

Renewal and Tradition in the Teaching of Building Construction at the Ecole des Beaux-Arts of Paris: the Course of Edouard Arnaud, 1920-1934

Antonio Brucculeri

This paper is based on research in progress regarding the teaching of building construction at the Ecole nationale supérieure des Beaux-Arts de Paris, between the 1920s and 1940s. The first part of this research, concentrating on the course given by Edouard Arnaud (1864-1943) from 1920 to 1934, will be the focus here.

During the International Architects' Reunion in Milan in 1933 one of the topics discussed was architectural training in France and the changes in its pedagogy, centering on the approach to architectural practice. The Ecole des Beaux-Arts did not remain on the sidelines in this debate (Grande Masse de l'ENSBA 1933, pp. X-XI). Albert Laprade (1883-1978), one of the representatives of beaux-arts architectural culture, appointed general inspector of artistic teaching at the beginning of that year, highlighted the problem. He predicted a basic vocational training, where "technical teaching would monopolize eight-tenths of the time of the pupils", and a true "technical training school which would produce conscientiously educated architects, truly possessing 'their craft' and able to make very respectable common buildings" (Laprade 1933, p. IX). In the early 1920s, the debate had started around the need for a greater presence of technical instruction in the pedagogy of the Ecole des Beaux-Arts. This presence was considered, simultaneously, as both separate and complementary to the teaching of architectural composition (Chafee 1977). In 1921 Paul Guadet (1873-1931), professor of the course in perspective at the Ecole, stressed the new complexity of the teaching of architecture at the fifteenth conference of the Société centrale des architectes, , underlining the decisive role of scientific knowledge and the need "to follow the development of new methods of construction" (Guadet 1921, p. 50).

A COURSE OF BUILDING CONSTRUCTION FOR ENGINEERS AND ARCHITECTS

That very same academic year, 1920-21, a new professor held his first general construction course at the Ecole des beaux-arts in Paul Monduit's place (born in 1850, Monduit had been responsible for construction lectures since 1886). This educator, Edouard Arnaud, was a former pupil of the Ecole centrale des arts et des manufactures (class of 1888) (on the teaching in this college, see Hamon 1997 and Pfammatter 1997; on the former pupils and the building construction in Paris see Belhoste (ed.) 2004). He had enrolled in 1889 in the architecture program at the Ecole des beaux-arts where he obtained his diploma on 14 December 1894 (Delaire 1907, p. 162; ECP, CdD, dossier Arnaud).

Arnaud's full-time career in teaching started in 1909, and it was in the scholarly setting of the Ecole centrale that he first worked. Being responsible for a course on architectural and civil engineering construction to second year students (Thevenot 1994), he revealed his true teaching intentions only right after the First World War. These consisted of giving the students in engineering the tools to approach a "method of architectural composition" which, until that moment, was missing from the training of the Ecole centrale alumni, exclusively trained in the details of "technical practice". The message that Arnaud delivered to the pupils as soon as he introduced the first part of his course - dedicated to the "entirety of operations to consider in the construction of buildings" - was that "technical practice" was not sufficient if one did not learn "the art of composition". It was impossible in teaching to circumvent "the original idea", which was at the heart of any architectural project (Arnaud no date [1919], t. I). After the study of the program and the choice of the site, the "recherche du parti" (composition choice), the third preliminary operation, constituted the essential phase of the perfecting process. Sketches and drawings concerning the development of a project of Central College of Arts and Manufactures made up the iconographic aspect of the course (fig. 1).

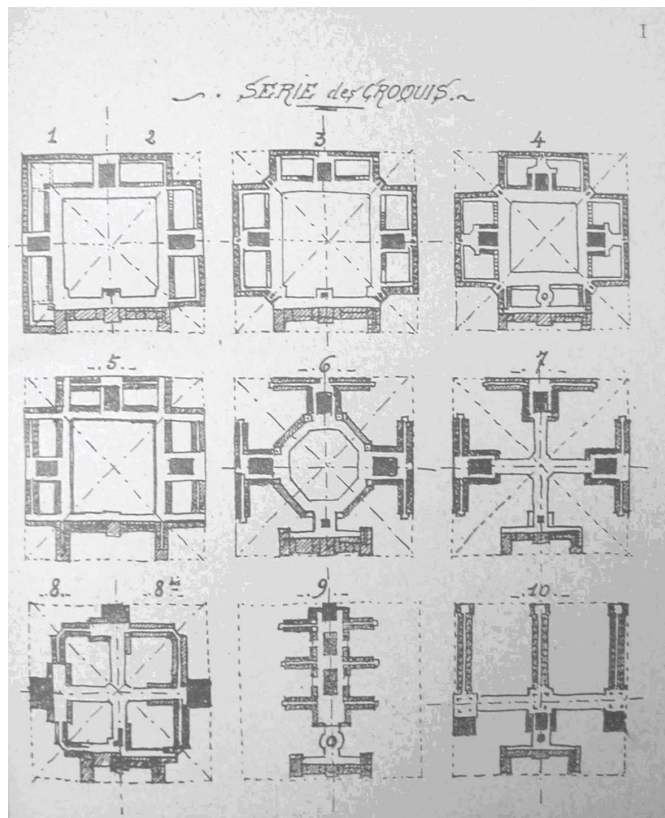


Figure 1. Drawings for the project of a Central College of Arts and Manufactures (Arnaud 1920, t. I, pl. I)

Arnaud emphasised that his own training at the Ecole des beaux-arts was necessary to supplement his “engineering training” and his “builder qualifications”. In this context he pointed out the relevance of the teaching of his former master, Jean-Louis Pascal (1837-1920), but also remembered the importance of the role played by Julien Guadet (1834-1908), the father of Paul. The course that Guadet taught at the Ecole des beaux-arts between 1894 and 1908 as dean of architectural theory (Published under the title, *Eléments et théorie de l’architecture* (n.d. [1901-04], in 4 volumes), he regarded as, “one of most remarkable works ever written on this subject and which I found and noted was the perfect expression of the mental operations of the Architect in his work of creation, and which, hitherto, was taught only verbally and by example” (Arnaud n.d. [1919]).

This strategy of Arnaud’s, aimed at improving the education of the Ecole centrale engineer – a strategy that was supported even by the council of the Ecole centrale – was developed throughout the decade. The final edition of Arnaud’s course, in 1931, saw modifications that included a 25% reduction in the number of lessons for the majority of technical courses, but the five lectures devoted to importance of composition introduced in 1924 (Guillet 1929, p. 126), were kept. These were the subject of the publication of a separate title (Arnaud 1931a). The importance of creative capacity alongside the technical aspects was thus once again reaffirmed.

