

“The face of the stone“: Traditional construction and tectonic innovation

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ABSTRACT

Through the tectonic metaphor will investigate the relationship between the construction and expression in modern stone facade, meant as the first element of the representation and relationship between the building organism and the city. The relationship between construction, form and representation in massive stone architecture will be analyzed under a dual aspect: the tectonics of the wall and the relationship between "form" and facade element as a possibility that have to represent, through itself, the building organism, or "fall off" and become constructive metaphor.

So, the evolution from the historical city to a contemporary city, spread between modernity and tradition: the buildings show more and more languages and technologies evolved and preserve a traditional and durability character. By the research appears the central theme of the urban facade, linked to the concept of stability, robustness and separation between public and private sectors. The development of the theme of the urban front comes from the urban planning experiences attributable to lesser-known architects, but the most important experience is that of Fernand Pouillon's buildings characterized by a principle authorising of urban space. In all these architectures emerging high performance quality of the stone, in terms of durability and strength, as well as aesthetic value. The challenge of the architect is to create a constructive alternative process, based on the use of global stone, both structural and compositional. Through a mechanical system it was possible to extract and cut blocks in the quarry: in this way the stone has become an industrialized product so that the same Pouillon used the term "prefabricated stones". The predominant role to the relationship between the stone and facade together to the relationship between form and structure makes timeless architecture.

INTRODUCTION

“while the plant, as the document does not address the mind, will always be the first concept, the vertical surface, such as a picture presented to the eye, will always be the first perception, and there will be just the beginning of understanding. ”[1]

The facade is often assumed in the history of an important symbolic function, a transition between inside and outside, between the public and private sectors: from the outside contribute to shape the character of urban space, but also reveals significant indications on the organic internal buildings and therefore, is a synthesis of the aesthetic of the time, the social functions and the design intent of the architect. It, therefore, as indicated by the etymology of the word, is the face of the building, *facies*, the "mode of occurrence of a phenomenon" membrane between inside and outside, a place of transition between the intimacy of being and the externals of appearance, becomes the manifestation of the character of the building and the representation of its "intent expression" [2]

Beside the expressive value, the façade of the building is connected to constructive aspect: it is not a simple plan of representation, but through the balance of the masses, and rhythmic dialectic relationship between solids and voids, is an instrument of interpretation of 'building acts as a sequence of concrete construction.

Paper Format

The events related to the urban transformation happened in Paris, concerning its architectural techniques of bearing stone , can be historically framed and this is an essential step ,leading up to define the connection between "construction " and "shape" in the idea of the urban facade's composition, meant as the first element of performance and connection between the organism and the town. At that time, the urban facade progressively achieves simplicity and regularity, and this fact can be correctly included in the architectural movements which universally recognize buildings without ornaments as the objectification the most congruent to the new century's values. These cultural dynamics can be well-developed in Paris thanks to particular conditions that make the architectural production, the housing scheme above all, extremely interesting. In effect, Paris evolution from a historical town to a metropolis, typical event in the twentieth-century, develops in double-track , tradition on one side and innovation on the other side.

These buildings show styles and technologies more and more advanced, but they don't give up to have a "cover" of stone which represent a tradition and long-lasting quality's carrier, although it is no more the bearing structure, but only the "skin" of the building. In general , the main theme is the urban facade, connected to the idea of stability and ability to separate public sphere from the private one. Urban facade is the result of *haussmannienne* town's transformations, which imposed facades made of cutting stone , fluting walls (*refends*), "*filantes*" balconies located all along the front from an end to an end of the building, without a smooth transition. Moreover , accurate rules concerning storey's height as a function of the road section's width, ensure that balconies' lines were continuous (Fig.1).

