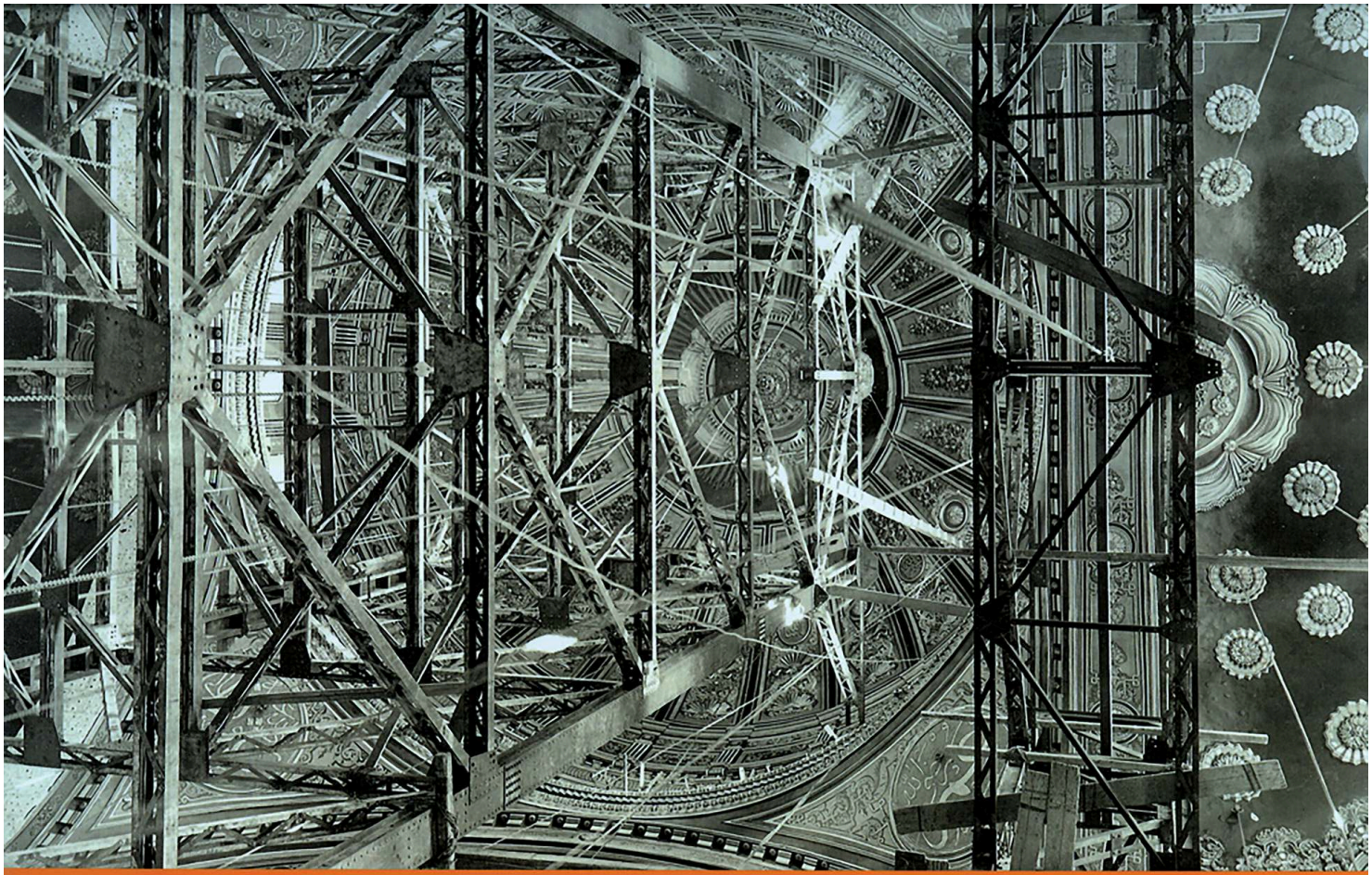

Honoré Clair

BUILDING BEYOND THE MEDITERRANEAN

STUDYING THE ARCHIVES OF EUROPEAN BUSINESSES (1860-1970)

Building Beyond The Mediterranean

Studying The Archives of European Businesses (1860-1970)

Construire au-delà de la Méditerranée. L'apport des archives d'entreprises européennes (1860-1970)

Claudine Piaton, Ezio Godoli and David Peyceré (dir.)

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Honoré Clair

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Muhammad Ali Mosque, Cairo: The interior scaffolding for restoration in the 1930s (C. Andreae collection, ETH, Zurich)

BUILDING BEYOND THE MEDITERRANEAN

STUDYING THE ARCHIVES OF EUROPEAN BUSINESSES (1860-1970)

Edited by Claudine Piaton, Ezio Godoli and David Peyceré

Honoré Clair

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Introduction

Mercedes Volait

Interest in European architecture beyond Europe, particularly in the Mediterranean, is currently thriving. But specialists are aware that the field is not easy to document, should they wish to go beyond the usual material provided by architectural journals in European languages. In many cases, it is biased or limited to a survey of what survives on the ground. Research is complex and difficult for many reasons: sources are dispersed north and south of the Mediterranean, there are no dedicated research centers, and access to documentation fluctuates from one country to another. Given such circumstances, this initial panorama of the resources offered by the archives of contracting companies based in Europe is quite an achievement.

Since 2002, these research teams have been studying modern architecture in the Mediterranean.[1] They have identified the archives of European companies active in the region from 1850 as a rich source of information. In many cases, company archives are the only source for visual records of one or another construction or worksite. This is the case for Hennebique Reinforced Concrete, an engineering office that has preserved unequalled Mediterranean imagery, well identified since 2003.[2] Likewise, certain companies documented the important role they were playing as developers. The Compagnie Universelle du Canal Maritime de Suez built several Egyptian cities from 1862 on.[3] Even the fraternal benefit society that accompanied the Italian migration across the Mediterranean commissioned significant developments in housing and facilities in Egypt, Tunisia, and Libya.[4] These preliminary findings were an invitation to continue the exploration; this has now been achieved with the present publication. It contributes its own lot of fascinating discoveries: surprising projects (in the field of monument restoration), unknown partnerships (occasioned by big jobs like the reconstruction of the great temples of Nubia), and concepts of urbanism (in the case of mining towns, for example).

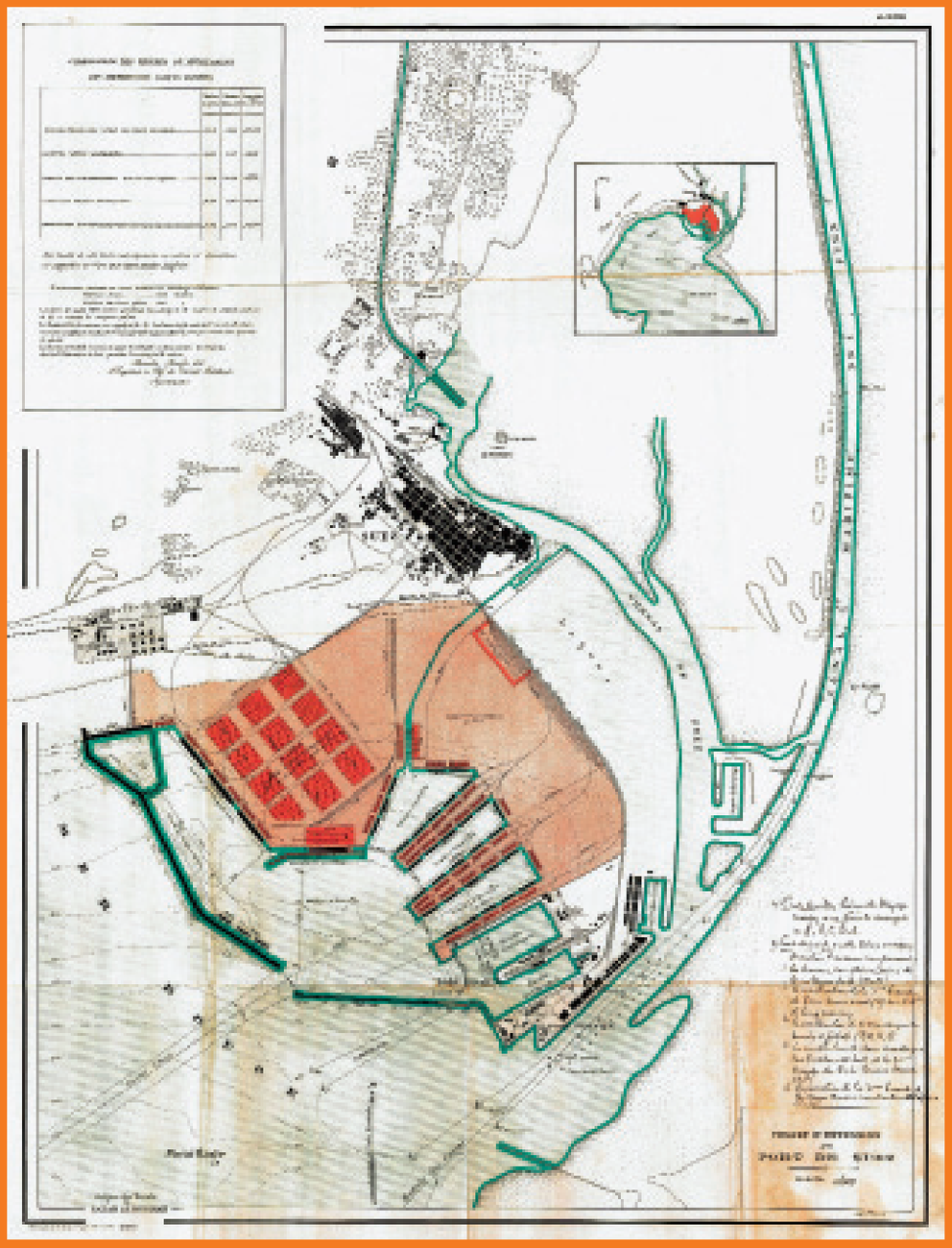
Research is certainly far from being completed. Investigations into crafts like wrought iron and mosaic have only just begun. Many companies involved in finishing work have never been studied – for example, the British manufacturers, Critall, flooded the international market with steel window from the 1850s. Schindler elevators were trading regularly with Mediterranean construction contractors from the 1900s. All of this unpublished material is of interest not only to research; the information it provides is also useful for those who work on the conservation of recent heritage. Possessing accurate and reliable information on building techniques and materials is a guarantee of sustainable and high quality restoration, when the time for redevelopment and reuse comes.

Construction archives in the Mediterranean are still underused by architectural historians, who are more familiar with the archives of architects. They are indeed unevenly inventoried in public collections because they require specialized knowledge on non-European contexts. They are furthermore troublesome for companies lacking dedicated archival departments. However, for both research and restoration, they constitute a unique asset, and a cultural heritage that deserves to be preserved and enhanced. May this volume provide the demonstration of this, and convince the holders of contracting archives of the potential slumbering in their filing cabinets.

- 1 -

VILLES ET RÉSEAUX
CITIES AND NETWORKS
CITTÀ E RETI
المدن و شبكات المكاتب

BUSINESS NETWORKS ABROAD



Port of Suez extension project (1918),
Gaston Jondet, eng.: Overall map

Entrepreneurs, contractors, public works in the Maghreb and the Middle East from the 1860s to the 1940s

Dominique Barjot

1860-1914: From Egypt and Algeria to the entire Arab-Muslim world

Essentially, the major works of French contracting companies and contractors in the Maghreb and the Middle East began in the late 1850s and early 1860s.

Two geographical areas attracted them first: Egypt and Algeria. In the former, the arrival of contractors was prepared by that of engineers. The major event was the construction of the Suez Canal. Works began in 1859, but the contractors arrived in 1862: Paul Borel and Alexandre Lavalley and their bucket dredgers; Alphonse Couvreux and his digger; and the brothers Élie and Elzéard Dussaud with their cranes, used to build the facilities at Port Said. Thanks to them, the canal was finished in 1869. They introduced a new generation of engineers. Alexandre Prompt and Jules Barois directed the hydraulic development of the Nile Valley during the 1880s and 1890s. Then came Laurent-Louis Godard, technical advisor to the Minister for Public Works, from 1908 to 1911. He opened the way to the Établissements Schneider, whose head of Public Works, Charles Laroche, gave the port of Alexandria a new berthing pier in 1913. Nevertheless, the most active French company was undoubtedly the Société des Grands Travaux de Marseille (GTM). Benefitting from its alliance with the Almagià brothers' firm, from Rome, it carried out major dredging at Suez (1903 and 1905), Port Said (1905), and Alexandria (1909). Spurred by Charles Rebuffel, their chief manager, the GTM then made an alliance with Schneider et C^{ie}.

In Algeria, Antoine Castor, Hildevert Hersent, and Joseph Lesueur very soon began to compete with the Dussaud brothers. The three partners built the bridges of Duvivier and Bougie in 1860, then tackled the construction of the ports of Philippeville in 1863 and of Bône in 1867. Their most important works nevertheless remain the breakwater and quay walls at Philippeville, from 1883 to 1892. At that time, Ernest Goüin was already involved with the construction of the railway from Bône to Guelma from 1876. At the turn of the century, between 1899 and 1905, the Giros & Loucheur company built the Hussein Dey thermal power plant. They changed the company's name to Société Générale d'Entreprises (SGE) in 1908 and took over the Ciments de Rivet-Alger in 1913. The first rolling companies set up in Algeria as early as 1895: hence the compactor specialists Émile (1895) and Henri Saucède (1904).

However, it was Tunisia which attracted the most contractors. Already participating in the Bône-Guelma railway, the Société de Construction des Batignolles (SCB), managed by Jules Goüin, was granted a concession to develop the port of Tunis (1885-1890). There it faced competition from Hildevert Hersent, and afterwards from his sons Jean and Georges, who had had a base at Bizerte since 1883. They developed the town, building three successive tranches of the port (1883-1892, 1899-1902, 1913-1914), the large ship refitting basins at Sidi-Abdallah (where the Fougerolle brothers were also working, as was GTM) (1901-1905), and cleaned up the bay of Sabra (1913-1914). Between 1899 and 1903, Alexandre Giros built the aqueduct from Bargou to the city of Tunis. In 1901, the Société des Mines d'Asphalte du Centre created an agency in Tunis to pave the city streets. Later, Morocco was at the origin of the creation in 1912, of the Consortium Marocain (SGE + GTM + Fougerolle frères + Établissements Daydé), which a year later became the Société Générale d'Entreprises Marocaines (SGEM).

The ambitions of French companies were not limited to the Maghreb. They progressed as far as Ethiopia, where from 1897 to 1910, Duparchy and Vigouroux built a large portion of the Djibouti-Addis Ababa railway line. But the most important projects were built in the Ottoman Empire, such as the port of Smyrna, developed from the 1860s by the Dussaud brothers. The most active company there by far was the Régie Générale des Chemins de Fer owned by Count Philippe Vitali. It obtained the concession for major railway lines: Thessalonica–Constantinople (1894-1920), Smyrna-Cassaba, today Izmir-Turgutlu (1894-1934), Nakoura-Beirut-Tripoli (1901-1955). Likewise, it acquired the concessions for the ports of Beirut (1901-1947) and Tripoli (1901-1955). In the Middle East, it met with lively competition from other French firms,

such as SCB, owned by Ernest and Jules Goüin, which built the Moudania-Bursa (1891-1893) and Beirut-Damascus (1891-1893) lines as a concession. Joining forces with the companies Hersent and Schneider et C^ie^, the Régie Générale des Chemins de Fer created the Consortium des Ports Ottomans. Other companies swarmed the Empire, too, such as the SGE, whose subsidiary, Ottomane d'Électricité, built a large thermal power plant at Constantinople (1912-1914). The same year, another consortium, the Société Générale d'Entreprises dans l'Empire Ottoman (SGE + GTM + Fougerolle frères) won an enormous contract to maintain the roads in the Empire.

1914-1945: A withdrawal to the colonial empire

World War I caused French companies to pull back from vast territories like the Ottoman Empire. Ataturk's Turkey was not especially open to them either, despite the creation by Eau et Assainissement, a subsidiary of Pont-à-Mousson, of the water system of Bursa (1930) and the construction by the Régie Générale des Chemins de Fer of the aerodrome at Izmir and of 50 km of tourist roads around the town in 1937-1939, in partnership with the Société des Routes Modernes. Egypt also became less friendly, as the experience of the GTM shows: after building workers' housing for the Compagnie de Suez in 1921, the company tried to create an agency in 1925. It remained relatively inactive after it failed to obtain the contract for the construction of the Nag-Hammadi dam. The Société Anonyme Hersent (SAH) also encountered setbacks: in 1934, although victorious in the competition for the works at the Assiut Barrage, it was rejected by the Egyptian authorities in favor of a British firm. In 1936, it nevertheless opened an agency. Until 1940, this office carried out numerous civil-engineering works for the Egyptian government, such as the famous El-Alamein roadway.

SAH also had little luck in Iraq, where it was again excluded from a competition it had won (the Kut dam, 1933). It made up for the loss in Iran, with the construction, from 1934 to 1938, of 14.8 km of the Trans-Iranian railway line (including 15 tunnels, two bridges and 5 viaducts) in cooperation with Edmund Nuttal Sons and Co, a major British family firm. They created a joint venture managed by the SAH. Even though the SCB failed to create a consortium with Ulen (United States) and Julius Berger (Germany) to build the entire Trans-Iranian line, the Régie Générale des Chemins de Fer also won two tranches (13 km with two large viaducts and 6.5 km of tunnels).

The French companies returned to their own colonial empire, where major technical opportunities came their way. Certainly, World War I slowed down business, but some construction continued: the Ouenza railway line in Algeria (to 1916) and narrow gauge railway lines in Morocco (1917-1918). In particular, from the early 1920s, reinforced concrete contractors did a booming business. The material was ideal for port works (Kenitra wharf in 1921 by the Société des Grands Travaux en Béton Armé or GTBA) as well as bridge construction. The bowstring bridge without triangulation on Mellègue wadi in Tunisia (1927) was an engineering exploit designed by Henry Lossier for the Entreprises Fourré & Rhodes (EFR). GTBA built a span over Sebaou wadi in Morocco (1923). In this field, Enterprises Boussiron, founded by Simon Boussiron, was the firm that completed the most projects, through its subsidiaries in Algeria (bridges at Bil-Braguetz and Perrégaux), Morocco (airfields), and Tunisia (Bizerte hangars, 65m span, 1931). In 1936, Jacques Fougerolle took over his father-in-law's company and changed the name.

Roads also offered interesting prospects for works. The most active companies were the Société Anonyme pour la Construction et l'Entretien des Routes (SACER), established by Gaëtan Brun, and Société Routière Colas. SACER, founded in 1913 in Morocco, built numerous roads and avenues in Algiers, Bône, Philippeville, and Tizi-Ouzou in the interwar period. Colas, managed by Georges Mathieu, had been spawned by the Emulsion Department of the SGE. From 1929 on, having become the Société Routière Colas, it developed significant business in Algeria and Morocco, where it

operated three of its nineteen factories. There they met with competition from the Routes Modernes, established for a time in Algiers (1929-1930), from Viasphalte, whose Algerian agency also operated three factories, at Oran, Philippeville, and Constantine. Finally, numerous companies worked on the electrification of Northern Africa: for example, Parisienne Électrique, a subsidiary of the Empain group, installed lines for the Algerian railways from 1924 to 1926, then equipped the port of Algiers in 1933. The Compagnie d'Entreprises Électriques et de Travaux Publics, a subsidiary of the CEM, also worked there, on the electrification of the Bône-Oued Keberit in Algeria from 1929 to 1933, l'Électro-Entreprise of the Lebon Group which, in Morocco equipped the Petitjean-Meknès-Fez line (1934) and the Compagnie Générale d'Entreprises Électriques (CGEE), subsidiaries of the Compagnie Générale d'Électricité, established in Algeria and Tunisia since 1928 and which opened an agency in Algiers in 1935.

In the Empire, French companies were active chiefly in Algeria (almost a quarter of colonial contracts between the two wars). There, they built railway lines and ports. Of all the construction projects, the biggest was undoubtedly the port of Mers-el-Kébir. It employed Dragages TP, the Entreprises Campenon Bernard (ECB), the Entreprises de Grands Travaux Hydrauliques (EGTH), the Entreprises Léon Ballot, Ossude & Blanc, the SAH, Sainrapt & Brice, Schneider et C^{ie}, the Société Algérienne des Entreprises Léon Chagnaud (SAELC), and Truchetet & Tansini. French firms also responded to new needs: the construction of churches and thermal power stations (one in Algiers in 1927) for the Fourré & Rhodes enterprises; the water supply for the company Eau et Assainissement (Bône, Philippeville, Sidi-Bel-Abbès between 1923 and 1934). However, it is the dams that are most striking. Beginning in the second half of the 1920s, spectacular works were begun. They include a gravity dam (Zardezas by the Entreprises Léon Ballot), a dam with multiple vaults (Ksob wadi, from 1931 to 1935, by the Travaux Hydrauliques et d'Entreprises Générales), but also riprap dams: Foum-el-Gueiss (EFR), Ghrib (1927-1937) and Bou Hanifia (1932-1943). Ghrib and Bou Hanifia were enormous SAELC projects, completed while the company was developing the lower Chéliff valley for irrigation and modernizing the port of Mostaganem. In terms of dams, the ECB have to their credit the Fodda wadi (1926-1932), of the Hamiz (1934-1935), where they introduced prestressing, the Portes de Fer (1937-1939) and the Beni Bahdel (1939-1941). The implementation of the 44 km of overflow ducts of the Fodda wadi were a decisive step towards the final victory of prestressed concrete.

In terms of infrastructure, Tunisia had acquired a certain lead before World War I. Nevertheless, major construction projects continued there, such as dams (Oued el-Kebir by GTM from 1921 to 1925), thermal power stations (La Goulette, in 1926 by EFR), underground fuel oil tanks (Ossude et Blanc, from 1930 to 1936). Through its subsidiaries France Dragages, Compagnie du Port de Bizerte, and Énergie Électrique de la Ville de Bizerte, the SAH was in a privileged position on the Tunisian market. However, it was faced with increasing competition. Numerous companies from France tried to expand there, sometimes unsuccessfully, such as the SGE, through the Société Tunisienne d'Entreprises, liquidated in June 1924. Others, like the Entreprises Chaufour-Dumez, succeeded. Their Tunisian subsidiary worked at Tunis and Bizerte from 1935 until 1944. Even more spectacular was the success of the Société des Grands Travaux de l'Est (GTE). Founded in 1930, their Tunis agency built military barracks at Bizerte, Sousse, and Tunis, and buildings for industrial complexes, like phosphate silos, at Sfax and Tunis. Spurred by CEO Jean Vichot, the company thus penetrated the Algerian market, in 1936, where it worked on the development of ports and delivered schools and aviation hangars. In 1939, the GTE earned over 50% of its turnover there.

The Depression of the 1930s hit Morocco hard. However, it had been a sort of Eldorado during the previous decade. Banque de Paris et des Pays-Bas (Compagnie Générale du Maroc) and Schneider (Compagnie Marocaine) and their entrepreneur allies vied fiercely for the market. It offered immense construction prospects, in port development, for

example. Schneider et C^ie^ in partnership with the SAH got the contract for ports at Casablanca (1913-1929) and Safi (1923-1929). In 1916, the Société des Ports Marocains was constituted. It combined the SGEM, the Compagnie Marocaine, and Omnium d'Entreprises; between 1919 and 1927, it built the ports of Méhédya-Port Lyautey (Kenitra) and Rabat-Salé. The competitors quickly reached an agreement: in 1920 and 1923, the Générale du Maroc and the Compagnie Marocaine respectively gave rise to the Chemins de Fer du Maroc and to Énergie Électrique du Maroc. From then on, enormous railway construction projects began to install an electrified network that was more modern than the one in mainland France. Fougerolle Frères delivered a portion of the Tangier-Fez railway line in the 1920s, and major works were carried out on the CFM network: Fougerolle Frères, GTM, and SEG built lines south of Rabat from 1920 to 1926, while Schneider et C^ie^ worked in the north from 1920 to 1929. The EGTH (1929-1933) and the partnership Ballot-Gianotti Frères (1931-1933) also worked there, on the Fez-Oujda line. Finally, in 1935, the Port-Lyautey-Petitjean link was finished, on which Bringer et Tondu, A. Dehé & C^ie^, and l'Électro-Entreprise worked. Lyautey's decision to condemn the narrow-gauge railway line required major construction on bridges and tunnels (Le Scorpion by Fougerolle Frères).

Morocco's hydraulic and hydroelectric development also offered perspectives. The large dams built in the period include the EGTH projects on the Mellah wadi (1927-1931) and on the Beht at El Kansera (1927-1935). Hydroelectric power was harnessed at Sidi Said Machou, 1924-1929, by SGEM. which also built the thermal plant at Casablanca. The cities also needed a water supply. Eau et Assainissement thus carried out major works at Ksar-el-Kébir (1928) and Rabat (1931-1932). Bringer et Tondu installed the irrigation system for the Sidi Yahia oasis near Oujda, in 1930 before working on the sewer system for Marrakech, in 1935. As for the Société des Tuyaux Bonna, it laid 130 km of water pipes and other conduits to bring water from the Fouarat region as far as Casablanca, Fédala, Port-Lyautey, Rabat, and Salé. Everything slowed down noticeably in the 1930s, due to the absence of a protectionist customs system in Morocco. French companies switched to Algerian clients.

Between the two wars, France governed three League of Nations mandates: Syria, Lebanon and the Sanjak of Alexandretta (today's Iskenderun, Turkey). In Alexandretta, especially, GTM and the Société Française d'Entreprises (SFE) developed a modern port under the concession regime, from 1922 to 1927. Incorporated in 1914 by GTM, SGE, and Fougerolle Frères, SFE, in partnership with Fougerolle Frères, built the suspension bridge over the Euphrates at Deir-es-Zor. From 1925 to 1933, the Travaux Hydrauliques d'Entreprises Générales (THEG) worked on the Damascus water supply lines, then in 1934 on raising the dam at Homs Lake. During the 1920s, the Entreprise Sainrapt & Brice, which was also active in Oran and Mostaganem, constructed a dam and irrigation canals in this part of Syria. As for the CGEE, it delivered its first hydraulic power station on the Orontes river, Syria, in 1935. Finally, Lebanon remained the preserve of the Régie Générale des Chemins de Fer. It built an additional 70 km of railway lines and pursued equipping the ports of Beirut (1925-1940) and Tripoli (1933-1939). In Beirut, the Régie also graded and built the airport, and dozens of buildings.

The Société Anonyme Hersent reinforced its presence in the Empire (26.5% of its turnover from 1919 to 1929, 41.2% from 1929 to 1939). The company worked on the port of Algiers with Schneider et C^ie^, from 1921 to 1939, but also at Safi and Casablanca. In Morocco, it controlled the Compagnie Marocaine de Fédala, which dealt in real estate, and its subsidiary, the Société du Port de Fédala. Although SAH failed to make Fédala a major oil terminal, it created a modern fishing port and built Morocco's main refrigerated warehouses there. GTM enjoyed a similar expansion (22.7% of its turnover in the Empire from 1913 to 1931, 37.8% from 1931 to 1939). In Tunisia, as early as 1921, it installed the Tunis-Bizerte high voltage line, then the Tunis-La Goulette thermal power station. In Algeria, it set up part of the Compagnie Méridionale de Mostaganem's network,

especially the Oran-Mascara high voltage section, developed the waterfall at Aïn Tinzert (1932-1936), and built the Bakhada dam (1932-1936). In Morocco it built the Fez hydroelectric station (1932) and dam (1932-1935), then the N'Fis hydroelectric factory. Finally, it cooperated with the SFE on equipping Djibouti, in 1936, a project in which the SCB and the Entreprises Métropolitaines et Coloniales also took part. The SCB appears to have been less involved in the Empire (9.1% of its turnover from 1913 to 1932, 11.3% from 1932 to 1939). Nevertheless it took a majority share in the constitution of the Compagnie Générale des Colonies, with Paribas, Fougerolle, GTM, and SFE. In Morocco, with SGEM, it erected the dams of Sidi Said Machou, then of Im Fout (1939-1944), over the Oum el-Rebia.

World War II significantly reduced construction activity by French companies, even though some, such as the Grands Travaux de l'Est, withdrew from France to its colonies. Others suffered a lot from the situation. The SAH continued its projects in Algiers, on the naval base of Mers-el-Kébir and in the port of Casablanca. However, at Bizerte, it was subject to so much destruction it was obliged to sell out to the Société Foncière de l'Afrique du Nord. In fact the concentration on the Maghreb (55.4% of total turnover from 1939 to 1944) only provided slight comfort. The GTM followed the same route, but depended less on North Africa alone (28.6% of turnover at the same dates) and, above all, carried out income generating hydraulic works in Morocco. The situation appeared generally identical for SGE (21.3% of total turnover in North Africa, mainly in Morocco from 1939 to 1944). These two companies thus retained their advantages faced with the challenges of the post-war period.

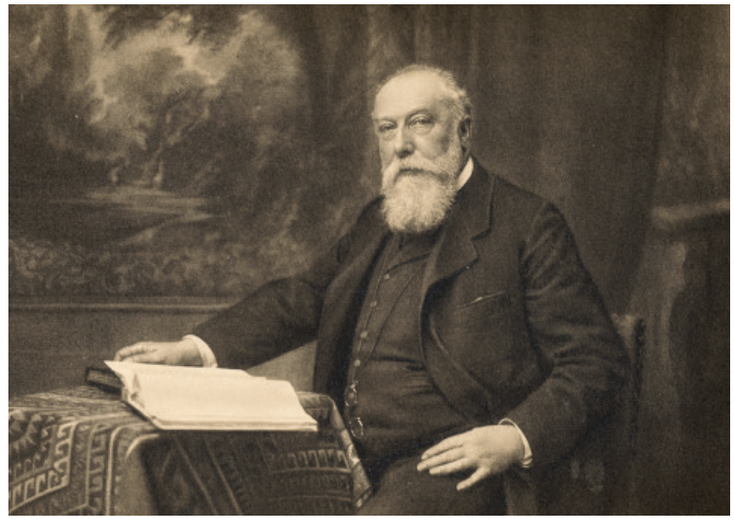
Beyond the Haine: The growth of the Belgian company Baume & Marpent

Karima Haoudy

"The modest foundry of Baume which, in 1870, employed just 60 workers and staff, whose facilities barely covered 2 hectares around 1875, became this powerful corporation, with buildings and courtyards spreading over more than 60 hectares, where over 4,000 engineers, technicians, administrators, and workers labored daily." (Écomusée de Bois-du-Luc, fonds Baume & Marpent, company catalogue, c. 1953).

At the origin of Baume & Marpent, the steel construction giant whose influence extended worldwide, was a doctor, Clément Delbèque (1810-1893). Born in Morlanwelz (in the province of Hainaut, Wallonia), he started out in the industrial sector by opening a modest foundry in 1853 at Baume, where he owned land ideally situated along the "Mons-Manage and extension" railway line.[1] Initially oriented towards the manufacture of hardware items for building, the Baume, Delbèque et C^{ie} foundries specialised in the production of axle boxes, buffers, and other cast iron parts for the equipment of railways, an industry that was booming in the second half of the 19th century.

The small local foundry's growth to a firm with multinational reach was driven by the founder's nephew, Léon Moyaux (1846-1912).[2] He pioneered the growth of both production and sales, diversifying the manufacturing program at home and conquering new markets beyond Belgium's borders. After training to be a mining and civil engineer at the University of Liege, Léon Moyaux became the general manager of the company Delbèque et C^{ie}, which became the company Baume & Marpent in 1913.[3] Moyaux was a model 19th century "captain of industry." The charities to which he donated were essentially educational for industrial purposes (he contributed funds to the École Industrielle of Morlanwelz and to the Athénée du Centre). He was also on the lookout for technological innovations. Like the majority of industry captains in the Hainaut, he also took on political responsibilities, including that of liberal alderman of public instruction in Morlanwelz, and he built relationships with emblematic personalities of the business world, including the Warocqué dynasty and Ferdinand de Lesseps.



The company's name shows the search for new outlets. The construction, from 1882 of a factory at Marpent (an outskirt of Jeumont, in the Nord department in France) with the aim of avoiding protectionist measures adopted by the French minister Jules Méline under the 3rd Republic, encouraged Léon Moyaux to expand and conquer new markets. Baume & Marpent set up factories – called "*régies*" then "*divisions*" – beyond the Haine, from the name of the river that flows through the Centre region of Belgium, in Italy (provisional division), Egypt, and, after World War II, in the Belgian Congo (Baumaco) and Brazil (a partnership with the SA União dos Construtores Metálicos de São Paulo).

New divisions were created for a variety of reasons: to specialize production, to ensure links with clients on location, to make the most of new markets which were expanding at the time, such as Egypt, to reduce transport costs, to skirt legislation that was too protectionist, etc. Some of these divisions, such as that set up in Egypt, were equipped with workshops which ensured varying levels of independence, depending on their commercial strategic position. They were managed by a steward who was supervised by the general manager of the head office, located at Haine-Saint-Pierre (La Louvière, Hainaut province). They had to report regularly to the Baume & Marpent board

Léon Moyaux, General manager of Baume & Marpent between 1871 and 1902 [undated portrait]

of directors on production, the state of their equipment, the regular conquest of new markets, and how they were managing their facilities. The company also made use of agents who acted as an interface between the company and its clients, whether public or private. The names of these intermediaries were lettered in on certain technical drawings at the time of drafting. Annotations outside the title block mention the agents. Sometimes, a passage in the minutes of a meeting of the board of directors records reception of an order, the genesis of a new project. For example, the design of a summer theatre at Casablanca[4] is not unrelated to engineer Bossut's journey through the Maghreb, to drum up business.[5]

From an analysis of the minutes of the board of directors, it is also possible to see the management's ongoing concern about its agents' efficiency. Léon Moyaux emphasized this on several occasions: "We keep our agents abroad in suspense. Unfortunately, the number of active, skillful agents remains small. We should organize a relatively stable schedule of staff duties."[6]

Although railway construction contributed to establishing the company's fame, starting in 1871, as it was gaining territory outside Europe, Baume & Marpent extended its manufacturing program to the design, production, and assembly of civil engineering structures. The company also explored all the fundamentally innovative resources of steel architecture (pre-fabrication principles, adoption of new materials, architecture that could be taken apart, a syncretic vision of engineering and architecture, etc.). Production facilities were located right next to the head office in Haine-Saint-Pierre, Belgium. All types of bridge systems (fixed and mobile, riveted or soldered bridges) were built there, structures (frames for civil and industrial buildings), gazometers, tanks (water, gasoline, and acid), heavy engineering equipment, steel casts produced in the Bessemer converter, and railway equipment. In 1896, 5km from this nerve center, Baume & Marpent opened the Morlanwelz factory (in the former Brison workshops established in 1844). It specialized in the construction of rolling stock from 1896. The works produced diesel and electric locomotives, diesel, electric, and mechanical trains and coaches of all types, fixed track equipment, a variety of freight cars, cars for tramways, buses and trolleybuses, etc.[7] In France, the Marpent division condensed the two manufacturing programs of its Belgian neighbors. In 1914, a new Siemens-Martin steelworks was opened at Marpent to supply axles, tires, and all sorts of cast steel parts necessary for the construction of rolling stock.[8]

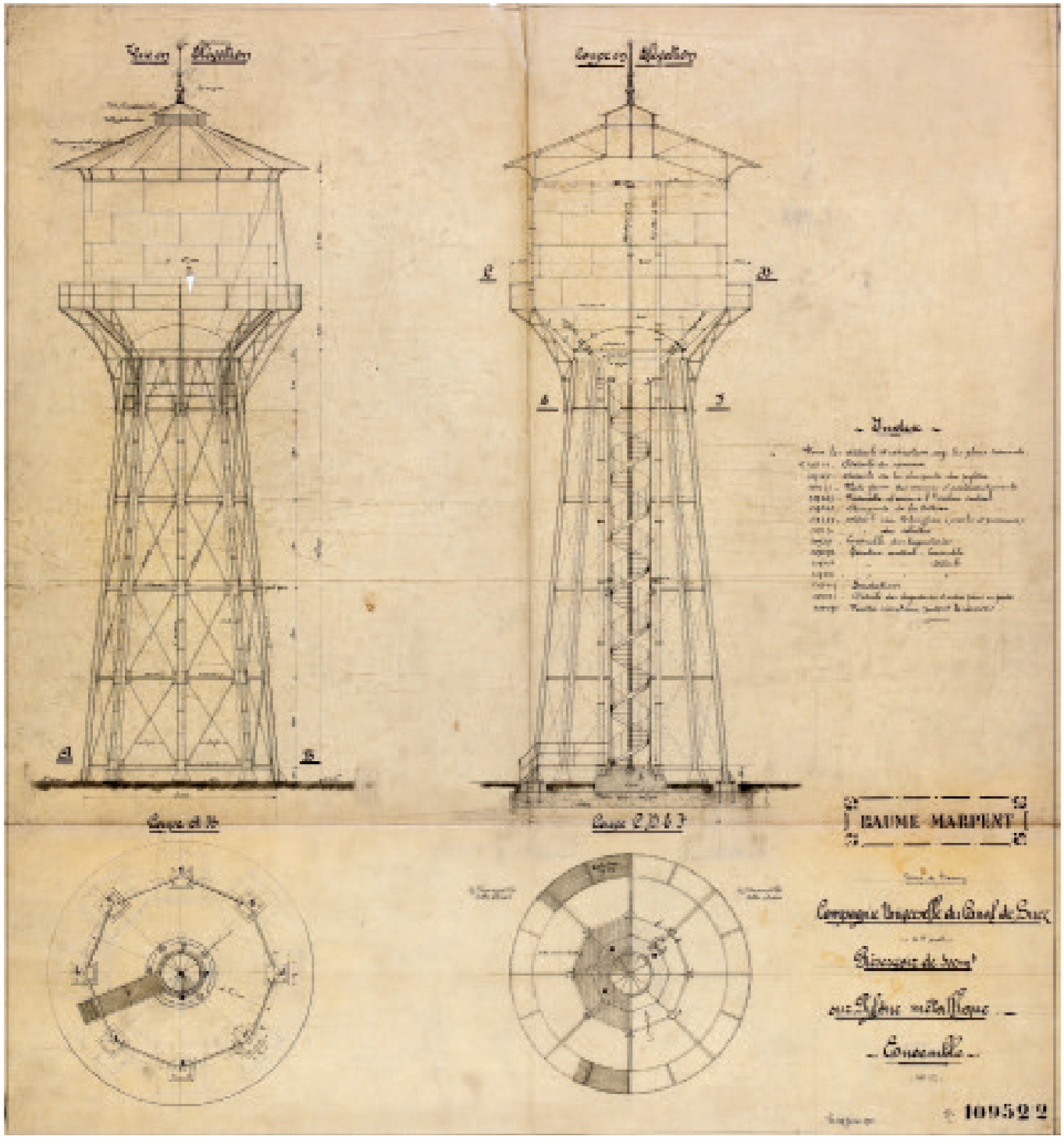
Locating in Egypt

"Baume & Marpent was involved in the majority of the major technical constructions of recent centuries, from the Eiffel Tower to the Suez Canal. […] The largest swing bridge in the world, to open in the near future at El Ferdan on the Suez Canal, emerged from its Belgian factories, and will be built by its Egyptian division."[9]

In 1893, even before it had expanded locally to Morlanwelz, Baume & Marpent set up an assembly workshop in Egypt. At the beginning, the company's sales representatives were Lambert & Ralli. However, Baume & Marpent terminated this contract at the beginning of the 1900s to hire the Camel Toueg office instead, which at the time represented the interests of numerous Belgian industrialists in Egypt.

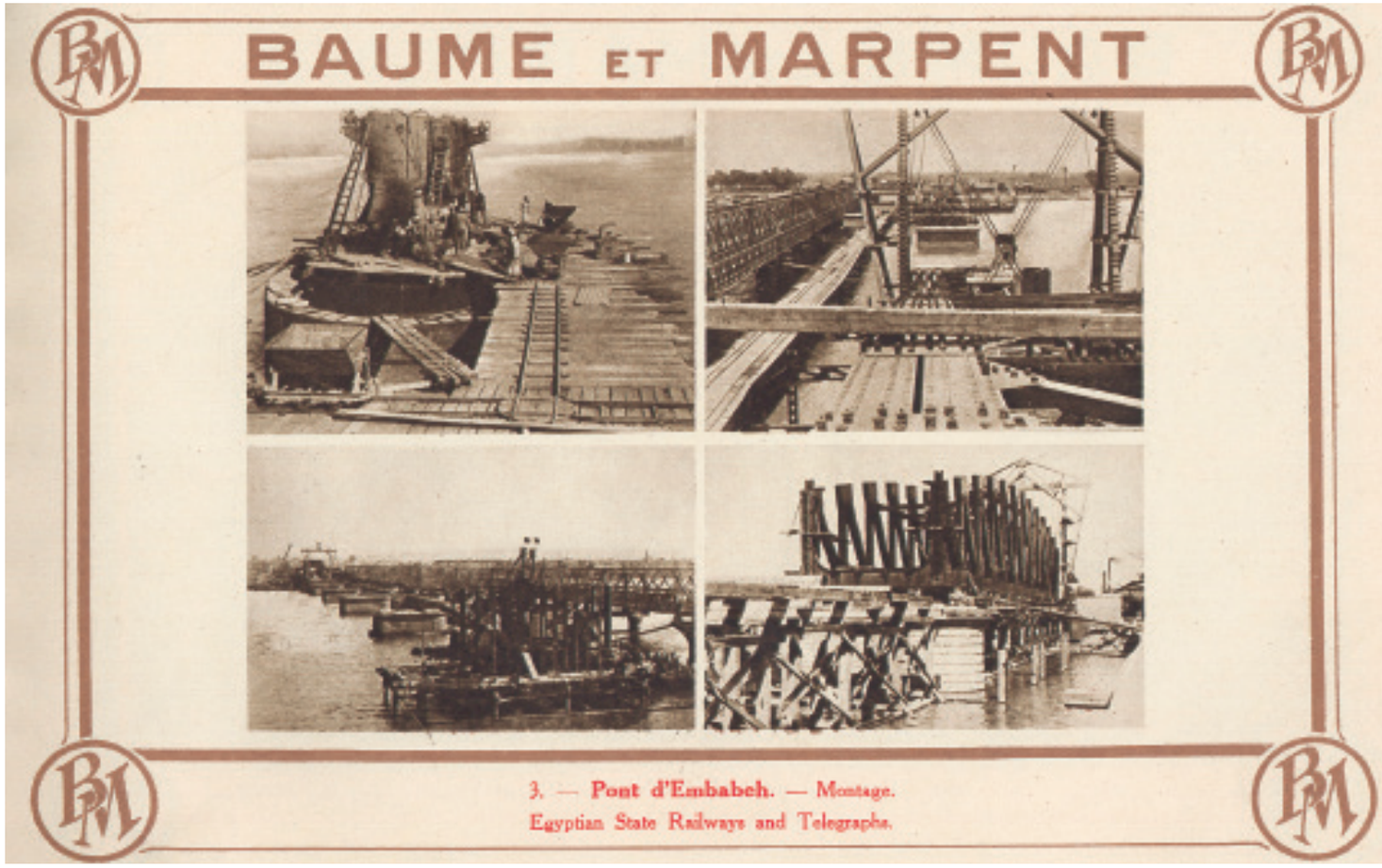
Nearly immediately after Baume & Marpent set up shop in Egypt, the Compagnie Universelle du Canal Maritime de Suez commissioned it to supply water tanks for the Raswa waterworks at Port-Said. Participating in the modernization of infrastructure initiated by the Egyptian Department of Bridges,[10] Baume & Marpent received its first important order in 1894. Although the majority of Belgian companies entered the Egyptian market by building railways, Baume & Marpent proved its skills by building the bridges at Sahel Boulaq, Demerdash, Farkha, and Diffrah, from 1892 on.[11] As a supplier of steel structures, especially bridges, Baume & Marpent tended to stand out in the Egyptian industrial landscape.

300-cubic-meter steel water tower erected for the Suez Canal Company, Port Said (1914): Plan, section, and elevation



Locomotive repair shop, Boulaq, Cairo,
Baume & Marpent cont. : Interior view

Baume & Marpent brochure: Imbaba Bridge construction, photographed phase by phase

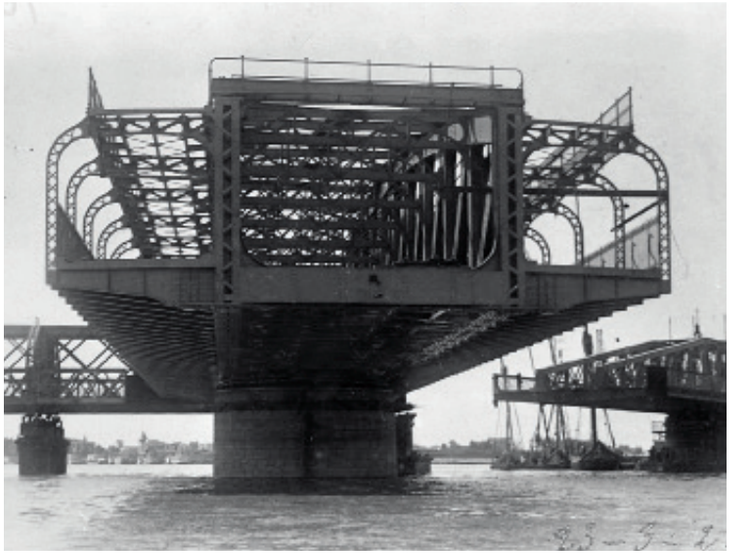


"Mr. Moyaux explains to the Council that in a situation where a major contract for the construction of the Imbaba Bridge is awarded, given the plans to reinforce several bridges in Egypt, it could be advantageous to create a workshop, in Cairo itself, for the erection of the bridges and structures. Mr. Rifflart, present at this stage of the meeting, confirmed Mr. Moyaux's observations; according to him, the profit yielded by the use of indigenous labor would allow significant savings to be made on the costs we would incur in constructing the bridges in our Belgian workshops. Materials procurement, made difficult in Belgium due to reception by British agents, could be done in England, with direct shipping to Egypt; finally, having a workshop in situ would put us in a more favorable position compared with our competitors."[12]

The construction of the Imbaba Bridge (1912-1924) in Cairo, to which Léon Moyaux was referring, was a turning point for Baume & Marpent, both in Egypt and around the rest of the world. A feat of engineering, the Imbaba Bridge was at the heart of the marketing strategy and tools used by the directors of Baume & Marpent, from Léon Moyaux, who attended the cornerstone-laying ceremony, to Jean Carton de Wiart, the company's last managing director. In its relations with Egyptian clients, Baume & Marpent systematically highlighted this important construction. The iconographic variations of the Imbaba Bridge are numerous and the supports

Imbaba Bridge, Cairo (1912-1924), Baume & Marpent, cont.: The swing span, near completion

Egyptian State Railways (1927), Baume & Marpent, cont.: First-class coach monogram design



varied (drawings, photographs, postcards, office decoration, etc.). Besides appearing in all of the company's sales catalogues, a reduced model of the bridge also greeted potential clients in the main lobby of the headquarters at Haine-Saint-Pierre. In Cairo, another reduced model of this bridge entered the collections of the new Railway Museum, opened in 1933 during the International Railway Congress.[13]

In 1912, after winning the Imbaba Bridge contract, Baume & Marpent decided to set up a large outpost in Egypt, equivalent to a "division."[14] This initiative was a continuation of the efforts begun as early as 1893 to set up the Cairo workshop. Managing Director Léon Moyaux, eager to extend the company's markets beyond Belgian borders, planned to send both administrators and workers to Egypt. The latter would be backed up by the presence of local manpower, assigned to varied tasks depending on specialization, as the distribution of work on the construction of the Imbaba Bridge[15] shows. In 1953, when the company was experiencing the major difficulties in Europe that would lead to its closure, Jean Lemaigre, Chairman of the Board of Directors, noted[16] that the Egyptian division required one director, 20 employees, and 350 laborers. During rush periods, the Egyptian subsidiary could mobilize close to 600 laborers. The organization chart tells us that it was managed by a principal engineer from Baume & Marpent, who shared his responsibilities with the "business development" unit, a task entrusted to Camel Toueg & Co. for several years. In addition to administrative services (secretarial and accounting), the management supervised a team of foremen, worksite supervisors; a depot, managed by Baume & Marpent and the Camel Toueg office; and finally a technical service consisting of three engineers chosen by Baume & Marpent.[17]

The Egyptian division had a much broader field of action and greater independence compared to other divisions. In fact, it was responsible for all foundations using pneumatic caissons, the construction of abutments and piers, the erection of structures in reinforced concrete in partnership with other companies such as Rolin & C[ie], and for the assembly of steel structures as well as railway equipment.

The mechanism of exchanges: Baume & Marpent and engineers

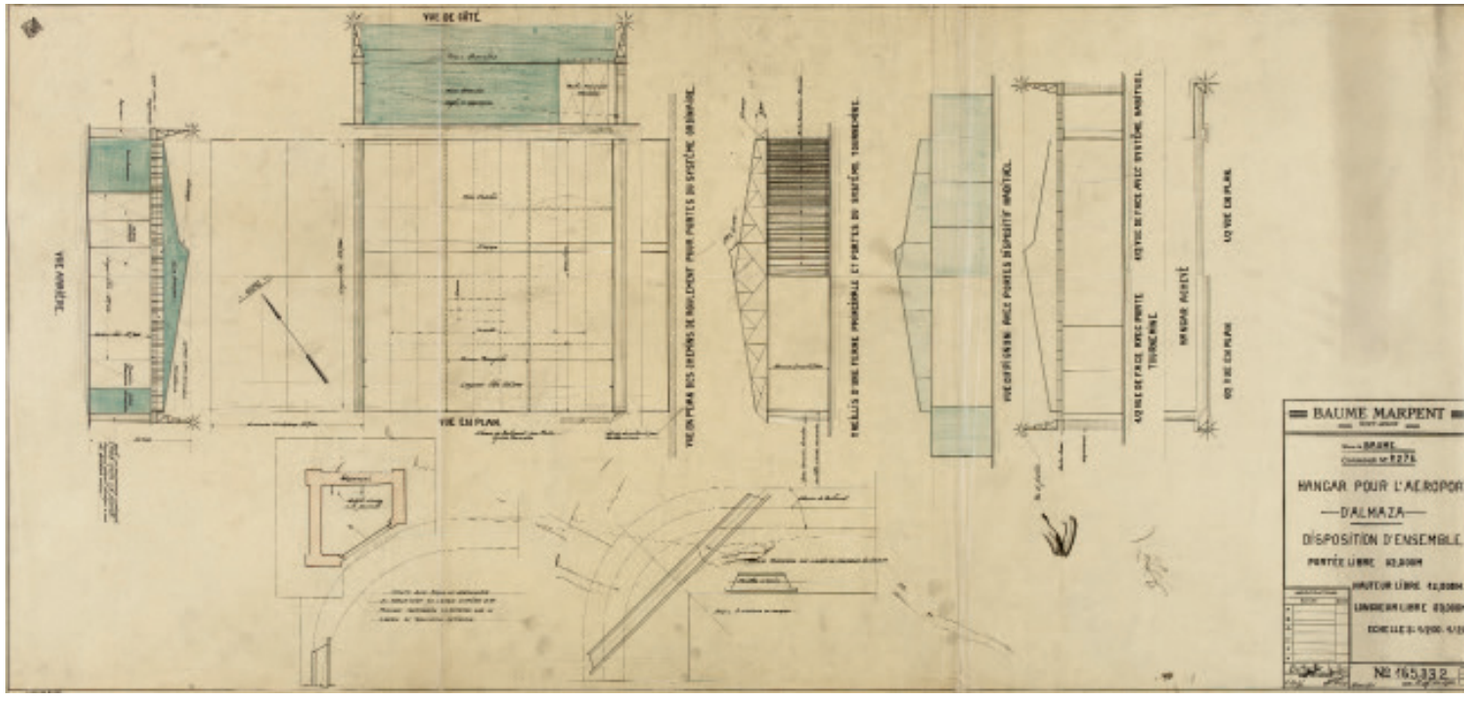
Until the eve of World War II, the engineers sent by Baume & Marpent were from the inside.[18] The Hainaut-based management assigned its most trusted engineers

Hangar for Almaza Airport, Cairo (1933):
Plans, sections, and elevations

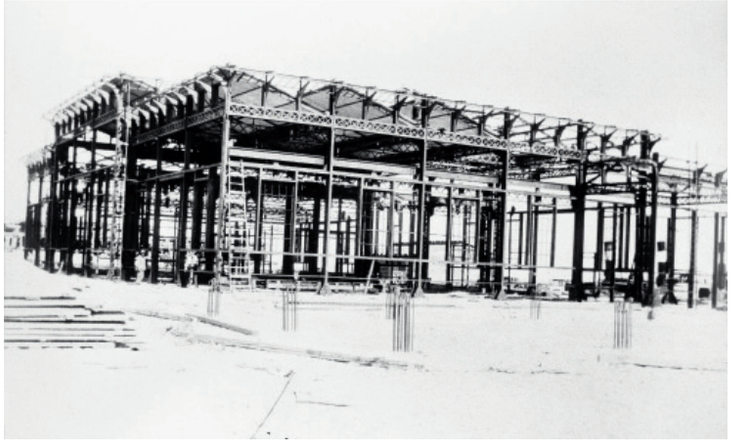
to the running of its business in Egypt. Thus, Charles Rifflart, one of the pioneers of Egyptian operations who had significantly contributed to influencing Moyaux's decision, had previously proven himself in the French division of Marpent.[19] His deputy assistant, the engineer Edmond Bossut who, with Charles Kerihuel, replaced Rifflart after his death, had a strong background in the search for new clients located essentially in the southeastern Mediterranean (Greece, Turkey, etc.).[20] The administrators Henri Fauquel and Louis Dupont regularly asked Bossut to travel outside Egypt, his assigned area, to develop business. As for Charles Kerihuel, he was promoted to chief engineer of the Egyptian division following the works he successfully supervised for the building of a bridge in the province of Sichuan (China).[21]

Baume & Marpent's Egyptian career officers, who had trained as engineers at the top Belgian and French schools (Liege University, Faculté Polytechnique de Mons, Faculté Polytechnique de l'École Royale Militaire de Bruxelles, École Centrale des Arts & Manufactures de Paris, etc.), also had a strong background in terms of business development. They were used to dealing with non-European authorities whose communications customs and codes they tried to master, for better or worse. In 1929, when Kerihuel left, the company hired engineer Henri Fontaine to replace him. Before reaching Cairo, Fontaine underwent from three to six months of training (depending on the source) in the workshops at Haine-Saint-Pierre (in the Bridges and Structures section).[22] The idea was to have him work on orders for structures to be sent to Egypt, to accustom him to his future position.

In March 1937, the Board of Directors' minutes show that given the political context, Baume & Marpent was obliged to add an engineer of Egyptian nationality to its staff.[23] A few months later, the engineer Ahmed Samy Auf joined the division.[24] In 1936, Baume & Marpent had already hired an Egyptian engineer, Pierre Bocti, for strategic reasons, among others. As Henri Fauquel noted in the letter he sent to his



Suez Canal Company warehouses, Port Tewfik, Suez (1930), Paul Albert, arch.; Baume & Marpent, cont.: Construction on the steel framework



chairman: "Being already settled in Cairo and being of Egyptian nationality, perhaps he could help us in our relations with the Egyptians, if we engaged him. On the other hand, however, is it unreasonable to fear that after Mr. Bossut has taught him his profession as site manager, he will leave us and compete against us, either by conferring with local firms, or by making himself available to one of our Belgian competitors?"[25]

There is some question as to how the company carried out this "Egyptianization" of its staff, because we later discover, in an examination of the Egyptian division, that the "Egyptian" staff did not speak Arabic fluently. The tendency to follow political fluctuations of the Egyptian regime was constant. It continued right up to 1953, when closure was imminent. Baume & Marpent considered replacing Bocti with a Muslim engineer, hoping by this tactic to please the Egyptian authorities.[26]

The exchanges between Baume & Marpent and the Egyptian administration are recorded in the archives and relate particularly to the supervision by Egyptian civil servants of structures built by the company. Occasionally, Baume & Marpent strengthened these ties, for example by training Egyptian engineers, as it had done in Chile and other countries with promising markets. In September 1920, Kerihuel went to New York with Raimondi, the head engineer of the Egyptian railways. The point of the trip was commercial; Kerihuel hoped it would convince the Egyptian administration to adopt the Strauss system, perfected by Baume & Marpent, for constructions on the Suez Canal.[27] Except for this research mission and the occasional support given by Baume & Marpent in 1933 to the setting up of the International Railway Congress and the Cairo Railway Museum,[28] we have not found any trace in the archives of any long-term support for continuing the education or training of engineers in Egypt. The company regularly undertook such initiatives in both Belgium and France, providing funds and materials to promote technical teaching in regional vocational schools, to support engineers' associations, and to train in specialized schools abroad, especially at the École Supérieure de Fonderie in Paris, etc.[29]

At the turn of the century, the Baume & Marpent engineers located in Egypt had an opportunity to work alongside the famous engineer and mathematician, Farid Youssef Boulad Bey (1872-1947),[30] who was internationally known for his studies on the theory of elasticity, the resistance of materials and, above all, for his discoveries in the field of graphic calculations. There is no need to mention that his research was valuable for steel construction, especially for the design of bridges. After having studied at the Paris École Nationale des Ponts et Chaussées (1893-1898), where he attended the classes of the most illustrious engineers of the time (Clément Colson, André Blondel, Auguste Choisy, etc.), Farid Boulad, back in Egypt, was appointed head of the technical office at the department of New Bridges and Works. During this period, he handled both the completion of a series of civil engineering projects, which he himself wholly designed, and the supervision of constructions built by foreign companies. Among these, the swing bridges at Imbaba (1924), Mansoura (1913), Asyut (1913), Abu Zabal (1911), and Benha (1904), developed and mounted by Baume & Marpent. These bridges should be mentioned because their construction works were the subject of a thorough study, led by Farid Boulad, who was especially interested in improving the calculation methods for this type of bridge, common in the Egyptian landscape.[31]

Kosheshah Bridge over the Nile north of
Beni Suef (1909): Overall view

Strauss-type bascule bridge on Albert Canal, Belgium (1954), Baume & Marpent cont.: The swing span

At the International Congress for Steel Construction held in Liege in September 1930, during the International exhibition of heavy industries, sciences and appliances, Farid Boulad presided over the section devoted to his preferred area: mobile bridges and locks. There, he presented his research on the calculation of the principal girder of the deck of swing bridges on crown rollers, and its practical application on worksites he had supervised with Baume & Marpent and other European firms.[32]

Farid Boulad Bey made the transition between Egypt and Belgium, but also between steel and reinforced concrete, since the Congress for Steel Construction was coupled with the International Congress for Concrete and Reinforced Concrete, a material the Egyptian engineer took an interest in and admired, conscious of its prospects in civil engineering. Farid Boulad's exceptional career does not reflect all the exchanges Baume & Marpent maintained with Egyptian engineers. Thorough research in the

The design office drafting room
at Baume & Marpent in Belgium

archives of the Belgian and French polytechnic faculties, complemented by a study of the resources kept at the Écomusée, would allow the mechanics and complexities of these relationships to be better understood. Finally, in addition to reconstructing the history and rapid geographic expansion of Baume & Marpent, the Écomusée archives highlight Belgium's importance during the industrial era. The Railway Museum located at the heart of Ramesses station in Cairo recalls Baume & Marpent's contribution and, more generally, the decisive role played by Belgian skills and knowledge (especially those of ACEC, Cockerill, the Brugeoise Nicaise & Delcuve, etc.) in the Egyptian industrial landscape.

The National Ironworks of Savigliano on the Mediterranean Rim

Vilma Fasoli

Founded in 1880, the Società Nazionale Officine Savigliano (National Ironworks of Savigliano, hereafter referred to as SNOS) began doing business outside Italy almost immediately: in 1883, it was awarded the contract for designing and building coaches for the Orient Express railway. The following year, it began supplying the Belgian Compagnie Internationale des Wagons-Lits. The Belgian company, which owned a stake in SNOS, was headquartered in Braine-le-Comte and manufactured railway equipment. Its managing director was Ernest Rolin (1841–1918). It is probable that Rolin, who had acquired experience on various construction sites in Central Europe, Russia, and Egypt, and was Chairman of the Belgian Bourse des Métaux et des Charbons, was instrumental in promoting SNOS beyond the borders of Italy, where it was already one of the most important mechanical industries.
In Italy, the company competed directly with Impresa Industriale Italiana di Costruzioni Metalliche, founded in 1870 by engineer Alfredo Cottrau at Castellammare di Stabia, near Naples, with capital provided by the Belgian company Finet Charles & Cie and the Antwerp financier Édouard Cahen. Cottrau had been a scholarship student at French navy academies in Toulon and Paris. Upon graduating, he worked for the Ernest Goüin & Cie technical design office and locomotive works in Paris. In 1878, he became the sole licensee in Italy for the Eiffel portable military bridge construction system. He then filed a second patent in order to limit the spread of the Eiffel system in Italy. When Cottrau died in 1898, the company closed down, and SNOS became the Eiffel system licensee.

In 1914, SNOS celebrated the anniversary of its founding with a publication entitled *Types de Constructions Métalliques*. It contained a complete list of the company's accomplishments, including many illustrations. Just prior to World War I,

Street bridge on the Drin River, Shkoder, Albania (1913): Construction site

Project drawing for the street bridge on the Drin River, Shkoder, Albania (1913)

SNOS owned two factories (one in Savigliano near Cuneo, the other one in Turin), covering a total area of 170,000 m² (almost two million square feet). They employed a staff of 2,500, and had already processed a total of 200,000 tons of iron. The central theme of the publication was the construction of metalwork bridges, the structures which first won SNOS international renown. The company's skill and reliability were recognized, not only in construction but also in design and testing.

From its inception, SNOS's technical department was headed by Swiss engineer Julius Rothlisberger (1851-1911), who designed the bridge over the Adda at Paderno (near Milan) in 1887.[33] This two-level parabolic arch structure, with a span of 266 meters and a rise of 37.5 meters, enabling road and rail transit 80 meters above the river, still arouses the interest of scholars in building science and technology. It was a demonstration of engineering virtuosity, comparable to Gustave Eiffel's Garabit Viaduct over the Truyère, because its construction was the first to apply the theory of the elasticity of an ellipse, hotly debated throughout Europe.[34] The techniques adopted during trials on the bridge in order to check the working behavior of the structures under dynamic stress and strain were also innovative. SNOS conducted stability tests with eight locomotives weighing 83 tons apiece (traveling at a speed of 45 kph), pulling 30 cars loaded with gravel, for a total weight of 600 tons.

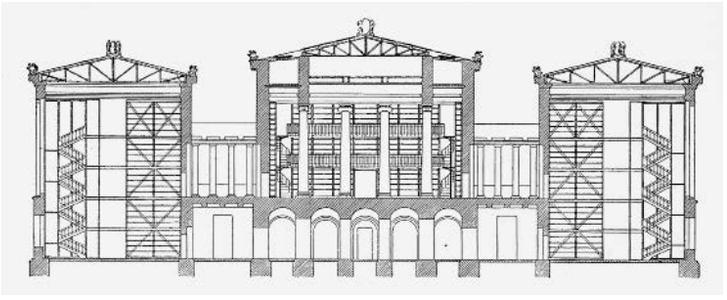
This technical success, in terms of both engineering and testing on the Paderno bridge, explains the rise of SNOS's international business. The company innovated again in 1895, with the construction of the swing bridge in Calchis (Greece) connecting the city to the mainland by the Strait of Euripus. The bridge, recently replaced by a more modern structure, "covered a gap of 40 meters between the abutments, by means of two projecting spans [with 21-meter cantilevers], opening symmetrically. Each span had two groups of supports, one for the closed bridge and the other for the opening. [...] The deck is 4 meters wide between balustrades and 2.5 meters between beams. The lower flange of the beams forms an arch over the gap. [...] The bridge is maneuvered [...] manually. It requires two men per span, and takes eight minutes when the machinery is well-lubricated."[35]

Despite the severe economic crisis threatening Greece that year, SNOS was awarded the contract for the construction of roofing and shelving at the Vallianos library in Athens. The building had been begun in 1887 (completed in 1902), supervised by the architect Ernst Ziller, on the basis of plans drawn up by architect Theophil von Hansen[36]. SNOS's enterprise in Athens is emblematic of the company's progress: it had secured its first architectural contract outside Italy, as opposed to major infrastructural works, further proof of the company's commitment to innovation and experimentation; and its attention to fire prevention and safety.

Vallianos Library, Athens (1887-1902), Ernst Ziller and Theophil von Hansen, arch.; Savigliano, cont.: Plan for the roof and the shelving structures (1895) and steel shelving in stacks

SNOS's international success continued with the construction of road and rail bridges: over the Danube at Újpest (Budapest) in Hungary (under the design and construction supervision of engineer Giovanni Marsaglia); in Romania at Dragasani and Ramnicu-Valcea (1898-1899); and at Shkodër in Albania, built just before the outbreak of World War I.
However, the construction of the railway line along the coast of Libya, where Italy launched its first political phase of colonization in 1912, left no written traces in the company archives.

If the outbreak of war stopped all activities, the subsequent recovery was made more difficult by the economic crisis, and for SNOS even more so by the loss of one of its most important collaborators, engineer Julius Rothlisberger. Engineer Alberto Ballocco, who had previously held the position of technical director at Fiat, succeeded him. At the end of the war, thanks to solid diplomatic relations with the court of Siam, and to the presence in Bangkok of some architects and engineers trained in the schools of Turin between 1920 and 1922, SNOS became active again in the construction of bridges.[37] However, the new business did not generate enough revenue to stand up to foreign competitors. Between 1906 and 1930, a large share of stock was sold to the Crédit Général de Belgique, leading to strong foreign representation within SNOS's board of directors.[38]
In 1926, SNOS began publishing the *Bollettino Tecnico Savigliano* as a means of promoting the company in foreign markets, because "the domestic market is no longer sufficient to consume the growing potential of the works."[39] Although SNOS could rely on uninterrupted international relations,



articles in the company bulletin readily complained of the shortage of raw materials in Italy due to Fascist government policies like customs restrictions and the Italian currency revaluation imposed in 1926. Its statement "Industry must essentially help itself" was thinly veiled criticism of a government which was not careful enough to promote and support Italian companies internationally.
In the 1920s, SNOS took a lively interest in the Egyptian market, where it was present beginning in 1928. That year, it began the construction of a large canopy measuring 17,000 square meters and weighing 1,400 tons in

Bridge on the Nile in Girga, Egypt
(c. 1930): Stability trials

Abu Zabal, which was followed by two bridges over the Nile, one in Samanud and another in Banha. These were swing bridges with 64-meter spans, supported by 6-meter-high isosceles-triangle trusses. Both bridges spanned broad gaps. The breach in Banha was 238.5 meters wide, with a revolving bay and four fixed bays spanning 54 meters each, whereas the Samanud bridge spanned 240 meters with five 43.8-meter bays, one of which revolved.

In 1929, at the invitation of the Egyptian State Railways, SNOS bid on and won the contract for the complete electrification of the (standard-gauge) Cairo-Helwan line with a 1,500 Volt DC system. In the summer of that year, SNOS also won the competition launched by the Egyptian Ministry of Communication for the design and the construction of two railway bridges in Girga on the Cairo-Shellal line. This last contract was a particular source of pride for SNOS, for it won out over more firmly established Belgian, French, German, and British steel construction companies.

Political and military events of the second half of the 1930s diverted SNOS towards the important works in the Italian colonies of East Africa.[40] In the post-war period, SNOS specialized in the production of electromechanical installations for alternative energies, heavy structural work, the reconditioning of electric motors and transformers, and in hydraulic systems. In 1975, the company was taken over by General Electric.

The staff of the Hennebique office, Cairo, at their desks [1899] (photo by Lekegian et Compagnie)

The staff of the Hennebique office, Cairo, on the balcony [1899] (photo by Lekegian et Compagnie)

The organization of the Hennebique firm in the countries of the Mediterranean Basin: Establishment and communications strategy

Christel Frapier and Simon Vaillant

The eagerness of a reinforced concrete entrepreneur like François Hennebique to expand to the countries of the Maghreb is easily explained. Rather than representing an opportunity to experiment with and improve his process, the territory offered expansion potential for the economic and organizational system he had begun setting up from his Paris headquarters in 1896. In open competition with a certain number of other construction systems in mainland France, he undoubtedly believed that his establishment in French colonies would facilitate winning government contracts there, and also give him access to new markets. The "French Conquest" of these countries was in fact recent and the needs were immense. Economic, industrial, and tourist development did not begin to take root until 1935. In fact Hennebique expanded to this region very early, opening one of its first agencies in Algiers in 1893, at the same time as its French, Swiss, and Italian (Naples) agencies. The case of the Egyptian office, opened in Cairo in 1898 under the leadership of the engineer Émile Servin, stands out from the other countries by the advanced nature of its organization, and it became a model for other countries of the Mediterranean Basin.[41] In obtaining a license[42] from Hennebique in 1901, Émile Servin indeed benefitted from complete autonomy in running the agency and administering its affairs. His freedom of action – quite rare for agents – is perhaps associated with the observation of defects in the roof terraces of the Museum of Egyptian Antiquities of Cairo, erected two years earlier.

The relation between agents and licensees of the Hennebique firm was formed around the design and execution of works in reinforced concrete which the entrepreneur-licensee assigned to the engineer-agent. This system was the only means for Hennebique to establish its authority and to control its production especially abroad. Generally, the system's success outside France was based on the personality of the engineer-agents and their ability to balance their leeway in the field and full compliance with the requirements of the central office. Although agents

representing faraway territories rarely attended the biannual meetings in Paris, but this was undoubtedly for reasons of geographical distance.

