

**PRESERVING THE LEGACY OF THE MODERN MOVEMENT**

*Miremont-le-Crêt (1953-1957) in Geneva*

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EXTENDED ABSTRACT

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This document is the extended abstract of the dissertation elaborated as part of the Integrated Masters in Architecture at the Instituto Superior Técnico – Universidade de Lisboa – submitted for the award of the referred degree. It is however essential to note that it was developed during the Spring semester of the academic year 2013/2014 at the École Polytechnique Fédérale de Lausanne, in Switzerland, under the Erasmus mobility programme.

## ABSTRACT

Recent decades testified an increasing interest in Modern Movement architecture along with a rising concern regarding its preservation. The rehabilitation of the built legacy of this period is therefore essential to guarantee the continuity and sustainability of the Modern buildings, being mainly focused on the heritage, economic and energy constraints. Its challenge is to conserve the Modern architects' original conceptions, while adapting them to the new standards of the contemporary society.

The objective of this dissertation is the analysis of the mentioned constraints in the light of a specific example – the apartment building *Miremont-le-Crêt* (1953-1957) in Geneva – currently under a rehabilitation intervention. Fruit of the inventiveness of the local architect Marc Joseph Saugey (1908-1971), it is considered today an original and unique example, far beyond the context of Geneva. Listed as a Cantonal monument since 2002, its rehabilitation is being carried out by the local architecture office Meier-associés architects. Mainly focused on the building's envelope, it also includes several technical improvements of its components, all of them introduced with respect to Saugey's spirit and the building's existing substance.

A brief foreword on Modern building's conservation together with the description of successful case studies of rehabilitation interventions in Geneva is present as introduction to the study done, attempting to draw attention to the importance of preserving the architectural legacy of this epoch, and to the major challenges that it comprises.

This work results, therefore, in the documentation of *Miremont-le-Crêt's* rehabilitation intervention. However, for the broaden understanding of the solutions adopted, Saugey's original project and intentions are extensively described, as well as contextualised both in the work of the architect and the local architectural and urban-planning *panorama* of the post-War.

**Keywords:** Modern Movement, Geneva, Marc Joseph Saugey, *Miremont-le-Crêt*, Meier+associés architects.

## INTRODUCTION

The main objective of this dissertation is the discussion of the issues involved in the preservation of the architecture of the Modern Movement, mainly related to heritage, economic and energy constraints, gathered together under a global strategy of intervention for the sustainability of the built heritage of this period.

Through the study and documentation of the ongoing rehabilitation intervention on one of Geneva's most notorious Modern Movement buildings, *Miremont-le-Crêt* (1953-1957), this work attempts to draw attention to the importance of preserving the architectural legacy of this epoch, as well as the major challenges that it presents.

Planned and built by the local architect Marc Joseph Saugey (1908-1971), between 1953 and 1957, the apartment building *Miremont-le-Crêt* is considered by experts a remarkable building in the history of housing, even beyond the context of Geneva, since there is no other building in the world with the same typology. Taking into account its originality and the quality of its architecture and construction, it was listed as Cantonal monument in 2002.

Recently, it has become the object of a large rehabilitation programme, led by the Geneva-based architecture office Meier+associés architectes. This project, focused mainly on the envelope of the building, aims to respect Saugey's spirit and to maintain the building's existing substance, however taking into account the present standards of comfort, energy and security.

## METHODOLOGY AND STRUCTURE

In order to achieve the proposed objectives, the research process was divided into two parts, the theoretical research and the fieldwork.

The first was based on a literature review and included four different research areas: preservation of the architecture of the Modern Movement; architecture and urban planning in post-War Geneva; life and works of the architect Marc-Joseph Saugey; project and construction of the apartment building *Miremont-le-Crêt*.

