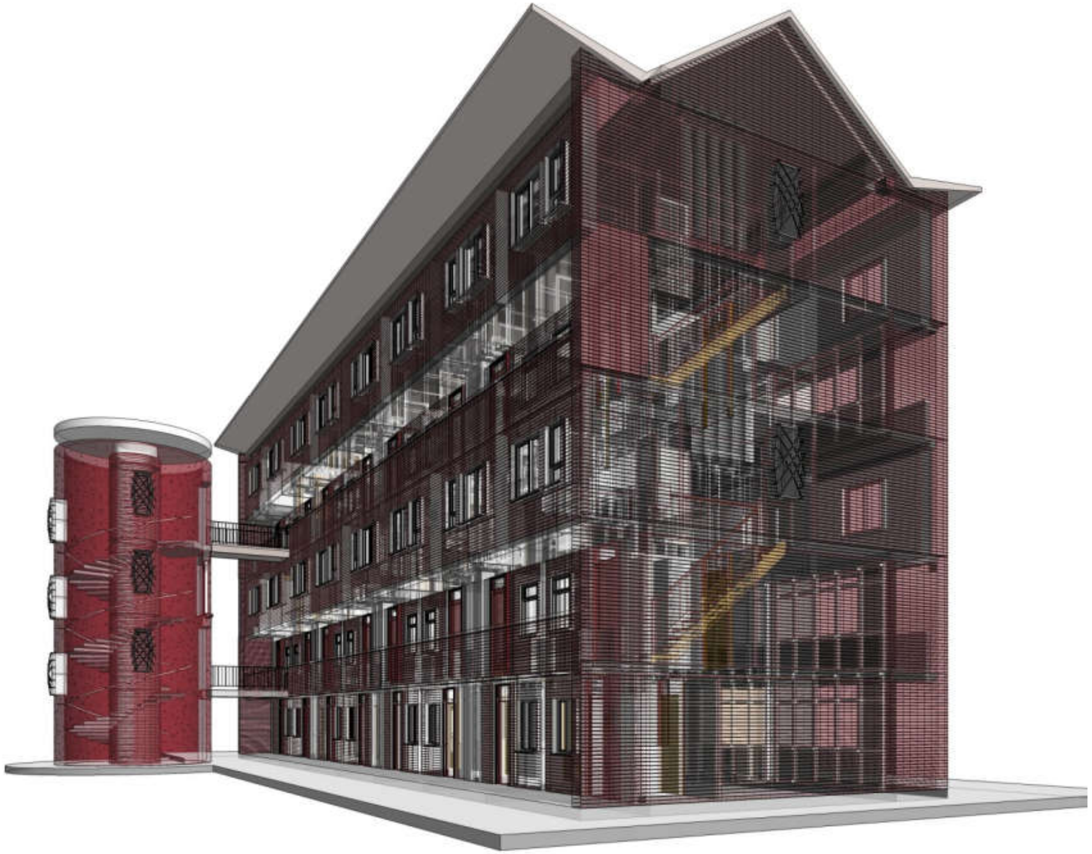
Gullwing retrofit for Dublin City Council

Summary by Simon McGuinness, MRIAI

Project brief

- Achieve a BER of A3
- Achieve compliance with Part L, 2011 (new build)
- Condensation risk
- Surface temperatures
- Calculated linear thermal bridges

