Project Documentation
Gebäude-Dokumentation

1 Abstract / Zusammenfassung

Childcare centre in Torrens Australia

1.1 Data of building / Gebäudedaten

Year of construction/ Baujahr	2018	**Space heating / Heizwärmebedarf**	**15 kWh/(m²a)**
U-value external wall/ U-Wert Außenwand	0.263 W/(m²K)		
U-value basement ceiling/ U-Wert Kellerdecke	0.469 W/(m²K)	**Primary Energy Renewable (PER) / Erneuerbare Primärenergie (PER)**	29 kWh/(m²a)
U-value roof/ U-Wert Dach	0.177 W/(m²K)	**Generation of renewable energy / Erzeugung erneuerb. Energie**	143 kWh/(m²a)
U-value window/ U-Wert Fenster	0.91 W/(m²K)	**Non-renewable Primary Energy (PE) / Nicht erneuerbare Primärenergie (PE)**	64 kWh/(m²a)

Heat recovery/ Wärmerückgewinnung	77 %	Pressure test n_{50} / Drucktest n_{50}	0.6 h-1
Special features/ Besonderheiten	Solar PV array, heat pump domestic hot water, rainwater utilisation		

1.2 Project Description

Torrens Early Learning - Passive House

Torrens Early Learning is a long-day-care facility which provides early education and care for 89 children aged from 6 weeks to 6 years, and has a staffing element of around 20 carers/teachers /administration staff.

The facility consists of 2 separate buildings, (both 2 storey) linked by a large external deck and playgrounds and front entrance.

The first building has administration, commercial kitchen, dining rooms and a baby's nursery space – this building was a re-adaption of the existing building's footprint. The re-adaption reused the slab and services, retained brick fences, and boundaries, and rebuilt and re-developed the space. The building was built to the Passive House standard, but did not meet the final airtight criteria.

The second building is a certified Passive-House building – certified as Premium. The building was developed for solar performance – to face north, allow a roofline for maximum solar panels, to allow natural light into all learning spaces, and mobility access for children to all spaces and playgrounds. Careful attention was paid to windows and the distribution of light into classrooms, and importantly solar heat gain in winter, and the rejection of such heat in summer. The building consists of 6 large classrooms, and 3 bathrooms.

1.3 Responsible project participants / Verantwortliche Projektbeteiligte

Architect/ Entwurfsverfasser	Christie Hartfiel Architectural Design / Can PLAY / VRD Design	
Implementation planning/ Ausführungsplanung	Christie Hartfiel Architectural Design / Can PLAY / VRD Design	
Building systems/ Haustechnik	Rudds Consulting Engineers	
Structural engineering/ Baustatik	Tim Gibney & Associates	
Building physics/ Bauphysik	H3Space	
Passive House project planning/ Passivhaus-Projektierung	H3Space	
Construction management/ Bauleitung	Can PLAY	
Certifying body/ Zertifizierungsstelle	Detail Green	
Certification ID/ Zertifizierungs ID	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivehouse-database .org)	6326
Author of project documentation / Verfasser der Gebäude-Dokumentation	Harley Truong H3Space	
Date, Signature/ Datum, Unterschrift	8 May 2020 	