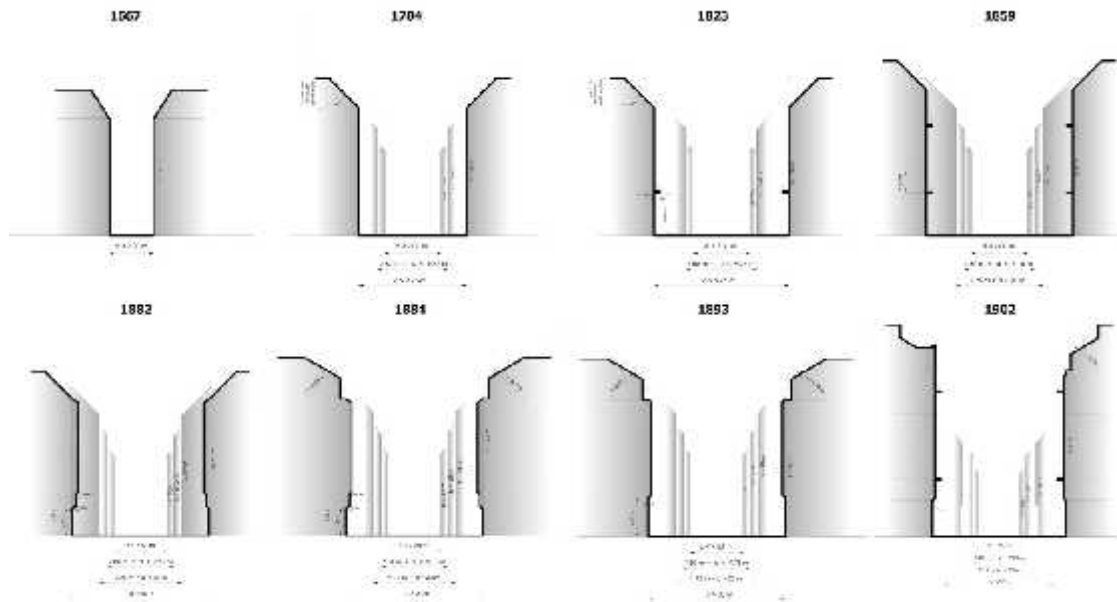


Figure 1: Variation of road section (*gabarit*) through Building Regulations

So, Paris facades take on a massive and heavy aspect, thanks to the typical character of the stone, and they present glass section with important lights, especially in the baseboard parts, so that facades seems to be not bearing walls, but discrete studded structure located at the back of the exterior walls or included in them.

François Loyer deals with the evolution of the carpentry's techniques of construction in his book about the 19th century's Parisian buildings, highlighting the importance of industrial revolution on execution processes and used materials, that are still the same of the tradition, in particular in the bearing structure [3]. Natural stone, that remains Haussmann's buildings favourite material, is now only cutting stone: blocks of stone are realized in the pit and moved to Paris by the new transports (ferries and canals) and so they arrived already shaped at the construction site.

In the case of a Parisian building, this kind of transport permits that different stones can be used as different architectural elements, so it allows to increase walls height and to sustain heavy load , reducing wall's thickness and its track on the soil. In France, during the first two decades after World War Two, the development of natural stone's industry is extremely meaningful in the researches on the natural stone application in construction. In effect, this is the moment in which took place a change in the operation of the stone's pit , in its realization on the site and its use. The big amount of mined stone was used for the edification of big house plans, showing how this construction's technique can be economically competitive. Good condition maintained by housing scheme to this day, compared to other contemporary techniques used , is one of the causes of the interest for this construction's technique in these years. After the Liberation, on August 25th 1944, France strongly needed a rebuilding, like other countries . For this reason, on November 16th

1944, a new authority was founded to organize the general rebuilding: it was called the MRU, city planning and reconstruction Ministry.

Natural stone obtained a moderate success with the first rebuilding, started after the Dutch invasion in 1940, especially thanks to the architects who promoted a return to French architecture. But it was only during the first two decades after World War Two that French stone's sector changed into an out-and-out industry and natural stone became one of the main material used in building. One of the most important causes of this success was the small amount of energy required for the extraction and the manufacturing of the natural stone, that was a easily available source on the French soil, unlike steel and cement used in the production of concrete. Using stone in constructions became a French tradition that prepared the ground for the industrial development during the years of rebuilding: in effect, together with great urban restorations wanted by Haussmann, in order to face the great number of buildings that should be realized, there was an "industrial" evolution in production and installation, instead of a revolution in techniques and materials. Natural stone was still the building material par excellence, used as ashlar and set according to the "*opus isodomum*" model. The improvement of transports simplified the supply of several natural stone kind and so building structure could be articulated, especially thanks to the use of "hard" stone for the base and thanks to the "*pi re meul re*", that, mixed with hydraulic mortars, was used to realize foundation and dividing-walls."Hard" stones are compact limestone that allows to erect very high walls, reducing their thickness and increasing the habitable area: an economy in both material and surface [4]

Natural stone is reintroduced as an architectural material at the beginning of the 20th century, thanks to the architects now interested in stonework, as an architectural process simpler than the reinforced concrete one. The leading role of this revival was Pol Abraham, president of the "Commission de Normalisation de la Ma onnerie", who promoted the return to this technique with a scientific and industrial approach. The industrialization of productive processes and the resort to repeatable and standard elements seemed to be the unique possible answer to the increasing request of new buildings. Elements must be ready-made and the normalization, that is the resort to modular dimensions applied to few elements, must be employed also to the installation's methods, in order to reduce realization time. (Fig.2)