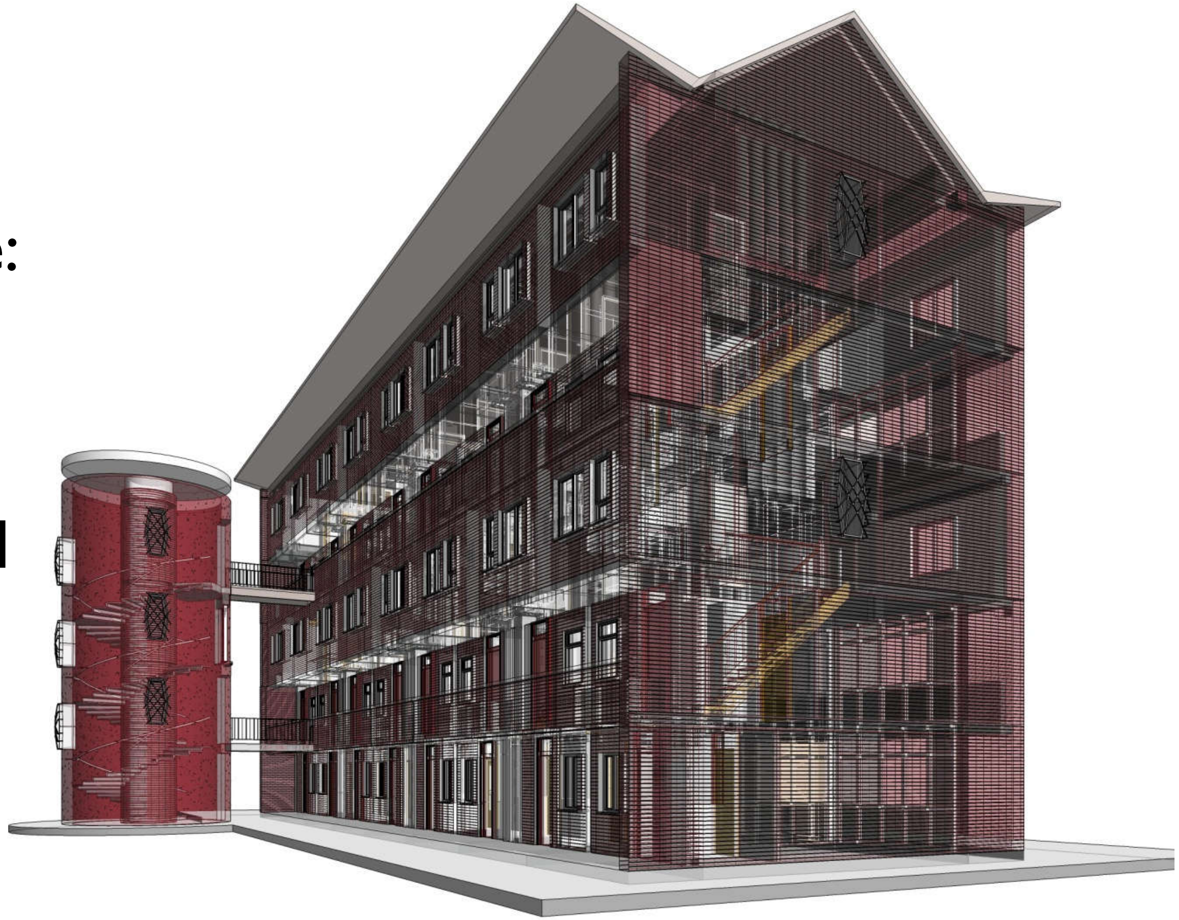
Investigation



Investigation

- The buildings are:

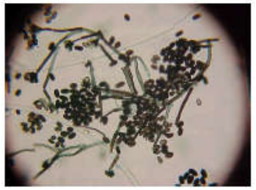
- Well designed
- Robustly detailed
- Resilient
- Upgraded
- Well located

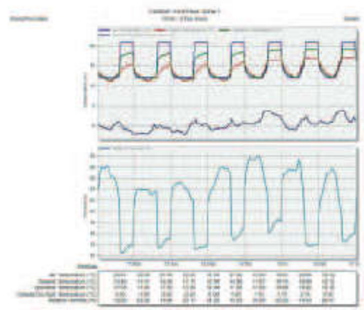


Analysis

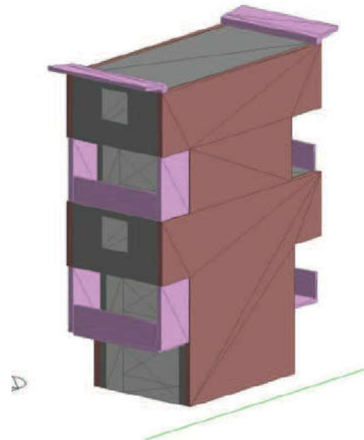
- The buildings are also:

- Un-heatable (Part L)
- Un-healthy (Parts L&F)
- Un-visitable (Part M)
- Un-comfortable
- Non-compliant (Part B)