The position that Arnaud took straddled the cultivation of composition and the cultivation of construction, resting between the scientific world of the Ecole centrale and cultural world of the Ecole des beaux-arts, and is essential to an understanding of his wish to make architectural training more efficient. Furthermore, it was this same course, developed at the Ecole centrale after the war, which became the tool he used to transform the teaching of construction at the Ecole des beaux-arts. Arnaud saw the introduction of contemporary construction practices into the fine art curriculum as unavoidable. In the review of the Société centrale des architectes: *L’Architecture*, he wrote:

Thus, in teaching, there is a gap to fill. At this time in France, when we have the most pressing need to rebuild our devastated areas, it is necessary to be able train quickly and surely an army of excellent builders, who are useful on construction sites as soon as they exit from school and who can improve on their own time by their own means.

(Arnaud 1921, p. 1).

It was not only a question of considering coordination with the other scientific lessons envisaged by the school curriculum. Arnaud also proposed to direct the contents of his course towards a systematic knowledge of new constructive processes – initially reinforced concrete – through a carefully planned study of buildings. The update of construction training included not only its contexts but also its methods:

It is indeed necessary to give up the dictated courses, used until now, accompanied by

drawings that the pupil reproduces in the amphitheatre. It is too slow a teaching process in the current situation and which cannot teach a twentieth of what it is necessary to know [...]. It is thus necessary to find a more efficient mode of teaching technical and practical skills, which retains the interest of the pupil, without boring him, which develops in him paramount faculties of observation, reflection and judgment, allowing him to put into practice what he has learned, to find in his turn just solutions as well as personal ones. It is necessary in a word to form the temperament of the constructor.

(Arnaud 1921, p. 1)

In spite of the obstacles that a theoretical course presented, Arnaud seized upon the need to bring the architect in training closer to the realization of the architectural object. He thus chose to present an exhaustive document on the materials, processes and techniques through overhead projections. These projections established the connection between theory and work on site:

The pupil thus sees with each lesson the building being built gradually until the end. He understands the order, the place of each thing, the difficulties which can emerge, and the solutions to be used. He learns all this through numerous projections and with accompanying notes. The governing principle of the question is stated and all the times possible, the projections give: 1° the principal diagram; 2° the various construction systems that one can use to put into practice the diagram; 3° Views of the building site during construction. Thus the visits of the building sites will be replaced by the projections. The pupil will follow construction from the beginning to the end, following the building from conception through to its execution in this way. Visits the pupil will be able to make personally to the building sites, as recommended, become extremely advantageous even without a guide.

(Arnaud 1921, p. 2)

The course proceeded like an illustrated guide. The explanation of the various stages of construction was accompanied by an imposing iconographic apparatus, as both the pages of the handbook and the glass plates used for projection in the amphitheatre, mostly preserved until today (CAP, VitFr 186 Ifa 401-407), demonstrate. This guide adopted, in fact, “the order which the constructor must follow, considering and solving specific difficulties or questions, as they are logically introduced in the coursework” (Arnaud 1920, t. II, p. 1). Thus, in the second volume of his course - which related to the “technique of building” - after having initially introduced reinforced concrete as a material, Arnaud showed the construction of foundations, masonry, floors, roofs, staircases, iron work, various installations and decoration. The resumption and the widening of the corpus of projected images can be followed through the first publication of the course, in 1920 (an undated version probably preceded this one in 1919, ECP, CdD), to its last edition, in 1931; with the publication, at this later date, of a new additional atlas (an other version of plates completed the first edition, ECP, CdD).

The pupil learned progressively, on examples impossible to ignore in the history of construction, from the vault of the Pantheon in Rome to the propping up of Notre-Dame with flying buttresses in Paris, Amiens or Reims (Arnaud 1931c, pl. CLVI-CLVIII). But, the pupil was confronted in particular with examples of contemporary constructive solutions, the vaults in metal framework in the National Library or the Saint-Augustin church in Paris, as well as the reinforced concrete frame of the hangars in Orly (Arnaud 1931c, pl. CXLII-CXLIII, CLII-CLV). The course concentrated mainly on the illustrated examples of several buildings designed and produced by Arnaud, such as the one built for the insurance company L'Urbaine, located on Boulevard des Italiens in Paris, which was the subject of the third and last part of the course (Arnaud 1920, t. III) - removed in the 1931 edition. It was this part which Arnaud conceived as a “revision and an application of the principles” previously presented. The textbook even went into the details of patents application for new materials (stone “Allur”; reinforced stone “Pauchot”; brick “Léan”, as well as the latest types of reinforced concrete floors: Payet, Pfeifer, Siegwart, etc.) (figs. 2 and 3). Arnaud’s course is based on printed sources from the end of the nineteenth and the beginning of the twentieth century (main sources: Planat 1888-92; Cloquet 1898, 1901-13; Magny 1914). There are also many figures drawn by the author that are probably the development of a first group of sketches drawn by Arnaud since 1914 (Hamon 1997, vol. 1, p. 65).

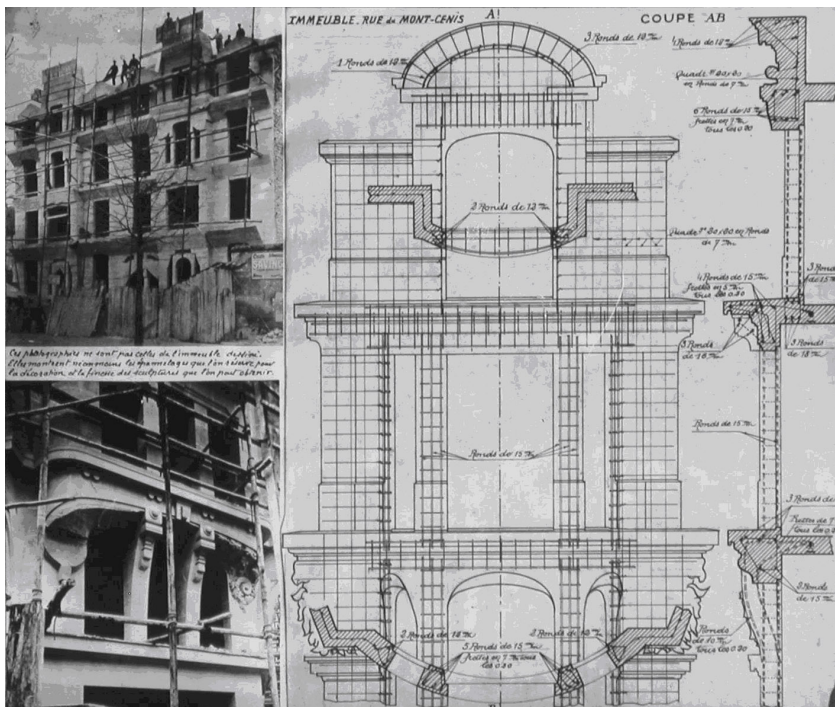


Figure 2. Reinforced stonework by “Pauchot”, glass plate no. 171 (CAP, VitFr 186 Ifa 402; Arnaud 1931c, pl. LXXIV)

