

Refurbishment of the Riva Bella School

1. INTRODUCTION

PROJECT SUMMARY

- Existing semi-prefabricated building, built in 1970
- Renovated in 2010/2012
- Program that combines two functions, similar but distinct in one place
- Surface area : 4 500m²

SPECIAL FEATURES

- Major refurbishment with conservation of the metallic structure
- Specific goal: renew – make new by transforming
- Low energy renovation
- Extremely low budget

ARCHITECT

aa-ar, sprl Alain Richard

CONSULTANTS

Stability: Ney & Partners sa

HVAC: Seca Benelux sprl

OWNER

SPABS - Communauté Française



IEA SHC Task 47

Renovation of Non-Residential Buildings towards Sustainable Standards

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2. CONTEXT AND BACKGROUND

BACKGROUND

The Royal Atheneum Riva Bella (Braine-l'Alleud) forms a campus of various buildings. The building "BSP" is a semi-prefabricated building, east-west oriented and disused for reasons relating to fire safety and presence of asbestos.

The competition organized by the French speaking Community aimed to save, renovate and reassign the building for two types of education: compulsory education during the day and social advancement courses in the evening.

OBJECTIVES OF THE RENOVATION

Specific goal: make new by transforming

- Prefabrication and reuse
- Restore links with the city and the built environment
- Energy performance and thermal comfort
- Users participation and integrated design approach as a teaching tool

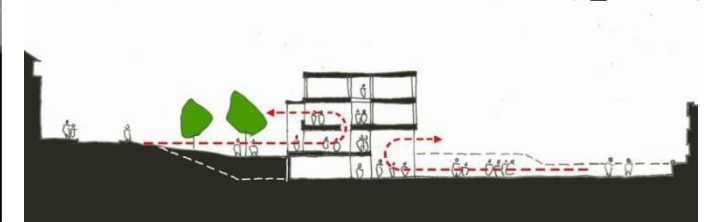
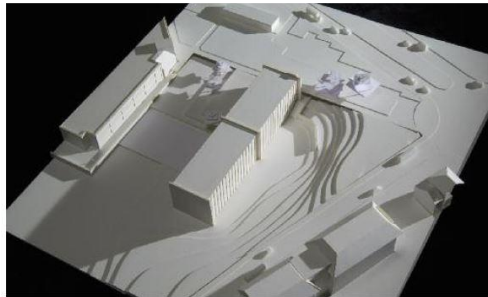
SUMMARY OF THE RENOVATION

Reduction of energy requirement

- Heating demand: 35 kWh/m².year

Costs (excluding fee)

3 800 000€ or 845€/m² (incl. subsidies)



3. DECISION MAKING PROCESSES

The building "BSP", built in 1970, has been disused since 1995 for reasons relating to fire safety and presence of asbestos.

The students of Riva Bella school were relocated into trailers waiting for the new construction.

In 2008, the Ministry of the French Community and the Société publique d'administration des bâtiments scolaires (SPABS) decided to renovate the building while maintaining the existing structure. A competition was organized and awarded to aa-ar office (Alain Richard).

The contractor and subcontractors were chosen through an open tendering process (public contract).



Timeline for the decision making process



** Building site was stopped during 6 months due to non payment of works*

4. BUILDING ENVELOPE

Roof construction - U-value: 0,19 W/m²K

Materials (int. to ext.):

- Fireproof plasterboard	15 mm
- Plenum + steel structure	variable
- Existing steel panel	3 mm
- Existing PUR insulation	50 mm
- Vapour barrier	2 mm
- High density Mineral wool	200 mm
- Roofing membrane	5 mm
Total:	min 275 mm

Wall construction - U-value: 0,17 W/m²K

Materials (int. to ext.):

- Fireproof Plasterboard	15 mm
- DURELIS panel	15 mm
- Mineral wool between wood frame	240 mm
- AGEPAN panel	16 mm
- Air layer	40 mm
- Polycarbonate	2 mm
Total:	328mm

Slab construction - U-value: 0,51 W/m²K

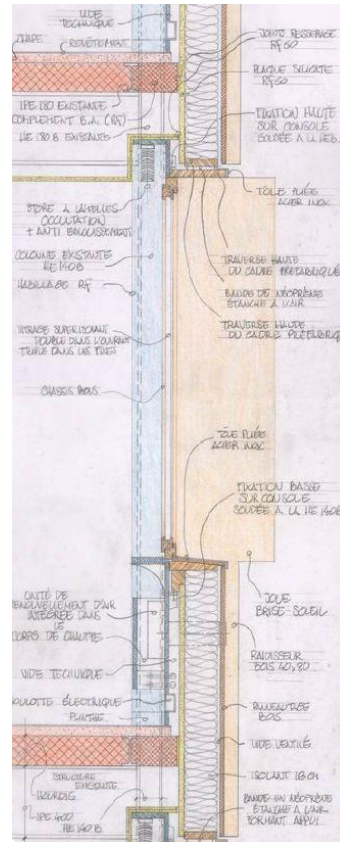
Materials (int. to ext.):