Obviously, the exponential expansion of Hennebique's constructions abroad was driven by the growth in the number of its local licensees over the years, especially after the 1910s. Initially most often limited to a single agency and two licensees for each country – which was the case for Algeria, Tunisia and Egypt in 1904 – around 1913 Hennebique increased the number of its licensees while it consolidated its Algerian and Tunisian agencies.[43] It had nine licensees in Algeria and Tunisia, six in Morocco, and five in Egypt. However, in Turkey, Hennebique expanded drastically, going from only one agency and no licensees in 1904, to 28 licensees managed by the Constantinople agency in 1913. The offices enabled Hennebique to extend and operate in such distant countries as Syria. The Hennebique sales strategy, aimed above all at conquering new markets by setting up locally, was clearly operating in Turkey in 1912, a year marked by two major events: the earthquake at

The Hennebique office, Algiers (1927),
Régnier et Guion, arch.; Louis Grasset, cont.
(photo by H. Besson)

Murefte and the beginning of the Balkan War (in which the Ottoman Empire became involved in October). By opening an agency in the Galata area right in 1912, Hennebique was poised to benefit from the economic and construction opportunities of a return to peace in the near future. Apparently, although the personality and the "activism" of its local agent, A. George, enabled it to expand its system *in situ*, official support – especially from government ministries – was instrumental in arming Hennebique to face strong competition in the field.[44] The Turkish case is also representative of the situation for the majority of agents active abroad between 1900 and 1920. A first period in which competitiveness and strategic projects[45] – not always executed – aimed to establish the Hennebique system abroad would be followed by a boom in construction so significant that it generally overwhelmed the central agency and resulted in logistical dysfunctions. Around the 1920s, the correspondence contains many complaints local agents addressed to the central office, swamped with a backlog of orders to be processed and shipped. Local agents were losing business, as a result.

In Algeria, Hennebique had been established since the end of the 19th century. Initially, it entered the sectors of civil and military engineering, building bridges and hydraulic structures (piers, quays etc.), before responding to numerous commissions for public works (hospitals, schools, town halls), industrial buildings (silos, reservoirs, factories etc.), and private investments (hotels and some apartment buildings). Yet it was during the interwar period, when the agency in Algiers was constructed (touted by Hennebique as the first building in Algeria to be made entirely of reinforced concrete),[46] that it spread its process more broadly and extended its field of action to other typologies, especially to offices and apartment buildings. Like the company headquarters on rue Danton in Paris, the Hennebique building in Algiers was an excellent advertisement for ways to apply reinforced concret to civil constructions. Therein lies Hennebique's originality, differentiating it from its competitors. Other French construction companies established in Northern Africa, particularly reinforced-concrete companies such as Fourré & Rhodes, remained confined to the major public works sector. Hennebique had set up locally much earlier than its competitors, and diversified its offer, applying the Hennebique system to all types of buildings. As a result, reinforced concrete became one of the essential elements in civil construction in both Northern Africa and the Middle East.

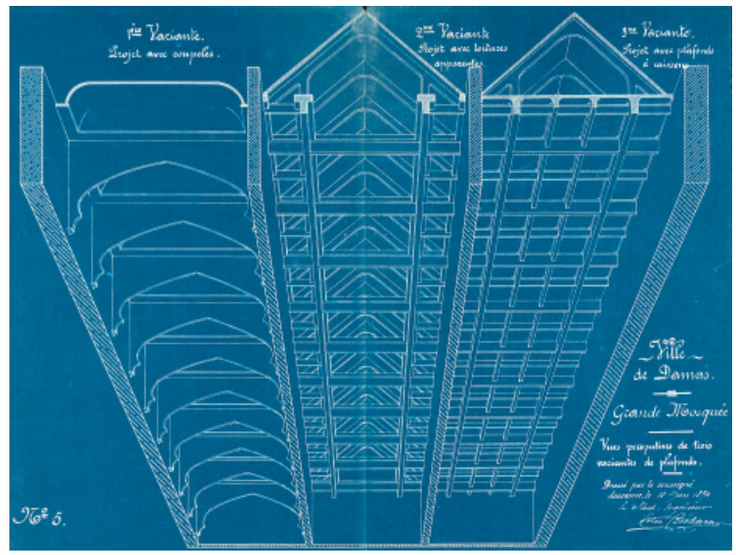
Hennebique office, Algiers (1927), Régnier et Guion, arch.; Louis Grasset, cont.: The office of Hennebique licensee Dop in 1933 (photo by Henri Eichacker)

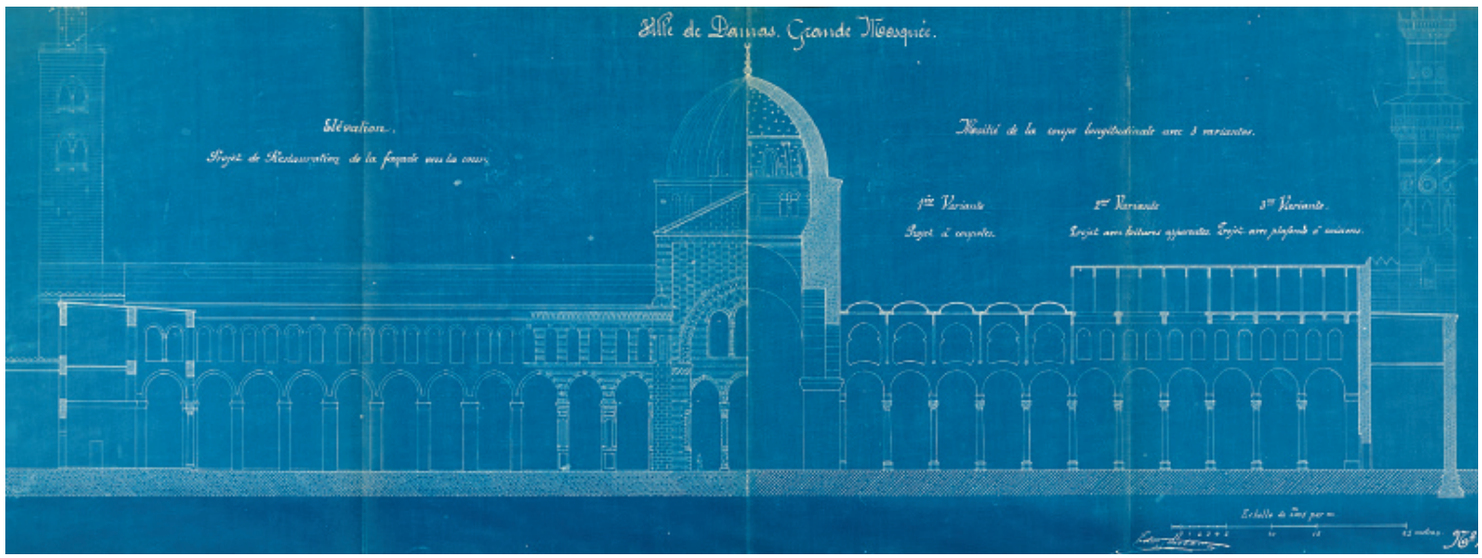
These territories constituted a true opportunity for the Hennebique firm, but also for the agents and licensees who depended on the system. Thus it was not rare to perceive in the various projects the personal strategies of entrepreneurs and engineers based in southern France, in Spain or in Italy, rather than south of the Mediterranean.[47] Besides dealing with agents eager to poach business from the North African territories, Hennebique was troubled to some extent by local labor. Specifications were tight, and compromise was impossible. Even though the firm "educated" workers in the company's expertise, there was nevertheless some skepticism about the new material and its requirements, if not rejection of them. Thus, Hennebique sometimes employed other agencies, depending on the skills needed for various projects. Obliged to consolidate structures, cover them or make them more resistant, on specific occasions, it sometimes made use of European agents such as the Swiss Samuel de Mollins for the restoration of the Great Mosque of Damascus (1894)[48], but also for bridges (Tizi-Ouzou, 1909). One of the constraints of worksites abroad lay

Preliminary drawings for Great Mosque restoration (following the fire on October 14, 1893), Damascus (1894), Edmond Béchara, arch.-eng.; Samuel de Mollins, eng.; P. Poujoulat, cont.; Francillon et Compagnie, cont.: perspective view of three ceiling variations, elevation and longitudinal section

in the additional costs incurred for example by the shipping of materials (cement, steel and wood for coffering). Charged to the budget of some projects, they forced the agent of the central office to make savings on design costs.[49] But sometimes, these additional execution costs were compensated for by the low cost of local labor. Representing at least 25% of the cost of establishing a structure in 1906,[50] this "cheap" labor was then a boon for reducing costs or at least rebalancing them. The organization and co-ordination of a worksite as well as the qualification of the labor appear to have determined the choice of technical solutions. Calling on specific skills, these requirements could in certain situations be abandoned in favor of simpler solutions: "Because this construction will be done in Morocco, a country where there is no any specialist manpower to speak of, we have designed a second solution..."[51]. The absence of qualification therefore does not seem to be an obstacle to the method of construction developed by Hennebique nor to its expansion. This disadvantage even allowed the contractor to have additional influence during the construction phase: "An intelligent site manager assisted by a good carpenter will have quickly transformed a few indigenous people into mixers of mortar."[2]

Communication about the structures erected by Hennebique in these countries appeared in print locally in the journal *Les Chantiers Nord-africains* (1928-1950).[53] This illustrated periodical about construction in northern Africa was an important endorsement for the firm. Many articles praised the functional and esthetic characteristics of Hennebique-system buildings. From 1902, local French language

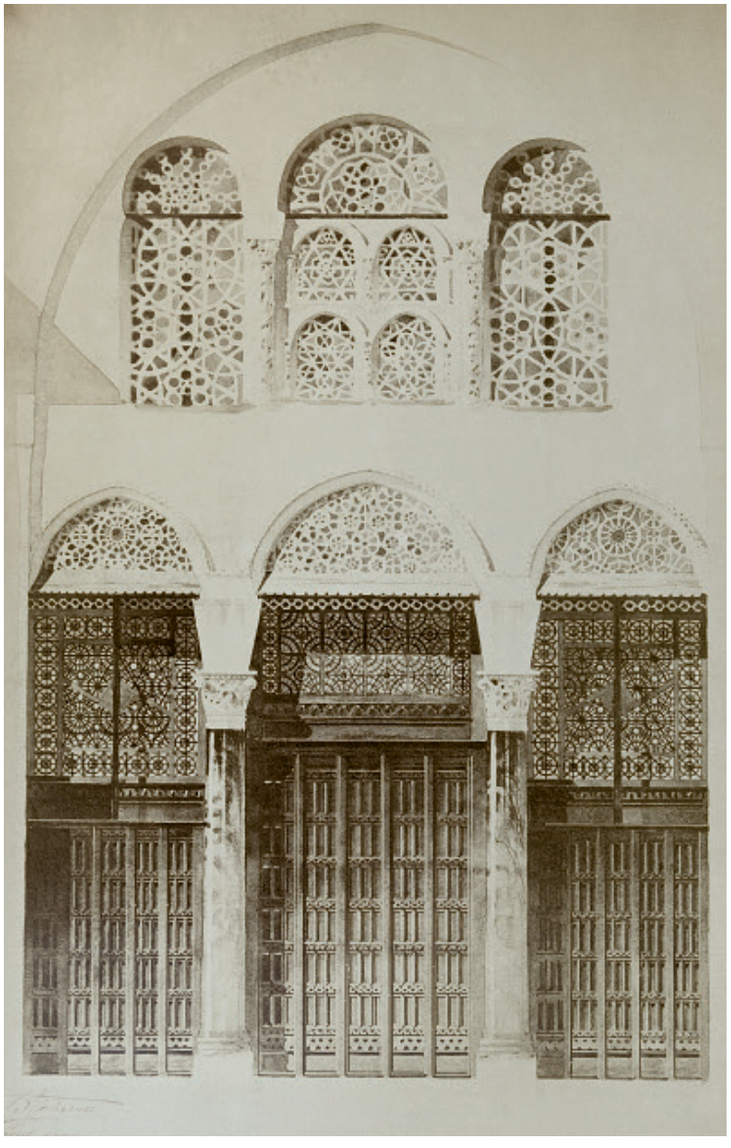




Preliminary drawings for Great Mosque restoration (following the fire on October 14, 1893), Damascus (1894), Edmond Béchara, arch.-eng.; Samuel de Mollins, eng.; P. Poujoulat, cont.; Francillon et Compagnie, cont.: detail, main portal

newspapers such as *Le Phare de Port-Saïd* reported to the general public on the advantages of reinforced concrete, highlighting its official adoption by the Ministry for Public Works and even inciting its generalized use for its solidity and low cost.[54]

The journal *Le Béton armé,* an official organ of the firm, also dedicated five issues to construction in Northern Africa between December 1934 and April 1935. Almost exclusively covering Algerian constructions, these issues constitute a special dossier showing a range of structure types completed by Hennebique since the Algiers office had opened in 1894. The articles describe the architectonic qualities of each building and in particular the various businessmen involved in the projects.



But the firm went beyond the level of business rhetoric, a genre it had mastered long before the special issues of *Le Béton armé were* published. It even engaged in political discourse, presenting itself as an essential ally of the authorities for the "industrial and commercial" development of a territory, which moreover was a colony. The firm built its authority on bases other than those listed in its reinforced concrete process. It echoed colonialist values in which the spirit of conquest of the "natives" and the struggle against unfair competition were precepts, while it benefited from a quasi-monopoly in Algeria in 1935.

Globally, Hennebique's communication strategies abroad were the same as those used by the company in Belgium and then in France from the late 19th century. Positioning itself in particular against the expansion of the steel sectors, for example, it emphasized the mechanical qualities of reinforced concrete, and in particular its resistance in the event of a fire, just as François Hennebique had done at the turn of the century for the textile regions of northern France. Thus, in 1927, the journal continued to report on major fires, both in France and in the countries of the Mediterranean perimeter, whereas one might have thought that after the death of François Hennebique in 1921, the company might have changed its pitch. In this sense, the case of the Cicurel stores in Cairo is enlightening: the journal explains that the building had been entirely erected in 1912 by the Entreprise Rolin – a licensee in Cairo since 1904 – except for the large central staircase which, for purely esthetic reasons and despite Hennebique's opposition, was built of wood and wrought iron. When the department store was hit by a fire in 1920, the reinforced concrete resisted, but the staircase was

Cicurel department store, Cairo (1909-1912), Émile Servin, eng.; Rolin et Compagnie, cont.: The pit of the central staircase after the fire on October 13, 1920

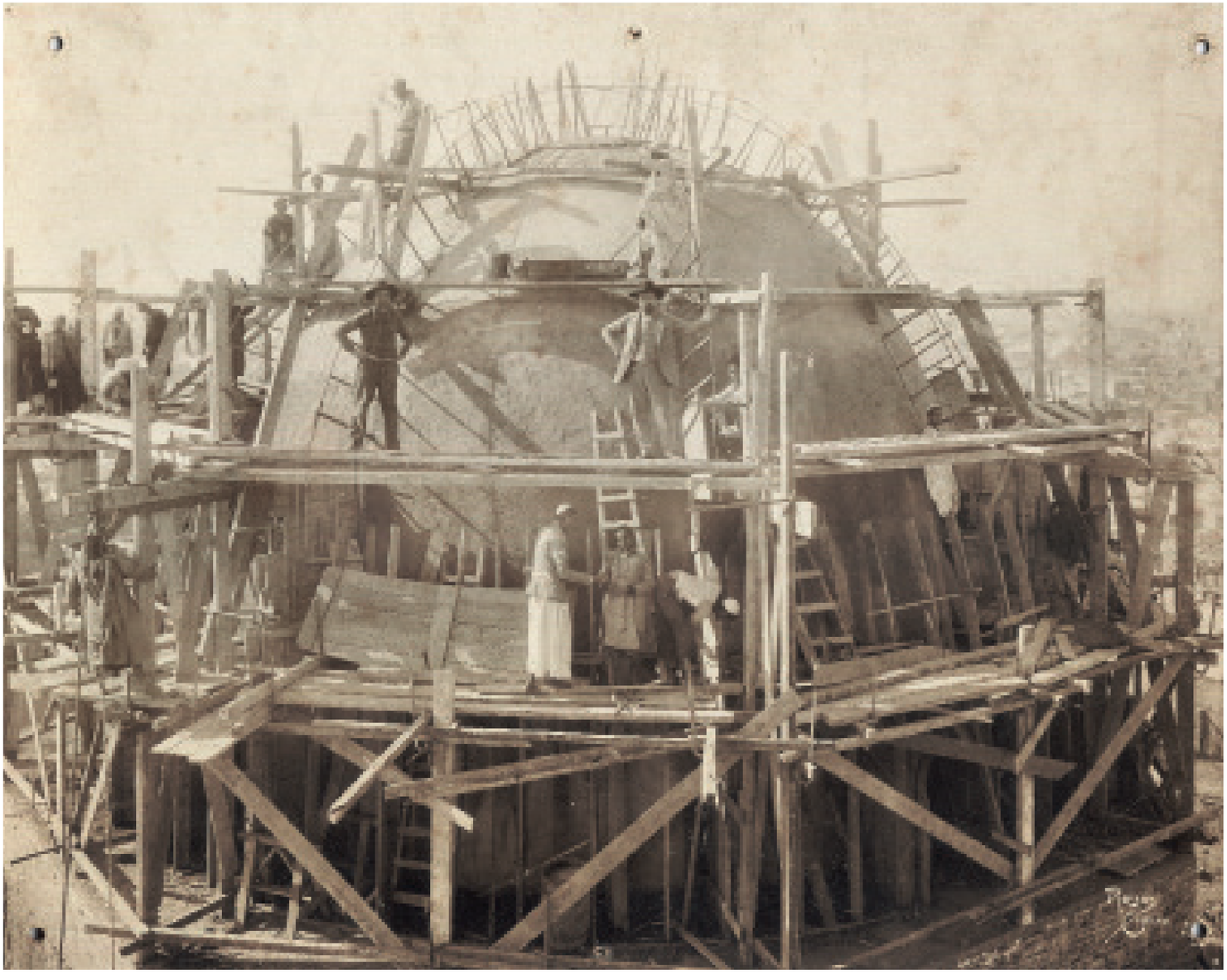
destroyed. The large void it left eloquently expressed the superiority of reinforced concrete over metal.

The competition between metal and concrete was played out in construction capacities, but also in the esthetics of the two materials. Hennebique's concern for the esthetic aspect of its first structures abroad was what enabled it to compete with the steel sector – especially the firms Daydé, Baume & Marpent and Fives-Lille[55]– and thus to win contracts.[56] A bitter battle was indeed engaged in the area of the erection of structures, steel appearing more easily to obtain the favors of public authorities responsible for parceling out contracts in the early 1900s.[57] Besides the fact that reinforced concrete had not yet come into the public domain, the spectacular constructions of Eiffel for example, still present in public memory, as well as the recent creations of the various European steel manufacturers, undoubtedly contributed significantly to this trend. The stakes for reinforced concrete and Hennebique in particular were therefore to show that concrete could match the beauty of steel construction, while surpassing its mechanical capacities. One of the sales argument of the "first application of reinforced concrete of [its] system for a large bridge in Egypt",[58] the road bridge at the Gabbari Station in Alexandria in 1905, moreover does not lie as much in the calculation sheets the firm could provide, but in the photographs and reports of tests on bridges it had carried out in advance.[59] All the arguments and examples it called upon were then likely to tilt the scales in favor of reinforced concrete: resistance to outside military attacks, examples of earlier maritime constructions, constructions abroad, testimonials from administrations which had already ordered structures, etc.

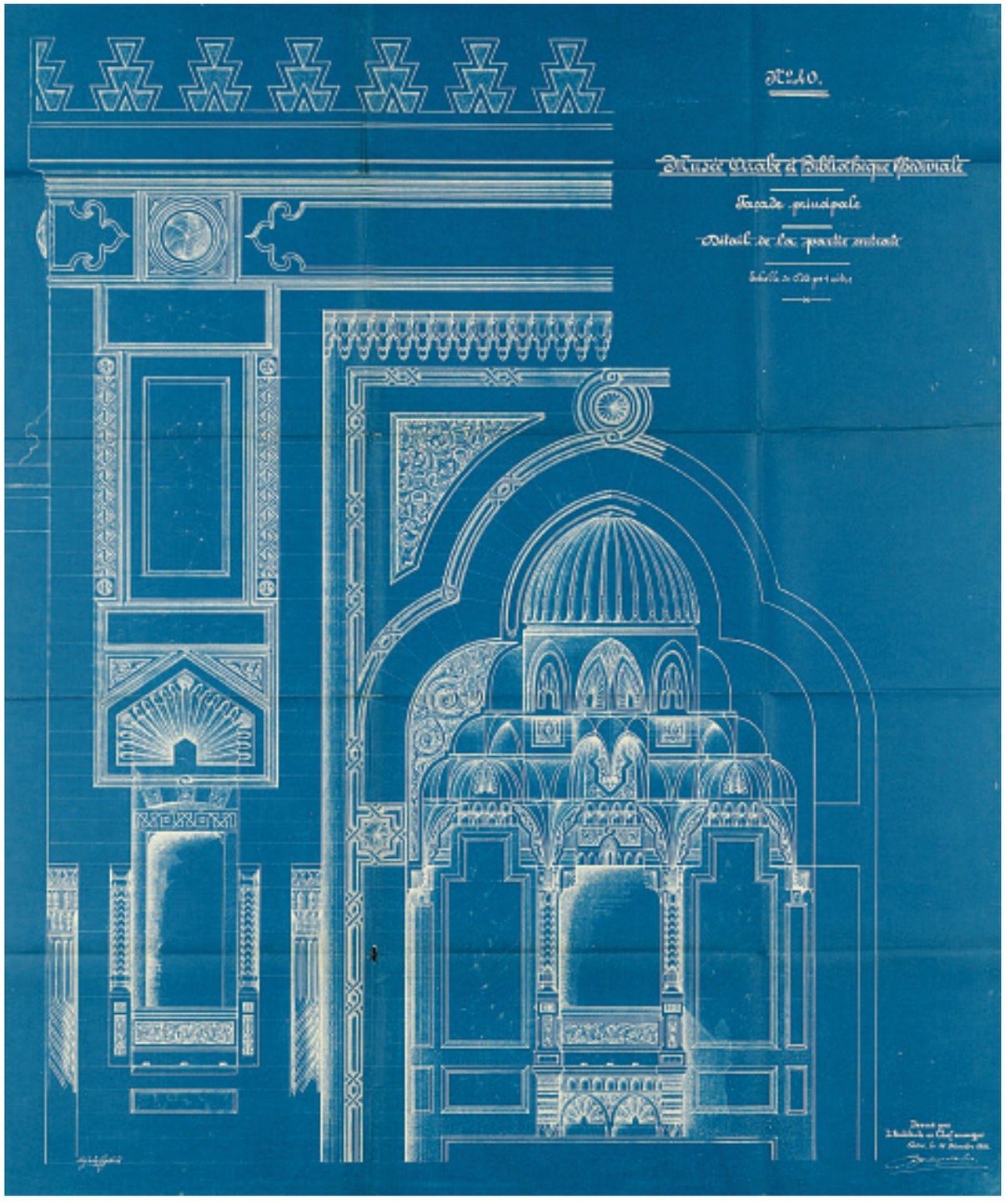
During this period, reinforced concrete also played on its ability to attract architects by offering them decorative elements. Thus, by emphasizing the esthetic capacities of reinforced concrete, Hennebique succeeded in obtaining one of its first contracts in Northern Africa: the Arabic Museum and the Khedivial Library in Cairo (1895-1898). To sell its technical offer (building the sleepers[60]) to the investors, two possibilities were available: the economic argument or the esthetic argument. Against all expectations, the company did not emphasize the economic aspect of its construction system, but the capacity of concrete to "decorate easily and artistically" the ceilings of the large rooms and lobby. Thus, it was not the architect who proposed an esthetic solution to the company, but the Neapolitan agent, Giovanni Narici, who suggested a decorative project to the architect Alfonso Maniscalco, to convince him to support the Hennebique system. Tactically, Marciano, the company from Cairo, had to present to the Egyptian Government the girderings – a rather arid technical element – of the most visible public rooms, in order to display the Neo-Mamluk style ceiling coffers. The economic argument appeared only later, because the proposed decor varied in complexity. A change in the quantities of material needed to complete the decor would cause additional expenses that the architect might very well have turned down.

The establishment of Hennebique in the countries of the Mediterranean perimeter is surely more complicated than

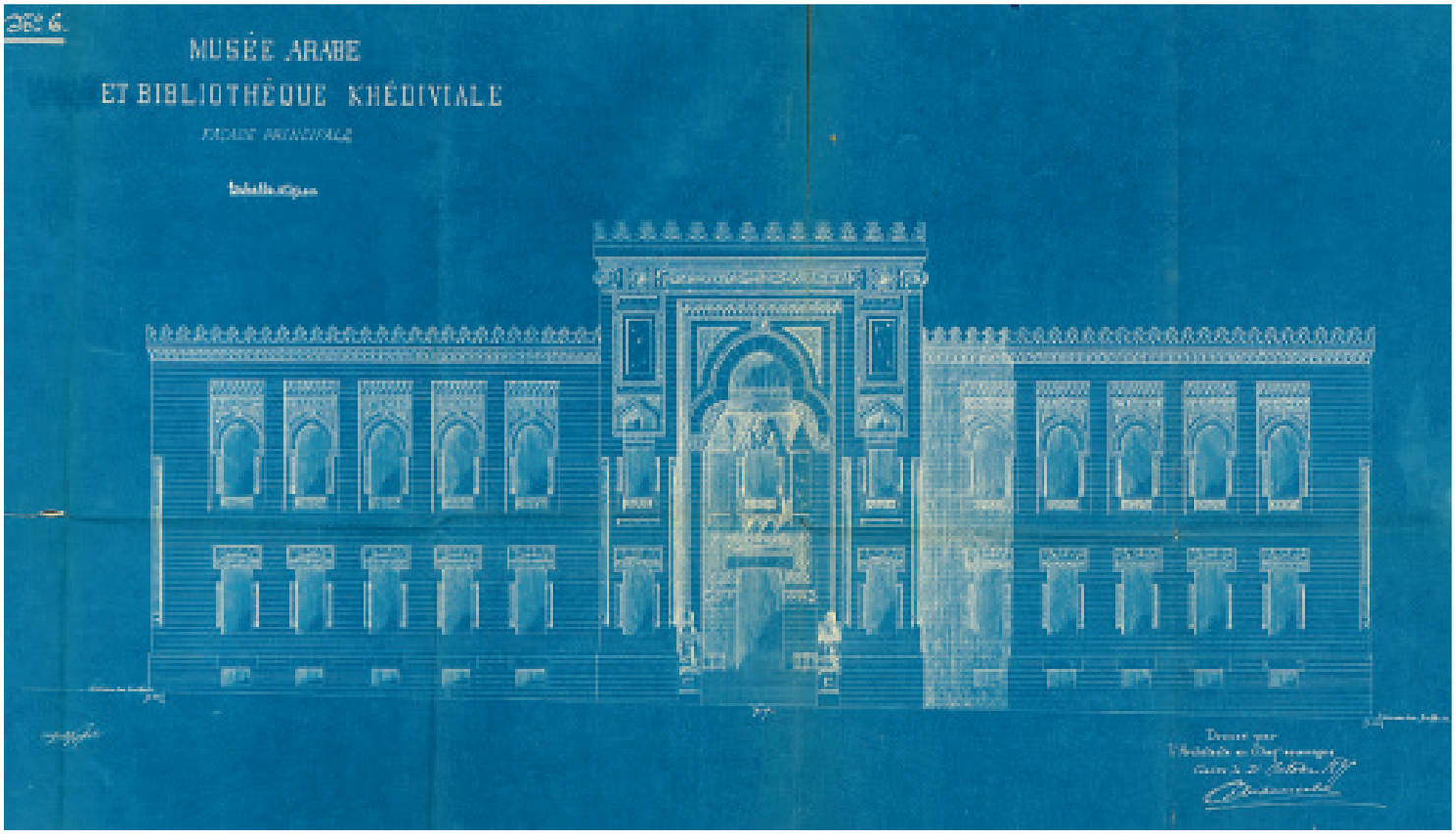
Sultan Qalawun Mosque, Cairo (1904-1905),
restoration by Max Herz Bey, arch.;
Émile Servin, eng.; Rolin et Padova, cont.:
The dome under construction
(photo by M. Reiser)



Arabic Museum and Khedivial Library, Cairo (1895–1898), Alfonso Maniscalco, arch.; Clifton, eng.; Émile Servin, eng.; M. A. Moreau, cont.: Detail of the central portion of the main facade



Arabic Museum and Khedivial Library, Cairo (1895–1898), Alfonso Maniscalco, arch.; Clifton, eng.; Émile Servin, eng.; M. A. Moreau, cont.: Elevation of the main facade



it appears, given the geographical extent of the zone and its political heterogeneity. Even though the examples listed above show a method of operation or a type of commission, they are the expression of an unusual context of creation, specific to a country at a specific time. Currently, the classification of the Hennebique archives[61] is incomplete. This is an obstacle to a more synoptic approach to our area of study. Although the period of activity is clearly marked, the essential data, such as knowledge of the exact role of the main players or the chronology of the typological production in a given region is either missing or insufficient for us to document in detail the stages in the establishment of a sprawling but nevertheless mobile network.

Perret Frères, architect/contractors in Northern Africa

David Peyceré

A unique design and construction arrangement

From around 1895 to the end of the 1950s, the Perret Frères architectural and building firm took an approach that was unique France. It was characterized by an unconventional union between architectural practice (inspired by one of France's strongest, most original, and most coherent architectural thinkers in his time, August Perret, 1874-1954) and the business of building structures in reinforced concrete, also quite innovative at the time.

That the two pursuits should be united in a single firm, directed assertively by a single group of individuals – three brothers – collided with the principle of absolute separation between architect and contractor, a basic tenet of the "Guadet Code" which governed architecture from 1895.[62] The purpose of the rule is to avoid tainting architecture with commercialism. But the Perrets' approach enabled them to engage in unique building experiences that were decisive for the future of reinforced concrete construction, in France and worldwide.

This experience, and the association between the two businesses, was made possibly only by the fact that the Perrets had put down roots across the Mediterranean, in Northern Africa. Although they approached neither Tunisia nor the French protectorates in the Near East, they nevertheless had close relations with Algeria, where they created a subsidiary contractor to build dozens of projects. Likewise, in Morocco, they built several pioneering projects during World War I, and these would play a major part in the agency's publicity from the end of the war, in view of projects in France. The Perrets also availed themselves of opportunities offered by the young Turkish Republic, and erected some prestigious buildings and villas in Egypt.

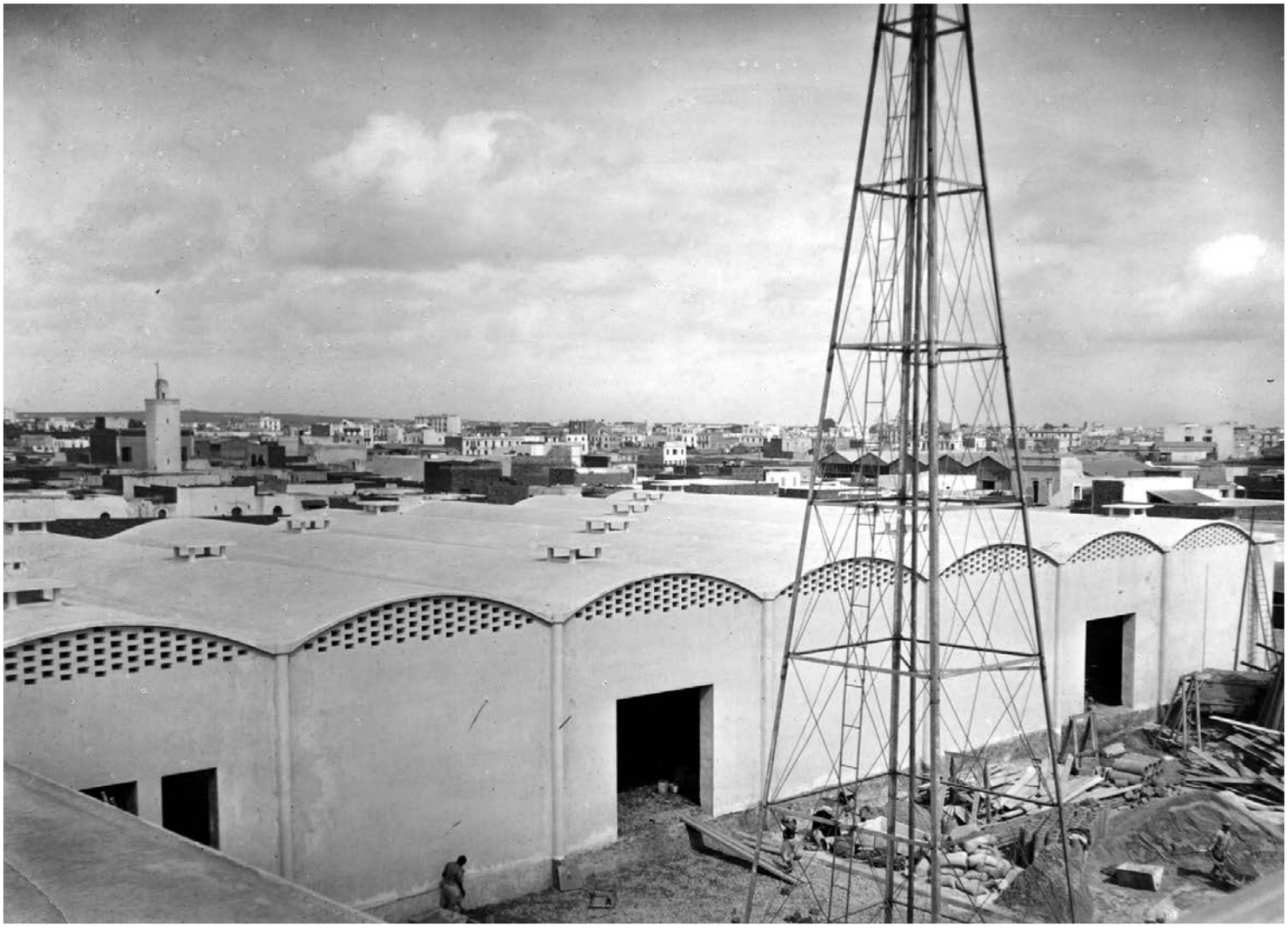
Their magnificent archives, containing 30,000 drawings and blueprints, among other things, have been conserved since 1990 at the Centre d'Archives d'Architecture du XX^{e} Siècle (Cité de l'Architecture et du Patrimoine, Paris).[63] They provide invaluable information on the firm's strategies – both experimental and promotional – including the constant to-and-fro movement between center and peripheries, between France and dependent territories (particularly the Moroccan protectorate or Algerian departments). This is a process that is now quite well known and studied.[64]

The Perrets' roots in France

First, let us introduce the family and their travels. Auguste (1874-1954), Gustave (1876-1952), and Claude (1880-1960) were the three sons of a masonry contractor from Burgundy whose support for the Commune forced him to flee into exile. The three brothers were thus born in Brussels, and the family returned to Paris in 1880. The general company then established by the father rapidly prospered, while the two elder brothers studied architecture (brilliantly, especially Auguste) at the École des Beaux-Arts. The two brothers allowed themselves to be absorbed by their father's company – which became Perret et Fils, then Perret Frères in 1905 – without sitting for the architect's diploma. Auguste Perret was almost inclined to strut his doubtful pedigree as "contractor-cum-architect" when he launched his career in the 1910s and early 1920s. From the beginning, they associated with great architects from the structuralist-rationalist school identified with Viollet-le-Duc: they were students of Julien Guadet, and their father was a friend of Albert Ballu, whom they would join in Algeria.

Their first Parisian buildings are a series of novel and radical proposals, sometimes in form, especially in concept, all based on a structure in reinforced concrete. They contracted the construction of their building on the rue Franklin (1903) to another company working in concrete, but the Perret company itself built the automobile garage on the rue de Ponthieu (1905), and especially the Théâtre des Champs-Élysées (1911-1913): they insinuated themselves as architects into this project – which they grabbed from Henry Van de Velde – after having shown, as contractors, the economic rationality of reinforced concrete for its construction.

Wallut Docks, Casablanca (1914-1917):
The warehouse buildings, nearly completed



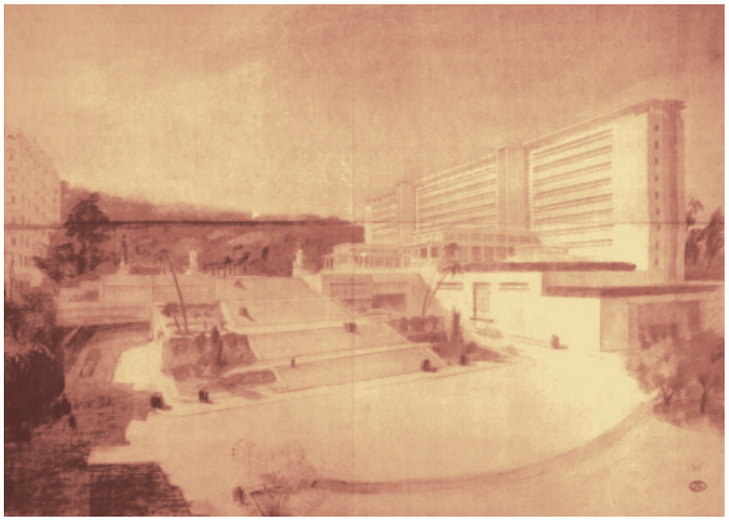
Although the Perrets' abundant production after the war – another chapter in itself – is not relevant here, it should be noted that on several occasions, from 1924 until his death, Auguste Perret taught and trained architects belonging to several generations of the 20th century. We will meet some of them in Algiers. Others, such as Henri Tastemain and Éliane Castelnau at Rabat, and Élie Azagury, Gaston Jaubert, Isaac Lévy, and Louis Riou in Casablanca, would transmit the Perret stamp to the architecture of the post-World War II period in Morocco.

A decisive Moroccan excursion

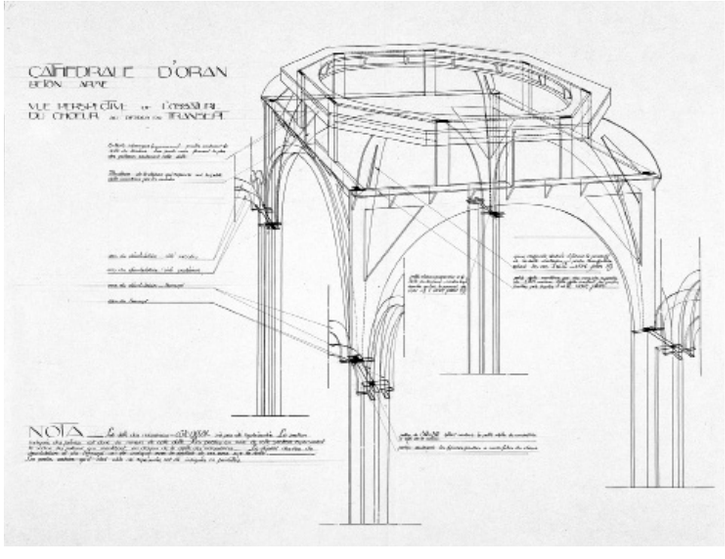
The Perrets' experience in Morocco was brief but fundamental. They worked there from 1913 to 1920, and created a Moroccan subsidiary early on, when they received the commission for the Paris-Maroc department stores (Hippolyte Delaporte, arch.), a key retail palace in downtown Casablanca. Their other projects were mainly warehouses (including their own materials store) on the outskirts of

Layout of Place du Maréchal Foch, Algiers (1935-1941), Jacques Guiauchain and Maurice Rotival, arch.: The garage structure, nearly completed (photo by Chevojon)

Layout of Place du Maréchal Foch, Algiers (1935-1941), Jacques Guiauchain and Maurice Rotival, arch.: Perspective on the esplanade



Cathedral of the Sacré-Cœur, Oran (1908-1912), Albert Ballu, arch.; P. Cottancin, eng.; Perret, cont.: Perspective view of the framework for the choir above the transept



Casablanca. One of these, the Wallut complex, was celebrated at length – by the Perrets, as by all the critics of the time – for its soaring, thin shell vaults. The Perrets reused the vaults for the church at Le Raincy in 1923, and explicitly emphasized the connection between the industrial scheme in Morocco and the monumental scheme in France.

Perret seems to have had such high hopes for Lyautey's Morocco that in 1920, he stated that the "cities of tomorrow" should be created in "new countries," obviously referring to Casablanca, in particular. But the firm was focused on the conquest of Paris, and the same year, it closed its business in Morocco.

Algeria in two steps

A friend of the Perrets (and originally of the father), the architect Albert Ballu hired the company for the construction of several of the Algerian pavilions at world's fairs, from 1889 to 1908. In Algeria itself, as early as 1908 – at the same time as their first critical success in Paris –, Perret Frères was called in to rescue the cupola of the cathedral of Oran, also designed by Albert Ballu. The contract for building the cathedral (awarded in 1902) should have been Perret's to begin with, but at the last minute, it had gone to a competitor, Cottancin, who held a patent on a reinforced brick system which seemed promising at the time. However, the walls were too thin to buttress the cupola. The Perrets thus had the opportunity to test solutions based on reinforced concrete, and to show the superiority of their approach. From this eventful project, it appears[65] that if they had won the contract from the beginning, the Perrets would have had a substantially different experience with reinforced concrete. Their first contact with Algeria then ended, since their plans for the theatre of Oran (1902) were not accepted.

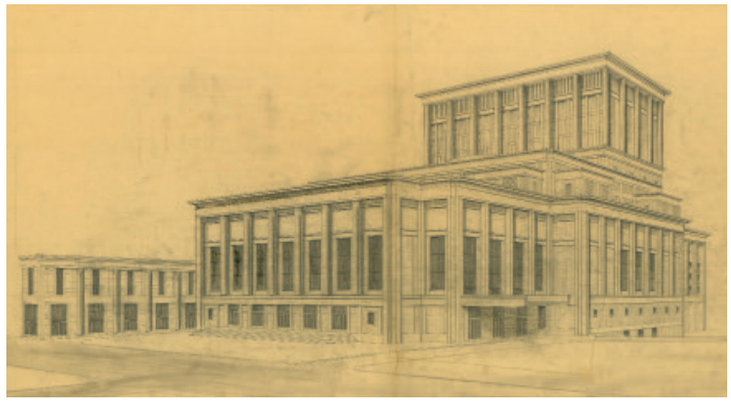
It was only in 1930 that the Perrets returned to Algeria, again as contractors. Jacques Guiauchain, an architect they must have met at the École des Beaux-Arts, had moved to Algiers, and he encouraged Auguste Perret to send him students. Until the war, these students, Denis Honegger, Pierre Forestier, and Michel Luyckx, would maintain ties between the architect-builders and Algerian territory. All of them, especially Guiauchain, would enable Perret Frères to win numerous competitions and tender offers, or to secure privately-agreed contracts, while the architectural agency, in turn, embarked on projects in Algiers, or elsewhere in the country. In 1934, Perret Frères opened an Algiers branch, directed from Paris

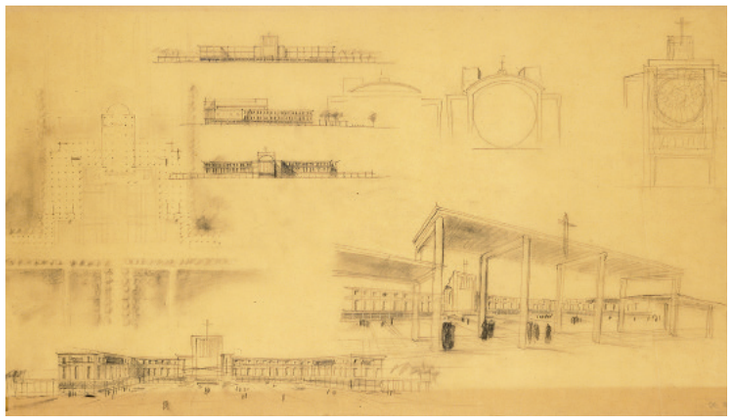
Grand Theatre, Istanbul (1939-1940): Perspective of western and southern facades

Dominican Mission Convent, Cairo (1930-1932): Plan, elevation, and perspective sketches

by Claude, the youngest of the three brothers. In 1948, it became the company Perret Frères Algérie. Well after the death of the Perret brothers, just before being repatriated to France, it did a final stunt by building the hyperbolic paraboloids of the Sacré-Cœur Basilica, finished in 1963 (Paul Herbé and Jean Le Couteur arch., René Sarger eng.). In all, Perret Frères worked on dozens of projects, essentially in or around Algiers, some of them quite large. The most outstanding ones were the offices of the General Government of Algeria (Guiauchain arch., 1929-1934), built in exactly the same years as the Maison de l'Agriculture (Guiauchain arch., 1929-1934). The Perrets also designed buildings, such as the Barbier-Hugo hospital (1936-1955) and a building of studio apartments on rue Desfontaines (1939-1948). Their layout for the esplanade of the Forum (place du Maréchal-Foch) in front of the Government General (1937-1938), with vast terraces above an underground section, was also an architectural milestone.

The archives contain detailed and regular correspondence between the Algerian branch and the main office in Paris, revealing the company's strategies for success in a lively construction market. After World War II, when the Perret brothers were over 70, they tackled the huge task of reconstructing Le Havre. At the same time, they were questioning their presence in Algiers. Competition seemed tough, and the company became less involved. Nevertheless, it would continue to be present until independence, managed by Antoine Perret, Claude's son.





Egypt and Turkey: Outlines of expansion

Although the company did not build public works in Egypt, the architect Auguste Perret did erect several residences in Cairo and Alexandria for two networks derived from two main sponsors, Gustave Aghion and Élias Awad Bey.[66] Perret also dreamed of several monumental projects (including a Dominican convent) which were not executed. Two of the "signatures" of his style of the 1930s were allegedly inspired by Egyptian motifs: pre-cast trellisform panels (although Perret never confirmed Egypt as a source) and the tapered columns used at the Paris Musée des Travaux Publics (built in 1936, today's Conseil Économique et Social). Perret himself said that the inspiration for his design of the column went back to his 1927 trip to Egypt.

Finally, except at the very beginning, Perret's relations with Istanbul[67] were a series of missed opportunities, limited to building two projects by Paul Chedanne for the French Embassy (leading to two trips for Auguste Perret to Istanbul, in 1908 and 1910). Next, just before World War II, Perret was invited by Henri Prost to design two major theatres around Taksim Square, but they were never constructed. Perret also submitted a design for the mausoleum of Mustafa Kemal Atatürk in 1942, but it was rejected. Nevertheless, the

Elias Awad Bey Villa, Cairo (1930-1938):
Eastern elevation, on the Nile

Perret firm was influential in Turkey at the time, for many Turkish architects who later became prominent studied or did internships with Perret.
It should be emphasized that, although Perret's international influence – especially in the Mediterranean world – was much more extensive, thanks in particular to its teaching, Morocco, Algeria, Egypt, and Turkey are the only countries where the firm worked directly.

Italian construction companies in Egypt

Milva Giacomelli

In the first half of the 20th century, most of the construction companies founded and managed by Italians in Northern Africa (outside of Italian Libya, where most of the companies operating were headquartered in Italy), were in Egypt and Tunisia. Some of those based in Egypt did business in Sudan, Palestine, and other Middle Eastern countries; the Italo-Tunisian companies worked in the French Maghreb. These companies were very often established and run by self-made men of humble origins with little formal education. They parlayed their experience as bricklayers or master builders into positions as entrepreneurs, and sometimes succeeded in becoming prominent citizens in the expatriate Italian community. Their rapid upward social mobility leads one to wonder what channels they used to raise the funds necessary for large construction projects, requiring dozens of skilled and unskilled workers. True, labor was cheap, because both indigenous men and Italian laborers were exploited for low wages,[68] and the practice of subcontracting was widespread. Nevertheless, an entrepreneur needs access to investors with large amounts of capital. Some historians have surmised that these ambitious working-class bosses were able to obtain loans through their membership in the Freemasons or the Saint Simonian movement. Both movements had many followers among the members of workers' mutual aid societies, and would have facilitated relationships with Freemasons or Saint Simonians prominent in the banking system.

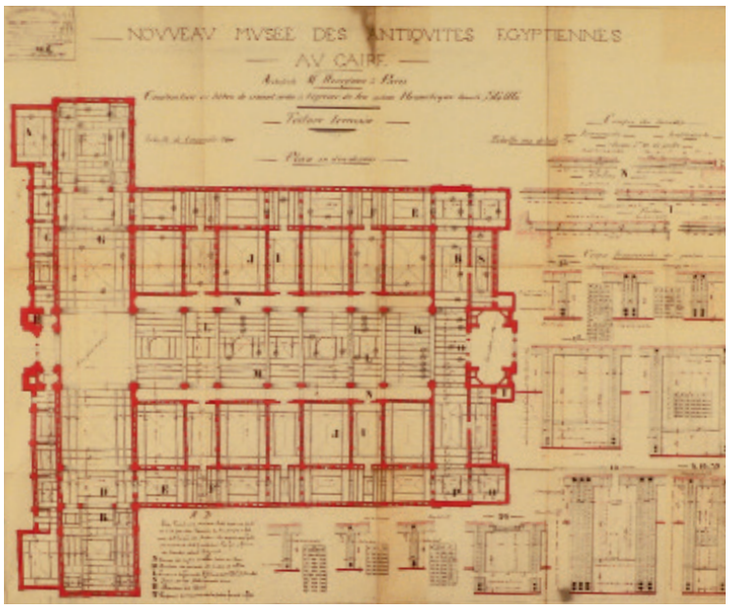
Between 1875 and the political upheavals of 1954-1956, Egypt is an excellent observatory for the study of Italian construction contractors. More than one hundred companies were operating there, specializing in a wide variety of trades; likewise, the personalities of the men in charge of these companies were also diverse. Lastly, they carried out a large number of important projects. The role played in Egypt by the big Italy-based construction companies, such as the Società Nazionale Officine di Savigliano, the Metallurgica of Castellammare di Stabia (awarded the construction of the Kafr el-Zayat bridge over the Nile in 1892),[69] and the Stabilimento Tecnico Triestino (which completed the iron swing bridge over Mahmudiah Canal in Alexandria in March 1927),[70] is marginal, in comparison. There were also companies which followed up on successful growth in Italy and internationally, decided to move from Italy to Egypt. This was the case of the company founded in 1868 by the engineer Edoardo Almagià (1841-1921) from Ancona. Initially active in the railway sector, he later specialized in the construction of ports. In 1899, the company expanded its business abroad, first to Turkey and Romania, and then to Egypt, the Isle of Rhodes, Libya (where in 1912 it was awarded the contract for the port of Tripoli, designed by Luigi Luiggi), and Palestine (Haifa). In 1911, Edoardo's son Roberto (1883-1947), an engineer with a degree from Polytechnic of Turin, joined the firm. In Egypt, their most important projects were related to the port in Alexandria, where the company had its main headquarters before opening an office in Cairo. Almagià's projects included building the large Eastern Basin there (1899-1904); a breakwater for the western port and new timber quays (1906-1908); extension of piers E, K and coal loads; a port of refuge for barges; reinforced-concrete warehouses on pier E (1908-1921); a pier and wharf at Ras el-Tin (1922-1923); and a breakwater made of artificial boulders and extension of the drainage canal towards the sea at the eastern port of Silsilah (1929-1934). For the Compagnie Universelle du Canal Maritime de Suez, the company extended the western breakwater in Port Said (1911-1915), and in Suez, the quays of Port Ibrahim (1928-1930) and the coal pier (1935-1939). Among the few works not involving port facilities, we should mention the main building of the Benito Mussolini Hospital in Alexandria (1921-1923, Giacomo Alessandro Loria arch.). After World War II, the company continued to do business, directed by Roberto's son, Edoardo Almagià, who had earned his degree in engineering from the University of Rome. During his tenure, the company was responsible for the construction of the platform at the new passenger terminal in Alexandria, of the drainage canal of the eastern port (1948-1954), and of the breakwater for the nitrate pier in the western port (1951-1954). From 1954 to 1957, the company was involved in dredging the Suez Canal.

New Museum of Egyptian Antiquities, Cairo (1898), Marcel Dourgnon, arch.; Hennebique office, eng.; Garozzo & Zaffrani, cont.: Plan for the reinforced concrete structures of the terrace-roof

In 1978, after the long interval due to the change of political regime, the company resumed its activities in Egypt, having been awarded the contracts for various works at the Port of Alexandria.

Born in Catania (Sicily), Giuseppe Garozzo (1847-1903) stands out among the pioneers of Italian entrepreneurship in the construction sector. After immigrating to Alexandria in 1862, he was hired by the Società Operaia Italiana as a master builder for the works on Khedive Ismail Pasha's palace and stables at Sidi Gaber. In 1874, he founded his own civil engineering and construction company. One of its most important achievements was the Labbane police station on Cherif Pacha Street in Alexandria. Ismail Pasha continued to be one of its main clients. The construction work at the khedivial palace in Giza, which lasted for more than six years, motivated Garozzo to move to Cairo. His business grew considerably after the merger with the company owned by Nicola Marciano, an entrepreneur (1837-?) from Casoria (Naples), who had come to Egypt in 1863. In Cairo, Marciano founded a construction company which was among the first to use reinforced concrete, and in 1895 was awarded the concession for the Hennebique method. The Garozzo & Marciano company built the indigenous hospital in Alexandria, the Tewfikieh canal lock at the Delta Barrage, the Shepheard's Hotel in Cairo (1892; enlarged in 1906) and completed the works at khedivial palace of Abdeen. In 1896, after the dissolution of his partnership with Marciano, Garozzo joined with Francesco Zaffrani (1847-?), a native of Casalzuigno (Como). He had come to Egypt in 1869 and settled in Alexandria, where he was hired as master builder at Storari & Radice. Later, he founded a company specialized in waterworks (locks, bridges, and reservoirs), first active in Lower and then in Upper Egypt. The first and most important contract awarded to Garozzo & Zaffrani was the construction of the Museum of Egyptian Antiquities of Cairo (1897-1902, Marcel Dourgnon[71] arch.), after an international competition (1894-1995). Marciano was also associated with construction of the museum. Other Garozzo & Zaffrani achievements were the Savoy Hotel in Cairo (opened in December 1898); the enlargement of the New Hotel, which was transformed into the Grand Continental Hotel; Chawarbi Pasha's new residence in the Ismailiyya district; and the Ataba fire and police station (1901, Alfonso Maniscalco arch.). In 1901, Giuseppe Garozzo's son Francesco (1873-1937) joined the firm. The eldest, Filippo (1867-1929), already worked in his father's company, and had drafted the plans for a new building for J.-B. Piot-Bey in Cairo in 1898.[72] In 1903, Filippo and Francesco replaced their father as directors of the company, later hiring their younger brothers. Their company held the license to the patented Siacci reinforced-concrete process, which was employed in the construction of the Luxor Winter Palace Hotel (1906, commissioned by Upper Egypt Hotels, Arrigo Baroni and Léon Stiénon arch.). In 1906, an album of photographs of the projects completed by the company in Egypt was shown in the "Italians Abroad" section of the Milan World's Fair.

In Cairo, G. Garozzo & Figli (Garozzo and Sons) built the Umberto I Italian hospital (1902-1903, Luigi Tosi arch.) and chapel (1925, Achille Patricolo arch.), the church of San Giuseppe (1904-1909, Aristide Leonori arch.), buildings S and T



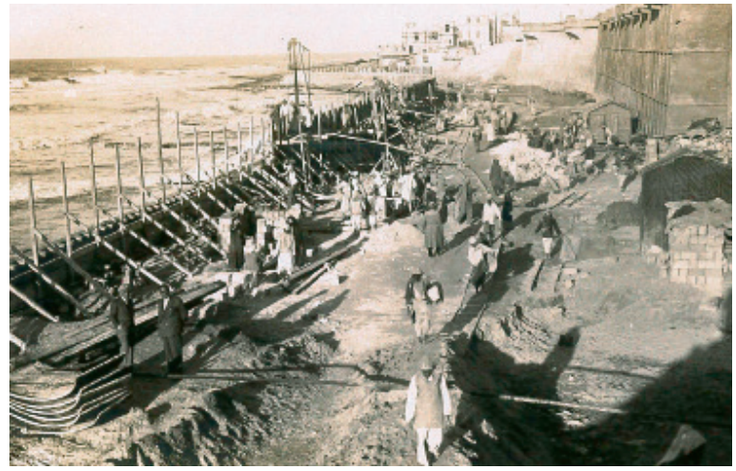
Mex waterfront promenade, Alexandria, Dentamaro & Cartareggia, cont.

Waterfront promenade between Chatby and Campo Cesare, Alexandria (1920s), Dentamaro & Cartareggia, cont.: Construction on the 3rd section

Waterfront promenade between Stanley Bay and Montaza, Alexandria (1933), Dentamaro & Cartareggia, cont.: Construction on the 7th section

of the Belgian-Egyptian Society in the Azbakeya district (1906), Italian schools in Bulaq (1906, Tullio Parvis arch.), the headquarters of Assicurazioni Generali di Trieste (1911, Antonio Lasciac arch.), the Austro-Hungarian hospital in Shubra (1912-1913, Léon Stiénon and Maurice Cattaui arch.), the Regina Elena primary school (1925, Paolo Caccia Dominioni arch.) in Bulaq, and the headquarters of the National Bank (formerly Lloyds Bank, 1926-1927, Marco Olivetti arch.).

One of the most productive Italian entrepreneurs in the construction field, Emanuele Dentamaro (1880-1935), a bricklayer from Bari, had emigrated to Egypt to seek his fortune in 1896 after completing his apprenticeship. By 1898, he had worked as construction site supervisor for various companies.[73] After these experiences, he and engineer Felix Gusman founded the construction company Gusman & Dentamaro, headquartered in Cairo. There is some evidence that Dentamaro's membership in the Masonic Lodge Le Cinque Giornate (he later served as Worshipful Master in 1919-1920) was associated with his company's success. The railways at Kharga Oasis[74] (under construction from 1906-08; subcontracted by Corporation of Western Egypt, Ltd.), built up to kilometer marker 193, and a portion of the Egyptian Delta Light Railway, which stretched through the desert from Bab-el-Hassanayn to the Cairo citadel, bari[75] were among the first works carried out by Gusman & Dentamaro. In 1907, United Egyptian Lands assigned to the company the construction of the dam over the Nile next to Roda Island. The dam was built with the "system for drilling wells that are built above sea level using temporary foundations."[76] In 1908, the company was commissioned to carry out the enlargement and the lengthening of the Nubaria Canal, tendered by the Third Circle of Irrigation of Alexandria.[77] Besides working as a subcontractor, the company took part in the competition tendered by the Egyptian Government for the completion of the brickyard of Khatatba, whose structure was designed by the Sabbatelli engineering firm. As Sabbatelli's licensee, Gusman & Dentamaro equipped the brickyard with a technical and administrative office, and built food storehouses and dwellings for



Stanley Bay Beach, Alexandria (1932), Dentamaro & Cartareggia, cont.: The beach cabin arena (photo by A. du Boistesselin)

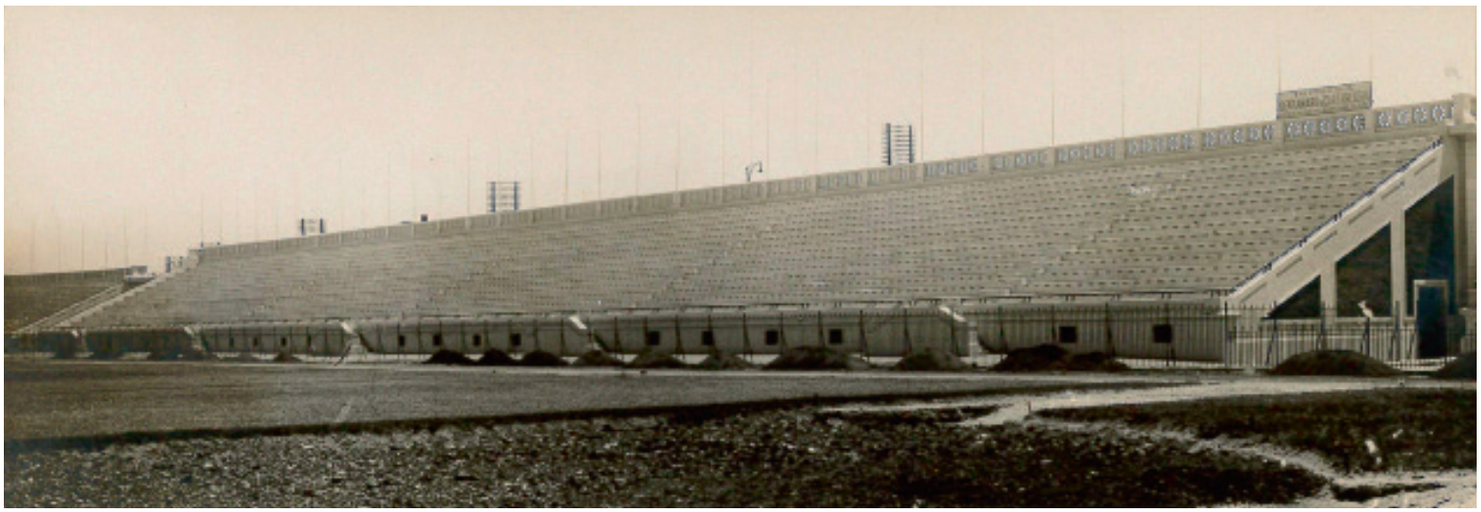
executive staff and workers. Despite its specialization in road construction and plumbing, the company invested in real estate development projects showing architectural quality and a strong urban impact. Towards the end of 1907, when Cairo real-estate values were skyrocketing, Gusman & Dentamaro purchased a 25,000-square-meter tract northeast of Cairo on Shubra Alley, planning to subdivide the property and build single-family homes. Gusman's project subdivided the land into 9 parcels bordered by a regular layout of internal streets, dotted with 65 small Italian-style homes, each with a private yard. Cesare Brunelli described the Shubra project as a "model [...] town," provided with "playgrounds, a market, and a theater", built according to a "system [...] which was brand new for Egypt": "sturdy concrete blocks with a hollow center, which protect the dwellings from moisture and heat, perfectly shaped for stacking using little mortar."[78] A large number of the small homes, available in three models of varying prices, were already constructed by January 1910. By 1919, the Gusman & Dentamaro partnership was no longer active. Dentamaro set up a new company with Ferro and Padova, to work with the firm Léon Rolin & Co. on the construction of the Heliopolis Palace Hotel (1908-1910, Alexandre Marcel arch.). In October 1922, Dentamaro, who had since moved to Alexandria, formed a partnership with young Filippo Cartareggia (Cairo, 1904 - Milan, 1978), whose family was Sicilian.[79] Cartareggia became his son-in-law two years later. A graduate of the RR. Scuole Medie Italiane

Municipal Stadium, Alexandria (1927-1929), Wladimir Nicohosoff Bey, arch.; Dentamaro & Cartareggia, cont.: The combat sports pavilion

(Royal Italian Junior Secondary schools) of Alexandria, Filippo had worked for important public-works contractors. In fact, at age seventeen, he had been the general manager of the British company A. Urquhart & Co. Until it was dissolved in 1935,[80] the Dentamaro & Cartareggia company also operated in Egypt, Sudan,[81] Eritrea,[82] and Palestine. The Italian community in Alexandria appreciated the company's "philanthropic" contributions: between 1922 and 1933, it completed projects at no charge for various agencies and institutions of the Italian colony.[83] Filippo, in particular, was especially active in ensuring the participation of the Egyptian Government in the exhibitions in Bari and Tripoli. One month after participating in the 3rd Cairo International Exhibition (February 1933), Filippo went to Tripoli in order to curate the Dentamaro & Cartareggia pavilion at the 7th Fair of Tripoli, where he presented "a magnificent documentation of the grandiose projects carried out over a decade of activity."[84] Among the hydraulic engineering public works carried out by the company, it is worth mentioning the Lake Hadra drainage (1925),[85] the raising of the Aswan Dam in Upper Egypt, in collaboration with other companies (1929-1933), and the construction of the three-kilometer Muhammad Ali drainage canal (1932-1933), which flows into Lake Mariut. The company's most significant road works include: the "restoration in the Kom el-Chogafa district through primary and secondary pipework and road paving with asphalt" (1925); the drainage and enlargement of the Siouf road, between Carlton and Bulkeley, the first section of which was completed in June 1931; and the waterfronts in Mex and Corniche, which extend from Ras el-Tin to Muntaza (the company built all but one section, which was awarded to the Almagià company[86]). Dentamaro won the contract thanks to the crucial support of Ismail Sidqi, with whom he had maintained a friendly relationship since 1905.[87] The first sections were completed in the 1920s; the fifth and sixth sections (Cleopatra-Carlton and Carlton-Stanley Bay, the contract for which included the construction of an amphitheater on the beach at Stanley Bay) in 1932; and the seventh and final section (Stanley Bay - Saba Pasha - Gharbana Bay) in 1933.[88] In addition to these major hydraulic engineering and paving works,

Municipal Stadium, Alexandria (1927-1929), Wladimir Nicohosoff Bey, arch.; Dentamaro & Cartareggia, cont.: The third-class bleachers

Dentamaro & Cartareggia built public buildings in Alexandria, such as the Egyptian Maternity Hospital (1928) in the Anfushi area, on the edge of the Ras el-Tin district, the second group of pavilions (tuberculosis and isolation wards, housing for the Sisters of Africa, and a chapel) at the Benito Mussolini Italian hospital in Hadra (1929-1930, G. A. Loria arch.), the third-class bleachers and reinforced concrete combat-sports pavilion for the municipal stadium of Alexandria (1927-1929, Wladimir Nicohosoff Bey arch.), the Egyptian hospital for infectious diseases in the Hadra district (1930-1932), and finally, the racetrack and the Royal Pavilion at the Sporting Club (approx. 1932). Another major Italian construction firm in Egypt was the company founded by Ernesto De Farro (1875-1941). De Farro left Turin, Italy in 1898 to reunite with his family, residing in Cairo. Between 1898 and 1900, he was employed at the Project Office of the Ministry for Public Works, and between 1901 and 1904 he worked as assistant to the chief engineer for the construction of the Aswan Dam (assigned to the British company John Aird & Co.). After having completing this mission, he moved to Zifta in Lower Egypt in order to supervise the lime kilns belonging to his uncle Augusto, owner of the firm Società Augusto De Farro & C. Ernesto started his career as a building contractor in partnership with his uncle with the construction of the Agricultural Bank of Belgium in Cairo (1902). In 1905, he founded his own firm, De Farro & Co., specializing in reinforced concrete and structural steel construction. Two important buildings in Cairo made a name for the firm: the Davies Bryan building (1911, Robert Williams arch.), and the Sednaoui department store on Khazindar Square (1913, George Parcq arch.; stucco decorations by the Giuseppe Santo Riccaldone studio). The latter was one of the first examples in Egypt of a steel frame structure.[89] The structure itself was made in England under the supervision of his nephew, also named Ernesto, who by 1905 had founded his own company, De Farro & Co. Specializing in constructions in reinforced concrete and steel framing, the company expanded so quickly, it was necessary to open offices in Cairo, Alexandria, London, and Jerusalem, from which it engaged in business in Transjordan and Syria.[90] International directories cited De Farro & Co. for its loose-soil consolidation technique. Unstable soils, typical in Egypt, were compacted using compression pillars (Sinus and Compressol systems), which also functioned as foundations.[91] In 1914, the Imperial Wire Company awarded De Farro & Co. the construction of the Marconi radiotelegraph station in Cairo, and in 1915, he built five bridgeheads with 25 km railway track each for the British army on the Asian shore of the Suez Canal.[92] Among the major constructions carried out alongside other companies, the Nag-Hammadi Dam (1928-1930) and the raising of the Aswan



Dam (1930) deserve mention. The company's long list of achievements include some of the most representative architecture ever built in Egypt by the Italian government, such as the Royal Italian Embassy in Cairo (1926-30, Florestano Di Fausto arch.), the Scuole Littorie of Chatby, Alexandria (1931-1933) and the Scuole XXVIII ottobre of Shubra, Cairo (1933-1935), both designed by Clemente Busiri Vici. The company's excellent reputation is also attested by the commissions it won for the works on enlarging the Ras el-Tin Royal Palace (1920-1925) and on constructing of the Muntaza Royal Palace (1923-1928) in Alexandria. The latter job involved a collaboration with the architect Ernesto Verrucci, which continued with the construction in the same city of the Vittorio Emanuele III nursing home (1929-1932) and of the monument in honor of khedive Ismail Pasha (1934-1938). Verrucci, who was a friend and adviser of King Fuad, served as Worshipful Master (1919-1920 and 1924-1925) of the Masonic Lodge "Il Nilo" of Cairo, whose members also included Ugo De Farro and Arturo Garozzo. Ernesto De Farro and Emanuele Dentamaro were members of the Lodge "Le Cinque Giornate".[93] Nevertheless, we should not interpret the membership in Freemasonry of various entrepreneurs, engineers, and architects solely as a means of obtaining building commissions or finances. They also had deep ideological motivations and commitments. For the Italian community in Egypt, where numerous political exiles resided from the very beginning, the Italian Masonic lodges, whose presence dated back to the Risorgimento age, acted as a national and patriotic bond, which can be seen from the works of charity offered by the richest "brothers" to their countrymen.