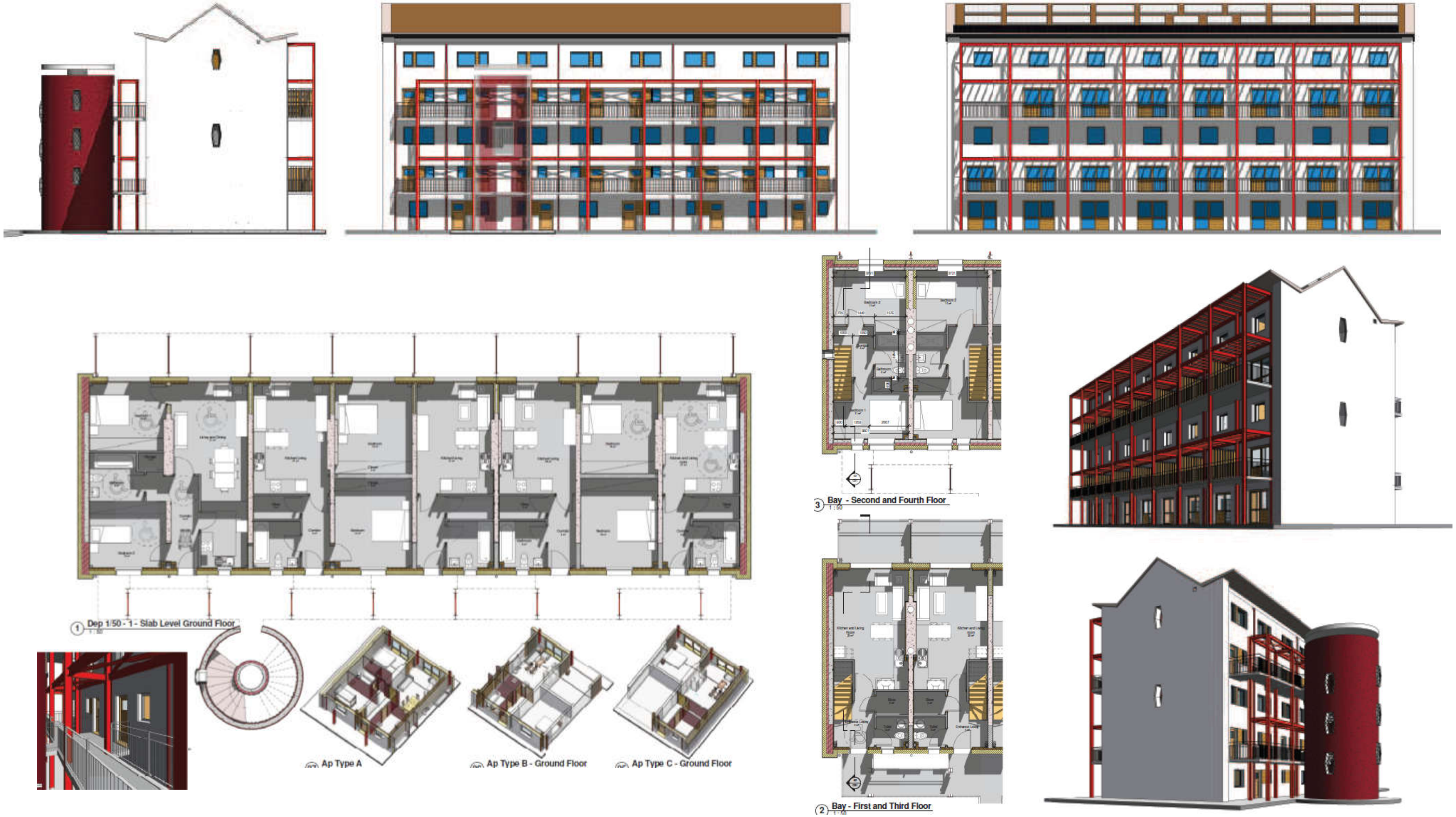
EXISTING LIVING ROOM
WINTER COMFORT



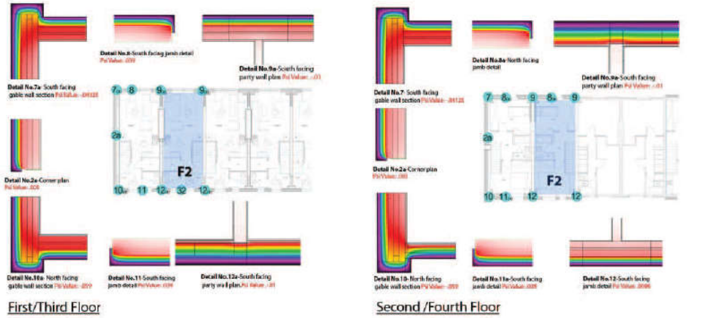
DESIGNBUILDER MODEL EXISTING BUILDING (2 BAYS)

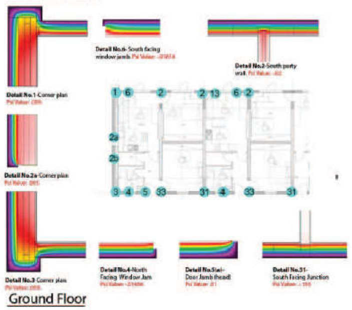
DESIGNBUILDER ANALYSIS - OVERHEATING AND WINTER COMFORT LEVELS

Team A (insitu retrofit)



Team A (insitu retrofit)





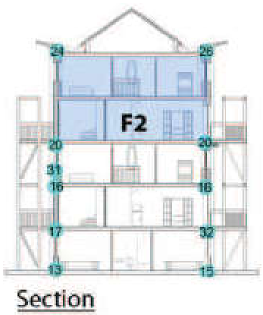
The Psi-Value is the linear thermal transmittance of the thermal heat bridge (correction factors Psi (Ψ, LΨ,) resulting from the input of U-values and lengths specific to the building component concerned and its thermal coupling coefficient L2D as calculated within a steady state, two dimensional thermal heat bridge simulation.