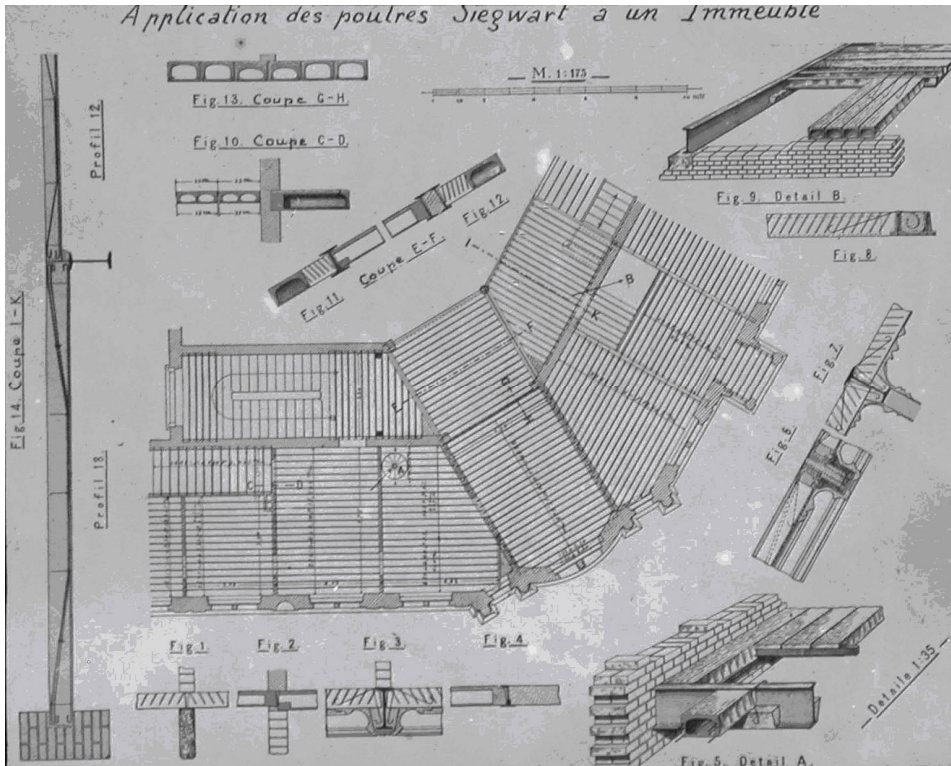


Figure 3. The application of the Siegart reinforced concrete floor, glass plate no. 235 (CAP, VitFr 186 Ifa 402; Arnaud 1931c, pl. XCVI)

In fact, for Arnaud it was important to maintain a strict bond between technical teaching and architectural drawing in the training of the future constructor. “To develop the graphic language of the Engineer and the Architect” was the first of the objectives of the course of construction (Arnaud 1920, t. I, p. 7). Accordingly, at the Ecole centrale and the Ecole des beaux-arts, Arnaud requested that the pupils have a sketchbook. The new system of projections did not leave enough time for the pupil to reproduce the drawings in the amphitheatre, as had always been the case when the professor drew on the board himself during the course. Arnaud asked the students to present at the examinations a “book of careful freehand drawings”, from which a group of fundamental drawings, announced in advance by the professor, would appear in questions on the examination. The sketchbooks of two pupils of the Ecole centrale, Liébaut and Desrousseaux, during the 1923-1924 academic year, offer an interesting glimpse of this method (fig. 4). The introduction of this practice to the Ecole des beaux-arts reaffirmed the importance of drawing there. The idea of the sketchbook was used again in 1926 by Louis Hautecœur (1884-1973), in his proposal for the reform of the history of architecture course (Bruculeri 2000, p. 100). Arnaud redirected it as a building interpretation tool. This marks a considerable evolution in the teaching of construction at the Ecole

des beaux-arts. Drawings that some of the pupils of François Vitale (1898-1962), the successor of Arnaud to the Chair of Construction, did between the second half of 1930s and the beginning of the 1950s, still testify to this great innovation (CAP, VitFr 186 Ifa 1/2 and 302).

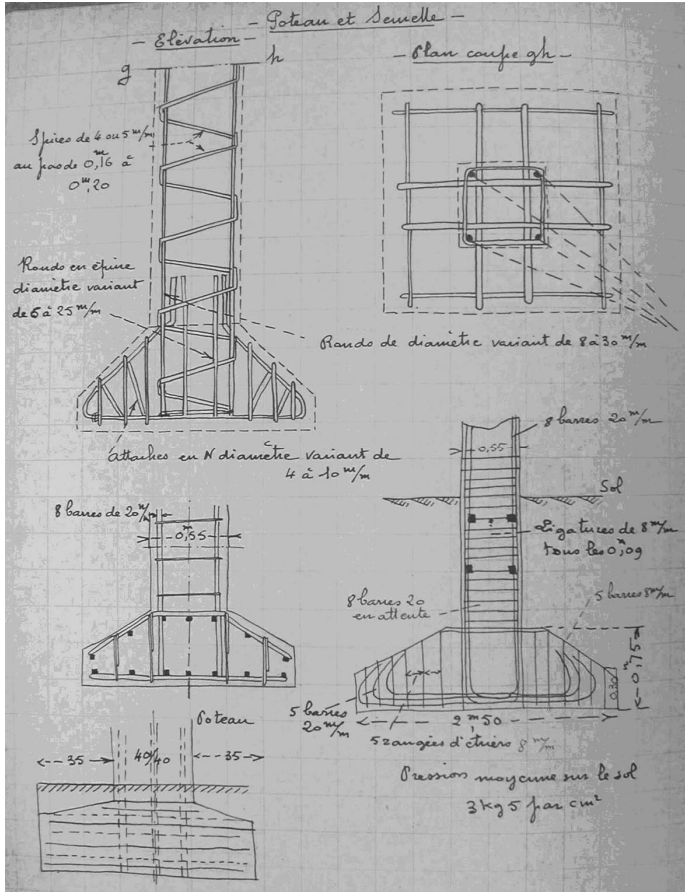


Figure 4. Sketchbook of Liébaud, second year pupil Ecole centrale, 1923-24 (ECP, CdD)

GENERAL CONSTRUCTION COMPETITIONS

The two-pronged training of Arnaud and his notion of architecture based on a balanced relationship between construction and composition, came from the direction he took at the beginning of his career in the Ecole des beaux-arts. It concerned the most recognized form of the pedagogy of construction: the general construction competition. The attempt to coordinate this traditional formula with the new subjects chosen, illustrates his intention to offer the pupils a complete approach to the project.