2 Views

North west elevation

North elevation

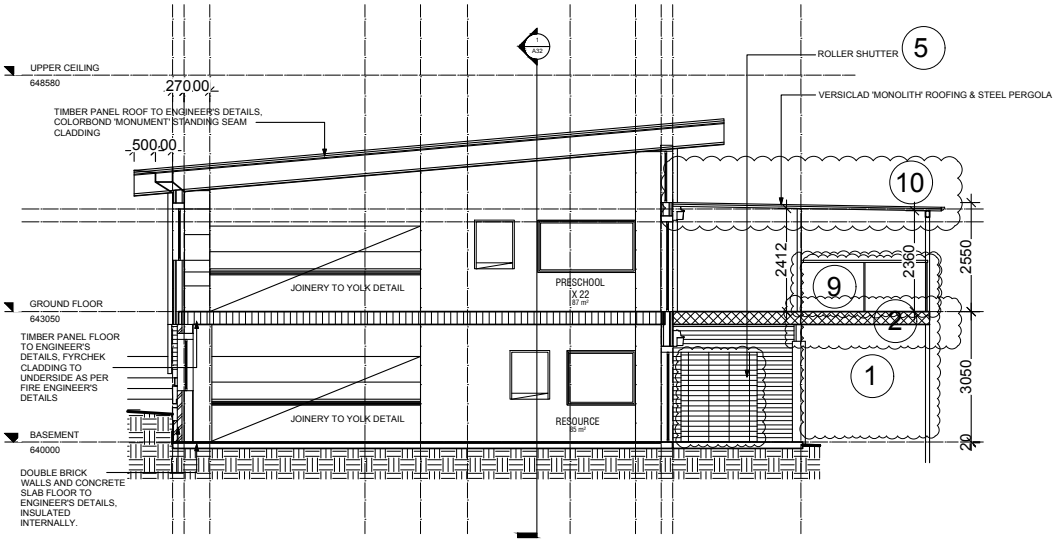
East elevation

South elevation

Playground

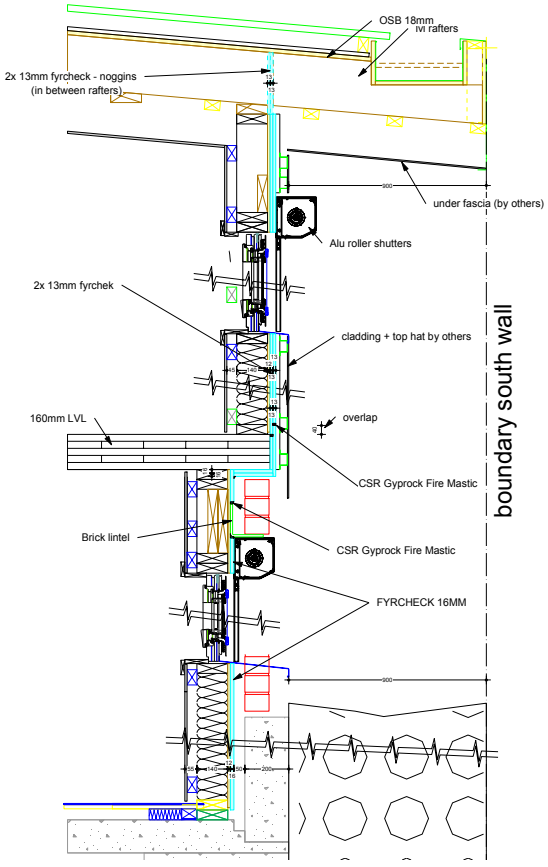
Classroom

3 Section drawings



Cross section

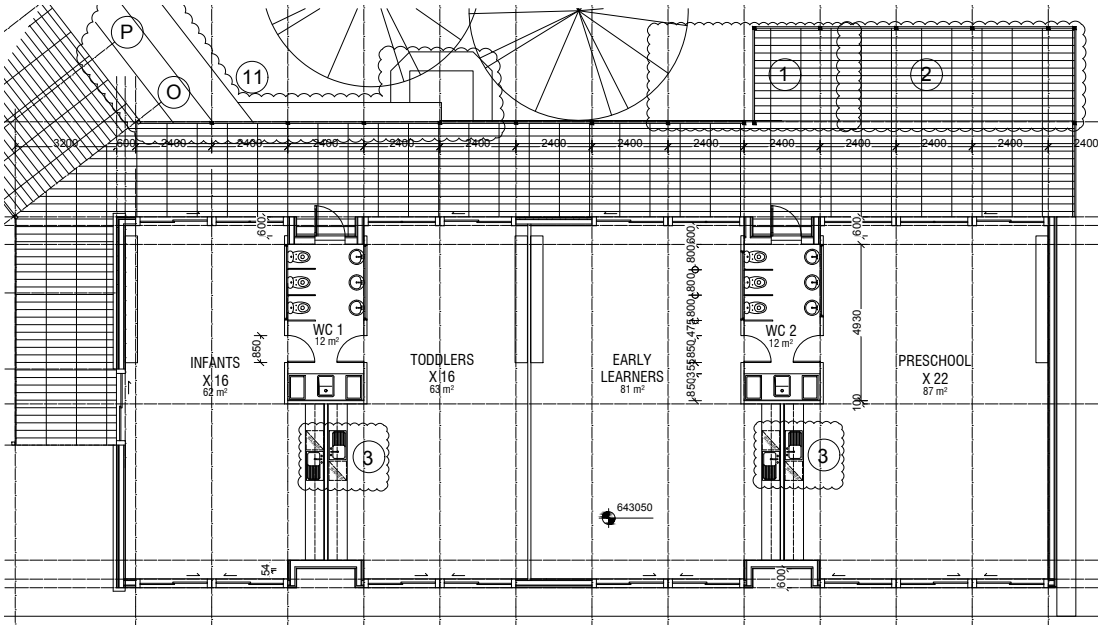
The thermal envelope consists of prefabricated Carbonlite panels for walls and roof all sitting on an insulated concrete slab. The mid floor is made from Cross Laminated Timber (CLT)