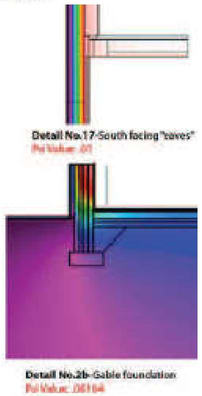
Y-Factor is the total of the sum of the psi values times the length of the thermal bridge, divided by the total surface area for the dwelling.

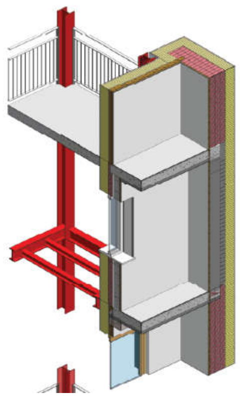
Apartment Type F2:Y-Value DEAP input differences:
(F2 is shown purely as a typical example)

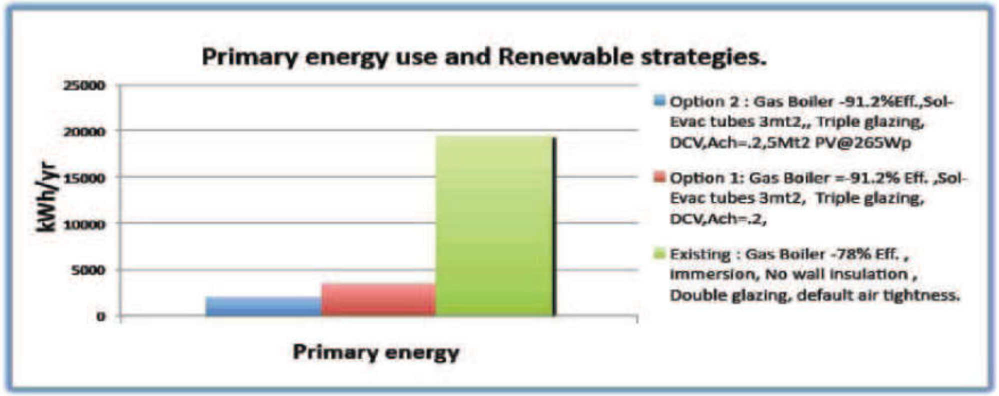
	Y-Factor	kWh/m²/Yr
Default Value	.15W/(m K)	-260kWh/m²/Yr
UK accrediteded Details	.08W/(m K)	-233kWh/m²/Yr
Calculated value	-.003W/(m²K)	-204kWh/m²/Yr