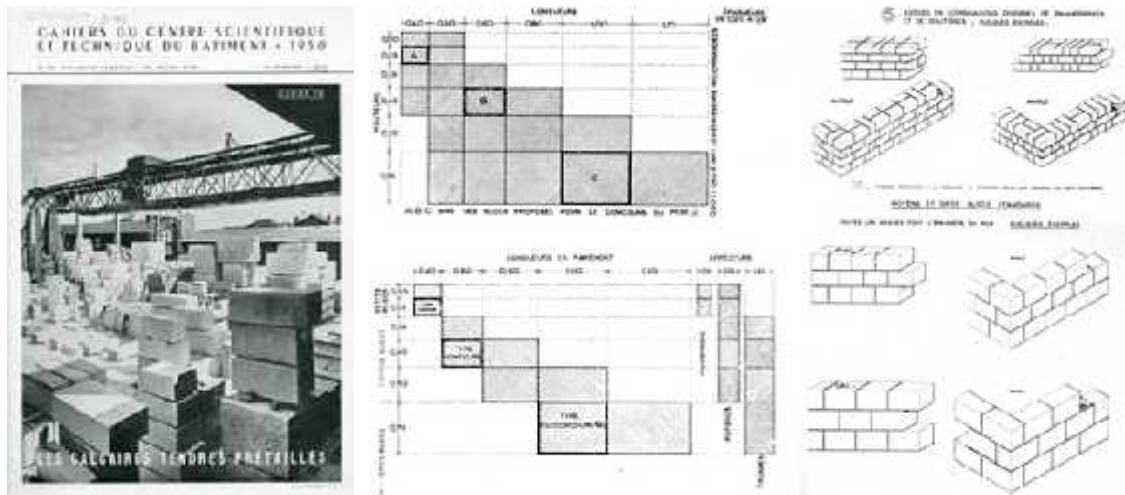


Figure 2: Tables for the normalization of cut blocks and diagrams of equipment [5]

Fernand Pouillon's French works are in step with those urban, technique and architectural transformations. He used cutting stone, a symbol of tradition and monumental nature, that becomes a way to level fronts and to give them a compositional preciousness and wealth figure. This French Architect has been selected as our specific field of research, since his work not only deals with architectural style but also with narrative aspect of building, which became ground of continuous testing. Pouillon works on the building system's representative forms, that tell of construction, and he highlights abstraction, that is a summary of the order's tectonic meaning. Fernand Pouillon worked in Paris during the crucial years when the rebuilding took place, trying to solve a deficit situation worsened by migration from country to city. Common houses become necessary. Pouillon's point of view is totally antithetical compared to the other solutions suggested. In effect, he doesn't agree with the emphasis for residential buildings that become a complex self-sufficient system at the expense of the traditional urban area's elements (streets, squares, blocks). It is now that arise a deep attention to the general relationship between the village and the city, giving a fundamental role to the open space related to the built one [6].

At the Sixties' dawn, after his experiences in Provence and the big opportunity to rebuild the Vieux Port in Marseilles, Pouillon answers the need to relieve congestion in Paris, and he takes the chance to plan a set of "ensembles urbaines monumentales", something complex and economic at the same time, located in suburban areas, focused to give symbolic value to the urban area. Pouillon aims to show that an architect must plan "human" places for people who live there, characterized by rigorous layouts, realized by architectural knowledge and noble material, like stone. The proposed city's aspect satisfies the need of a "modern kind of space". An evident shy nature permeates each neighbourhood, stressed by the contrast between the interior facades that show a richness expressed by architectural style and materials. Thanks to this evocative strength, Pouillon gives architecture the ability to use a limitless urban and architectural culture, referring to travels and rare book, and he desires the buildings "speak" about the nature of the place they belong. In addition to the urban compounds composition, we must underline the building aspect. Son of a construction engineer, Pouillon hangs out building site since in tender age and he

analyzes planning's pragmatic aspects, reaching a refined knowledge in stone's building. Influenced by Aix-en-Provence's studies, Pouillon was really interested in stone and so he starts to test stone's potentiality thanks to his friends experience, Pierre Marcerou, who really revolutioned this branch. (Fig.3) In effect, Marcerou adapted to cutting stone machines used to knead steel and wood; therefore he could mine and knead to a tee his Fontvieille pit's blocks and he could test a particular building technique, named "ready-made stone" by Pouillon. This technique is adopted for French and Algerian neighbourhoods, using stone as "formwork" or bearing block. Moreover, the hard economic trends in post-war period, characterized by lack of steel and concrete, favoured stone's installation because of its very cheap processes. (Fig.4)



