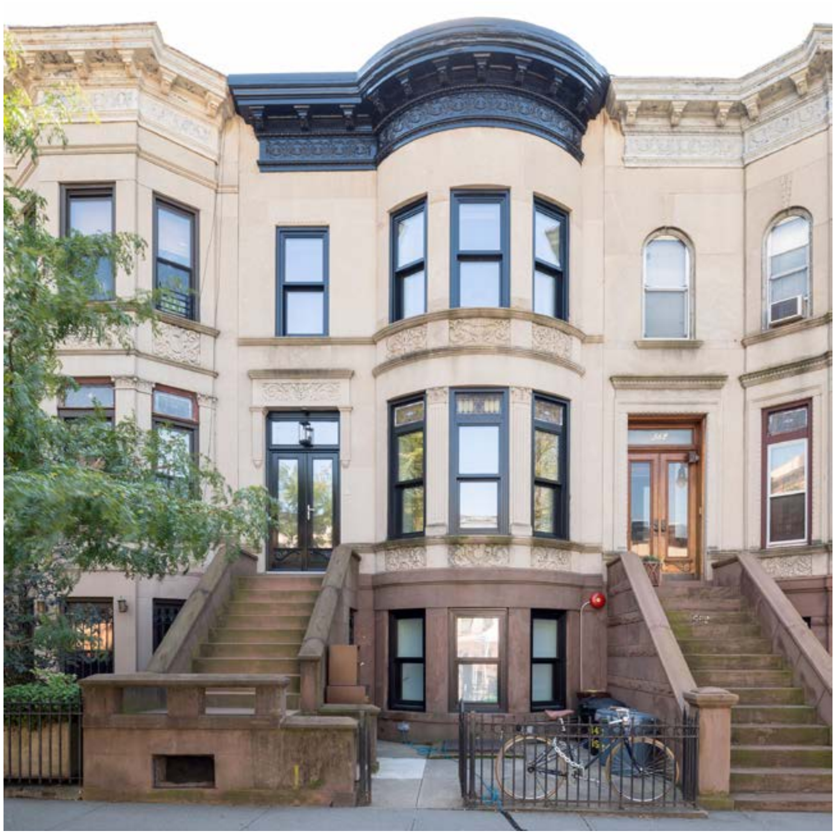
Project Documentation
Gebäude-Dokumentation

Abstract | Zusammenfassung



2-Family EnerPHit Renovation – 564 9th Street – Brooklyn, New York

Data of building | Gebäudedaten

Year of construction Baujahr	2017	**Space heating** **Heizwärmebedarf**	**17** **kWh/(m²a)**
U-value external wall U-Wert Außenwand	0,217 W/(m²K)		
U-value basement U-Wert Kellerdecke	0,227 W/(m²K)	Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER)	52 kWh/(m²a)
U-value roof U-Wert Dach	0,098 W/(m²K)	Generation of renewable Energy Erzeugung erneuerb. Energie	– kWh/(m²a)
U-value window U-Wert Fenster	0,953 W/(m²K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	112 kWh/(m²a)
Heat recovery Wärmerückgewinnung	69 %	Pressurization test n_{50} Drucktest n_{50}	1,0 h^{-1}
Special features Besonderheiten	Sonnenkollektoren für die Warmwasserbereitung, Grauwasser-Wärmerückgewinnung, Regenwassernutzung		

Brief Description

564 9th Street – Brooklyn, NY

This row house, first built in the early 1900's and renovated to the EnerPHit standard in 2017, consists of a two floor main unit and an apartment on the ground level. Its location in a historic district meant that, with the exception of the roof, insulation had to be from the interior. Careful attention was paid to the detailing of the air barrier and insulation layers in order to ensure that this renovation would position the home for its next 100 years.

Windows on the front façade use a simulated double-hung window profile (fixed window over an operable window) in order to mimic the appearance of traditional sliding sash windows. Historic elements, such as the stained glass transom windows and wood brick moulding, were preserved or replicated on the front façade.

There are separate mechanical systems for the two dwellings. Both employ balanced ventilation with energy recovery and ducted split heat pump systems for heating and cooling. Domestic hot water production is also done with heat pump units.