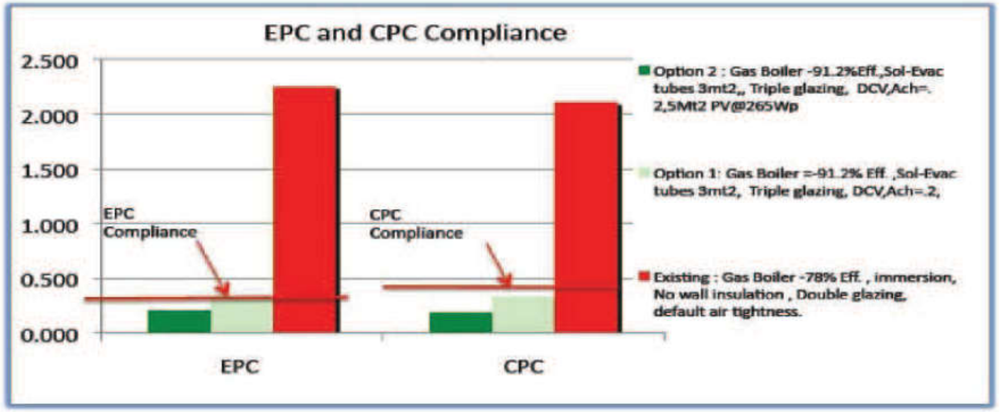
THERM ANALYSIS - KEY PLANS AND DETAILS

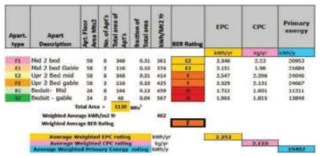


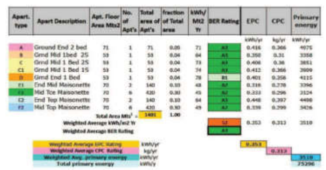




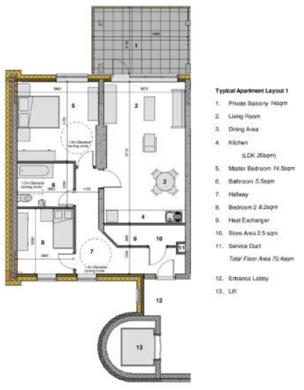


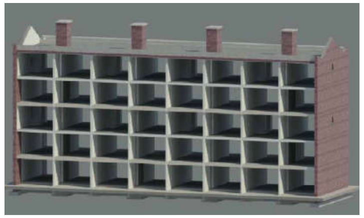


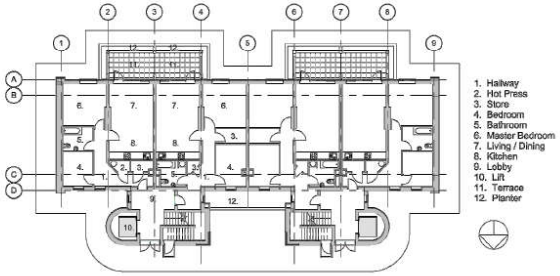




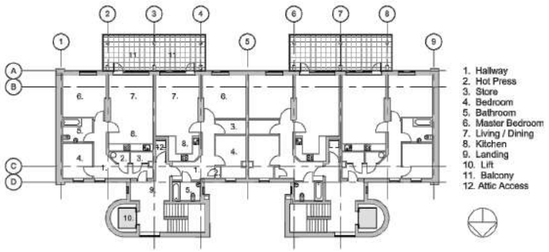
Team B (south orientation)





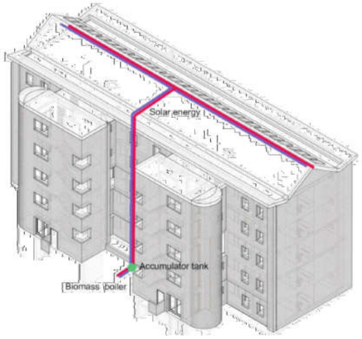


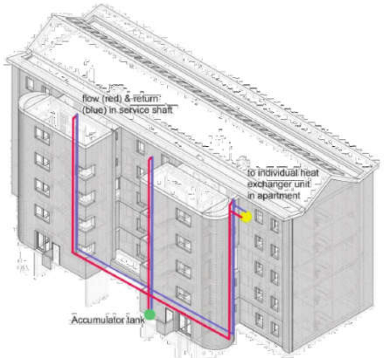
2 Ground Floor Plan
1 : 200



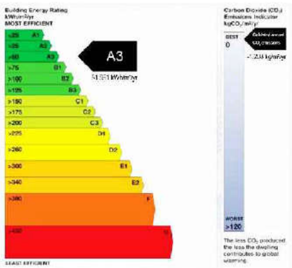
3 Fourth Floor Plan
1 : 200

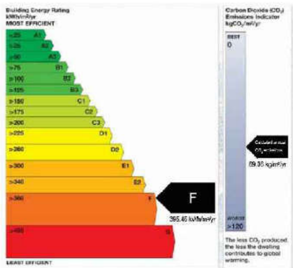
Team B (south)

