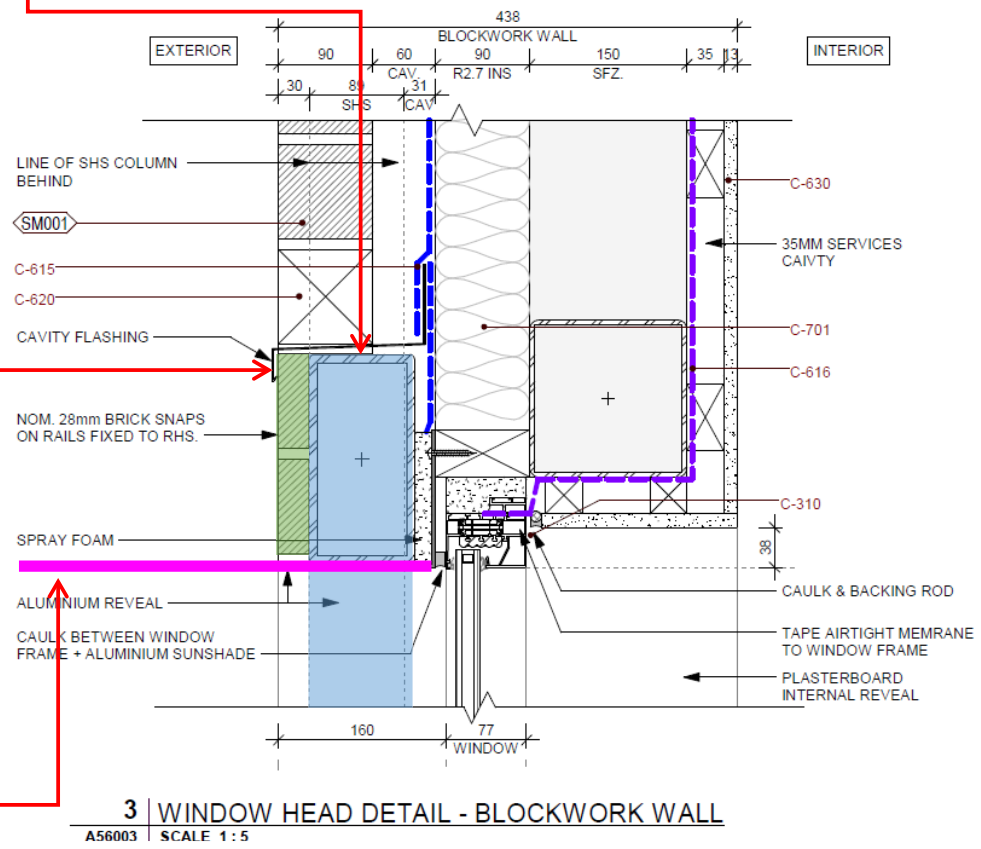
## Blockwork wall details




Secondary Steel Frame
COLD only

CUT “snaps” Blockwork

Aluminium awning supported by external steel structure