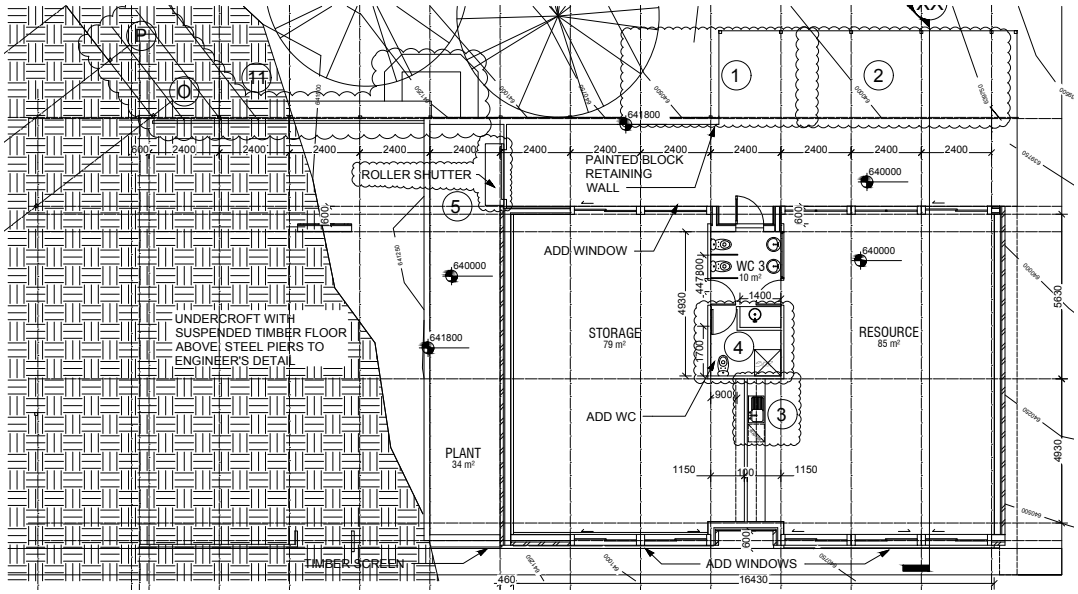
Detailed cross section

4 Floorplan

The ground floor has four classrooms and two bathrooms. The lower ground has a similar layout with two classrooms and single bathroom. Access to each of the classrooms is through an external entry door. There are no internal stairwells.



Ground floor



Lower ground floor

5 Construction details

5.1 Floor slab/basement ceiling

Part of the building has a concrete slab floor that is insulated above with 50mm Phenolic foam (Lambda 0.020 W/mK). The other part of the building has a timber suspended floor insulated with 240mm of fiberglass insulation (Lambda 0.043 W/mK).