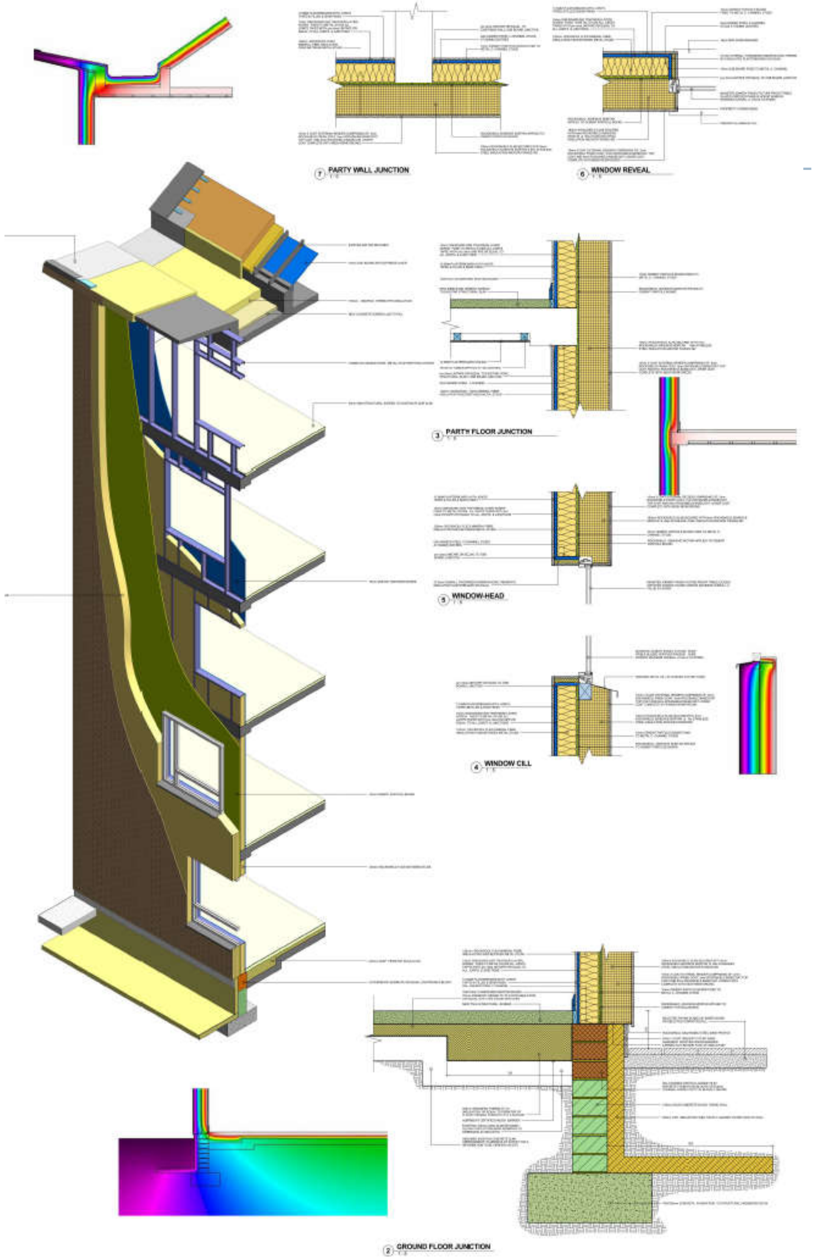




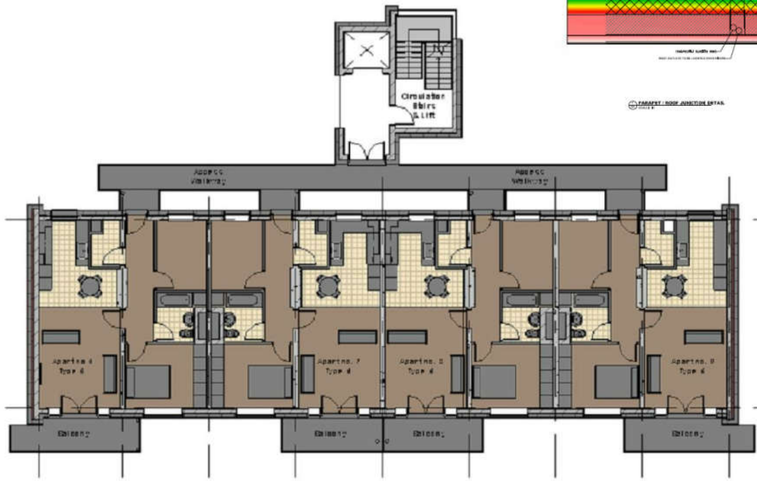
BER Summary- Average BER and Compliance Figures									
Apartment	Floor Area	No Of Units	Total Floor Area	BER per Unit	Primary Energ	EPC per Unit	Total EPC	CPC per Unit	Total CPC
	m2		m2	kWh/m2/yr	kWh/yr				
Type 1	70	2	141	59	8265	0.350	49.320	0.001	0.124
Type 2	70	6	423	37	15582	0.264	111.656	0.049	20.670
Type 3	70	2	141	46	6521	0.276	38.910	0.023	3.277
Type 4	74	2	147	64	9380	0.406	59.743	0.036	5.296
Type 5	74	6	441	45	19731	0.346	152.695	0.046	20.219
Type 6	74	2	147	83	12284	0.557	81.894	0.015	2.164
			0		0		0.000		0.000
			0		0		0.000		0.000
			0		0		0.000		0.000
Totals		20	1440		71762		494.217		51.751
Average					50		0.343		0.036
						MPEPC	0.400	MPCPC	0.460

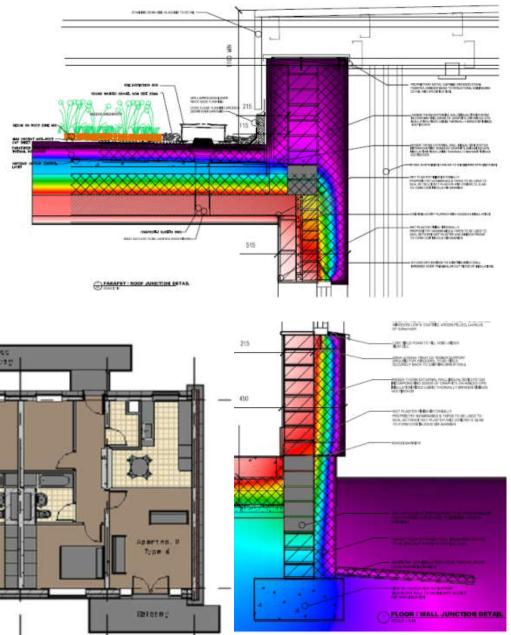






Team C (north orientation)





Team C (north orientation)