Ernesto De Farro, like Dentamaro, stood out as a praiseworthy member of the Italian community by financing the Dante Alighieri Library and the evening classes at the Leonardo da Vinci drawing school, long directed by Verrucci. Both also donated generously for the construction of Casa del Fascio (House of the Fascist Party) and Vittorio Emanuele III Nursing Home in Alexandria. Even De Farro's decision to join the Fascist Party very early (like that of many other Masons, including Jewish ones) should be considered in the light of the patriotism nurtured by the Risorgimento spirit. Moreover, despite this allegiance to Freemasonry, he maintained good relations with various religious associations and orders, such as the Franciscan Missionaries of Upper Egypt, the American Mission, the Salesians (for whom he built the Loris Pagano-designed Don Bosco church and nuns' house in Alexandria, between 1929 and 1936), the Young Men's Christian Association, etc. On behalf of the Franciscan Sisters of Egypt, he purchased land and built nearly fifty buildings (schools, small hospitals, clinics, and orphanages) in Cairo, Port Said and in other smaller towns. Following Italy's declaration of war on Great Britain, Ernesto De Farro was interned in a detention camp, but he succeeded in returning to Italy in 1940 thanks to the intervention of Minister Plenipotentiary Mazzolini.

The Dentamaro, Garozzo, and De Farro families were the most visible figures in the large entrepreneurial network covering all the trades related to the construction industry. Although the companies we described operated in multiple construction trades, others established excellent reputations in building due to their high level of specialization. For example, Andrea Vescia's firm was active from 1897 to 1940, working on the such major hydraulic engineering projects as the Aswan and Muhammad Ali dams on the Nile. Vescia's company was also commissioned to build several bridges over the Nile and the base of the Saad Zaghloul monument in Cairo. Among the other Italian-owned contracting companies associated with important achievements in the field of hydraulic works (dams, drainage channels, and drinking-water and sewage facilities), we must cite Alfonso Sasso and Amedeo Bracale (active 1926-1927 and 1930-1931, also in Sudan), G. D'Alba, and Giuseppe del Puente and Sons, and those owned by engineers, such as Ermete Alessandrini, Gesù Archimede Messina, Guido Pizzagalli, and Costantino Taverna (who also built police stations, prisons and courts).

The Suez Canal Company and the British Army were the two key clients for Italian companies. The first often turned to Pietro Grinza, Archimede Petraia, and Ugo Rossetto. The second

Hospital for Infectious Diseases, Hadra, Alexandria (1930-1932), Dentamaro & Cartareggia, cont.: Overall view in the 1930s

Maternity Hospital, Anfushy, Alexandria (1928), Dentamaro & Cartareggia, cont.: Queen Nazli Street facade

Benito Mussolini Italian Hospital, Hadra, Alexandria (1929-1930), G. A. Loria, arch.; Dentamaro & Cartareggia, cont.: Overall view in the 1930s

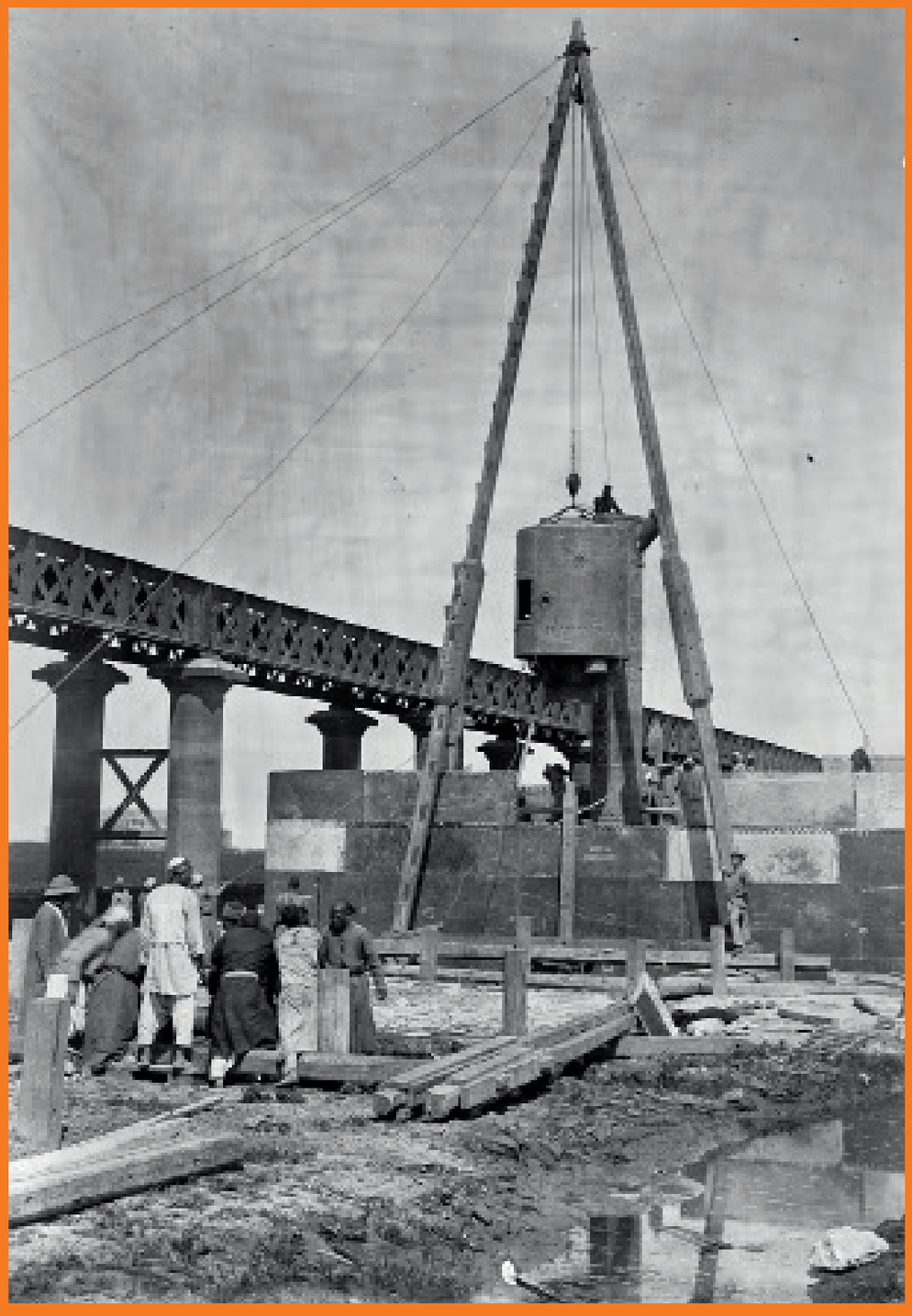
called upon companies experienced in industrial construction, such as T. Mafera, Uva e Piscitelli and, for the construction of warehouses and hangars, Ugo Roccheggiani's firm.

Another recurrent figure was that of the architect or engineer who worked both as designer and as contractor, building structures that either he or his colleagues had designed. This category included Domenico Limongelli, Ugo Dessberg and Giuseppe Tavarelli (who, as a contractor, worked mainly in restorations).

The number of entrepreneurs working primarily in the field of private housing was also substantial, among which it is worth mentioning Giulio De Castro, Salvatore Di Mayo (also active in the road construction field), and Vespasiano Griffoni in Port Said and in the Canal cities. Equally long would be the list of Italian companies, founded in Egypt, which specialized in architectural decorations and those that produced building materials.

The contributions of these entrepreneurs went beyond the modernization and expansion of the territorial and urban infrastructures of Egypt, and the definition of the architectural appearance of Cairo, Alexandria,[94] and other towns. They also took it upon themselves to play a leading role in financing and managing the facilities that were essential to the Italian community, such as schools, hospitals, nursing homes, recreational clubs, etc., compensating for the absence of government initiatives or in some cases stimulating them. The integrity of the Italian builders was expressed by their ability to transmit their knowledge of the trades to local workers and businessmen, and was acknowledged by the large British companies, who subcontracted key projects to them.

ORGANIZING THE TERRITORY



Kosheshah Bridge for the Egyptian State Railways, north of Beni Suef (1909): Sinking the pilings with compressed air

Demerdash Bridge, Cairo (1894): Plan and elevation of the metal deck

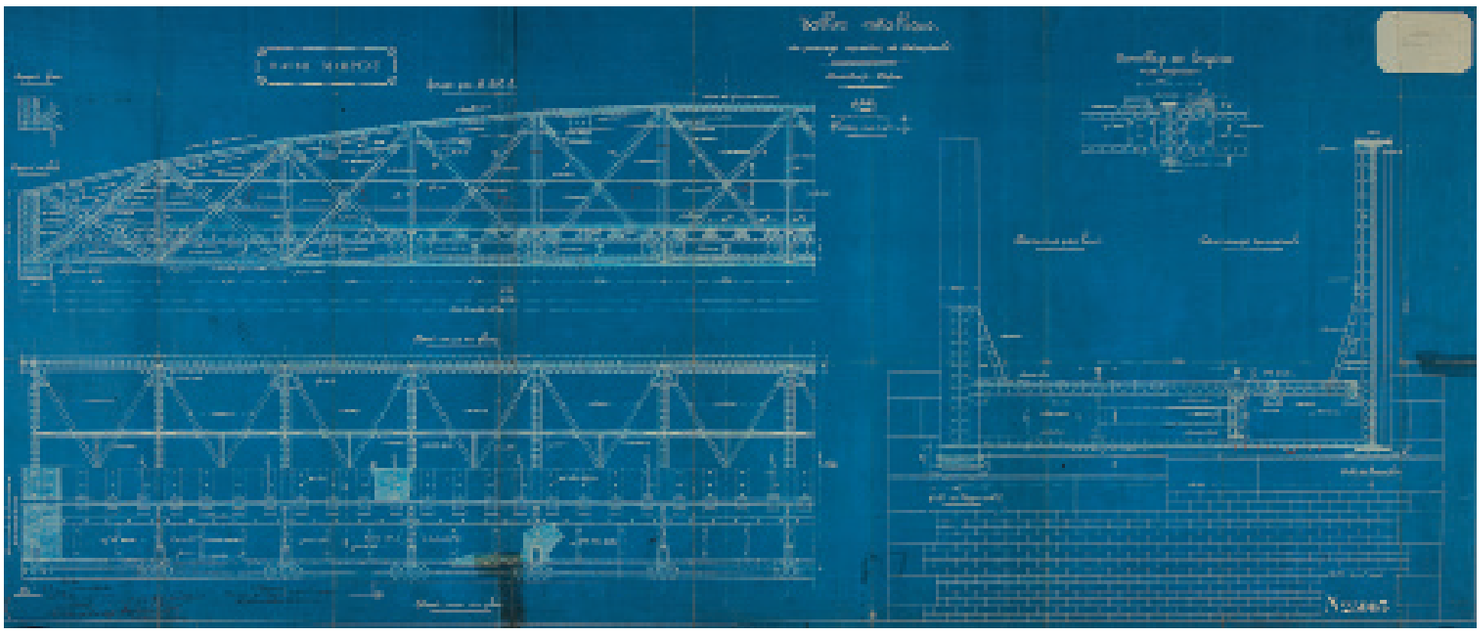
From one shore to the other: Baume & Marpent's Egyptian bridges

Isabelle Sirjacobs

The company Baume & Marpent (1853-1956) is known worldwide for its bridges. From China (the Yellow River bridges, 1906), to Brazil (bridge over the Uruguay River, 1910), via Europe (the Simplon railway bridges in Italy, between 1883 and 1885), the production of bridges of all types (fixed, mobile, or suspension bridges, and draw-bridges), and of all tonnages, is undeniably a specialty of the Belgian firm. The company's rise coincided with the invention of efficient steel-production methods in the 19th century, decisive for metal construction and the creation of structures. Baume & Marpent's plants in Belgium (La Louvière) and France (Marpent) shaped laminated, molded, cast, or forged steel structures weighing several thousand tons, before exporting them to the four corners of the world.

In Egypt, Baume & Marpent worked on the creation of numerous structures that contributed to the company's worldwide reputation. Between 1894 and 1952, the company supplied 158 bridges to that country, including its emblematic achievement, the famous Imbaba Bridge (1912-1924). In fact, seven of the large bridges over the Nile were the work of the Belgian firm. In Egypt, it also distinguished itself by supplying rolling stock (freight and passenger cars and chassis) and metallic frames for various buildings (hangars, reservoirs, pylons, trestles, etc.). The company thus stood out from other Belgian concerns, introduced to the Egyptian market essentially through rolling stock.[95] In 1892, Baume & Marpent received its first Egyptian orders and built the bridges of Sahel Boula, Demerdash, Farkha, and Diffrah. These bridges formed part of a program to modernize Egypt's structures, initiated by a governmental agency. This authority began a series of consolidation works on existing structures due to the increased weight of trains, and invested in the construction of new bridges spanning the country's many waterways and canals. The program was a boon to European steel construction companies, especially those from Wallonia. They swarmed to Egypt, in a climate of fierce competition.

Baume & Marpent continued to receive commissions into the 1900s, expanding far and wide on Egyptian territory. In 1909, it began the Koshesha Bridge, whose piers and



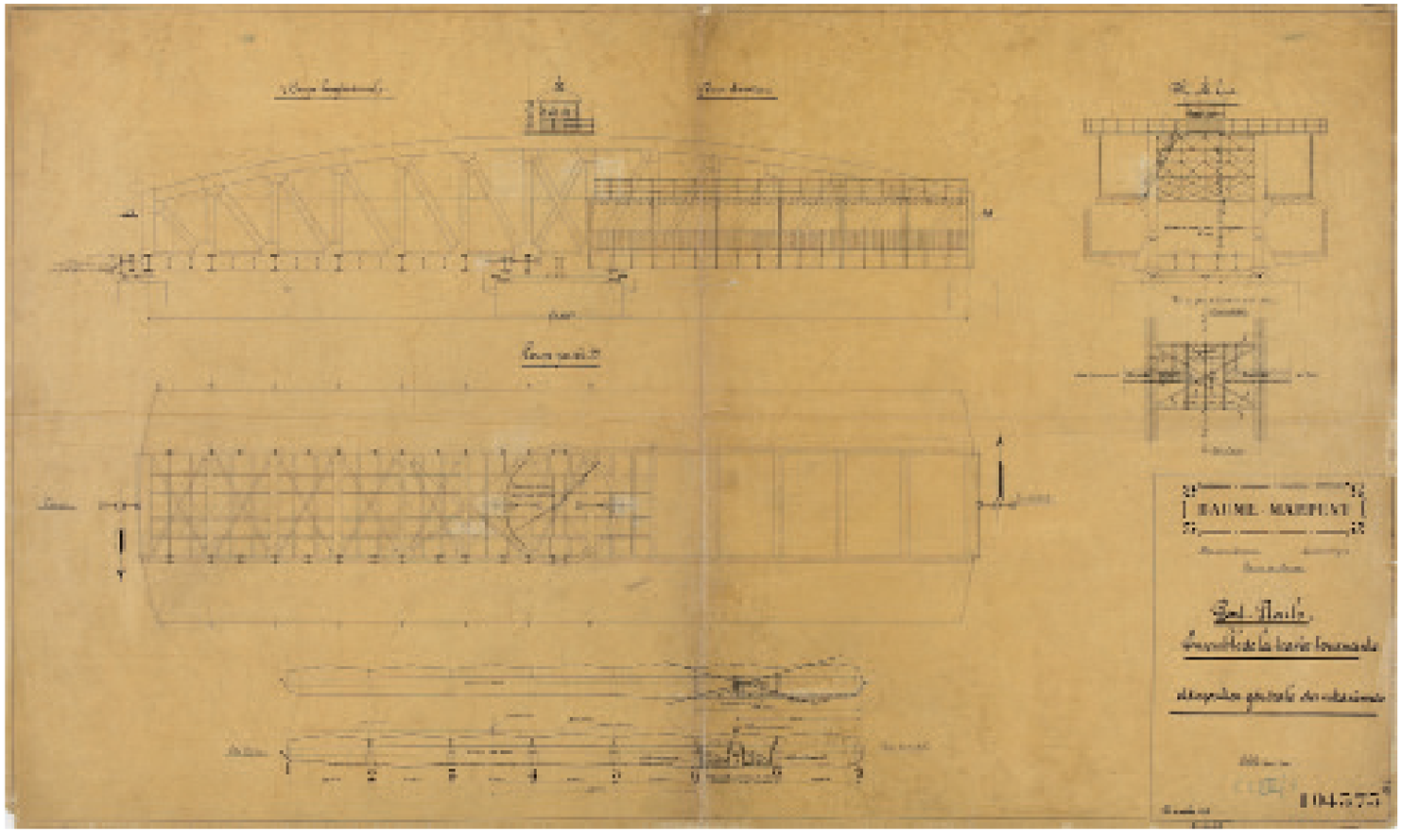
Imbaba Bridge, Cairo (1912-1924): View from the Nile banks

Imbaba Bridge, Cairo (1912-1924): Plan, section, and elevation of the swinging span, 1912

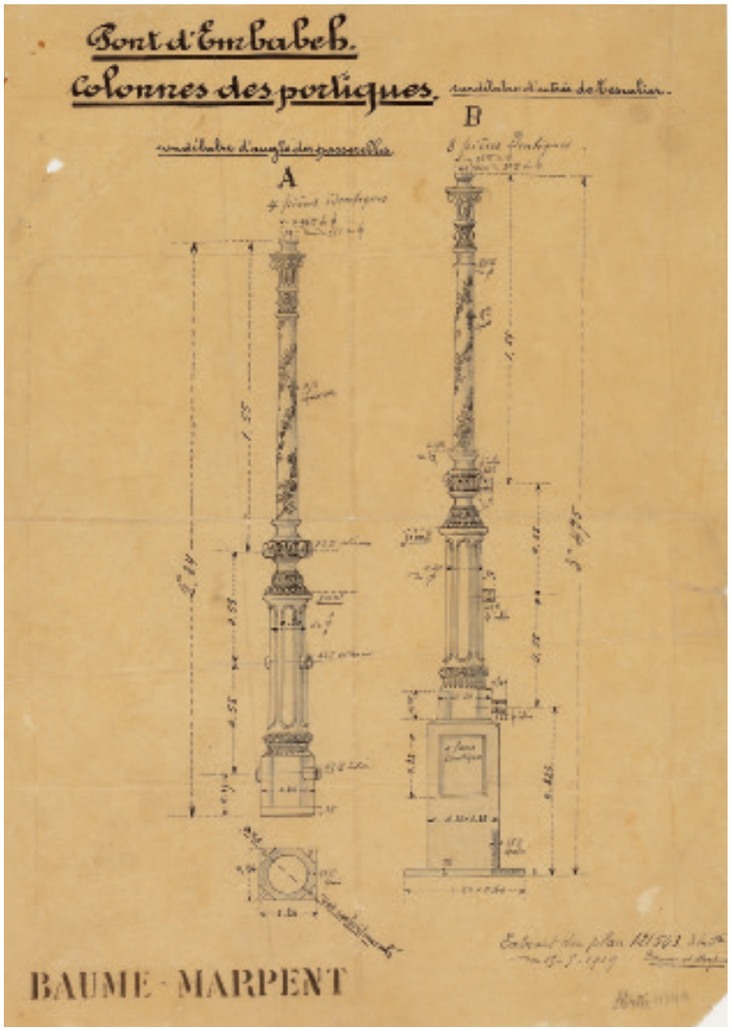
abutments were sunk with compressed air. This construction was very quickly recognized as a technological feat and became part of the company's self-promotion, displayed in its production catalogues.

The Mansoura Bridge, built between 1911 and 1913, also contributed to Baume & Marpent's reputation in Egypt. At the time, with a length of 300m, this swing bridge was the longest one the company had built.[96] Nevertheless, that record was soon broken by the Imbaba Bridge, on which construction began simultaneously.

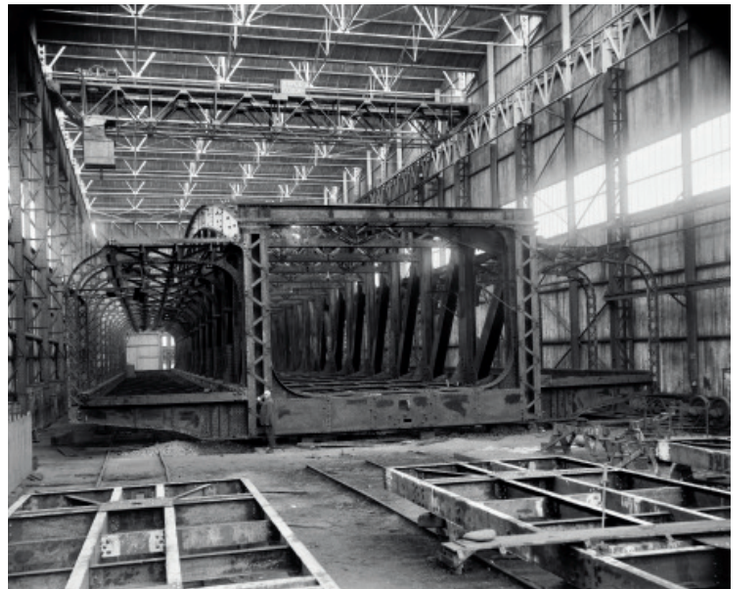
The Imbaba Bridge (Cairo), built between 1912 and 1924, constitutes *de facto* a feat of engineering in the first half of the 20th century. The 490-meter span on the Nile replaced the older structure built in 1892 by



Imbaba Bridge, Cairo (1912-1924): Elevations of the lampposts for the stairway and entrance to the footbridges, 1919



Imbaba Bridge, Cairo (1912-1924): Manufacturing the swing span in the Baume & Marpent assembly shop in Haine-Saint-Pierre, Belgium

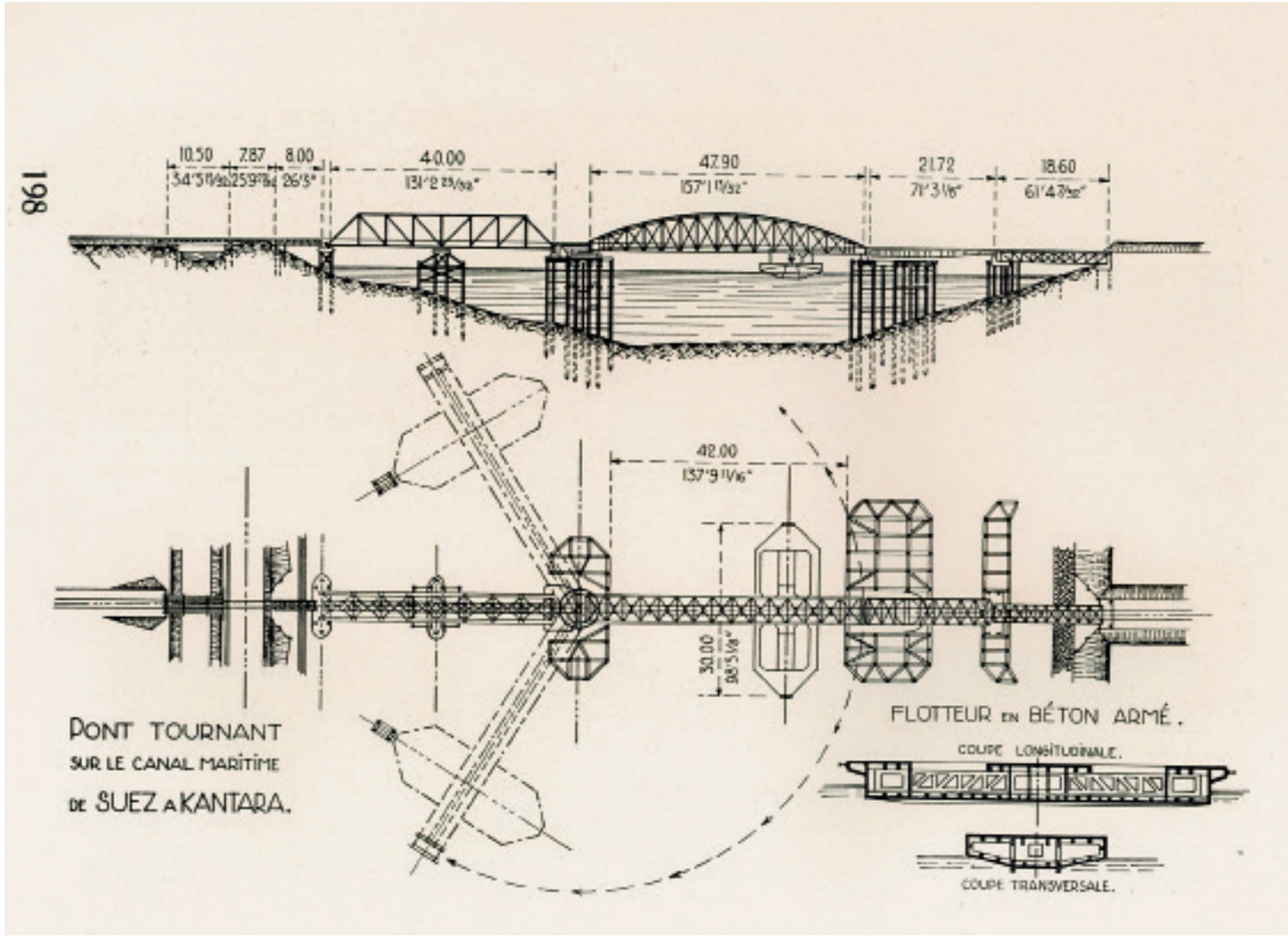


the French company Daydé & Pillé. Its 1500-ton swing span (for a total of 10,000 tons) permits river navigation, and includes a two-track railway line, and two paved roads bordered by sidewalks. The challenge of the Imbaba scheme was also in digging the foundations for the steel caissons protecting pilings and abutments, again done using compressed air. Sealing the company's global reputation, the Imbaba Bridge was proudly printed on company catalogues and postcards, and scale models were made.[97]

After Imbaba, orders flowed in regularly, especially during the 1930s. All types of bridges (Strauss system swing bridges, suspension bridges, wing bridges, railway bridges, overpasses, etc.) proliferated in Egypt. To cite several: Bahr el Aama (1900), Zagazig (1930), Kafr-el-Badamas (1935), Kantara on the Suez Canal (from 1917), Nag-Hammadi (1936), Samannud, Kafr el-Zayat (1937), Khandak-el-Sharki (1946), Deirout (1951), Sawagha (1951), etc. These bridges, most of which spanned the Nile or major canals, were designed, built, and erected by Baume & Marpent in association with Egyptian engineers and construction workers.[98]

The famous Egyptian engineer and mathematician Farid Boulad Bey (1872-1947), director of the technical office of the Bridges and Works Service,[99] collaborated on many of these projects. Responsible for checking calculations, he had assisted with the construction of both Imbaba bridges, the one by Daydé & Pillé in 1892 and then the one by Baume & Marpent in 1912. Baume & Marpent worked actively with the Egyptian technical services, advising them on new procedures in the area of civil engineering.[100]

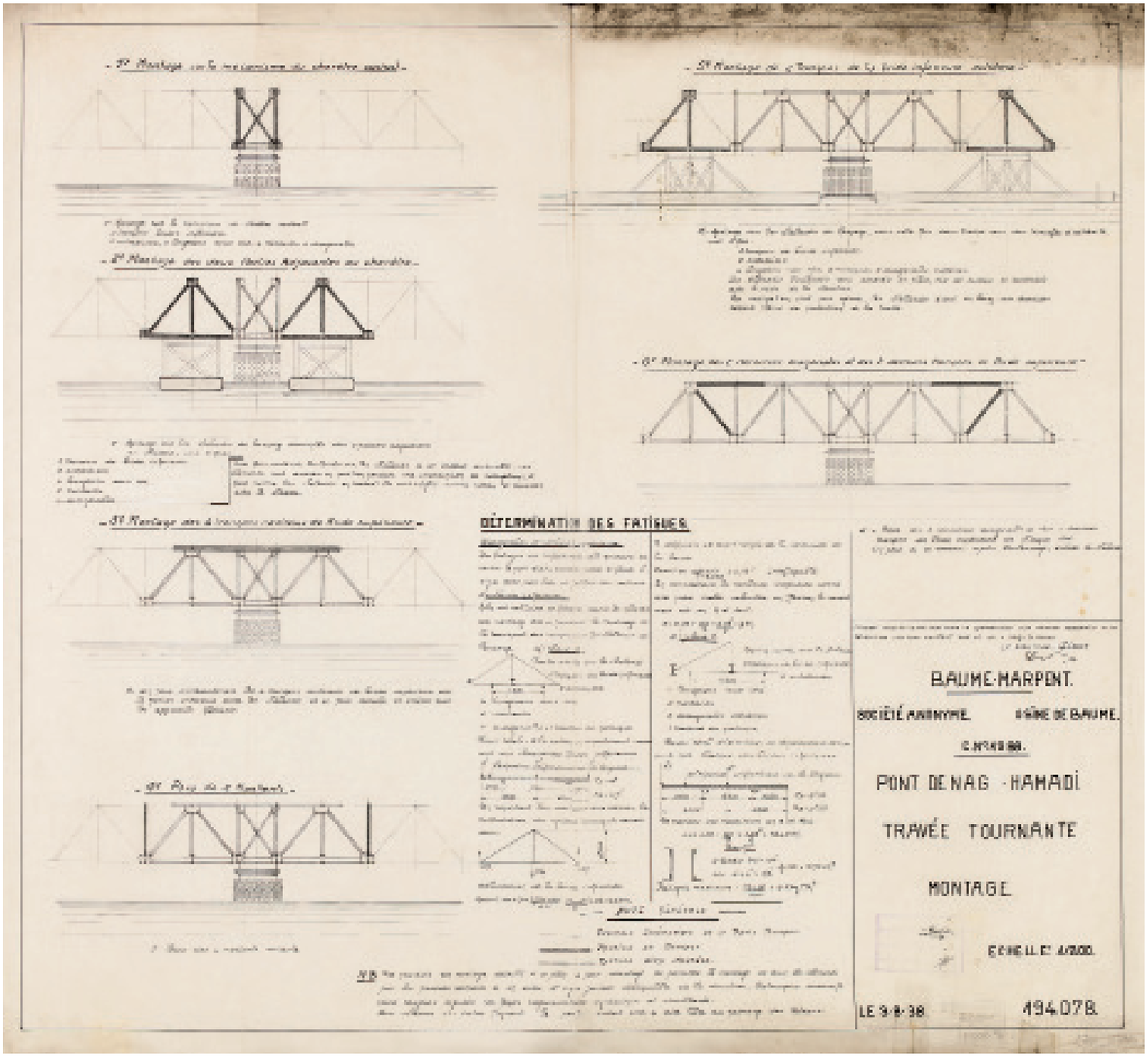
Kantara swing bridge on the Suez Canal (1938): Plan and elevation



Likewise, Baume & Marpent organized collaborations with other Belgian contractors, like Léon Rolin & Cie on the construction of the Kantara Bridge. The structure was commissioned by the Compagnie Universelle du Canal Maritime de Suez, and provided the railway link between Egypt, Palestine, and Syria. With a span of 163m, this bridge included two mobile sections allowing ships to pass. However, it was destroyed shortly after its erection.

In January 1940, the famous French trade monthly on the applications of steel, *L'Ossature métallique*, reported on the Baume & Marpent railway bridge at Nag-Hammadi, describing every aspect of the construction in great detail. An impressive amount of steel was used for the project: 2,000 tons of rolled steel, 44 tons of steel beams, 50 tons of cast or forged steel and various other metals for the mechanisms, as well as 500 tons of rolled steel for the foundation caissons.[101]

Nag-Hammadi swing bridge (1938):
Assembly plan for the swing span



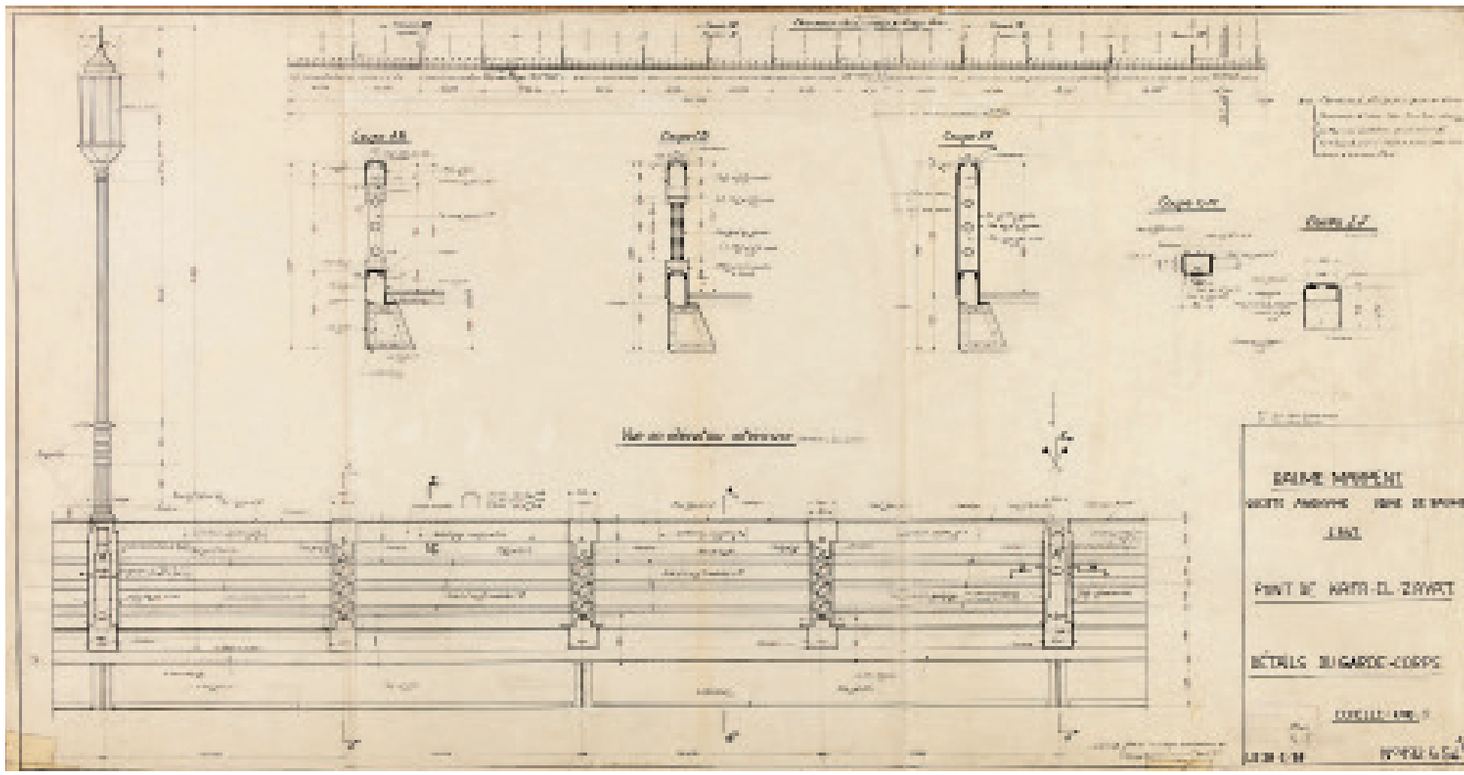
Kafr el-Zayat Bridge, Rosetta Branch of the Nile (1938): Balustrade details

The 500-meter Kafr el-Zayat highway bridge over the Nile was completed in 1940. It was another technical feat, because the deck under the roadway rested on three main girders connected to each other by a system of trusses ensuring equal load distribution on each girder. High strength steel was used in order to lighten the parts subject to the greatest stress.[102]

The early 1950s were marked by setbacks that impeded Baume & Marpent's works in Egypt and everywhere else. The company had suffered numerous losses, which led it gradually to a cessation of its business in 1956, at least in central Belgium, its cradle. Political and economic upheaval in Egypt also increased the difficulties of the company, which had to stop works after completing the Ferdan Bridge, built between 1950 and 1954. Work on the structure was disrupted by a shortage of steel, incurring penalties for the constructor.[103] In December 1953, the losses on this project were estimated at 17,000,000 Belgian Francs.[104] Nevertheless, once it was finished, with its two mobile sections, each 110 meters long, it was considered the world's largest swing bridge. It was destroyed in the Six-Day War in 1967.

After the temporary stoppage of Baume & Marpent's works in Egypt in 1954, a new construction campaign was launched by the company, and again it won some contracts. However, the swing bridge at Damanhur, among others, announced the end of the Egyptian adventure for the Belgian company in terms of bridges.

In 1956, Baume & Marpent went out of business.[105] Although its longevity was not exceptional, the company stands out from its competitors due to the diversification of its products and their global spread. Its numerous actions in Egypt contributed to its reputation. Today, Baume & Marpent's Egyptian bridges still attest to the



One span of Kosheshah Bridge for the Egyptian State Railways, north of Beni Suef (1909), in the Baume & Marpent shop in Haine-Saint-Pierre, Belgium

Bahr Moes Bridge, Zagazig (c. 1930): The deck laid on steel pilings

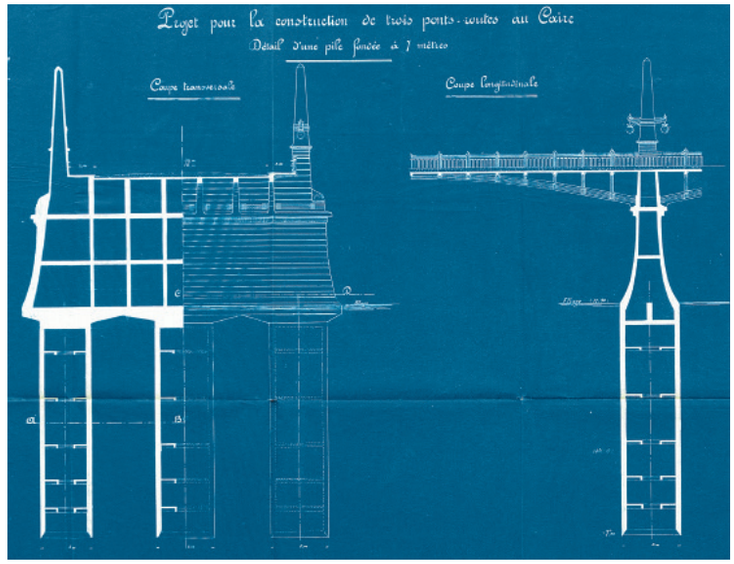
company's know-how. In Belgium, in addition to the archives preserved by the Écomusée of Bois-du-Luc, the Morlanwelz street where Baume & Marpent had established one of its divisions, called *Rue du Pont du Nil* [Nile Bridge Street], is a reminder of the aura the company had acquired with its famous Imbaba Bridge.

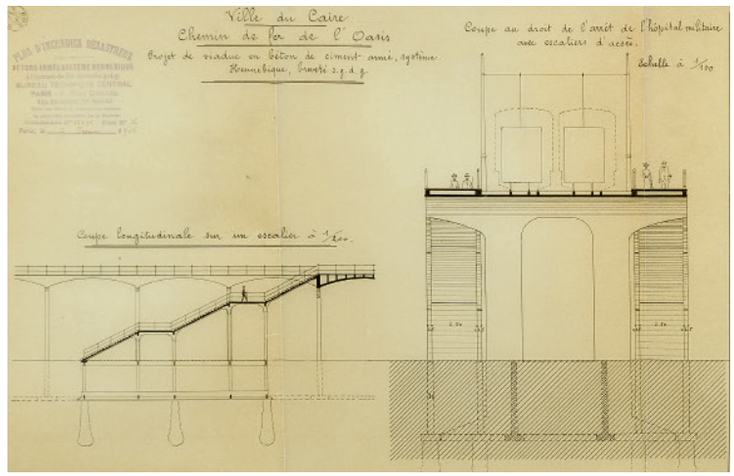
Bridges as ambassadors: Hennebique's expansion in North Africa

Guy Lambert

In contrast to the prominent position Hennebique generally granted to bridges in its advertising strategy, those built by the company in Northern Africa appear only occasionally in its publications and exhibitions. True, bridges were less representative than other types of projects of its activities on that continent. However, we may also wish to consider the extent to which they fit the image the firm wished to project. Despite the limited publicity Hennebique gave to such works, its sales agents and proxies expended considerable energy in situ, prospecting for projects and developing them. Of course, no potential contract was neglected. Nevertheless, the quest for major projects stands out from the design of smaller scale operations, and according to a 1906 letter, bridges are structures "with great publicity potential."[106] The desire to expand south of the Mediterranean here went hand in hand with the broader ambition of "conquering the Department of Ponts et Chaussées"[107] that François Hennebique had shown since his beginnings. Although railway companies and some industrialists were interested in reinforced concrete for the construction of their projects – especially in Egypt, where as early as 1903, the Parisian firm built two bridges[108] – it is in fact official recognition which counted the most. In a business sector dependent mainly on public authorities, it was probably simpler to build in a protectorate country such as Tunisia rather than in colonial territories, with a "narrow and puerile administrative formalism"[109] castigated by Hennebique and its representatives.[110] Thus in Algeria, where convincing civil engineers was as uncertain as in mainland France, the consistent efforts spent in this way were slow to bear fruit, as an agent regretted: "Unfortunately, as you can see, although there are plenty of projects (and how many of them have we dismissed!), completed constructions are rather rare."[111]

For all that, beyond the borders of Algeria, this observation could in reality summarize more broadly Hennebique's position in Northern Africa up until World War I. Whether or not these schemes were actually completed, designs proliferated. More than sixty projects were studied in Algeria before



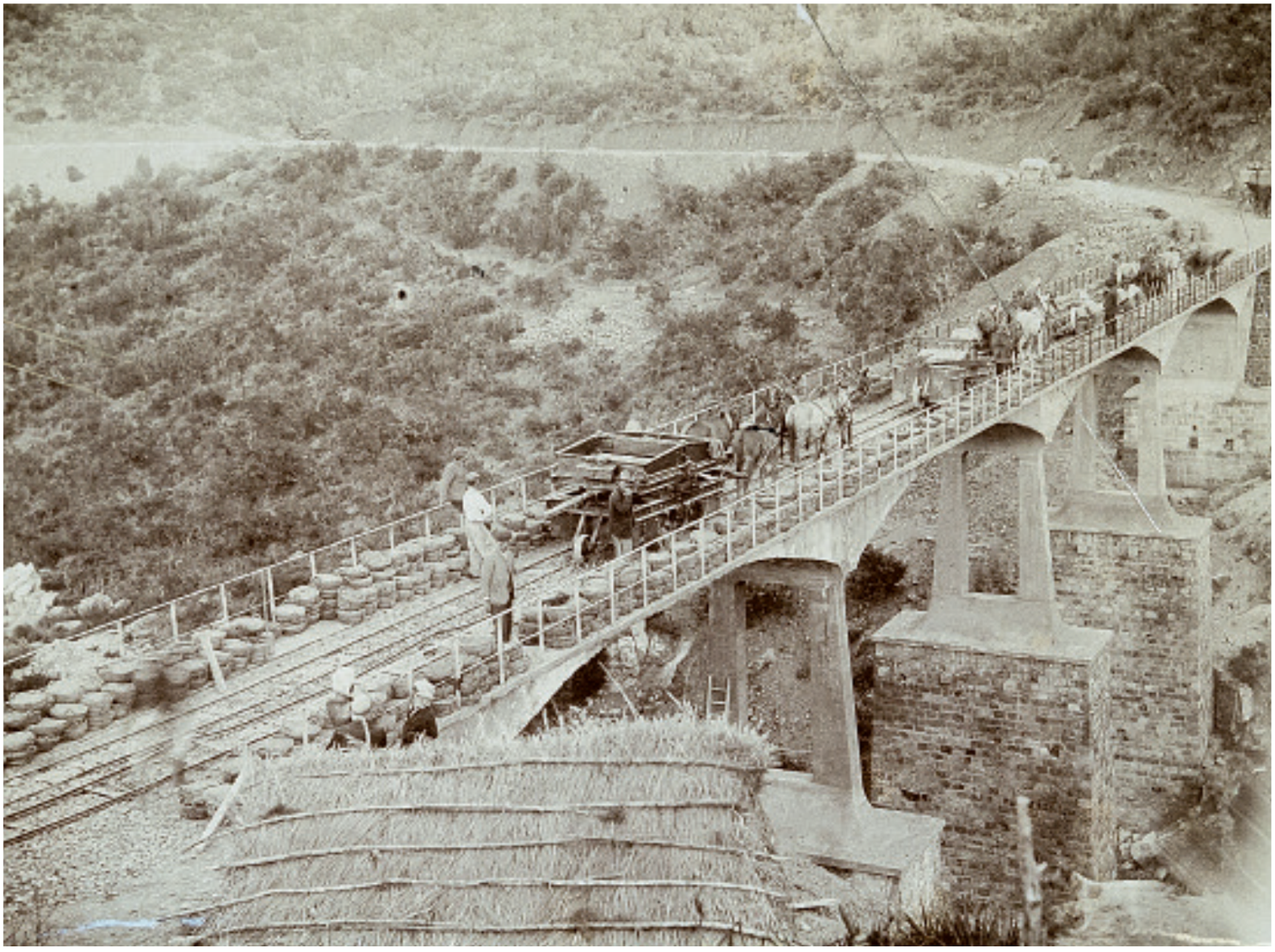


1914; about fifteen, in Tunisia; a dozen, in Egypt. Company policy was tried and true: in particular, it consisted of establishing its authority by producing quantities of design files. The profusion shows the productive strength of the Hennebique network and also highlights its adaptability to highly varied situations and, above all, its reactivity to the frequent redefinition of programs. But the course of project development also reveals that the organization was occasionally cumbersome. Its efficiency was sometimes hobbled

353-m bridge over the Nile, Cairo (1903), Hennebique central office, eng.: Detail of a piling sunk to 7 meters; Unbuilt project drawn for a competition

Railway overpass for Les Chemins de Fer de l'Oasis, Cairo (1906), Della Riccia, ing.; Hennebique, cont.: Preliminary design, unbuilt

Bridge over Malah wadi, Ténès, Algeria (1905-1908), Hennebique central office, eng.; Louis Didier and Société de Fondations par Compression Mécanique du Sol, cont.: Trials



by communications difficulties between participants, accentuated even more by distance. Often, a project fully designed in Paris arrived at the North African agency so late that the agent had to rush to meet the deadline to submit a bid – if it was not too late altogether. Regardless of the real consequences of tardiness, it was often a source of tensions between the central office and the sales network. Agents were frustrated when deals hovered out of reach, and the head office sternly hurried projects: for example, in 1907, it reminded the contractor in charge of the Ténès bridges that "the satisfaction given by the bridge will determine the future of reinforced concrete in Algeria."[112] This essay examines bridge production by Hennebique in Northern Africa, 1900-1910, in this light. In a context marked both by the firm's expansionist dynamic and by an official resolve to regulate the use of reinforced concrete, the strategies of

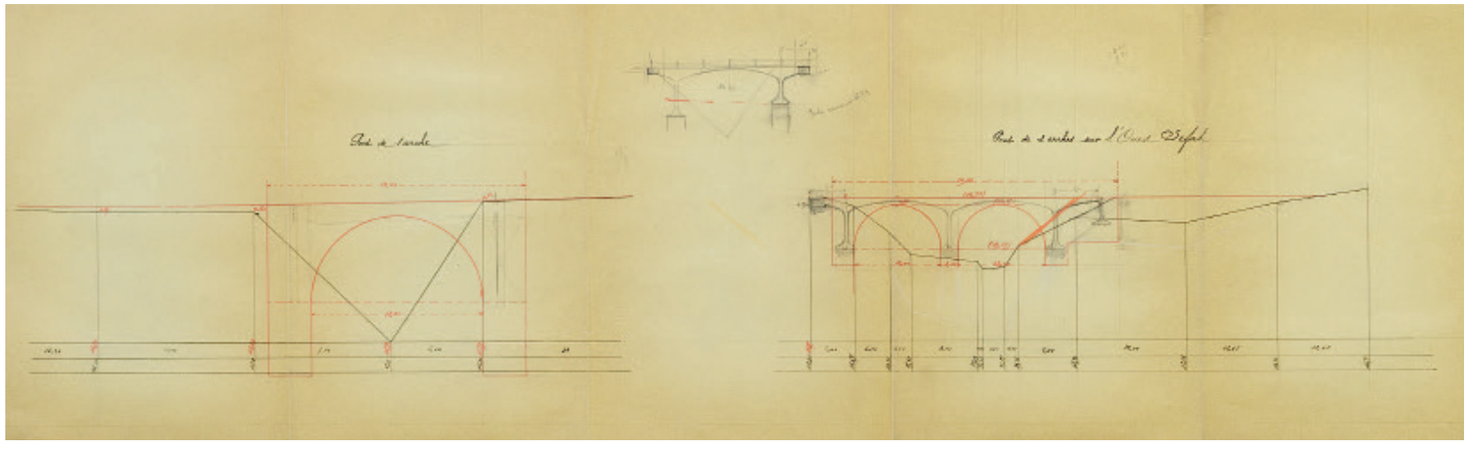
Bridge over Sefah wadi, Ténès, Algeria (1905-1908), Hennebique central office, eng.; Louis Didier and Société de Fondations par Compression Mécanique du Sol, cont.: Sketch of Hennebique project on print of previous project

persuasion at work, both in the design of the structures and in the preparation of design files, are worthy of attention.

Breaking into the market: Hennebique's potential to adapt

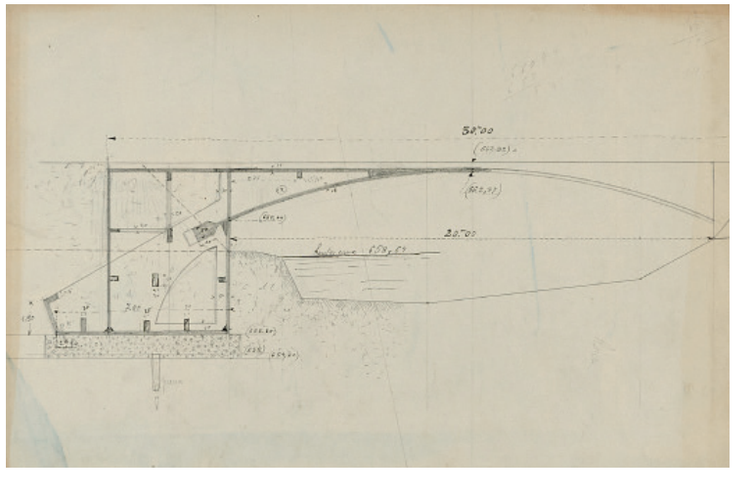
Regardless of the impact of the "propaganda" developed by Hennebique,[113] the public authorities were undoubtedly more sensitized to the advantages of reinforced concrete in a geographical context where the flash flooding characteristic of a *wadi* frequently demolished structures, sweeping away steel decks and washing masonry piers away. Even engineers who were least inclined to welcome licensees or general agents supported the new material – for example, mentioning how quickly reinforced concrete could be poured, or its resistance to salinity, close to the sea – when asked for a price or project offer. Indeed, many engineers contacted Hennebique representatives with a project in hand, already designed by their own department – most often in steel construction – in the hope of "improving" it or, on the contrary, simply for the purpose of "comparing the systems as applied to entire projects."[114] Shaped by a culture of mistrust, Hennebique's usual practice sought to limit the risk of information leaks by sending only a draft, which moreover was not systematically accompanied by design specifications. Nevertheless, at a time when the perspective of regulation of reinforced concrete made Public Works more intransigent, this strategy of professional secrecy may not have been relevant. "This is a question of principle that must be answered. Should we satisfy the Algiers engineers, who demand to see construction drawings in order to assess projects?"[115] asked general agent Reymond in 1907.

The preference for private agreements was expressed at all levels of the Hennebique network. However, once public officials had Hennebique's plans and price estimates in hand, they were often likely to call for competitive bidding. This practice also lent itself well enough to the firm's strategy, especially when Hennebique intended "to break into the market for steel construction."[116] At a time when Hennebique still dominated the reinforced concrete industry, the art of the alternative plan, well known to entrepreneurs, was above all an opportunity to attract attention to the material. Thus, in entering the competition opened in 1903 for the construction of three bridges over the Nile, connecting the island of Roda to Cairo and Giza (the largest of which spanned 535 m), Hennebique observed that "the specifications, although they do not explicitly demand reinforced concrete, do not exclude it, either."[117] Henceforward, though Hennebique's sales pitch touched on the company's long experience – going back to the bridge at Châtellerault in 1899 – the main thrust of the argument was to disqualify steel from all points



Bridge over Damous wadi, Dupleix, Algeria (1905-1906), Hennebique central office, eng.; B. Reymond eng.; Louis Didier and Société de Fondations par Compression Mécanique du Sol, cont.: Detail of a span, unbuilt project

Bridge over El-Akoum wadi, Tlétat el-Douaïr station, Algeria (1910), B. Reymond, eng.: Preliminary design, unbuilt, sketch by B. Reymond

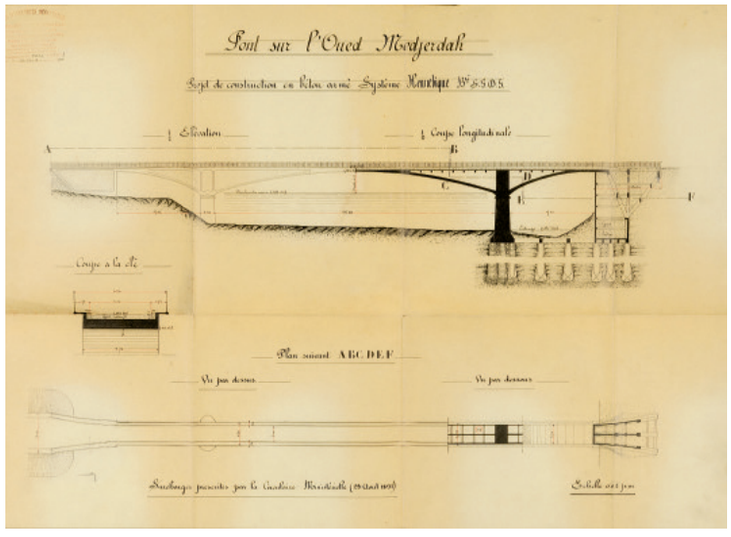


of view. For example, when a call for bids specified the "monumental character" of the planned structure, Hennebique asserted "it is a well-proven fact today [...] that steel construction is not architectural"[118] (in contrast to the potential of reinforced concrete), and furthermore, the quest for monumentality "does not always lead to excessive spending, especially when the engineer-architect uses the [reinforced concrete] judiciously."[119].

The range of constructions encountered in the projects submitted by the Hennebique network fundamentally reflects the diversity of technical and commercial cultures of the players. Indeed, design often seems like a collective process, in which the summary draft prepared by the local agent or by a contractor – on the basis of his own views and sometimes quite independently – constitutes the basis for the Paris office's designs. The manner in which each party envisaged reconciling technique, economy, and esthetics sometimes shows differences in strategy. The plans themselves also attest to these interpretations, if only through the series of different solutions for the same project. If among the Hennebique agents a taste for arched bridges, or at least for the refining of arches, can be identified, other types of structure were also chosen, determined by the constraints of the site, by the cost, or simply by the skill of the contractor who had won the contract. Thus for the Lamy Bridge in Constantine in 1905, Reymond regrets, like his contacts on the rue Danton, that the contractor had presented a plan for a bridge with girders rather than the one designed by the head office: "The form with an arch would have had a far more preferable appearance and I am convinced that it would not have resulted in extra expense, but Mr. Didier, to whom I had given the task of dealing with the mayor, judged differently."[120] The plans also illustrate a transposition into reinforced concrete of types from construction in steel, such as the cantilever bridge or the tied-arch or bowstring bridge. This last type of construction, implemented as early as 1906 in a bridge over the Beja wadi in Tunisia (40 m span), occupied a privileged position in Hennebique's production. But at a time when *Le Béton armé* columnist Paul Gallotti was castigating these forms, for the issue was competing with the beauty of steel construction,[121] this structural type was sometimes adopted only as a last resort, especially when the subsoil made it impossible to establish abutments able to resist lateral thrust. If the question of foundations is moreover very often crucial where clay is the dominant substrate, Hennebique again had an advantage when hoping to prevail over its competitors. The fact that it held a patent on a system for deep pile driving ("Compressol"), through a company it had taken over in 1902, was a strong argument for an "all-concrete" solution that could enable Hennebique to win contracts by concentrating tasks. For example, the case of the bridge on the Medjerda at Sidi Zehili in Tunisia shows how these different factors affected the design of the structure, for which three solutions were studied successively between 1907 and 1911. First, a plan for a three-arch bridge was drawn up, for a privately agreed contract. When

Bridge over Béja wadi, road from Medjez el-Bab to Souk el-Arba, Tunisia (1906-1907), Hennebique central office, eng.; Jean Peloni, cont.: Construction site

Bridge over Medjerda wadi, Sidi-Zehili, Tunisia (1907-1911), Hennebique central office, eng.; Jean Peloni and Société de Fondations par Compression Mécanique du Sol, cont.: Project for cantilever bridge, 1908



competitive bidding was opened instead, Hennebique's engineers preferred to submit a cantilever bridge (with a central span of 56 m). This change required the use of Compressol for the pilings and therefore the services of the Hennebique subsidiary Fondations par Compression Mécanique du Sol. The latter company finally obtained the contract in its entirety after the withdrawal of the initial agent (Peloni), who had brought the business to Hennebique but missed the deadline for submitting a bid. During the works, the form of the structure was changed significantly for reasons that are not clear from the archives, but which could be connected to the composition of the soil. The deck finally consisted of bow-strings resting on the two pilings already under construction, and raised, as well as on a newly driven median pier.

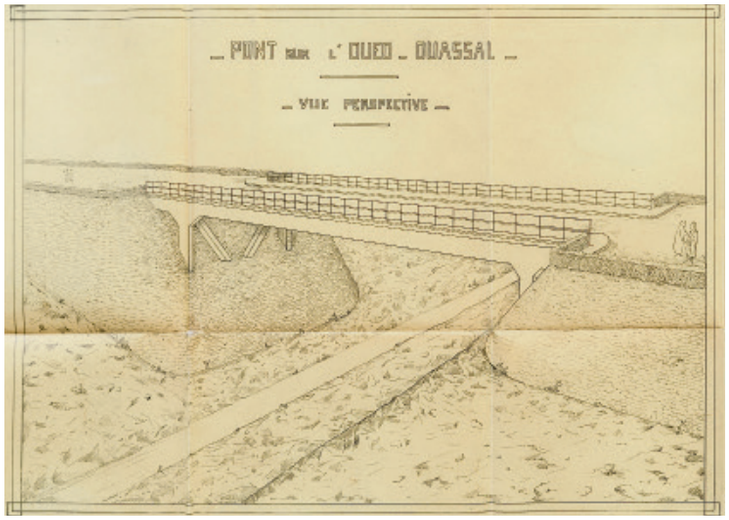
The "rational, ideal solution"[122]

The range of bridges designed by Hennebique exemplifies the adaptability of reinforced concrete, constantly touted in its advertising. However, the media campaigns organized from 1905 in the bridge industry tended to focus more specifically on the formal or esthetic qualities of the new material. The idea was that reinforced concrete was the most suitable and rational material for the architecture itself of these works, which were the quintessence of rationality, at least as characterized at the time. Several key operations in Hennebique's expansion in Northern Africa attest to this approach, being connected with emblematic projects and constructions the company then used for its prestige and ambitions. Thus, in 1905, the plans for a bridge over the Damous wadi near Dupleix, Algeria, and for a road overpass at Gabbari train station in Alexandria, never completed but each presented as the firm's "first major feat of engineering" in the relevant countries, reflected the aura of the Mativa Bridge built in Liege, Belgium, for the world's fair there the same year. It was more than a question of image, as Hennebique's engineers seemed to pursue the Mativa approach in other projects. The design's public success was obviously an asset to Hennebique's representatives in their dealings with government civil engineers, who had only recently been won over to reinforced concrete. But the lines themselves of the new bridges derive from an aspiration to produce "20th century bridges."

The series of plans for the bridge over the Damous wadi (total length 200 m) shows the scheme being

Bridge over Medjerda wadi, Sidi-Zehili, Tunisia (1907-1911), Hennebique central office, eng.; Jean Peloni and Société de Fondations par Compression Mécanique du Sol, cont.: Completed tied-arch bridge

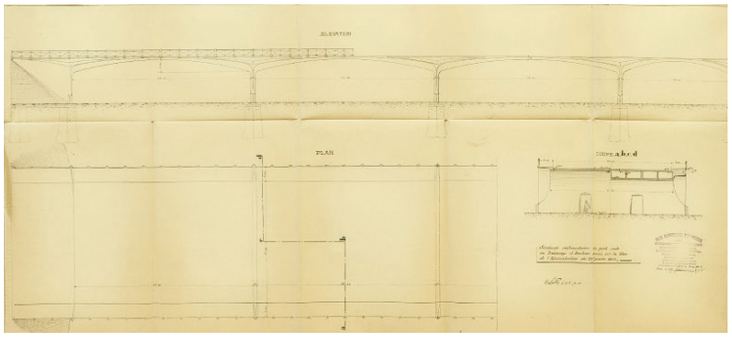
Bridge over Ouassal wadi, Mateur, Tunisia
(1913-1914), B. Reymond, eng.: Perspective



simplified significantly. Hennebique's initial proposal in October 1905 derived from an earlier steel-deck bridge project established by the authorities. While retaining the number of piers and their rhythm, the Parisian office designed a five-arch bridge suggesting it was made of stone. This satisfied the government engineers, who objected only to "the thinness of the key, for esthetic reasons, not because of strength."[123] Yet the following month, a completely different design was prepared by the offices in Paris: the planned abutments were replaced by half-spans conceived on the principle of the cantilever. This structural change was accompanied by a general refinement of the bridge's lines: the proportional relation between the breadth, now significantly reduced, of the piers (50 cm) and the opening of the arches (between 24 and 40 m depending on the hypothesis) are more reminiscent of the Passerelle des Arts in Paris than of a stone bridge. These changes seem to be less the result of the client's request than of a new philosophy at Hennebique. Handwritten notes on a reproduction of the first blueprint, requesting radical corrections, summarize the guidelines: "Keep the opening wide. Don't obstruct it with piers. With reinforced concrete, they can be made very *thin*. They are thus less likely to cause a washout, and are also less expensive."[124] Although the comments were strictly "in-house" at the firm, they are the exact echo of the rhetoric developed at the time by Paul Gallotti in *Le Béton armé*. In November 1905, he put forth the same idea to assert the superiority of reinforced concrete over other building techniques.[125] Repeating the argument in the magazine in April 1906, Gallotti invoked the authority of 18th century École des Ponts et Chaussées founder Jean-Rodolphe Perronet. According to the author, he "admirably defined the true esthetic of bridges: obstacles reduced to a minimum in the riverbeds, arches, just what is needed to support the lintel, the flat stone which must constitute the roadway, no useless superfluities, everything that cannot be justified being irrational."[126] Gallotti's interpretation of Perronet's precepts naturally leads him to conclude that Hennebique's Mativa Bridge in Liege is "the epitome of the ideal bridge Perronet dreamed of."[127] But as a critic, Gallotti also commented on other bridges Hennebique was building at the time. For example, he admires "cut-waters shaped like plowshares,"[128] for their naturalism, echoing the spirit of the design for the bridge over the Damous wadi.

Intended to cross railway tracks rather than flowing water, Gallotti's comments on the overpass at Gabbari Station in Alexandria, 1905 seem to reflect the same reasoning. If its overall thinness results primarily from the need to find a compromise between the size of the trains and the rather low level of the street above, it undeniably shows architectural intentions about issues going well beyond merely wooing the contracting authority. Clearly, the configuration of very slender piers in the construction lends itself admirably well to the discourse on the potential of reinforced concrete: though their breadth of 60 cm is a "concession that we make to esthetics," it does not weaken them in any way. Were a train to derail, the author says, the locomotive "would simply smash like an apple thrown on a rock."[129]

Gabbari Station street overpass, Alexandria (1905), Hennebique central office, eng.; Émile Servin, eng.; Léon Rolin & Padova, cont.: Unbuilt project, plan, section, and elevation



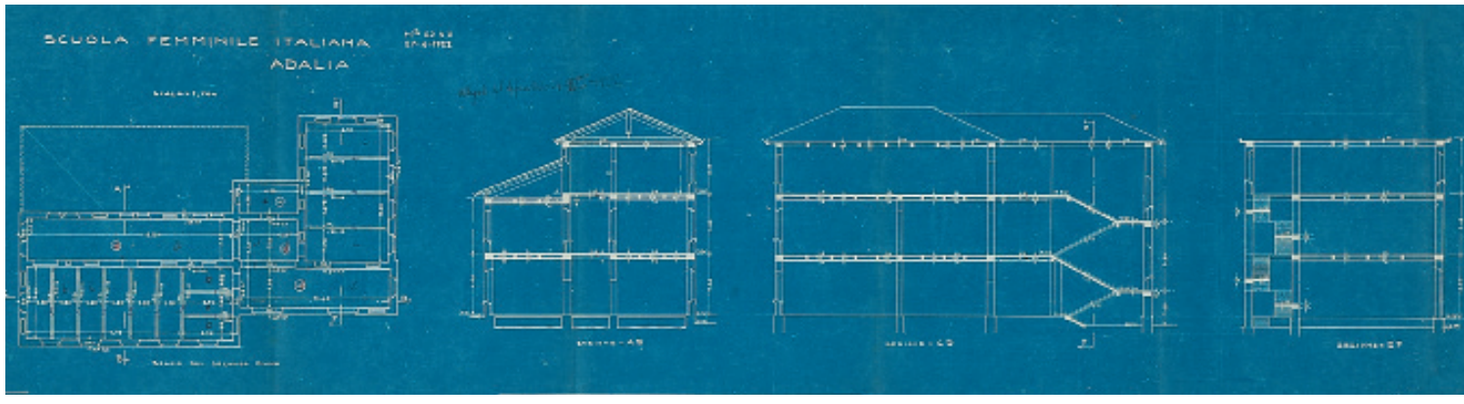
An acculturation at work?

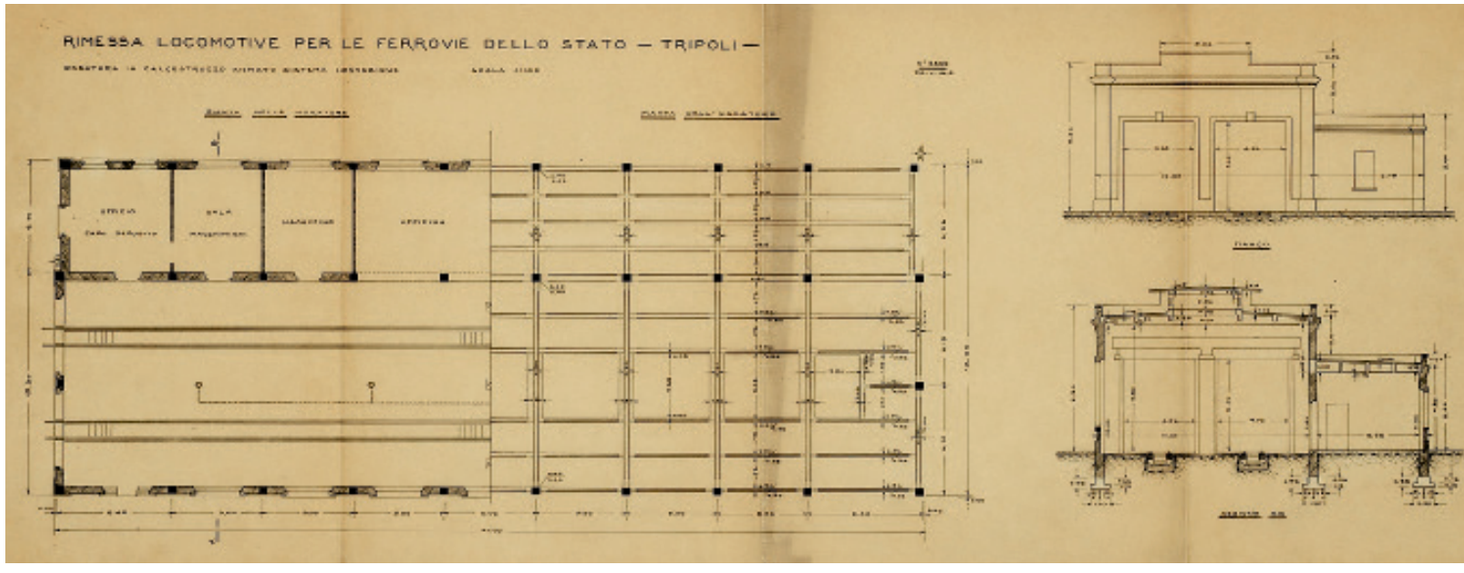
The role of builders in the popularization and official acceptance of reinforced concrete no longer needs to be shown. Hennebique's design files, studied here, show some of the methods by which this process worked. It is noticeable even in the daily routine of the various figures of the building industry, from contractors to the public services. Thus, at the beginning of the century, a technical culture identifying with the firm was constituted, not only by the head office in Paris, but also in response to a demand from the agents themselves, faced with learning the new science of reinforced concrete. A request from the Egyptian agent, Émile Servin, in 1909 shows this: "I would be grateful if you were to ask Mr. Serra and Mr. Dufour if they would be so kind as to study in detail the calculations for the bridge as I have planned it for both methods, the Hennebique method and the official one, so that in the future, I will no longer be taken as I have been this time, and that I can present a bid that conforms to the requirements without your assistance. For this, please do not spare me any explanations because in the calculation of the arches there are points which I have never fully understood and I am always uneasy when I have to apply them."[130] Although the letter is primarily related to the communications dysfunctions slowing down the transmission of information and plans within the Hennebique organization, it also reveals an aspiration to greater autonomy, equally beneficial to the agents themselves and to the head office. But the share of acculturation resulting from the firm's communications is even more obvious when it is reflected in standards and codes by government civil engineers. As Reymond pointed out to his supervisor in 1907: "the program, except, however, as regards the breadth of the piles and the application of the memorandum on reinforced concrete, is inspired from your own teaching. In fact, Compressol is first on the list of construction-foundation processes."[131] Is this not precisely a victory of the strategy developed by Hennebique, promoting an identification with the materials it produces?