**IFC Stage**

**Final Construction**

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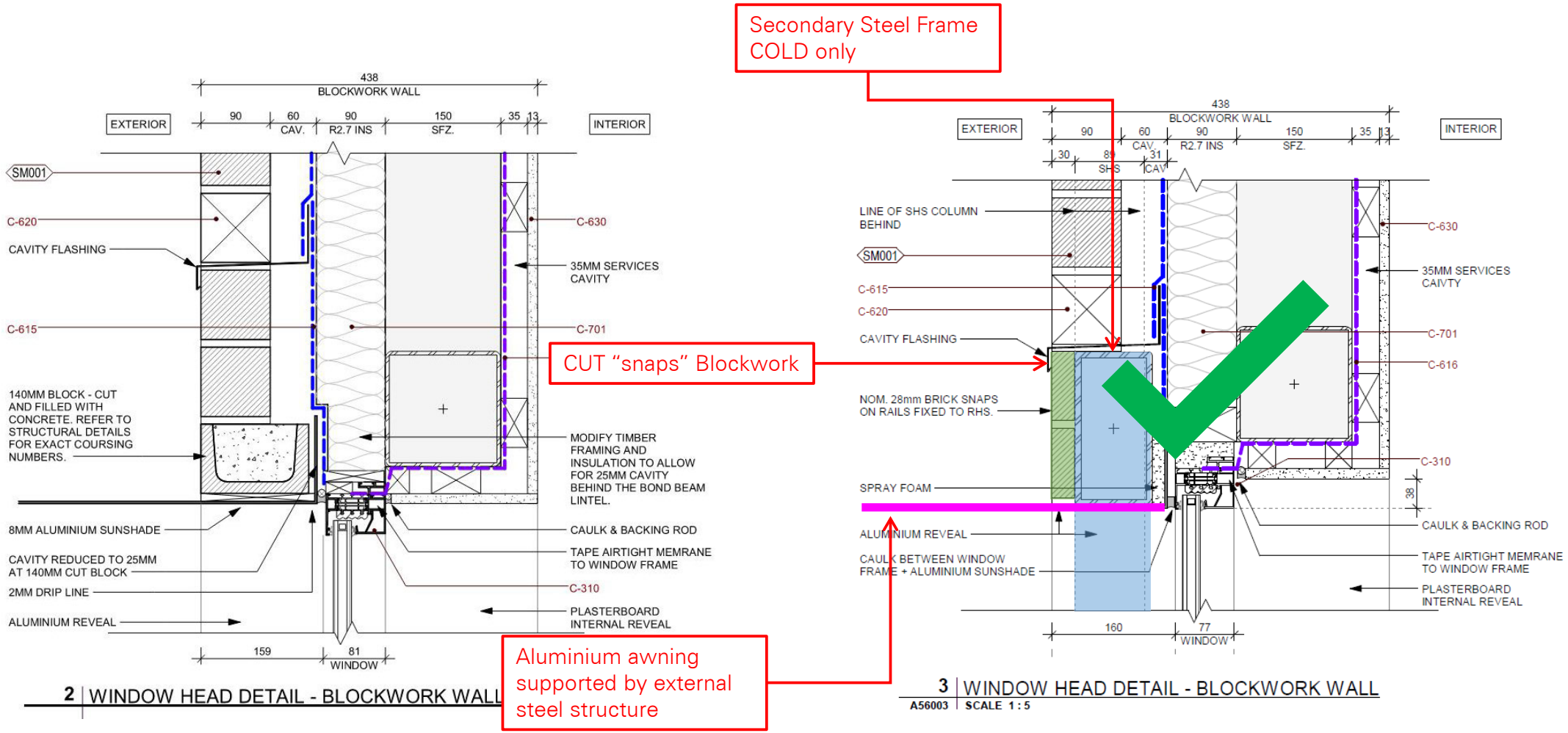
# Windows