Figure 3: Machines for cutting stone in the quarries of Fontvieille

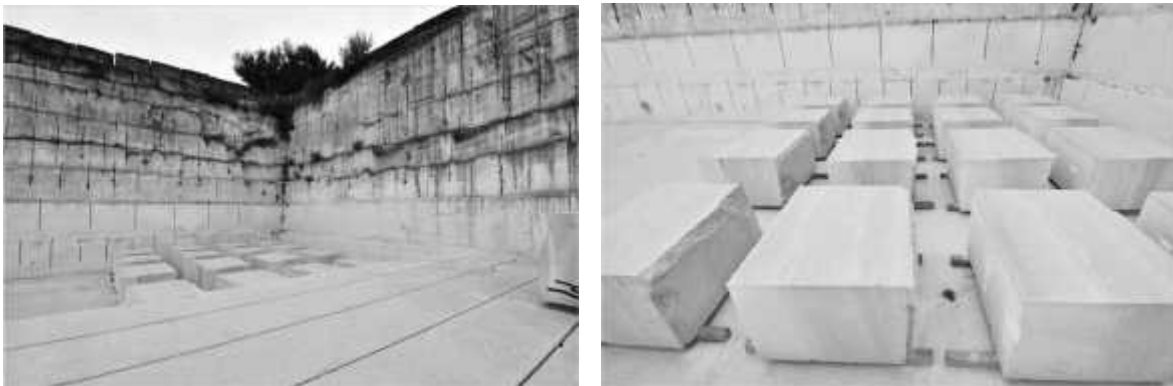


Figure 4: "*Pierre pré-taillée*" in the quarries of Fontvieille

As a Perret's student, convinced that architectural form corresponds to the structure's one, Pouillon commits to structure the representative task: starting from this principle, it's the birth of his residential ensembles' stylish identity. In contrast with urban blight's areas where he works, Pouillon believes that urban architecture requires peculiar instruments and that monumental nature and a kind of "inspiration" stress places 'qualities. This means measured results, coherently with urban scale, without decoration's excess. In addition to architecture's qualities and typical characteristics, buildings have a specific "epicism", given by several factors, the use of stone in particular: buildings recall acropolis and Ottoman fortresses, walls and historic squares, and they show themselves as summary of different forms that relate architecture and places' geography.

Pouillon's point of view on History is similar to his approach to building. He is able to take advantage of real conditions and, at the same time, to show the obvious lacks; he is able to use the available landscapes, keeping them in architectural frame and reinventing them, always having the stone as the essential element. The architect chooses squared blocks, panels, or formworks stones, because of their ageing characteristics, that require less service than reinforced concrete, and because of their evocative power, that give a lead role to stone's dignity, durability and beauty. The continuous connection between architecture and building techniques was a permanent feature in Pouillon's work, because he strongly believed that architecture is building and building is architecture.



Figure 5: Assembly techniques of stone blocks on Pouillon's construction sites

In his works, Pouillon isn't interested in cutting edge materials, but in the efficient use of traditional ones (Fig.5). He aims to unify because it means simplification, necessary when you need savings in building. Pouillon's register was always moderate but never poor; in his works he used different planning solutions, harked back by Pantin and Montrouge in other design. The limited register requires accuracy and scrupulousness, so that there are only elements clearly justified by architectural needs. Simplification of the forms implies two consequences. The first is that the big residential compound's architecture tended to choose basic contrasts, in particular in the opposition between heavy and light parts: for instance, at Point du jour of Boulogne, residential blocks have different facade, one completely glassed-in and pointed towards the common space, the other divided into squares by the ready-made structure. The second consequence is that Pouillon preferred well-defined architectural effects to have a "more and more strong expression". In this sense, the big residential four-storey compound in Meudon-la-Forêt (Fig.6) represents an excellent example, since there is an opposition between the west facade, characterized by repeated squared openings, and the front on the opposite boulevard, spaced out by majestic pillar of stone, more protruding than the body of windows at the back, as if they wanted to define a blank wall. Each detail turn out to be calculated in the function of the entire building's scale, which achieves an "archaic" dimension. This "archaism" is translated in rigorous and basic aspects, able to communicate an endless permanence of architectural forms. So Pouillon developed own architectural research according to the technological profile, using stone in different functions: bearing, supporting, covering. But in the matter of society, he was stubbornly interested in housing project, in order to obtain adequate and rigorous architectural results.



Figure 6: Unity of the composition of the stone facades into residential compound in Meudon-la-Forêt

Style, expression, technology and production's conditions constitute Fernand Pouillon architecture, characterized by total disqualification of any formalism and by decoration's cancellation, highlighting stereotomy and the depth of the walls made of stone blocks . Simple and essential plans and volumes create a close relation between structure and form, in which stone's stability and mutability make timeless the architecture. Buildings are results of a rapid and mechanized process of production and construction , and they are characterized by an original archaic purism, lacking formal superstructure but rich in architectural meaning.

CONCLUSION

The perfect blend of tradition and innovation leads to the creation of a research project that will enhance the one hand the use of stone in residential construction, on the other hand the influence of the shape and performance of the material in architecture. The awareness of the need for a re-appropriation of a constructive memory, its forms, its materials, has been the impetus for harmonizing a new balance through dialectical two components: the imprint alive the traditions and the relentless force of technological innovation (Fig.7)



Figure 7: Formal synthesis of stone facades in the first half of the twentieth century in France [7]

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