- Flooring	2 mm
- Existing tiles	8 mm
- Cement screed	40 mm
- Existing slab	120 mm
- PUR foam (sprayed)	60 mm
Total:	230mm

Thermal bridge avoidance:

Thermal bridges have been avoided by:

- a clear dissociation between the façade and the rest of the structure
- a continuing inside insulation



Summary of U-values [W/m²K]

	Before	After
Roof/attic	0,5 W/m²K	0,19 W/m²K
Floor/slab	2,5 W/m²K	0,51 W/m²K
Walls	0,8 W/m²K	0,17 W/m²K
Frame	6 W/m²K	1,6 W/m²K
Glazing	5,7 W/m²K	1,1 W/m²K

5. BUILDING SERVICES SYSTEM

OVERALL DESIGN STRATEGY

- Low energy retrofitting with structural mesh conservation and reuse of different existing components and materials;
- Redefining interior and exterior spaces by combining two types of education and recreating links with the city

LIGHTING SYSTEM

- Percentage of glazed façade was increased
- Solar shading on the east and west façade
- Light sensors and sensors for illumination level in classrooms

HEATING SYSTEM

- Before: fuel heating
- After: 2 condensing boilers with gas

COOLING SYSTEM

- No mechanical cooling
- Free and night cooling

VENTILATION

- Hygienic ventilation: dual flow ventilation system with heat recovery (h 85%)
- Intensive ventilation: free-cooling

RENEWABLE ENERGY SYSTEMS

- Solar thermal planned for hairdressing and cooking classes was postponed for financial reasons.



6. ENERGY PERFORMANCES

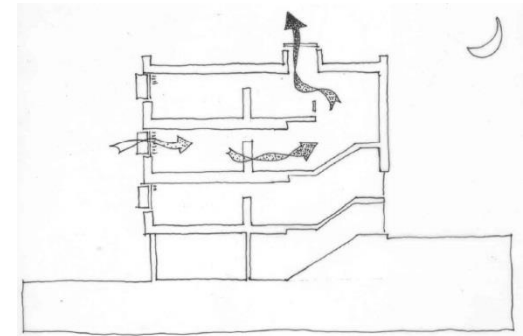
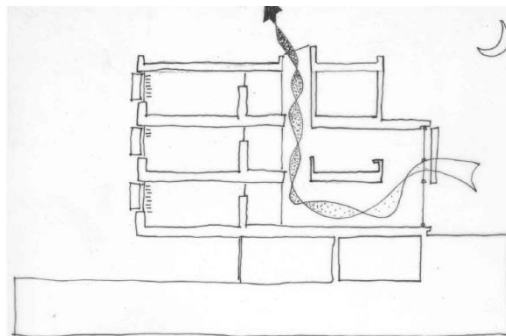
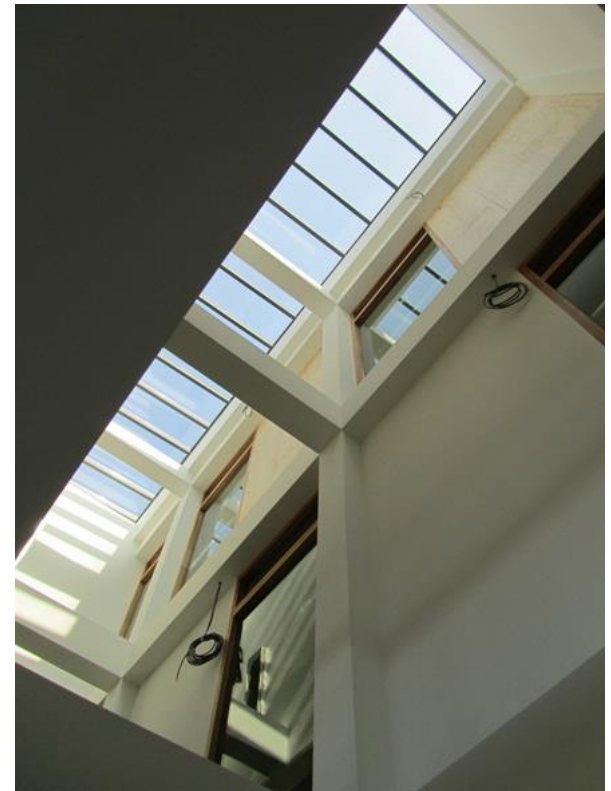
The building was unoccupied for 15 years. It is therefore difficult to obtain accurate data about its energy performance before renovation. However, we can estimate it to be 180 kWh/m²/year.