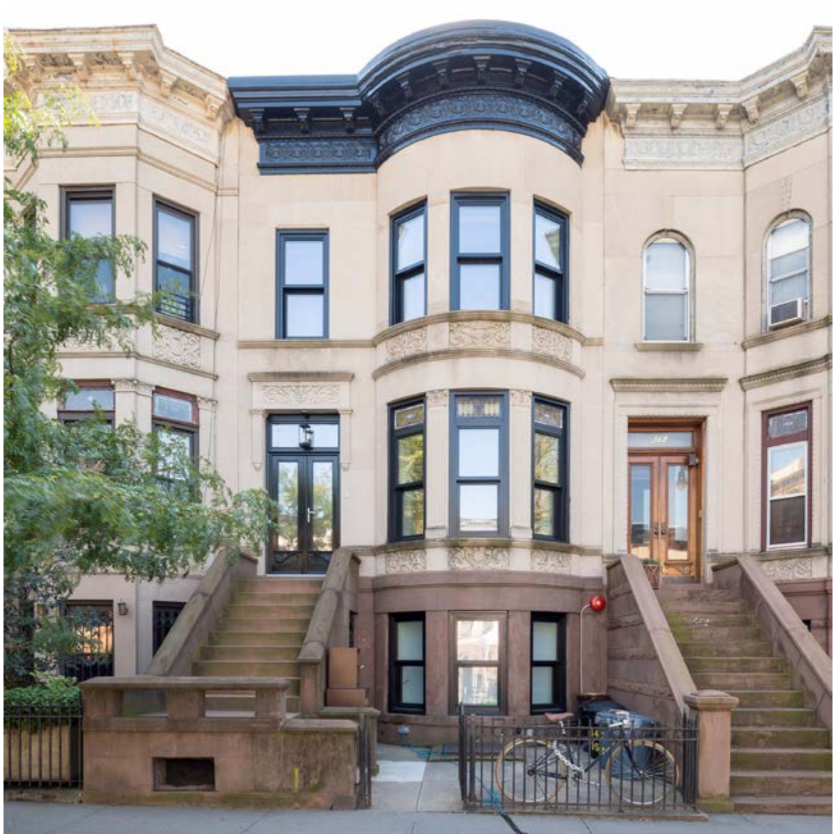
Kurzbeschreibung

Passivhaus Darmstadt Kranichstein

Responsible project participants **Verantwortliche Projektbeteiligte**	
Architect Entwurfsverfasser	Jordan Parnass Digital Architecture www.jpda.net
Implementation planning Ausführungsplanung	John Mitchell - bldgtyp www.bldgtyp.com
Building systems Haustechnik	John Mitchell - bldgtyp www.bldgtyp.com
Structural engineering Baustatik	-
Building physics Bauphysik	John Mitchell - bldgtyp www.bldgtyp.com
Passive House project planning Passivhaus-Projektierung	John Mitchell - bldgtyp www.bldgtyp.com
Construction management Bauleitung	Supreme General Contracting www.supremegeneralcontracting.com
Certifying body **Zertifizierungsstelle**	
Passive House Academy www.passivehouseacademy.com	
Certification ID **Zertifizierungs ID**	
6181	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivhausprojekte.de)

Author of project documentation **Verfasser der Gebäude-Dokumentation**	
Passivhaus Institut Darmstadt www.passiv.de	
Date Datum	Signature Unterschrift
October 22, 2019	