The Porcheddu company and the projects for reinforced concrete water tanks: Building models and construction site experiences (1912-1933)

Vilma Fasoli

Engineer Giovanni Antonio Porcheddu[132] went into business in the field of civil and industrial construction in Turin in 1894. He had already purchased the northern Italian license for the patented French Hennebique process, and after 1914, he was the only Hennebique licensee in all of Italy. Porcheddu and François Hennebique knew and respected each other, and were friends. Hennebique provided support for the Italian company in the early years, delegating his offices in Brussels, Belgium, to help with calculations. However, after 1897, he gradually allowed Porcheddu greater autonomy, depending on the difficulty of the project. Porcheddu's company also experimented with differently shaped metal reinforcement bars (other than round ones), and obtained improved adherence. They filed a patent on the system in 1906, and subsequently advertised it in the Italian magazine *Il Cemento*.[133] The following figures are indicative of both the escalation of the company and the success obtained by the application of the Hennebique patent in Italy: having completed 12 projects in 1895, Porcheddu expanded to 424 projects in 1902.[134] The company grew steadily, and by 1909 had engaged in as many as 1,307 projects. However, by 1933,





Additions to the Italian School for Girls, Antalya, Turkey (1922): Plan for the reinforced concrete structure

Locomotive depot, Tripoli, Libya (1912): Plan for the reinforced concrete structure

the business was suffering and the company was liquidated between 1934 and 1935. During its period of activity (1894-1933) a total of 2,600 projects were carried out, but only 5 of them involved work outside of Italy: a locomotive depot and a water tank in Tripoli (Libya) in 1912, the Italian schools in Rhodes (Greece) and in Antalya (Turkey) in 1922, and the Italian hospital and a water tank in Tangier (Morocco) in 1926.

Porcheddu was the leading contractor in the field of reinforced concrete water tower construction beginning in 1903. It had undertaken an unusually bold prototype at the Sforza Castle in Milan, presenting substantial difficulties. The assignment was to construct two concentric cylindrical tanks, the bottom one containing 480 cubic meters (126,800 gallons) of water and the top one 1,600 cubic meters (422,000 gallons), to be placed inside the circular southern tower of the castle. These water tanks were designed to be integrated in architect Luca Beltrami's plans for the reorganization of Milan's drinking-water distribution system, involving the use of the Sforza Castle towers to store supplementary tanks. In the years that followed this showcase accomplishment, Porcheddu built other, much smaller tanks for other city water supplies.

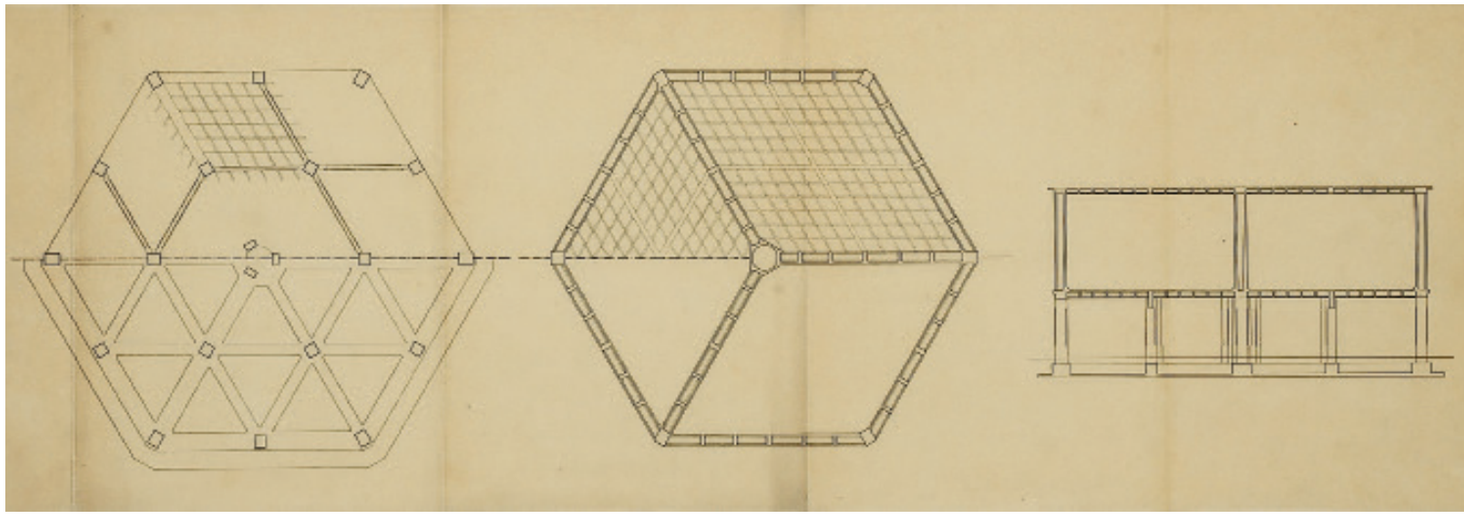
The magazine *Le Béton armé* was particularly interested in exploring sizing and structural analysis. As early as 1900, it wrote "water-tower construction is one of the primary applications for reinforced concrete, and this kind of work has been an important source of business for all the reinforcement systems."[135] The magazine mentioned earlier works by Joseph Monier, such as the 200-cubic-meter water tank built in 1868 in Maisons-Alfort and the 119-cubic-meter tank built in 1872 in Bougival. In 1897, François Coignet had built 500-cubic-meter tanks with cylindrical base for the port of Toulon. In its early days, the Hennebique company usually designed tanks subdivided into at least two compartments, with a rectangular base. Dual tanks made it possible to supply water continuously, even during maintenance operations requiring that one of the tanks be drained. By 1900, Hennebique had already built over 80 tanks.[136] They differed in shape (rectangular and cylindrical), location (underground tanks or water towers, supported by both pillar structures and a continuous wall) and inner subdivisions (one to more compartments).

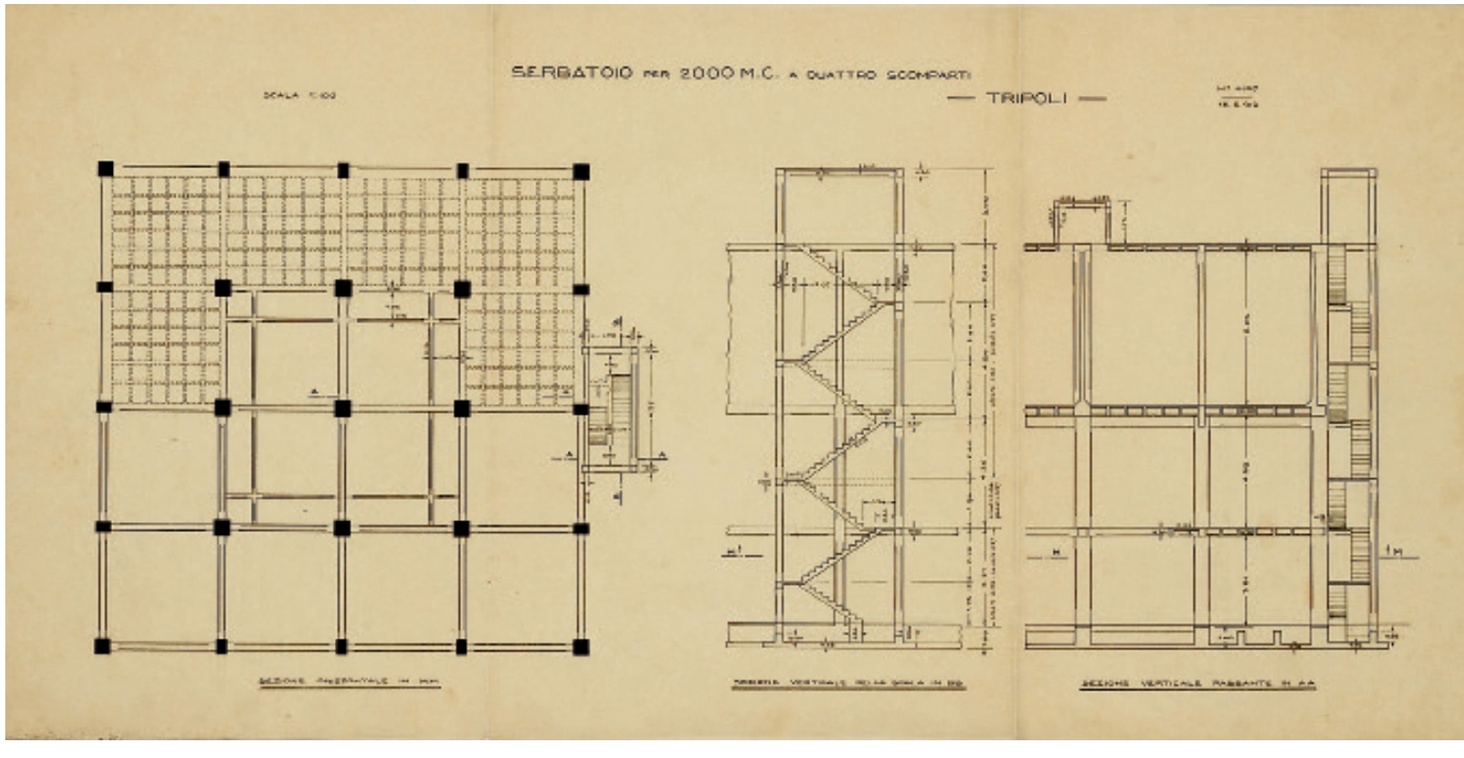
The 260-cubic-meter tank, built in Saint-Marcel (Aude, France) by Rouverol and Teissier, Hennebique contractors and licensees in Montpellier,[137] was a fundamental advancement in reinforced concrete water-tower construction. The technical measures and solutions that emerged from the project became references for later Hennebique water tower projects, such as the 2,500- cubic-meter tank built in 1926 in La Rochelle.[138] The cylindrical shape of the Saint-Marcel tank facilitated the uniform distribution of water pressure inside the tank. It was supported by 28 reinforced concrete stanchions and a system of radial beams. To facilitate monitoring and maintenance of the water tower, the square space in the center of the stanchions was provided with a stairway and conduits for water draining and distribution pipes. To solve the problem of water overheating in concrete tanks (which happens even more often in the metal tanks most commonly used) the ceiling or upper terrace was covered with a layer of earth and grass that was watered regularly. After being completed, the tank was wrapped in brick, creating a spillway for excess water so that it would not percolate along the concrete walls. Openings judiciously distributed along the inner wall of the upper part of the hollow tower enabled excess water to evaporate. Moreover, only Hennebique licensees had access to a special waterproof coating called Pixoline, the qualities of which were often vaunted in *Le Béton armé* magazine.

On May 28, 1912, the Porcheddu company presented a proposal for a 50-cubic-meter hexagonal tank, based on the design of the Saint-Marcel model, to the Italian Ministry of Colonies (General Directorate for the Civil Matters and Public Works), to be built on the breakwater of the esparto[139] pier in Tripoli (Libya).[140] Their bid

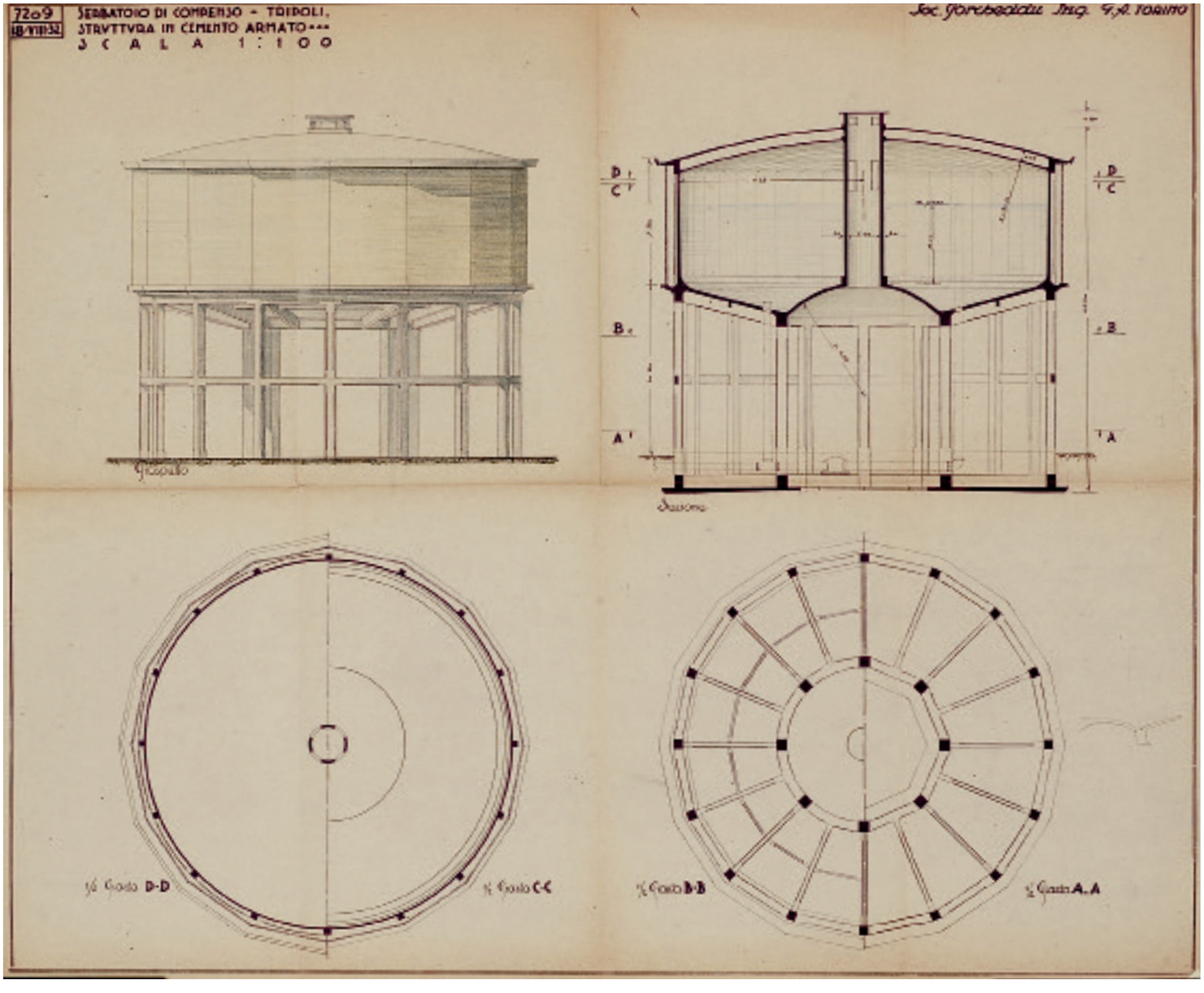
2000-cubic-meter water tank for the esparto pier, Tripoli, Libya (1912): Design for the reinforced concrete structure with 50-cubic-meter compartments, section and axonometric projection

2000-cubic-meter water tank for the esparto pier, Tripoli, Libya (1912): Design for the reinforced concrete structure with 50-cubic-meter compartments, plan and elevation

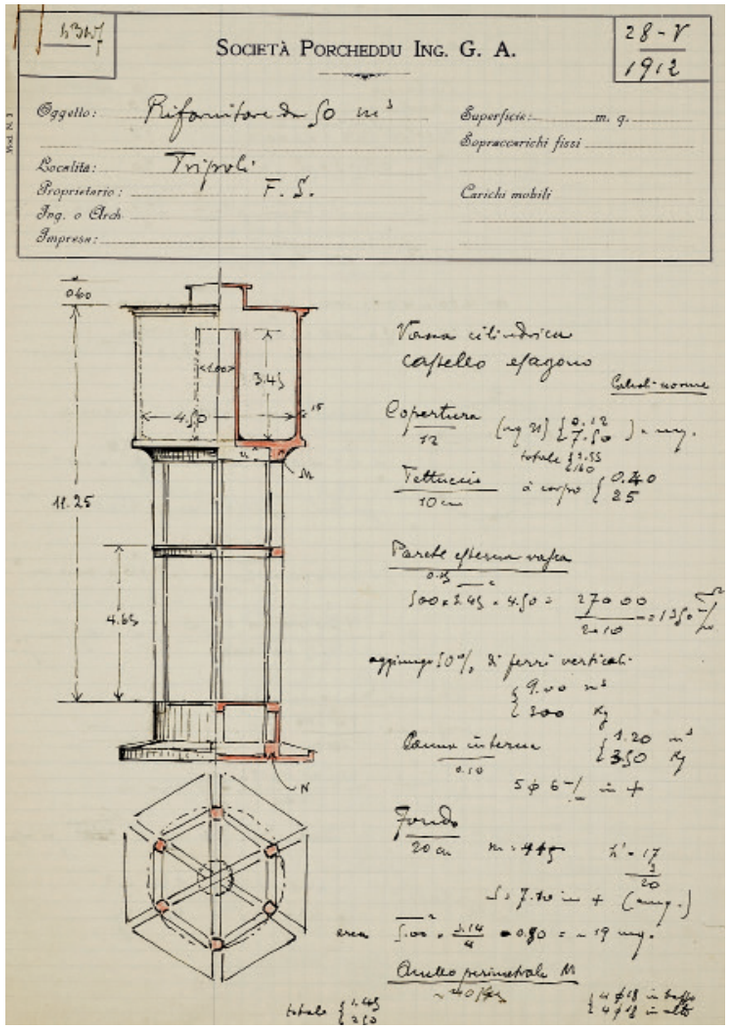




Water tank for the esparto pier, Tripoli, Libya: Project for the reconstruction of a reinforced concrete reservoir, plans, section, and elevation, 1932



50-cubic-meter reservoir, Tripoli, Libya (1912): Plan and elevation of the reinforced concrete structure



was rejected, probably due to the lump sum form of the contract and the need to contain costs. The Ministry of Colonies instead accepted the project for a much bigger tank (2,000 cubic meters of water), more conventionally shaped. Porcheddu agreed to build a four-compartment, square water tank on a reinforced concrete stanchion-and-beam structure. It was designed to contain both the small amount of water coming from the Boumeliana aqueduct, and that coming from a seawater distiller which was under construction.

The many difficulties that arose on the construction site delayed completion of the projects by 91 days[141] and a fine was imposed on the company. Some additions required by the Ministry regarded raising and widening the tank in order to add space for offices and a caretaker's house, which implied structural reinforcements of the ceiling, introduction of a double bottom slab, and as a consequence, an increase in costs. At the end of the project, it was not possible to carry out tests on stability and waterproofing, because the seawater desalination plant had not yet been completed, and the Boumeliana aqueduct was not supplying sufficient water. The tests were therefore postponed to the following year (March and April 1913), leaving the tank inactive. In 1913, the tests on the structures had a positive outcome, while the waterproof tests turned out to be negative. During the winter of 1920, when the final payment was due to the Porcheddu company, the Department of Public Works in Tripoli started reporting cracks on the reinforced concrete structures of pillars and beams. Cracks were recorded on the edges between the vertical walls and the lower floor, due to non-uniform water pressure and the difficulty in bending the reinforcing bars. Furthermore, the coating was flaking off the walls of the tank, and the reinforcements started to rust. The situation seemed likely to worsen, arousing fears that the tower would collapse. As a result, the Ministry of Colonies brought a lawsuit against the Porcheddu company. The observations that appear from the minutes of the inspections performed by the Government-appointed experts mainly related to the construction methods. It is noted that "the Porcheddu company, wishing to do business in a country with a hot climate, failed to protect itself from the climate and certainly failed to reinforce certain risk prevention procedures. The gravels were not crushed finely enough and the steel bars were not properly covered. The proximity of the sea may have accelerated and intensified the damage due to these phenomena."[142] Porcheddu sent in technicians to carry out confidential inquiries, and concluded that the steel bars had rusted due to the

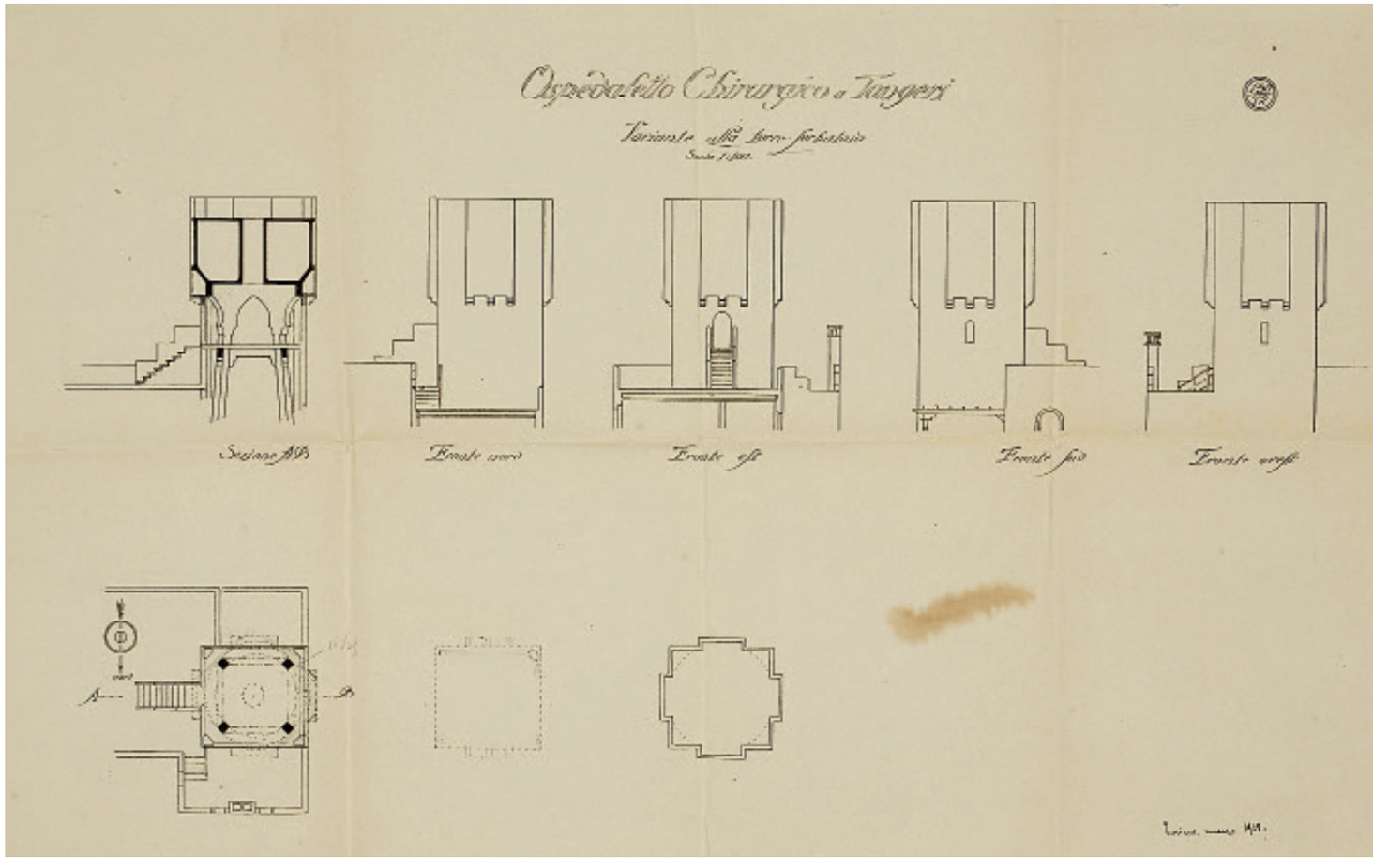
2000-cubic-meter water tank for the esparto pier, Tripoli, Libya (1912): Flawed reservoir walls, c. 1920

proximity to the sea. However, they rejected the allegation that seawater, sand, and salt gravel had been used for the preparation of mortar and concrete mixtures. The company had declined to use the rubble of Ain Zara and preferred the more expensive and heavier sands from Sicily. The tank was kept in full operation until September 1929, when a surprising decision was made to demolish it because "its low position does not provide sufficient pressure, and for esthetic reasons."[143] An undated, unsigned "reminder" explained that the Porcheddu company was willing to pay the fine for the delay, but also underlined that the company's presence in Tripoli had driven down construction prices. There was a shortage of work, and local companies had lowered their rates, hoping to win contracts for large Italian government projects in Libya, like the new Tripoli aqueduct dating from the early 1930s. The legal wrangle between the Ministry of Colonies and Porcheddu continued until 1939, when it was interrupted

Italian Hospital, Tangiers (1927-1928), Piero Molli, arch.; Gasparini, Bergonzo and Porcheddu, cont.: Study of reservoir tower variations, 1928

by World War II, even though the company had gone out of business in 1933. Porcheddu would never succeed in reestablishing a good relationship with the colonial administration, even though it offered to lower prices and waive profits on the construction of new cylindrical tanks according to revised and updated plans submitted on August 18, 1932.

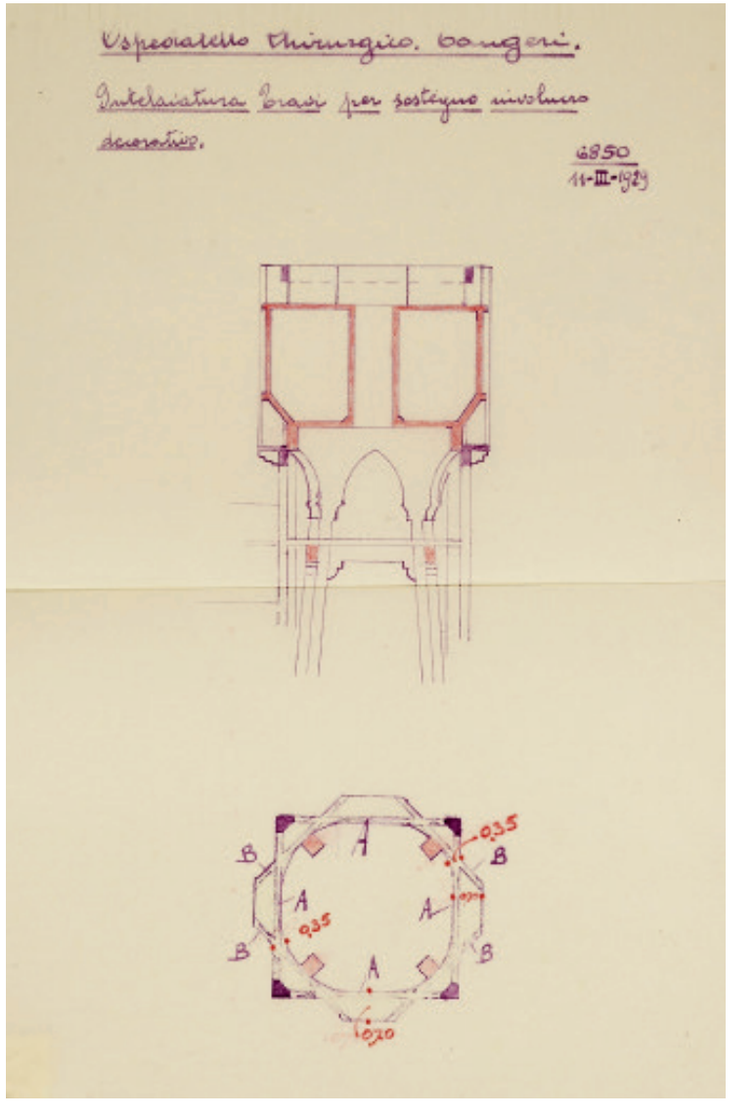
Despite this negative experience, the Porcheddu company was able to participate in other construction sites in the Mediterranean thanks to the involvement of the ANMI (Associazione Nazionale per Soccorrere i Missionari Italiani - National Association for the Assistance of Italian Missionaries)[144] established by the archeologist Ernesto Schiaparelli, who personally donated a large estate, the former palace and garden of the Sultan Moulay Abd al-Hafid in Tangier, Morocco, purchased on behalf of the Italian Government in 1926. One year later, an Italian hospital was built on the property, based on plans by engineer Piero Molli, an alumnus of Politecnico of Turin, like Giuseppe Porcheddu. Some sketches for the project, dating back to 1927-1929, show plans for a rooftop water tank for the facility. It was designed in full conformity with the Hennebique method, featuring a reinforced concrete stanchion-and-beam structure, incorporating the standards developed for the Saint-Marcel water tower on a smaller scale. The reinforced concrete tank was



Italian Hospital, Tangiers (1927-1928),
Piero Molli, arch.; Gasparini, Bergonzo
and Porcheddu, cont.: Sketch of reinforced
concrete structure for the reservoir

circular, with a single compartment, equipped with a hollow inspection cylinder inside. It was supported by four reinforced concrete beams forming a square tangent to the inner cylinder. A decorative outer structure, coated with plaster, protected the tank and made it look like an Oriental tower.

Gradually, the technical experimentation on the design of water tanks was enriched by an effort to beautify them architecturally. Soon, they would be appreciated as landmark structures in the urban landscape.



SETTLEMENTS

Suez Canal Company garden-city, Port Fuad, Port Said (1919–1924): Overall view of European workers' housing

Félix Paponot's canal-construction camp in the Isthmus of Suez

Bertrand Paponot, Véronique Laurent

In 1869, after the Suez Canal was opened, many of the engineers who had worked on the breakthrough of the isthmus were dismissed with compensation. It was then that Félix Paponot (Cosne-sur-Loire, 1835–Chartrettes, 1897), who had directed the works on the canal at Kantara, contacted Ferdinand de Lesseps, director of the Universal Suez Ship Canal Company, in the hope of executing earthworks or becoming involved in canal maintenance in Egypt. His initiative paid off. When he founded his own company in 1870, he benefited from Lesseps' support, and until 1877, was actively involved in digging the freshwater canal intended to connect the Nile to the maritime canal.

The family preserves the archives of these plans and projects, which had remained the property of the contractor. These archives (contracts, official letters, technical documents) are of considerable interest for the political and economic history of the Isthmus of Suez. In addition, two albums of photographs and private letters constitute a hitherto unknown record of the life and organization of a construction camp on a large public project in the eastern Nile Delta, in the late 19th century.

Felix Paponot's career

After graduating from the Collège of Cosne-sur-Loire in 1852, Félix Paponot trained as a draftsman and then as an architect with his cousin Guillaume Robert, an architect in Paris. On the strength of his construction experience on the Solférino Bridge in Paris, he was hired in 1860 by the Hardon company, the Suez Ship Canal Company's contractor for excavating the isthmus. In 1863, when Hardon's contract was terminated, Paponot was employed by the Suez Company. He rose through the ranks and, from 2nd class foreman, he became a section chief. [145]

When the works for the Suez Canal were finished, Félix Paponot created his own public works company, in order to be involved in the major project of digging the freshwater canal from Cairo to Ismailia. It consisted of the completion of gigantic earthworks and the erection of associated constructions, bridges, and locks.

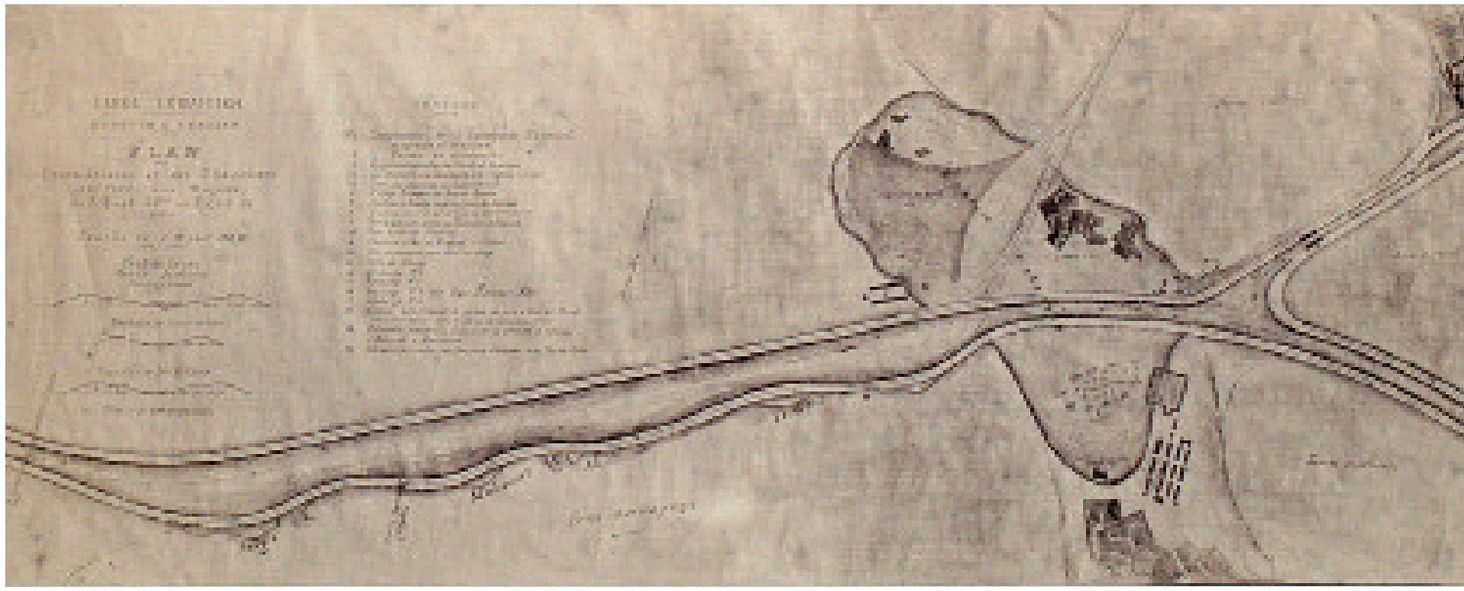
Though the freshwater canal received less publicity than the ship canal did, it was nevertheless a key element in the Suez Isthmus development project Ferdinand de Lesseps had begun planning in 1855. An irrigation, supply, and navigational canal along Wadi Tumilat, leading to Lake Timsah (where the town of Ismailia would be created) had even been planned to precede the saltwater canal. But due to difficulties with the project, in particular relating to the expropriations it necessitated, construction was postponed until after the maritime canal opened. Initially, the Suez Company limited its project to extending a small pre-existing canal, the Ouady, whose line was based on that of an ancient canal,[146] to Timsah. In 1886, following a disagreement with the Egyptian Government, the Suez Company was forced to cede the canal (from then on known as Ismailia Canal) to Egypt. But it obliged the government to finish digging it, to obtain a size and water level sufficient for supplying towns with water and for navigating.[147] Despite incomplete sources on this subject, it appears that on the strength of preliminary studies de Lesseps's company had carried out to define the route of the new canal, de Lesseps was instrumental in securing the contract for Paponot.

The Paponot company's activities on this major project can be divided into three periods: two relate to the Ismailia Canal works, and one to the design of the project for the Tewfikieh Canal, a diversion branch intended to carry fresh water between Ismailia and Port Said. In the end, the last was not dug by the company.

The first period, from 1870 to 1872, corresponds to the excavation of the western section of the Ismailia Canal, between the swamps of Abascé (or Abbasa) and the village of Gassassine, located about 40 km from Ismailia. The Paponot company worked as a subcontractor of the company of M. Brocard, a Marine Engineer and representative of the Société des Forges et Chantiers de la Méditerranée (the company from La Seyne-sur-Mer, near Toulon, that built the heavy machinery for excavating the shipping canal), which had signed the contract for the works with the Egyptian Government.

Ismailia Canal (1874-1877), Paponot cont.:
Plan of facilities and worksites

Gassassine Lock (1874-1877),
Paponot cont.: Completed, prior to filling



The period from 1874 to 1877 marked a new phase in the company's development. In 1874, after the refusal by the Suez Company board of directors to approve the agreement signed by de Lesseps to complete the final section of the Ismailia Canal (with the Paponot company as subcontractor), de Lesseps suggested to the Egyptian Government that it deal directly with Félix Paponot. Paponot made an offer to the Egyptian Ministry for Public Works to dig the canal while "bearing all the costs for design, tracing, staking, and installations generally."[148] In order to win the contract, he established a new company under Egyptian law and settled in Cairo in a house he owned there. After he provided the Egyptian Government with a guarantee deposit, the contract was signed on July 2, 1874 by Hussein Pasha, representing the Public Works division of the Egyptian War Ministry. Drafted in French, this fixed-price contract was the first of its kind to be signed in Egypt.[149]

Félix Paponot was able to benefit from experience acquired on the ship canal and to develop new excavation techniques for this major project. He registered several patents, including a freight rail car adapted for earthworks, the self-locking railroad tie pad, and, in 1883, iron

sheet piles. The works were completed in record time, no doubt because Paponot had offered his employees a share in the profits from the operation, as he had in 1870-1872 on the Ismailia Canal.[150]

After 1877, encouraged by Ferdinand de Lesseps, Félix Paponot began the design of the Tewfikieh Canal, planned to

Freight cars used for excavation works, invented by Paponot, c. 1874

Félix Paponot's house at Camp Abu Hammad, c. 1870

connect Ismailia to Port Said. He analyzed all aspects, both technical and financial. Once the studies were finished, he spent several years waiting for the contract which would allow him to begin works, and, at the request of de Lesseps, keeping his excavation equipment on site. Back in France, he published several studies on the issue of hydraulics in Egypt and on the Panama Canal.[151] He was mayor of the town of Cosne from 1884 to 1886. In 1887, when he learned that the Suez Company had decided in 1883 that his company would not be digging the Tewfikieh Canal, he sold the equipment he had been storing on land rented from the Suez Company. Félix Paponot was an officer and member of various engineering and geographical societies and was a Grand Officer of the *Khedivial Orders.*

Organization of the Isthmus camps

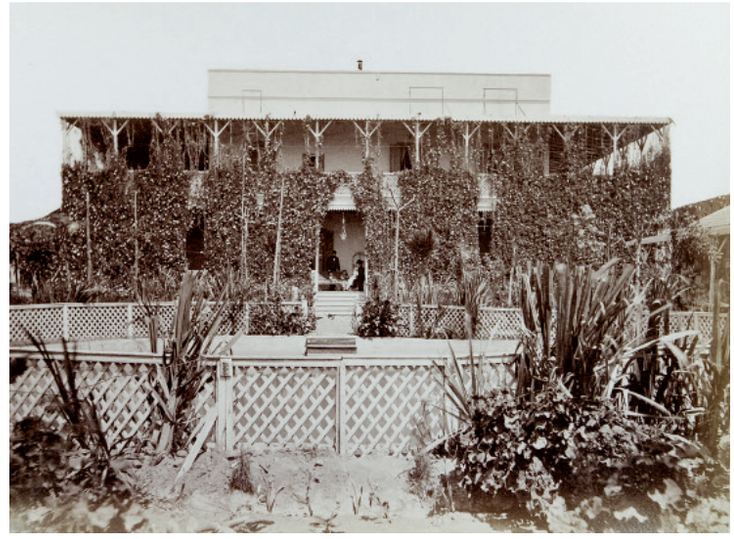
In a letter sent to his mother in January 1861, Paponot noted his first impressions, on arriving. He briefly described the Egyptian villages and the first camps: "The Arab towns and villages are built like the road workers' sheds you see along French roads. [...] My lodgings consist of a wooden chalet, which I have divided into 4 parts with screens. I have made myself quite a nice bedroom, left a room for my site manager, an office and a storage area where I put my food."[152] This correspondence also reveals the difficult living conditions on the site: "The bad weather beginning now will last for two months; there are terrible hurricanes that sweep everything away. A week ago, the storm was so violent that it knocked over all the tents and removed part of the roof of my shack."

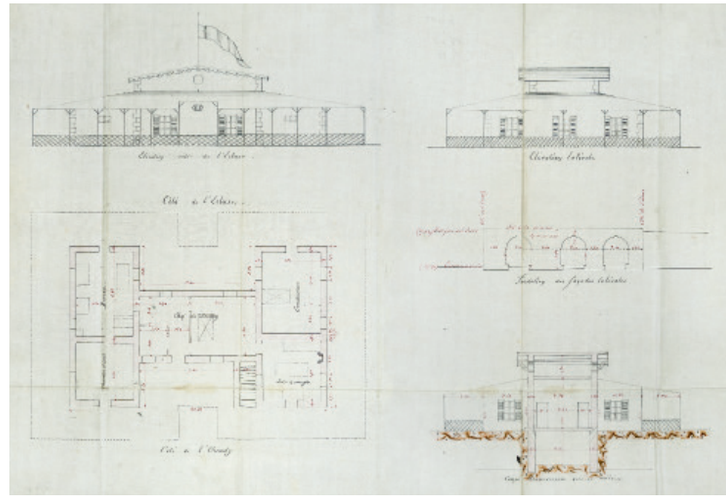
But it is the photographs in the two albums and the plans of various facilities that give the most precise information on the organization and architecture of these camps. Two freshwater-canal construction camps, Abu-Hammad and Rhamsès, are documented. They each represent a different type. Abu-Hammad, where Paponot lived between 1870 and 1872, as Brocard's subcontractor, was a section camp, while Rhamsès was the main Paponot company camp, 1874-1877, and therefore contained more buildings. They shared only two characteristics: they were temporary, to be torn down when construction was completed, and they were both located on hillocks to protect them from the Nile's floods.

The camps along the freshwater canal were arranged according to the system developed by the Ponts et Chaussées engineers active on the Suez Canal worksite.[153]

Félix Paponot's house at Camp Rhamsès, c. 1875

Model of engineer's house, Paponot cont.: Plan, section, and elevations





First, the site was divided into sections. The composition of each section camp was precisely defined by Paponot company regulations: "Each camp includes a five-room building. One room is for the section chief (if he is married, he may claim two, should he wish); a room for the driller or chief foreman; a room for the head supervisor; one room for the dining room; one for the office. Assistant supervisors shall live on the worksites and occupy houses with moveable panels, wherever the section chief thinks it necessary. Each camp will be closed off by an enclosure of reeds to form a store and within the enclosure there will be a shelter for animals." The supervisory staff (section chief and driller or foreman) were therefore accommodated in a single building. The size of this building depended on the importance of the works being carried out in the section (with or without constructions). It could be a simple edifice with contiguous rooms or a true villa. The section chief's house at the Gassassine Lock and those of Félix Paponot at Abu-Hammad and Rhamsès were comparable to the mansions erected by the Suez Company to house its executives in the towns along the canal. They were built in masonry and surrounded by a wooden veranda covered with foliage to provide shade.

The Rhamsès[154] camp stood out because it was very well equipped. It stood on a small rise, on land donated to the Paponot company by the Suez Ship Canal Company.[155] During the creation of the garden around his villa, the contractor discovered monuments that were vestiges of the town of Tjeku, founded in the 7th century BC when the ancient canal was being dug. Arranged for years around the camp's main square, the monuments were transported to Ismailia in 1882, "by my own means and in the interests of science" (to quote Paponot).[156]
The town of Ismailia moved the relics to a plot of land that was Suez Company property. After the contractor died, it was called "Paponot Square." In the early 1900s, they were exhibited in the former Khedivial palace garden, which took on the name of "garden of the stelae." One of the sphinxes was placed in front of the museum of Ismailia in 1934. After travelling here and there, the other monuments were reunited with it, in the museum garden.[157]
Thanks to its proximity to the Ouady Canal, the location had a steady supply of fresh water, and it was also well connected to Cairo and Ismailia by both rail and telegraph line. Even before winning the contract from the government, Paponot had built, at his own expense, "constructions for housing the agent of the Egyptian Postal Service, the railway agent as well as the station for the new stop, and constructions to

Camp Rhamsès: Place des Consuls and the antiquities unearthed in grading for the camp, c. 1875

house my employees and workers."[158] The rail and communications lines were vital to coordinating and supplying the various worksites, as they had been on the Suez Canal. Thus when, "without prior notice, either by letter or circular, the local train ceased to stop at Rhamsès, and even the agent of the station had been sent elsewhere," jeopardizing the postal service, Paponot quickly made a plea to Ferdinand de Lesseps to intervene directly with the Egyptian Government: "this situation has a consequence that is so serious for the company and the camp that I could be forced: 1. to abandon the camp and 2., even more distressing for me, to claim damages from the government."[159]

In addition to the accommodations for the contractor, employees, and workers, the camp contained a canteen, a dispensary, warehouses, and workshops for the maintenance of the worksite machinery. The warehouses were placed along the Ouady Canal and the railway line by which materials were brought to the site.

Camp Rhamsès, Paponot cont.: Freight dock

Ismailia Canal (1874-1877), Paponot cont.:
The lock upstream from Ismailia during
raising works

The company's staff, with Félix Paponot seated on a chair in the center, c. 1875

An Arab village where the Egyptian laborers were housed was located nearby. Paponot had a mosque built there, and its brick minaret dominated the camp. Evidence of his interest in and respect for religious diversity, the mosque undoubtedly also corresponded, as had been the case for camps on the isthmus, to the "well understood interests" of the company. As early as 1861, the Suez Company had noted that "the presence of a mosque is a way of attracting workers to the worksites and also of maintaining order."[160] Furthermore, there was a social life at the camp: oddly enough, the local newspaper in Cosne-sur-Loire, France, reported in 1876 on a fancy Carnival costume ball which had just taken place at Rhamsès!

At the end of the works in 1877, after the construction workers had left the camps, the installations were used by the Suez Canal Company to isolate the victims of a great malaria epidemic then raging in Ismailia. Upon receiving a request from Ferdinand de Lesseps "to use the buildings of Rhamsès temporarily to accommodate those from Ismailia who are convalescing from fever,"[161] Paponot

Camp Rhamsès, Paponot cont.:
Warehouses and stores from
atop the minaret

Camp Rhamsès, Paponot cont.:
Employee canteen

responded immediately, making the structures in the camps of Rhamsès, Gassassine and Nefiche available.[162]
Although nothing remains today of the company's constructions – destroyed by the contractor in preparation for the Tewfikieh Canal works,[163] the site at Rhamsès is still occupied by the village of Tell-el-Maskhutah. Since the rediscovery of the ancient site by Félix Paponot, British, French, Canadian and, more recently, Egyptian archeological teams have excavated the site. They have brought major finds to light. Perhaps the memory of the company is fading, but these archeological vestiges attest to the enduring attraction of this marshy Egyptian delta region, an essential location for contacts and commerce with the Middle East.

European construction companies in the towns along the Suez Canal

Claudine Piaton

The archive collection of the Compagnie Universelle du Canal Maritime de Suez (known in English as the "Suez Canal Company"), the joint-stock company formed in 1858 by Ferdinand de Lesseps to build, maintain and operate a canal connecting the Mediterranean to the Red Sea, is one of the richest corporate groups of archives in France.

This private collection, placed on deposit at the Archives Nationales in 1977 by the Association du Souvenir de Ferdinand de Lesseps et du Canal de Suez, has been located since 1995 at the Archives Nationales du Monde du Travail in Roubaix.[164] The main source for primary university research on the history of techniques and economic history,[165] it has yet to be studied extensively by architectural historians, despite the fact that the structures built by the Suez Company during its tenure in Egypt (1859-1956) constitute an exemplary case study of the ways European corporate architecture spread south of the Mediterranean in the 19th and 20th centuries.

The Suez Company, which had not contracted to build anything other than the canal and its ports, was very quickly faced with the issue of accommodation for its employees. The canal's route crossed desert zones where construction camps had to be created from scratch to house the men and to store and maintain the machines used on the worksite. After the canal began operating in 1869, the company had to undertake further construction projects, building offices for the Company's administration and, throughout the 20th century, accommodations for its numerous expatriated European employees (accountants, engineers, pilots, skilled workers, etc.).

Although the town plans are attributed to Company engineers, construction projects were systematically contracted out to "entrepreneurs".[166] In the same way, until 1921, the Company lacked an in-house architecture department, and had to call upon independent architects to draft plans, the supervision of which was then entrusted to its engineers.

Thus the Company's archives can inform us about various facets of the entrepreneurial world in Egypt between 1860 and 1950. On the one hand, they shed light on the role of the Company as designer and then administrator of the towns: like other 19th century French company towns, Port Said and Ismailia were created by Suez engineers. It laid them out, defined the zoning, conceded plots, and managed the public areas until 1869, when the Egyptian government integrated them into Egyptian common law. Moreover, the abundant material the archives contain documenting construction (architects' plans, technical drawings, works contracts, photographs) reveals the swarm of European construction businesses gravitating around the Company: small companies which owned innovative patents, Egyptian branches of major European corporations, small traditional building-trade companies managed by Europeans living in Egypt.[167] Before examining these contractors more closely, we shall briefly review the Company's role in the creation of town plans.

Company towns

In 1861, a master plan for the first camps, established along the route of the future canal and spaced at regular intervals from north to south, was drawn by the Company engineers, under the supervision of the civil engineer François-Philippe Voisin (known as Voisin Bey), general manager of works and chief agent of the Company between 1861 and 1870. The two main camps, each of which housed a division of the works, spawned two of the three cities of the isthmus: Port Said, located at the mouth of the canal in the Mediterranean, and Ismailia, placed halfway between Port Said and Suez, the small Red Sea port which existed before the canal. The plans adopted grid layout pattern from military engineering, but without walling off the compounds. Like other company towns,[168] however, communities were segregated by "race." Housing and community services for European managers and workers were separated from the "Arab village" for Egyptian laborers by the garages for heavy machinery.

The initial plan for Ismailia – located at the canal's halfway point to serve as the capital of the isthmus – comprised

A 1903 map of Ismailia

Voisin's preliminary draft plan for Port Said, 1860

a series of repetitive square modules (the Greek square, the European square, the Arab square). Depending on the company's needs, it could extend unimpeded along the freshwater canal[169] and a large port (which would finally be abandoned). According to Nathalie Montel, the plan was "the ultimate manifesto of the reasoning of a Second Empire engineer, applied on a city-wide scale."[170] Less known, because they were not implemented in the field, the initial layout for Port Said represented the same bias: as early as 1859, the engineers projected a town on a grid pattern centered on a harbor basin separating the European neighborhood from the Arab one.[171]

The contractors who built the towns

Between the beginning of the works and 1956, the profile of the entrepreneurs (nationalities, geographical area of activity, etc.) and their method of selection evolved.

Suez Company European workers' housing, Port Tewfik, Suez (1922), Paul Albert, arch.; Almagià, cont. (photo by A. du Boistesselin)

Suez Company warehouses, Port Tewfik, Suez (1930), Paul Albert, arch.; Baume & Marpent, cont. (photo by A. du Boistesselin)

Suez Company headquarters in Ismailia (1863), Fréret & C^ie^, cont.: The wooden veranda

Early on, French companies were preferred, irrespective of what was being commissioned, but later decision-makers chose contractors depending on the type of structure to be made.

In 1858, in anticipation of the beginning of the works, the Company issued its first invitations to tender for the supply of "workers cabins." About twenty companies, mostly French, responded. Some were suppliers to the army, such as Godillot which made tents, in addition to the soldiers' boots to which it gave its name. Unusual designs were suggested, such as the construction of huts in matting ("Guillot system, patented SGDG") by Frédéric Latour based in Clichy. Likewise, Stierlin & C^ie^ presented constructions in sand roofing felt, entrepreneur Émile Revest suggested using asphalt roofing paper, and the British Caoutchouc Company, Beck and Peupin, recommended its specialty, rubber.[172]

The Company finally opted for wooden constructions from Victor Fréret & C^ie^ in Fécamp (Normandy), because "it was the only one to agree to take care of the transport and mounting *in situ* for a fixed price [...], and in addition it was perfectly familiar with Egypt where it supplied provisions to barracks [...], and it was a shareholder in the Company."[173]

In addition to supplying the cabins for the camp along Port Said beach and a special cabin for Ferdinand de Lesseps in Ismailia, the company was hired to make and install the imposing Oriental-style veranda on the "headquarters" at Ismailia in 1863. The letters exchanged with the Company's engineer, James Pouchet, demonstrate how difficult it was, day by day, simply to finalize the technical details. The construction phase was also arduous, because the French company had trouble dispatching workers to assemble the prefabricated elements.

This experience perhaps explains why the Company quickly stopped importing prefabricated components from Europe. After the canal was opened, carpenters and masons worked onsite using imported materials, such as Nordic wood, lime from the Teil, and tiles and bricks from Marseille. As time went on, more locally-produced materials were used: Egyptian cement bricks, rubble stone, and "Sornaga" tiles. By the early 1900s, the Company method for awarding contracts for the construction of housing and offices left little room for innovation. Specifications were prepared by the Company (which imposed materials, such as rough stone and marl produced in its own quarries).[174] The contracts were then put to restricted tender or, for smaller contracts, allocated by mutual agreement. It was Company strategy to stagger its operations, to limit the size of the contracts. Most contracts were awarded to small firms, local licensees of maintenance work on the Company's buildings, which rarely did business beyond the eastern Nile delta. J.-W. Williamson, then Marino & Bevilacqua of Ismailia,[175] won many contracts, as did R. Lomolino, Figlio & C^ie^ in Suez, which was retained without a call for tenders for a job in 1911 because, wrote the Company senior officer, "we consider from several points of view that there is an advantage in giving work to our ordinary entrepreneurs who are familiar with our methods, including the workers, among which we have eliminated the least good, are today the best in the country, and finally because, working constantly for us, they do not try to exploit us, because they know that in this case, the

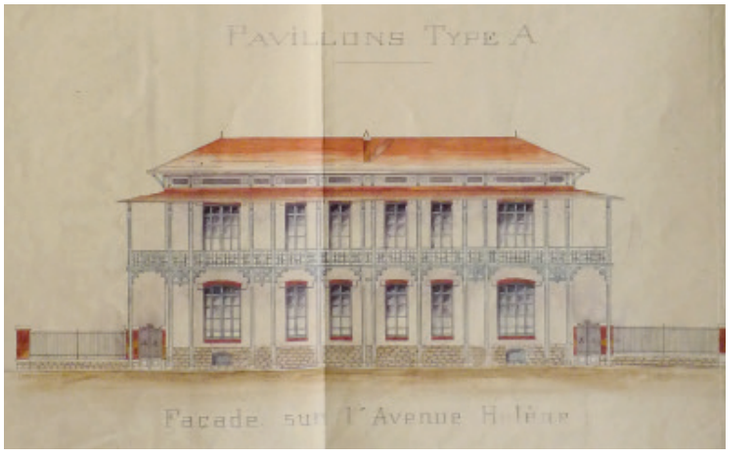
Duplex housing for Suez Company employees, Port Tewfik, Suez (1906), Agence Fabricius Pacha, arch.: Facade

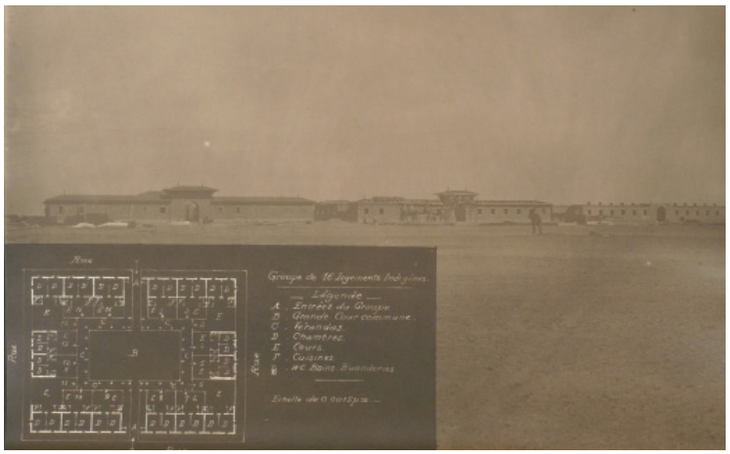
16-unit Arab workers' compound, Port Fuad, Port Said (1919), A. Bos, cont.: Overall plan and view of the facilities near completion

16-unit apartment building for Suez Company employees, Port Said (c. 1919), Paul Albert, arch.; U. Griffoni, cont.: Under construction

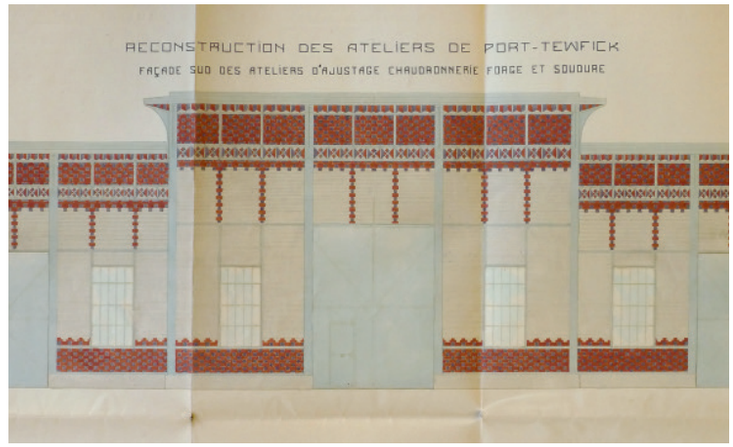
punishment would be the cancellation of the contract for repair, which we renew at the beginning of each year."[176] This distrust of large local entrepreneurs explains no doubt the small number of contracts awarded to the big Port Said construction firms during the inter-war period. The Italians, Archimede Petraia and Spiro Scarpa, missed out, as did Alberti, originally from Switzerland. Like Suez contractor Ugo Roccheggiani, they had all built tenements for private investors as well as large structures for the Egyptian government or foreign communities.[177] Mutually agreed contracts were also used for low cost operations involving a specific construction process. For example, the stone quarrying company in Attaka, near Suez, owned by A. Bos (domiciled in Dordrecht in the Netherlands) was chosen to build tenements for indigenous workers at Port Fuad in 1919 thanks to "its interesting design for 3 blocks of 16 home units. Bos was lauded by Suez managers in 1931 for "again reducing the price of the 24 home units by adopting an economical type of construction in thin and porous concrete, common in the Netherlands and Belgium."[178]

When there was a restricted call to tender, the Company preferred to invite three or four European companies that were well established in Egypt, considering them capable of meeting very tight deadlines. In 1907, it consulted three companies from Cairo for the construction of villas designed in 1906 "by the staff of the architect Fabricius Pacha":[179] Garozzo & Son, Guérin, and MM. Padova & Rolin. Garozzo had built the Museum of Egyptian Antiquities of Cairo and, like Padova & Rolin (which would become Léon Rolin & C^{ie}), a licensee of the Hennebique reinforced concrete patent in Egypt. Companies based in Alexandria were also involved in major contracts for housing: Fumaroli built 50 homes for European workers in Port Said in 1912 and then won the contract for another 60 homes in 1921. Lanari & Dessberg built 44 homes for indigenous workers in 1919[180] and responded to the call for tender for the construction of two apartment buildings in Port Said for canal pilotes, a job Léon Rolin & C^{ie} also submitted a bid.





Suez Company workshops, Port Tewfik,
Suez (1930), Paul Albert, arch.;
Baume & Marpent, cont.: Southern facade



However, the choice of a major company did not guarantee good workmanship. Thus the Suez waterworks, built in 1930 by Bertagnol & Cie (later Travaux du Midi),[181] based in Cairo since 1927, began to crumble within two years, and had to be consolidated. The Company granted the second contract to the local Greek company managed by Terzis and Stavropoulos, whose bid on the first job had been rejected.[182]

The market for industrial structures and infrastructure differed, being more open to international companies and, at times, to innovation.

In 1869, the Company built a new lighthouse at Port-Said, to replace a wooden one dating from 1857. The contract was granted to François Coignet, who was experimenting with a new pre-cast concrete construction process that had been perfected in Saint-Denis in the Parisian suburbs.[183] The Company had established ties to Coignet in 1860,[184] attracted by his patents for pre-cast concrete blocks. Moreover, Coignet's father owned the Lyon chemical company that supplied the Company's matches! The first precast block construction was commissioned in 1864 by Lavelley, one of the subcontractors on the canal, for his own home in Port Said.[185]

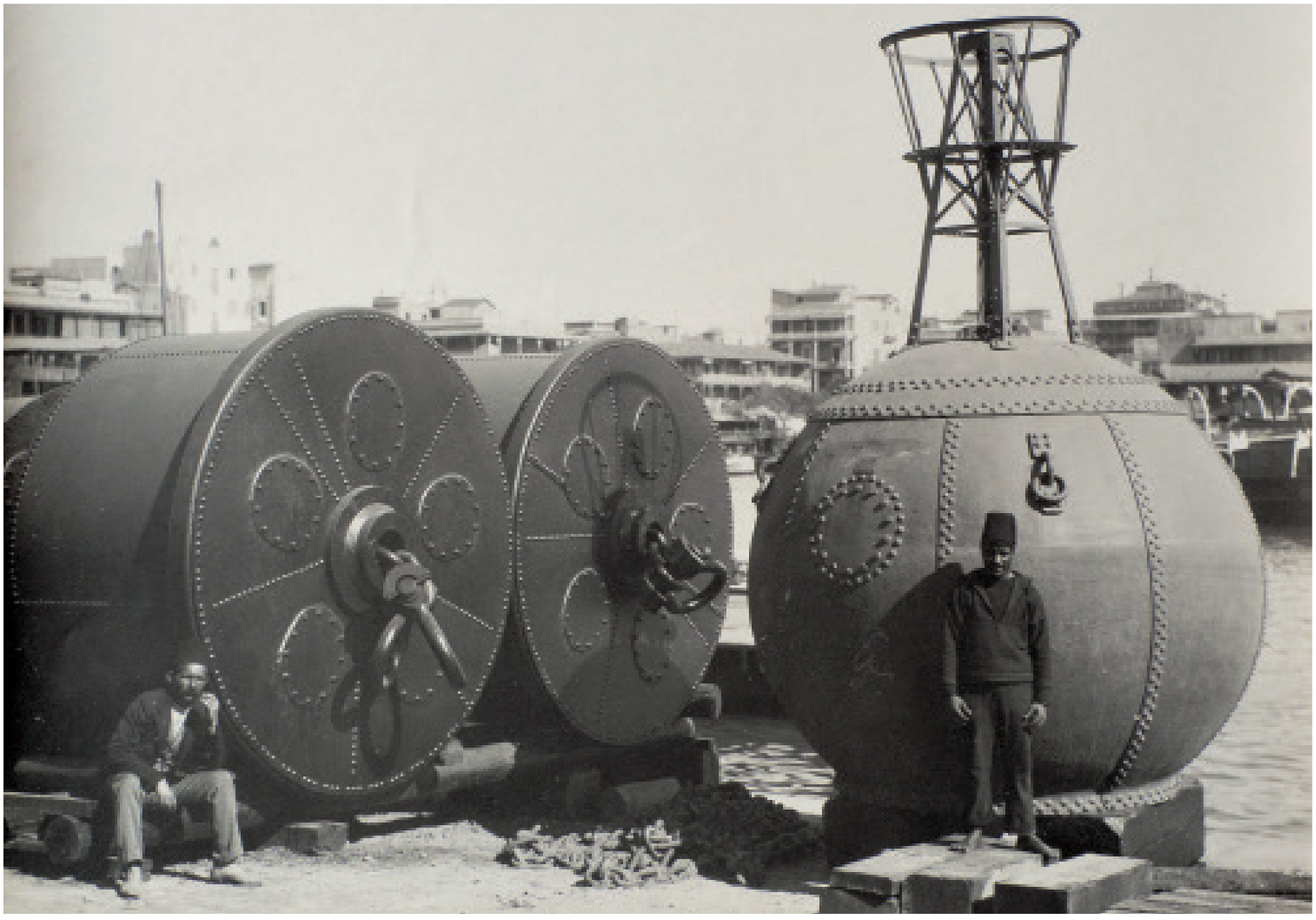
The novelty of the technique did not inspire new architectural forms. The lighthouse erected by Coignet was a copy of one designed twenty years earlier by Léonce Reynaud[186] when the Phare des Baleines at the tip of the Ile de Ré (off La Rochelle) was renovated: "We felt obliged to adopt the Phare des Baleines as a model which combines elegance with solidity; we only made minor changes: reduction in the thickness of the interior masonry by 0,20m and removal of the consoles supporting the cornices. The reduction in thickness was justified by the nature of the masonry which, comprised of seamless superimposed monolithic rings, creates a uniformity in the mass never equaled by ordinary masonry, even of cut stone."[187]

Between 1891 and 1894, the company, at the time managed by Edmond Coignet and with a new patent (masonry and iron combined), completed the harbormaster's compound at Port Said (Charles Marette arch.). Next, Coignet was hired to build the administrative residence in Port Tewfik (Suez), as well as the employee housing on the waterfront there. But by then, pre-cast concrete already seemed old-fashioned, compared with the new patents for reinforced concrete being developed in Europe.

In 1876,[188] the Company commissioned its first steel constructions from European mills, such as the Bazin company's footbridge,[189] shipped from the Gustave Eiffel company in Levallois-Perret, outside Paris. The lock gates of the freshwater canal at Ismailia were supplied in 1877 by Ernest Goüin & Cie (parent of the Société de construction des Batignolles). In 1893, the Company contacted the Belgian company Baume & Marpent, which had just created a base in Egypt, to supply the steel structures for its large constructions. It commissioned reservoirs for the Port Said waterworks between 1905 and 1909, buoys for the canal entrance, and steel frames for the Sherif Basin dock hangars in Port Said. From 1913 until 1930, Baume & Marpent's Cairo workshops forged all the steel frames for Company hangars, workshops, garages, and warehouses at Port Fuad and Port Tewfik. [190]

In 1934, Company architect Paul Albert, drawing inspiration from the Port Fuad and Port Tewfik schemes, designed the workshops at Ismailia. The company Fils, Barthe-Dejean was granted the contract as the local representative of the French company Fives-Lille, which supplied the steel parts. The Company's chief engineer, Paul Solente, justified the refusal of the more advantageous offer of the Ateliers

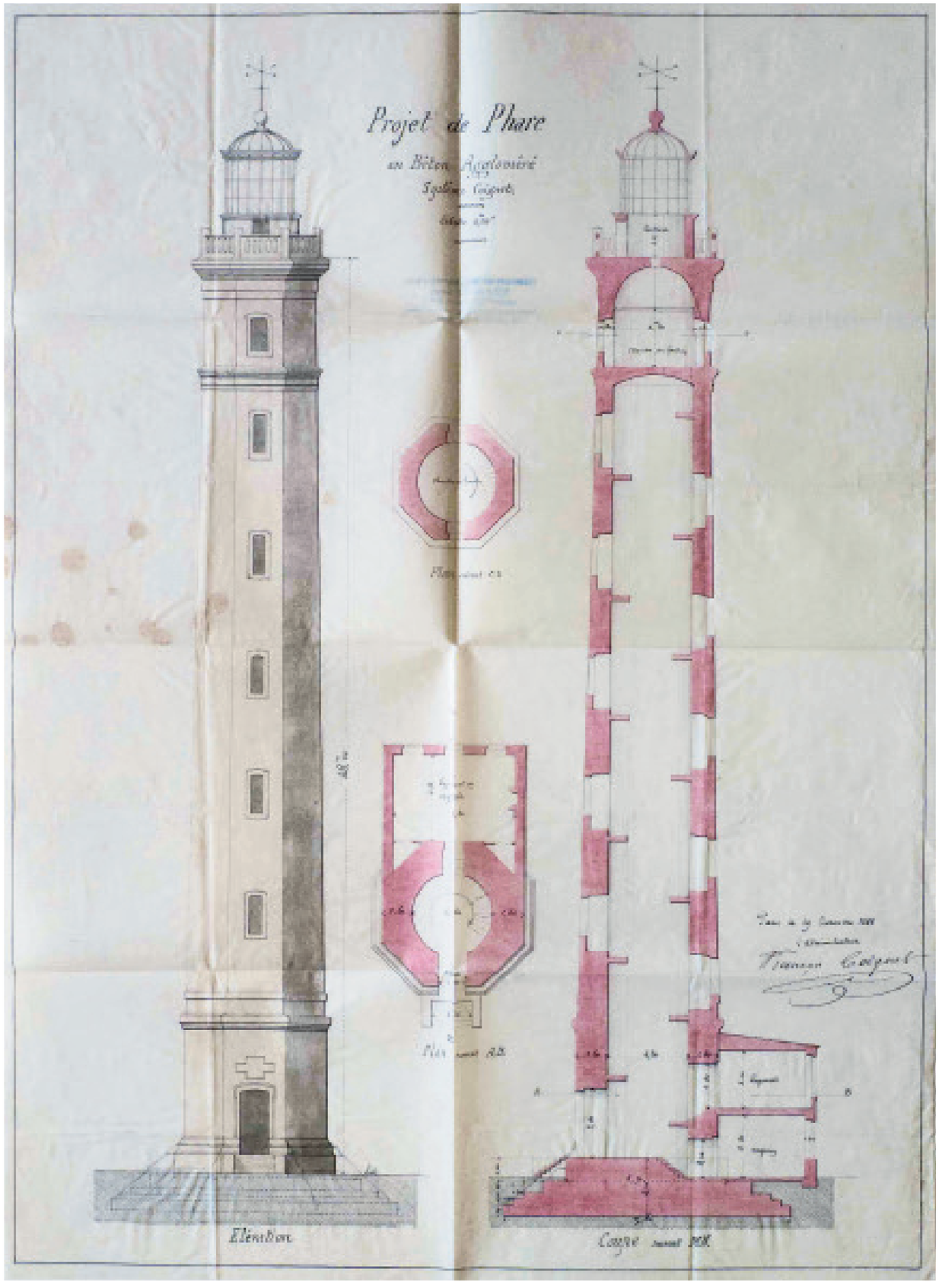
Canal buoy, Port Said (1905-1909),
Baume & Marpent, cont.