The second included several visits to Geneva, where document, technical and photographic information was collected. Visits were made to the following places: the Saugey Archives; the *Office du Patrimoine et des Sites*; the architecture office Meier+associés architectes; the architecture office Oleg Calame architecte (partner office in *Miremont-le-Crêt*'s rehabilitation intervention); the case-study building *Miremont-le-Crêt*.

Following the methodology adopted and to allow a complete understanding of the rehabilitation project developed by the architecture office Meier+associés architectes, the dissertation work is organized in three chapters, in addition to the introduction and conclusion.

The first chapter – *Preserving the legacy of the Modern Movement* – is focused on providing a general context to the theme of the rehabilitation of the architecture of the Modern Movement, being dedicated to understanding the issues involved in the preservation of buildings and sets of these

period. It also enumerates some recent important rehabilitation projects in Geneva.

The second chapter – *The post-War context in Geneva and the architect Marc-Joseph Saugey* – describes the historical context of Geneva in the post-War years, concerning its architecture and urban planning, including as well the study of the life and works of Marc Joseph Saugey, one of its main characters.

The third – *Miremont-le-Crêt: case study* – is oriented towards the detailed analysis of the case-study building. It includes the description of its original project and construction, its process of heritage classification and its implications, as well as the explanation of the ongoing rehabilitation project and the consequent solutions adopted.

Apart from the written documentation, they were also produced a couple of comprehensive axonometric sectioned views of *Miremont-le-Crêt's* façade.

## THE POST-WAR CONTEXT IN GENEVA AND THE ARCHITECT MARC-JOSEPH SAUGEY

During its recent history, Geneva has known several phases of economic and demographic growth, however the apogee of this development occurred after the WWII, when the city extended itself to the territory of its peripheral communes and gradually acquired the form of a metropolitan area.<sup>1</sup>

Nevertheless, understanding the architectural and urban context of this city in the post-War years requires the knowledge of the major events that punctuated its history until then - the transformations after joining the Confederation in 1814, the demolition of its fortifications since the middle of the 19<sup>th</sup> century, the choice of Geneva for the headquarters of the Society of Nations in 1919, the arriving of the new international organisations and the installation of the European headquarters of the UN in 1946<sup>2</sup>.

In fact, since the end of the WWI, the history of Geneva would be forever linked to international events. Then, after the WWII, the city knew a significant development, being one of the first European cities to benefit from an economic recovery. The explosive demographic growth demanded its “urban restructuring (...) and the creation of new dwellings, services and facilities”<sup>3</sup>, which changed the city forever. The architect Marc-Joseph Saugey was one of the notorious personalities who participated in these transformations.

The Swiss architect Marc-Joseph Saugey was born in 1908 in *Vésenaz*, a village of the Canton of Geneva, located in the shore of Lake *Léman*, dying in 1971, in Geneva.<sup>4</sup>

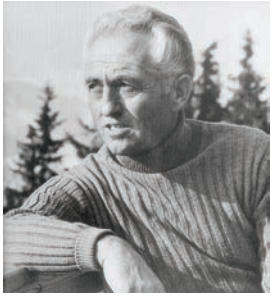
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1 Cf. Laurent Moutinot - “Préface” in Isabelle Charollais et al. – *L’architecture à Genève, 1919-1975*. Lausanne: Editions Payot, 1999, vol.1, p.9.

2 Cf. Catherine Courtiau - “Le contexte historique de la Genève internationale de l’après guerre” in Catherine Courtiau et al. - *Marc J. Saugey, spacialité, urbanisme et nouveaux programmes de l’après-guerre: la ville des années 50 et 60*. Genève: IAUG, 2007, p.18.

3 “(...), la nécessité d’une restructuration urbaine, (...), de la création de nouveaux logements, services et équipements.” in Idem, p.60.

4 Cf. Armand Brulhart - “Marc Saugey (1908-1971) ou la tentation d’Icare” in Giairo Daghini (dir.) – *Faces*, n<sup>o</sup>. 21, Genève: EAUG, 1991, p.8.