1. Ansichtsfotos



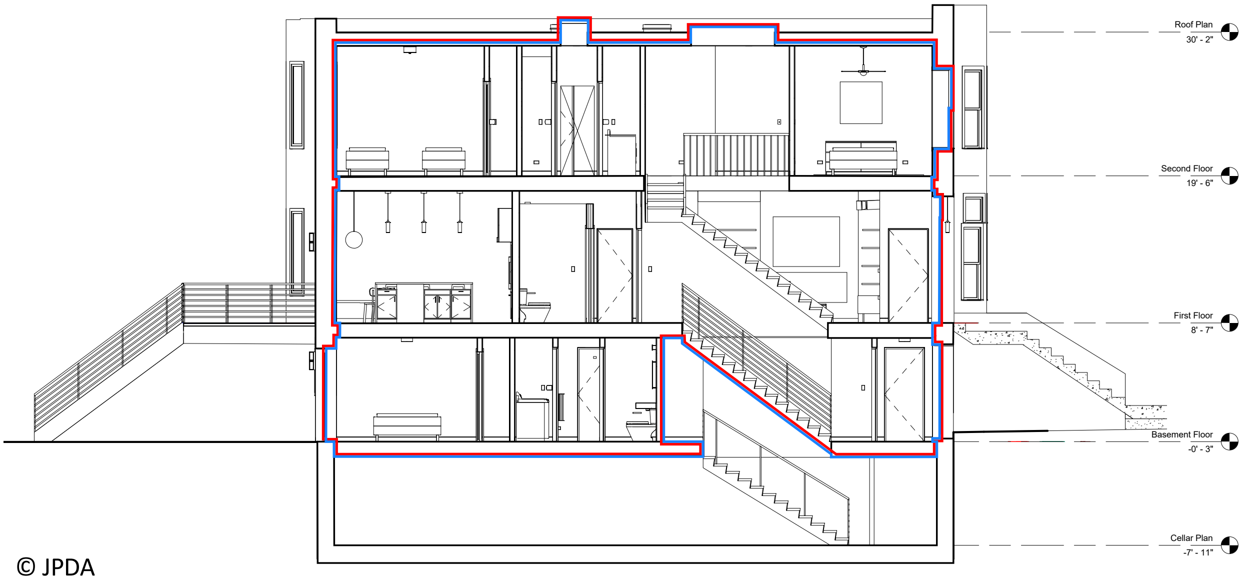
Nord

© JPDA

2. Innenfoto exemplarisch

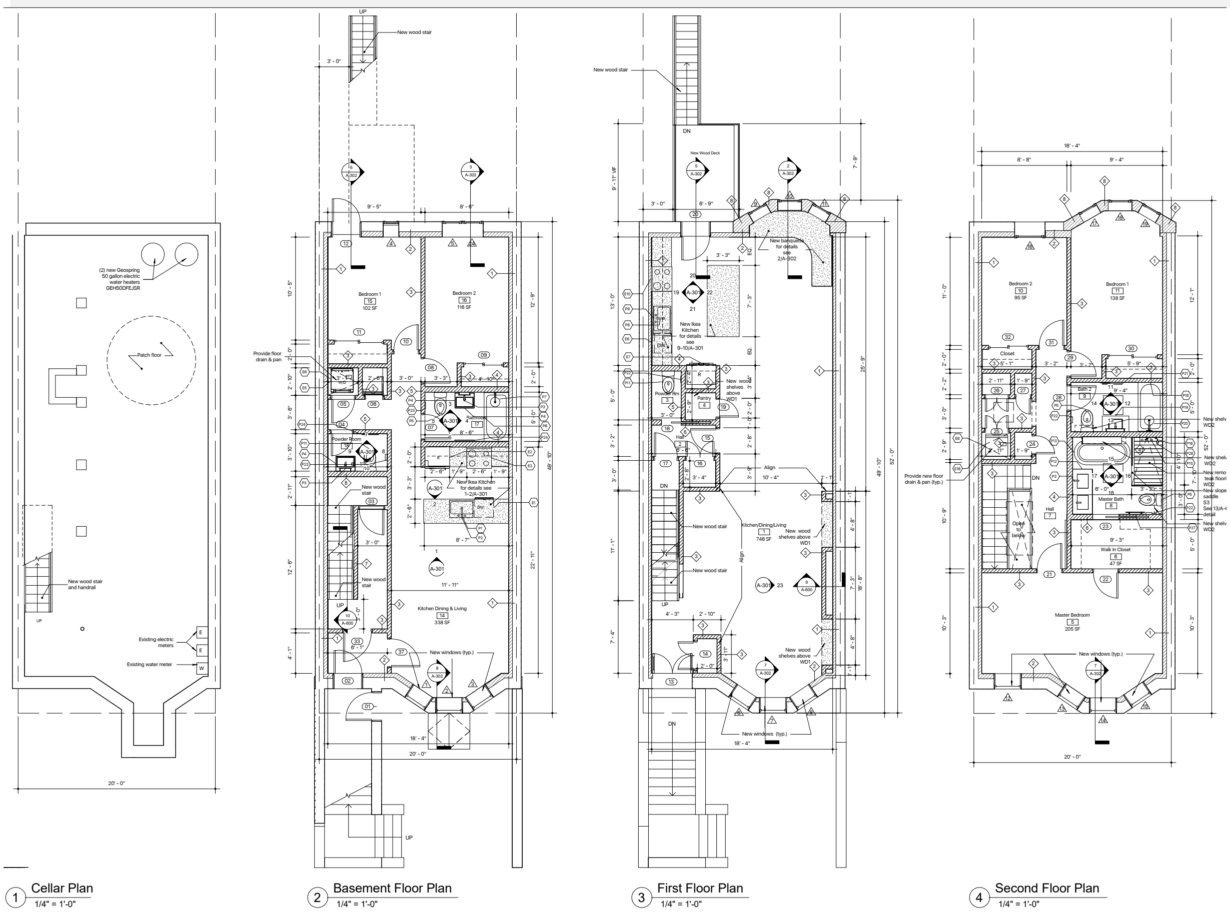
© JPDA

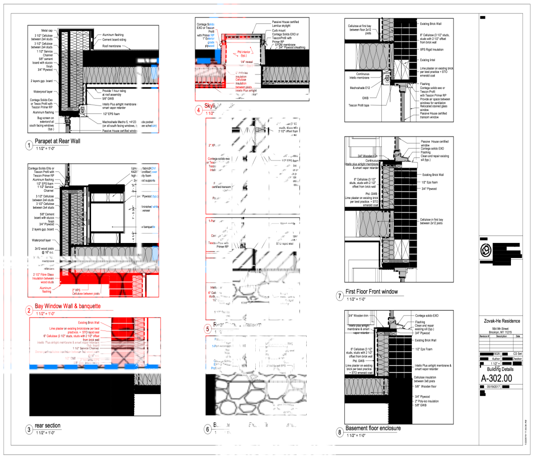
3. Schnittzeichnung



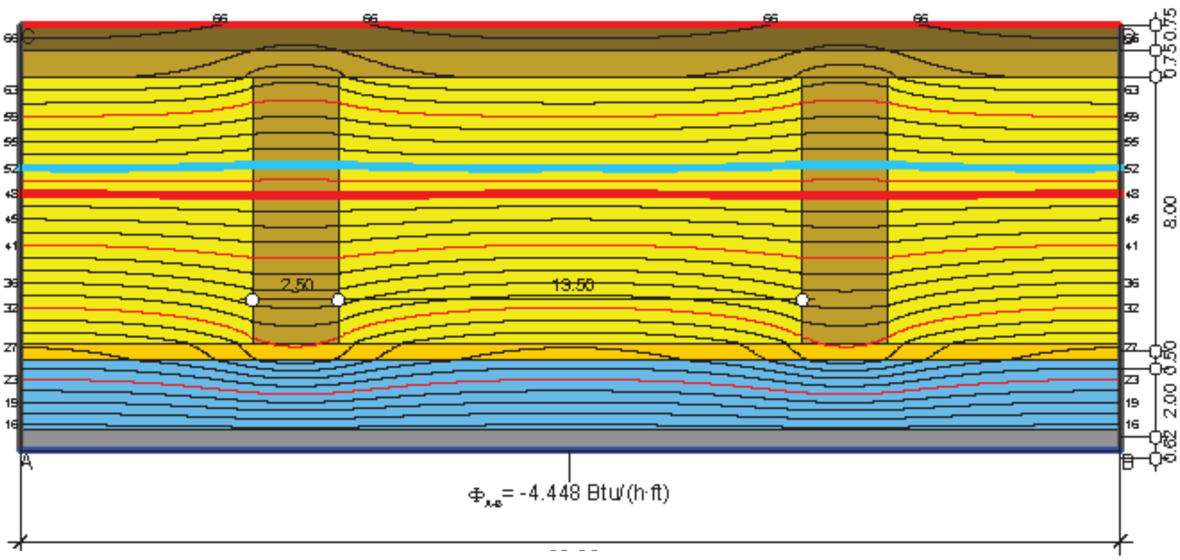
Insulation Layer
Airtight Layer

4. Grundrisse





The ground floor is built over an uninsulated basement. Two inches of foil-faced EPS foam were installed under the existing floor joists. Joist bays were filled with dense packed cellulose insulation.



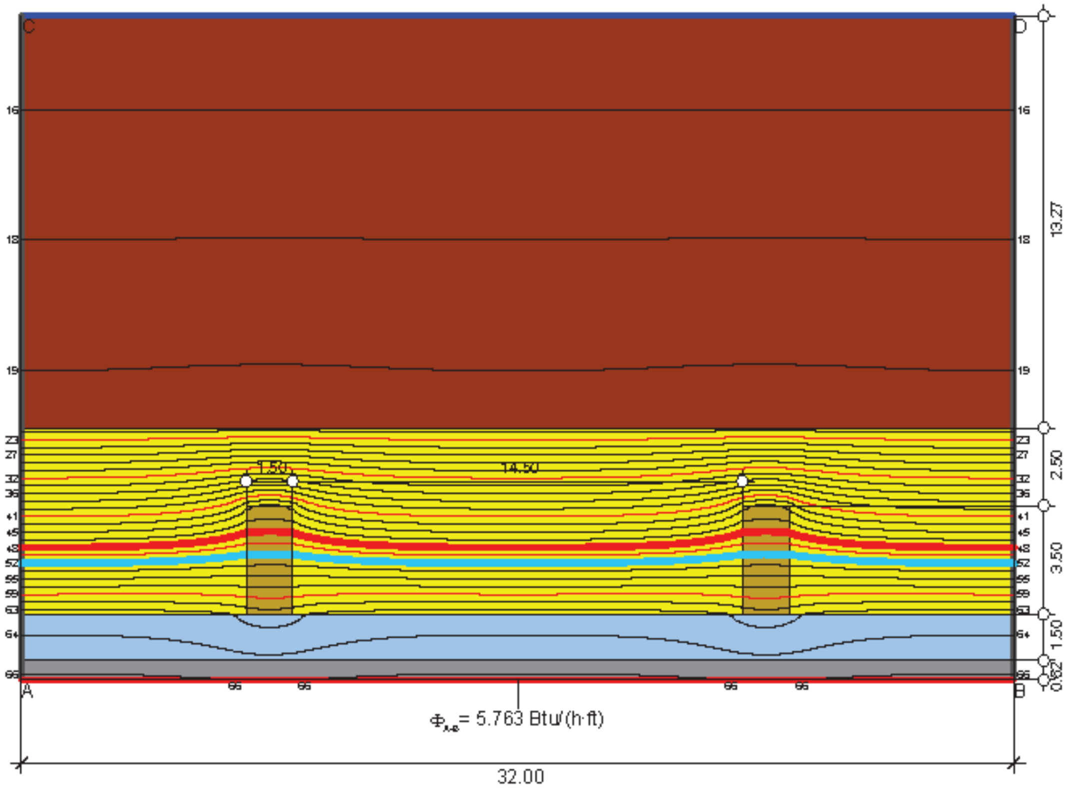
$$U_{eq\,A\text{-}B} = \frac{4.277}{30.000 \cdot 0.813} = 0.175\ \text{W/(m}^2\cdot\text{K)} = 0.0309\ \text{Btu/(h}\cdot\text{ft}^2\cdot\text{F)}$$

Boundary Condition	q[Btu/(h·ft²)]	θ[°F]	h[Btu/(h·ft²·F)]	ε
Exterior, normal		14.000	4.403	
Interior, heat flux, downwards		68.000	1.036	
Symmetry/Model section	0.000			

Material	λ[Btu/(h·ft·F)]	ε
Cellulose (Densepack) [R-3.7/in]	0.023	0.900
EPS (Type I), [R-3.7/in]	0.022	0.900
GWB (Typ) [R-0.85/in]	0.098	0.900
OSB [R-1.11/in]	0.075	0.900
Plywood (Typ) [R-1.2/in]	0.069	0.900
Wood, Coniferous (Softwood) [R-1.03/in]	0.081	0.900
Wood, Deciduous (Hardwood) [R-0.91/in]	0.092	0.900

6. Konstruktion der Außenwände

A wood-framed wall was built to the interior of the existing masonry wall. A vapor variable ("smart") air barrier was installed on the interior of the framed wall. A service cavity was built to accommodate electrical and other services without disturbing the air barrier.