Renovation of the building was carried out before the implementation of the European Directive on Energy Performance of Buildings. This is why no EPB or PHPP calculation was made.

However, depending on the U values of the walls, the heat requirement of the building can be approximated at 35kWh / m² / year.

The energy savings are due to:

- *Installation of two condensing boilers;*
- *Heating control: external probe, night break and thermostatic valves;*
- *Installation of mechanical ventilation system (dual flow) with high efficiency*
- *Free-cooling by night;*
- *Demand controlled artificial lighting which means maximum use of daylight and minimum use of artificial lighting; and*
- *Artificial lighting provided by low energy equipment.*



7. ENVIRONMENTAL ASPECTS

WATER MANAGEMENT

- Efficient appliances
- Rainwater tank of 20 000 liters
- Use of external draining coatings and flow to infiltration trench

WASTE MANAGEMENT and MATERIALS

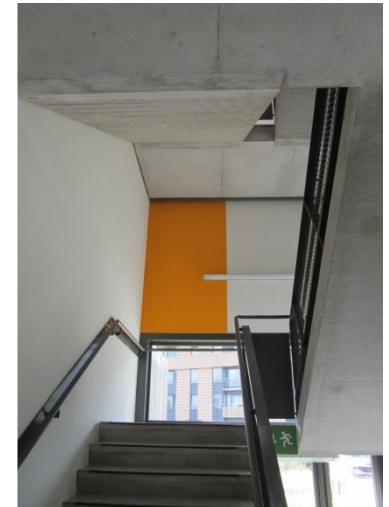
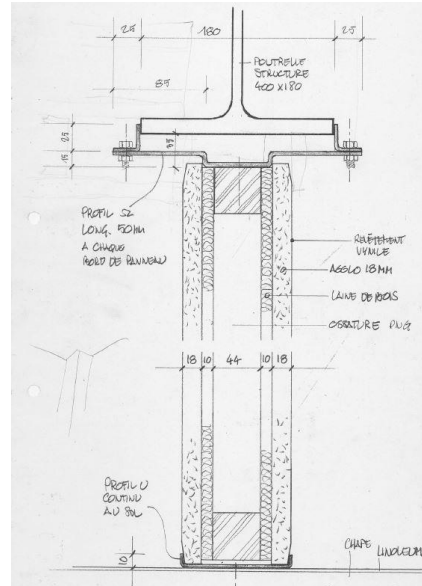
- Reuse of many existing components and materials: metallic structure, concrete floor, partition walls, flooring materials, steel panels, etc.
- Demolition waste management during the retrofitting works: recycle building waste as much as possible
- Prefabricated insulated wood elements for façade, PEFC and FSC wood for facade and frames

INCREASING QUALITY OF LIFE

- New and comfortable classrooms and teaching spaces
- Improvement of the thermal comfort (summer and winter)
- Implementation of green spaces and green roofs

LIGHTING QUALITY

- Improvement of daylighting in classrooms: extension of glazed areas, sunshadings, etc.



8. MORE INFORMATION

RENOVATION COSTS

- Expected pay back time for all the environmental measures: **approximately 15 years**
- Extra investment for energy savings (insulation, ventilation system, new boiler, acoustic panels, sunshadings, water management, green roofs, etc) : **400 000€**

FINANCING MODEL

The renovation project was funded by the SPABS – French Speaking Community

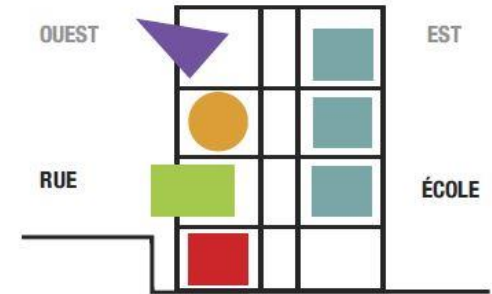
OTHER INTERESTING ASPECTS

Enhance and live in the existing structural mesh (metallic)

The program has two types of rooms: classrooms and other teaching facilities. These need to be in relation to the outside world, directly or through the media.

All classes are east oriented. They receive generous natural light and are open to the campus and the other buildings in the complex with which they interact. Other spaces and rooms are facing west, towards the city.

Each function is housed in a specific space, according to its morphology, its size, its dimensions, openings, connections, its views and its relationship to the outdoor space and to the public space.



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