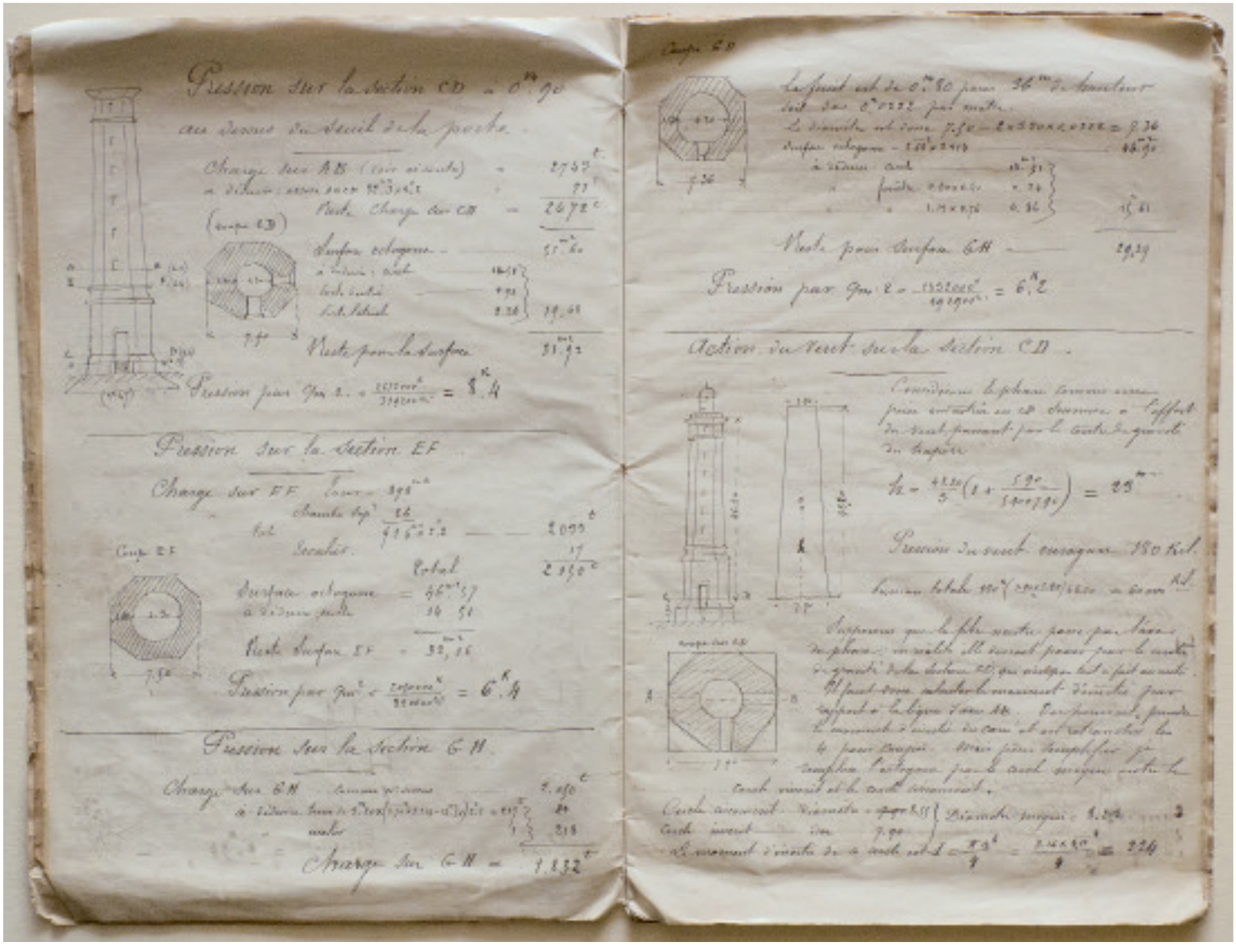
Atmeda in Cairo because "the difference (in price) was insignificant, I considered that it was preferable not to try out local steel construction on a building this important."[191] Similarly, for the construction of its waterworks for Suez in 1910, the Company teamed the Cairo reinforced concrete builder Léon Rolin & C[ie] with Henri Chabal, a Parisian entrepreneur specializing in water treatment, because the chief engineer Perrier considered that they were "the only entrepreneurs capable of carrying out the works quickly while offering the best prices."[192]

Suez Company constructions:
Technical innovation meets architectural conformity

For the digging of the canal (1859-1869), the Company engaged firms that pioneered outstanding technical innovations. But relative conformity characterizes nearly a century of its urban and architectural constructions. Traditional stone housing built for European workers in the 1920s was generally inspired by pre-World War I French industrial models. [193] Towns built for the indigenous population copied


Projet de Phare
Elévation
Coupe

Port Said lighthouse (1869-1870), François Coignet, cont.: Plan, section, elevation and calculation notebook



Suez Company workshops, Port Fuad, Port Said (1919), Paul Albert, arch.; Baume & Marpent, cont.: Interior metal framework and machines

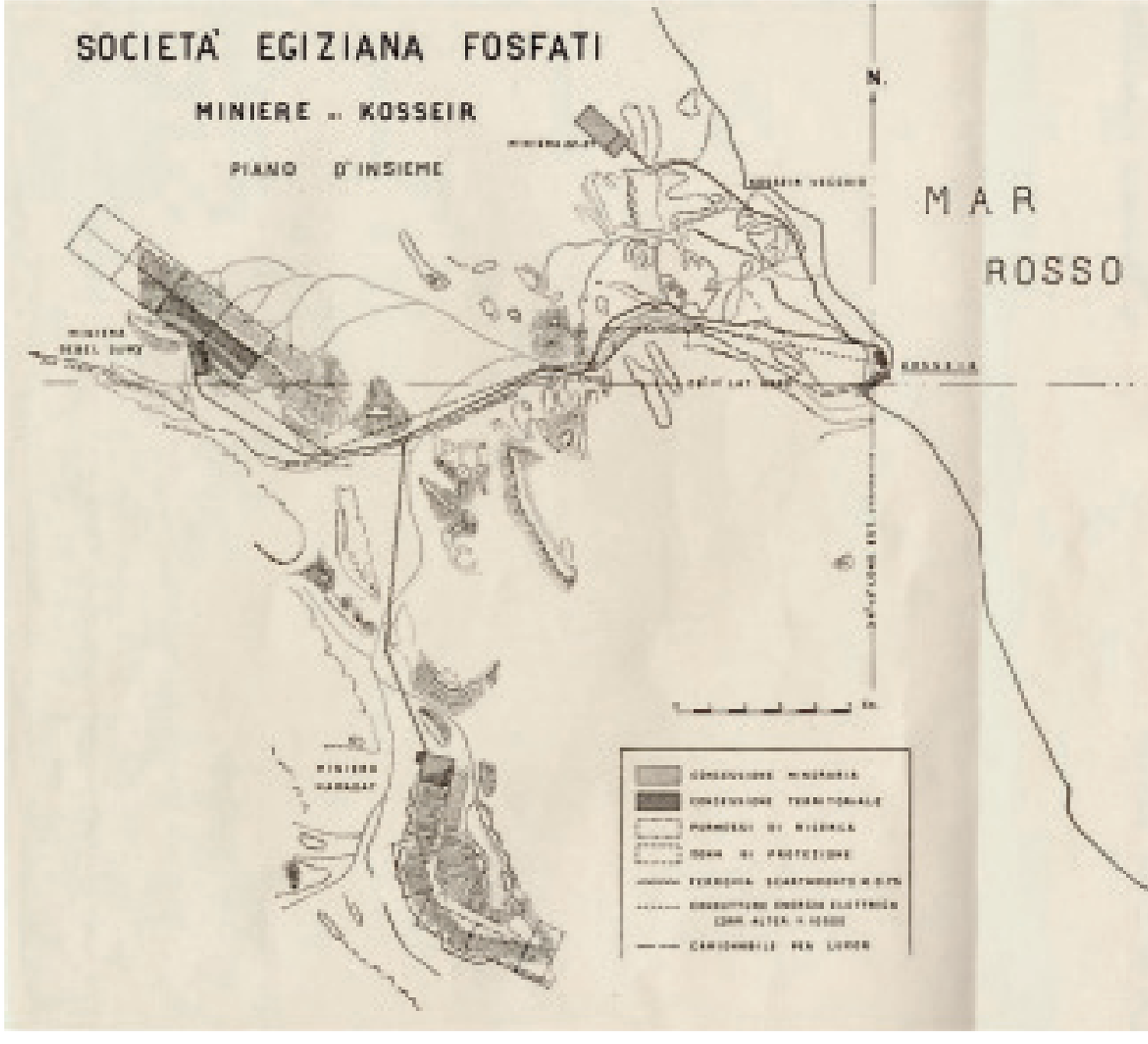
Bridge and lock upstream of Ismailia (c. 1877). Lock: Félix Paponot, cont.; Bridge: Ernest Goüin, cont. (photo by H. Arnoux)

the community organization model tried out by the Empain company at Heliopolis, in the suburbs of Cairo.[194] Large structures, like the churches erected between the two wars (Louis-Jean Hulot, arch.) adopted a highly conventional Neo-Romanesque style, far from the modernist experiments being carried out in Europe.[195] Coignet's 1869 Port Said lighthouse was thus the sole construction that showed true technical progress, experimenting with a new concrete technique on a large scale. However, as noted above, its shape was inherited from older models. The audacious architectural scheme for a surgery pavilion at Ismailia Hospital, designed by the American architect Paul Nelson in association with Vladimir Bodiansky in 1934, was not built, due to cost considerations.[196]
By relying on local companies whose capabilities and limits it knew, the Company sought, above all, to master the profitability of its construction projects. It may have failed to support avant-garde architectural schemes, but it satisfied its shareholders. Its choices in the field of town planning were guided by the same pragmatic approach.

Overall plan, Kosseir Mines (c. 1939)

Prospectors' refuge in the Wadi Semiuki valley (1930)

Gebel Duwy mine : section on the concession 52



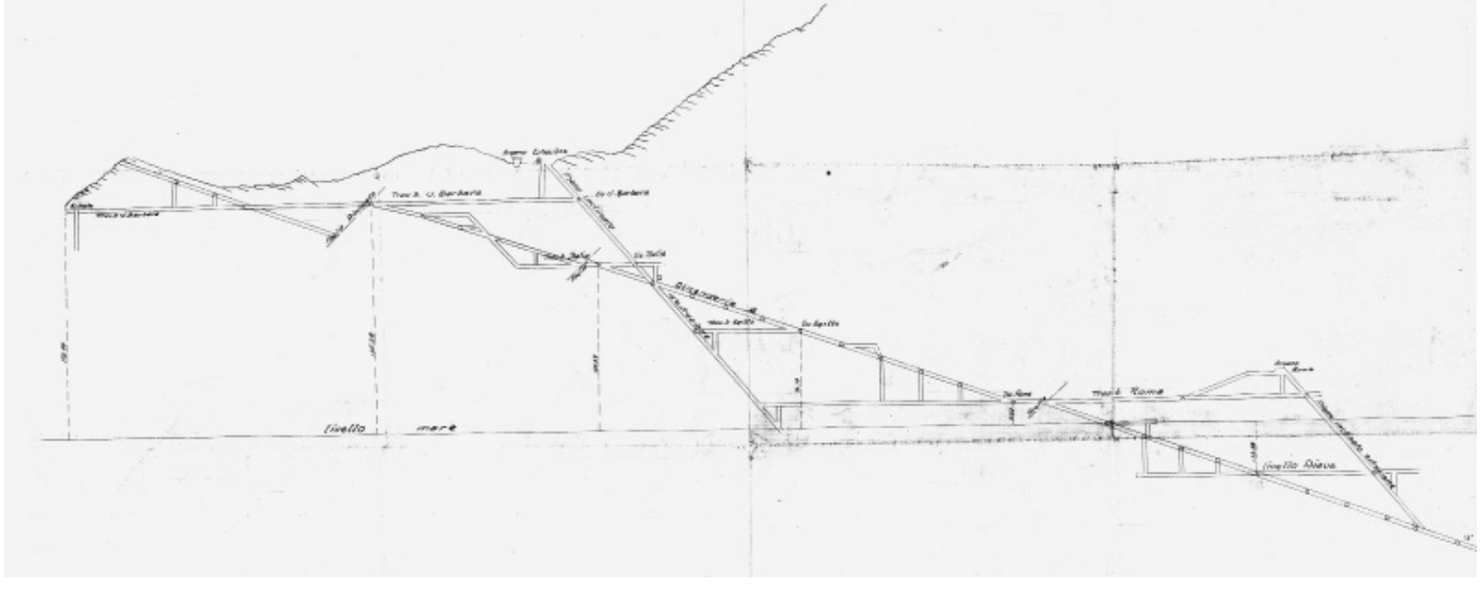
Kosseir, a phosphate-shipping town

Antonella Cabassi

El Quseir[197], known as Kosseir in English, is an ancient harbor city on the Red Sea, and as such has been influenced by many different cultures. In the first half of 20th century, its waterfront was transformed by an Italian phosphate-mining operation. The project was carried out by the Società Egiziana per l'Estrazione e il Commercio dei Fosfati (Egyptian Phosphate Mining and Trading Company).[198] Despite its name, it was an Italian company founded by Banco di Roma[199] in Egypt, with headquarters in Alexandria and Cairo, factories and mines in Kosseir,[200] and a sales office in Rome.

The concession became a factory town adjacent to the old city. It covered an area of approximately 1,500 hectares (3,750 acres), enormous in comparison to the size of the city of Kosseir at the time. The compound, built on a sand bar, was separated from the old city by a wall, and was open to the sea to the south. Over the years, the company enriched the city with a new hospital, a radio station, residential districts (chiefly tracts of single-family dwellings), a street-lighting system, and much more. The intense construction process involved and changed even the surrounding lands. A new railway connected the city to the mines, where new villages were built, along with isolated shelters for prospecting expeditions.[201]

The urbanization of Kosseir is highly complex. It began in the first years of the 20th century with Banco di Roma's venture in Egypt, and gradually continued for fifty years, with continuous additions, occasional accelerations, profound ideological changes, and various protagonists. The company, which repeatedly risked bankruptcy, was purchased by the Italian



State Treasury in 1927. Starting in 1933, it was operated by the IRI (Industrial Reconstruction Institute). In 1958, it was nationalized by the Egyptian state, and the Kosseir plant was finally closed in 1964.

Fosfati in Kosseir: A history of projects and managements

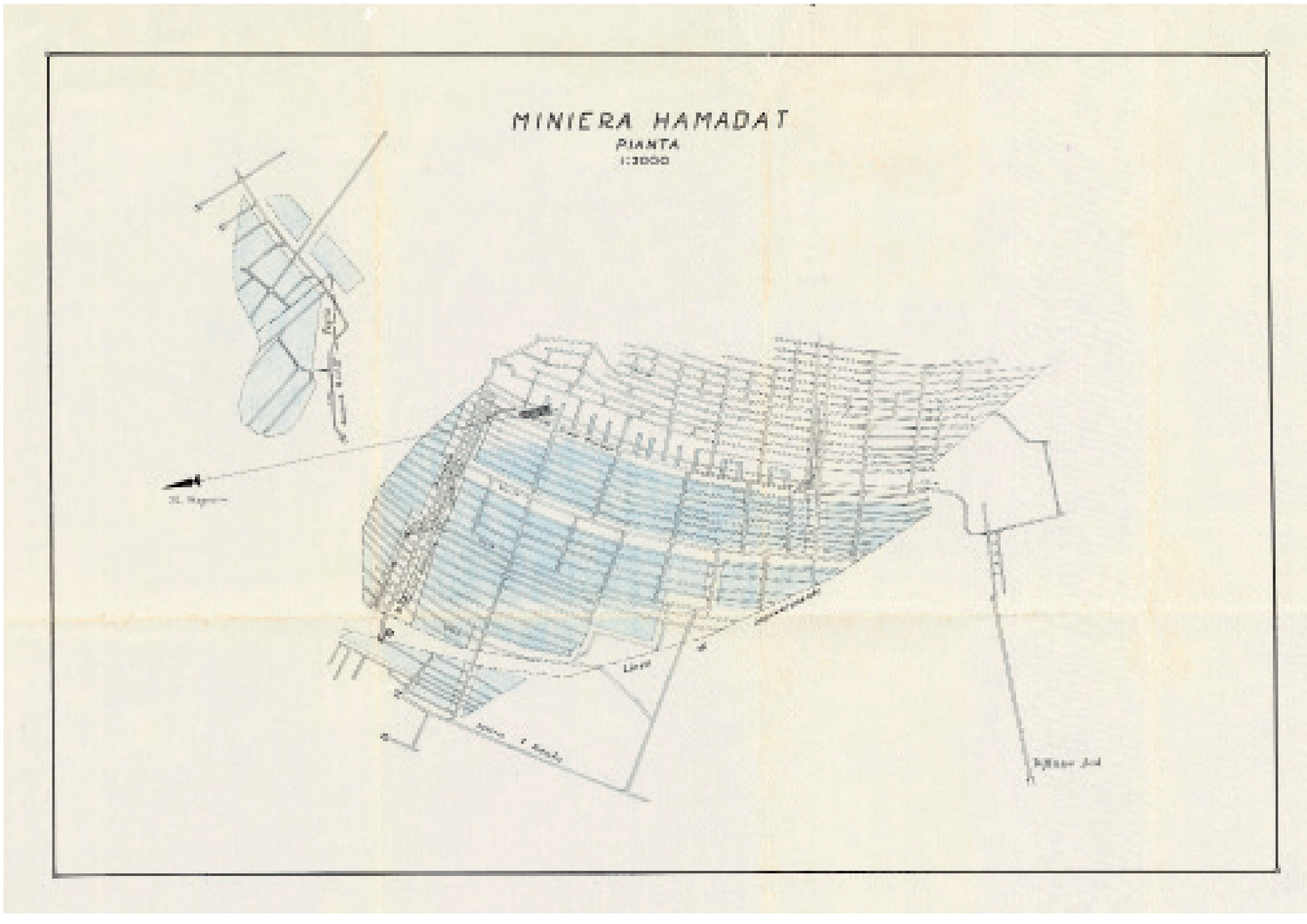
Due to its strategic position, Kosseir played an important role in the political and commercial geography of Egypt for more than 4000 years. According to historians and archeologists, Kosseir is Egypt's most ancient port.[202] It has an illustrious history, having been known as Tjau under Hatshepsut, as Myos Hormos under the Ptolemies, and as Leucus Limen under the Romans. Following the Arab conquest, it became a port for trade with the East and an embarkation point to Mecca. It is also mapped on 15th century Portuguese charts of routes to the East Indies. The city grew under Ottoman rule, dating from 1517. Selim I ordered the construction of a fortress and new port, located further to the south and therefore better protected from winds. In 1798, Napoleon's troops captured the fort, and added casements to it. In 1801, the English expelled the French and opened a new breach in the walls. Kosseir's strategic importance lasted until the opening of the Suez Canal (1869) and the construction of the Alexandria-Cairo-Suez railway line.

At the turn of the century, benefiting from new sea and rail trade routes, new mining companies were established on the Red Sea coast. In 1898, they were no longer attracted by Egyptian gold and emeralds, but oil, manganese, and phosphates, the latter coming from the region of Qena, Upper Egypt.[203] The Scotsman Andrew White Crookston was the first to attempt mining these deposits, but he soon abandoned them in order to devote his time to exploring the new ore deposits discovered in Safaga.

The concessions were transferred to Banco di Roma,[204] which was looking for new investment opportunities. However, the mines were in remote areas, and transportation was expensive, so the bank focused its attention on promoting new geological expeditions. The first one took place between 1910 and 1911 through the Wadi Hammamat, under the supervision of engineer Emilio Cortese.[205]

Wadi Hammamat is a rocky gorge halfway between Qena and Kosseir, with walls decorated with drawings and inscriptions dating back to 4 000 B.C., and mountains of aggregated

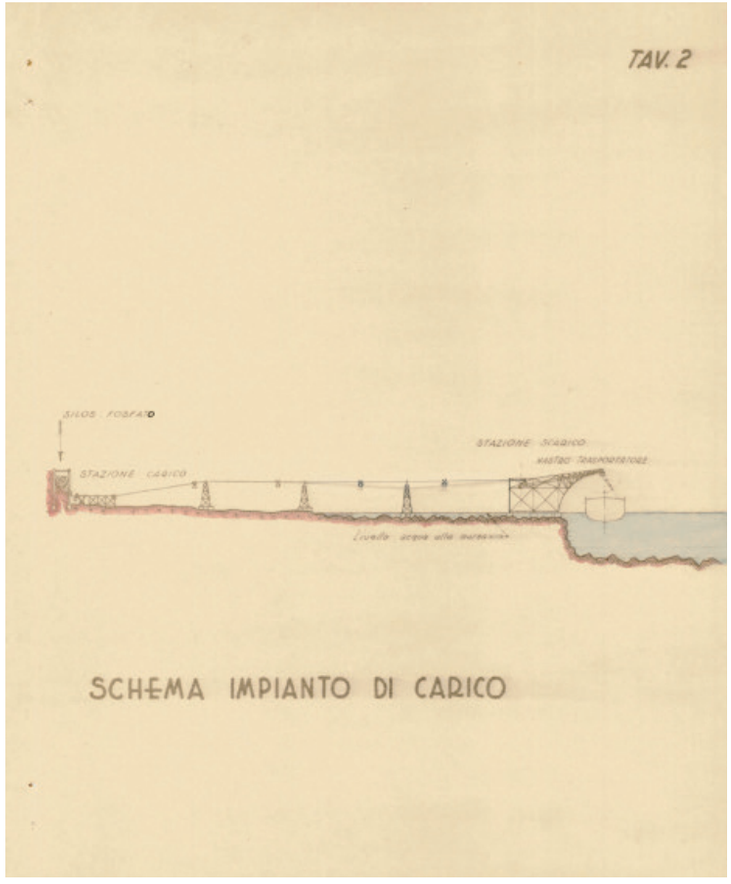
General plan of Hamadat Mine

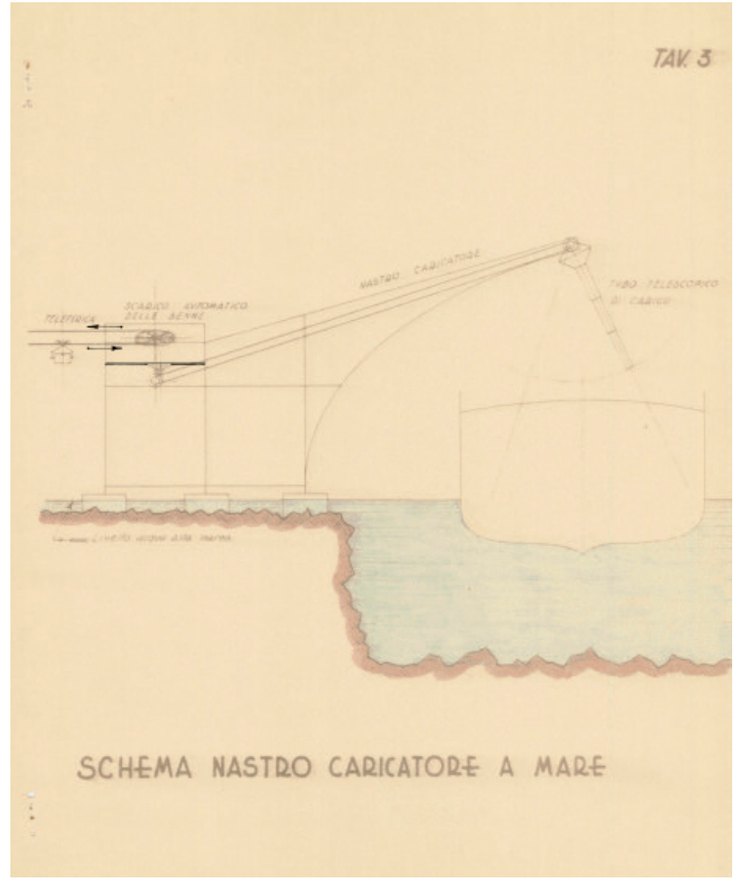


fossil shells. From ancient times, Wadi Hammamat had been the shortest natural path from the Nile to the sea. Ornamental green stone known as Bekheny was quarried in this valley. Ancient Egyptians considered the stone sacred, carving it into cups, statues, and sarcophagi. The valley, fortified by the Romans, still contains intact watchtowers, wells, English fortresses, old quarries, and mines.

Cortese, like the French writer Gustave Flaubert fifty years earlier, left Qena riding a camel. He made the same stops and described the same places, such as Bir Inglisi, Bir Hammamat, and, further north, the ruins of Bir Umm Fawakhir, 5th and 6th century Byzantine gold mines. Once he arrived in Kosseir, he described the city and its inhabitants, providing us with valuable information: "here, you can drink sea water distilled by a special plant, which is, to tell the truth, not very new, but very well maintained by the distillation technician, who is Italian, Mr. Scoccimarra. Besides him, there are only a few Europeans in Kosseir, such as the Governor of the Port and Town Square, who is Maltese, and a Greek doctor, who is responsible for the Maritime Health

Port of Kosseir: Plan for the ship-loading facility (c. 1930)





Service [...] There are many wells along the beach, and wind engines could be used to pump water from them to irrigate gardens and orchards."

Cortese published the description of the trip and of his considerable findings a year later in *Bollettino della Società geografica*.[206] In the same year (1912), the Banco di Roma founded the Società Egiziana per l'Estrazione e il Commercio dei Fosfati[207] in Alexandria, and hired Cortese as the first technical director and buildings and facilities engineer.

The factory transformed Kosseir. As we noted earlier, a hospital, several housing tracts, a radio station with its own group of homes, and the wind power plant described above were built. In 1914, a phosphate mine was opened at Gebel Nakheil, only 12 km away from Kosseir. Its phosphate deposits were as rich as those at Safaga, and from then on, phosphate from both mines was shipped from the port. Construction also started on a new loading dock and a narrow-gauge railway, supervised by technicians from Sardinia and Piedmont. When World War I broke out, Cortese was still busy with construction. In 1917, he left his post as director of mining operations, and although he was over sixty, returned to Italy to enlist as a volunteer. The direction of the mines was entrusted to an engineer named Rolfo, and direction of the city's plants to the expert Cagnati.

After the war, Cortese returned to work at Fosfati as an advisor, between 1918 and 1920. This time, he was employed directly by Banco di Roma.[208] War and other upheavals produced a very serious economic crisis, and Fosfati was

on the verge of collapse. The situation was solved only when the Società Finanziaria per l'Industria e il Commercio (Finance Corporation for Industry and Commerce) bought a large stake in the company.

With fresh capital and a new board, the company sought a new director and new concessions. It purchased the rights for the ore deposits at Gebel Duwy, only 20 km away in the back country, from a British syndicate, and hired Riccardo Decima as director in early 1920.

Decima directed prospecting expeditions, surveyed land, and designed structures, sending frequent reports to Rome regarding possibilities for excavation. In 1923, the intensive excavation of the mines in Gebel Duwy began, while prospecting continued elsewhere. The earlier concessions, unfavorably located or offering poorer phosphate, were gradually abandoned. In 1926, Gebel Duwy was the company's major asset, although it still lacked reliable technical equipment.

Thus far, two companies had extracted and traded Red Sea phosphates: the British Egyptian Phosphate Company and the Italian Società Egiziana per l'Estrazione e il Commercio dei Fosfati. The activity of the Italian company was directly related to Italian Government and finance, its holding company being controlled by Consorzio per Sovvenzioni sui Valori Industriali (Consortium for Subsidies on Industrial Values). Minister Giacomo Acerbo paid a visit to Kosseir's mines in 1926, while traveling in Egypt. Meanwhile, the construction of the new port was started, as shown in the correspondence between its engineer, Luigi Luiggi, and Decima.[209]

In 1927, all Fosfati's shares were transferred to the Italian State Treasury,[210] in a sale arranged by the Istituto delle Liquidazioni.[211] In the same year, SAFNI, the Società Anonima Fertilizzanti Naturali Italia (Italian Limited Company for Natural Fertilizers), was established with a capital of 38 million Italian lire. In the 1930s, the demand for phosphate-based fertilizers increased sharply in Italy, and Fosfati signed agreements to supply the Federazione Italiana dei Consorzi Agrari (Italian Federation of Agricultural Associations). The phosphorite produced, then ground by Raymond mills, was tested in special experimental government stations, mobile agricultural professorships managed in cooperation with the Research Institutes of the Faculty of Agriculture. The results of the agricultural applications of Kosseir Phosphorite – then called Italian Phosphorite – were disseminated by SAFNI's press office.

These were the years of the greatest Italian colonial expansion and of a large number of achievements in terms of infrastructure, urban transformations, construction of new public buildings, and establishment of new settlements. Kosseir was no exception: it had a new port, public lighting, and a cable car for transporting ore to the port. While these projects were being carried out, blueprints for new buildings were arriving from Rome. At Gebel Duwy, a mining town was being built.

An inventory drawn up in 1932 lists the equipment and facilities at Gebel Duwy: drills, electrical cutters for the mechanical extraction of phosphates, and 90,000-ton silos. The port housed new silos, a plant for the low-cost production of 100 tons of fresh water daily, an ice factory, four 1,200-ton fuel-oil depots, various other depots, phosphate-processing mills, new locomotives and freight cars; a plant for the sorting and crushing of residues; and a plant for the natural and artificial drying of phosphate ore. The inventory also mentions: buildings in the old town; the Qena-Kosseir rail line, the works for which were started by the Egyptian Government in cooperation with Fosfati; a detailed list of the new mining prospects with related permits; and a schedule of ongoing mining and construction concessions.

In 1933, when IRI took control of the company, construction of housing and community facilities continued. A new men's dormitory went up, along with a canteen, a recreational club, sports facilities, and a branch of the National Fascist Party. As described by Italian newspapers at the time, it was a "Little Italy," with pupils dressed in Balilla uniforms (the fascist party organization for children aged 8–14).

A photo lab in Kosseir printed postcards. The company commissioned Rizzoli[212] to publish a leaflet on phosphates. A new mine opened at Hamadat, with a large town around it.


Miniere di Kosseir - Società Egiziana dei Fosfati.
Panorama di Kosseir - Porto dal Pilone della Funicolare.

Overall view of Kosseir mining town from an aerial ropeway

Port of Kosseir from the upper aerial ropeway platform

Mine employee housing (1906) in Kosseir
(photo by A. du Boistesselin)

In 1939, mining engineer Adolfo Laurenti took over the company management. The port became a strategic point in Mussolini's war plans.[213]

The company's operations suffered a setback during the war. In 1942, the British interned all the Italians in a detention camp in Geneifa. The factory operated briefly under British control, but before the war was over, it returned to Italian hands thanks to patient diplomatic negotiations.

In the post-war period, operations resumed, with seven productive mines: Gebel Duwy, Hamadat, Atshan, Nakheil, Abu-Tundub (North and South), Faraa, and Hamarawein. Each mining center had its own village, with an emergency room, infirmary, and small mosque.

A report filed with IRI in 1952 states that the mines produced 400,000 tons of phosphates per year. The power station could generate 2870 Kw, and the silos could hold up to 150,000 tons. A new railway was built connecting the city to the mines. It had its own station and a small passenger train. Furthermore, the railway line connected the mines, and in order to speed up phosphate transport, tunnels were dug for

Locomotive roundhouse at Kosseir mine (photo by A. du Boistesselin)

the entire stretch of track between Nakheil and Gebel Duwy. The mining towns were provided with two schools for girls and three for boys. Three of the schools in Gebel Duwy were located next to the mines, and were run by the missionaries. Kosseir's desalination plant produced 150 tons of water per day.

Nasser's rise to power (1954) signaled the end of the period of Italian influence.[214] With the introduction of new economic planning measures, in the form of state capitalism, the factory was nationalized, and then decommissioned in 1964.

How the phosphate town was organized

Inside the new town, buildings lined a broad, straight, north-south highway connecting the city to the factory. This road, built by the Italians, intersected the coastal road to the north. To the south, it vanished into the maze of streets in the old town. Midway, the road was widened out to form a long square, lined with offices and public buildings. The mine was visible on the northern side. The elementary school dominates the northern end of the square. It is a

The home of the director of Kosseir mine, in 1938

one-story, Fascist-style, cross-shaped building. The portico on the facade is graced with a Palladian window with a broken pediment. The project dates back to 1930, and was designed by Florestano Di Fausto, architect of the Ministry for Foreign Affairs of the Fascist Government, although he did not follow through with the construction. In the 1950s, there were 120 pupils enrolled at the school.[215]

The church is situated to the east, on the right side of the square.[216] It is provided with three naves and an apse oriented to the east. Built in 1938, it was the last project Riccardo Decima carried out. The building belonged to the Coptic Church, which administered all of the Franciscan Missions along the coast of Upper Egypt after 1927. The central nave forms a vestibule with a Gothic arch surmounted by a rose window and Latin cross. The spire bears a Byzantine cross.

Buildings dating back to the 1940s stood on either side of the church. The Franciscan mission was on the corner, between the school and church (to the north), while the girls' boarding school was located to the south, beside the Franciscan Sisters' convent, which opened in Kosseir in 1946. These buildings were similar in appearance. All are one-story buildings with roofed terraces, and volumes reflecting elementary geometric shapes. In other words, all are modern, rationalist variations of the colonial house style.

The Administration House is on the same side. It is a very beautiful building, dating from 1931, and designed to be the director's dwelling and a reception house. The white mansion overlooks the sea, turning its back on the square. It features four corner turrets connected by a double portico. There is a row of single-family dwellings along the beach and, next to them, several sports facilities. The rationalist-style Fascist Party headquarters (*Casa del Fascio*), which housed a canteen and a recreational club, dominates this part of town.

On the other side of the square there is a row of small one-story homes, each of which differs in character, though all feature a portico entrance. Those located closer to the factory have plainer façades, reflecting the poorer living conditions of the inhabitants.

Further along the road, at a suitable distance, are the laboratories and the imposing porticoed building housing Fosfati's managerial offices. It faces a smaller square, where the power station (resembling a 19th century barracks), mills, silos, and an iron-and-brick locomotive roundhouse are also located. A large reservoir closes the opposite end of the square.

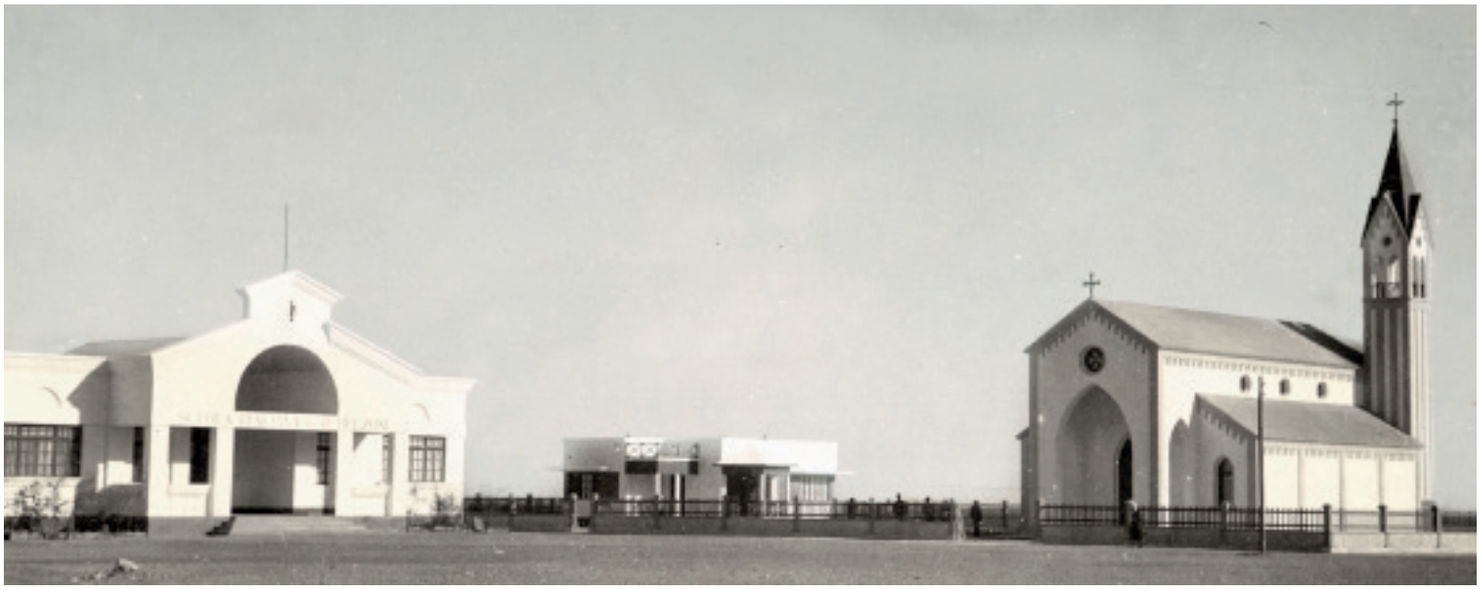
The succession of buildings, which are physically distant from each other and highly varied in style, gives the elongated square a static, petrified feeling, reinforced by the nearby sea. The view of the square looking towards the large reservoir is reminiscent of a sleepy, imaginary de Chirico cityscape, particularly the one in *La Torre rossa (The Red Tower)*.

On the outskirts of the town, at the corner of the 19th century coastal road and the street leading to the port, is Kosseir's telecommunications center, radio station, and two houses which once belonged to the Marconi company.

Continuing south towards the fort, we find the building that was once the Italian hospital. Built in 1914, it was designed in an eclectic, almost orientalist style. A 1930s renovation provided it with new X-ray facilities, a pharmacy, an obstetrics unit, and a day-care center. Recently renovated,[217]

Kosseir Square, with the primary school (1930-1931, Florestano Di Fausto, arch. and Saint Barbara Church (1938, Riccardo Decima, eng.)

the building now houses the headquarters of LDC (Learning Development Center), a community-education foundation.
On the waterfront outside the complex, there are two rows of six small single-family dwellings, built in 1906 for the technical workers at Fosfati. Currently, they house the offices of the Kosseir Department of Mining. All of the homes are single-story with walls are made of blocks of coral stone, which was quarried in the mountains nearby. This material produces a surprising harmony between the eclectic characteristics of the philanthropic architecture and traditional indigenous construction.
Kosseir is the only town on the Egyptian coast that offers tangible evidence of the ancient architecture typical of the Red Sea region.[218] The houses of the historical town, built around interior courtyards, are made of the only material readily available in this area, coral stone. The construction technique, unchanged over the centuries, is the most suitable for the local climate. Stone walls provide excellent shelter from heat, absorbing moisture at night and cooling the home by exuding the moisture in the daytime.
Coral stone walls are repeated in the building where food was stored and in the recreational club next to the port (beside the large Ottoman-era Governorate building) in a sober, interesting mixture of styles.
It would seem that the city of Kosseir is composed of three parts: the historical center, the Italian addition, and the contemporary Arabic extension. Actually, the situation is more complex. As illustrated above, the Italian presence modified the city's historical fabric, sporadically but decisively. Furthermore, the planners' conception of the relationship between living and working places and the cultural attitudes piloting each intervention changed radically over the course of the project's completion.
Generally speaking, we can distinguish two different land-management periods and policies. The first, probably based on the experience of the factory town, instituted a separation between the residential district and the factory and mine. The second, associated with the urban, expansionist, colonial policies of the Fascist regime and the establishment of numerous small towns, unifies everything as a whole.
Most of the buildings went up between the 1920s and 1936, date of the proclamation of the Italian Colonial Empire; that is, at a time when the debate on modern colonial architecture was growing and maturing. The ideology of



The main street of the mining town at Kosseir: the administrative offices are on the left

urbanization and building type elaborated by this debate was based on an opposition between monumental classicism and the rediscovery of local traditions. Nevertheless, Kosseir presents a spatial continuity with the previous era, visible along the coast, in the succession between the waterfront, the port, and the new town. Its ideological continuity can be perceived in the fact that no worker housing was built, because the workers were indigenous.

The structures along the main square of the small community are public buildings, workshops and mills, and the homes of managers and other high-ranking people. They are diverse in style, but they express a well-defined hierarchy of housing. The façade is the most immediate means of distinguishing between the dwellings which only the very skilled and better-paid individuals could afford, and the types of buildings in which laborers were housed.

The high status of a dwelling's inhabitants was also reflected in the layout of the home: whether it included a vestibule, several bedrooms, a living room, and a separate dining room. In conformity with the guidelines on "building hygiene" fashionable at the turn of the century, architectural design had a duty to organize living space in a rational manner that would inspire ethical attitudes in the inhabitants. Architecture was supposed to be conducive to respect of the ethical code defined by the "healthy" part of society. This is the ethical model that gave rise to community structures and recreational spaces based on a social utopia, like the community canteen in Kosseir.

Casa del Fascio, Kosseir (c. 1933):
After-work club and restaurant for mine
employees (photo by A. du Boistesselin)

Other workers' settlements were established on the uplands, around the mines. Because they were far from Kosseir, new housing, places of worship, and recreational clubs had to be built for each social class. The structures follow the contours of the landscape, with the mine always present in the background. Residential tracts repeat the pattern of the homes in the main town, with minor variations, even in the apartment dwellings.

The Fascist city is brand-new, whether it is created or grafted onto an existing city. Kosseir is a rational construct which, as Alberto Moravia writes, "speaks not to reason but to the imagination." Sabaudia[219] harks back to Africa. Kosseir is also Africa, but a different Africa. The city asserts its dual nature: it is and wants to be two different types of city at the same time, rationalist and traditional, serving the community, and representing it.

Excavating the company town: Small Moroccan mining cities in European archives

Tom Avermaete

Much of Morocco's modernization during the 20th century, as well as its urban and architectural development, are linked to the mining of the country's wealth of natural resources, such as coal, lead, zinc, and phosphates.[220] Even before colonial times, mining had attracted the notice of foreign powers.[221] The years immediately before and after the Protectorate was established, in 1912, saw a frenzied rush for mining concessions. As a result, the first Resident-General, Hubert Lyautey, "nationalized" phosphate reserves in 1920 and placed mining and marketing activities under the control of the Office Chérifien des Phosphates (OCP).[222] In 1928 another institution was established, the Bureau de Recherches et de Participations Minières (BRPM),[223] to prospect for and mine non-phosphate ores.

Under the Protectorate, several agencies directly or indirectly related to mining also played paramount roles in the development of Morocco's built environment.[224] In addition to the OCP and the BRPM, they include other public companies such as the Société Chérifienne des Charbonnages de Jérada (SCCD) and Charbonnages Nord-Africains (CNA), which collaborated with economic and financial groups such as Banque de Paris et des Pays-Bas (Paribas), the Omnium Nord-Africain (ONA) and the Banque d'État du Maroc (BEM).[225] Until independence in 1956, these institutions worked together with colonial administrations specialized in planning the built environment, such as the Ponts et Chaussées Coloniaux (1920), the Ponts et Chaussées d'Outre-Mer (1949), or the Travaux Publics Coloniaux (1952 to 1955).[226] In this context, urbanism and architecture were not the exclusive task of urbanists and architects, but most often the work of engineers with various specializations.[227] Each mining company had its own purpose, ranging from pure economic gain to more enlightened ideas of providing quality housing and community services to workers. Together, they laid the foundations for a large number of urban and architectural complexes related to mining.[228] Today, the result is a landscape of mining towns of different sizes, such as Bangrir (62,872 inhabitants), Bouarfa (25,947 inhabitants), Boubkere (1,942 inhabitants), Boujniba (15,041 inhabitants), Boulanouare (10,469 inhabitants), Ganfouda (5,748 inhabitants), Hattane (10,284 inhabitants), Jérada (43,916 inhabitants), Khouribga (166,397 inhabitants), Laayoune (183,691 inhabitants), Ouad Zam (83,970 inhabitants), Oued Al Heimer (1,997 inhabitants), Touissite (3,429 inhabitants), and Youssoufia (64,518 inhabitants).[229]

The OCP: "Scientific management" of mining and the town

By far the most important player in the development of Moroccan mining towns was the Office Chérifien des Phosphates (OCP).[230] The OCP was established by royal decree, or *dahir*, in 1920, as a state company holding a monopoly on mining. However, despite the fact that it was a state agency, its management and production methods were largely based on the approaches of private companies in Europe. Intense mechanization was the credo, and a "scientific" Taylorist system was applied to maximize the yield of natural and human resources, as well as time and space. Very simple rules governed all OCP mining operations. First, every mine was designed as an autonomous center, able to function independently. This implied that every mining town was equipped with its own infrastructure (power generator, sources of water). However, the basic amenities of everyday life (education, health facilities, culture) were also provided on site.

A second characteristic of OCP mining towns is that they were always closely linked to the development of transport infrastructure. Rail transport, in particular, was chosen as the most appropriate means of moving freight. Hence, in the majority of mining towns, the railroad became not only a key part of the infrastructure, but also an element of socio-spatial structuring and differentiation. In addition, the railways that were built for mining, often with the help of engineers from the Ponts et Chaussées Coloniaux (1920) and the Ponts et Chaussées d'Outre-Mer (1949), crossed large expanses of land, making the electrification of remote rural villages possible.

OCP company towns also obeyed a third imperative: segregation of functions. Each of the OCP settlements is characterized

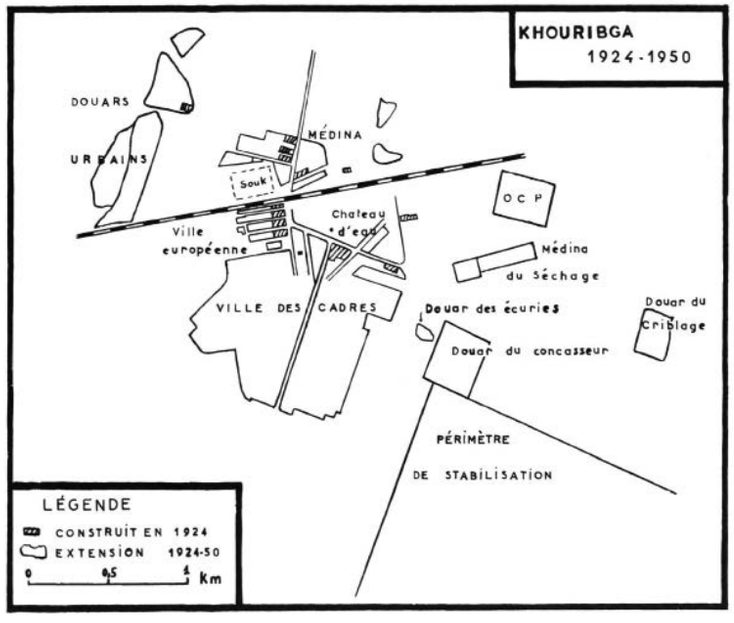
Khouribga (1924–1950),
Office Chérifien des Phosphates, cont.:
Tract of single-family dwellings, c. 1950

by clear-cut spatial boundaries between the various tasks in a mining town. Production, processing, storage, transportation, waste disposal, administration, and housing occupied zones that were clearly separated. The "scientific organization" of personnel and processes was extended from the mining activity to serve as the primary planning principle for the mining settlements. Hence, most of the mining towns in Morocco have an extremely clear and compartmentalized urban structure. It can be interpreted in two ways: as the spatial expression of the general management principles of mining, and as a form of social and cultural control.

One of the best examples, the largest mining town built by the OCP, is the city of Khouribga. It is situated in the center of Morocco, 120 km southeast of Casablanca.[231] Before 1921, this desert area was occupied by semi-nomadic populations who herded livestock and engaged in extensive farming, a means of subsistence and a social structure inimical to any long-term settlement density. The discovery and mining of phosphates brought about drastic changes. In addition to the introduction of the railway line, a permanent settlement pattern of white-collar workers and laborers was established. The first major settlement, founded by the OCP in 1921, was

Khouribga (1924–1950),
Office Chérifien des Phosphates, cont.:
Zoning map

The swimming pool and the community hall (1930s)



located near the open quarry on the outskirts of Boujniba. But by 1924, several new neighborhoods were planned, extending the city considerably.

Khouribga's urban structure clearly obeys the "scientific" logic of separation of functions and thus is divided into four distinct zones. The first contains various OCP production units and plants. The second zone encompasses the so-called "Ville des Cadres," a series of identical single-family dwellings reserved for OCP management. The third area is the administrative district, located in the center. It acts as a buffer zone between the settlers' city and that of the indigenous people. The fourth zone is separated from the others by sports facilities, parks, and the railway. Called the "Habitat Économique," it is where the mine laborers were housed (neighborhoods of Lebyoute and Hay Salam).

The last two neighborhoods were the product of typological experimentation. Already, in 1929, under the supervision of Dr. Lamielle, the OCP had begun to experiment with new forms of housing, introducing the concept of the "stabilization perimeter." This was the learned name given to an innovative housing plan intended to mediate between the way of life in rural areas, where the workers came from, and urban dwelling practices in the mining town. It consisted of buildings containing four two-room apartments, set in the middle of four hectare lots (9.9 acres). Each family was expected to cultivate a quarter of the land, a one hectare plot (2.5 acres), marked off by an olive tree border. There was enough room for the worker to raise livestock or even build a traditional structure. The idea was to maintain some elements of the rural way of life, in order to ease the workers' transition to urban life. The experiment failed, because the "stabilization perimeters" ranged too far, creating large distances between home and school, or the city center and the workplace. Workers' housing built later was developed according to denser urbanization patterns. The Cité Boujniba, built in 1938 by architect Edmond Brion,[232] is one example, as is the neighborhood planned much later, in 1977, by Émile Aillaud.[233]

In addition to building housing for its workers, the OCP also promoted education. From the very beginning, the Khouribga city plan also involved the design of school facilities.[234] Even more important were the health and physical fitness of the mine laborers and management. Large areas were set aside for sports and recreation facilities. Very soon after Khouribga was laid out, it had an open-air swimming pool. The OCP's Sports Association was provided with state-of-the-art

athletic facilities. And the company even supervised the spiritual well-being of its employees, symbolized by the church located in the middle of town. The OCP's ambition was to control every dimension of employee life.

Jérada and Bou Tazoult:
Transnational actors and pragmatic design approaches

Though many of the mining towns in Morocco reflected the initiative and perspectives of the OCP, in some instances more complex combinations of transnational actors and interests were at work. The founding of the city of Jérada in the Beni Snassen Mountains is a good example. It originated with the discovery of the Jérada coalfield by geologists from the Belgian mining company Ougrée-Marihaye,[235] who had conducted an extensive survey of northeastern Morocco in 1927. In the wake of this prospecting, the Société Chérifienne des Charbonnages de Jérada (SCCD) was formed in January 1929 as a joint effort between Ougrée-Marihaye and the Bureau de Recherches et de Participations Minières (BRPM). In 1946, their collaboration led to the establishment of a new company, Charbonnages Nord-Africains (CNA), whose chief shareholders were the Belgian, French, and Moroccan states.

Jerada, Société Chérifienne des Charbonnages de Jerada, cont.: Overall view and Europeans' housing

Jérada's city planning was carried out by engineers from the Société Chérifienne des Charbonnages de Jérada (SCCD) and based on pragmatic principles, along with strict socio-spatial zoning and separation. The coal mining and processing zone, and two separate housing zones, for laborers and management, were laid out on different mountain plateaus, connected only by the main road. Likewise, both laborers and management lived in neighborhoods laid out in grids, but in different ways. The laborers' housing was organized as a dense pattern of patio dwellings and was surrounded by a perimeter wall. It was modeled on the medina, and had at its center a large square with a marketplace and other collective functions. The managers' neighborhood reflected the European garden-city model, featuring rows of semi-detached homes with private yards. The center of this neighborhood contained shops, a school, and administrative buildings. The urban plan of Jérada is a string of self-contained settlements, connected by roads.

Imini Bou Tazoult, between Marrakesh and Ouarzazate, is another example of how a combination of private and public agencies became involved in the planning of a manganese mining town.[236] In this case, the old French mining firm Mokta el Hadid, with leases in Algeria, Tunisia, France,

Laayoune: Worker's housing
(photo by Rafa)

Laayoune: overall view of the workers' housing

Bou Tazoult (late 1940s), Société Anonyme Chérifienne d'Etudes Minières, cont.: The French engineers' residences

View of the Kissaria (market) in the Moroccan compound

and Russia, initiated a collaboration with the Bureau de Recherches et de Participations Minières (BRPM) to form the Société Anonyme Chérifienne d'Études Minières (SACEM).[237] Drilling began during the World War II, and accelerated after 1947. At that time, SACEM engineers laid out a town in the immediate vicinity of the quarries. Laborers were housed in a 350-unit "native village," while management housing consisted of 100 single-family dwellings, lining the main road in the mountains, or grouped on plateaus. In addition, the SACEM provided many community services, building two clinics, three elementary schools, two swimming pools, sports areas, a cafeteria and hotel, three guest houses, a cinema, a church, two mosques, two grocery stores, a commissary, and a military *bordj* for security.

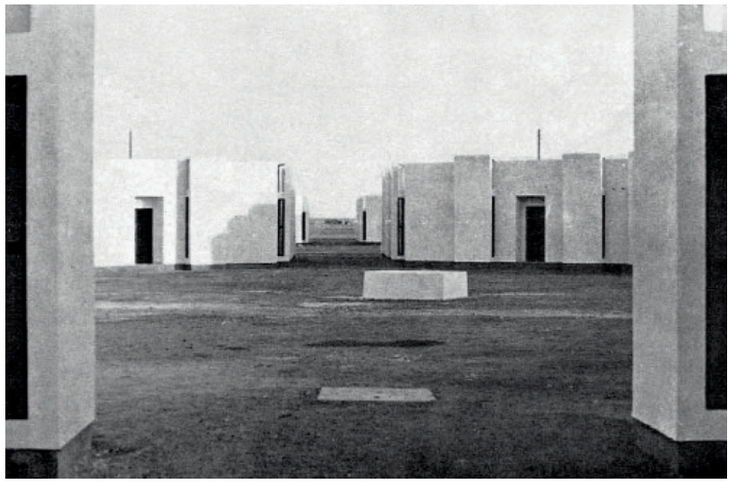
In the late 1940s, SACEM engineers initiated the idea of adapting the housing to the inhabitants' culture. Hence, the French engineers' dwellings were built in a sober, modernist style. The same rational, modernist style was applied to community facilities, such as the cinema, grocery shops, and school. However, the collective housing for Moroccan laborers told a completely different story. Though the buildings were planned and laid out just as rationally as the engineers' dwellings, the shape reflected the architecture of the Atlas mountains and the Imini valley, in spite of the modern construction technique of concrete and natural stone. The typology of the buildings referenced traditional forms such as the fortified casbahs, and included vernacular decorative patterns. The marketplace and wash-house were built in this style, as well as the multiple-family dwellings.

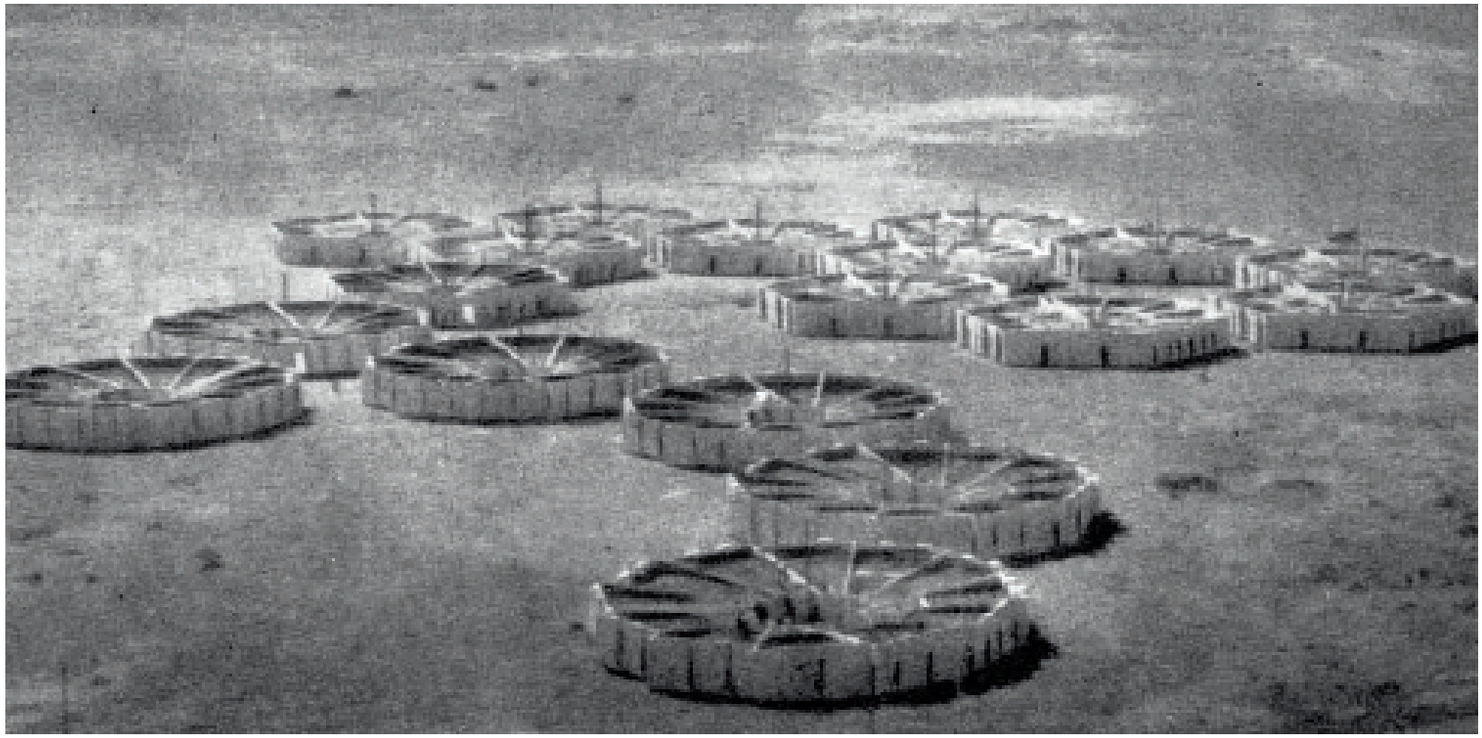
Laayoune: A Spanish-style mining town

French colonization was not always the basis for the emergence of Moroccan mining towns, as the example of Laayoune in the Western Sahara clearly shows.[238] This city was officially founded by the Spanish in 1938, as the administrative, military, and European population center of the province of Spanish Sahara. Laayoune also operated as the mining town

Laayoune (1966), Capote, Estalella & Serrano-Súñer, arch.: Commons in the Moroccan workers' housing and overall view of the compound

for phosphate deposits at Bou Craa, to the southeast. The German firm Krupp built a 105 km conveyor belt to move the ore from Bou Craa to a loading dock at Laayoune harbor. Laayoune was built up chiefly between 1940 and 1946, ultimately attaining a population of over 2000 inhabitants. The Spanish State appointed engineers and military personnel to design and build 226 new housing projects for the town. Construction was often supervised by master masons from the Canary Islands, while soldiers carried out the works.[239] They were single-story dwellings in nearly every case, constructed of ordinary masonry walls. The roof was made of reinforced concrete slabs, often complemented with characteristic traditional domes. All the houses were finished with tiled floors, wood-framed doors and windows, and whitewashed stucco walls, creating visual unity. The same approach was taken to community buildings like administrative centers, cultural centers, and churches, as well as public spaces such as Plaza de España.[240] While most of the town of Laayoune was designed by engineers and military personnel, input from architects was occasionally sought. They engaged in typological experimentation with worker housing. For example, the "Houses for Natives" were developed by architects Capote, Estalella, and Serrano Súñer in 1966.[241]





Pragmatic acculturation

The urban planning and architecture of the Moroccan mining towns stands out because it was usually not the work of urban planners or architects, but of engineers and technicians from large mining and engineering companies. Hence, the mining towns are true company towns, reflecting corporate production and organizational schemes. Since the majority of the mining towns were founded under colonial conditions, French and Spanish administrations and public companies, military engineers, and the soldiers who served as construction workers were decisive actors in their development.

As a result, the planning and architecture of the different mining towns is primarily defined by a "strategy of pragmatics." Practical considerations, such as travel distances from the mining installations to worker housing, the efficiency of the grid pattern for land development, and drinking-water supply, are at the basis of the mining towns in Morocco. However, the planning of urban centers offering community services and public places reveals an affinity with the discussions that were going on in the broader international discourse on urban planning.

The urban plans of the mining towns also reflect a strategy of segregation. The different zones of the mining town were clearly separated, by either geographical features or large infrastructural elements like railways or vacant lots. In most mining towns, residential zones were especially clearly distinguished: luxurious, modern dwellings for the Europeans, and denser, more rudimentary housing designs for the Moroccan laborers. The mining towns are clear examples of colonial prejudices projected onto the Moroccan territory. Nevertheless, many mining companies were generous in providing community services, usually accessible to all the town's inhabitants. It is remarkable how even mining towns located in the most desolate regions set aside large areas for playing fields and maintained swimming pools. The community-services offer was often unprecedented in Morocco. The indoor cinema in Bou Tazoult, for instance, was the first in the region.

Hence the mining towns in Morocco could be described as zones of pragmatic acculturation. They were pragmatic in that they were inspired by plain engineering logic, instead of the principles and schemes of academically-trained architects. And acculturation was also at work, because in these towns, various attempts were made to adjust the engineers' logic to international ideas about architecture and urbanism, as well as to local climate and traditional dwelling construction.

- 2 -

BÂTIR ET EMBELLIR
BUILDING AND EMBELLISHING
COSTRUIRE E ABBELLIRE
البناء و التجميل

ARCHITECTURE

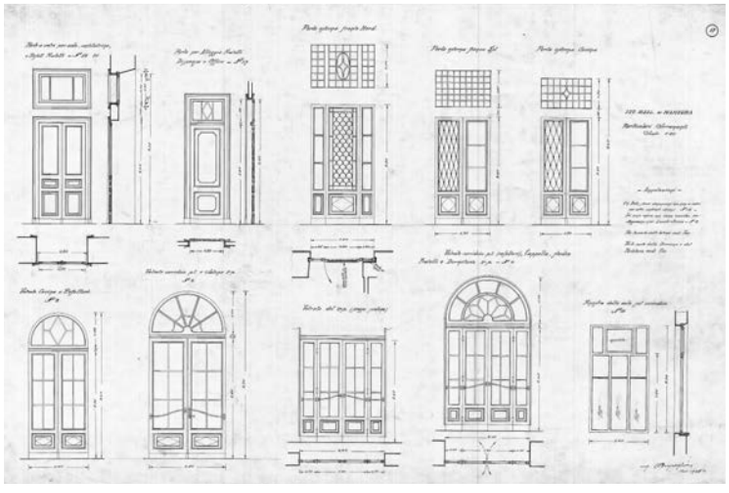
Garage Vinson, Algiers (1929),
Paul Guion, arch.; Hennebique, eng.:
The central shaft (photo by H. Eichacker)

Boys' school, Mansoura, Egypt (1928),
Carlo Buscaglione, eng.; Del Core, cont.:
General view and plans for the
woodwork

The documentation concerning hospitals and schools in the ANMI Archives

Anna Nuzzaci

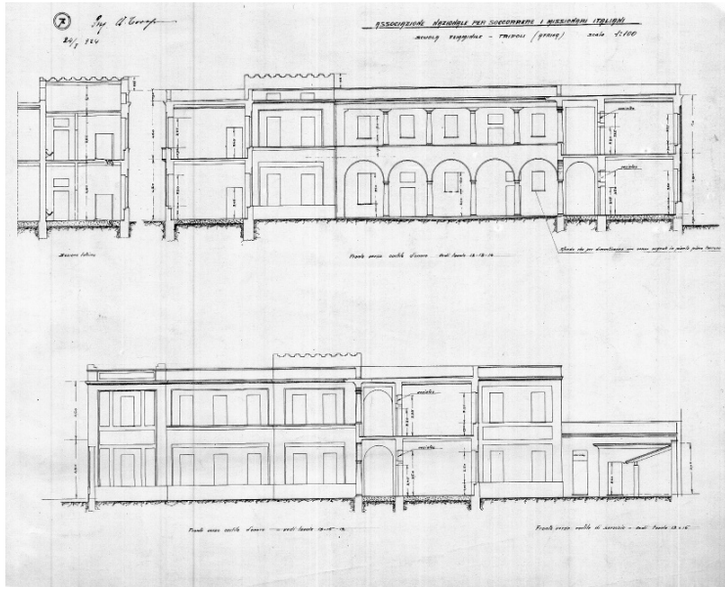
The Archives of the projects completed by ANMI (Associazione Nazionale per Soccorrere i Missionari Italiani - National Association for the Assistance of Italian Missionaries) in the years 1890-1940 are kept in the organization's headquarters in Rome.[242] The files contain a variety of documents making it possible to follow the projects step by step, from their design to completion, and, in some cases, their restoration. Founded in 1887 in Florence, ANMI was the most important promoter of Italian works in the Middle East and Northern Africa (with the exception of Libya)[243] until the outbreak of World War II. In 1920, due to the large number of facilities to be built, the Association found it necessary to establish two technical design offices, one in Turin and the other in Rhodes (in the Eastern Dodecanese, occupied by Italy 1912-1940). The latter was active until 1925, at least. ANMI mainly planned school and hospital buildings.[244] The materials archived in Rome, transferred from the Turin premises when the organization moved its headquarters, are extremely interesting, as they document in detail a large collection of projects. The first school and hospital buildings were designed by the missionary fathers, who also supervised the construction, collaborating closely with the Association. A constant increase in the number of projects to be carried out led to the creation of technical offices for the development of blueprints. At the same time, architects and engineers were appointed to supervise the work. After a preliminary visit to the project area, they developed ideas in Italy and then supervised their implementation, engaging in ongoing correspondence with various partners (the Association president, the building surveyor, the building contractor, the staff of the institute). This was a way of creating a wide network of expertise, in which the technical director managed to oversee the construction works even from a distance. Blueprints drawn up by architects abroad were submitted to the technical director and the staff of engineers in Italy, who then sent them back along with their observations. The archive documents attest to a gradual transfer of skills: professionals who worked with the association regularly, such as Carlo



Buscaglione, Piero Molli, and Giulio and Antonio Barluzzi, had already gained experiences in Italy and abroad when they took on ANMI's projects. Carlo Buscaglione, director of the Turin technical office from 1923 to 1940, is the architect who designed most of the buildings.

ANMI's debut in the field of school-building dates back to 1889 with the construction of a school for girls in Luxor, Egypt. In the late 1800s, the Association built six schools in Upper Egypt (in El Fayum, Ghirghe, Beni Suef, Asyut, and Kena). Later, in the 1920s, it constructed a seventh, in Mansoura. The ANMI archives contain many documents

Girls' school, Tripoli, Libya (1924), Andrea Torasso, arch.; Gasperini & Rossi, cont.: Longitudinal sections



regarding the restoration of the Italian schools in Asyut and Luxor, including estimates for the expansion, correspondence between the planners, blueprints, newspaper articles, and photographs of the construction site. Likewise, extensive documentary material can be found regarding the boys' school in Mansoura, planned in 1928 by Carlo Buscaglione: the contract between the construction company and the association, specifying details about foundations, walls, and roofing, along with other components of the building such as plastering, moldings, doors, and floors. It even specifies the color scheme. The technical specifications are supplemented with blueprints, perspective drawings, elevations, sections, foundation plans, and many drawings detailing both the facade and the interiors.