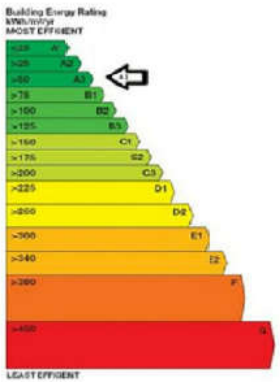
Proposed Average Building BER Rating:

Table 1 : Apartment Types BER Ratings

Floor	Unit Type	No.	Area	Primary Energy	EPC kWh/y	CPC kg/y	BER rating
Ground	Apartment Type 1 – 1 bed, ground floor end Apart	1	53 m²	73 kWh/m²y	0.395	0.413	A3
	Apartment Type 2 – 1 bed, ground floor mid Apart	2	51 m²	70 kWh/m²y	0.395	0.414	A3
	Apartment Type 3 – 1 bed, ground floor mid Apart	1	53 m²	68 kWh/m²y	0.394	0.413	A3
	Apartment Type 4 – 2 bed, ground floor end Apart	1	71 m²	68 kWh/m²y	0.396	0.412	A3
1st & 3rd	Apartment Type 5 – 2 bed, mid floors end Apart	4	71 m²	57 kWh/m²y	0.40	0.419	A3
	Apartment Type 6 – 2 bed, mid floors mid Apart	4	71 m²	53 kWh/m²y	0.396	0.418	A3
2nd	Apartment Type 7 – 2 bed, mid floors end Apart	2	70.6 m²	56 kWh/m²y	0.394	0.414	A3
	Apartment Type 8 – 2 bed, mid floors mid Apart	2	70.6 m²	53 kWh/m²y	0.397	0.419	A3
4th	Apartment Type 9 – 2 bed, Upper floors end Apart	2	70.6 m²	65 kWh/m²y	0.399	0.415	A3
	Apartment Type 10 – 2 bed, upper floors mid Apart	2	70.6 m²	61 kWh/m²y	0.395	0.413	A3

Table 2 : Individual Apartment BER Ratings

Floor	No.	Type	BER rating
Ground	01	Type 1	A3
	02	Type 2	A3
	03	Type 2	A3
	04	Type 3	A3
	05	Type 4	A3
1st	06	Type 5	A3
	07	Type 6	A3
	08	Type 6	A3
	09	Type 5	A3
2nd	10	Type 7	A3
	11	Type 8	A3
	12	Type 8	A3
	13	Type 7	A3
3rd	14	Type 5	A3
	15	Type 6	A3
	16	Type 6	A3
	17	Type 5	A3
4th	18	Type 9	A3
	19	Type 10	A3
	20	Type 10	A3
	21	Type 9	A3



Average Building BER Rating:

Total Building Energy use (86986 kWh/y) / Total 21 Apartments area (1358m²) = **64.05 kWh/m² y A3**

Average Building EPC & CPC's :

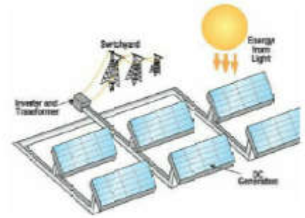
	Primary energy [kWh/y] EPC	CO2 emissions [kg/y] CPC
Performance coefficients	0.3961	0.415
Maximum permitted	0.400	0.460
	Complies	Complies

PRIMARY HEATING SYSTEM:
ECODAN: Air to water heat pump

AERECO: VAM fan

AERECO: wall vent

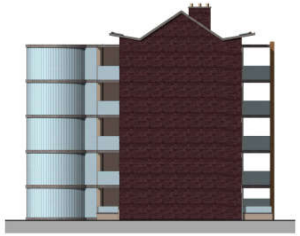
AERECO:
Mechanical Demand Control Ventilation



WATER HEATING:
PV solar panels

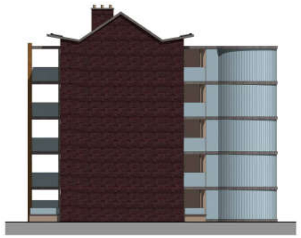
Team D (west orientation)