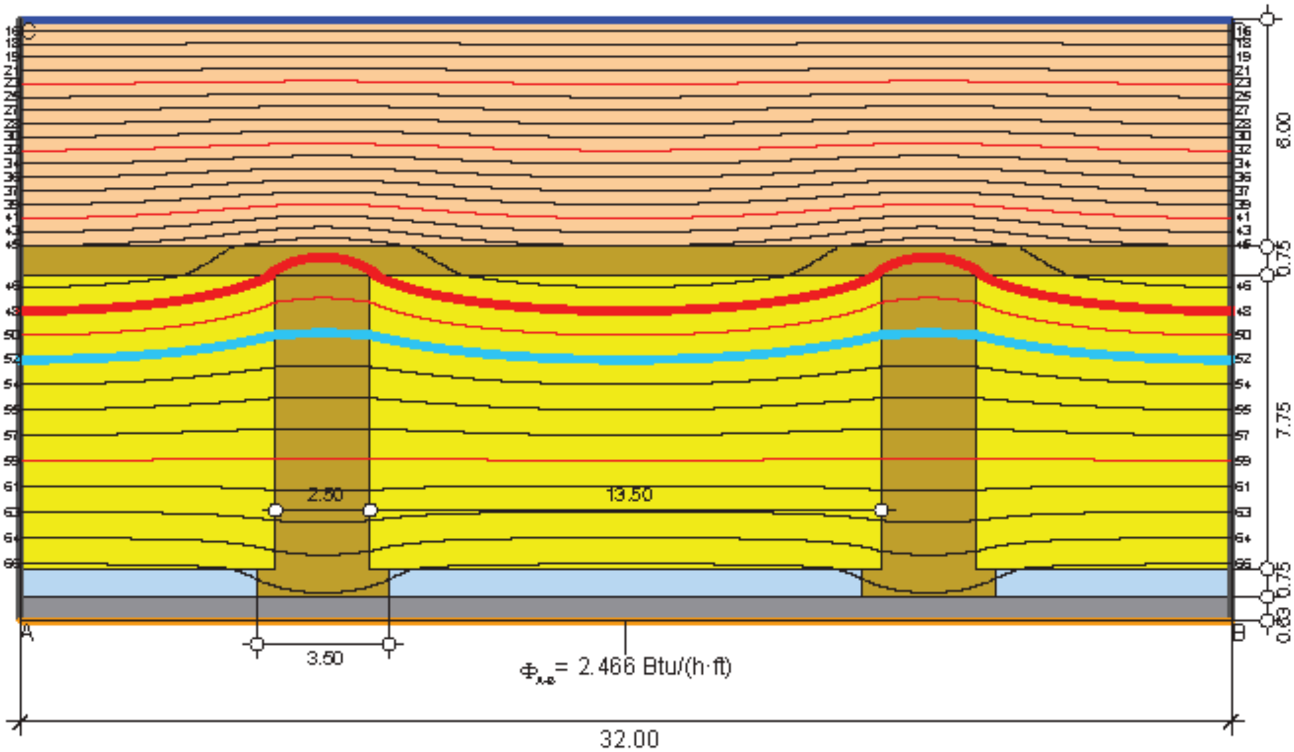
$$U_{eq,A\text{-}B} = \frac{5.541}{30.000 \cdot 0.813} = 0.227\ W/(m^2 \cdot K) = 0.0400\ Btu/(h \cdot ft^2 \cdot F)$$

Boundary Condition	q[Btu/(h·ft²)]	θ[°F]	h[Btu/(h·ft²·F)]	ε
Exterior, normal		14.000	4.403	
Interior, normal, horizontal		68.000	1.355	
Symmetry/Model section	0.000			

Material	λ[Btu/(h·ft·F)]	ε
Air layer, unventilated, horizontal, thickness: 40 mm	0.128	
Brick (Common) [R-0.2/in]	0.416	0.900
Cellulose (Densepack) [R-3.7/in]	0.023	0.900
GWB (Typ) [R-0.85/in]	0.098	0.900
Wood, Coniferous (Softwood) [R-1.03/in]	0.081	0.900

7. Konstruktion des Daches

Six inches (150mm) exterior insulation (polyisocyanurate) was added to the existing roof structure before insulating between the joists with dense packed cellulose. The cellulose was held in place by the air barrier, a vapor variable "smart" air barrier/vapor retarder.