Arnaud proposed that:

after the final examination, in order to see whether the pupil can carry out his thought completely, and at the same time from the composition point of view and the construction point of view, an architecture project will have a dual development. The subject is chosen by both the professor of theory and the professor of construction, permitting a pupil to work towards an award in architecture and to realize a final construction project.

(Arnaud 1921, p. 3)

In 1921 this took the form of a “concours d’émulation de seconde classe” (second class competition) for the best design of a covered swimming pool. The program of the competition was outlined by Victor Blavette (1850-1933), professor in theory of architecture, and integrated by Arnaud (ENSBA. Les concours d’architecture... 1921-22, pp. 3-4 pl. 1-10), and asked for several executed details of the pool (fig. 5). This practice was not typical of competitions, that mostly concentrated on composition. The same thing was repeated the following. On 5 May 1922 Blavette chose a panorama as the subject of the competition (ENSBA. Les concours d’architecture... 1922-23, pp. 2-3, pl. 1-8). Even faced with such a traditional subject (Jacques 1982), Arnaud insisted on the students defining every detail of their projects in their drawings – as he has done the year before – “created with strong construction lines, not washed-out effects” (ENSBA. Les concours d’architecture 1921-22, p. 4).

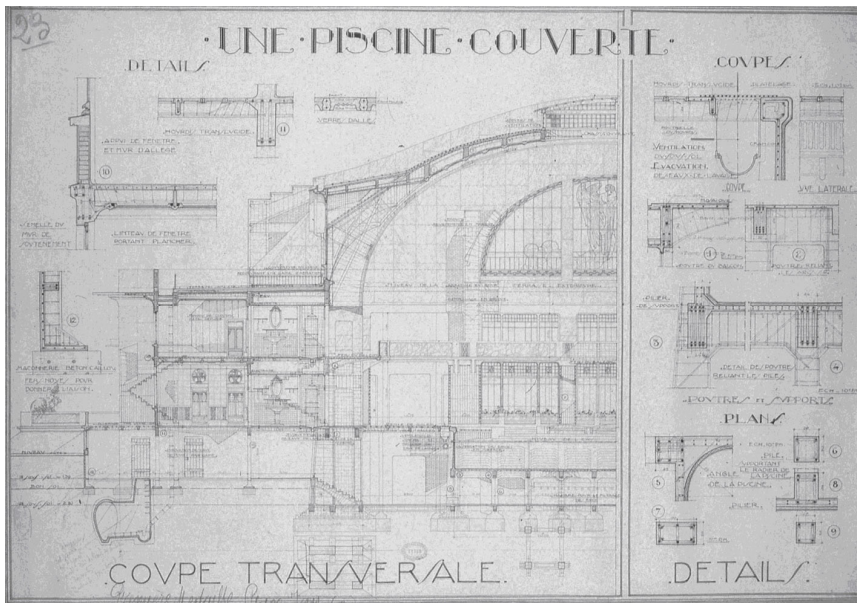


Figure 5. Heitzler, “concours de construction générale” 1921: a covered swimming pool. Cross section and details (BENSBA, CG 357)

That year, Barbé, a pupil from the Héraud atelier, and Vitale, a pupil from the Umbdenstock-Tournon atelier, won the first medal. Vitale was however a former pupil of the Ecole centrale (graduate in 1921) and he aimed to strengthen, like Arnaud did, his engineering training by an architectural education. He was not the only one: three years later another former pupil of the Ecole centrale studying architecture at the Ecole des beaux-arts, Jean Démaret (1898-1967), got first place in the general construction contest. The subject, a public hall and the safe deposit of a bank, was not innovative, but Démaret defined all of the technical aspects concerning the project (ENSBA. Les concours d'architecture 1925-26, pp. 3-4, BENSBA, CG 363). It is not surprising, therefore, to see Vitale take part successfully in some academic competitions. In March 1924, he was in the "concours d'esquisse en loge de douze heures" (twelve hour drawing contest: the subject was a monumental staircase) and was admitted to the "concours d'esquisse en loge de vingt-quatre heures" (a twenty-four hours contest: the subject was a commercial tribunal for a large town), the purpose of which was to choose the finalists for the Grand Prix de Rome (CAP, VitFr 186 Ifa 100/6). This is the fitting demonstration of the two-pronged educational process advocated by Arnaud.

The fact that, in the beginning this two-pronged education was aimed at the Ecole centrale students and that an Ecole centrale alumnus won the 1922 contest may have sparked the debate that the principal of the Ecole des beaux-arts, Albert Besnard, called for in December 1922. The following members of the Higher Teaching Council were enlisted: Paul Nénot, Victor Laloux, Charles Girault, Victor Blavette, Pierre André and Paul Boeswillwald, the former principal (Besnard assistant's minute to these members of Council, 9 December 1922, AN, AJ/52/976).

Whether its intention was to defend the establishment of the Ecole des beaux-arts or to preserve a specific place for construction in the contest, the repercussions of this debate were not long in coming. The experiment of incorporating construction into the composition contest stopped in 1923. Be that as it may, the general construction programmes and competitions conceived by Arnaud up until 1934 remain an excellent way to test the technical knowledge of the pupil, while remaining concerned with composition. This was at the heart of the type of architectural education that Arnaud defended on the first pages of his course handbook.

The planning of the general construction competitions was the occasion for him to update their topics. The initial project, the covered swimming pool proposed in 1921, was followed by a series of challenging subjects for the pupils in the late-1920s and early-1930's. One example, among others, was the project for a cinema on 15 April 1927. This took into account the police regulations of 1 January 1927 concerning emergency exits for this type of buildings (ENSBA. Les concours d'architecture 1927-28, pp. 3-5). The programme for a medical centre, presented to the students on 13 April 1931, obviously related to the sanatoria built at the end of the 1920s (ENSBA. Les concours d'architecture 1931-32, pp. 3-6) (fig. 6). Finally there was also the project for "a skating rink in a sports training and advertising centre", conceived in December 1933, in close collaboration

The direct reference to buildings was significant. In 1934, the winter cycling track, the Molitor swimming pool and, in particular, the Palais de Glace aux Champs-Élysées (the documentation which Vitale examined, CAP, VitFr 186 Ifa 2/1) are considered the most relevant Parisian examples. Four years earlier, the programme of the contest was once again devoted to “a swimming pool in a youth sports center”. Arnaud announced initially, “among the interesting swimming pools to visit in Paris”, an example now impossible to overlook: the swimming pool of Butte-aux-Cailles by Louis Bonnier (1856-1946), as well as more recent achievements like “the newly constructed municipal baths, on rue Blomet” (ENSBA. Les concours d’architecture 1930-31, p. 4). Earlier still, the competition program submitted to the students on 16 April 1928 focused on a car garage, showed a close relation with the professional context as well as with the architecture produced (fig. 7). More than the references to the recent covered garages, “which one can visit in Paris” in the programme, one notes the similarity with the a programme chosen as subject of a diploma exam by Léon Bazin (1900-1976), a student from Expert’s atelier. Bazin will be, in fact, become associated with Laprade in the project for the Citroën garage, built the following year in rue Marbœuf in Paris (AN, Laprade Papers, 403/AP/157).