01. Saugey in Gstaad (approximately 1960).

Source: Alberto Sartoris - op. cit., p.7.

In 1923, he joined the section of construction and civil engineering of the *École des Arts et Métiers* of Geneva, also known as *Technicum*, obtaining his diploma in 1926. In the following two years, he attended the architecture section of the *École de Beaux-Arts* of Geneva<sup>5</sup>, then starting a four-year period of practicing abroad.

In 1933, Saugey started to work in Geneva in collaboration with Louis Vincent, René Schwertz and Henri Lesemann, who together formed the architecture office VSSL, also known by *Atelier d'architectes*. Their collaboration lasted for eight years, between 1933 and 1940, and was very important to Saugey's professional formation.

Saugey opened his own architecture office in 1940, building his most important projects between 1950 and 1958 – the *Hôtel du Rhône* (1947-1950), the *Malagnou-Parc* (1948-1952), the *Mont-Blanc Centre* (1951-1954), the cinema *Le Paris* (1955-1957), the *Terreaux-Cornavin* (1951-1955), the *Miremont-le-Crêt* (1953-1957) and the *Gare-Centre* (1954-1957).<sup>6</sup>

He also taught at the School of Architecture of Geneva, between 1961 and 1970, having as well an important an active role in the city's urban-planning almost since the beginning of his career.

"Included within the actors-creators and (re)constructors of the post-War"<sup>7</sup>, Saugey knew how to leave his mark in Geneva, with his avant-garde buildings of the 1950s, as well as to "distinguish himself, by his structural researches and new techniques"<sup>8</sup>, and by his active engagement in the urban-planning of the city.

## MIREMONT-LE-CRÊT: THE ORIGINAL PROJECT (1953-1957)



02. *Miremont-le-Crêt*. Photo Alain Grandchamp.

Source: Christoph Schmidt-Ginskey – op. cit., p.53.

The apartment building *Miremont-le-Crêt*, located in the Geneva district of *Champel*, was conceived in the architecture office of Marc Joseph Saugey in close collaboration with the engineer Pierre Froidevaux and the artists Edouard Nierlé (1916-2006) and Louis Bongard, being built between 1956 and 1957.

*Miremont* is the result of several constrains that Saugey elegantly knew how to master, "lead[ing him on the] search for an entirely new solution for, (...), [a housing] block"<sup>9</sup>. The result was a building with a length of 126 meters, composed of 139 one-floor apartments, distributed along 5 unities (entrances A, B,C, D and E), with 7 floors on the side *Miremont* and 6 floors (plus an attic) on the side *Calas*.

In *Miremont*, the existent accesses are pedestrian and located on both sides of the volume, on the nearby roads: *avenue de Miremont* and *avenue de Calas*. They were designed to include the surroundings of the building and, therefore, on both sides of the building, breezeways superimposed

5 Cf. Alberto Sartoris – *Joseph-Marc Saugey 1908-1971 ou l'architecte retrouvée. Hommage à Saugey*, Cossonay: Editions des valeurs nouvelles, 1991, p.99.

6 Cf. Patrick Devanthéry - "La contingence et l'apesanteur" in Giairo Daghini (dir.) – op. cit., p.4.

7 "Inclu dans les acteurs-créateurs et (re)constructeurs de l'après-guerre." in Catherine Courtiau (2007) - op. cit., p.18.

8 "(...), s'a distingué par ses recherches structurelles et de techniques nouvelles, (...)" in Idem.

9 "(...), amènent, (...), à rechercher une solution entièrement nouvelle pour, (...), barre, (...)" in Christoph Schmidt-Ginskey - "Miremont-le-Crêt, 1953-1957.«L'espace habitable»" in Giairo Daghini (dir.) – op. cit., p.52.

on the sidewalks drive the inhabitants to the ramps, leading them to the respective entrance hall. The two halls are open towards the garden that was conceived as an interior street, serving as a passage between both adjacent roads.