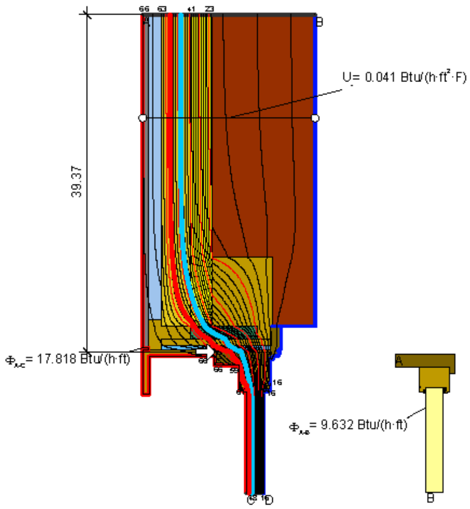


$$U_{eq,A-B} = \frac{2.371}{30.000 \cdot 0.813} = 0.0972\ W/(m^2 \cdot K) = 0.0171\ Btu/(h \cdot ft^2 \cdot F)$$

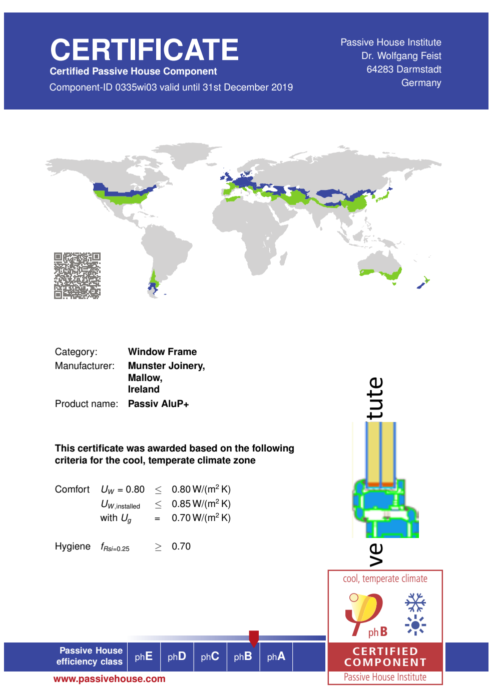
Boundary Condition	q[Btu/(h·ft²)]	θ[°F]	h[Btu/(h·ft²·F)]	ε
Exterior, normal		14.000	4.403	
Interior, heat flux, upwards (1)		68.000	1.761	
Symmetry/Model section	0.000			

Material	λ[Btu/(h·ft·F)]	ε
Air layer, unventilated, upwards, thickness: 19 mm	0.069	
Cellulose (Densepack) [R-3.7/in]	0.023	0.900
Firestone ISO 95+ GL Polyisocyanurate Board [R-6.7/in] (1)	0.015	0.900
GWB (Typ) [R-0.85/in]	0.098	0.900
Plywood (Typ) [R-1.2/in]	0.069	0.900
Wood, Coniferous (Softwood) [R-1.03/in]	0.081	0.900

8. Fenster und Fenster-Einbau



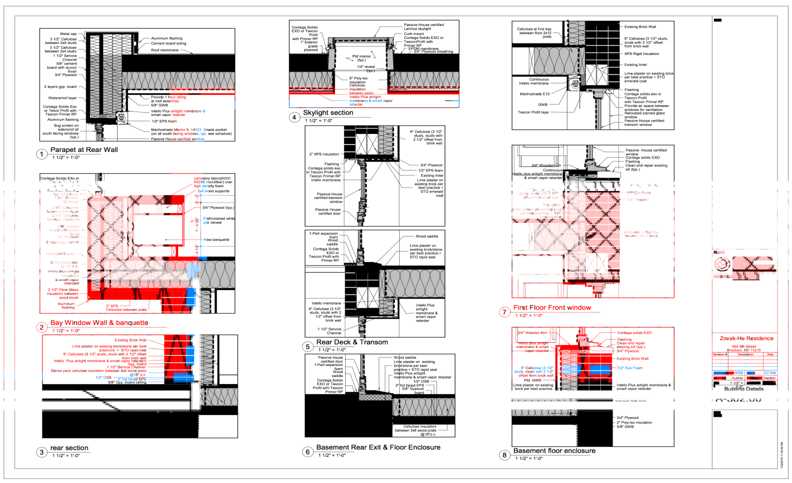
Beschreibung der Fenster (rahmen)-Konstruktion, Hersteller	**Klearwall (Munster Joinery)**
Fabrikat Fenster (rahmen; Produktname)	Front: Landmarks simulated double-hung wood windows Rear: PassiV AluP+ composite aluminum windows
Rahmen-U-Wert Uf	Front: 0,95 Rear: 0,85
Bauart der Verglasung	Krypton filled; 4 | 20 | 4 | 20 | 4
Glas-U-Wert Ug	0,50 W/(m²K)
g-Wert der Verglasung	0,49