For the construction of schools, the Association relied mainly on Italian companies with branches in Egypt (where competition with France and Britain was fierce), but also occasionally used the services of local Egyptian businesses. Only rarely was the construction company itself in charge of both the project design and the supervision of the construction, as with the new girls' school in Luxor in 1928.[245]

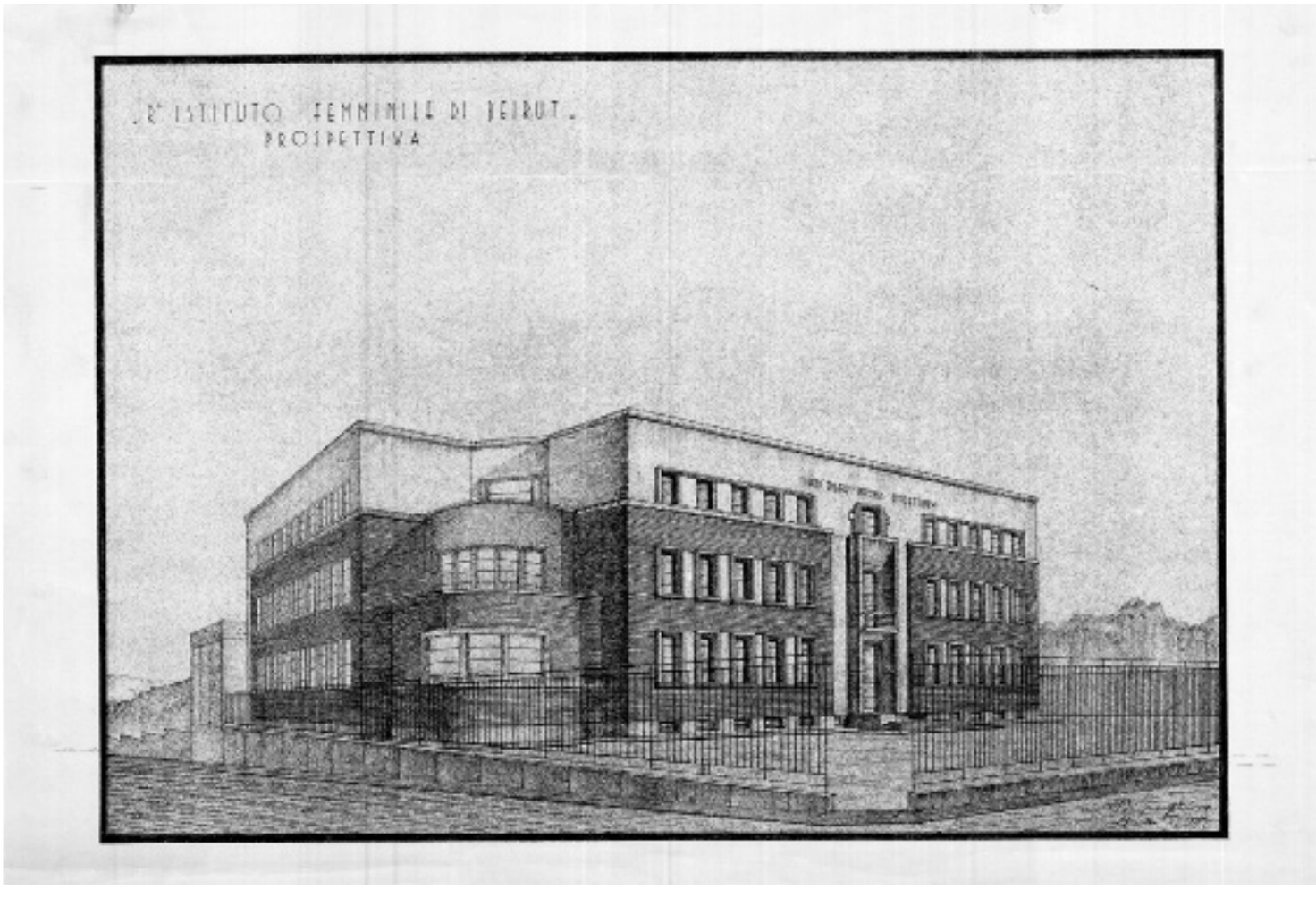
ANMI started working in Smyrna, Turkey in 1896, with the construction of a new kindergarten in the Punta district. It continued with the central girls' school, designed by Stefano Molli and built between 1903 and 1906. Cited along with the French Consul's residence as the city's most representative examples of modern architecture by the local newspaper *Le Courrier de Smyrne*, the school was destroyed by the fire that devastated the city in September 1922, but was later rebuilt. In 1924 Andrea Torasso designed the girls' school of Tripoli, Libya, and in 1926, Carlo Buscaglione – who, at that time, had already drawn the plans for the boys' school in Rhodes in collaboration with Florestano Di Fausto – designed the new girls' school in the center of Benghazi. Unlike previous projects, the schools in Tripoli and Benghazi showed "Orientalist" influence.

Usually, in this early period, both the design of the facade and the floor plan of the schools built by ANMI were based on designs adopted in those same years by school buildings in Italy.[246] These buildings usually featured a central entrance framed with classical elements like pediments, columns, cornices, and scrolls. Inside, the classrooms opened off long corridors; the chapel was prominently located, and there were staircases on the central axis of the building or on either end.

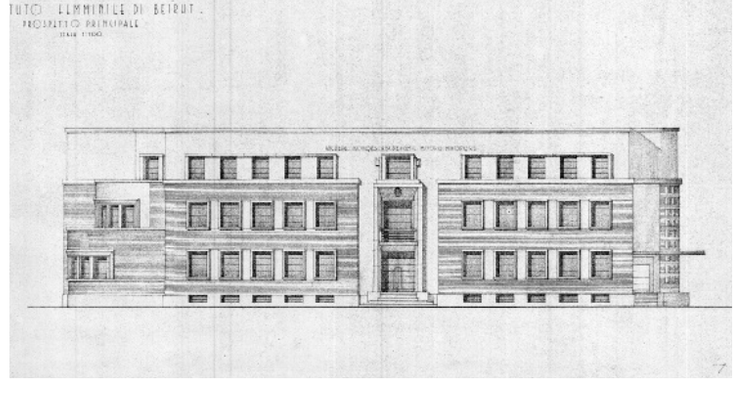
Buscaglione's designs for a boys' school and small hospital in Damascus, Syria were both neoclassical in style. The entranceways were decorated with a colossal order made up of joined pilasters resting on a high stylobate. On the other hand, for the boys' school in Beirut, Lebanon (1931), Buscaglione designed a single C-shaped block, the central section of which presented a tripartite and, on the first floor, a sequence of triplet windows, proposing a free interpretation of the Palladian window. Between 1930 and 1937, Carlo Buscaglione collaborated with his brother Enrico on the design for both a boys' and a girls' school in Haifa, Palestine. Stylistically, the year 1937 was a turning point for ANMI, which gradually freed itself from conventional neo-Renaissance and neoclassical formulas in its school projects. In Beirut, Buscaglione started construction of a girls' school

Girls' school, Smyrna (Izmir), Turkey
(1903-1906), Stefano Molli, eng.,
Luigi Rossetti, cont.: General view

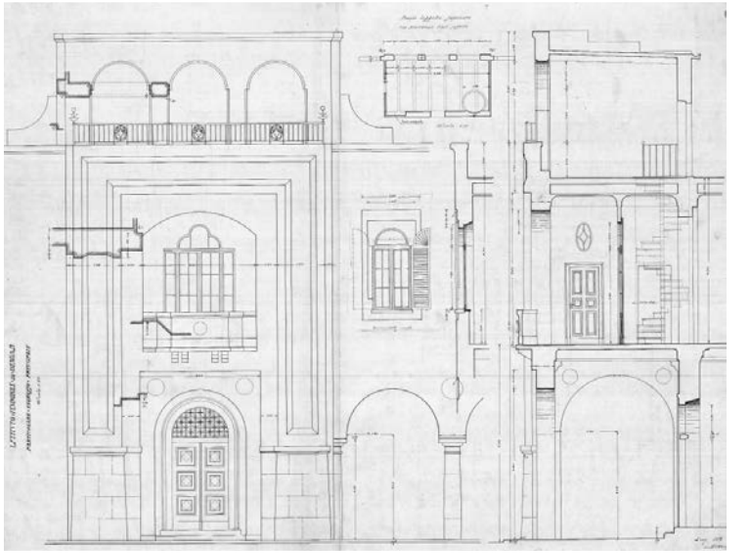
Girls' academy, Beirut (1937), Carlo Buscaglione, eng.; Gasperini Rossi, cont.: Perspective signed Buscaglione and front facade



inspired by the work of Marcello Piacentini, with whom he had been in contact since the years of the Benghazi girls' school. The result was an elaborate volumetric structure. Because it had to house a variety of functions – such as kindergarten to 12th-grade classrooms, dormitories, dining facilities, and nuns' quarters – it included three floors above the ground and a basement. The structure consisted of two wings meeting at a corner rotunda, which he redesigned several times. It expresses a desire for formal minimalism, according to Buscaglione's personal interpretation of the themes of Fascist architecture.



Girls' academy, Benghazi, Libya (1926), Carlo Buscaglione and Marcello Piacentini, eng.; Gasperini Rossi, cont.: Plan and details of main entrance and view of the building under construction



The lines of Piero Molli's Franciscan seminary at Giza, Egypt, started in the spring of 1939 and completed in October of the same year, are also influenced by the ideas of rational architecture, although the classicist references dear to Fascist architecture are also present. It is a reinforced concrete structure, featuring a large wall of glass bricks on the northern façade, lighting the staircase.

ANMI's hospitals were designed and built between the 1910s and 1940s. However, their typology reflected that of the 19th century and did not undergo any significant change, except for the gradual transition in design from enclosed courtyards to pavilions,[247] and then to monoblock style.[248]
The oldest hospital projects sponsored by the Association were constructed in the enclosed courtyard style, such

Italian Hospital, Jerusalem (1911), Giulio and Antonio Barluzzi, arch.: main facade and the hospital, nearly completed

as Stefano Molli's design for a Chinese mission hospital (1904), the neomedieval-style Hospital of St. Anthony in Smyrna designed by Molli's son Piero in 1921, and the Hippocrates Hospital in Kos (in the Dodecanese, 1926) designed by Carlo Buscaglione and Florestano Di Fausto. The pavilion style struggled to be recognized in Italy, even if the building reform's project report of the Ospedale Maggiore di Cremona (Ospedale Maggiore of Cremona)[249] stated early as 1892 that, "structures with enclosed courtyards are obsolete, and the system which has finally prevailed is that of isolated pavilions [...]. Possibly, there should be no superimposition of floors, as the unhealthy air which flows out of the windows of the floor below may infect the rooms above. [...] It is advisable to connect the pavilions with roofed porticos and galleries [rather than corridors] for better air circulation."

The first hospital ANMI built on the southern shores of the Mediterranean dates back to 1911. The Italian Hospital of Jerusalem, designed by the brothers Giulio and Antonio Barluzzi, opened in 1919. It was based on Siena's 13th century Palazzo Pubblico (City Hall). The 150-bed facility specialized in the surgical treatment of women and children. It housed modern physical therapy and radiotherapy departments, chemical and microscopic research laboratories and an orthopedic workshop. Oversized and centrally located at the junction of the building's wings, the chapel featured prominently in the composition of the structure. Giulio Barluzzi copied the "Florentine" design (on a smaller scale) the following year, for a school and a small hospital in Damascus. These facilities were redesigned by Stefano Molli in 1913, and again in 1924 by his son Piero, who combined all the building's departments in a single longitudinal building with a central corridor.

The majority of the Association's hospital projects from 1924 to 1931 were designed by Carlo Buscaglione. Manager of the Association's technical department and reference technician of the studio, he boasted extensive experience in the design of hospitals. During the 1920s, he designed the hospitals of Rhodes and Kos, collaborating with Amedeo Favero on the first project, and with Florestano Di Fausto on the second. In January 1927, he designed a hospital in Antalya, Turkey, and from 1930 to 1932, he completed work on a hospital in Tripoli, Lebanon, as well as the enlargement of the Italian hospital in Istanbul (1931). He also designed the Italian hospital in Haifa, Palestine, which opened in October 1933 and specialized in surgery. Three years later, during his stay in East Africa, he drafted the projects for two hospitals in Om Ager, Eritrea, and Gimma, Ethiopia.

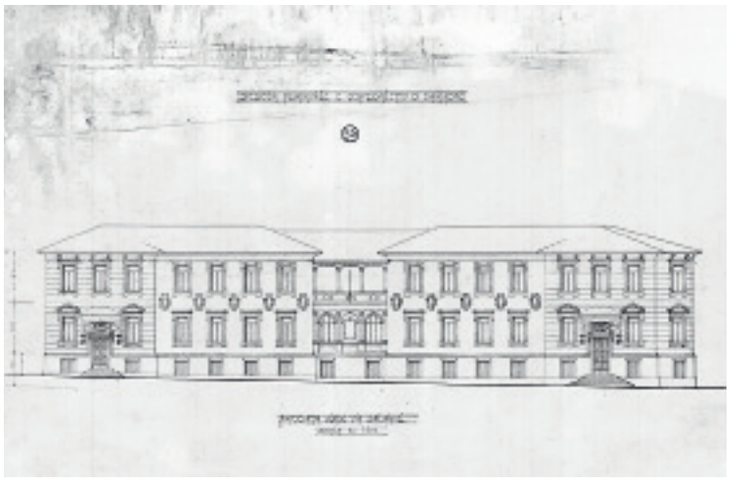
The civil hospitals of Rhodes and Antalya (never built) were of the pavilion type but, to overcome drawbacks due

Italian Hospital and Girls' school, Damascus (1931), Piero Molli, arch.; Taddeo Denti, cont.: Main facade on Salahié Street and the main facade, completed

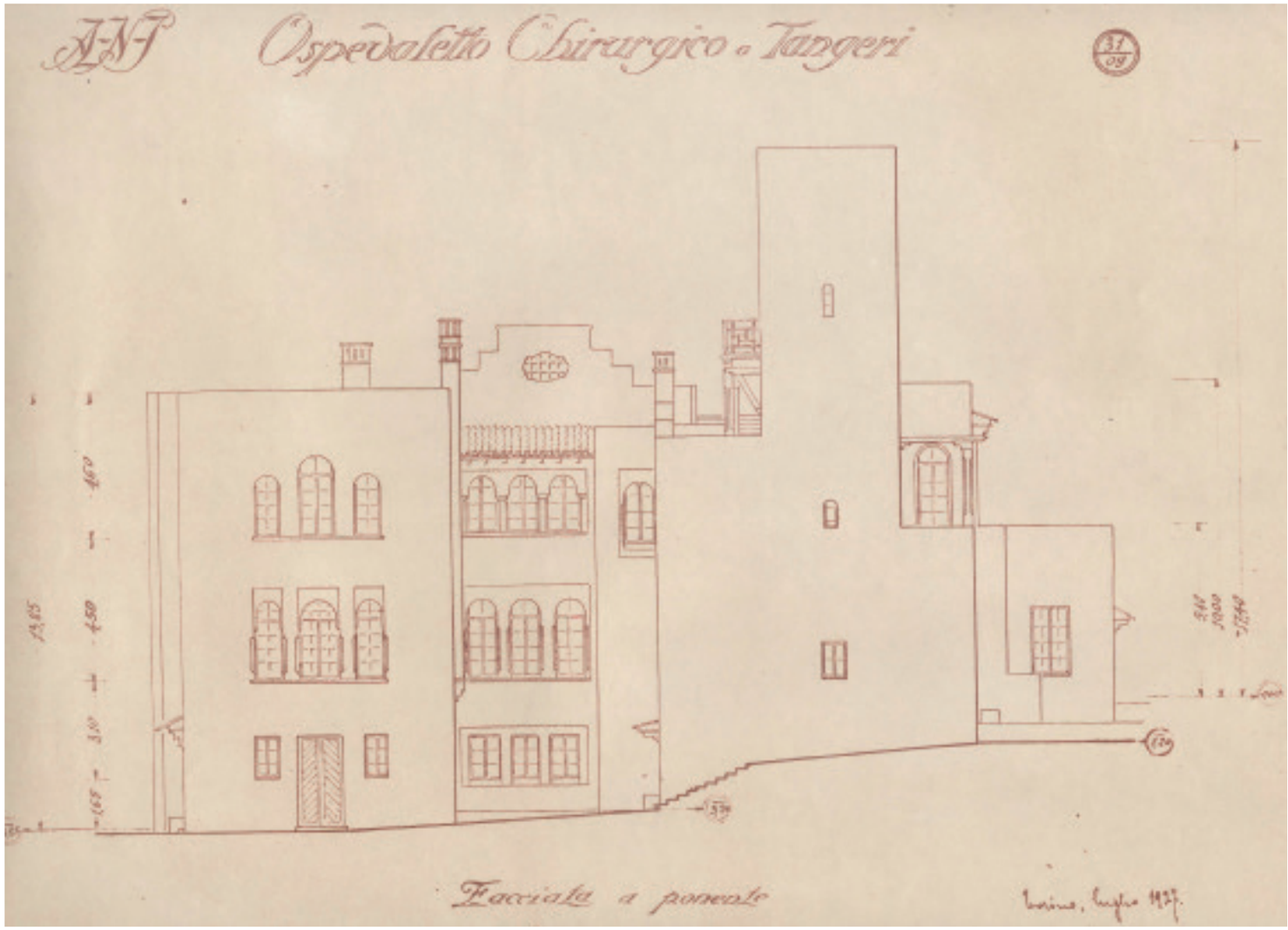
to excessive distances, the buildings were clustered and linked to the central block by short glazed hallways. In Tripoli, Lebanon and Haifa, Palestine, Buscaglione preferred to group the functions into a C-shaped, horizontal system consisting of a single main block and two lateral wings connected to it.[250] In both cities, the hospitals were located on the outskirts, in conformity with the Italian legislation on the subject. They were structures consisting of three floors above ground and a basement, in locally-quarried stone, framed by reinforced concrete pillars, and also roofed with reinforced concrete. Although the hospital's technical equipment, furniture, and facilities were cutting-edge for the time, its architecture still harked back to classicism. Only the facade of Haifa's hospital, and more markedly the doctor's residence – an isolated volume located next to the hospital – showed a desire to innovate the architectural language by incorporating some dynamism in the design of the facade's balconies and the cylindrical staircase visible on the outer wall. Both of the companies that carried out the work on the facilities were Italian, and they imported Italian building materials and master builders specialized in tile work for the floors and wall coverings.

In 1927 and in 1934, ANMI built two hospitals, in Amman and El Kerak, Transjordan, designed by Antonio Barluzzi and supervised by Carlo Buscaglione.

The first one, a reinforced concrete structure completely covered with ashlar masonry, stands on a hill overlooking the city center, on a piece of land which had been bought by the Association from the Latin Patriarchate of Jerusalem. The construction permits were obtained in 1925, and the Italian company De Farro started building the following year, completing the facility by the end of June 1927. The hospital of El Kerak, a village 150 km away from Amman, is more interesting, from an architectural viewpoint. A perspective sketch drawn in pencil by Barluzzi emphasizes the general lines intended for the structure. Surrounded by hills, the two-story building is topped by a high loggia. A massive portico with joined pilasters shaped like fasces marked the entrance. The last hospital ANMI sponsored abroad was built in Tangier, Morocco. The Italian Government, banned from purchasing property due to the city's international status, commissioned the Association to acquire a large parcel on its behalf,[251] where a new hospital designed by Piero Molli was built in 1927. The three-floor building – Mediterranean in style, similar to local architecture models, covered with white plaster and topped by a terrace – was built between 1926 and 1929 by the Italian company Andrea Gasparini e Bergonzo. The load-bearing parts, as well as the water-tower tank, were built in reinforced concrete by the Porcheddu company of Turin.[252]



Italian Hospital, Tangier (1927–1928),
Piero Molli, arch.; Gasparini,
Bergonzo & Porcheddu, cont.:
West facade



In Tunisia, where ANMI had not previously built any school or hospital worthy of mention, Cesare Valle designed a hospital in the city of Tunis (1935), to replace the old Italian colonial hospital, dating back to 1899.[253] Its modern design and innovative forms put it far ahead of any of the styles we have reviewed thus far. It is a monoblock-style building; that is, according to the term coined by rationalist architects, an essentially vertical, multi-story hospital. Its compact organization made it much more efficient for both builders and users.

ANMI's work in the field of school and hospital architecture in the countries on the southern rim of the Mediterranean is a valuable reference for the historical evaluation of this type of facility. It also attests to the success which greeted the export of both Italian architectural models and the skills of Italian contractors.

Hennebique reinforced concrete constructions in Eastern Algeria: patrons and contractors (1900-1930)

Assia Samaï Bouadjadja

Hennebique did a thriving business in Algeria, building large structures for public investors as well as private commissions. The company's Algiers office, established in 1893, was the center,[254] but its network of licensee contractors, spread throughout the territory, underwent rapid growth in the first quarter of the 20th century. Eastern Algeria, the object of intensive agricultural colonization since the mid-19th century, especially under the leadership of the Compagnie Genevoise des Colonies Suisses de Sétif,[255] offered promising land for the company's development. Helped by the discovery of phosphate deposits on the high plateaus and by the arrival of the railway in 1879, the region enjoyed an unprecedented boom; at the time, 15,000 settlers were recorded in the high agricultural plains around Constantine.[256] As André Prenant has emphasized, profits were then invested in property speculation and in businesses.[257]

Hennebique slotted itself into the construction markets of the two Eastern Algerian cities of Constantine and Setif through public commissions and those of settlers who owned large agricultural estates. The construction of buildings connected with the cultivation of grains (mills and silos) and to a lesser extent viticulture (vats and "amphorae") represented between 1908 and 1930 a major proportion of the company's business[258] in the region. Other projects for which the archives unfortunately provide little information were also directly related to agricultural colonization: a "model" farm at Biskra (1905) on the road to Constantine,[259] built by the entrepreneur Giovanelli, and in 1929, the "Agriculture House" of Constantine.[260] This structure, boasting Art Nouveau facades, is also called the "*Maison du Colon*" [Settler's House] in certain documents. Designed by the architect Ange Journeau whose name is inscribed on the façade, and built by the Société Algérienne des Établissements Louis Grasset, it was opened in 1930.

The names of several protagonists of this adventure (clients, contractors, and architects) emerge from Hennebique's archives. In Constantine, first, the Kaouki (sometimes spelled Kaouky) brothers were, from the beginning of the 1910s, the main customers behind construction schemes using Hennebique reinforced concrete. "The three colorful men, sons of Maltese immigrants, present themselves either as grain merchants, traders, millers, or industrialists."[261] They built up a huge portfolio of property between 1906 and 1935, both rural and urban, of several hundreds of hectares, by buying up in particular properties from indebted settlers. In 1913, the engineer and Hennebique agent for Tunis, Barthélemy Reymond, designed electrical poles for their

Farm and dwellings, Biskra, Algeria (1905), Giovanelli, cont.: General view

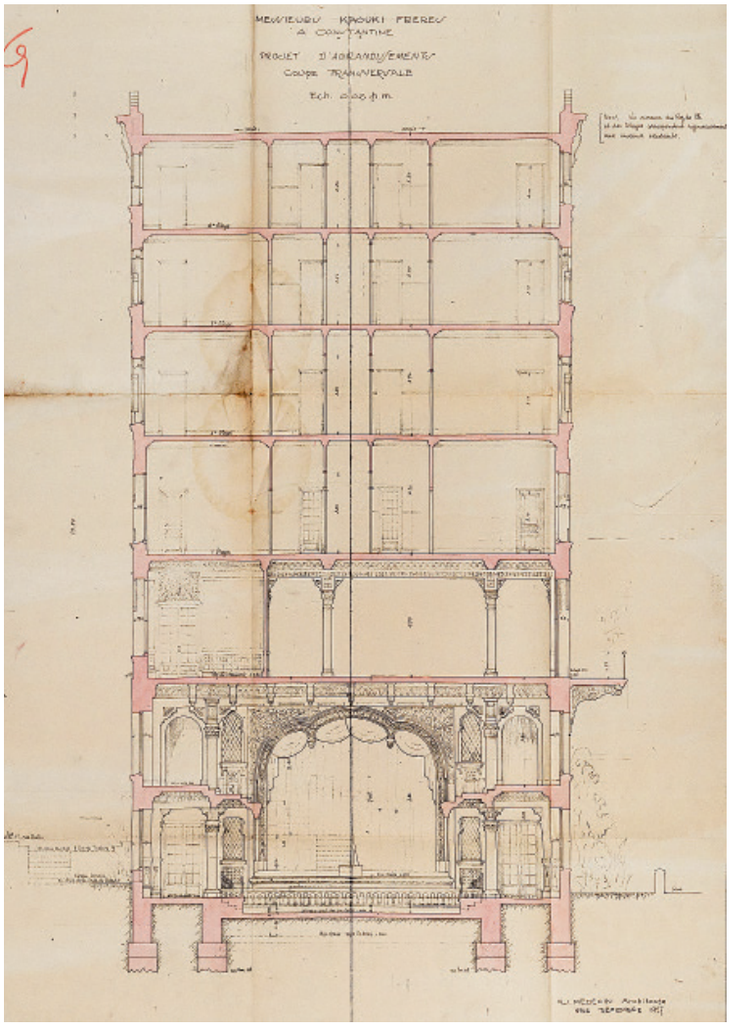
Maison de l'Agriculture, Constantine (1929), Ange Journeau, arch.; Louis Grasset, cont.: Main facade

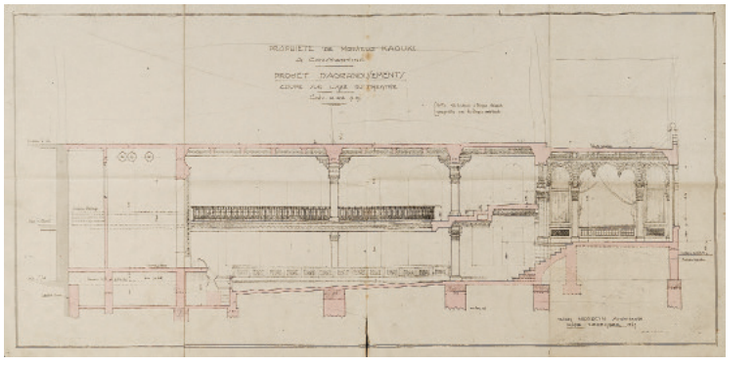
Cirta Hotel, Constantine (1928-1929), Jean Médecin, arch.: Project for extension and theater construction, cross section and section on the axe of theater

mill at Constantine.[262] In 1926-1927, the Kaouki brothers asked the Hennebique design office in Algiers, managed by the engineer Charles Bonduelle, to design their projected brick and tile factory of Hamma (at Hamma Bouziane, near Constantine).[263] In 1928, Hennebique designed the structures for their silos at Ain Abid (east of Constantine) and their mills at Bône (now Annaba); in 1932, that of another building that adjoins the silos.[264] All these schemes were given to the Compagnie Louis Grasset. These industrial projects were followed by more prestigious commissions in the center of Constantine, still on behalf of the Kaouki brothers: in 1927-1928, the extension of the Cirta hotel and the construction of a theatre (Jean Médecin, architect from Nice)[265] on the ground floor, then in 1928 the erection, not far from the hotel, of an investment property by the same architect in the same Neo-Moorish style.

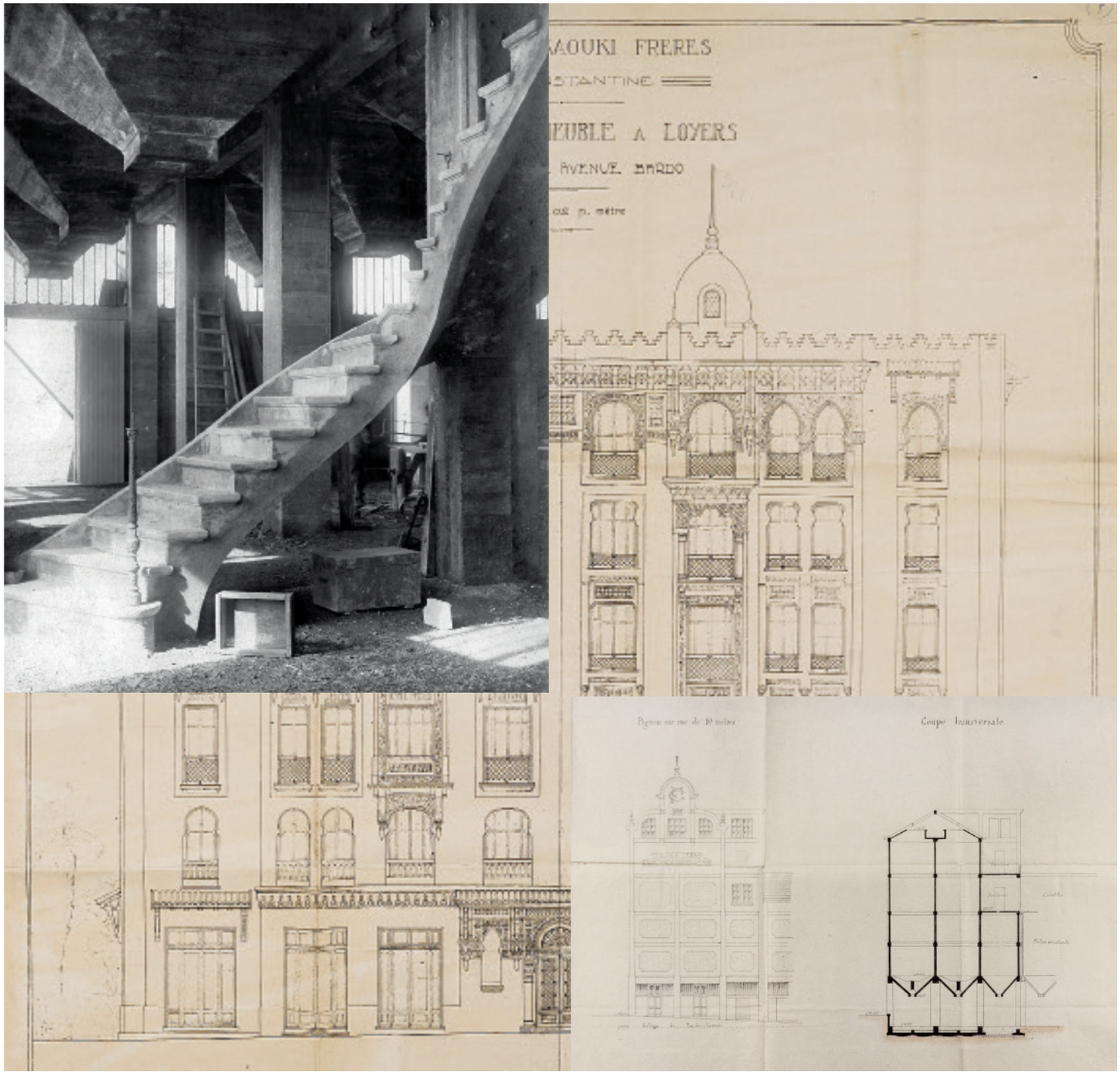
The correspondence between the engineer and the Paris office highlights the difficulties of the worksites, due in part to the personality of clients – "the client here is short-sighted, he has made no overall plan, and moreover does not wish to make one because he wants to build brick by brick without planning beyond what he can see from day to day"[266] - but also to the recurring problem of obtaining supplies of steel.

The major banks, like the Compagnie Algérienne and its rival, the Crédit Foncier d'Algérie et de Tunisie, were also important clients. The first acquired docks and warehouses throughout the Algerian territory (Blida, Bordj Bou Arreridj, Mascara, Saïda, Saint-Arnaud, Setif, Sidi Bel Abbès, Souk Ahras and Tiaret) during the first half of the 20th century, because it could use stocks of commodities it controlled as collateral for loans: "the increase in grain production encouraged us to expand our warehousing operations."[267] Since the 19th century, it had also owned the vast Ain Regada property (76,000 hectares in 1951) located on the high plateaus of Constantine. In 1927, the architects La Chapelle and Du Merlin (who succeeded Pierre-Louis Bonnell, author of the scheme in 1906) commissioned Hennebique to design the reinforced concrete structure of the large central cash office of the

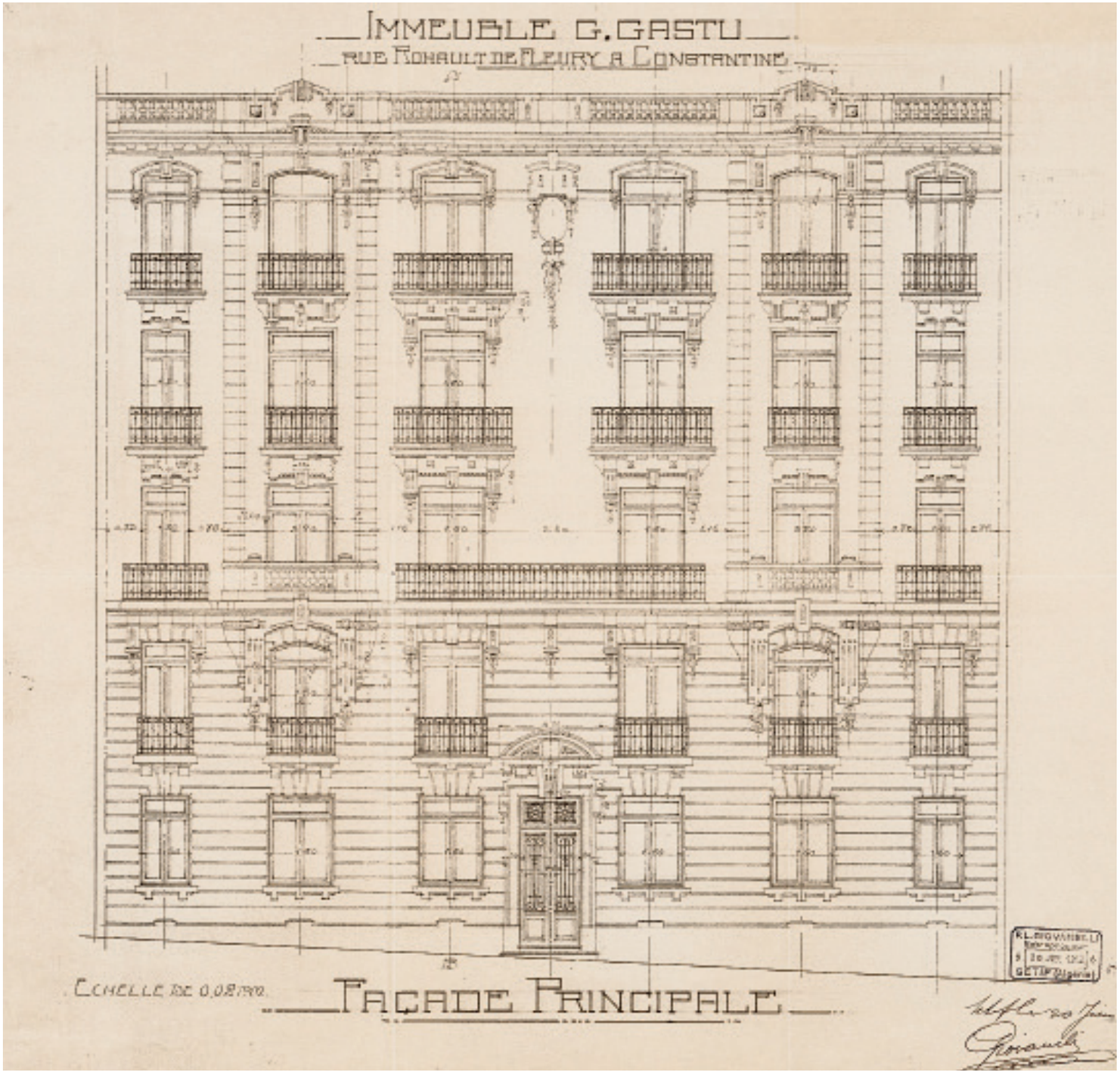




Kaouki Frères rental apartments,
Constantine (1928), Jean Médecin, arch.:
Front façade on avenue Bardo



Branch office for Crédit Foncier d'Algérie et de Tunisie, Setif (1914–1920), Ponsard, arch.; G. Charbonnières, eng.; Giovanelli, cont.: Front facade, 2nd project, 1920



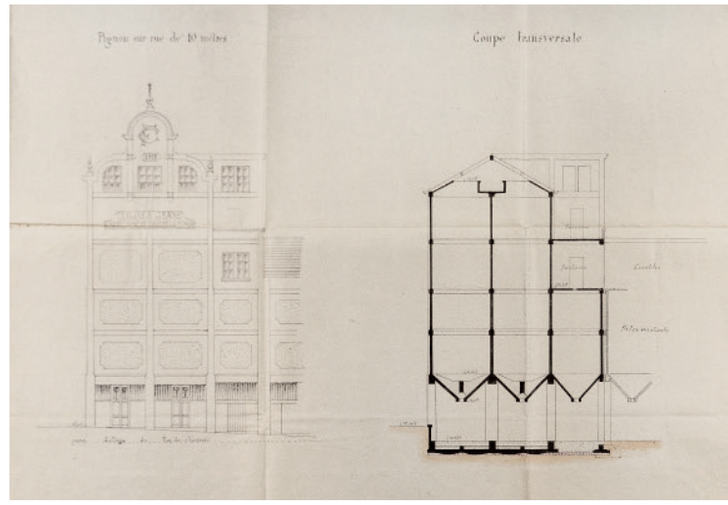
Grain silos for Crédit Foncier d'Algérie et de Tunisie, Setif (1909), Reymond, eng.; Giovanelli, cont.: Interior stairway on completion and gable and cross-section

Setif branch of the Compagnie Algérienne, to be built by the Compagnie Louis Grasset.[268]

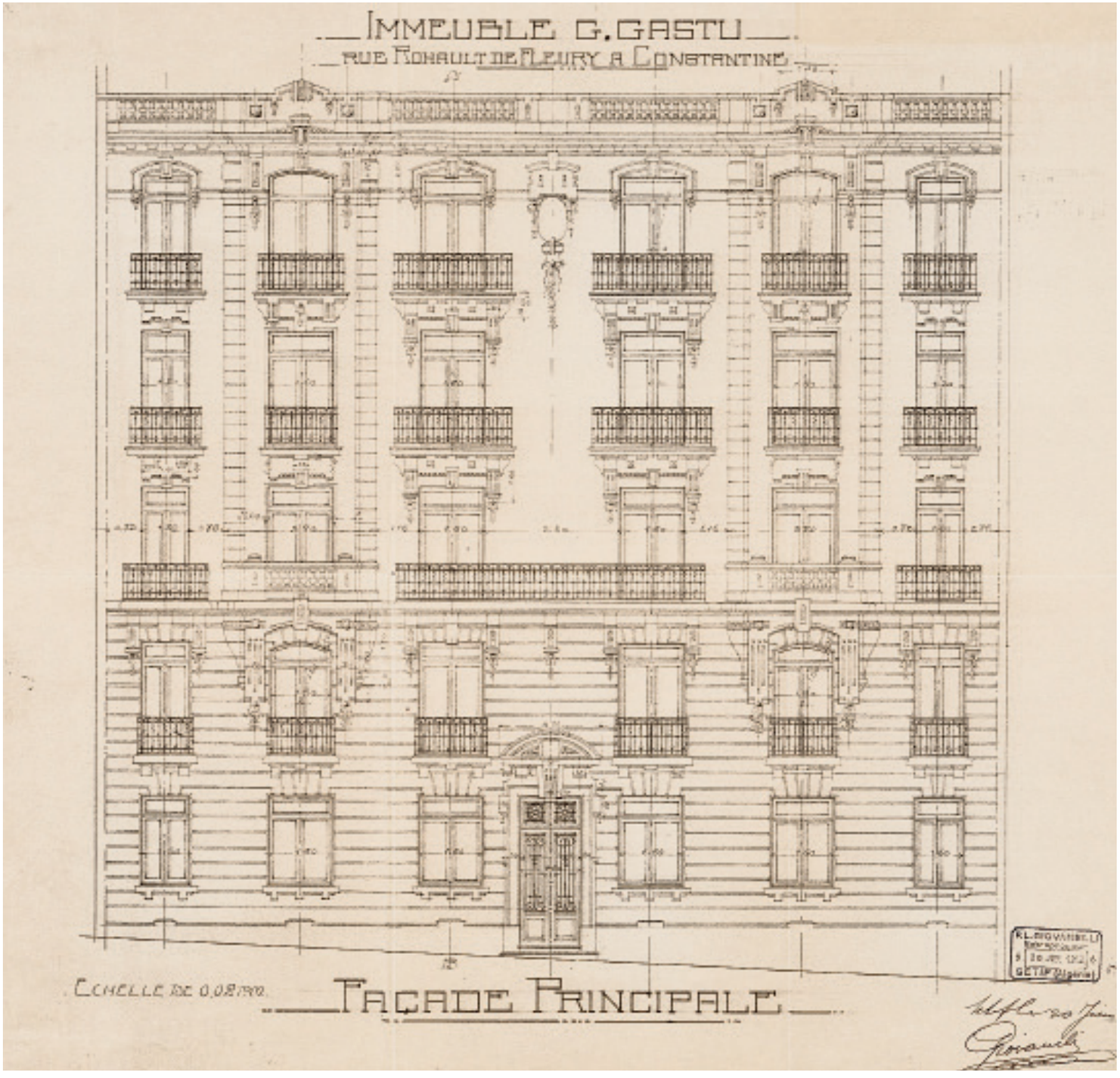
As for the Crédit Foncier d'Algérie et de Tunisie, it had square section wheat silos built in Setif in 1909-1910, then docks with cylindrical silos which were apparently a replica of those built at Dunston, Tyne and Wear in Great Britain.[269] In 1913, at Saint-Arnaud (now El-Eulma, Setif), it commissioned the largest silos on Algerian territory, each of which had a capacity of 11,000 tons.[270] The silos were erected by the contractor Giovanelli, on the basis of calculations by the engineer Barthélemy Reymond, and "under the high management of the architect-advisor of the Crédit Foncier, M. Ponsard."[271] Between 1914 and 1920, the bank erected a prestigious reinforced-concrete building to house its Setif branch.[272] The plan is the work of the architect Ponsard, the construction was supervised by the agent-engineer G. Charbonnières, and it was erected by Giovanelli.

Public commission represented the second major market for Hennebique. Certain major constructions at Constantine can be mentioned as examples, some of which are spectacular due to the rugged topography of the site: in 1916, the cantilevered footpaths along the former boulevard Joly-de-Brésillon, a contract for which Hennebique was in competition with the Maison Considère[273]; the madrasah of Constantine in 1906, a beautiful building in the Neo-Moorish style, designed by the architect Albert Ballu and for which the Hennebique offices designed the dome's framework;[274] the people's university of the town in 1925-1929, by the architect-surveyor (E. Bel [reading unsure])[275] which required the completion of an imposing retaining wall.

In Setif the spread of the Hennebique reinforced concrete system was largely due to the personal investment of the masonry contractor Giovanelli. Pascal Louis Giovanelli, also called Louis Giovanelli[276] (Veccana [Italy] 1876 – Setif 1950) was, from 1905 and for nearly fifty years, the exclusive Hennebique licensee in the town of Setif. Giovanelli, whose company "counted 300 workers in a very modern and



Gastu Building, Constantine (1914),
Giovanelli, cont.: Main facade
on rue Rohault-de-Fleury

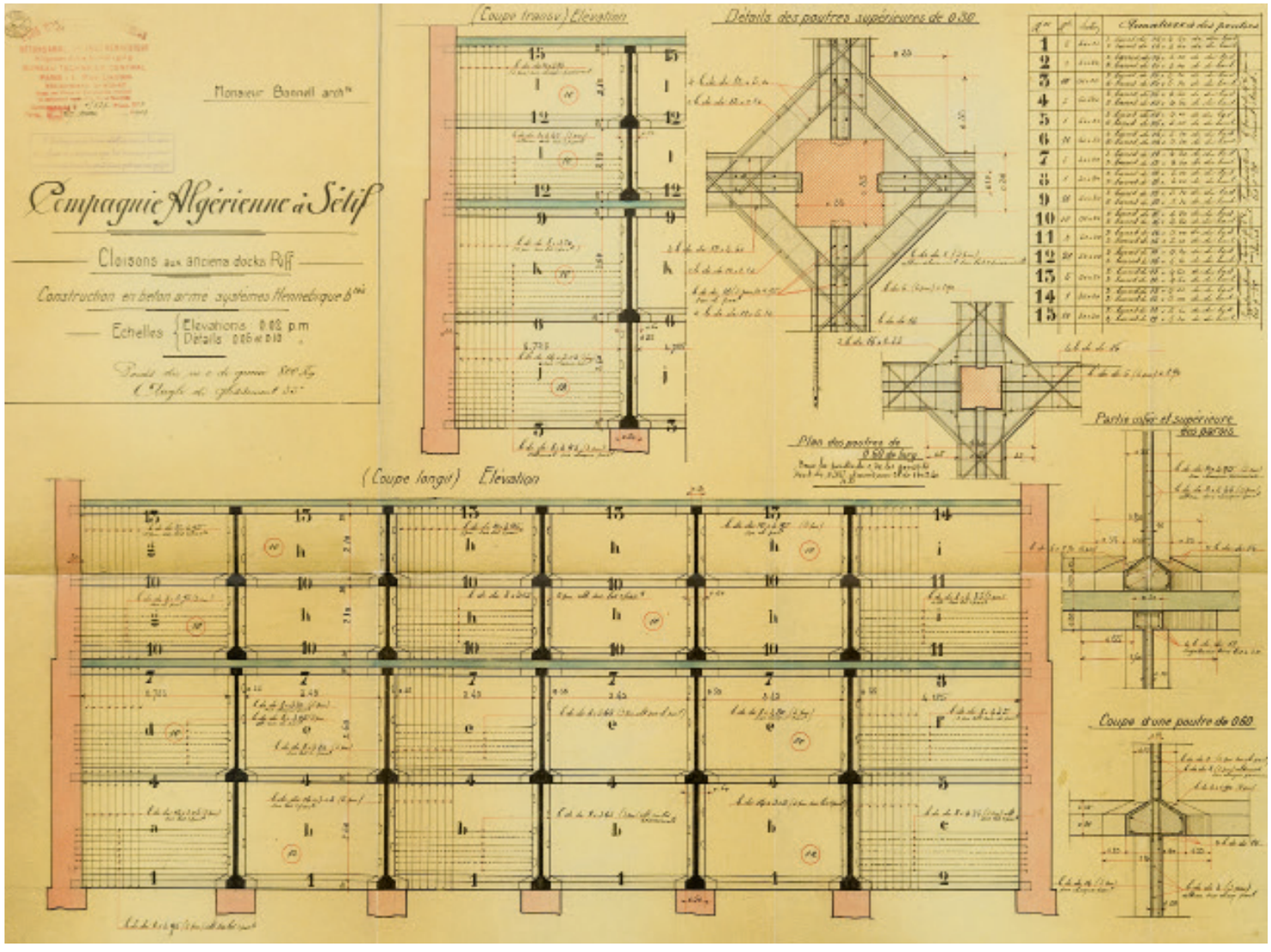


Passeron Building, Setif (1910 modifications), Louve, arch.; Giovanelli, cont.: View after raising and creation of an street-level arcade

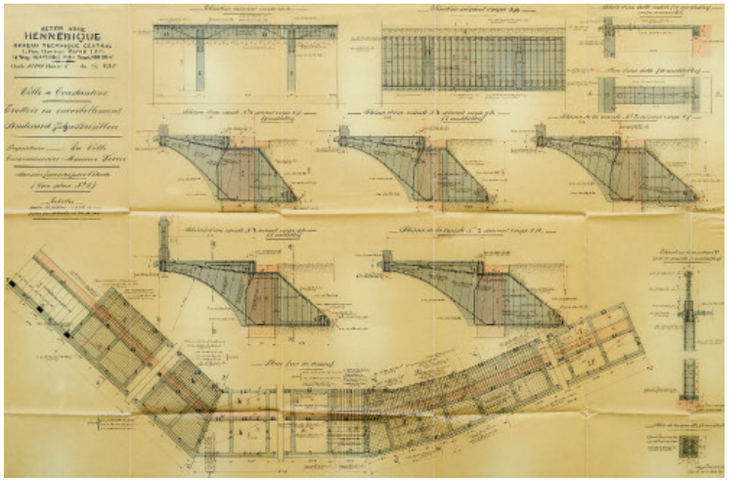
Garage Citroën, Constantine (1929),
Maurice-Jacques Ravazé, arch.;
Louis Grasset, cont.: The lateral facade
in the 1930s (Photo by Lauffenburger)

Docks of La Compagnie Algérienne, formerly Riff, Setif (1908), Pierre-Louis Bonnell, arch.; Giovanelli, cont.: Reinforced concrete wall structure

complete material, is known by all those who are involved directly or indirectly in building throughout Algeria."[277] Apparently he was also involved in the construction and development of Chrea (Wilaya of Blida), a summer and winter resort, created in 1911 (and which would become a town in 1956).[278] Until he was drafted for World War I, in June 1915,[279] he and A. Lisio, a contractor at Philippeville (currently Skikda),[280] were the only Hennebique licensees in the entire *département* of Constantine, and as such built many structures. In 1909, he built his own house in reinforced concrete, the design of which had been by Barthélemy Reymond, who offered "to charge him a reduced fee, 2% for example, because he is doing this to attract other owners."[281] However, his first reinforced concrete constructions were industrial buildings connected with agriculture, as we have seen for the silos commissioned by the Crédit



Docks of La Compagnie Algerienne, formerly Riff, Setif (1908), Pierre-Louis Bonnell, arch.; Giovanelli, cont.: General view during construction works



Creation of an overhanging pavement on boulevard Joly-de-Brésillon, Constantine (1916): Technical plan

Foncier d'Algérie et de Tunisie. In 1908, for the Compagnie Algérienne, he transformed the former docks of the Société des Colonies Suisses (also called the Riff Docks, from the name of the director, Gottlieb Ryf) into a granary. The trusses of the new frameworks are all in reinforced concrete.[282]

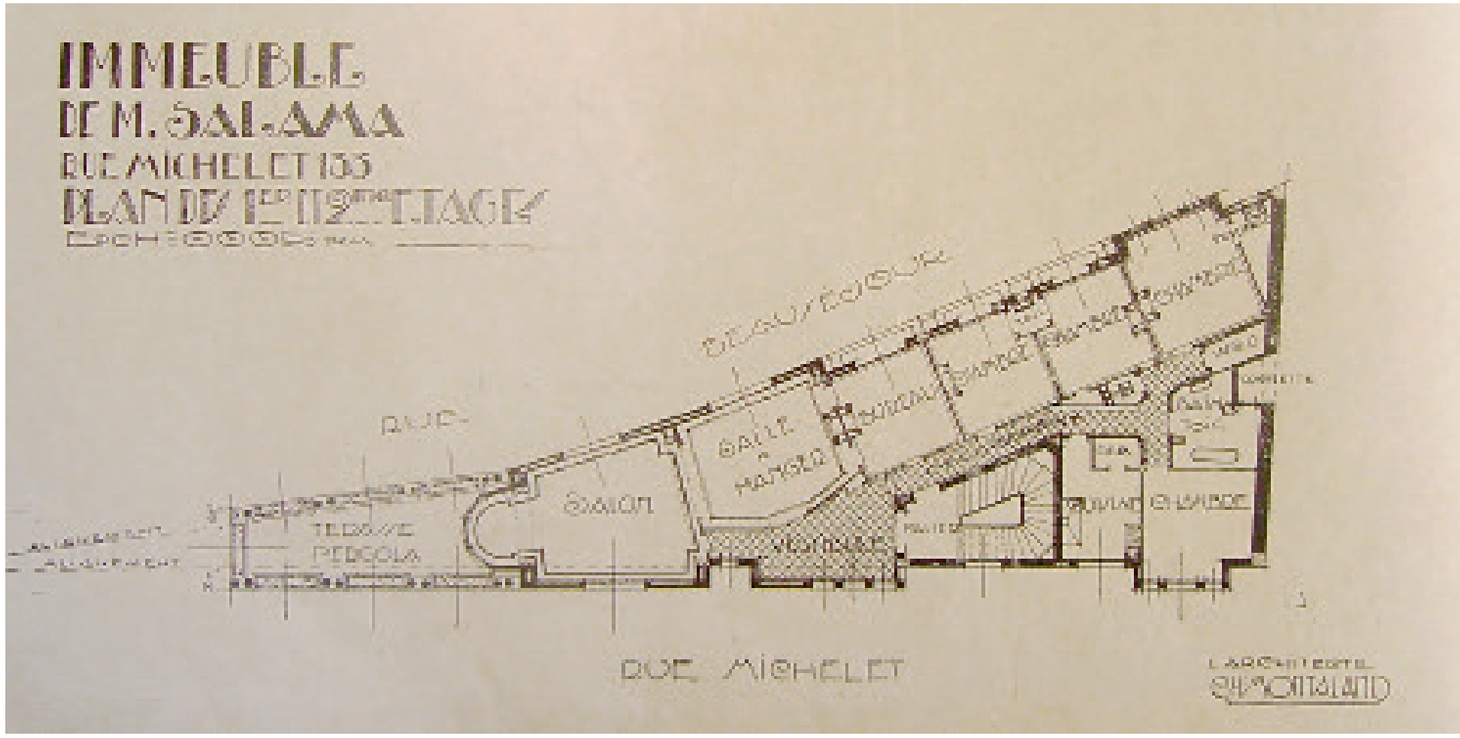
Other Hennebique projects included several extensions to urban dwellings in Setif, such as the creation of arcades along the Timsit building and the raising of the Passeron house (M. Louve arch.), and some large apartment buildings such as the G. Gastu building created in 1914 at Constantine. Nevertheless, in the area of urban architecture, Compagnie Louis Grasset asserted itself as the most active licensee company, with the completion in Constantine of the Francini garage (Max Cherri arch., 1927), the Voiley building (Ange Journeau arch., 1929), the Citroen garage (Maurice-Jacques Ravazé arch., 1929), the Bergougnau building (Mr. Dumoulin and Mr. de La Chapelle arch.,[283] 1931), and the Wolf building and garage in 1932.

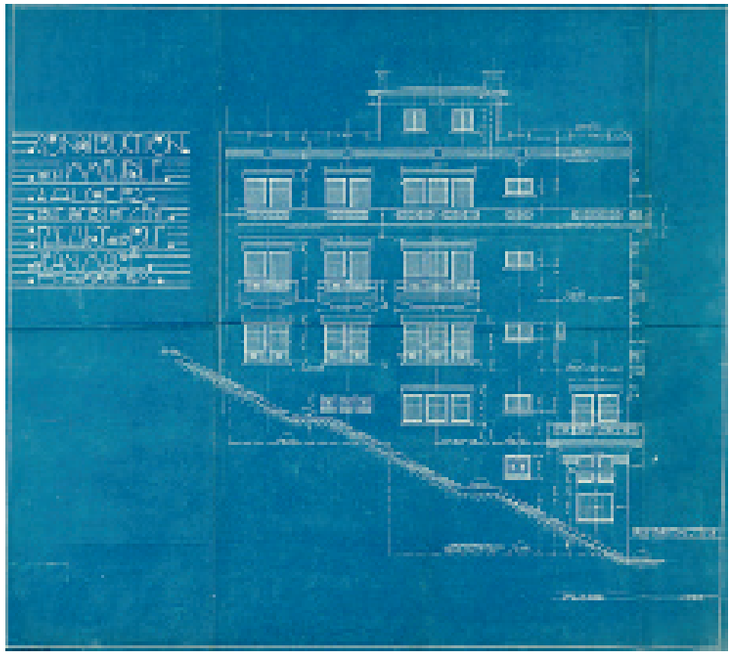
The heritage left by Hennebique in Eastern Algeria has withstood time perfectly. The majority of the constructions identified in the archives are still standing and in remarkable condition, such as the Cirta hotel. Others have changed identity, such as the Citroen garage of Constantine, but they all remain strong elements in the urban landscape.

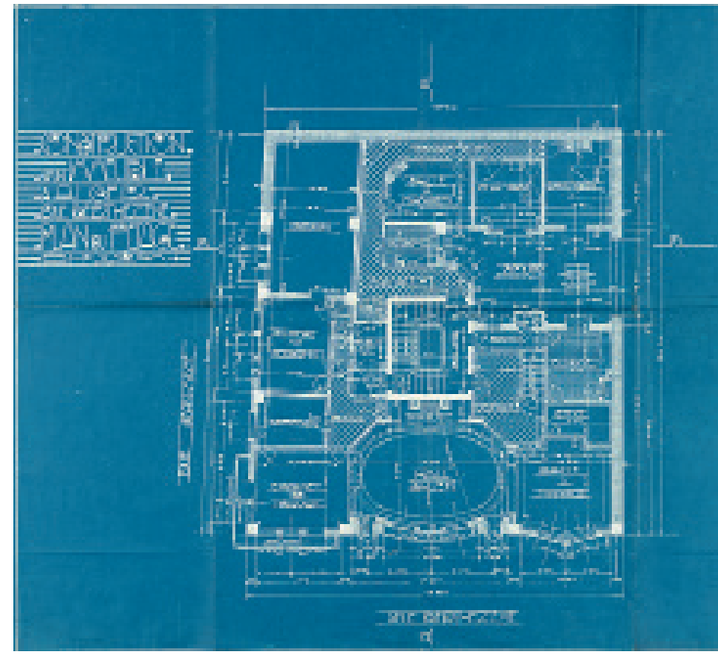
Salama Building, rue Michelet and rue Beauséjour, Algiers (1929), Charles Montaland, arch.; Bonduelle, eng.: Plan

Hennebique Building, 10 rue Berthezène, Algiers (1924-1927), Charles Montaland, arch.; Bonduelle, eng.: facade on rue Jean-Macé and second floor plan

Garcia Building, 21 rue de Constantine, Algiers (1928-1929), Paul Guion, arch.; Bonduelle, eng.; Louis Fernez, art.: Detail of bay decoration (photo by B. Aiche)







The Hennebique agency and the figures of modernity in Algiers

Boussad Aiche

Towards the end of the 1920s, the Hennebique agency benefitted from the unprecedented expansion of the construction sector in Algeria. The exemption of land from tax, the end of the moratorium on rents, and a decrease in the value of securities allowed significant capital to be directed towards construction.[284] According to René Lespès, this explains why "the construction of the largest and most expensive buildings was undertaken precisely between 1927 and 1930."[285]

Moreover, the large number of building permits issued for the municipality of Algiers confirms this increase. It amounted to 543 for 1928 and reached the record number of 697 for 1929, on the eve of the Centenary of Colonization.[286] Despite the Depression that year, ground was broken on many construction sites in Algiers.[287]

This context, favorable to the dissemination of the Hennebique construction system, encouraged Algiers property developers to create numerous projects in an expanding market. In view of the information in the printed sources and archives,[288] these projects reveal close collaboration between the architects and Hennebique's engineer-agents Charles Bonduelle and Henri Dop, both of whom were especially prolific.

Highlighting technical references from Europe provides perspective on their combined knowledge. This inevitably leads to a reflection on the architectural culture and formalization of projects subject to the interplay of various influences, especially in the specific context of the interwar years.

Modernity emerges

In 1927, Bonduelle collaborated with the architect Charles Montaland on a building at 10 rue Berthezène (now the rue du Docteur-Saadane),[289] to house the offices of the Algiers subsidiary of Hennebique. The journal *Chantiers Nord-africains*[290] presented it as the first building to be constructed entirely in reinforced concrete.[291] Of course, it was a showcase for the promotion of the Hennebique system, and the reliability and capabilities of this new material.

In the duplex apartment[292] of the first and second floors, Montaland laid out offices and the apartment around a central lobby with a mezzanine level, lit by an impressive Art Deco stained glass window facing the rue Berthezène.

Attentive to site integration, Bonduelle again worked with Montaland on the construction of the Salama building.[293] Confined to a steep terrain at the intersection of the rue Michelet (now rue Didouche-Mourad) and rue Beauséjour (now rue Rabah-Maïdat), the building is integrated thanks to a play of levels on the 8m height difference separating the two streets. The underground spaces thus open onto the rue Beauséjour, and on the lowest level accommodate the garage, with the concierge's lodgings on the first level. From the rue Michelet, the ground level occupies the entire plot with two distinct entrances, maintaining direct access to the owner's office.

Bonduelle's activity also extended to numerous projects by the architect Paul Guion, based in Algiers, for the

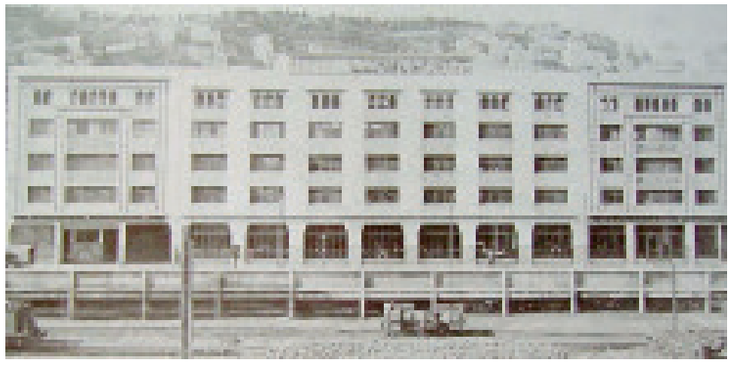
Garcia Building, 21 rue de Constantine, Algiers (1928-1929), Paul Guion, arch.; Bonduelle, eng.; Louis Fernez, art.: Under construction

Garage Vinson, Algiers (1929-1931), Paul Guion, arch.; Hennebique, eng.: Main facade on rue Sadi-Carnot

calculation of his structures (the Garcia building, the stores of the University of Algiers and the Bon-Accueil housing complex). Named for its former owner, the Garcia building, located at 21 rue de Constantine (today rue Colonel-Colonna-d'Ornano and rue Abane-Ramdane) close to the Aletti hotel, acts as an urban landmark due to its treatment of angles. Guion was especially fond of this type of urban staging, also expressed in his careful attention to façade décor and details, a hybrid of traditional Algerian art and Art Deco.

Designed by the artist Louis Fernez, the geometrical motifs used for the metalwork or the ceramics and mosaics were inspired by Berber art, while the arcades on the attic floor recall Neo-Moorish esthetics.

The wish to appropriate local models, specific to Guion's career,[294] is also noticeable in the treatment of the facade of the Vinson garage[295] at 140 rue Sadi-Carnot (now rue Hassiba Ben Bouali), built in 1931. The building, a car dealership and parking lot, offers perfect symmetry and introduces arched openings at the top level in the Neo-Moorish manner, while the verticality of the lateral elements is emphasized by a treatment in mosaic by the Tossut workshops of Algiers. This building combines workshops, accessory stores, and tiered parking areas with a capacity of 700 vehicles. Although it does not make the means by which the structure functions visible, its frame in reinforced concrete, designed by the engineer-agents Courtot and Dop, facilitates the layout of internal spaces.



Modernity as assumed by René Lugan

From a construction point of view, reinforced concrete also introduced significant changes in layouts and above all, allowed the expression of a new architectural language, referring to a modern and streamlined style. Free of the physical and structural constraints related to bearing walls, architects were now able to hollow out facades to suit projects, allowing them to create large windows as well as projecting volumes used as loggias or bow-windows. Space was uncoupled from

Petit, Thiedey & Delorme Building, boulevard Victor-Hugo, Algiers (1932), René Lugan, arch.; Bonduelle, eng.: The corner rotunda

structure, and the concepts of "open plan" and of "architectural space," abundantly used in avant-garde literature, also encouraged the new language of modernism[296] beginning to appear on the architectural scene in Algiers.

Excluding all forms of decoration, René Lugan focused on enhancing volumes, thus approximating the Parisian moderns. Both engineer and architect, he designed the apartment building on boulevard Victor-Hugo[297] for Petit, Thiedey & Delorme,[298] in 1932, in collaboration with Bonduelle. Characterized by its rounded corner and the simplification of the proportions and profile of the moldings, it is testimony to the spare language of the Modern Movement. The integration of balconies as compositional elements and living spaces, as well as the use of the color white and the starkness of the wrought iron balustrades, are also signs of modernism.

Commonly used in France during the 1930s, the cylindrical theme is also present in the apartment building erected in 1933 on the corner of the rue Denfert-Rochereau (now rue Khelifa-Boukhalfa) and rue Bourlon (now rue des Frères-Boulahdour)[299] on behalf of Beldodere et Loup, with the collaboration of Henri Dop.

It is reinterpreted in larger proportions not far away, at the intersection of the rue Edgar-Quinet and rue Courbet[300]. Designed in collaboration with Charles Bonduelle, on behalf of Ms. Duhem, this apartment building adopts the principle of an open court, a new device derived from the hygienist movement. It is the reason for the gap between the cylindrical volume on the corner and the narrow lateral strip which accommodates lodgings on the landing. The upper stories were designed for apartments, while the ground and first floors are for shops and services.

The deliberate plainness of René Lugan's language is also visible at 1-17 rue Michelet, on the luxury apartments he designed close to the University Tunnel in 1932, on behalf of the company Michelet Immobilière. The modern lines are emphasized by the treatment of the balconies and the awning of the top story, as well as by the wrought iron made by the Établissements Robert et C^{ie}.

Pinned to three staircases, the six levels, to which two attic stories are added, contain in all 45 apartments of 2 to 10 rooms. Here again, the integration of the balconies as both compositional elements and living spaces, as well as the use of the color white, refer to the modernist esthetic.

Architectural culture and technical culture

This style, which also derives its references from numerous industrial buildings, set the stage for the appearance of new architectural technologies using reinforced concrete.

Duhem Building, boulevard Edgar-Quinet, Algiers (1932), René Lugan, arch.; Bonduelle, eng.: The courtyard

Beldodere & Loup Building,
rues Denfert-Rochereau and Bourlon,
Algiers (1933), René Lugan, arch.;
Dop, eng.: The corner rotunda
(photo by B. Aiche)

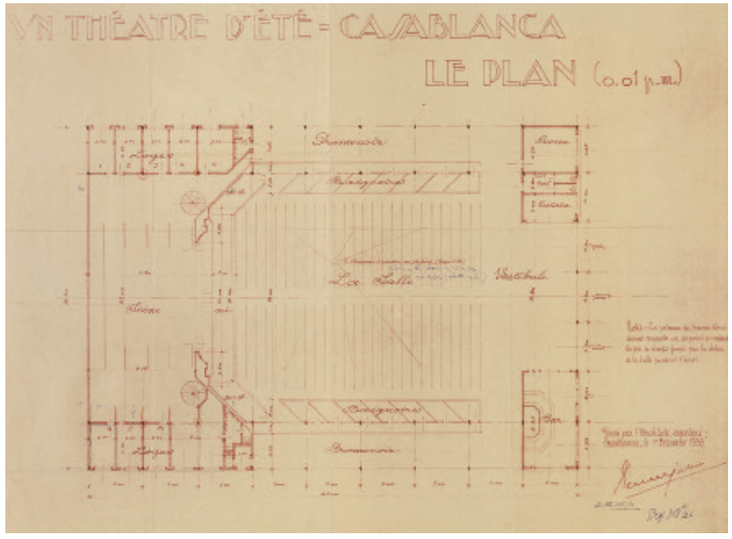
Because industrial buildings are usually designed by engineers, their construction obeys functional considerations. This gave architects perspective on a renewal that was esthetic as well as technical. Reinforced concrete made it possible to build structures with broad inner spans, a major technical innovation, so it was especially appropriate for industrial needs. Widely publicized by reports published in the Algiers trade journal *Chantiers Nord-africains*,[301] the structural and sculptural possibilities of the new material became issues in the legitimization of modernity. Architecture and civil engineering thus spawned a truly technical culture by generating new forms based on the rational use of materials.

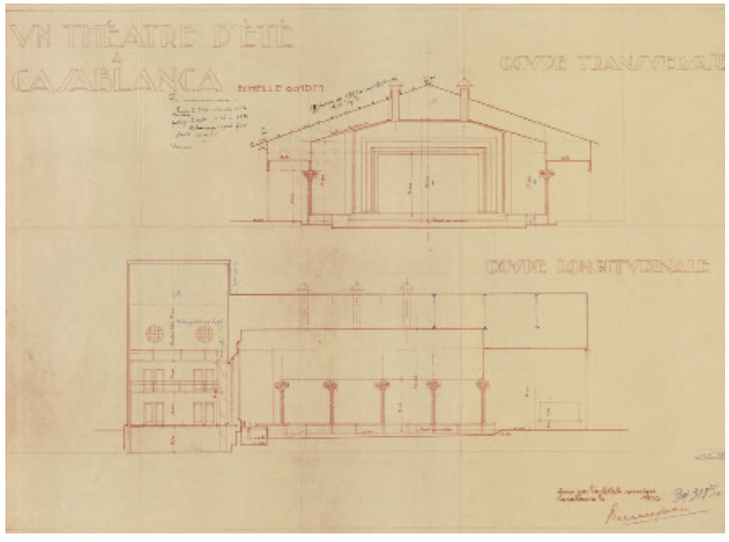
For example, the design of workshops for the PLM[302] railway company of Algiers, in the Hamma area, moving away from from architectural or stylistic arguments, was essentially aimed at technical and economic efficiency.

Technical innovation influenced construction systems and reinforced concrete. In these years, it integrated the intellectual pathway of the architectural planning of a scheme, preceding the actually drafting process. These technical solutions, combined with the knowledge and skill of Hennebique's architects and engineers, fuelled architectural inventiveness, by emphasizing the importance of the structure as an element of architectural composition.

The Casablanca summer theatre by Baume & Marpent

Karima Haoudy





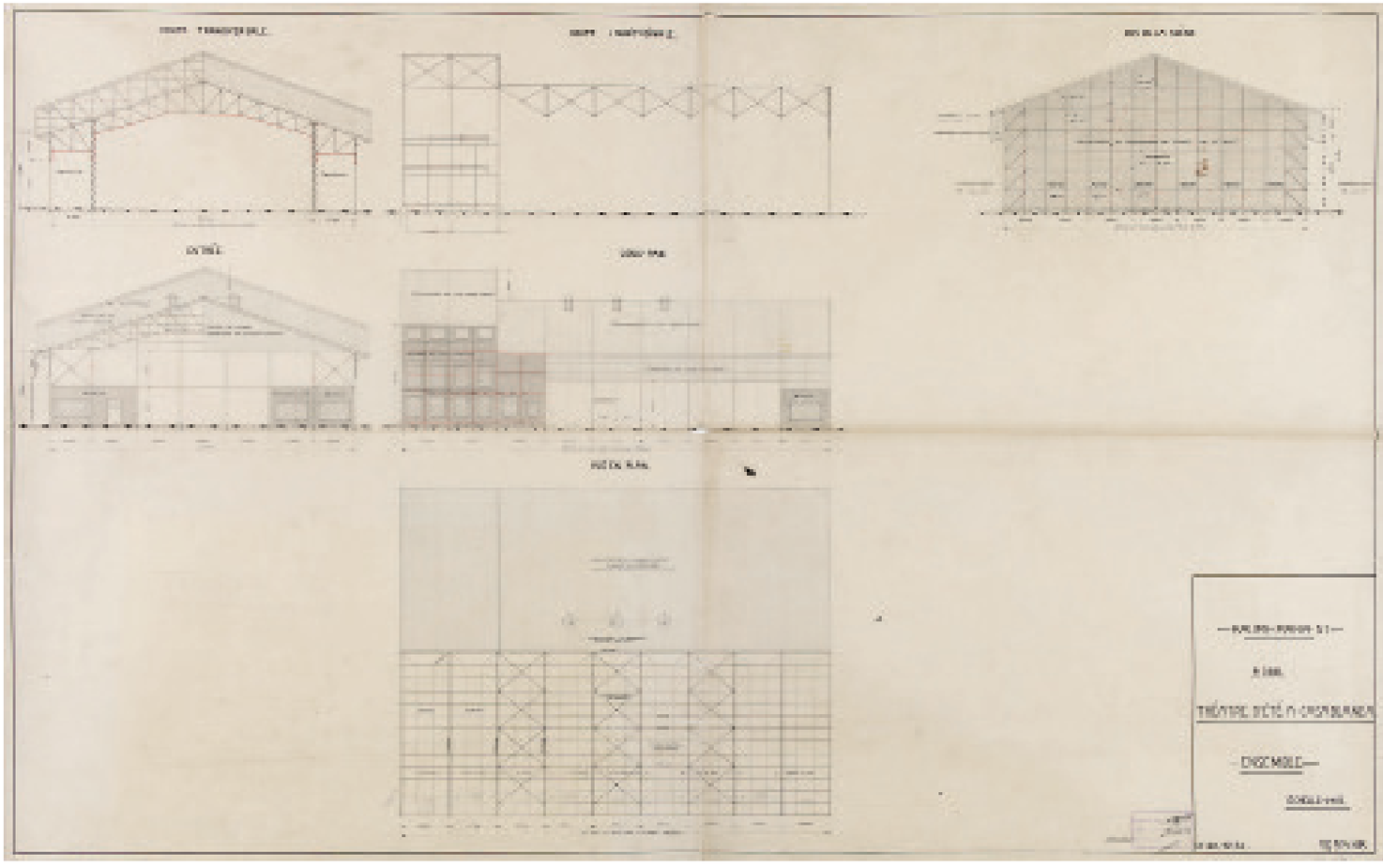
Among the theatre schemes designed by Baume & Marpent, that of Casablanca, dating from December 1933, constitutes an interesting case. On the one hand, from a structural and decorative point of view, it proposes a new variation in this type of building, explored by Baume & Marpent since the end of the 19th century. On the other hand, from the historical viewpoint, the project is the tangible result of efforts by Baume & Marpent to penetrate the Moroccan market.