The transparency achieved in the halls, by completely glazed façades, allows the permanent contact between the building and its “exterior elements, natural or built”<sup>10</sup>. This relation is emphasized with the implementation of elements of connection, as the circles and stripes of vegetation, the existence of a water basin, as well as the wall paintings from Louis Bongard and Edouard Nierlé.

Saugey proposed a floor-plan of four non-traverse apartments per vertical stairwell, each of them with a private balcony. Although with variations in the apartments of the gable-end façades, the type-plan includes two studios, a 2 bedroom apartment and a 3 bedroom apartment.

The plan organised according to a frame of 60° allows each apartment to benefit from a double exposure – “looking East and West towards the depth of the garden”<sup>11</sup>. This multiplicity of points of view towards the exterior, grant these “collective housing cellules, (...), the qualities of a *villa*”<sup>12</sup>.

However, the fundamental element for the creation of these «*villa*» is the triangular balcony, result of the adoption of a 60° grid, and “around which a plan of great spatial fluidity is articulated”<sup>13</sup>.

Together with the *brise-soleils*, the diagonal orientation of the plan leads to the suppression of the *vis-à-vis* between the apartments and the nearby buildings.

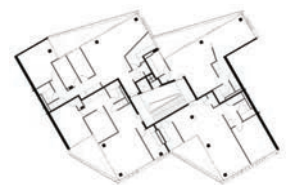
In *Miremont*, Saugey used a punctual load-bearing system, however he opted for the partially dry assembling of the second-fix elements<sup>14</sup>. The rationalisation of the construction elements, implying the use of repetitive and simple details, is however beautifully mastered in *Miremont*, with the employment of a set of different and heterogeneous materials that highlight the spatial qualities of the building – the prefabricated concrete panels covering the façade’s opaque parapets, the translucent wired glass parapets, the blue pinewood window frames, their bottom fibre cement panels, and the aluminium *brise-soleils* and panels overlaying the façades’s opaque sections.

*Miremont* is Saugey’s invention of an *immeuble-villa*, where “each apartment plays the role of an individual *villa*”<sup>15</sup>, and “the plastic effect of the ensemble, (...), breaks with the monotony of the parallel blocks of buildings”<sup>16</sup>.



03. View of the “interior street”. Photo Klemm.

Source: Archives IAUG, Fonds Saugey.



04. Plan of the type apartments.

Source: Oleg Calame Architect.



05. View of the balcony from the bedroom. Photo Klemm.

Source: Archives IAUG, Fonds Saugey.

10 “(...), éléments extérieurs, naturels et bâtis.” in Marc-J. Saugey – “L’espace habitable, Miremont-le-Crêt”. *Architecture, formes, fonctions*, n° 8. Lausanne: Édition Anthony Krafft, 1961-62, p.77.

11 “(...), regarde à l’est comme à l’ouest, la profondeur du jardin.” in CB – “Miremont-le-Crêt” in Catherine Courtiau (dir.) – *Xxe, Un siècle d’architectures à Genève. Promenades*. Gollion: Infolio, 2009, p.107

12 “(...), aux cellules du logement collectif (d’acquérir) les qualités (réputées être celles) de la villa.” in Catherine Dumont d’Ayot – “Miremont-le-Crêt: manifeste de l’espace habitable” in Pierre Baertschi (dir.) – *Patrimoine et architecture*, n° 9, Dossier: Miremont-le-Crêt (1956-1957), patrimoine architectural du Xxe siècle. Genève: Georg Editeur SA, May 2000, p.31.

13 “(...), la pièce central autour de laquelle s’articule un plan d’une grande fluidité spatiale.” in Catherine Dumont d’Ayot – op. cit., p.32.

14 Cf. Christoph Schmidt-Ginzkey – op. cit., p.56.

15 “(...), chaque appartement joue le rôle d’une maison individuelle.” in CB – op. cit., p.107.