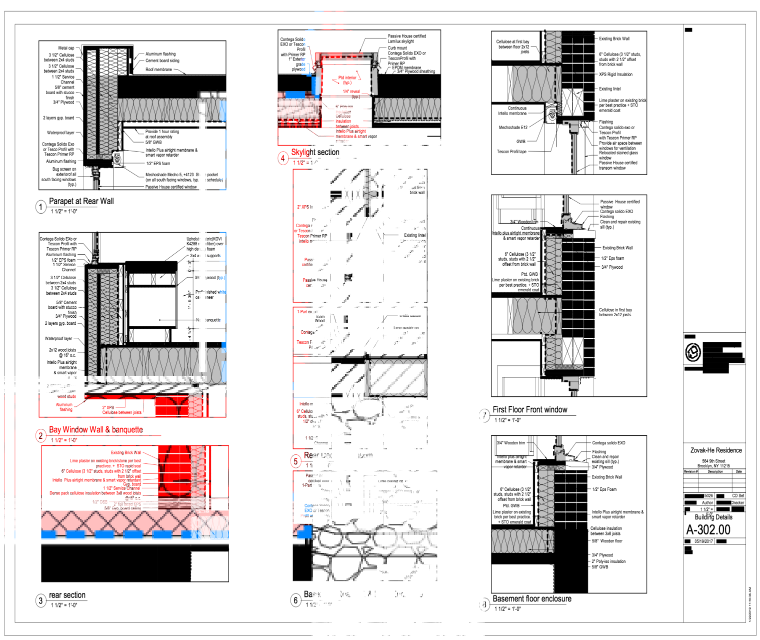


9. Beschreibung der luftdichten Hülle

The airtightness of the building was accomplished in a number of different ways, given the unique challenges of a renovation using interior insulation. At the cellar, the seams of the foil facing of the EPS insulation were taped and connected to the exsisting masonry walls, which had been parged and prepared with a liquid air barrier material. At the insulated front and rear walls, the vapor variable air barrier/vapor retarder was connected to the prepared masonry walls, windows, etc. with tapes. The same air barrier materials were used at the roof.

Blower door testing was done once the air barrier was complete (before windows were installed), then again after windows and doors were installed. Final blower door testing was done in November of 2017. A result of 1.0 ach@50Pa was achieved.



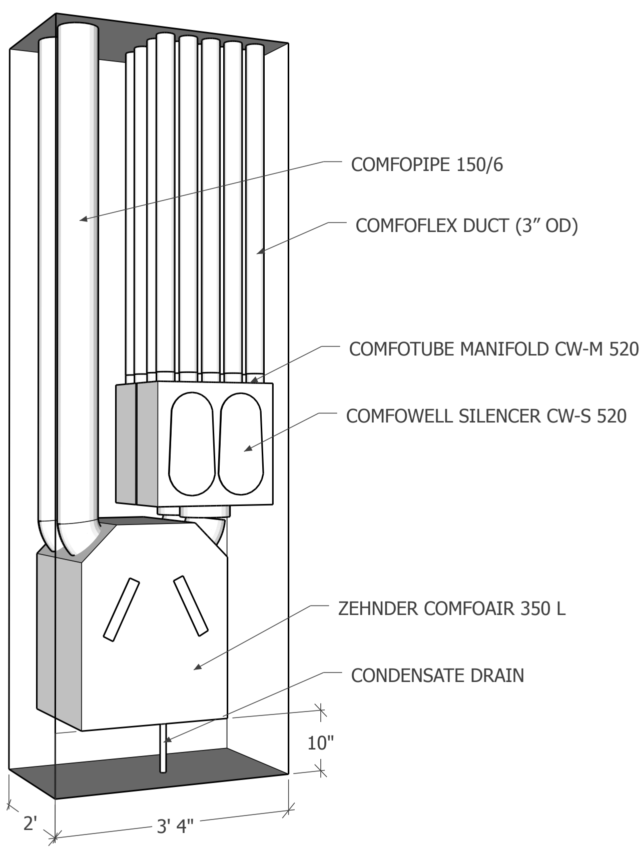


10. Lüftungsgerät

ERVs were chosen for this project because of the dehumdification requirements during summers in New York. The ERVs will also help maintain comfortable humidity levels in winter. One ComfoAir 350 was selected for each dwelling according to the owners' wish to keep services separate.

Fabrikat Lüftungsanlage	**Zehhnder**
effektiver Wärmebereitstellungsgrad	77 % (64% humidity recovery)
Elektroeffizienz	0,31 Wh/m³

11. Lüftungsplanung Kanalnetz



Supply air is distributed to bedrooms and living areas.

Extract air is take from bathrooms, laundry rooms and kitchens.