PROPOSED WEST ELEVATION
SCALE 1:100

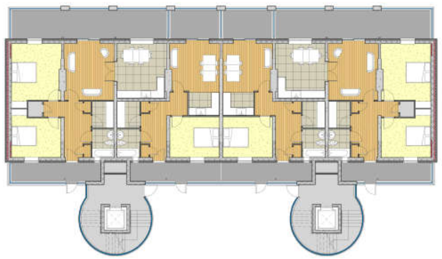


PROPOSED NORTH ELEVATION
SCALE 1:100

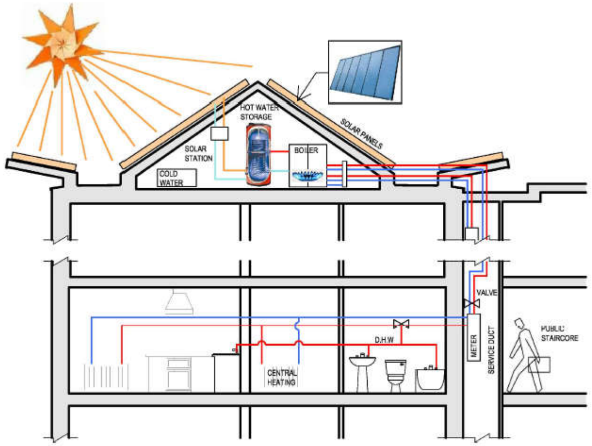
PROPOSED EAST ELEVATION
SCALE 1:100

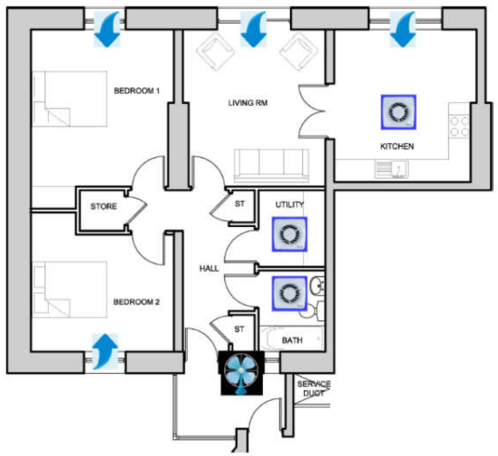


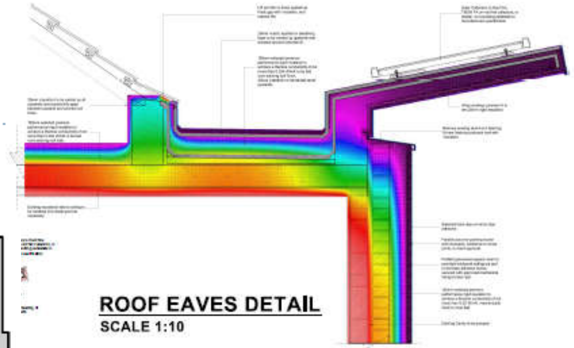
PROPOSED SOUTH ELEVATION
SCALE 1:100



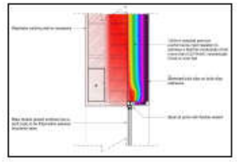
Team D (west orientation)



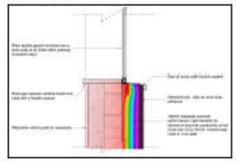




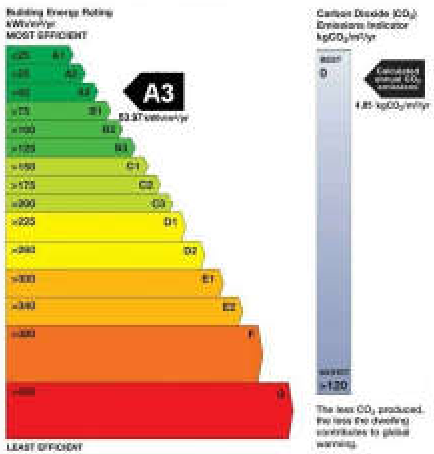
ROOF EAVES DETAIL
SCALE 1:10

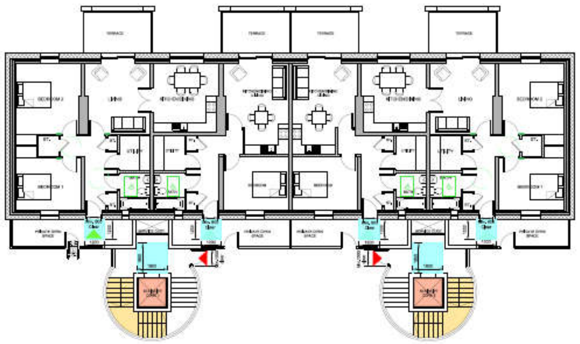


WINDOW HEAD DETAIL
SCALE 1:10

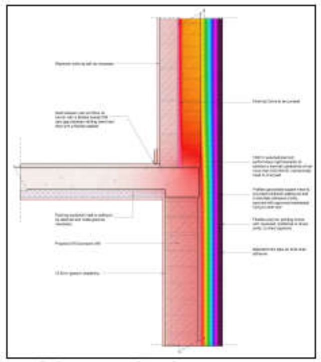


WINDOW CILL DETAIL
SCALE 1:10





PART M COMPLIANCE ASSESSMENT
SCALE 1:100



FLOOR JUNCTION DETAIL
SCALE 1:10

Retrofit to A3, accessible, safe, healthy, comfortable, self-funding, sustainable, replicable.

Post-Graduate Certificate in Digital Modelling and Energy Retrofit