In addition, competition presentations show the efforts made to update the technical aspects of the curriculum that Arnaud undertook, even when the topic appears to be irrelevant. The panorama projected by Vitale is an eloquent example. This building project provided the student with the occasion to illustrate foundations in reinforced concrete adopting the Piketty system. A whole presentation board was devoted to the drawing of “concrete and iron details”, with a half section of the truss of the building (BENSBA, CG 360 and CAP, VitFr 186 Ifa 500/1, photographs of plates) (fig. 8). Floor plans, facades and sections used to study the proposed building benefit, however, from the water colour rendering normally reserved for scholarly competitions (fig. 9). Instead, the three boards submitted in 1925 by Démaret only illustrated the technical details of the structural organization. That greatly distinguishes Démaret’s work from the award winning boards of the students obtained in 1920, when the last competition was held by Monduit, with a similar subject of the “deposit and till services as well as the safes of a large bank” (ENSBA. Les concours d’architecture 1920-21, pp. 3-5, pl. 1-12). The illustration of the ceiling of the safe deposit is, for Démaret, the occasion to detail even the economic advantages of this “large flagstone of constant thickness” compared to the price of a multi-layered floor (fig. 10).

When the subjects were revisited after several years, as it was the case with the swimming pool, Arnaud decided to define all the technical equipment. Therefore, as a note on the second board of the submission of Eschbaecher - a student from Laloux-Lemaresquier’s atelier - shows, special attention was given to the heating system of the swimming pool hall, to be “serviced by air taken from outside, brought in through a ventilator placed in the basement, then heated by serpentines at the same temperature as the water of the swimming pool (25°C to 26°C), which keeps the water temperature constant and prevents dilation of the tank, as well as condensation”, (fig. 11). Thus the system was described and illustrated at the same time according to the same principle adopted by Arnaud throughout the development of his course.

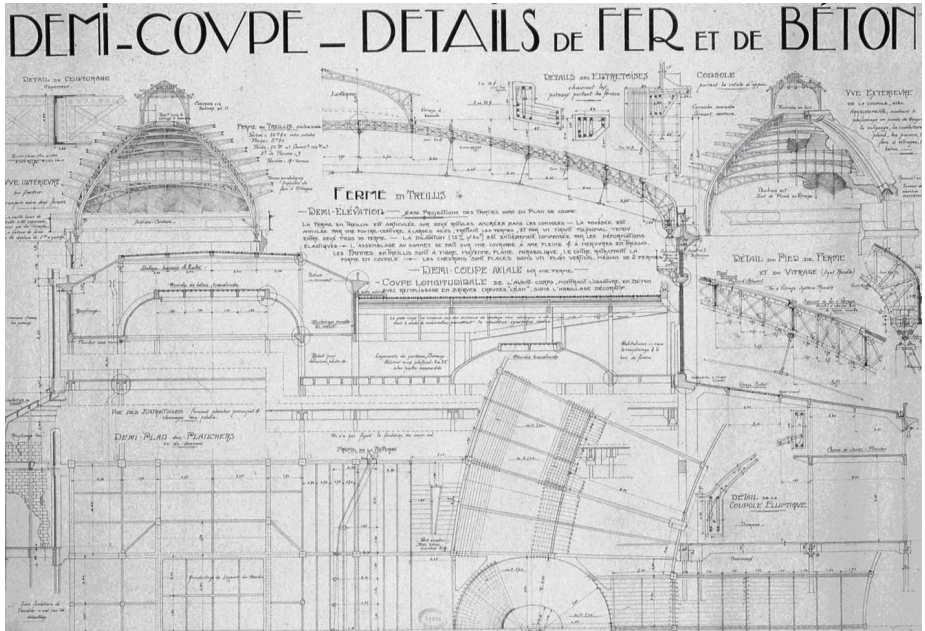


Figure 8. Vitale, “concours de construction générale” 1922: a panorama. Half-section, concrete and iron details (BENSBA, CG 360)

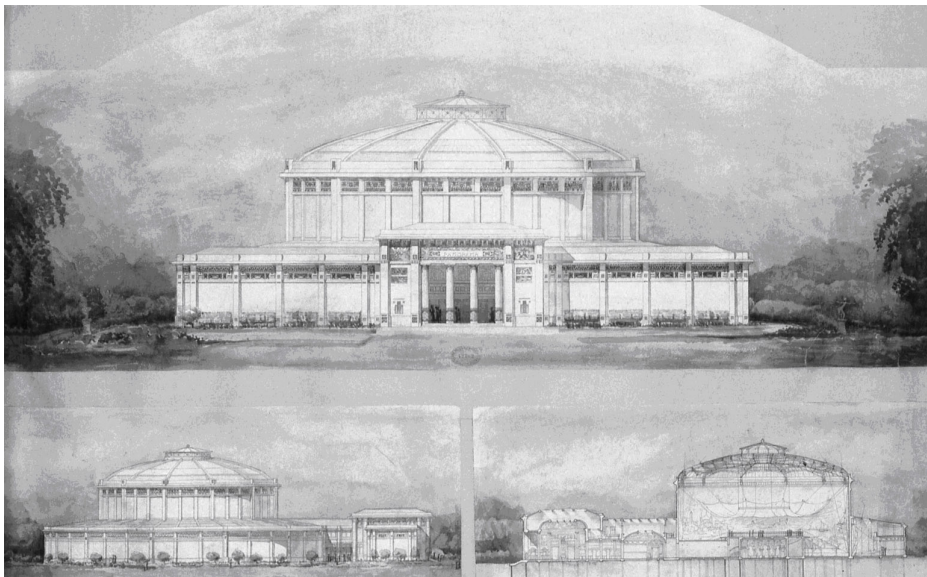


Figure 9. Vitale, “concours de construction générale” 1922: a panorama. Facades and section (BENSBA, CG 360)