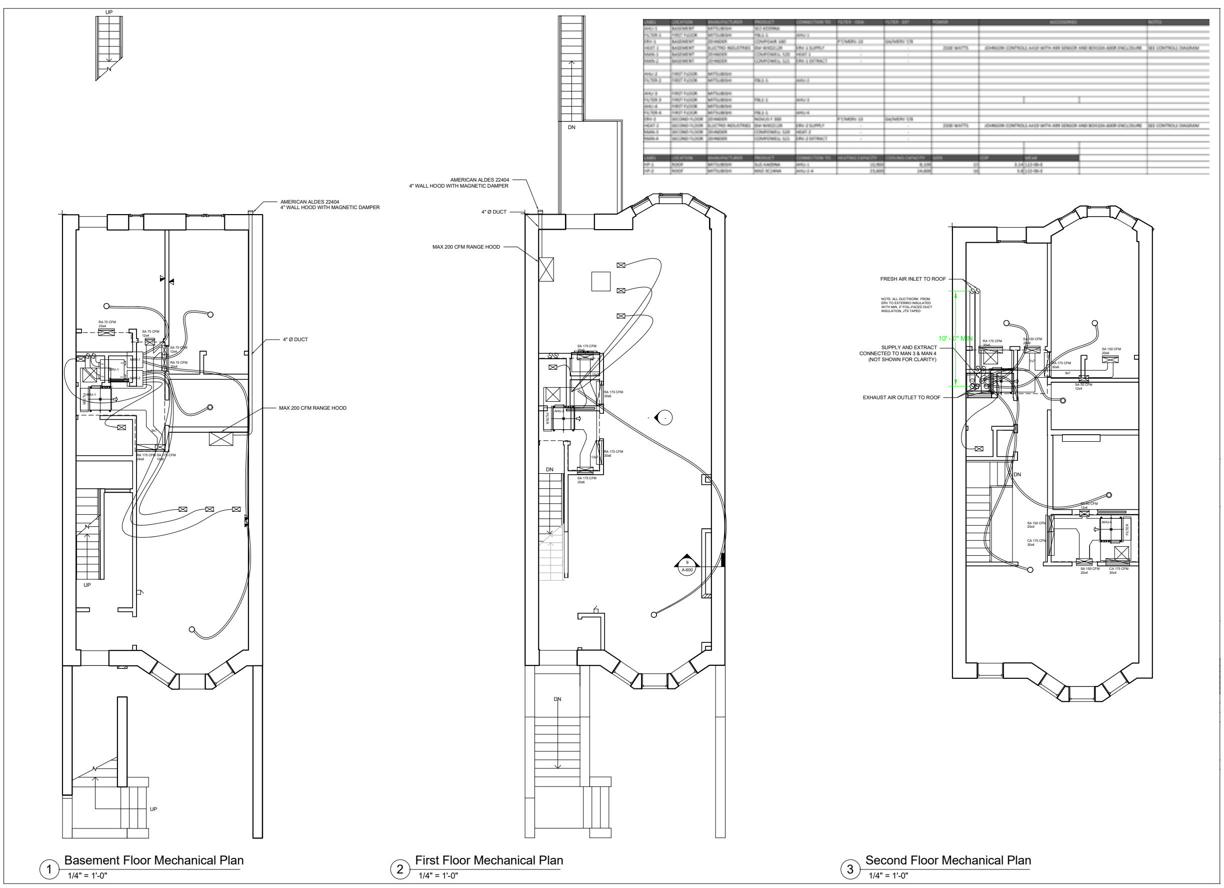
Transfer air is facilitated by undercuts on doors.

The system employs a manifold (combined with a silencer) and small diameter flexible ductwork .

12. Wärmeversorgung

Heat pumps are used for heating, cooling, and domestic hot water production.

Because of the need for mechanical cooling and dehumidifcation in summer in New York, ducted heat pumps were selected to supply cooling and dehumidifcation in summer as well as heating in winter. The ducted indoor units require relatively little space and provide zoned controls for the owners.



15. PHPP-Ergebnisse

EnerPHit Verification

Building:	Zovak-He Residence
Street:	564 9th Street
Postcode/City:	11215 Brooklyn
Province/Country:	New York, US-United States of America
Building type:	2-Family Residence
Climate data set:	US0055b-New York
Climate zone:	4: Warm-temperate; Altitude of location: 46 m
Home owner / Client:	Jiani Jane He and Skye Zovak
Street:	564 9th Street
Postcode/City:	11215 Brooklyn
Province/Country:	New York, US-United States of America

Architecture:	JPDA	**Mechanical engineer:**	
Street:	68 Jay Street, Suite 501	Street:	
Postcode/City:	11201 Brooklyn	Postcode/City:	
Province/Country:	New York, US-United States of America	Province/Country:	
Energy consultancy:	BLDGTYP	**Certification:**	Passive House Academy
Street:	231 Park Place #22	Street:	
Postcode/City:	11238 Brooklyn	Postcode/City:	
Province/Country:	New York, US-United States of America	Province/Country:	

Year of construction:	2017	Interior temperature winter [°C]:	20.0	Interior temp. summer [°C]:	25.0
No. of dwelling units:	2	Internal heat gains (IHG) heating case [W/m²]:	2.6	IHG cooling case [W/m²]:	2.6
No. of occupants:	4.9	Specific capacity [Wh/K per m² TFA]:	132	Mechanical cooling:	x

Specific building characteristics with reference to the treated floor area

			Value		Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	206.0				
Space heating	Heating demand	kWh/(m²a)	17.07	≤	20	-	yes
	Heating load	W/m²	17.66	≤	-	-	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	12.14	≤	18	18	yes
	Cooling load	W/m²	14.62	≤	-	10	
	Frequency of overheating (> 25 °C)	%	-	≤	-		-
	Frequency of excessively high humidity (> 12 g/kg)	%	4	≤	10		yes
Airtightness	Pressurization test result n_{50}	1/h	1.0	≤	1.0		yes
Moisture protection							
	Smallest temperature factor $f_{Rsi=0.25\ m^2K/W}$	-	-	≥	0.65		-
Thermal Comfort	All requirements fulfilled?	-			yes		yes
	U-value	W/(m²K)		≤	0.95		
	U-value	W/(m²K)		≤	1.13		
	U-value	W/(m²K)		≤	1.24		
	U-value	W/(m²K)		≤	0.52		
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	112	≤	-		-
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	52	≤	63	-	yes
	Generation of renewable energy (in relation to pro-jected building footprint area)	kWh/(m²a)	-	≥	-	-	

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

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

EnerPHit Classic? yes

Task:	First name:	Surname:	Signature:
1-Designer	John	Mitchell	
	Issued on:	City: Brooklyn	

The PHPP was used throughout the design process to test strategies and refine the design.