

CAYLA apartment Towers in Geneva

PROJECT SUMMARY

Renovation of three small apartment towers built in 1954
Historic preservation
Renovation 2003

SPECIAL FEATURES

Comparison of external and internal insulation for energy and conservation

ARCHITECT

Construction: G. Addor and W. Lups
Renovation: J. Cacheiro, architect

OWNER

Private owners



IEA – SHC Task 37

Advanced Housing Renovation with Solar & Conservation

Before



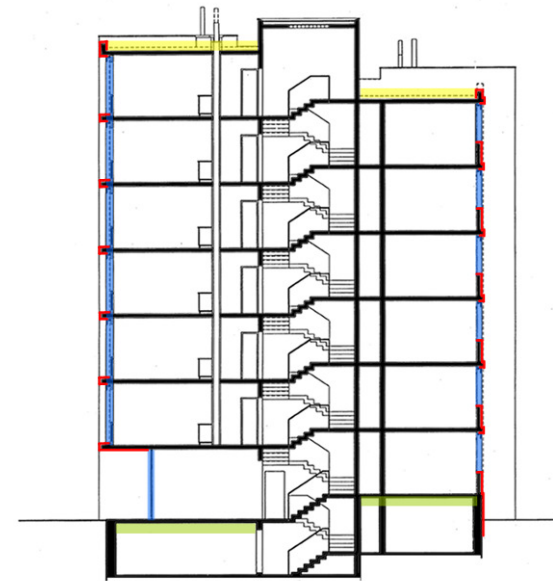
After

BACKGROUND

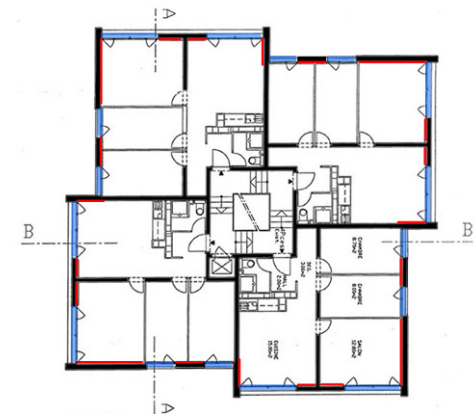
In bad condition, these buildings needed an important renovation that included, of course, the improvement of the whole thermal envelope. Additional insulation is easy to achieve for roof and basement. But external insulation of the walls, as suggested by the architect, raised the risk of changing the image of this 1950 modern architecture. Commission des Monuments et des Sites obtained that at least one of the tower was renovated with internal insulation.

SUMMARY OF THE RENOVATION

- New bathroom and kitchen layout
- Roof: new thermal insulation 20 cm
- Basement: additional thermal insulation 10 cm under the ground floor slab
- Windows: new thermal-break metal frame with double-glazing
- External thermal insulation 4-8cm with coating or internal insulation 6 cm
- Central heating with gas



Section B-B



Floor 1 to 6



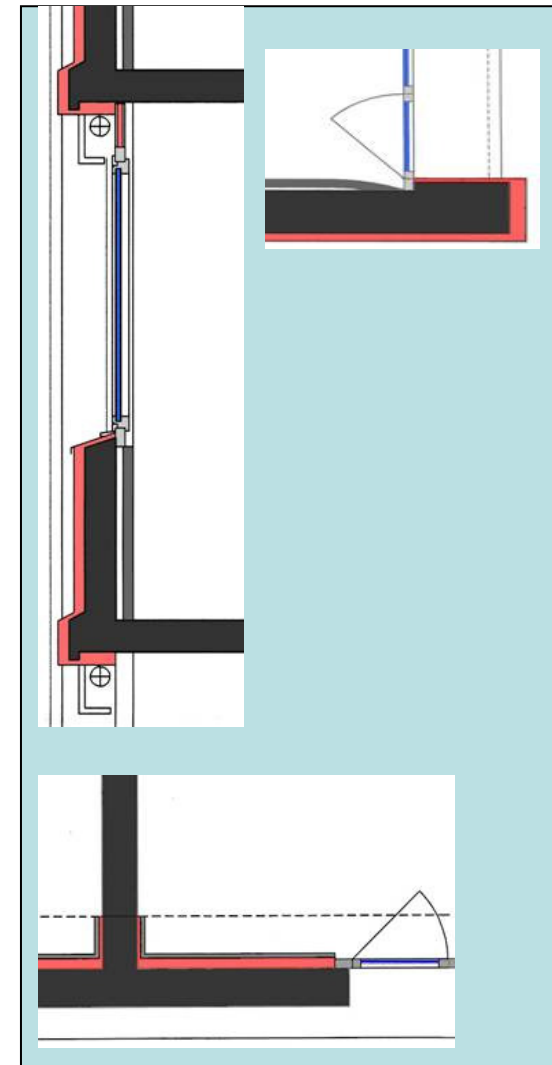
External insulation, test

CONSTRUCTION

Roof construction	<i>U-value: 0.20 W/(m²·K)</i>
Gravel	40 mm
Water proofing	3 mm
Insulation	200 mm
Reinforced concrete (existing)	200 mm
Plaste	10 mm
Total	453 mm

Wall, external insulation	<i>U-value: 0.42 to 0.66 W/(m²·K)</i>
(interior to exterior)	
Plaster	10 mm
Brick	40 mm
Vacum	40 mm
Cement brick	150 mm
Insulation	40 to 80 mm
Stucco	15 mm
Total	279 mm

Wall, internal insulation	<i>U-value: 0.65 W/(m²·K)</i>
(interior to exterior)	
Plaster board	26 mm
Insulation	60 mm
Cement brick	150 mm
Stucco	15 mm
Total	241 mm



Insulation of walls, details.



Internal



External

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

	Before	After
Roof	1.1	0.2
Walls <i>internal insulation</i> <i>external insulation</i>	1.75	0.65 0.45 / 0.63
Basement	1.75	0,4
Windows*	4.6	1.6

* including frame

APPEARANCE OF THE BUILDINGS

The opportunity to compare energy savings and architectural impact on scale 1/1 with two identical buildings improved with internal and external insulation is quite exceptional.

With only 4 to 8 cm external insulation, the result is surprising: no major image difference between the inside and outside insulated walls. Of course, the « historical value imperatives » limits the thickness of the external thermal wall insulation. However, some differences appear because of the necessity to protect this external insulation against rain by the addition of small aluminium elements under the windows.

ENERGY PERFORMANCE

Even for protected buildings, a careful “renovation” is able to reduce drastically the energy consumption without altering the architectural quality of the building.

Space + water heating (primary energy)*

Before: ca. 220 kWh/m²

After** : int. 114 / ext. 102 kWh/m²

Reduction: 50%

*Swiss Standard: SIA 380/1: 2007:

**Without added commercial surfaces

INFORMATION SOURCES

Bureau d'architecte J. Cacheiro, architect in charge of the renovation

L'architecture à Genève, 1919 – 1975, p 242-243

Brochure co-authors

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