5.2 Exterior walls

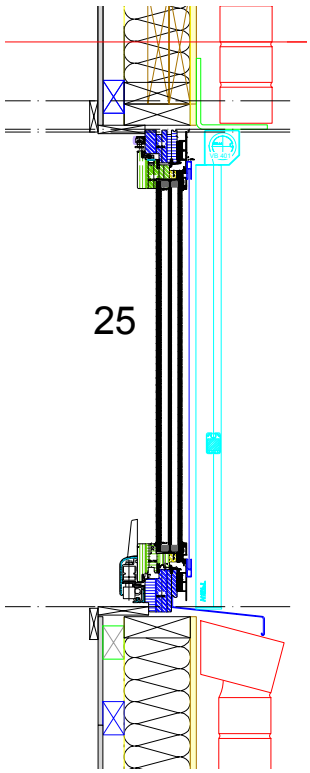
The walls are timber framed and insulated with 140mm of fiberglass batts (Lambda 0.035 W/mK).

5.3 Roof

The roof is made from timber rafters and insulated with 240mm of fiberglass batts (Lambda 0.043 W/mK). Above, it is lined with OSB, a weathertight membrane and then counter battens, battens and metal roofing.

5.4 Windows

The Windows and doors are Neuffer brand timber – aluminium framed, made of Eucalyptus and have an average Uf value of 1.03 W/m2K. The glazing is triple glazed Argon filled with low E coatings and laminated glass where there is the possibility of human impact. The average Ug is 0.60 W/m2K and g value 0.54. Barrier free thresholds were used in the bathrooms for wheelchair access.



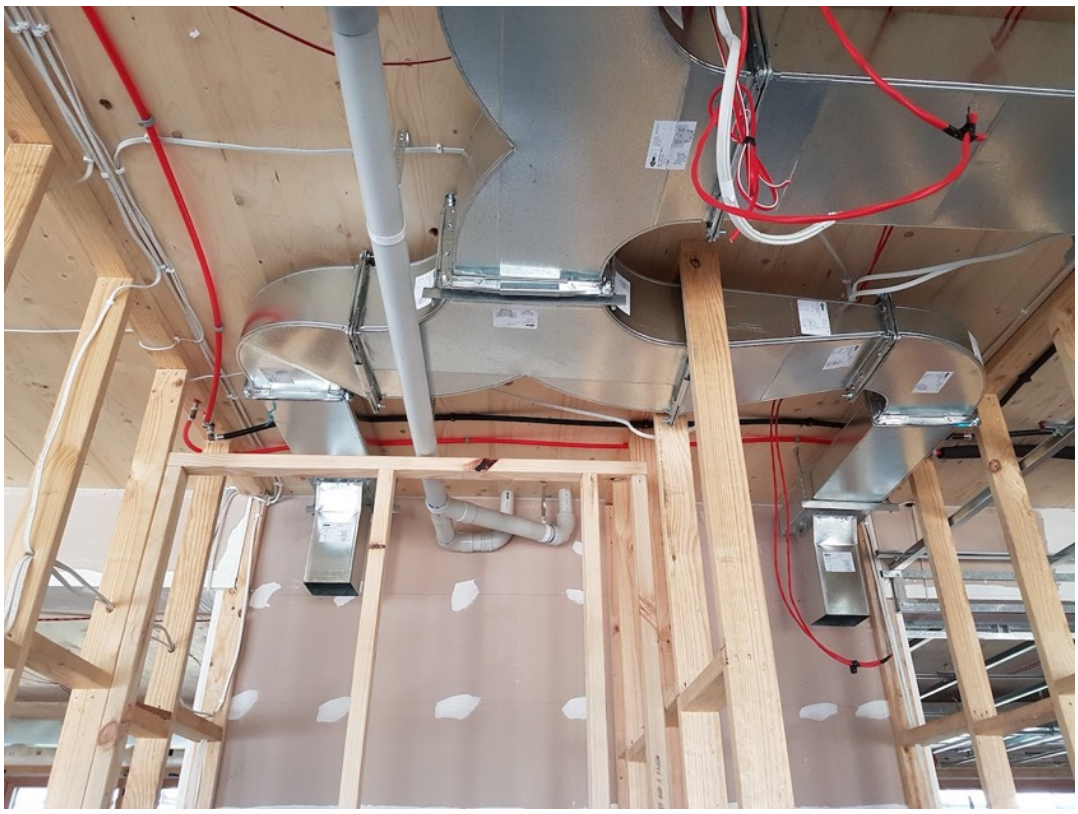
6 Airtightness

Pro Clima Intello airtight membranes were used on the walls and ceilings for airtightness. These were taped to the windows, doors, and junctions with matching airtight tapes. Penetrations were sealed with grommets.