16 “L’effet plastique de l’ensemble, (...), rompant ainsi avec la monotonie des bandes d’immeubles parallèles.” in Christoph Schmidt-Ginzkey – op. cit., p.54.



06. View of the façade and its different elements and materials. Photo Saugey. Source: Archives IAUG, Fonds Saugey.

## MIREMONT-LE-CRÊT: THE HERITAGE CLASSIFICATION (2002)

The heritage classification process of *Miremont-le-Crêt* began with an appeal from the Institut d'Architecture de l'Université de Genève (IAUG) in 1998. The causes of this urgent demand were certain concerns arose by some minor transformation works that were being executed at the time, which included the repair of the roof and the replacement of some lifts' landing doors.

Following the *Direction du patrimoine et des sites*'s decision to support the heritage listing demands, a long process was initiated. Along with it a detailed study on the condition of the building and the definition of the necessary works in the frame of a future rehabilitation intervention was commissioned to the Geneva architecture office Devanthéry & Lamunière.

Finally, on February 20<sup>th</sup> 2002, by a decree of the Council of State, the apartment building *Miremont-le-Crêt* was declared a Cantonal monument. The heritage classification statute issued by the State of Geneva contemplates, besides its exterior envelope, "the exterior spaces of the parcels, as well as the common areas on the ground floor of the buildings, (...), [plus covering] the stairwells, as common parts [of the buildings], and the original typology of the apartments"<sup>17</sup>.

## MIREMONT-LE-CRÊT: THE REHABILITATION INTERVENTION (2010-2014)

Following the heritage classification procedure, which ended with the listing of *Miremont-le-Crêt* as Cantonal monument, in 2002 - and from which also resulted the constitution of the specifications for a future renovation – it was only in 2010 that the decision was made to restore *Miremont*.

Consequently, the rehabilitation project of the apartment building *Miremont-le-Crêt* was developed by the architecture office Meier+associés architectes, between 2011 and the beginning of 2014. Its programme comprised primarily the renovation of its façades, including, however, the introduction of other technical ameliorations in the building<sup>18</sup> – the renewal of both piping and ventilation systems, the optimal insulation of the roof and the installation of solar panels for pre-heating of domestic water – as required by the present legislation of the Canton of Geneva.

*Miremont-le-Crêt*'s rehabilitation intervention is essentially linked to the enhancement of its inhabitants' comfort, therefore, requiring the building's exterior envelope to be submitted to a significant thermal improvement.

However, it is important to note that any transformation of this kind has to respect the maximum values of heat loss imposed by the regulations in force. According to the Geneva legislation on energy<sup>19</sup> – more precisely the standard SIA 380/1 – these values must be equal or inferior to 120 MJ/m<sup>2</sup>.year<sup>20</sup>, both in new constructions and renovations.

17 "(...), des espaces extérieurs des parcelles ainsi que des locaux communs du rez-de-chaussée desdits bâtiments, (...). Les cages d'escalier, en tant que parties communes, et la typologie original des appartements." in Arrêté du Conseil d'État, February 20 2002, p.4.

18 Cf. Meier+associées architectes's website. Available at: <http://www.maa.ch/> [19.09.2014].

19 The referred legislation includes the *Loi sur l'énergie* and the *Règlement d'application de la loi sur l'énergie*.

20 Value provided by the architect Ms. Laurence Boyé (Maa), in an interview on April 4 2014.



Since the building's actual consumption was quantified in 580 MJ/m<sup>2</sup>.year.<sup>21</sup>, the architects concluded that obtaining a heat loss complying with the SIA standard would require a pack of solutions capable of reducing *Miremont's* energy losses to less than half of the present values. Such a renovation intervention would contribute to denaturize the particular materiality and image of a heritage listed building.