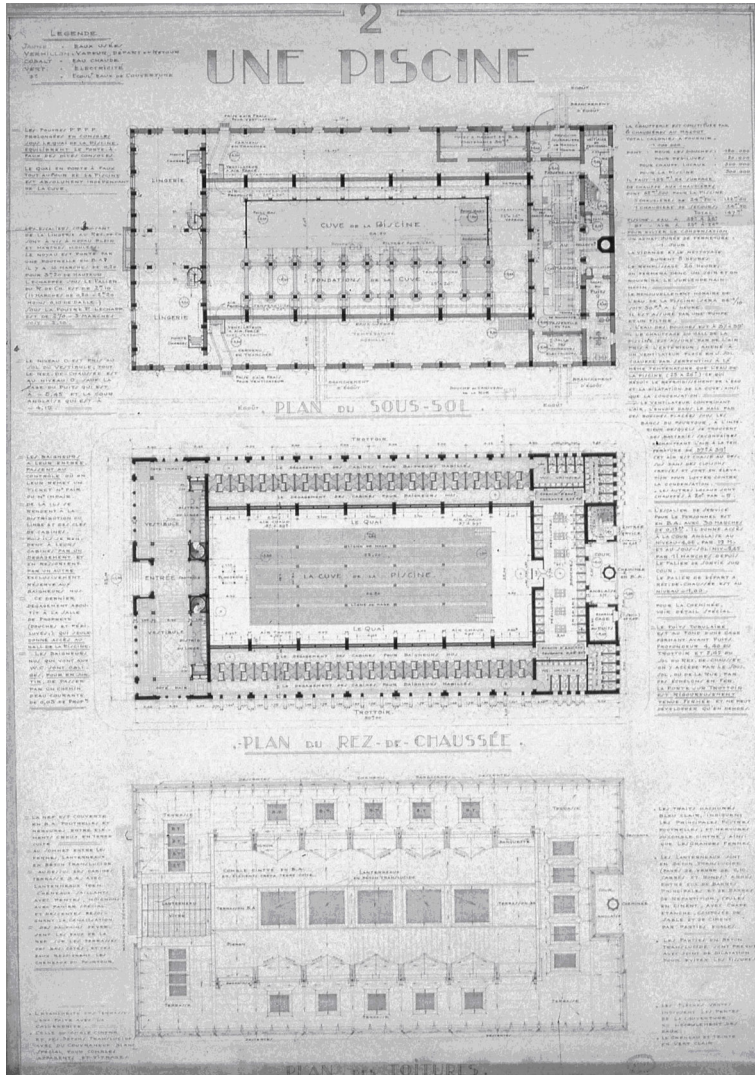


Figure 11. Eschbaecher, “concours de construction générale” 1930: a swimming pool in a youth sports center. Plans (BENSBA, CG 374)

Even when the subjects that were repeated were much more mundane, as in the case of the amphitheatre (1923) and the light tower (1924) projects, which were again the subject of the contest in 1932 and 1933 respectively, the interest in the constructive aspects evolved. Thus, in the program of 1933 for the lantern “intended to clarify the central space of a church and to accentuate its external silhouette” (ENSBA. *Les concours d’architecture 1933-1934*, p. 3), Arnaud asked for the roofs to be in reinforced concrete. In 1924 it was iron or steel that were used in the naves and the

lantern (ENSBA. Les concours d'architecture 1924-25, p. 3) (fig. 12). The 1933 contest reflected the more recent constructive experiments in religious architecture, incorporating reinforcement and expansion joints, as can be seen in the scheme presented by Thouvy (a student of Paul Tournon's) (fig. 13).

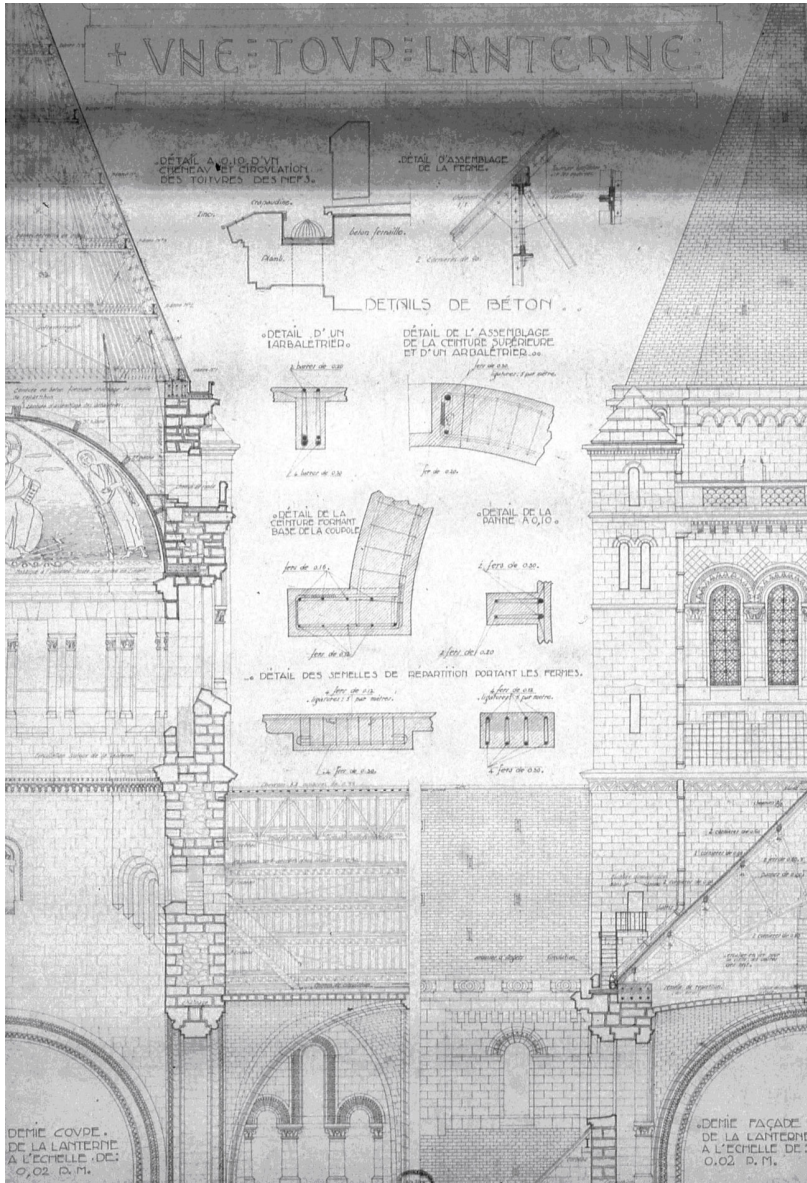


Figure 12. Dupas, "concours de construction générale" 1924: a lantern. Section, facade and details (BENSBA CG 362).