Baume & Marpent supplied all of the elements of the theatre's steel framework, designed by Pierre Jabin, a French architect settled in Casablanca. The simple, functional composition of the whole strives to adapt the edifice to the local climate. It is a rectangular building, combining three essential functions: lobby, auditorium, and stage. Each of these spaces has a distinct area. As Denise Gonçalves points out,[303] the particularity of the scheme is in the configuration of the entrance and the lateral walkways, which are open to the outdoors in order to solve the problem of ventilation, obviously necessary in a country with a hot climate. However, in the wintertime, these areas could be closed by frames that interlock with the structure, as the architect shows. The gable roofs are supported by lattice pillars decorated with a floral motif.

Conglomerate concrete blocks are suggested as filler for the panels of the steel frame, which is especially light, while corrugated asbestos cement is preferred for the roofing. It should be noted that corrugated asbestos cement is not especially appropriate for the hot climate. However, it is generally associated with utilitarian or industrial construction. Choosing it for a theatre was especially bold, a marked deviation from the eclectic theater models often used by Baume & Marpent. Finally, this project shows the relations between Baume & Marpent and Morocco, during the first half of the 20th century, while the company was trying to increase its influence in North Africa. The minutes of the board of directors' meetings are evidence of these efforts. Thus, in September 1932, the engineer Edmond Bossut, head of the Egyptian division, was sent to lead an "inspection tour" to Morocco in search of new opportunities.[304] In parallel, the managing director, Henri Fauquel, created a partnership with Marcel Lebascle, a French industrialist based in Casablanca, to supply materials to the Moroccan Public Works.[305] The nature of this "material" is not specified. However, a month later, reference is made to a major order for frameworks.[306] Is this the Casablanca summer theatre? We cannot confirm this, although from a chronological point of view, the administrative archives and plans correspond perfectly.

Summer Theatre, Casablanca (1933),
Pierre Jabin, arch.; Baume & Marpent cont.:
Architect's plan, longitudinal and
cross sections

Overall plan of the metal structure,
drawn up by Baume & Marpent



ARTISTIC CRAFTSMANSHIP

Front door of a bank, Cairo,
by Berté & Gaeta

On the right: Giuseppe Parvis main
office, Cairo

Art and luxury in the details: Italian interior decorators in modern Egypt, 1859-1967

Paola Ricco

If the contribution of Italian architects and engineers to the construction of the modern Egypt is fundamentally clear thanks to the several accurate studies carried out in recent years, information related to the activity of the art industries that supported the architects' projects is more fragmentary. The major obstacle to research has been the dispersion of archival materials when foreign contractors had to leave Egypt suddenly, due to political events. At the moment, the bibliographic resources are the main sources of information, and they suggest a flourishing scene which deserves to be investigated further. Newspapers, guides, exhibition catalogues, yearbooks, and vintage advertising are useful tools which shed light on the work of the Italian interior designers, some of whom were instrumental in contributing to buildings that consolidated the image of a country in search of its modern personality.[307]

Giuseppe Parvis's company played an important role in the production of interior furnishing.[308] Parvis, born in Breme in the province of Pavia in 1831,[309] studied and served his apprenticeship in Turin.[310] He later moved to Paris, where he worked as a sculptor and carver, and in 1859, to Cairo, where he opened a cabinetmaker's shop. It is likely that he was persuaded to stay in the Egyptian capital by the Italian consul Giuseppe De Martino, "who wanted to keep him [in Egypt], convinced that the workshop he would create there would be an honor to Italy."[311] His furniture found favor with Ismail Pasha "who helped him in the research regarding Arab artistic furniture."[312] The Khedive provided him with access to monuments and places that were not open to the public, and Parvis had an opportunity to examine and reproduce the most characteristic, significant decorations of Arab art, which he reinterpreted with inspiration and creativity in his own furniture designs. After a first interest in Arab ornamentation, Parvis started studying ancient Egyptian and Greek-Roman ornamental motifs, transposing into the creation of his furniture the eclectic approach that guided contemporary architectural choices.[313]

Parvis's excellent professional reputation in Egypt grew during international exhibitions. For the Paris Universal Exhibition of 1867, Ismail Pasha commissioned him to furnish and display an "Arab living room," or *mandara,* winning a gold medal for Egypt. In 1873, for the Egyptian pavilion at the Exhibition of Vienna, designed as an actual dwelling that would house the Khedive during the event, Parvis designed the *mandara* door, or living room, three tall cabinets and various other pieces of furniture, including *hursis* (stools), tripods for different uses, Quran stands and a collection of chased copper objects.[314] In 1876, in Philadelphia, he proposed "the furnishings for an Egyptian house," with two magnificently finished and decorated wardrobes;[315] in 1878, he exhibited a few pieces of furniture in Paris,[316] and in 1881, he was awarded a silver medal in Milan for the "Egyptian living room" he presented.[317] In 1884, he won a gold medal at the Italian Exhibition of Turin by presenting an "Arab reception room" and an "Egyptian room" decorated with sphinx statues;[318] in 1898, he took part in the Turin Exhibition in the "Italians Abroad" category, but as he was also a judge, his works were not included in the competition.[319] Besides his presence at international exhibitions, bibliographic sources document such work as the

Builders Club, Cairo: Bar furniture
and entrance, Fernando Parvis, cont.

decoration of houses and palaces commissioned by Ismail Pasha, works carried out in the palaces of Gezira and Abdeen, at the opera house in the Azbakeya Gardens[320] and in the Qubba palace.[321]

In the early 1900s, Parvis's studio employed about one hundred people.[322] The bibliographic sources are eloquent about his distinction as a furniture designer: "With the passion of an artist [...] he decided to regenerate the lost Arab art"[323] and "by looking at Arab monuments he immediately understood what he could learn from those odd, at first glance incomprehensible lines and their interlacement of incomparable elegance, which he applied to interior design."[324] Mashrabiyas, arabesques, muqarnas, and mosaics became ornaments characterizing objects designed to respond to both local and European customs and ways of living. Parvis's designs imposed a method and taste, offering the market models that were copied and spread, via the activity of cabinetmakers who had been trained in his workshop, such as the Furino[325] and Jacovelli brothers.[326] The Furino brothers produced the furnishings of the reception rooms at the Continental and Savoy Hotels. They were awarded the bronze medal at the Exhibition of Alexandria in 1884 and elected as members of the Academy of Arts and Industries of Brussels. The Jacovelli brothers were commissioned by the Committee for the Preservation of the Monuments of Arab Art to carry out restoration of mosques and various other buildings. In 1893, they supervised the installation of the Cairo Street at the Exhibition of Chicago and in 1911, they took part in the international exhibition of Turin. Parvis was a prominent citizen of both the Italian community in Cairo and Egyptian society. The attention he showed towards the cultural life of the city, contributing to the collections of the Arabic Museum[327] and the Geographic Society Museum[328] and donating some works for the cornerstone ceremony of the Museum of Egyptian Antiquities,[329] strengthened his reputation and the relationships with some of the capital's most important institutions. Even if his work was sometimes criticized,[330] the prevailing attitude that emerges from the bibliographic sources is that his furniture was generally appreciated, and his shop was one of the sights visitors to Cairo had to see.[331]

After Giuseppe's death,[332] his son Pompeo took over the company. In the late 1930s, he in turn passed it on to his son, Fernando (born in Cairo on June 30, 1901).[333] When he inherited the family company, Fernando substantially revised its production. Although he was not a radical proponent

Portrait of King Fuad of Egypt,
Berté & Gaeta

of the most genuine rationalist ideologies, his training as an architect at the Academy in Rome and his relationships within the cultural environment clearly pleaded for a renewal of the architectural language. As a result, his designs were informed by a refined modernism, a departure from the Parvis style for which the company was famous. After having attended the first Italian exhibition of rationalist architecture with a project for a sports club in Rome[334] and the Italian Navy art show,[335] Fernando went back to Egypt and took charge of the company. In an effort to make the public appreciate the modern style of furniture,[336] he designed home interiors, public and private places, and temporary exhibition installations. Often, he was assisted in his work by his wife, Anna Balsamadjeva, a Bulgarian-born artist he had met in Rome, who was in charge of all the sculptural or pictorial decorations.[337]

The Berté & Gaeta company produced outstanding wrought iron for much of the early twentieth century. In the early 1900s, Luciano Berté arrived in Cairo from Sicily and started a small business which established itself in the local market and quickly grew from a workshop to an art factory.[338] After Berté's death, Vincenzo Gaeta (1900-1969) took over. Adopted when the Berté family was still living in Sicily, Gaeta had studied drawing at the Dante Alighieri school of Cairo and began working at the company at the end of the 1910s. In 1932, he officially became the factory's technical manager and involved Vincenzo Berté, son of one of Luciano's brothers, as administrative manager.

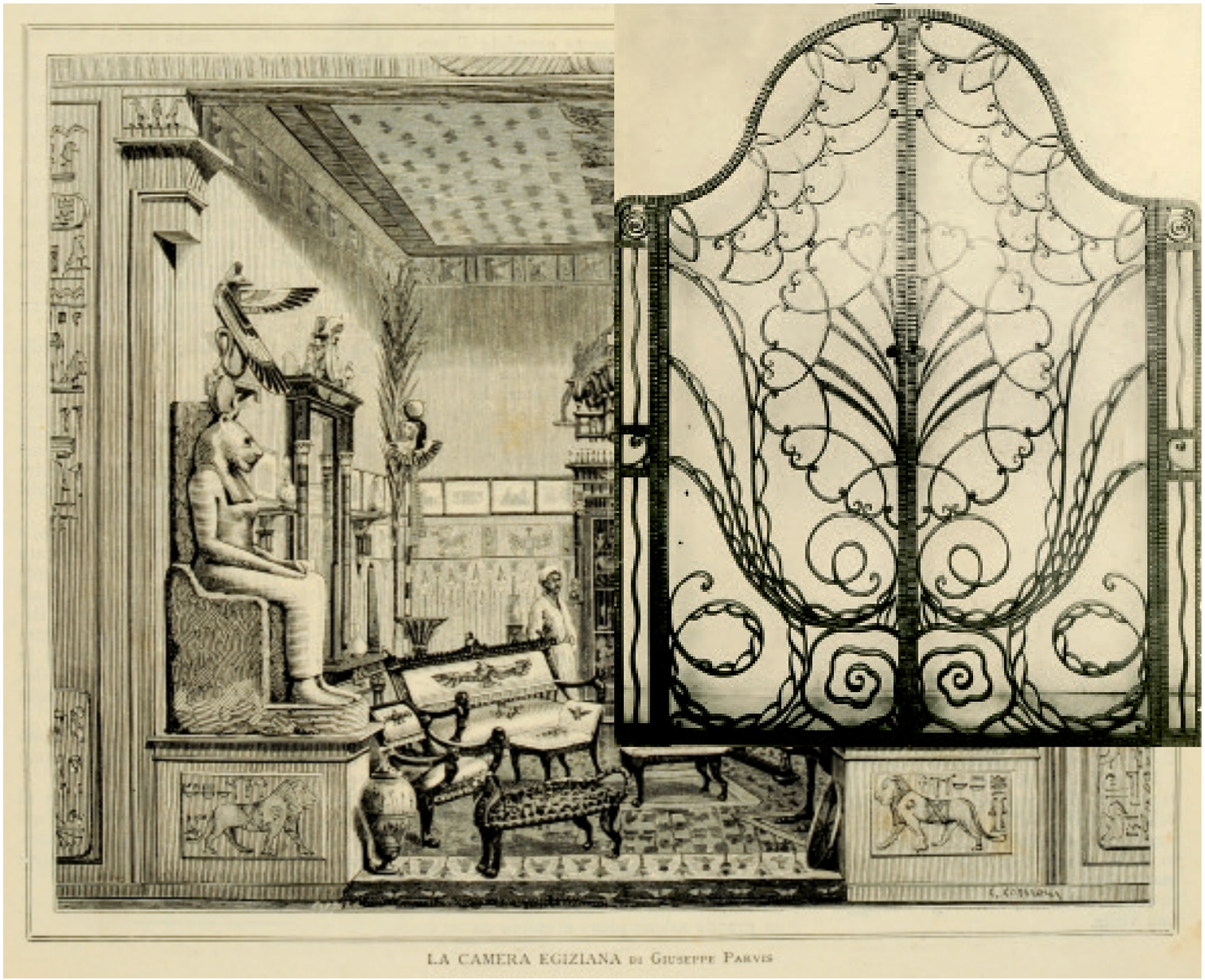
Thanks to this wise division of roles, and to Gaeta's technical abilities and shrewd entrepreneurial spirit, the plant was quite productive. It was awarded a gold medal and the honorary certificate of the 14th Cairo Industrial Exhibition in 1931; and in 1936, the certificate of merit at the Fiera del Levante of Bari. Berté & Gaeta was appointed "Official purveyor to his majesty King Farouk."[339] The gradual increase in workload necessitated a move to larger headquarters. The showrooms and production workshops, hitherto located separately, the former at 12 Soliman Pasha Street and the latter in the Bulaq neighborhood, were housed together at the new plant, covering 5,000 square meters in the Ghamra area of Cairo. In only three months, all the warehouses were built and modern machinery was installed. Offices and showrooms were designed according to architect Joseph Rabbat's "rational style" plan.[340]

The company achieved visibility and fame in the late 1930s. At the time, it employed about two hundred people as managers and skilled and unskilled workers. Its resources were its ability to adapt to changes in taste and its refined technical skills, meeting the specifications for highly complex orders. It could therefore diversify its offer, and had a highly varied roster of customers.

Giuseppe Parvis furniture shown at the
1878 Universal Exposition in Paris

Mobili egiziani dell'italiano Giuseppe Parvis, dimorante al Cairo *(Vedi l'art. a pag. 304. Disp. 38.)*

"Egyptian Room" presented by Giuseppe Parvis at the 1884 Turin Exhibition



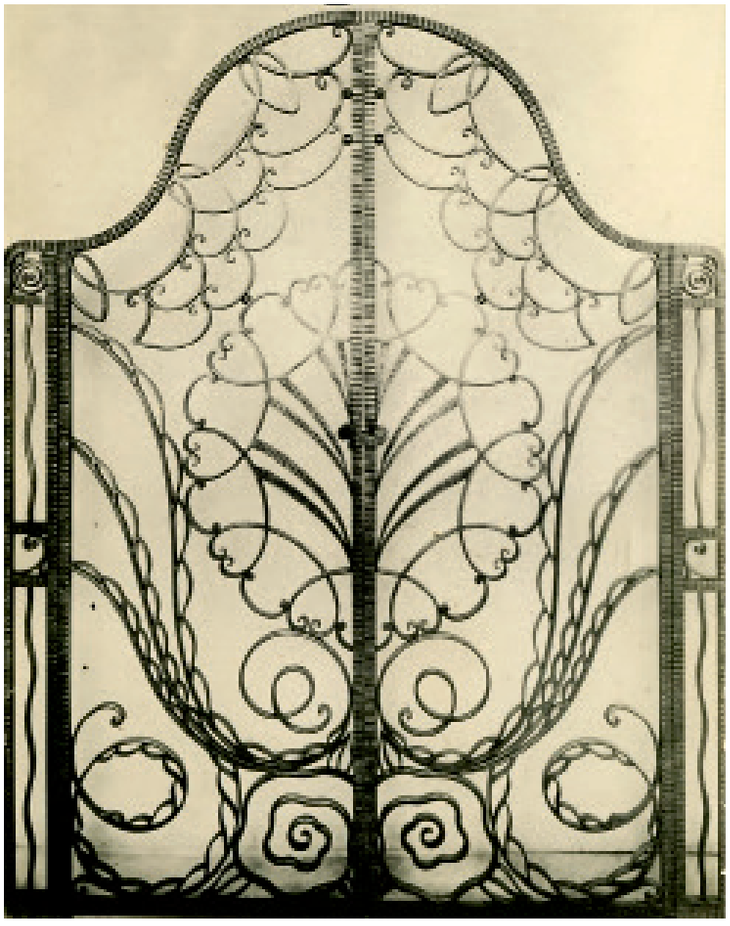
LA CAMERA EGIZIANA DI GIUSEPPE PARVIS

Giuseppe Parvis's Cairo showroom

In addition to making wrought iron for the royal palaces, the company was commissioned by wealthy private individuals, banks and insurance companies, and business owners who wanted to renovate their stores.[341] Together with their more artistic productions, the company implemented metallic structures for factories and industries, and was involved in the works for the Aswan Dam, where it contributed its expertise and products for the construction of power plants. Orders also came from other Middle Eastern countries such as Iraq, Libya, and Saudi Arabia. With the rise of Egyptian nationalism, Gaeta lost control of his plant, requisitioned when Nasser came to power, and in 1967, finally certain that he would never again manage the company he had helped to grow, he moved back to Italy with his family.

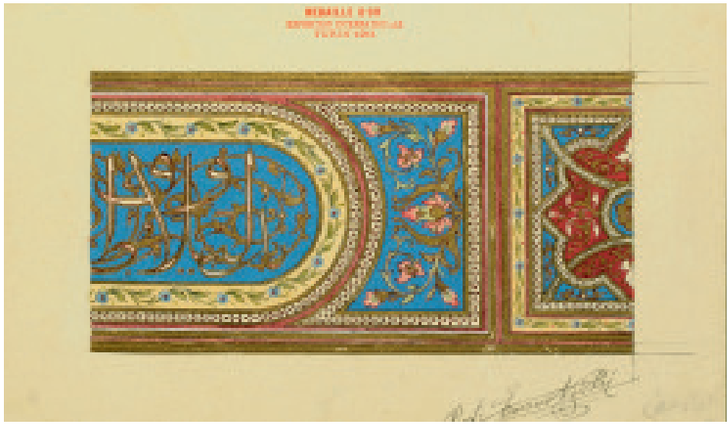
In March of 1938, *Il Giornale d'Oriente*, an Italian-language newspaper in Egypt, dedicated an article to the visit the Italian Minister Count Mazzolini paid to the Berté & Gaeta company. The guest list offers a glimpse of the Italian community there at the time.[342] In addition to the representatives of government institutions, professionals from various fields such as architects, engineers, contractors, and interior designers attended the reception. The interior designers included the Jacovelli brothers and engineer Umberto Bardelli, who represented the Enrico Nistri company, another of the Italian companies whose contribution played an important role in Egypt.

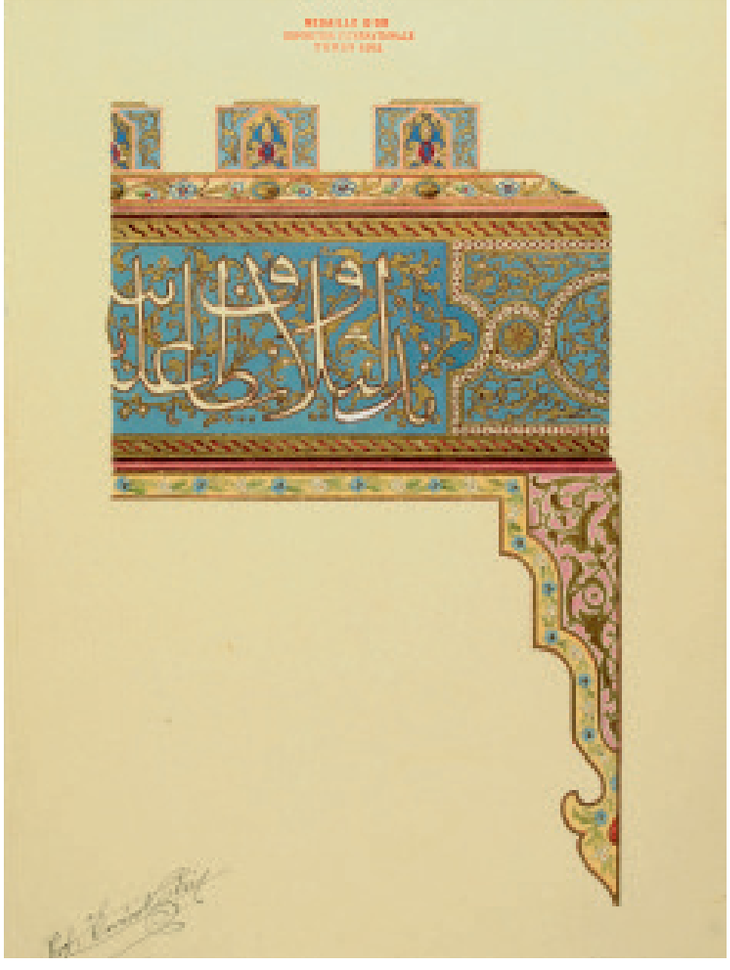
Giuseppe and Enrico Nistri arrived in Cairo in 1901. Armed with the knowledge gathered in their previous experiences – including their apprenticeship until 1890 in the family's workshop in Pisa – the two brothers started a business specializing in decorations, paintings, and gilding. It soon obtained great success, and received commissions from the royal family, other government institutions, and private individuals. In 1906, the two brothers decided to create two independent companies, possibly because of the heavy workload. Enrico Nistri (1871-1922)[343] had taken interior design classes at the Accademia di Belle Arti in Florence, and



after having qualified, he taught drawing at the Reale Scuola Tecnica of La Spezia. In Cairo, Nistri was quite successful, winning several prestigious orders. At its peak, his company was employed a staff of about 200 people. Between 1906 and 1910, the company worked for public and private clients, collaborating with well-known construction companies and with international architects who operated in Cairo. Nistri offered decorations inspired by the traditional motifs of Islamic art, alongside a repertory which drew on figurative and typographical motifs from Europe. The gold medal won in 1911 at the International Exposition of Turin for the drawings reproducing interior ornaments of mosques, villas, and palaces[344] was

Mosque decoration proposal by Enrico Nistri (Stamp: Gold medal at 1911 Turin Exhibition): Detail of the painted wood ceiling and ceiling frieze, frieze on the wooden ceiling beams, dome and stalactites





Enrico Nistri business office, Cairo
Enrico Nistri showroom, Cairo

public recognition of the company's contribution. Nistri directed it until 1919, when his grandson Gino Cattani and son-in-law Bardelli took over. In 1932, Bardelli was formally appointed chief executive officer. During his stay in Cairo, Nistri kept continuous contacts with Italy; he died in 1922 in Viareggio, where a decade earlier he had built his residence. The small villa was decorated inside and out with Oriental motifs, some of which had been inspired by the best ornaments of Cairo's mosques. Parvis, Berté & Gaeta, and Nistri were the most visible businessmen in a network of Italian interior designers, artists, and craftsmen working in Egypt. Bibliographic sources suggest the network was much wider. Isolated individuals or entire families could maintain a decent, sometimes even wealthy lifestyle, thanks to the numerous work opportunities facilitated by the favorable economic conditions granted to Europeans. Using a vocabulary that drew on Eastern and Arabic motifs, often mixed or toned down with European suggestions and recollections, the entrepreneurs working in the field of interior design sometimes guided and sometimes met the taste of their clients, who were particularly sensitive to art and luxury. Some of the designers, gifted with business sense and caution, took advantage of the favorable circumstances

Enrico Nistri employees, Cairo
Facade of Enrico Nistri's warehouse, Cairo

and became modern entrepreneurial figures. To trace the journey of those who operated in this field involves a gradual reconstruction of a whole set of relationships, acquaintances, and skills which, in the early 1900s and for a large part of the twentieth century, contributed to the formation of a new and quite characteristic image of some of Egypt's most important cities.

French metal craftsmen active in the southeast Mediterranean area during the twentieth century

Karin Blanc

This article is based on research relating to the architectural and artistic wrought iron work of about thirty French craftsmen from Paris, Lyon, and Bordeaux over the years from 1890 to 1960, a period greatly enriched by the Art Nouveau and Art Deco styles.[345] Unlike artistic wrought iron (tables, consoles, mirrors, lamps, etc.), which was generally signed or stamped, facilitating research, architectural wrought iron is more challenging to the historian, as it is not signed, and little is known about its makers.

There are many connections between the craftsmen presented in this text. Émile Robert campaigned strongly for a return to wrought iron in the 1890s, after a century of cast ironwork. He began publishing a periodical, *L'art de la ferronnerie ancienne et moderne*, which he composed and illustrated almost alone. In 1910, he and investor Ernest Borderel founded a company, Borderel & Robert. Robert accepted students, who included Edgar Brandt, Jean Schwartz, and Adalbert Szabo. Edgar Brandt, in turn, trained the Nics brothers and Paul Kiss, later employing them. Jean Prouvé apprenticed with Émile Robert and Adalbert Szabo. As early as 1910, Raymond Subes was drafting for Émile Robert; after the war, he learned to forge with him. In 1919, Subes replaced Émile Robert as head of the drawing office and the wrought iron workshop at Borderel & Robert.

These craftsmen operated within workshops or small companies, with 25 workers; the largest employed 300. They showed their designs at the Salon des Artistes Français, the Salon des Indépendants, the Salon de la Société nationale des Beaux-Arts, the Salon d'Automne, the Salon des Artistes Décorateurs, the Salon des Tuileries and at metalwork exhibitions, organized by Henri Clouzot at the Musée Galliera. Most of them participated in the International Exhibitions in Paris in 1900, 1925, 1931, and 1937, and in many of the International Exhibitions around the world. The Parisian metalcrafters also carried out projects in provincial cities. Some provincial metal craftsmen participated in International Exhibitions and also worked a little in Paris. A few companies – Baguès Frères, Edgar Brandt, Paul Kiss, Nics Frères, Jean Prouvé, Émile Robert, Jean Schwartz, Raymond Subes, Adalbert Szabo, and Georges Vinant – worked abroad, particularly around the Mediterranean. They are listed below in alphabetical order to facilitate legibility, with dates given for each of them.

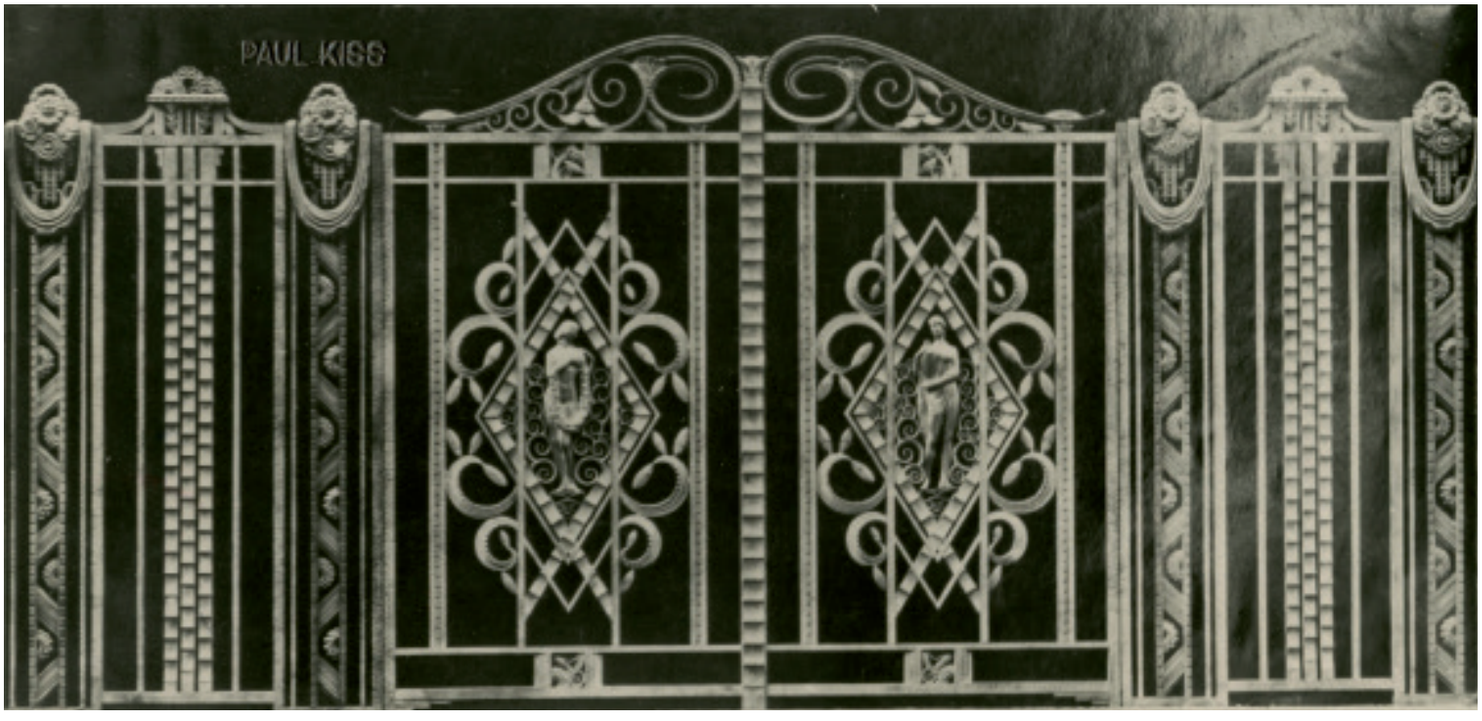
Baguès Frères

In 1913, with architects Auguste and Gustave Perret, the Baguès brothers designed and forged banisters, handrails, and even the monumental chandelier in the Théâtre des Champs-Elysées in Paris. Victor (1876-1934) and Robert (1880-1942) Baguès maintained an office in Cairo until 1934. In the 1930s, they produced mostly lighting and coffee tables. With architect Albert Laprade, in 1937, they designed and made the grand staircase railing and lighting in the French embassy in Ankara.[346] They also had offices in New York, London, and Brussels.

Edgar Brandt

Edgar Brandt (1880-1960) was the most important wrought iron artist in the 1925 International Exhibition, particularly for the imposing entrance gates to the Exhibition, as well as for the external and internal grilles of the Hôtel du Collectionneur (with architect Pierre Patout and decorator Jacques Émile Ruhlmann). Brandt had an office in Cairo and probably decorated Prince George Lotfallah's Gezireh palace with wrought iron.[347] It is the building between the two towers of the Marriott hotel. In 1932, Edgar Brandt also designed the simple entrance gates to the French Consulate in Jerusalem, featuring shields and a rooster (Marcel Favier arch.).[348] But Brandt had more important commissions in New York, Montreal, and London.

Lozy Bey Palace, Cairo, ironwork by Paul Kiss: Gate



Paul Kiss

Paul Kiss (1886-1962) created the impressive gate decorated with pheasants, now exhibited in the galleries of the Musée des Arts Décoratifs in Paris. In 1927-1928, he worked for King Fuad I and Queen Nazli in the Qubba palace (Enrico Verucci Bey arch.), north of Cairo. The Egyptian Government now uses the Qubba palace to receive its official guests.

According to the pictures and drawings in Paul Kiss's archives, the works he produced for the Qubba palace included balconies decorated with scrolls, flowers, leaves, and pleats; two chandeliers with numerous scrolls for the reception hall, a lamp in wrought iron and copper, again with scrolls; another lamp for the winter garden, and a separation gate with young women and animals for the apartments of Queen Nazli.[349]

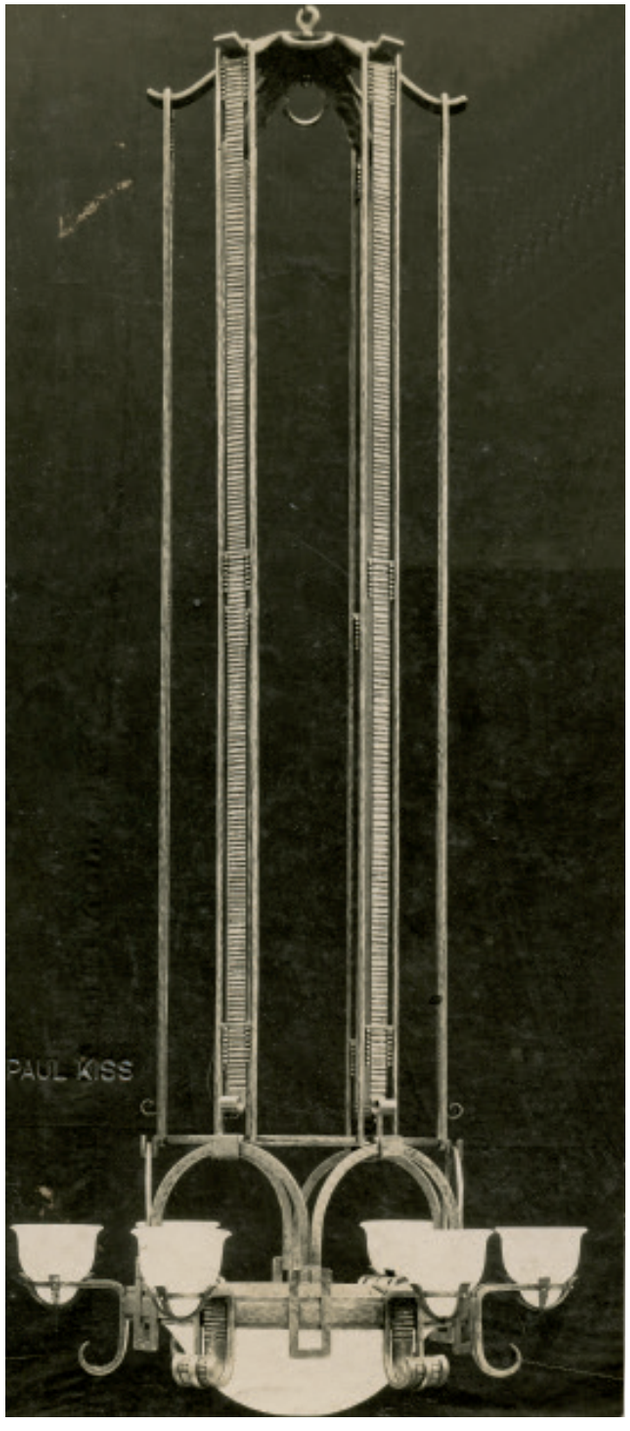
Paul Kiss was probably introduced into Egyptian society by his painter and decorator friend Edmond Soussa (1898-1989), the son of an important cigar manufacturer. Soussa was an international billiards champion and, with Kiss, made a trophy for the 1927 billiards championship in Paris. It is a globe, representing the world, resting on a sphinx, the Statue of Liberty and the Eiffel Tower. Together, they produced a second billiards trophy, presented by King Fuad I at the Pharaohs Challenge in Cairo in May 1928. This time, it was a bowl decorated with foliage, resting on three persons dressed in ancient Egyptian costumes.

In Cairo, Edmond Soussa directed a gallery called *La Forge*, created by architect Henri Solé. The sale in Paris of Edmond Soussa's collection contained eighteen wrought iron designs executed for Paul Kiss. Unfortunately, only one was photographed,[350] but it shows that he may very well have been the designer of Queen Nazli's separation gate.

Paul Kiss also worked in Zamalek on Lozy Bey's town house. The Bey seems to have been one of King Fuad's cousins. Kiss executed the double entrance gate with dancers and

Lozy Bey Palace, Cairo, ironwork
by Paul Kiss: Billiards room chandelier

Trophy given by King Fuad of Egypt, design
by Edmond Soussa, ironwork by Paul Kiss



Nahas Bey Residence, Garden-City, Cairo,
ironwork by Nics Frères: Front door

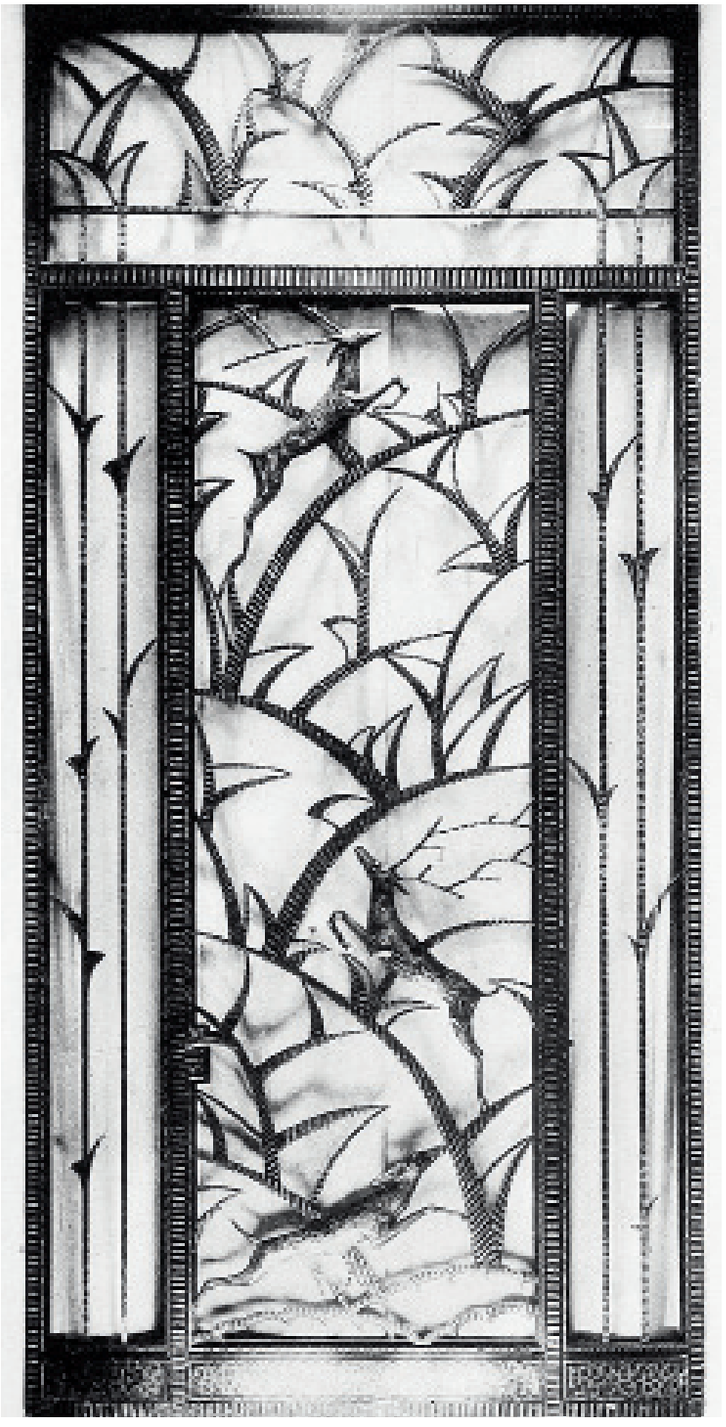
musicians, which he presented at the 1931 Colonial Exhibition. He also produced a separation gate with large lozenges and two chandeliers in geometric style for the billiards room.[351] The separation gate was sold in 2009 by Sotheby's in New York.

Nics Frères

In 1923, the Nics brothers created both the monumental gate and the chapel gates for the Douaumont Ossuary, one of memorials to World War I, with architects Léon Azema, Max Edrei (both born in Egypt), and Jacques Hardy. In 1924, these three architects were awarded the contract for Cairo's courthouse.
Michel (1870-1950) and Jules (1885-1963) Nics continued to work with the three architects: in 1926, they did the exterior and interior wrought ironwork on judge Nahas Bey's town house at 5 Ahmed Pasha Street in Garden-City, Egypt,[352] including two matching exterior gates decorated with leaping gazelles. The town house is now the residence of the Japanese ambassador to Egypt.
Architects Azema, Edrei, and Hardy also designed the 1931 Rabbath building, at the corner of Sharif and July 26 Streets[353]. He apparently modeled it on his design for a building in Paris, at 93-95 Quai d'Orsay, which also featured the Nics' brothers wrought iron with open scrolls and checkerboards. But the brothers Nics could very well have worked on the chandeliers of the Groppi pastry shop in Cairo.

Jean Prouvé

Jean Prouvé (1901-1984), one of the great 20th century creators and designers, first trained as a wrought iron artist, and worked in the medium until the 1930s. In 1931-1934, he was commissioned to create the steel and stainless steel entrance door, along with the staircase rails in sectional steel and upper part in stainless steel, for the French Government palace in Algiers (Jacques Guiauchain arch.).[354] The building is currently the headquarters of the FLN ruling party.



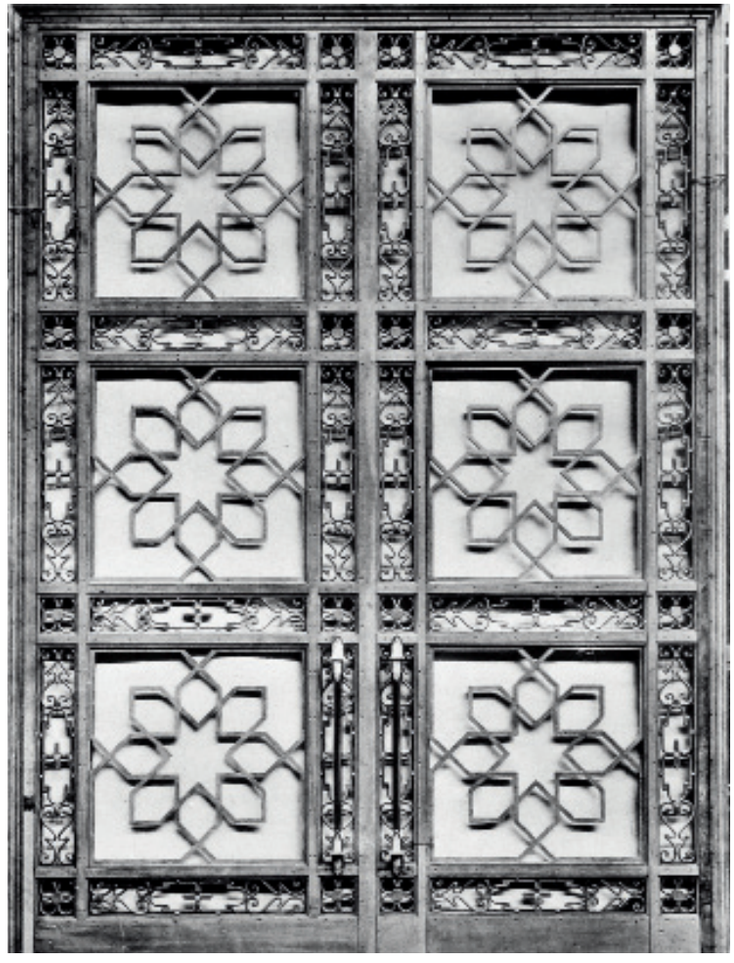
Banque d'Algérie, Skikda (formerly Philippeville), ironwork by Schwartz-Hautmont: Door

Émile Robert

In 1911, Émile Robert (1860-1924) designed and carried out the wrought-iron balconies and the interior grillwork of the Hotel Lutetia (Louis-Charles Boileau and Henri Tauzin arch.) in Paris. The awning above the entrance door, also in wrought iron, has since been removed.
In Istanbul, around 1900, with architect Bruno Pellissier, Émile Robert made a railing with roses and chrysanthemums for one of Sultan Abdul Hamid's palaces.[355] Likewise, he may have done the wrought iron balconies, featuring roses, on the home of Jean Botter, the sultan's couturier, built in Istanbul in 1901 (designed by architect Raimondo d'Aronco).

Schwartz-Hautmont

Directed by Jean Schwartz (1899-1967), Schwartz-Hautmont was a large international metallic construction company which also included a wrought iron department. In 1929, Jean Schwartz designed the octagonal, rectangular, and circular motifs, decorated with stylized flowers, surrounding the lettering SAMARITAINE on the facades of the new Paris department store (Henri Sauvage and Frantz Jourdain arch.). Schwartz-Hautmont published many catalogues listing their work in different countries; unfortunately, these contain very few details.
In Cairo, Jean Schwartz's father, Albert Schwartz (1861-1930), director of Schwartz & Meurer, apparently executed the wrought iron for the Zaafaran palace in 1902. He also worked for what was known as the Muhammad Ali Club.[356]
In 1919, Schwartz & Meurer bought out the Hautmont shop, forges, and foundries, becoming Schwartz-Hautmont SA. Jean Schwartz joined the company in 1926.
He worked on several commissions in Algeria and Morocco in the early 1930s. In Algiers, he designed the ironwork at the Grand Hotel and Casino with architects Auguste Bluysen and Joachim Richard. He also decorated the École Dujonchay in Algiers (Pierre-André Émery and Charles H. Breuillot arch.). Working with architect Gustave Umbdenstock, he decorated the Bank of Algeria offices in three cities. In Oran,[357] he designed the gates, with a geometrical circle motif. He also mades the doors, with a slightly different design, for the bank's offices in Hussein Deyn. Albert and Jean then decorated the gates of the offices in Skikda with a repeating star pattern.[358]
In Rabat, with architect Adrien Laforgue, Jean Schwartz created the gate of the French Residence, featuring an open scroll motif. In the same city, he designed a stylized floral motif for the gate of the Collège des Orangers (with architect Antoine Marchisio). With the same architect[359], Schwartz designed a main gate and a secondary one, with scrolls in C, for the Kenitra town hall.[360]



Raymond Subes

In Casablanca, Morocco, Subes designed the gates of the Casablanca cathedral (Paul Tournon arch.)[361] and the Mas bank (Charles Abella arch.). In France, Subes often worked with architect Joseph Marrast, and Marrast probably commissioned him for the wrought ironwork on the Casablanca courthouse, on Muhammad V Square.
Raymond Subes (1891-1970) had an office on 10 rue Michelet in Algiers but we know next to nothing about his work in Algeria.

Adalbert Szabo

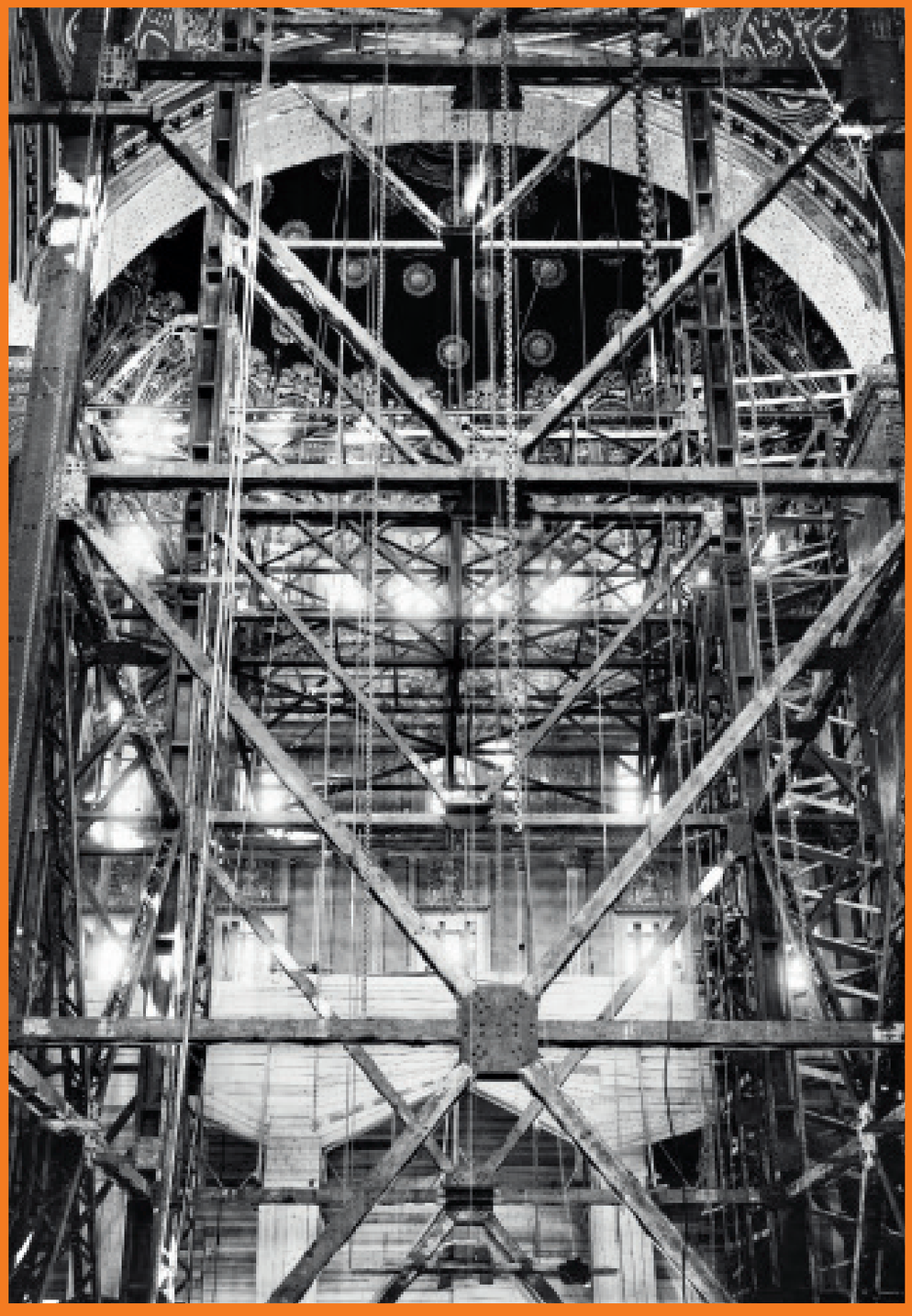
In Paris, in 1911, Adalbert Szabo (1877-1961) made the main gate and hallway decorations in the house located at 65-67 boulevard Raspail, designed by architect Léon Tissier. At the Salon des Artistes Français in Paris in 1923, Adalbert Szabo presented works executed for the Palais d'Été in Algiers.[362]

Georges Vinant

In 1908-1910, in Paris, Georges Vinant (1866-1943) crafted the lovely ironwork on the doors at 1-5 avenue Mozart (designed by architect Maurice du Bois d'Auberville), featuring an ornate border pattern of leaves and flowers. In 1890, the Compagnie de construction des Batignolles commissioned Vinant to design one of the bridges for the Bursa railway in Turkey.[363] At the 1925 International Exhibition in Paris, he presented the gates of the French post offices and of the pavilions of the Compagnie Asturienne des Mines (Guillaume Tronchet arch.).

According to J. Starkie Gardner, a British metal artist and an authority on the subject, "The palm goes to the French for their delicacy in execution, refinement of design and inventive genius."[364] Architectural and artistic wrought iron was quite successful, in France, but also in other countries, in the first half of the 20th century. But, due mostly to the cost of wrought iron and the effects of World War II, its success was short-lived. Today, the restoration of buildings often involves restoring the wrought iron decorations. Art Nouveau and Art Deco artistic wrought iron is regularly offered for sale by Sotheby's, Christie's and other dealers and can fetch rather high prices.

REHABILITATION



Muhammad Ali Mosque, Cairo:
The interior scaffolding for restoration in the 1930s

Muhammad Ali Mosque, Cairo:
Cracks at the top of the northern wall

The restoration of the Muhammad Ali Mosque in Cairo, 1931-1938

Mercedes Volait

On the southern side of the Mediterranean, European construction companies were not only called upon for buildings, industrial constructions, public architecture, and modern dwellings. They were also invited to take on restoration, even reconstruction work on historic monuments. From the 1870s, steps were taken by local or colonial authorities to protect the ancient centers of the region's cities, while also carrying out modernization works. In Cairo, partial reconstructions, alignment setbacks, and even relocating historic buildings, were done from the end of the 19th century.[365] The Hennebique archives have retained a record in images of the reconstruction in reinforced concrete of the sepulchral mosque of Qalawun (1284) in 1904-1905, as well as the restitution of the barriers on the cap of the Sultan Hasan Mosque (1356-1362) in 1909.[366] We know that a competition for the construction of the Amr Ibn al-Ass mosque (827, numerous subsequent alterations) was launched in 1925.[367]

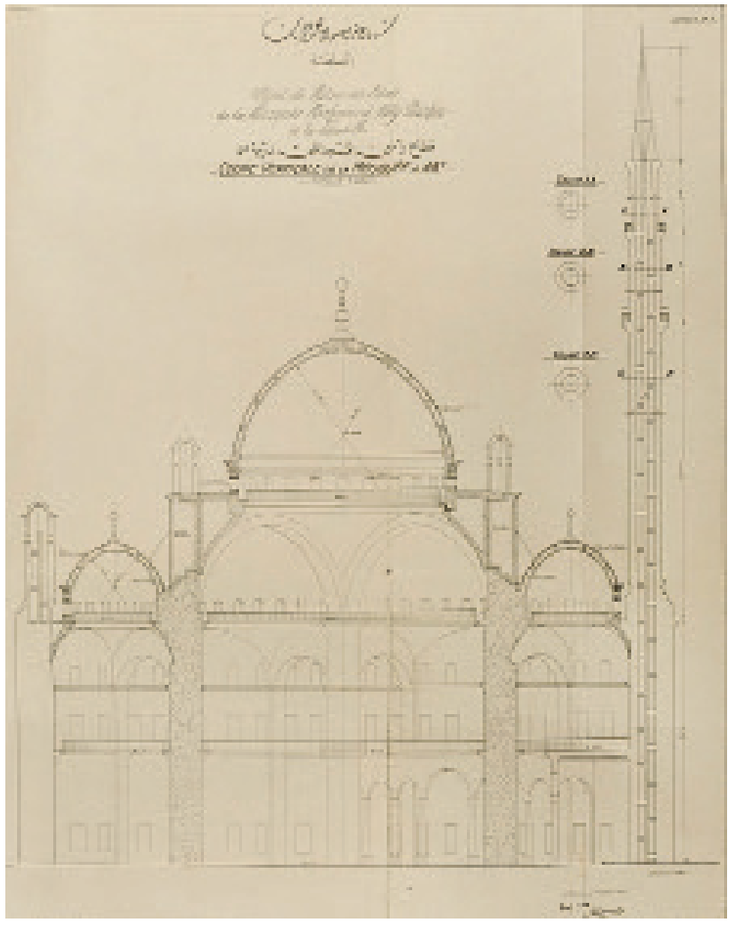
One major project is now well documented thanks to a comparative analysis of the sources.[368] The "restoration" of the Muhammad Ali Mosque was carried out during the 1930s. Built a century earlier on the orders of the reigning sovereign, the building constitutes Cairo's principal monument in the Turkish style. Its prayer room is covered by a large central dome supported on four half-cupolas, themselves resting on four arches and pillars; the two minarets follow the slender template in use in Istanbul. The sovereign had been ambitious: the minarets reach 82m, the dome has a height at its summit of 52m, ten more than the Sultan Ahmet Mosque (1616), its model in Istanbul, and the wall cladding is made of alabaster. Oversized, the mosque showed signs of weakness from the end of the 19th century; an attempt was made then to reinforce the masonry of the pillars supporting the dome by lining them; iron rings were placed at the springing of the main arches.[369]

Law n° 8 of 1918 for the protection of monuments of Arab art expanded the perimeter of protection to all buildings earlier than the end of the reign of Muhammad Ali (1849). The mosque was therefore included on the list of protected

structures (n° 503) and from then on entrusted to the Comité de Conservation des Monuments de l'Art Arabe, the protection agency for historic monuments created in 1881, so that its maintenance could be supervised.[370] It was on this occasion that a detailed examination of the building took place, and revealed worrying deterioration. The mosque had cracks all over, some fissures appearing through the entire height of the building; others, located at the bases of pillars, were almost 10 cm wide. Urgent action was required.

On December 29, 1931 a technical commission was formed under the leadership of the architect Sayyid Metoualli Bey,[371] director of the technical service of the "Arab Monuments" department at the ministry of the *Waqf*. Its other members

Muhammad Ali Mosque, Cairo:
Rehabilitation project (1933), vertical section of the mosque



were Charles Andreae (1874-1964), a Swiss civil engineer who since 1928 had been director of the Cairo Polytechnic School,[372] three civil engineers from the Ministry for Public Works: Serge Leliavsky (1891-1963),[373] Ismaïl Omar Bey and Ahmed Fahmy Ibrahim Effendi, and an architect, Farag Amin, Inspector of the Royal Buildings. The commission had to carry out a detailed examination of the mosque's condition, issue an opinion on the causes of the defects it identified, and present suggestions for its restoration, even though nothing was known about how the building had been constructed, because any building plans that had ever existed had been lost. Surveys and excavations were carried out on the mosque's foundations. An analysis of the construction materials was commissioned. Calculations of strain were made[374] and indicators were put in place. Sixteen months later, in May 1933, examination cleared the foundations of responsibility for the deterioration. A chemical analysis by Ismaïl Omar showed that the cracks were caused not by the materials used for the domes (bricks and mortar), but by their support structure: arches, drums, pendentives, and pillars. A verticality check showed that the building was sagging towards the exterior; on the walls, the deformation equalled 10 cm for 11 m in height, while in the minarets, some 20 cm of deflection were measured. The calculation of average strain led to the conclusion that the building's structural mechanics suffered under the thrust from horizontal forces. By elimination, the Commission came to identify the structural reasons for the deformities and tearing as insufficient anchorage of the straps placed at the springing of the arches, as well as rust. The iron dowels, sealed in lead, binding the stones together, like the metal ring around the drum, revealed badly eroded areas. It also appeared that the building had been weakened by a past earthquake, the later explosion of a munitions store, and Cairo temperatures.[375]

From May 1932 to February 1933, the Commission worked on a reconstruction project. Two scenarios were studied: either rebuilding the entire lower part of the structure (the pillars) without touching the domes, or redoing the upper area (the domes) and the pillars. In both cases, the entire building would require interior scaffolding. The first solution was rejected after studying the cost of scaffolding capable of supporting the upper structure whose weight was estimated at 4,000 t (of which 1,750t for the central dome). For reconstructing the domes, the Commission recommended using reinforced concrete framework. Originally, they planned to fill in with bricks, like in the original construction; in the end, prefabricated slabs flashed with lead sheeting were used to roof the structure.[376] The decision was based on the conclusions of the very recent International Congress on the Conservation of Artistic and Historic Monuments which accepted "the principle of using

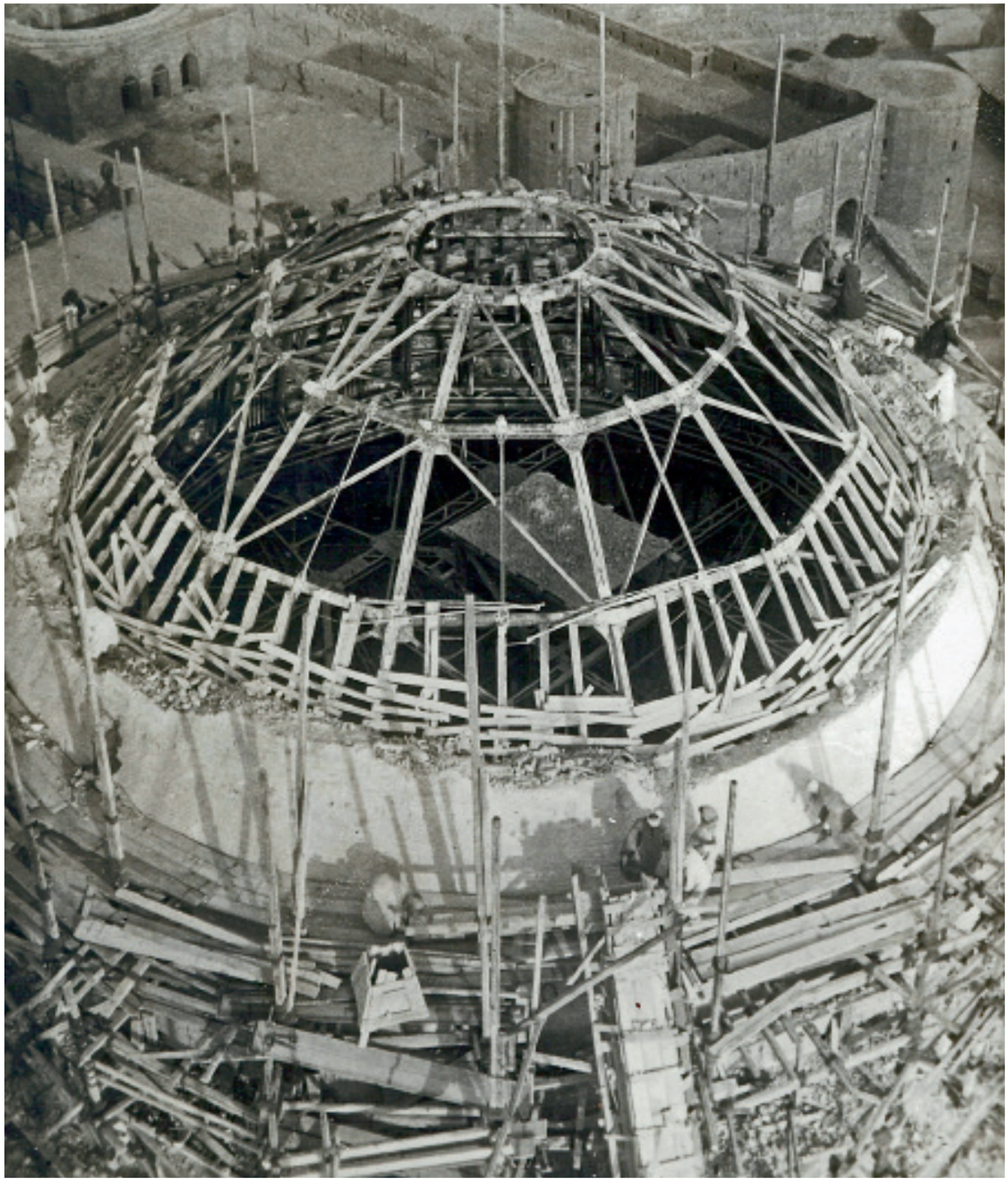
modern materials for the reconstruction of ancient buildings."[377] There, the issue of raising the main monuments of the Acropolis of Athens by the process of anastylosis had also been discussed.

The half-cupolas and the small domes had to be constructed on the ground and then raised; the large dome was to be reconstructed in situ. The work was estimated at 60,000 Egyptian Pounds (EP), of which 50,000 EP was budgeted for the metal scaffolding to support the building during the works. The structure was delicate to install because it could not use any bearing points likely to weaken the mosque even more. The work was put to tender in September 1933. Eleven contractors responded to the invitation.[378] With the help of its local agent, the Belgian Léon Rolin, Hennebique submitted a bid.[379] On December 27, 1933, the Commission endorsed the offer from the Swiss company, Rothpletz & Lienhard.[380] Andreae had already worked with both engineers, Ferdinand Rothpletz (1872-1949)[381] and Friedrich Lienhard (1873-1952); all three were graduates of the Federal Polytechnic Institute of Zurich. With 53,095 EP (including the installation of iron scaffolding for the entire mosque in one go), it was the lowest bid, ahead of the Italian company Garozzo (54,034 EP) and the *muallim* (master mason) Siyam Muhammad (54,061 EP).[382] The satisfaction of the Egyptian Ministry for Public Works with Rothpletz & Lienhard, in association with the companies Almagià (Italian) and Ruegg (Swiss),[383] on their first Egyptian worksite, the digging of the al-Ahaywa Tunnel in Middle Egypt, seems to have played a part.[384] Hennebique would subsequently admit to having incorrectly overestimated the cost of the metal scaffolding.[385]

The works were scheduled to be completed in 22 months, from March 1, 1934 to December 31, 1935. They lasted two months longer. The photographs of the worksite taken by the company and the report on the works made by Charles Andreae allow their progress to be followed.[386] The first stage was designing the scaffolding. It was completed and installed by March 1, 1935. Weighing 650 t, it was made by Goganian, a local locksmith company, from designs by two professors at the Cairo Polytechnic School, H. Schwyzer and I. El-Demerdash.[387] The central tower of the scaffolding was equipped with a lift for the workers (built by the Schindler company at Schlieren near Zurich) and a paternoster (a continuous caterpillar track supplied by the Swiss firm Oehler based at Aarau) to carry the concrete and the mortar. In parallel, the consolidation of the minarets with triangular slabs was done in July 1934. The coffering in wood for the large dome was prepared on the ground (September 6, 1934). Outside scaffolding was erected simultaneously; the demolition of the large dome in brick was begun in February 1935; the demolition works, pillars included, was finished in July 1935. The small domes were finished on December 24, 1935, the central dome on February 6, 1935, the half-cupolas a week later. The original covering in lead was returned to most of these; the large dome received new sheets of lead 3 mm thick. Some of the cut stone for the exterior casing was reused; the missing elements were replaced with imitation stone.

The project was managed locally by the architect Farag Amin Bey, Inspector of the Royal Buildings, Serge Leliavsky and Charles Andreae. They kept scrupulously to the allocated budget; the scaffolding (16,110 EP) and the reinforced concrete (21,260 EP) were the biggest expenses. An amount that was almost equivalent (40,000 EP) was spent on renewing the decoration, which Andreae considered

Muhammad Ali Mosque, Cairo: Demolition of the great dome, February 1935



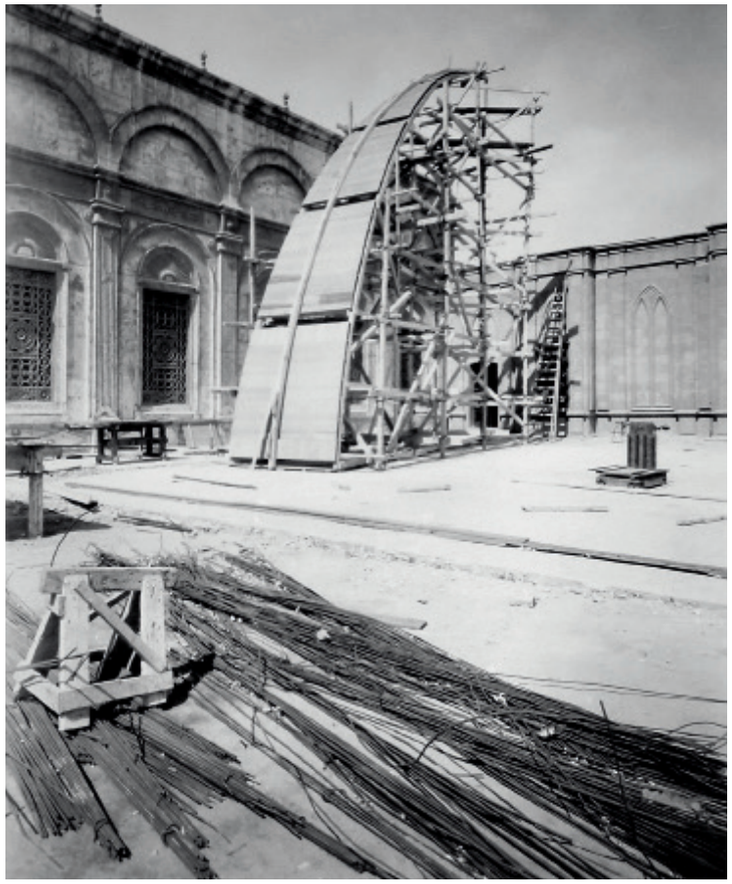
Muhammad Ali Mosque, Cairo: General view after dome demolition, July 1935

Muhammad Ali Mosque, Cairo: Installing the timber casing for the large reinforced concrete dome, autumn 1935

Installing the concrete tiles for the west half dome, January 1936

Muhammad Ali Mosque, Cairo:
Reinforcement of the concrete slab at the base of the northern minaret, August 1934

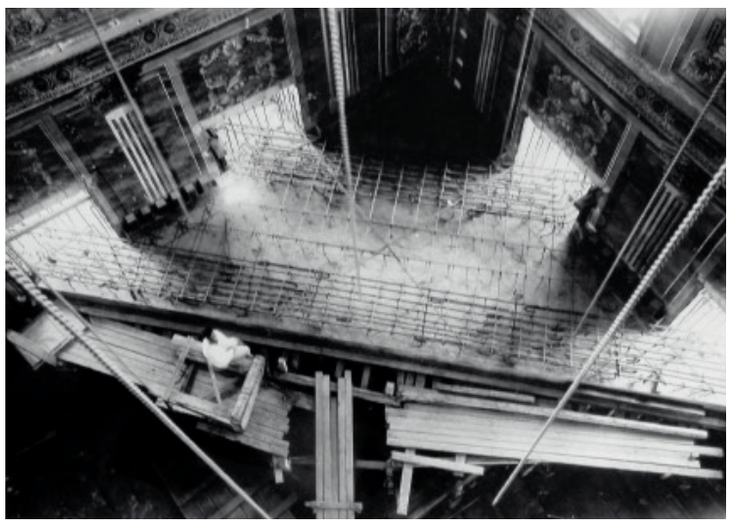
Plywood forms for a part of the great dome, September 1934



to be of much less value than the quality of the structure.[388] The Ministry of the *Waqf* had taken care to allocate 1,000 EP in 1934 to the Comité de Conservation des Monuments de l'Art Arabe for the execution of drawings in color, photographs and rubbings of the mosque's décor; plaster casts had also been taken.[389] At least the décors were recreated identically.