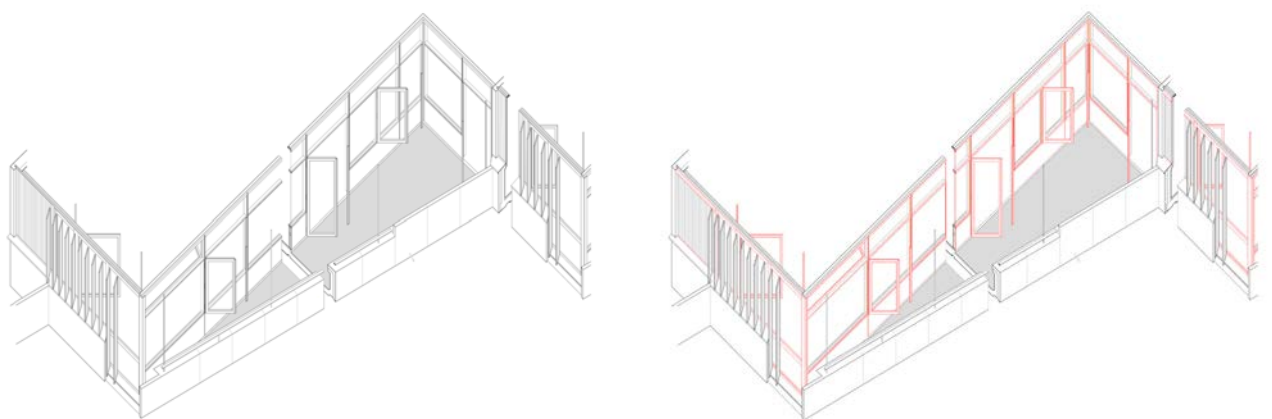
Thus, they requested the competent authorities' derogation from the SIA standard, arguing that such a special dispensation was the only way of allowing a respectful intervention on the existing building and its elements. An agreement fixed a special limit of heat losses for *Miremont-le-Crêt* in 200 MJ/m<sup>2</sup>.year.<sup>22</sup>

In order to achieve such values, the rehabilitation solutions proposed by the architects had to be primarily focused on the most critical elements of the building, in terms of thermal performance. Identified by the heat engineers, those included largely *Miremont's* façades, and more particularly its glazing surfaces.

This way, the architects aimed for "a minimal intervention, in compliance with Saugey's spirit, and to maintain the existing substance, whenever possible"<sup>23</sup>. Therefore, instead of attempting to renovate, in detail, the whole elements of *Miremont's* façades, they rather decided to operate only in the most delicate ones, in a very efficient way.

Therefore, the rehabilitation intervention foresees the replacement of all the building's single glazing by a Heat Mirror glazing (and the consequent reinforcement of the original window frames, to be maintained, in order to allow the sustainment of the new glazing), the substitution of the windows' opaque parapets insulation by a more performant solution – aerogel – and the replacement of their exterior fibre cement boards by new ones, also in fibre cement but free of asbestos, as well as the addition of an aerogel insulation layer to the aluminium façade sections.

However, in order to preserve the building's original substance, both the prefabricated concrete parapets and the wired glass ones, were not subject to any significant thermal improvement.



07. 08. Axonometric sectioned views of *Miremont-le-Crêt's* façade. Original Project and Rehabilitation intervention. Not to scale. Black: Existing building | Original project; Red: Construction | Rehabilitation intervention; Yellow: Demolition. Source: Produced by the author.

21 Idem.

22 Cf. Claire Maillat et al. – *Miremont-le-Crêt, un projet de sauvegard douce*. Report for the course *Construction et durabilité VII*, under the direction of Franz Graf, Giulia Marino and Pierre Zurbrügg. EPFL, 2012-2013, p.12.

23 "L'intervention se veut minimal, dans le respect de l'esprit de Saugey, et en maintenant la substance existante, lorsque cela est possible." in Meier+associées architectes's website.

Some renovation works are also planned to other parts of the building, although with no influence on the building's heat balance. Most of these works were requested by the co-owners.