## Blockwork wall details




**IFC Stage**

**Final Construction**

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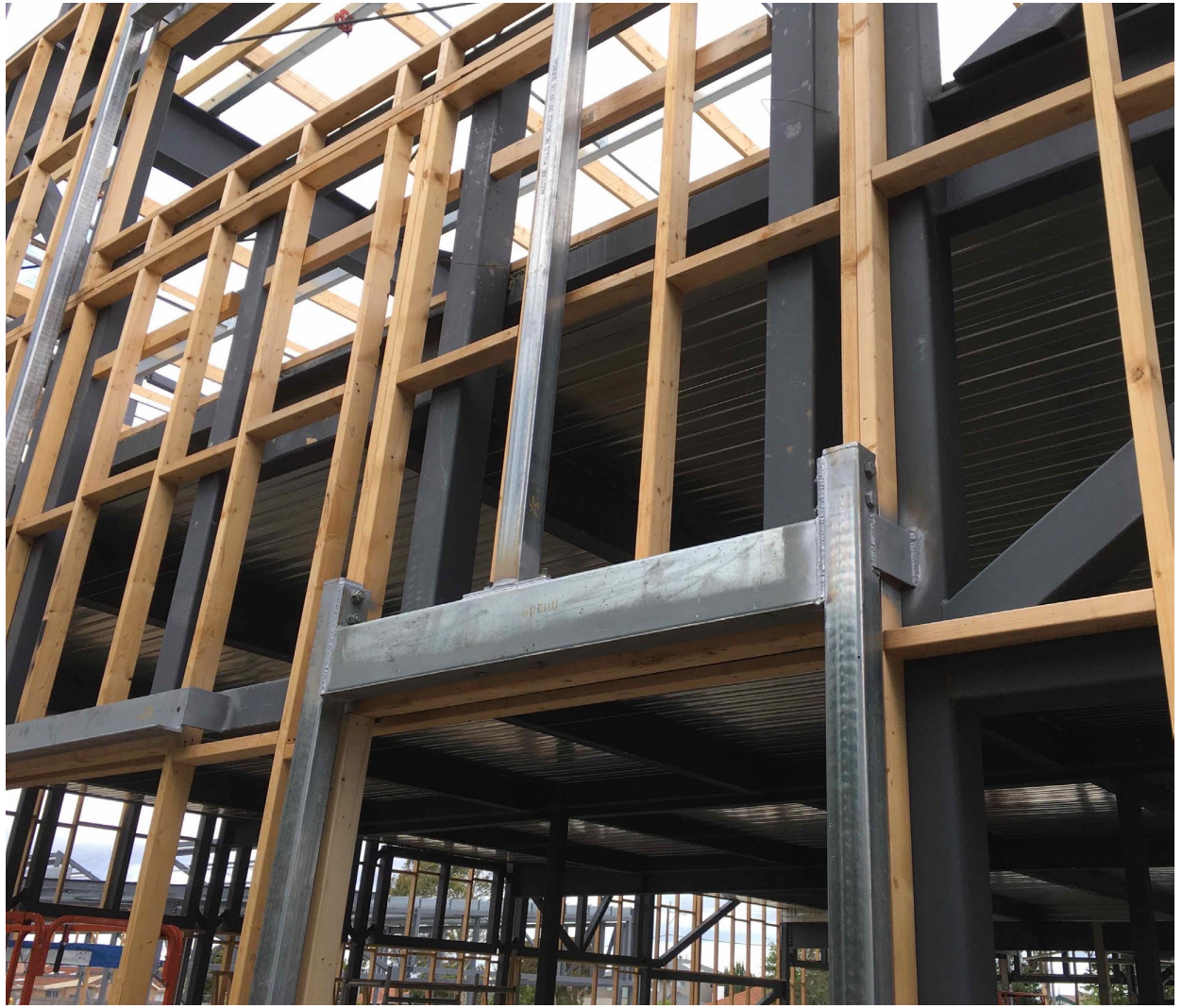
# Blockwork veneer