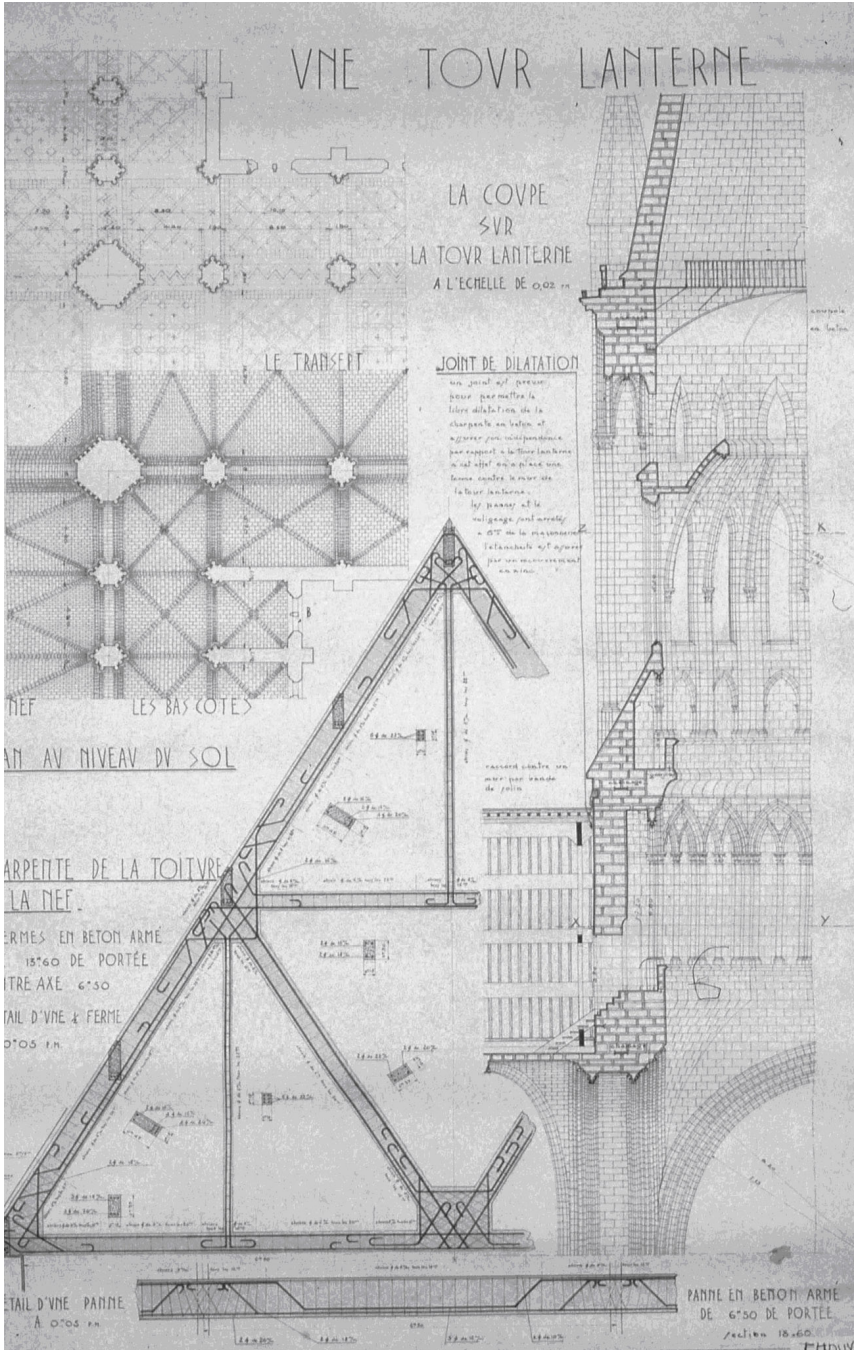


Figure 13. Thouvoy, “concours de construction générale” 1933:a lantern. Section and details (BENSA, CG - not catalogued)

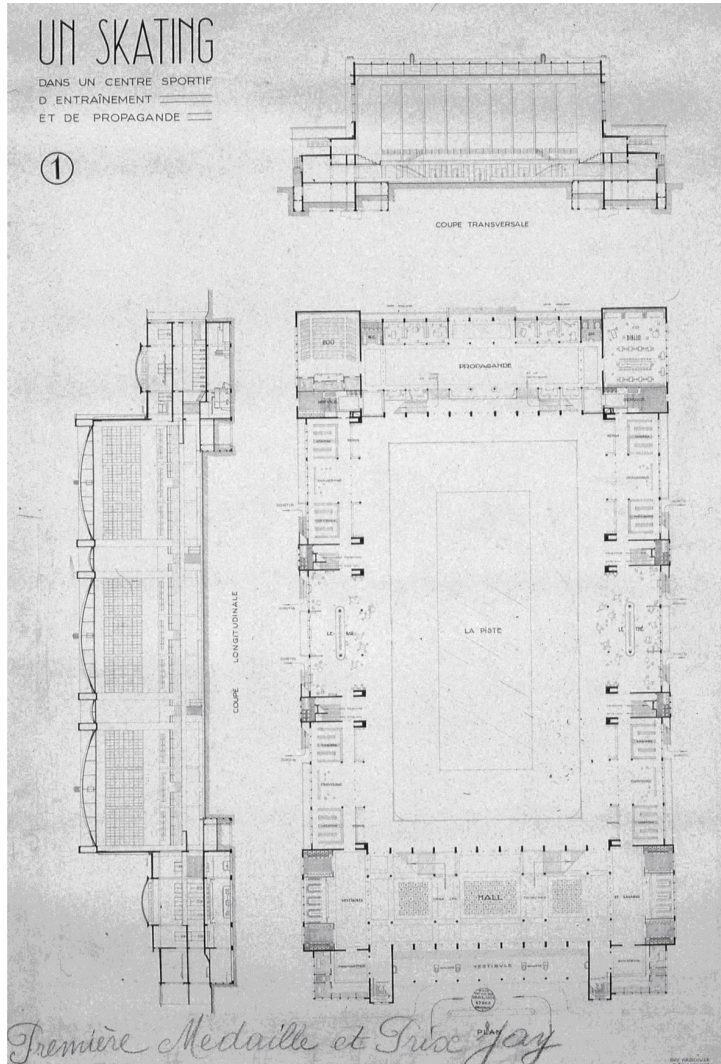


Figure 14. Ardilouze, “concours de construction générale” 1934: a skating rink in a sports training and advertising center. Plan, cross and longitudinal section (BENSBA, CG - not catalogued)

Lastly, in the 1934 competition programme, centered on a skating rink, a whole section on the technical requirements was annexed to the description of the project. Special attention was given to the characteristics of the installations intended for refrigeration, of the track itself and of the central heating and the ventilation of the building (ENSBA. Les concours d’architecture 1934-35, pp. 6-7). The pupils could not remain insensitive to this overwhelming and meticulous presentation of the project. It is enough to consider and compare the presentation boards of the first two medals, respectively the Prix Jay and the Prix Chedanne: Ardilouze, a student from the Pontremoli-Leconte

atelier, and Ventre, a student from the Expert atelier (ENSBA. Les concours d'architecture 1934-35, pl. 1-3 and BENSBA, CG no catalogued). One can initially appreciate the various choices which lead to two different solutions for the reinforced concrete structure: one uses large load-bearing structures with rectangular profiles which make it possible to give the large nave its maximum volume and to give light to the interior with large side glass windows (fig. 14); the other includes twelve trusses with a parabolic central core, with a length of 80 metres and a width of 26 metres (fig. 15). But, one also notices the attention given to the technical details filling the complementary boards - a feature of a true in-depth project, where the technical installations played an important role.