Answering the client's request, the building's piping system is going to be totally refurbished. Thus, apart from the substitution of both water-supplying pipes and drain pipes, inside the apartments, the rehabilitation project foresees the creation of separated vertical drain pipes for the kitchen's wastewater and the roof's stormwater, as demanded by the present legislation of the Canton of Geneva. In addition, the ventilation system, which contained asbestos, is also going to be remodelled. Apart from these two major operations, these renovation works also foresee the treatment of the carbonation on the prefabricated concrete panels, as well as the restore of the aluminium *brise-soleils*, panels, and respective fixations.

In addition, some other rehabilitation works are going to be conducted on the ground floor, both inside and outside *Miremont's* entrance halls.

Apart from the renovation of the interior and exterior flooring, as well as the repainting of the walls in their original colours, a solution had to be found regarding the halls' thermal insulation, compatible with the requirements of the present energy standards.

Therefore, the existent single glazing façade of the hall is going to be preserved, whereas the original heating system – a false-ceiling, made of perforated steel sheets (600x600x2mm) that radiate the heat from hot water pipes located above<sup>24</sup> – is going to be dismantled. To allow the thermal insulation of the upper floors, an insulation layer is going to be placed on the hall's ceiling, hidden by the original steel panels, although no longer fulfilling their original function.<sup>25</sup>



09. 10. View of the façade of the building A in the end of the rehabilitation works (July 2014) Source: Meier+associés architectes.

*Miremont's* construction site was officially opened on January 6 2014<sup>26</sup> – for the building's side *Miremont*. The rehabilitation works on both the façades and on the building's technical elements will be completed by the end of 2014, while the finishing works on the hall, as well as on the building's exterior accesses will take place in 2015.<sup>27</sup>

## CONCLUSION

In conclusion, the work developed in the present dissertation aimed to study and document the rehabilitation intervention on one of Geneva's most notorious Modern Movement buildings, *Miremont-le-Crêt*.

Its listing as a Cantonal monument in 2002 was an essential step towards the described rehabilitation intervention. It included a survey on the building's condition, developed by the office Devanthery &

<sup>24</sup> Cf. Patrick Devanthery; Inès Lamunière – "Sauvegarder Miremont-le-Crêt ?" in Pierre Baertschi (dir.) – op. cit., p.27.

<sup>25</sup> This description is based on an initial version of this solution can be seen on a detailed drawing of *Miremont-le-Crêt's* renovation project provided by the architect Oleg Calame (dating from January 17 2012).

<sup>26</sup> Cf. Meier+associés architectes's website.

<sup>27</sup> Cf. Idem.

Lamunière, which became an essential guideline for the current rehabilitation works.

However, the important reference for the development of this rehabilitation project was the research work made for the *Cité du Lignon* – one of the case studies of Geneva, presented in the first chapter of this dissertation work. This was a pilot study developed by the TSAM, the *Laboratoire des Techniques et de la Sauvegarde de l'architecture Moderne* of the EPFL, which took place between 2008 and 2011.

The research carried for the rehabilitation of the envelopes from the housing precinct of the *Lignon* was unparalleled, being innovative in terms of methods applied, in the reflexion that it presented on the restauration of buildings from the 1950s and 1960s, and in terms of rehabilitation techniques used such as to keep the original window frames by inserting performance glazing, and in the use of efficient insulation materials such as aerogel. All these techniques were used in *Miremont*, a fact which proves the importance of this research and its contribution to understand that the preservation of the built complexes from this period can be sustainable.

In *Lignon* there was a transfer of knowledge from research to the profession, which marked a turning point not only for Geneva but also for Switzerland and even internationally. This study was published throughout the world and recognized with the Europa Nostra award 2013, thus being a model and contributor to the preservation of the architectural heritage of the 20<sup>th</sup> century.

The main focus of apartment building *Miremont-le-Crêt's* rehabilitation project was the building's envelope - although some technical improvements of its components were also planned.