# Blockwork veneer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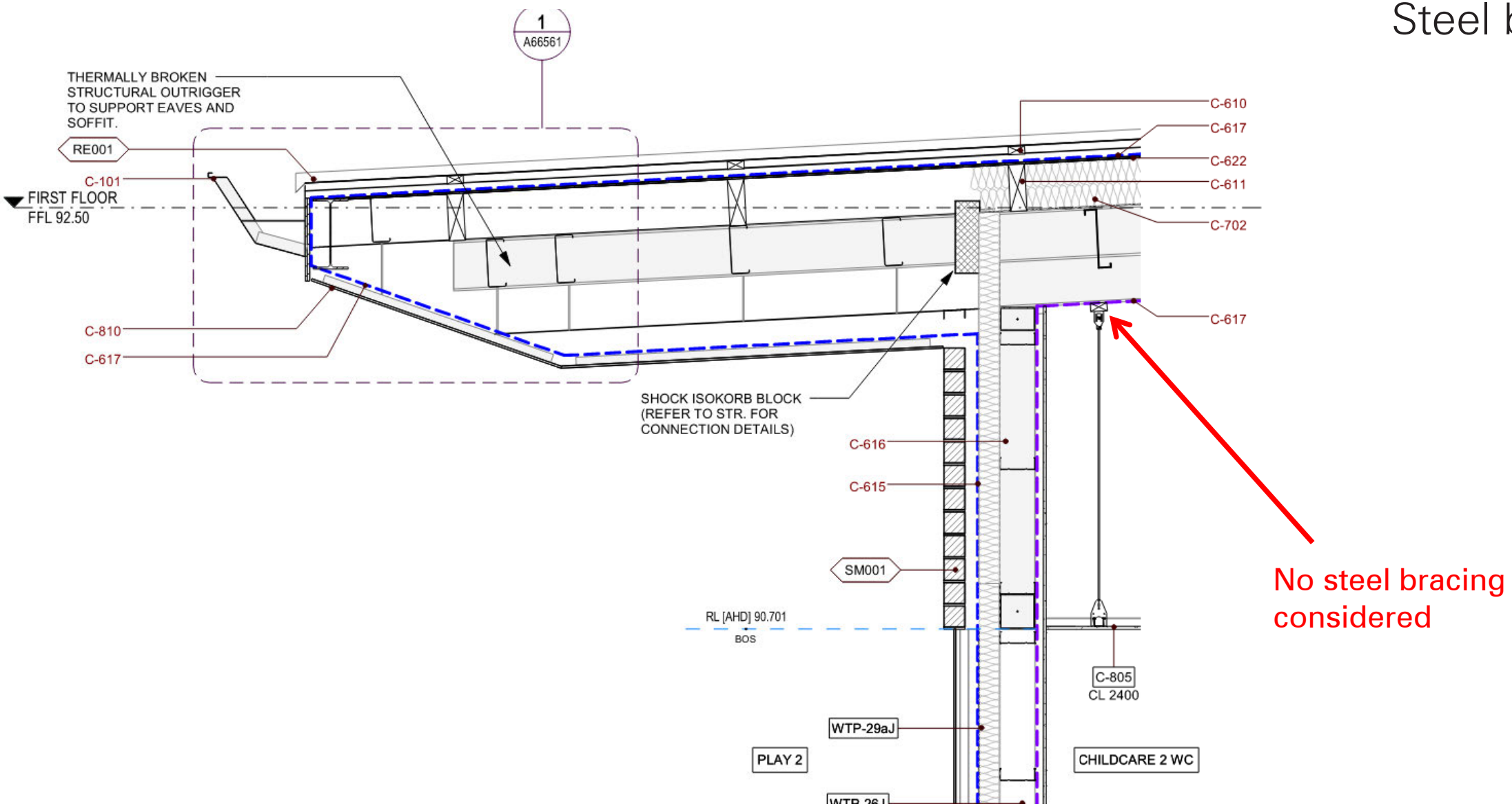
# Airtight membrane

## Steel bracing




No steel bracing considered

# Airtight membrane

## Steel bracing

# Airtight membrane

## Steel bracing

# Plywood
as airtight membrane

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# Blower door testing

## Installed window

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# Blower door testing

## Installed window

Benefits of component testing before installation
completed on other components.
Identified issues and inconsistencies

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# Blower door testing

# Once the doors open

Photography: Jacinta Keefe

# Who?

| | |
|---|---|
| Early Years staff | 15 |
| Maternal Child Health Nurses | 5 |
| Community Health staff | 10 |
| Library staff | 30 |
| Council Customer Service | 30 |
| Public | 300+ |

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# Thankyou

Photography: Dianna Snape