

## Apartment Building with shops in Zurich

### PROJECT SUMMARY

Renovation of an apartment building  
built in 1898  
Historic preservation  
Factor 4 energy reduction

### SPECIAL FEATURES

Prefabricated roof modules

### ARCHITECT

Architecture Office Viridén  
[www.viriden-partner.ch](http://www.viriden-partner.ch)

### OWNER

Peter Frey



IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation



Before



After

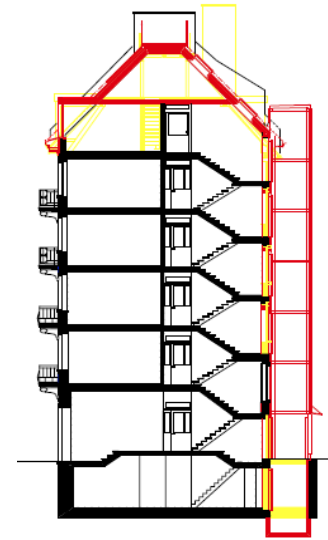
## BACKGROUND

This apartment building, constructed in 1898, was in poor condition when the owner inherited it. He wanted to renovate the units to a high living standard, drastically reduce energy consumption and preserve the historic urban character of the structure.

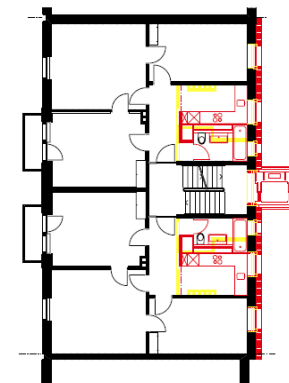
## SUMMARY OF THE RENOVATION

- Roof replaced with eight prefabricated modules (240 mm insulation) installed by crane in a single day.
- Two new penthouse maisonettes created.
- Insulation of the rear façade (240 mm) and basement ceiling (200 mm).
- New windows.  
(U-value:  $1.2 \text{ W/m}^2 \text{ K}$ , g-value: 0.56)
- Elevator tower added to rear
- Ceiling with stucco ornamentation preserved, wall paneling and doors restored.
- New bathroom and kitchen layouts
- New central mech. ventilation system (Heat recovery of 85 - 90%).
- Wooden pellet furnace (32 kW) as replacement of the gas heating (45 kW) with backup oil tank.
- Solar system with  $28 \text{ m}^2$  solar flat plate collectors combi-tank (4000l).

Section



Floor plan





The street façade could not be changed

## CONSTRUCTION

### Roof construction *U-value: 0.15 W/(m²·K)*

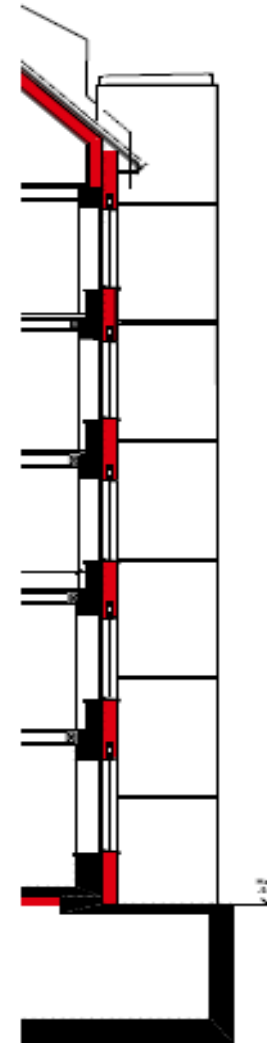
(from top to bottom)	
Roof tiles	66 mm
Wooden strapping	
	24 mm
Air gap, wooden cross strapping	50 mm
Weatherproofing paper	
OSB-panels	20 mm
Cellulose insulation	240 mm
Fermacel panels	12 mm
<b>Total</b>	<b>412 mm</b>

### Rear façade *U-value: 0.13 W/(m²·K)*

(interior to exterior)	
Interior plaster (existing)	10 mm
Brick (existing)	390 – 450 mm
Exterior stucco (existing)	20 mm
Mineral wool insulation	240 mm
Mineral plaster	10 mm
<b>Total</b>	<b>670 – 730 mm</b>

### Basement ceiling *U-value: 0.16 W/(m²·K)*

(top down)	
Ceramic panels (existing)	10 mm
Cement mortar (existing)	10 mm
Reinforced concrete (existing)	200 mm
Mineral wool insulation	200 mm
<u>Net support</u>	<u>10 mm</u>
<b>Total</b>	<b>430 mm</b>



Rear façade with ext. insulation and new elevator tower



### Summary of U-values $W/(m^2 \cdot K)$

	Before	After
Attic floor	ca. 1.7	0.15
Rear façade	1.06	0.13
Basement ceiling	2.64	0.16
Windows*	ca. 2.6	1.20

\* including frame

### BUILDING SERVICES

The existing gas heating (45 kW) with oil backup and tank was replaced by a wooden pellet furnace (32 kW).

A new centralised ventilation system with heat recovery (efficiency 85 – 90%) and a cross-flow heat exchanger were installed. The ventilation system has a fan with 410 W connected power.

### RENEWABLE ENERGY USE

28 m<sup>2</sup> solar flat plate collectors on the roof (combi-system) deliver hot water to a 4000 litre central boiler tank. The solar coverage is 100% in summer.

### ENERGY PERFORMANCE

Space + water heating (primary energy)\*

Before: ca. 160.0 kWh/m<sup>2</sup>

After: 39.5 kWh/m<sup>2</sup>

Reduction: 75%

\*Swiss Standard: SIA 380/1: 2001

### INFORMATION SOURCES

Enz, D.: *Bauerneuerung für die Zukunft*, Flumroc AG, Postfach, CH-8890 Flums, 36 pages (German, French, Italian) [www.flumroc.ch](http://www.flumroc.ch) March 2007

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