The changes introduced had to comply with Saugey's spirit, maintaining therefore the basic looks and functions of the building, a challenge successfully embraced by the architecture office Meier+associés architectes.

The main goal was to reduce the envelope's original thermal loss, from 580 MJ/m<sup>2</sup>.year to 200 MJ/m<sup>2</sup>.year – value accorded with the competent authorities. This was not only achieved but significantly surpassed, with the target now set at 160 MJ/m<sup>2</sup>.year, rather close to the current 120 MJ/m<sup>2</sup>.year standards of the Canton of Geneva, especially considering the building's date of construction (1956-1957) and the fact that the envelope is mainly composed by glazed façades and thermal bridges like the numerous balconies.

This challenge is however made bigger by the associated need to keep the appearance and substance of the building as close to the original as possible, an absolute requirement on a Modern Movement rehabilitation project. This was achieved by maintaining the original window frames – which were reinforced only in specific places in order to allow the sustainment of the new glazing – by insulating their opaque parapets, as well as the aluminium wall and gable-end façade without disrupting their original appearance; and also by preserving the wired glass parapets, regardless of this material thermal inefficiency.

However, there is a case where this wasn't possible. The building's entrance halls presented an ingenious system of heat radiation, which unfortunately largely contributed to the heat loss of this space, mainly through its glazing façade. Therefore, a choice had to be made between keeping the heating system and the original glazing. The decision of keeping the hall's glazing façade was taken not only within the rehabilitation principles but also considering the co-owners opinion and

the economical aspect. However, this is recognized as a loss in the building's original substance, although it may be reconsidered in the end of the ongoing works, depending on the remaining budget.

This decision raises an important question. Should a rehabilitation intervention be more concerned in complying with the actual thermal standards rather than with the preservation of the original architectural quality and technical solutions of the building? Or should a balance be found between energy, comfort and authenticity?

With this being said, it is notable the effort that the architecture office Meier+associés dedicated to maintain or recover the original appearance of the building and the success they are achieving.

In *Miremont-le-Crêt*, almost all materials and components that are still able to perform their role are being maintained and/or rehabilitated. The prefabricated concrete panels are being treated from carbonation and the aluminium elements – panels, *brise-soleils* and their respective fixations – are being restored. Also the balconies and ground floor's floorings are being renovated.

At the same time, a number of changes with the aim of returning the building to its original appearance are also being carried. The entrance hall's walls are going to be repainted in their original colours – following chromatic analysis – the covered interior and exterior circles and bands of vegetation are going to be refilled with earth and replanted, and the original water basin, outside *Miremont's* hall, is going to be refilled with water in the end of the works. However, not without the construction of a new passage over it, allowing to conciliate Saugey's original project with the transit needs of the users.

This way, by the end of the rehabilitation process the building will be back to a condition, both in the inside and outside, incredibly close to that found just after the completion of its construction by Saugey. Allied to the building's unique and, at the time of its construction, innovative characteristics, this is what makes this venture worth being analysed and documented as an example of Modern Movement buildings' rehabilitation. Consequently, this was also the major factor for being selected as the theme of this dissertation work.

In conclusion, given the limits of time and resources, this dissertation cannot be considered a complete and finished study on the rehabilitation of the apartment building *Miremont-le-Crêt*, but rather a serious contribution to a future work of detailed documentation of the project and its result. Such a work should include the full detailed drawings, as well as photographic records of every detail in the different project stages – original, condition before the rehabilitation intervention, rehabilitation work and final result – in order to allow their comparison and their broad and complete evaluation.

Due to the fact that only a few detailed drawings were made available by the architects, that just two short interviews were held with the project leader and that the monitoring of all phases of the rehabilitation works was not possible, this work lacks more detailed information on every aspect of the rehabilitation intervention, which occasionally made it difficult to accurately describe.

Nonetheless, a great effort was made to be the most complete, precise and coherent possible, as well as to overcome the challenge it constituted working simultaneously in different languages.