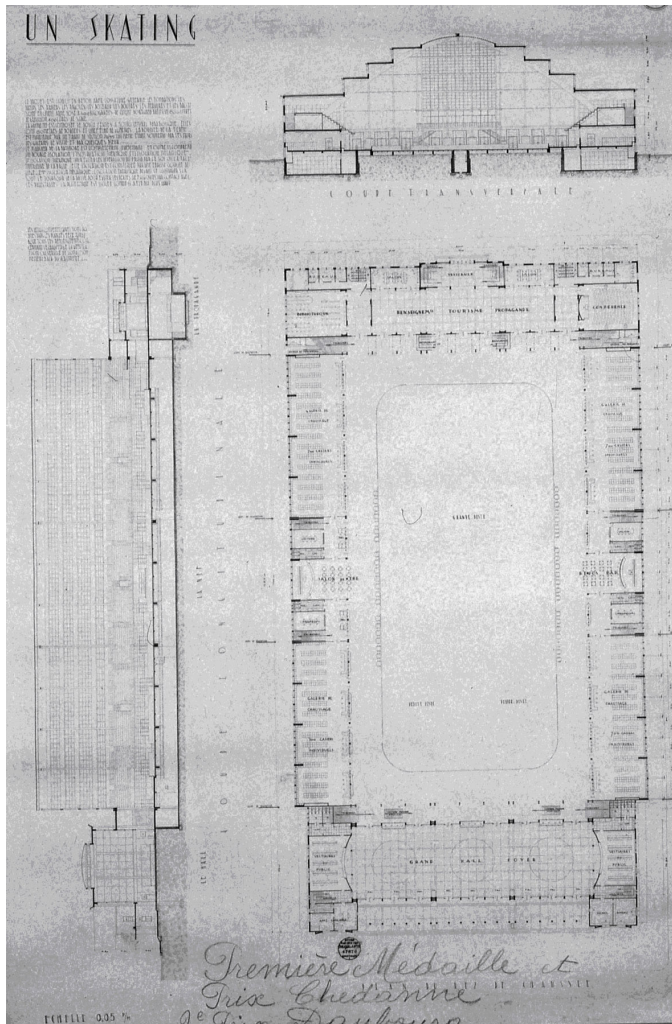


Figure 15. Ventre, “concours de construction générale” 1934: a skating rink in a sports training and advertising center. Plan, cross and longitudinal section (BENSBA, CG - not catalogued)

MORE AMBITIOUS REFORMS

Arnaud is quite conscious, in 1931 still, of the limits of teaching architecture at the Ecole des beaux-arts: “technical teaching concerning construction is there, let us say it frankly, completely elementary and even, in many areas, completely non-existent, compared to that which is taught in our school” he said addressing his Ecole centrale pupils (Arnaud 1931a, p. 6).

On the other hand, Arnaud is one of several craftsmen who filled a sizable gap in the pedagogy of Ecole des beaux-arts. Real change began in 1932, under the influence of Emmanuel Pontremoli (1865-1956): Ecole des beaux-arts director and an architect, already the head of his own atelier, he proved attentive to the questions of method in architectural pedagogy.

In the spirit of creating a stronger cohesion between the education and the profession of the architect (Pontremoli 1933), Pontremoli is interested in creating balance in architectural training so as to guarantee the understanding of questions relating to the execution of the project.

It is indeed essential that young Architects in the School should know certain techniques, so that they have the understanding necessary to work and handle the work load. [...] Without decreasing the value of our School from an artistic and composition point of view while perpetuating our robust traditions, it is necessary, so that our School keeps its standing, that our pupils, in addition to this high teaching, are sufficiently armed to be able to discuss, to control, to order.

(Pontremoli, letter to the chefs d’atelier, July 1934 circa, AN, AJ/52/979)

In 1932, in spite of the budgetary difficulties that prevented the foundation of new chairs, lectures were organized on reinforced concrete (attendance was purely on a voluntary basis), which allowed the pupils to acquire a thorough knowledge compared to the general concepts provided by the construction class. As a principal collaborator of Pontremoli in the realization of this project, Arnaud had proposed, on 7 December 1931, that François Vitale, already a professor of a reinforced concrete course at the Ecole spéciale d’architecture since 1925, and Raymond Guillaume (1882-1946?), engineer, and teaching assistant at the Conservatoire national des arts et métiers and also a teacher at Ecole centrale, be professors for the theoretical (CAP, VitFr 186 Ifa 3) and practical sections of the lectures. The following year, Arnaud hired Marcel Véron (1900-1984) to organize a biennial series of lectures on ventilation and heating installations of buildings. At the same time, Arnaud’s colleague and fellow student, Félix Marboutin (1864-1941 circa), professor at Ecole centrale, was asked to organize a special teaching session on hygiene and healthiness in housing (Brucculeri 1997). The choice of the specialists by Arnaud illustrates the exclusive nature of the scientific culture of the Ecole centrale.

Even after 1934, when Arnaud left teaching, the debate that he had started on the technical

preparation of the students continued to have a fundamental influence at the Ecole des beaux-arts. Pontremoli, director of the college until 1937, and Vitale, as a new holder of the construction chair, reorganized the construction course again, keeping with the idea of the parallel positions that composition and construction held in the teaching of construction. With Vitale, Pontremoli studied the definition of a teaching programme, which led to the evolution of the teaching of composition between first and second classes:

It appears to me that the course of construction should follow the same method and the same rate. The second class: general and analytical elements of Construction – its anatomy – with the study of the various elements in time and space, comparing it with what is practiced in medicine [...]. In the first class, on the contrary, the comparison would be closer to that of an orchestra class [...]. The course should relate, consequently, to the constructive choice for such programs – on the establishment of the projects according to the selected method of construction, on the details of construction, and finally on the techniques: heats – air – light – evacuations – communications necessary to fulfill the program.

(Pontremoli, letter to Vitale, 7 Decembre 1934, AN, AJ/52/976)

Accordingly, the lectures on heating and ventilation continued, from 1935, under André Missenard (1901-1989), former pupil of the Ecole polytechnique, while a new cycle of lectures devoted to electricity and lighting engineering started in the 1934-35 academic year. Pontremoli discussed the creation of this cycle directly with the Public Service Unions of Electricity; moreover, he supported the initiative of Missenard to supplement the theoretical courses with a series of visits to particularly interesting technical installations (AN, AJ/52/979). In this context, Vitale is diligent in continuing the challenges laid down by his master. While flying in the face of the official teaching system, these new strategies in technical teaching were supported by the principal of the Ecole des beaux-arts, even after the departure of Pontremoli, and played their part until the true reform of the teaching of architecture in France was conceived under the Vichy government.

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