The building achieved an airtightness test result of 0.6 ACHn50. Main leakage areas were around penetrations for data cabling.

7 Ventilation systems

Three SystemAir heat recovery ventilation machines are used to service the building. The heat recovery efficiency is 77% and electrical efficiency is 0.22 Wh/m3. Fresh air is delivered to the classrooms and extracted in the bathrooms. Air is delivered via rigid metal ducting that is insulated in some areas with fiberglass batts.



8 Heating and cooling systems

Each classroom has an average area of 83m2 and is heated and cooled with its own reverse cycle air sourced heat pump with a capacity of 5 kW.

9 PHPP results

The project is the first of its kind to achieve the Passive House Premium certification in Australia owing to its very low energy usage and very large 30kW solar PV array.

Passive House Verification

Building:	Torrens Childcare - New building		
Street:	1 Torrens Place Torrens		
Postcode/City:	2607	Canberra	
Province/Country:	Australian Capital Territory	AU-Australia	
Building type:	Childcare centre		
Climate data set:	AU0003a-Canberra		
Climate zone:	4: Warm-temperate	Altitude of location:	640 m
Home owner / Client:	Majura Park Childcare Pty Ltd		
Street:			
Postcode/City:			
Province/Country:		AU-Australia	
Architecture:	Christie Hartfiel Architectural Design		
Street:			
Postcode/City:			
Province/Country:	Australian Capital Territory	AU-Australia	
Mechanical engineer:	Rudds Consulting Engineers		
Street:	5 Bodalla Place Fyshwick		
Postcode/City:	2609	Canberra	
Province/Country:	Australian Capital Territory	AU-Australia	
Energy consultancy:	Harley Truong H3space		
Street:	10B Anderson Street Chifley		
Postcode/City:	2606	Canberra	
Province/Country:	Australian Capital Territory	AU-Australia	
Certification:	Detail Green		
Street:	18 Fletcher Road		
Postcode/City:	3747	Beechworth	
Province/Country:	Victoria	AU-Australia	

Year of construction:	2017	Interior temperature winter [°C]:	20.0
No. of dwelling units:	1	Internal heat gains (IHG) heating case [W/m²]:	2.8
No. of occupants:	50.0	Specific capacity [Wh/K per m² TFA]:	60
		Interior temp. summer [°C]:	25.0
		IHG cooling case [W/m²]:	2.8
		Mechanical cooling:	x

Specific building characteristics with reference to the treated floor area

					Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	485.8				
Space heating	Heating demand	kWh/(m²a)	15.4	≤	15	-	yes
	Heating load	W/m²	12	≤	-	10	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	1	≤	15	15	yes
	Cooling load	W/m²	4	≤	-	11	
	Frequency of overheating (> 25 °C)	%	-	≤	-		-
	Frequency of excessively high humidity (> 12 g/kg)	%	0	≤	10		yes
Airtightness	Pressurization test result n_{50}	1/h	0.6	≤	0.6		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	54	≤	-		-
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	24	≤	30	24	yes
	Generation of renewable energy (in relation to pro-jected building footprint area)	kWh/(m²a)	143	≥	120	111	

[2] Empty field: Data missing; '-': No requirement

10 Build cost

The construction cost was 2050 Euro/m2 of Treated Floor Area and that included the outdoor play area, shading devices and landscaping.

11 Experience

Some observations after the owner occupied the site for over 12 months:

“Working at Torrens is so comfortable, we rarely need to use artificial heating or cooling, and the constant temperature and quietness of the building (no external noise, no mechanical noise) makes for a relaxing work environment. The building feels fresh and the air is clean – even during poor weather – like the January smoky bushfire events when Canberra had the worst air quality in the world. “

“My other buildings cost me 9,000 Euro a year in electricity – whilst Torrens is only 21 Euro – and that is mostly from the administration fees for being connected to the electricity grid.”