The mosque was renovated again in 1999, when the dome covering was redone, and the minarets were refaced.[390]

The restoration of the Muhammad Ali Mosque earned the company Rothpletz & Lienhard a similar project, the restoration of the Nilometer. The structure, serving to measure the ebb and flood of the Nile, dated from 861 and was located at the tip of Roda Island. The company made it permanently impermeable with complete casing in reinforced concrete. The sizing of the structure was calculated free of charge by Serge Leliavsky. Carried out in 1937-1938, these works were complemented in 1945 by the reconstruction of the Nilometer's cupola, a subject that had long been debated within the Comité de Conservation des Monuments de l'Art Arabe. Some advocated replicating the roofing the Nilometer might have had when it was erected in the 9th century, under Fatimid rule. Another wing of the committee was in favor of restoring the curious Seljuk-influenced pyramidal dome,



probably built at the beginning of the Ottoman period. It had been surveyed quite accurately in 1737 by the Danish traveller Frederik Norden. The arguments of the latter group prevailed.[391]

These two projects are only the tip of the iceberg. In a region steeped in history, the sector involving the restoration of ancient monuments was undoubtedly much more important than we imagine today, but we lack of an overview on the subject. Let us hope that in the future, architectural historians will engage in the study of these projects. Reconstructions and relocations of historic buildings required as much ingenuity as than new construction. European engineers and builders were active in the field, and transferred know-how to local professionals.

Roda Island Nilometer, Cairo:
Restoration work in progress (1937–1938)

Imagination, design, technique: Three European projects for Abu Simbel

Cristina Pallini and Annalisa Scaccabarozzi

March 1813. On his way back from a journey in Nubia, John Lewis Burckhardt[392] noted four statues emerging from the sand: "They do not front the river [...] but are turned with their faces due north, towards the most fertile climes of Egypt [...]. On the rock wall, in the center of the four statues, is the figure of a hawk-headed Osiris, surmounted by a globe; beneath which, I suspect, could the sand be cleaned away, a vast temple would be discovered, to the entrance of which the above colossal figures probably serve as ornaments."

August 1817. Giovanni Battista Belzoni crossed the threshold of the Abu Simbel temple, brought to light after much hard work. "This temple was nearly two-thirds buried under the sand, of which we removed thirty-one feet before we came to the upper part of the door. [...] It is the last and largest temple excavated in the solid rock in Nubia and Egypt [...] It took us twenty-one days to open it, besides six days last year. [...] It is situated under a rock about a hundred feet above the Nile, facing the south-east by east, and about one day and a half's journey from the second cataract in Nubia, or Wady Halfa. The heat was so great in the interior of the temple that it scarcely permitted us to take any drawings [...] accordingly, we left this operation to succeeding travellers, who may set about it with more convenience than we could."[393]

The site continued to fascinate Europeans, as attested by this reference to it in *Death on the Nile*, by Agatha Christie: "It was the evening of the following day – a hot still evening. The *Karnak* was anchored once more at Abu Simbel to permit a second visit to be made to the temple, this time by artificial light. The difference this made was considerable, and Cornelia commented wonderingly on the fact to Mr. Ferguson, who was standing by her side. 'Why, you see it ever so much better now!' she exclaimed. 'All those enemies having their heads cut off by the King – they just stand right out.'"

Carved into the lower part of the cliff on the left bank of the Nile in the days of Ramesses II (1279-1213 B.C.), the two temples of Abu Simbel marked the southern border of Egypt, showing the power and the face of the Pharaoh to all who arrived from the south.[394]

The Aswan High Dam: Mobilizing support for the monuments

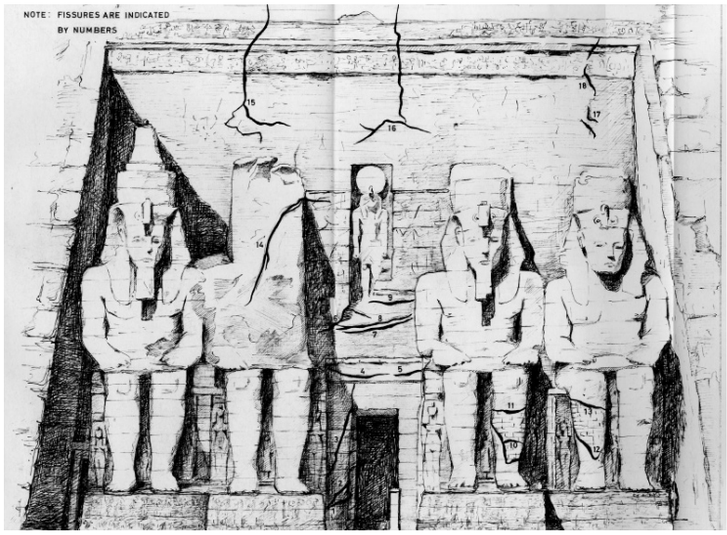
After the revolution of July 1952, the new Egyptian republic undertook a program of development based on new plans for agriculture and industrial production. The High Dam at Aswan, first proposed in 1946,[395] became a strategic project, the constructional details of which were finally worked out between 1953 and 1956. It was expected that the dam would lead to creation of a lake in that part of the Nile valley. It would be a source of energy and a reserve of water for agriculture, but it would also flood the villages and ancient monuments of Nubia.[396]

In 1954, Mostafa Amer, director of the Department of Antiquities, and Kamal el-Din Hussein, Minister of Culture, invited a delegation of foreign egyptologists and engineers to Nubia to show them how many treasures the country still possessed. Likewise, in 1958, Sarwat Okasha, the new Minister of Culture, brought in egyptologist Christiane Desroches-Noblecourt and René Maheu, Director-General of UNESCO, the international institute that was to head the campaign for safeguarding Nubian monuments.[397]

When work began on the High Dam the new Director of UNESCO, Vittorino Veronese,[398] made this heartfelt appeal: "Wondrous structures, ranking among the most magnificent on earth, are in danger of disappearing beneath the waters. The Dam will bring fertility to huge stretches of desert; but the opening of new fields to the tractors, the provision of new sources of power to future factories threatens to exact a terrible price [...] It is not easy to choose between a heritage of the past and the present well-being of a people, living in need in the shadow of one of history's most splendid legacies; it is not easy to choose between temples and crops. I would be sorry for any man called on to make that choice who could do so without a feeling of despair; I would be sorry for any man who whatever decision he might reach, could bear the responsibility for that decision without a feeling of remorse."[399]

UNESCO made requests to the governments of Egypt and the Sudan to allow foreign archeological teams to dig anywhere in Nubia and to send half their findings abroad. André Malraux,[400]

Great Temple of Abu Simbel, preliminary design (1960), Italconsult, Impresit & Lodigiani, cont.: Sketch of facade rock fissures



French Minister of Cultural Affairs, emphasized the exceptional nature of support by the civilized world in recognizing art as a collective and indivisible heritage.[401] Universities, museums, and scientific societies worldwide responded to his appeal. President Nasser stated that saving the temples of Abu Simbel deserved efforts as great as those required for economic, social, and scientific progress.[402]

New problems of preservation and design

UNESCO set up an *ad hoc* committee to determine the qualifications necessary for those coordinating urgent archeological research in Egypt and Sudan. It not only concerned making a study of the monuments at risk, both inside and outside the area to be flooded, but also deciding which monuments were to be moved. More experts were called in to identify the possible alternatives to preserving the temples of Philae and Abu Simbel at their original sites. This provoked a lively debate around the concept of "monumental integrity." The archeologists involved – Abdel Moneim Abou Bakr, Joe Brew, Christiane Desroches-Noblecourt, Sergio Donadoni – agreed on the importance of maintaining a close relationship between monument and environment. In the case of Abu Simbel, the monumental nature of the architecture and statuary was on a par with the immensity of the surrounding space. Twice a year, at the solstices, the sun shone over the entire length of the temple, lighting up the faces of the three gods and of Ramesses, all seated at the back of the shrine.

This parameter seemed to make the problem insoluble. Nevertheless, Vittorio Veronese announced a "competition of ideas" on how these antiquities could be saved, in conjunction with the campaign to attract experts and raise funds. In this context, UNESCO examined a plan drawn up by the Parisian engineering firm André Coyne & Jean Bellier[403] and another presented by three Italian engineering firms: Italconsult,[404] Imprese Italiane all'Estero, and Ing. Lodigiani S.p.A.

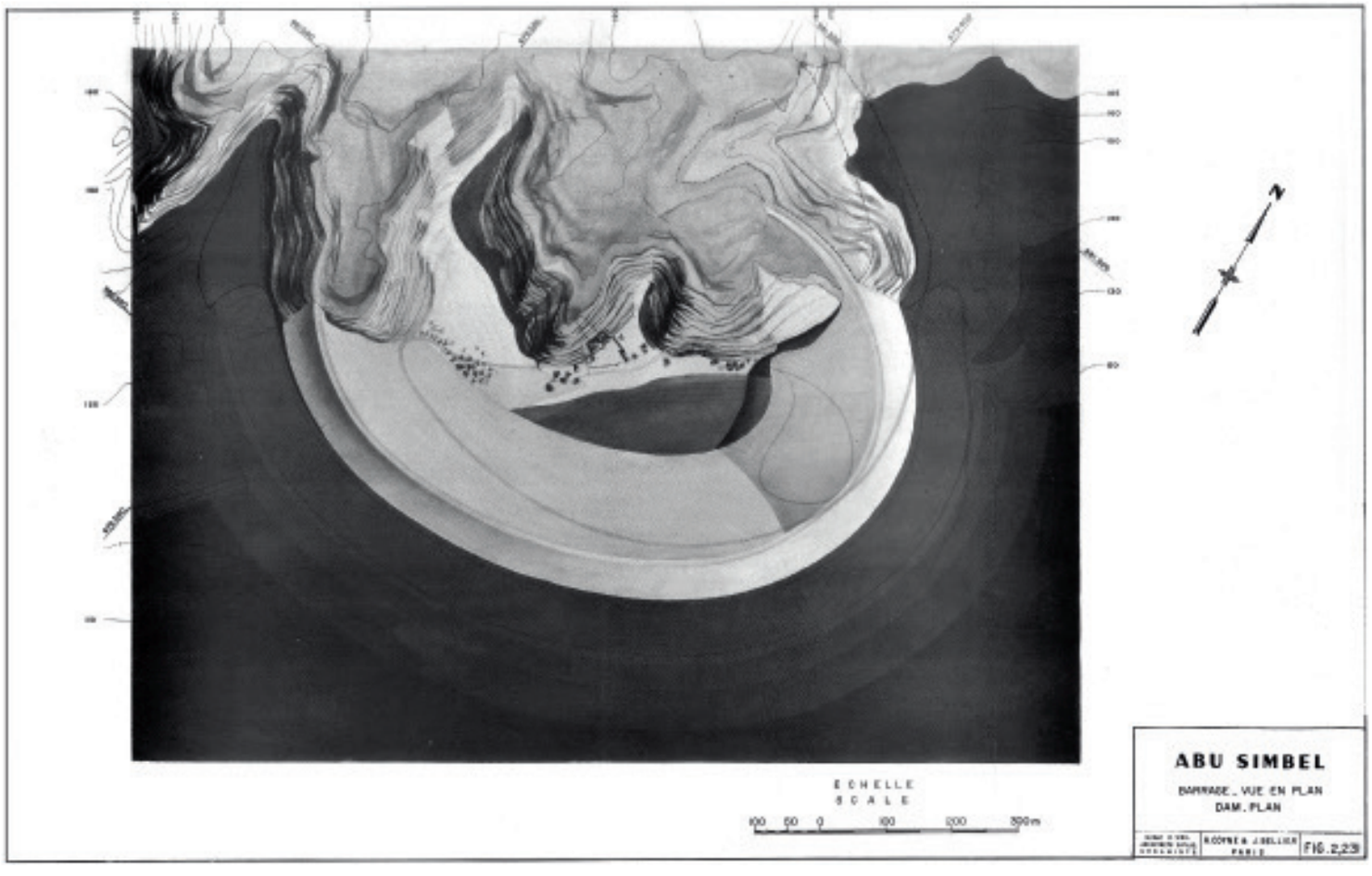
A dam to protect the temples

The Coyne & Bellier plan proposed leaving the temples where they were and protecting them from the higher water level with a semi-elliptical dam. Their report, dated September 22, 1959,[405] set forth the main features of their proposal. The dam, about 70 meters high, was to be about 1,500 m long, wide enough to ensure the least possible delay in receiving early sunlight, and to enclose a lake at the base of the monuments considered essential for the beauty of the landscape. An accurate topographical survey supported by geological, hydrographical, and climatic data, confirmed by laboratory tests, became urgently necessary. At this point, committee members began to express doubts about the risks of water seepage and increased humidity, as well as the isolation of the temples from their surroundings. According to Pietro Gazzola, UNESCO expert for the preservation of cultural heritage, "all of the elements of religious abstraction needed for the sublimation of artistic values would be destroyed forever."[406] In April 1960, Coyne & Bellier undertook to work out the technical and financial aspects of their plan, and in October 1960, produced a new report for which they had called in a number of experts,[407] including Albert Laprade and Gilbert H. Weil.

Their project presented two great advantages. In addition to keeping the temples at their original sites, it would also make

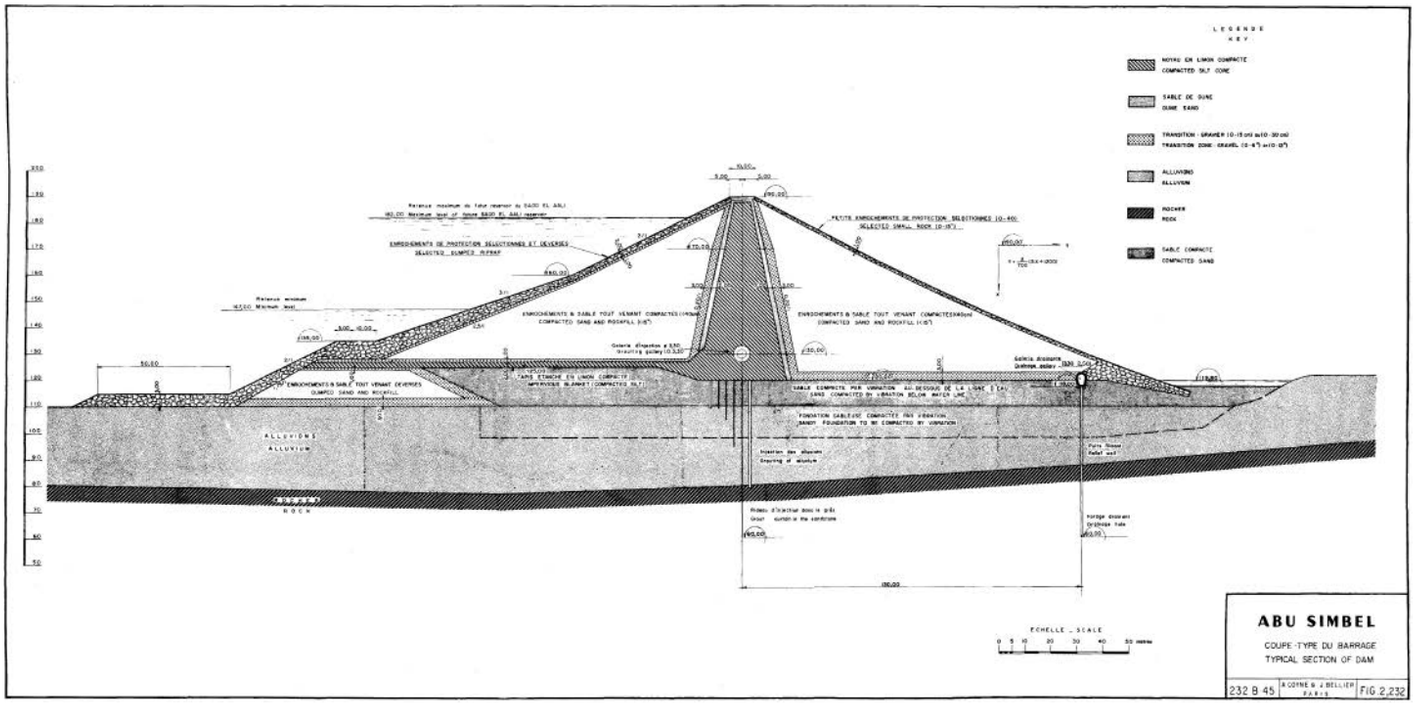
Temple at Abu Simbel, preliminary design (1960), André Coyne & Jean Bellier, eng.: Layout plan of dam

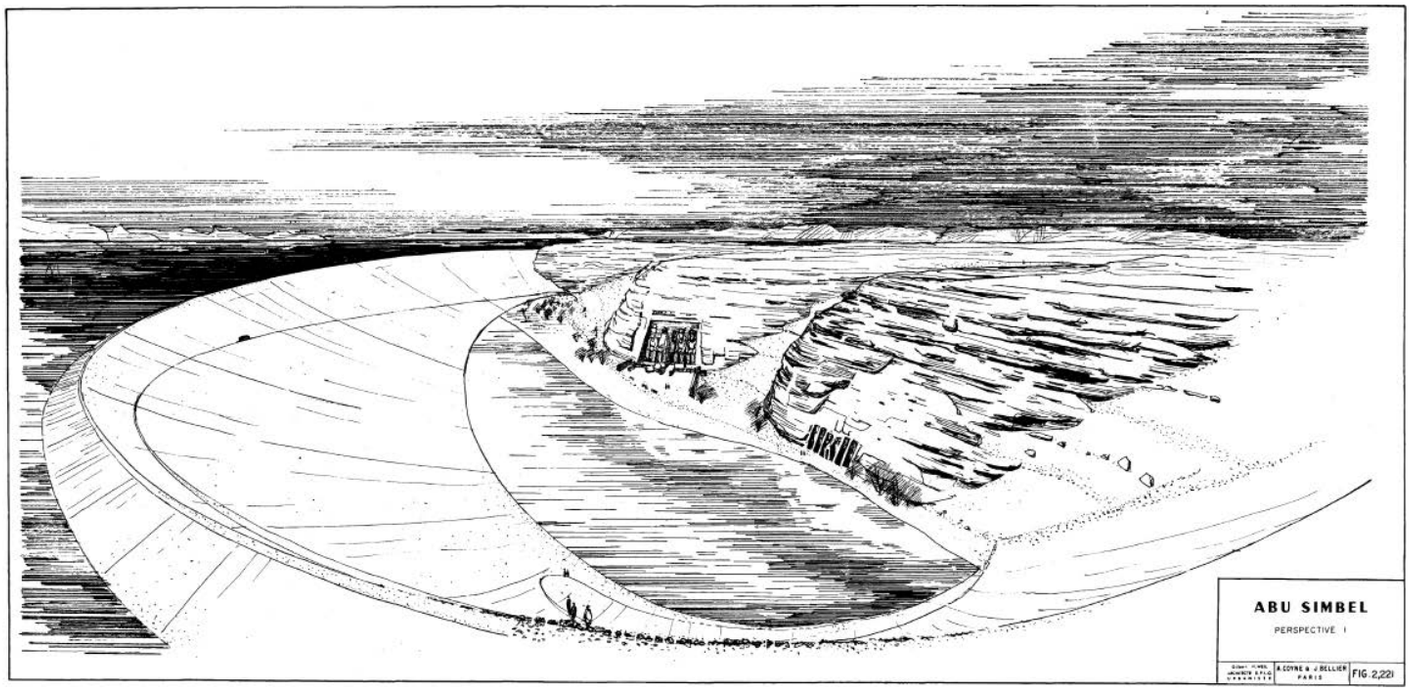
use of building materials that were locally available in large quantities, such as sandstone, gravel, and silt. Unlike reinforced concrete, these materials lent themselves to building a dam on the alluvial deposits of the Nile bed. Setting up the worksite meant building temporary dams (blocks of rock) to divert the river. However, constructing the foundations of the dam necessitated further difficult work, the outcome of which was uncertain. The top layers of sand in the riverbed would have to be dredged to expose more compact alluvial deposits, but additional compacting, by vibration, would be needed. The embankment was to consist of a central core of compacted silt sandwiched between two rock walls thick enough to protect it from seepage, and joined to the compacted alluvial deposits. Upstream of the central core there would be an impermeable layer of compacted silt. The inner base of the dam would comprise a ring of filtering shafts. Cement, fine clay, and various chemical compounds would be injected to help seal the dam; a series of drains and pumps would be added to prevent seepage, a risk that would be lessened over time on account of the large quantities of silt carried by the river. The work was to proceed while the lake formed by the High Dam filled up, the whole plan to be completed in 1967. The cost (including all the measures taken to save the monuments) was estimated at



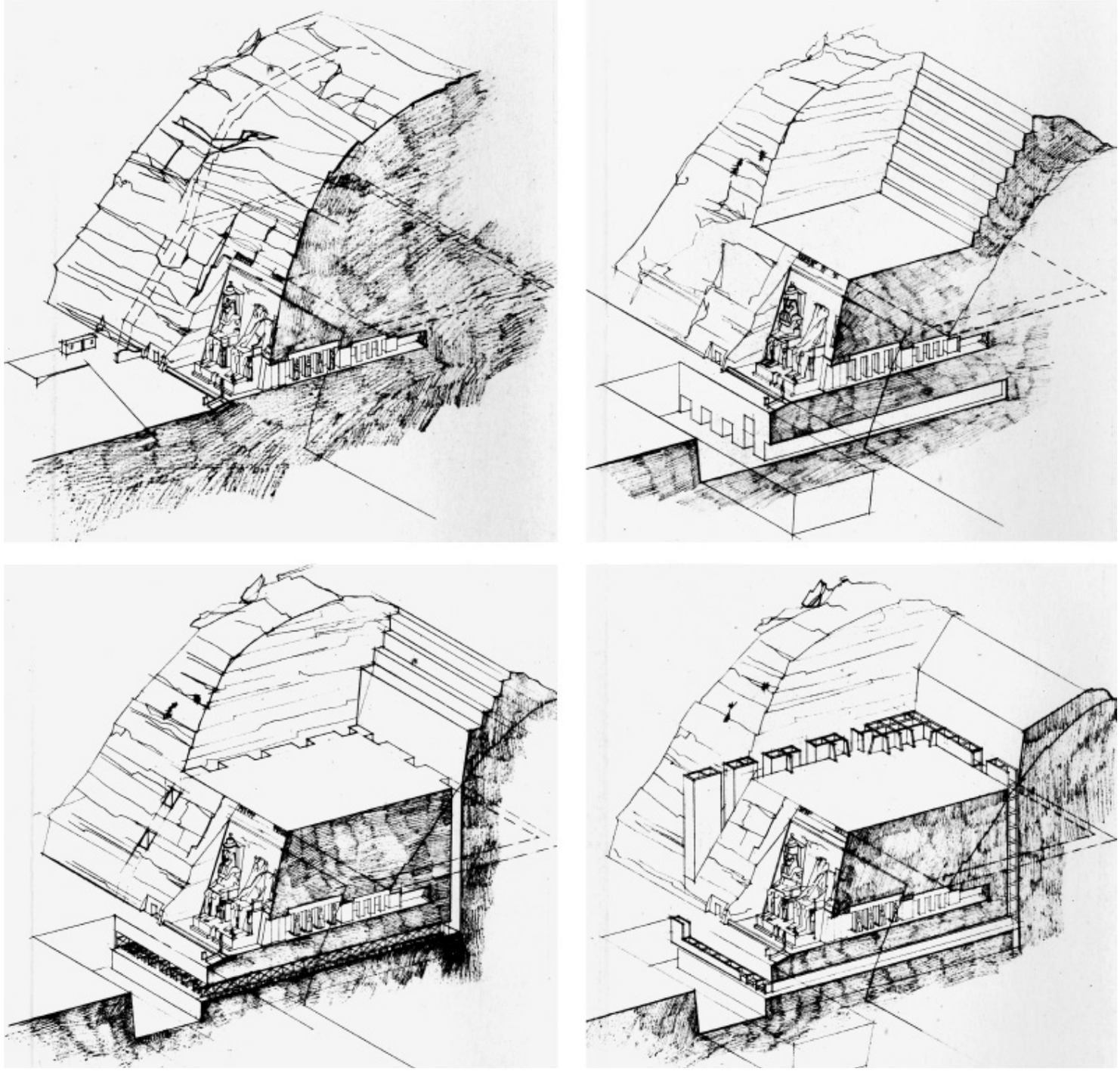
Temples at Abu Simbel, preliminary design (1960), André Coyne & Jean Bellier, eng.: Type sections of dam

André Coyne & Jean Bellier project: Overall perspective

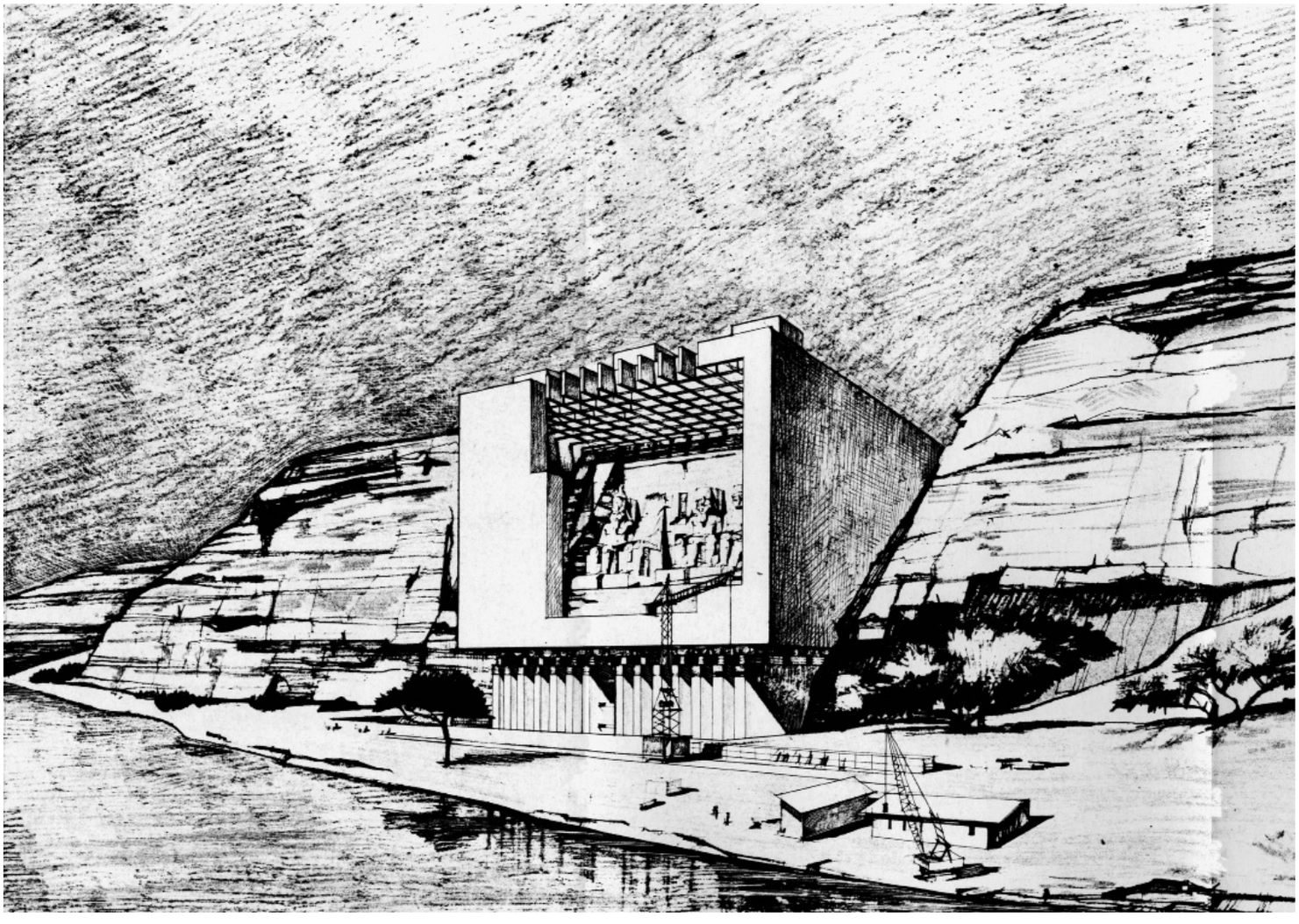




Great Temple of Abu Simbel,
preliminary design (1960),
Italconsult, Impresit & Lodigiani, cont.:
Perspectives showing rock removal
to create the caisson



Great Temple of Abu Simbel,
preliminary design (1960),
Italconsult, Impresit & Lodigiani,
cont.: Overall perspective

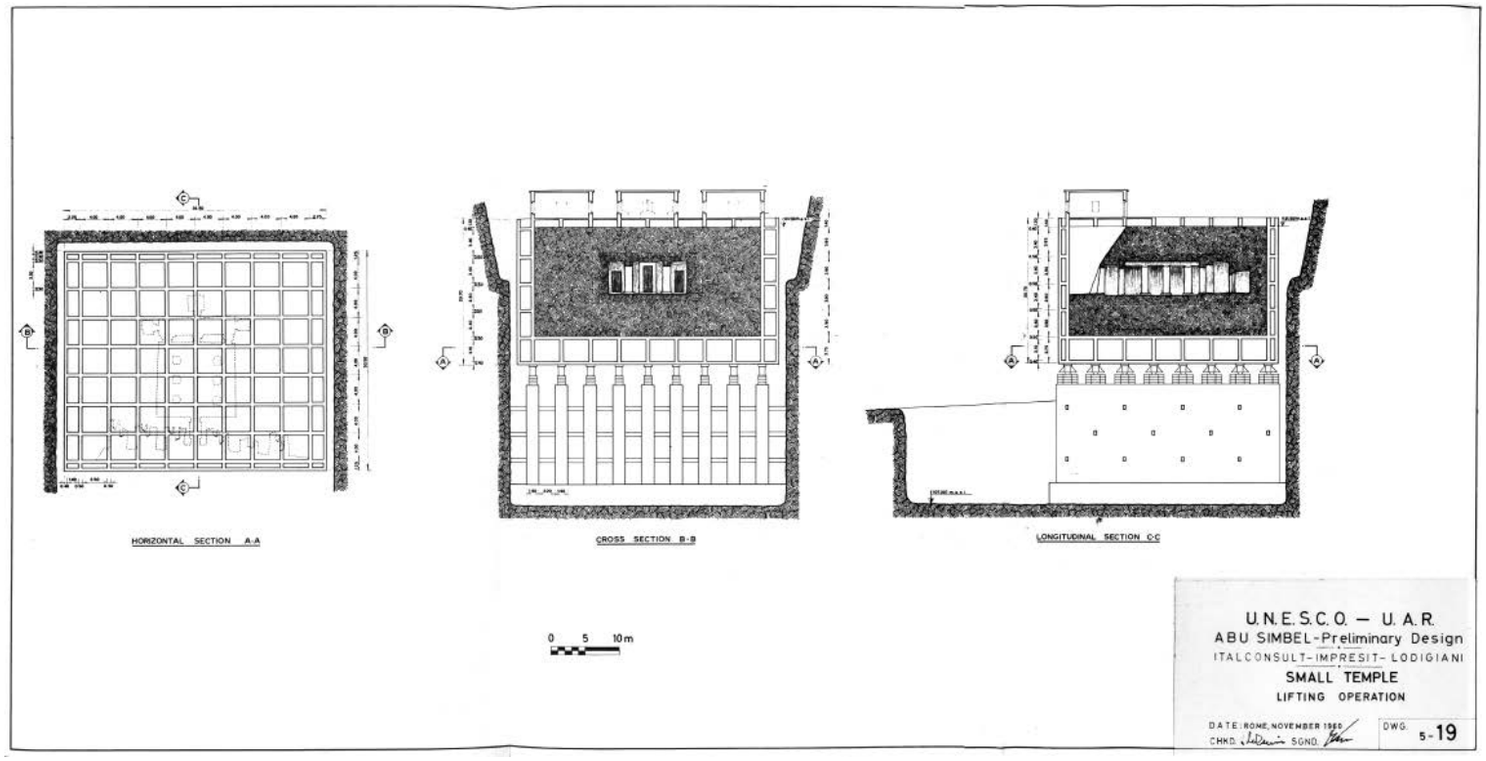


between 59 and 82 million US dollars, with annual maintenance amounting to about US$ 370,000.
Illustrations of the project showed a landscape of exceptional grandeur. The temples were to lie opposite the embankment of the dam lined with local sandstone. Visitors would reach it from above from where they could see the whole site at a glance; pathways along the inner slopes of the embankment would offer them a variety of viewpoints onto the reflecting pool dominated by the giant statues.

Lifting the temples

The second plan examined by UNESCO was the one presented by a group of Italian firms with Gustavo Colonnetti,[408] Pietro Gazzola[409] and Riccardo Morandi[410] acting as consultants. Using modern engineering means, the plan involved cutting through the hill, building a casing around each block of rock containing the temples, raising both casings to safe level above the waters, and reconstructing the hill around the casings in their new position. This would avoid any

Small temple at Abu Simbel, preliminary design (1960), Italconsult, Impresit & Lodigiani, cont.: Plan and cross and longitudinal sections of the caisson



direct intervention on the monuments and respect the sacred relationship between architecture and environment, namely: maintaining the original orientation of the Great Temple so it would still be aligned with the sun during the solstices.

Feasibility studies were begun in April 1960 and were completed about eight months later. The final version of the plan, dated November 1960,[411] included a series of specific reports, on the fissures already present, the characteristics of Nubian sandstone, the restoration work to be done before the buildings could be raised, and the work needed to consolidate the foundations of the temples in the rock in which they were going to be embedded. The plan was to be carried out in stages, over a period of six years. The first step was to construct cut-off walls and drain-wells to protect the worksite from the water of the Nile. A drainage ditch would be dug in front of the temples to isolate them from the river bank. The highly delicate second stage would involve removing the rock above the temples to reduce the load to be raised. A space would be created to separate the rock containing the temples from the solid cliff behind it. Likewise, a series of tunnels would be dug 7 meters below the average level of the temple floor, where the steel ribbing of the foundation slab would be assembled. In this space casings (cellular protection boxes) would be constructed to absorb the stress created while the temples and the enclosing rock were being raised. The biggest casing would measure 71.5 x 60.7 x 44.1 m. At this point, the temples would be completely enclosed in the casings, made of a gridlike structure of reinforced concrete beams. Its front wall would protect the façade of the temples while they were being lifted. The upper slab of the casing with its top connecting beams would absorb stresses previously taken up by the upper part of the hill. The base of the casing (foundation slab) was to be built under a thick layer of

rock, digging parallel tunnels to form an underground grid-type structure of reinforced concrete, the crossing points of which would receive thrust from hydraulic jacks used in the raising process. More underground tunnels would be used to build the platform to which the hydraulic jacks would transfer the load of rock. The Great Temple, weighing 253,000 t with its casing, would be raised by a set of 308 hydraulic jacks, each of a capacity of 500 t,[412] acting synchronically. Little by little, the temples in their casings would be raised by 62 m (from 125 to 187 m above sea level). Once the temples had been lifted to their final position, the hydraulic jacks would be removed and replaced by suitable foundations consisting of a series of continuous walls of reinforced concrete. The last stage of the work would concern restoration of the surrounding environment, building two artificial hills covered with blocks of Nubian sandstone and reproducing the former gorge between the two temples. In this form the plan was presented on October 25, 1960 to the director general of UNESCO on behalf of the Italian Government. The cost would vary between $43 million and $58 million, depending upon efforts devoted to restoring the landscape. The accompanying report emphasized the importance of restoration, coining the expression "living stone," a combination of geology and biology, to express the centuries-old balance between the monuments and their natural surroundings.

Appraisals

To compare the French and Italian plans, Veronese appointed a group of experts that included the Egyptian architect Ali Labib Gabr.[413] The committee rejected the French plan, judging it too difficult to carry out for technical reasons. The plan proposed innovative methods for building the dam in the absence of full knowledge of the properties of the alluvial silt under the embankment, or how far the Nubian sandstone might have deteriorated under the sand. The French plan could also be jeopardized by unfavorable climatic conditions, a risk that the engineers could not avoid. The Italian plan was appreciated for its inventiveness and completeness, but it could not be undertaken unless there was absolute certainty it could be completed on schedule. The lifting process using hydraulic jacks would have required an unprecedented degree of skill and precision, but the risks relating to mechanical and electronic problems could have been dealt with. Concluding the evaluation, the experts voted for the Italian plan.[414] They noted that the dam would not only diminish the proportions of the temples, but it would also require continual maintenance and the constant use of drainage and pumping systems. By raising the temples to a higher level, it was thought that they would better withstand the test of time.

Moving the temples

"After a thorough examination of both plans a final decision was taken in favor of a third idea put forward by a Swedish firm, this being to cut the temples into blocks and put them together again above the maximum level that the lake created by the High Dam could reach."[415] This decision was made in June 1963 and an international competition was announced for tenders. The contract was awarded to Joint Venture Abu Simbel.[416] Under this plan, the temples would be cut out together with some of the cliff around them, and put together again at a site 65 m higher up. The cutting and reassembly work, involving complex topographical operations, was assigned to Impregilo. They hired marble quarrymen from the Apuan Alps: "men skillful in plying traditional tools, such as handsaws, the only ones suitable for lessening the risk of damaging the structures."[417]

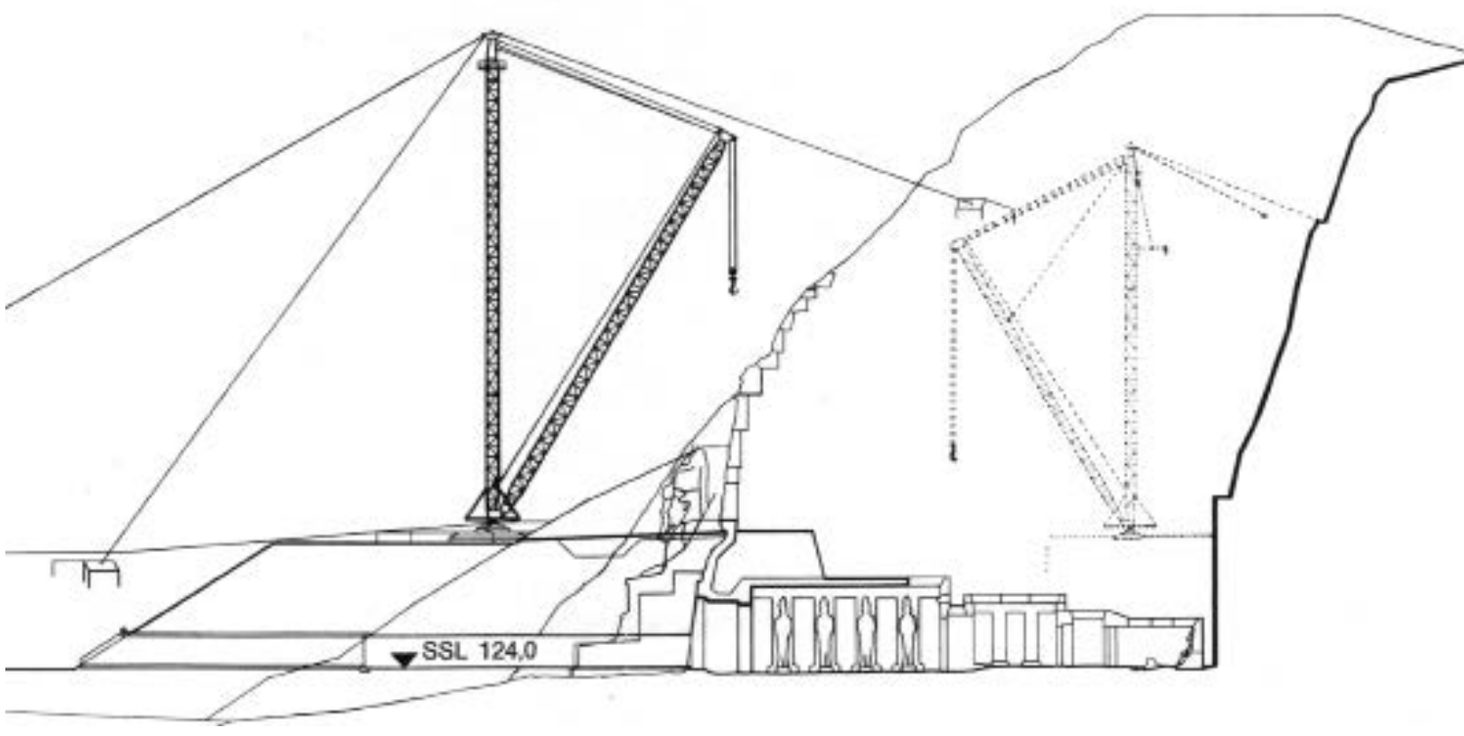
Work began at the beginning of 1964, with the creation of barriers to protect the worksite from the river water, followed by removal of rock around the monuments. Special apparatus was used to ensure that vibrations did not exceed a certain limit. The frontages of the temples were protected with sandbags, the roofs and walls with temporary braces. The layer of rock was reduced to 80 cm from the surfaces of

Great Temple of Abu Simbel, preliminary design (1965), Joint Venture Abu Simbel, cont.: Longitudinal section of the temple and construction cranes

the monuments. The first plan for actual cutting was ready in July 1964: the statues, walls and roofs of the temples were to be cut up into over a thousand blocks, of a size to permit their being raised and moved.[418]

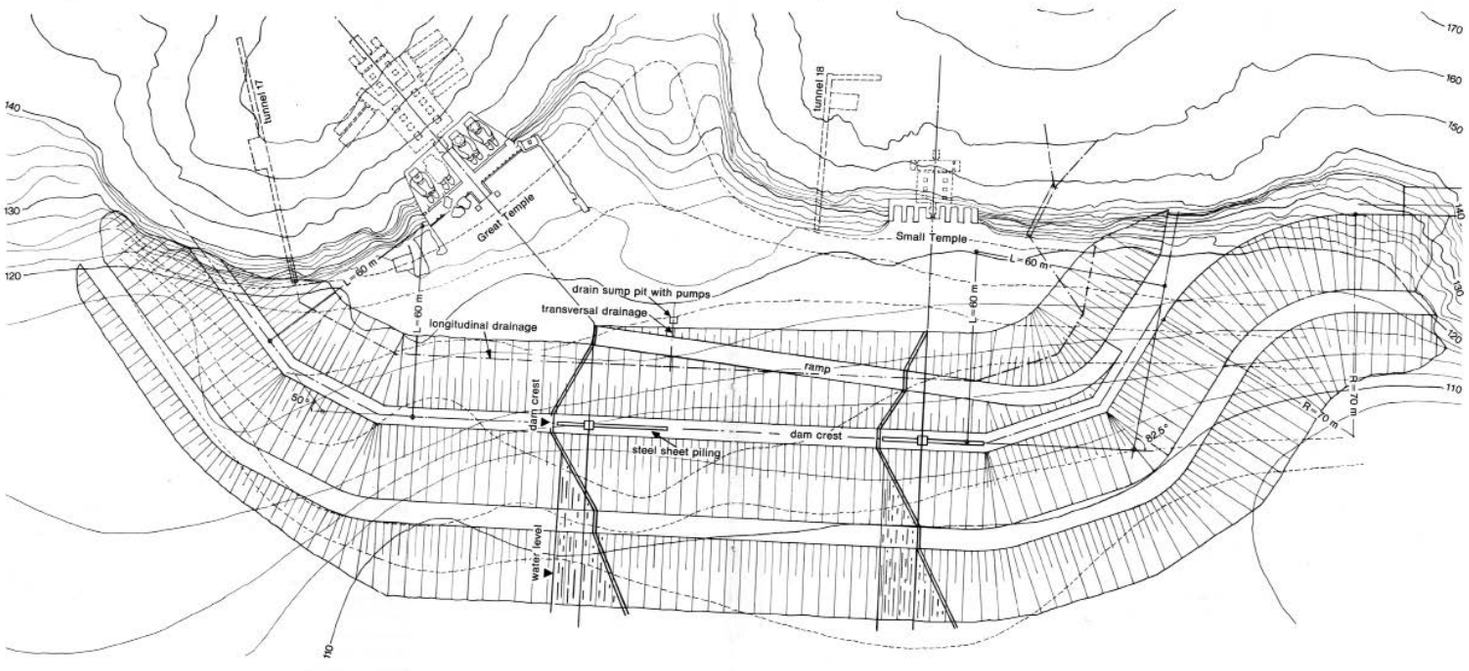
To cut through the sandstone with a maximum kerf, or width, of 6mm, handsaws were used for parts on the surface and mechanical saws for all the rest. Removed from their original positions, the blocks were taken to the depot[419] for treatment and preparation before being reassembled; their rear surfaces were reinforced with concrete and steel bars inserted for anchoring them.

The work of cutting and removal began on May 21, 1965 and was completed on April 16, 1966.[420] While the last blocks were being cut, crews began reassembling the temples in their new position; using a theodolite, surveyors and topographers checked the new positions of the blocks down to the millimeter. Reconstruction areas had been dug for the foundations of the temples with their reinforced concrete caps,[421] covered over with earth and sandstone debris. The cliff face, a sheer drop down to the lake, was mounted with the support of reinforced concrete walls; the temple façades were reassembled using supporting frames on which the single blocks of the colossal statues could be placed in position one by one. Considering the number of people employed at the site (about 1,900, a figure that rose to 3,000 when their families arrived), the temporary settlement envisaged by the plan was similar to a small town: houses and offices, dining halls and cafeterias, sports facilities, hotels and shops, a mosque, and a police station. Journeys to and from the site were made by jeep and on camels. Rebuilding of the temples was completed earlier than expected, in the autumn of 1968; though restoration work continued until 1972, the site was inaugurated on September 22, 1969[422] in the presence of UNESCO and high-ranking government officials.



Temples at Abu Simbel, preliminary design (1965), Joint Venture Abu Simbel, cont.: Overall map of the site facilities and the contractors' colony

Site plan showing the location of the temporary protection dam



Temples at Abu Simbel, Joint Venture Abu Simbel, cont.: Photograph of the temple reconstruction site and the dome that will support the landscaped hill, c. 1967

Much has been written about the temples of Abu Simbel, especially in the 1960s when rescue operations were in progress. The principles formulated during the international campaign launched by UNESCO were codified in the Convention Concerning the Protection of the World Cultural and Natural Heritage. For Egypt, the work at Abu Simbel, more than any other, attested to the importance of re-establishing relations with its history: a millenary history suddenly front and center on the world stage (and so re-launched in international tourism) due to the new geography of the Nile Valley and an operation of unprecedented technical value and interest.

We may add that the Italian planners, experts, and quarrymen who actually solved the problem of saving the temples of Abu Simbel further reinforced Italy's new role in building modern Egypt. In Italy, the venture made headlines for years, and was seen almost as a sporting challenge, expressing something of postcolonial pride. A recent article entitled "When our businesses saved the Pharaohs"[423] showed a half-page photo of the head of Ramesses II being lifted by a crane. It went on to state how the Egyptian guides told tourists that the "clever Italians" had moved the temples three hundred meters back and raised them sixty higher. [424]

Annexes

APERÇU DES FONDS
A BRIEF SURVEY OF THE ARCHIVES
IL PATRIMONIO ARCHIVISTICO
ملخصات مجموعات الارشيف

The Baume & Marpent archive collection

Isabelle Sirjacobs

The Écomusée of Bois-du-Luc, housed since 1983 at the old mining site of Bois-du-Luc (Belgium), has made the saving and transmission of industrial experiences one of its founding missions. Included among its collections is the Baume & Marpent archives. With over 100 linear meters of archives, this precious assembly contains numerous plans (1200) portfolios, photographs (including 800 glass slides) as well as administrative archives (20 linear meters). It reflects the international expansion of the company founded in Haine-Saint-Pierre (La Louvière) in 1853. Originally specialized in railway construction, from 1871 the company diversified its manufacturing programme and conquered the five continents: China, the Near and Middle East, Belgian Congo, Brazil, Argentina, Egypt etc. In addition to civil engineering constructions, it created structures for civil and industrial buildings; gasometers, water, oil and acid reservoirs; heavy engineering machinery, railway equipment, etc.. These constructions are all documented in the Baume & Marpent archive collection which is of undeniable interest for the architectural field. The portfolios of technical plans thus contain the entire development process for constructions, from land surveys for the elevation of a bridge to the details of rivets or even the decorative escutcheons of the railings that contain it.

The archives selected in the context of the Arching project illustrate the projects embarked on by Baume & Marpent in Egypt. These records show how much the firm from Haine-Saint-Pierre worked in that part of the Mediterranean basin. The company's administrative archives complement the information supplied by technical plans, such as, for example the abundant correspondence exchanged between the head office at Haine-Saint-Pierre and the Egyptian division (1948-1958). The archives describe moreover the close relationships formed between Belgium and Egypt through Belgian and Egyptian engineers in particular working together on numerous projects. Beyond the technical exploits of the company, it is precisely this alternative view which fascinates us and opens us to new perspectives.

The Società Nazionale Officine Savigliano archive collection

Vilma Fasoli

The documentation related to the Società Nazionale Officine Savigliano (National Ironworks of Savigliano) is currently housed at two different institutions in Turin: the State Archives (combined sections)[425] and the Central Library of Architecture at the Polytechnic of Turin (www.polito.it).[426]
The first institution houses documentary material from roughly 1880 to 1975, when the American company General Electric took control of SNOS.[427] The material, stored in folders or bundles, constitutes the largest part of the archive: nearly 400 linear meters. The part relating to projects and construction site activities is collected in folders, with the drawings folded. Numerous other documents, mostly tracing papers, are wrapped in tubes or lying flat in large folders. Other drawings (about 800) are simply wrapped. Photographic documents consist of glass plates, prints, photo albums, and slides. This section of the archive also contains woodblocks and metal plates that may have been used to print the company magazine. The archives also include the 665-volume technical library. As an excellent primary source for the industrial history of Turin and Piedmont, the company's archives were donated to the Italian State Archives, which then completed a full reorganization and computerized cataloguing of the materials between 2002 and 2003.
The Central Library for Architecture at the Polytechnic of Turin stores about 1000 glass plates, reproductions of the project and construction site drawings, some of which document the work in progress. An inventory of the archives has been compiled in hard copy.

The Hennebique agency archive collection

Simon Vaillant

Hennebique main office, Paris (1899-1900), Édouard Arnaud, arch.; Roquerbe et Compagnie, cont.: The archives

From 1967, the Hennebique archive collection was conserved at the Conservatoire National des Arts et Métiers (Paris). In 1989, it was deposited with the archives of the Institut Français d'Architecture.[428]

Although incomplete (estimated at 50,000 files among the 150,000 dealt with by the agency between 1898 and 1967), this archive is nevertheless the largest collection of documents existing in France on the history of construction with reinforced concrete (with that of the Pelnard-Considère et Caquot design office conserved at the Archives Nationales du Monde du Travail in Roubaix). It consists of 400 linear meters of case files, 10 linear metres of agency documents, 6500 photographs, and almost every issue of the journal *Le Béton armé* (1898-1939).[429]

The design files make up the main body of the collection and are spread over a period going from 1892 to 1939. Of varying size (in terms of volume and contents), each file was assigned an order number (*numéro d'affaire*) corresponding to that of the series in the main office. The files contain written documents (correspondence, calculations, quantity sheets, and "breakdown and use of bars" sheets (making it possible to order materials). In certain cases, there are

Porcheddu letterhead

The Porcheddu Archive Collection

Vilma Fasoli

also explanatory estimates, specifications, contract award announcements, etc., technical diagrams (drawings and tracings of armature plans, structure plans, diagrams of reinforcing bars), and architectural plans (architects' or contractors' drawings).

The photographs concern implementation and construction sites. They were sent by agents and licensees to be published in *Le Béton armé* and in sales brochures, or for exhibition. At Hennebique's head office,[430] they were cleaned and sometimes even retouched to match the company's brand image. Through photography, the design office re-occupied the site, and reappropriated the work, without actually carrying it out. From a difficult-to-master corpus consisting of built structures, Hennebique succeeded in forging an identity, something its competitors seem to have lacked.

The majority of the archives are in good condition. Currently, each document is being referenced, assigned a catalogue number, and filed according to a method which differs from Hennebique's original filing system. This consisted of a typological division with two hierarchical levels: six large categories (housing, public buildings, industrial buildings, civil engineering works, silos and reservoirs, and trials), subdivided into 32 subcategories of structures. In the folder for each subcategory, archivists at the head office filed the photos. All the elements of this catalogue have survived, providing much useful information: indications of place, techniques, dates, people's names, etc.

The processing of the design files, begun in 2005, will continue until 2016. To date, more than two thirds of the files in the collection have been made accessible.[431]

The processing of the photographs began in 1994 and was finished in 2000. 300 prints were digitized; the complete digitization of the rest of the photographs is still planned.

Since the liquidation in the 1970s of the company owned by Giovanni Antonio Porcheddu (1860–1937), its archives have been housed in the library of the Department of Construction Engineering at the Polytechnic University of Turin (Politecnico di Torino). They cover nearly 2,600 reinforced concrete structures built by the firm between 1895 and 1933 using the Hennebique process. Nevertheless, a comparison of these 385 dossiers with the monthly list of structures completed, published in the trade journal *Le Béton armé* under the column heading "Travaux du Mois," indicates that some files are missing from the archives in Turin. In 1977, with funding from Italy's National Center for Research (CNR), the library compiled a printed index of the documents to facilitate research. Original project drawings, blueprint copies of them, and preliminary sketches are folded and stored in boxes according to the filing system the Porcheddu company used. As a result, each folder bears a catalogue number associated with a type of project, and, in addition to the drawings, contains the correspondence regarding the project, along with invoices and other accounting data, as well as advertising brochures published by product suppliers.


SOCIETÀ PORCHEDDU ING. G. A.
(ANTICA DITTA ING. G. A. PORCHEDDU)
COSTRUZIONI IN CALCESTRUZZO ARMATO
SISTEMA HENNEBIQUE
ED ALTRE
Capitale Sociale L. 4.000.000 - Versato 2.800.000
Sede in TORINO
Corso Valentino, N. 20
FILIALI:
GENOVA - Via Maddaloni, 4
MILANO - Via Melchior Gioia, 35
ROMA - Piazza Colonna, 355
ELENCO DEI LAVORI ESEGUITI
IN CALCESTRUZZO ARMATO
SISTEMA HENNEBIQUE
DAL 1895 A TUTTO IL 1909

The historical archives of the Cavalieri del Lavoro

Michelangelo Salpietro

The Cavalieri del Lavoro is an Italian order of merit. In Rome, the archive, known as the Archivio Storico dei Cavalieri del Lavoro (ASCL, Historical Archives of the Knights of Labor) contains exhaustive and continuous documentation on 110 years of Italian industry. There are 2,702 files, of which 2,134 are stored in the so-called "historical" archives, defined as those concerning the deceased Cavalieri del Lavoro, and 568 in the "current" archives, concerning the living Cavalieri del Lavoro. The "historical" archives are collected in 209 cartons labeled with Roman numerals (I-CCIX). The "current" archives, reside in 80 cartons labeled with Arabic numerals (1-80).

The distinction between "historical" and "current" is chiefly for the convenience of the researcher. In fact, the files systematically present each Knight's biographical information and the reasons for his nomination to the order.

The archives are particularly valuable, because for the majority of the entrepreneurs awarded the Order of Merit for Labor from 1902 to 1943, the only documentary material extant is that preserved at the ASCL.

Since its founding in 1926, the ASCL's purpose has been to collect and store information on the life and works of the Cavalieri del Lavoro. The files contain valuable information not only on business activities, but also on social initiatives. They were systematically used as sources in 2001 for the publication of a book celebrating the centenary of the Order of Merit for Labor. Although they represent a first-hand source for the study of the history of economy, industry and entrepreneurship, they are largely unexplored.

The recent reorganization of the ASCL was carried out in conformity with the provisions concerning the organization of the archives. This effort was rewarded in June 2011 when the archives were declared to be "of particularly important historical interest". Thanks to this legal recognition, the ASCL is now listed as one of Italy's "national cultural assets", guaranteeing it the protection provided by the State in safeguarding cultural heritage.

Since June 2011, as a result of a computerization project started in 2009, an inventory of the records and a concise inventory of all files have been available online. The database is organized on the basis of open information infrastructures – that is, uniform, recurrent information elements liable to be systematically analyzed in order to facilitate the selective recovering and processing of data, allowing for reference aggregation and typological processing operations. The aim is to make the ASCL's documentation available to scholars and Knights' families, providing users with a free-access platform with a multi-level aggregation and decomposition structure to broaden the query and statement capabilities.

Raising the Aswan Dam (c. 1930), Historical Archives of the Cavalieri del Lavoro, Rome, dossier Guido R. Pizzagalli

The Fosfati archives

Antonella Cabassi

The archives of the Egyptian Phosphates Company are not and have never been comprehensive, due to the continuous changes in the company structure. Each administration produced its own set of documents, and the materials have rarely been reorganized and inventoried.

So far, our research has enabled us to identify the various company offices still maintaining valuable archives. Most of the collection is stored by Società Fosfati administrative departments, now dispersed in various locations in both Italy and Egypt. There are also the personal and professional archives of individuals (such as managers, architects, and others) and specific collections stored in archives of public officials, institutions, and agencies delivering permits and authorizations.

The administrative Archives of the Società Egiziana per l'Estrazione e il Commercio dei Fosfati is a part of the Historical Archives of Banco di Roma (Bank of Rome), and are conserved at the Palazzo del Monte di Pietà. However, restoration work on this building necessitated the temporary removal of the archives elsewhere, and not all collections are accessible. The material related to Fosfati, hitherto unstudied, can be divided into more than forty subgroups. They have never been filed together as a single collection: the documents are scattered according to accounting heading or the department in charge. Papers cover the period between 1900 and 1961, which we have divided into three periods. The first, 1900-1912, documents the Banco

SEP headquarters in Kosseir, c. 1935

di Roma's participation in the phosphate business through its subsidiaries. The second, from 1912 to 1927, covers Banco di Roma's ownership of Fosfati. The third, 1927-1961, documents Fosfati's control by the Italian state via IRI[432] and the Institute of Liquidation, which administered Fosfati's nationalization and its later sale to the Egyptian Government. The archives also store correspondence related to financing granted to the Marconi Company in 1908, in order to establish a radiotelegraph station in Kosseir.

The IRI archives became the property of the IRI Foundation, set up when the IRI was closed. They contain the documents produced during the regular audits of Società Egiziana Fosfati (SEF) accounts. Covering the period between 1933 and the company's transfer to the Egyptian Government in 1961,[433] they are currently being digitized in preparation for their inclusion in the Italian Central State Archives database. The body of materials related to Fosfati is considerable, both in the Archivio Generale Pratiche Societarie - Numerazione Rossa (General Archives of Company Business – Red Notation), which are considered to be the official archives of the Institute, and in the Archivio II - Numerazione Nera (Archives II – Black Notation), consisting of branch office files. A valuable collection of visual materials contains pictures of supplies imported from Italy (pumps, turbines, generators, etc.) and maps of the mines. On the contrary, blueprints and plans for the construction works carried out in Kosseir are rare or missing; most of the records extant are accounting documents and inventories.

During the research, we were able to study the personal archives of Pellegrino Pellegrini, a teacher at the elementary school in Kosseir between 1931 and 1958, who was also a representative of the Italian Consul in Port Said and a secretary of the PNF (Partito Nazionale Fascista) in Kosseir. The archives, which are a sort of great diary on Africa, were preserved and enriched by Mr. Pelligrini's son Ildo, as a record of the lives of immigrants from the Agordo region to Egypt.[434]

Furthermore, it was possible to study the professional archives of Fosfati's manager, Riccardo Decima,[435] who worked in Kosseir between 1921 and 1939. They contain drawings of mines, progress reports (on mining and construction works), estimates, correspondence, and photographs. The blueprints for the church built at Kosseir, however, are missing[436].

We have also begun to probe the archives of the Sacred Congregation for the Eastern Churches[437] for documents regarding Kosseir. Further information may emerge in sources conserved by the Archives of the Franciscan Province of Egypt.

A preliminary survey carried out at the Historical Archives of the Ministry of Foreign Affairs in Rome has identified some interesting materials related to the Italian Embassy and Italian Chamber of Commerce in Egypt, which are worthy of further examination. The files analyzed thus far are devoid of pictures, but contain correspondence that facilitates our comprehension of the events.[438]

The Archives of engineer Luigi Luiggi

Ezio Godoli

The library and a collection of documents without call numbers known as the *Miscellanea* from the engineering firm of Luigi Luiggi (Genoa, August 3, 1856 – Rome, February 1, 1931) are housed in the Filippo Arredi Library of the Department of Civil, Building, and Environmental Engineering (Dipartimento di Ingegneria Civile, Edile e Ambientale) of the Sapienza University in Rome.

Luiggi, a hydraulic engineer who specialized in designing ports, was also a political figure. At the Ministry for Public Works, he served as secretary to the minister, Francesco Genala (June 29, 1885 – April 4, 1887), and later as head of his cabinet (May 15, 1892 – November 8, 1893). In 1921, he was elected deputy of the Genoa Government on the Nationalist Party ticket, and in 1924 he was appointed senator at the request of the Minister of Interior Luigi Federzoni.

Nevertheless, he devoted most of his career to harbor engineering.

In 1878, after earning a degree in engineering in Turin, Luiggi was employed as a Civil Engineering Officer. In 1881, he was assigned to plan and supervise the extension of the port of Genoa. However, he was forced to interrupt this assignment in 1882, in order to take part in the Campaign of Africa. Beginning in 1892, he directed the restructuring of the port of Livorno.

On the recommendation of the Italian Government, Luiggi was hired in 1896 by the government of Argentina, which commissioned him to plan and supervise the construction of the Puerto Belgrano naval base. For the base, which opened in March 1902 and was located in the Province of Buenos Aires, he drew up a development plan and some terminals and warehouses linked to the railway branch line to the nearest city, Bahía Blanca. He was also asked to work as a consultant on port expansion projects in Mar del Plata, Rosario, Montevideo, and Buenos Aires, a business he continued even after his departure from Latin America in 1905. Upon his return to Italy, he was appointed Professor of Maritime and Hydraulic Constructions and Inland Navigation at the School of Applied Engineering (Scuola di applicazione per gli ingegneri) in Rome, a position he held until 1921. From 1905 to 1910, he also served on the Board of Directors of the Italian State Railways (Ferrovie dello Stato). He was a member of the steering committee of the Italian Society for the Advancement of Science (Società Italiana per il Progresso delle Scienze), founded in 1907, and also served twice on the Board of Governors for Education (Consiglio Superiore della Pubblica Istruzione) (1907-1913 and 1921-1923). Between 1911 and 1912, he designed the expansion and reinforcement of the ports in Massawa (Eritrea) and Brava (Somalia). Called up for the Italo-Turkish War of 1911-1912, he was asked to draft plans for the ports of Libya and the development of lighthouses and beacons along the Libyan coastline. During World War I, he was enlisted from 1915 to 1918, but continued working as a consultant for hydraulic engineering projects. In 1916, he was asked to be a member of the technical committee for the irrigation feasibility study of Puglia and Basilicata. In 1923, he joined the Commission Européenne du Danube and the Commission Technique Consultative du Canal de Suez. He designed the ports of Suez and Alexandria for the Egyptian Government. From 1926 to 1928, he was responsible for the design of the port and for the reclamation of Durres, Albania. Appreciation of his work abroad garnered him many academic degrees and honors: he was named honorary member of the Argentine Scientific Society and of societies of engineers in Buenos Aires, London, and New York; he belonged to the British Association for the Advancement of Science, and was also an Officer of the Order of the Légion d'Honneur.

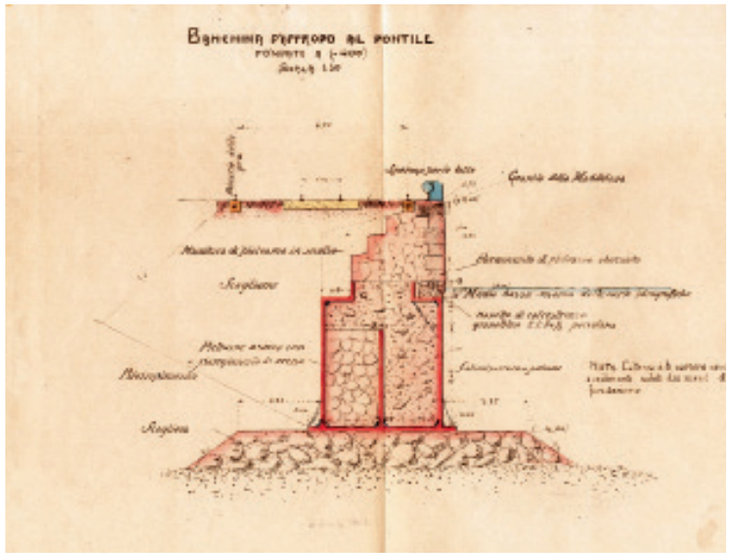
The Luigi Luiggi *Miscellanea* collection is stored in 90 folders numbered from 1 to 98. The few gaps can probably be explained by the absence or severe shortage of documents related to some of Luiggi's projects. Some of the projects in the file document the entire construction process, from the first sketches to the working drawings (with numerous details). They include specifications for the companies which have been awarded contracts (valuable sources of information on the materials employed and the construction techniques used), correspondence with

Port of Tripoli, Libya: Overall plan,
Luigi Luiggi, eng.

these companies, and photographs of construction sites. The *Miscellanea* also contain blueprints and photographic documentation of the hydraulic and railway engineering projects Luiggi examined as an officer of the Ministry for Public Works, civil engineering inspector, or member of numerous committees, as well as catalogues, photographs, and blueprints from the construction companies and building material suppliers with which he collaborated. Documents supplied by the large industrial firms for which he worked as a consultant – such as the bullet factory Gio. Ansaldo & C. in Sestri Ponente (Genoa) – can also be found in this archive. A selection of doctoral dissertations supplements the archive.

The contents of the *Miscellanea* reveal Luiggi's ongoing endeavor to stay up to date with the most recent engineering achievements and the latest findings in all the fields related to engineering, by maintaining his network of international relationships. The cartographic collection of development plans for the port zones of different cities on various continents, and the documentation on the structures

Port of Tripoli, Libya: Section of the unloading dock, Luigi Luiggi, eng.



built (lighthouses, warehouses, depots, etc.) and the equipment used in the ports to transport and lift goods are also valuable sources. As for hydraulic engineering, the collection includes projects for reclamation works, dams, power stations, and waterways. It also contains a wealth of documents on public housing (particularly on new patents for prefabricated systems) and on the works of Italian architects in Latin America.

Regarding Northern Africa in particular, the documents most consistently concern Libya and Egypt. The development plan for the port of Tripoli, drafted by Luiggi's firm between December 1911 and January 1912, established the method which facilitated the design, execution, and management of the works at the ports of Benghazi, Derna, and Homs. To draft his plans, Luiggi used to start with maps of the cities and territory, as well as charts of the coastal waters recovered from various archives. He then carried out inspections and depth-sounding on site to verify their reliability, and he also analyzed available data regarding weather conditions. He also sought out local sources for materials used in the construction of dams, breakwaters, and docks. Construction carried out for military purposes received top priority, but instead of building temporary facilities, Luiggi always designed them as the first stage of a broader development plan for the port, capable of meeting future requirements in terms of freight and passenger traffic. In January 1912, when the port he was engineering for the city of Tripoli required the construction of a new sewage system and an aqueduct, Luiggi appended a *Diagramma del piano regolatore* (development plan diagram) to the port project. The "diagram" was a general outline of the city, including railway and streetcar lines. He designated land outside the city walls for industrial, military, and hospital use, and zoned residential districts, segregated by class and ethnicity (Luiggi was motivated by the need to avoid religious friction). It called for the demolition of the city walls and the preservation of the ancient city (entailing a modest urban renewal program) for its "picturesque" quality. In the *Diagramma*, Luiggi even indicated the locations of the main public buildings, and for some (governor's residence, courthouse, city hall, schools, post and telegraph offices), the civil engineers drew up plans for these projects, which are now stored in the *Miscellanea*.

In 1923, Luiggi was hired by the Egyptian Government as an expert witness in the lawsuit against A. Bos & Cie, concessionaire for the works at the port of Suez. His appraisal was the basis for a project entitled *Travaux d'Amélioration du Port de Suez (Port of Suez Improvement Plans)*. It downsized the "grandiose lines" in French engineer Gaston Jondet's project (which had been approved in 1918). Luiggi developed his own project, based on the guidelines of the plan drawn up in September-October 1922 by L.A. Mazin, the project manager for the port of Suez, who assisted him in drafting the new project and estimating the construction costs. The 1923 plan indicated oil basin upgrades, pier reinforcement, and dredging at Port Ibrahim and at the old port of Suez as priorities (documented in the report with correspondence with the Ministry of Communications and 22 drawings).

Also in 1923, Luiggi was involved in the drawing up of a development plan for the Port of Alexandria. Although based in part on Jondet's plan (1920-1921), it was much greater in scope. The following priorities were listed: construction

Port of Derna, Libya:
Overall view of the facilities

of a new pier "E" south of the mouth of the Mahmudiah Canal; extension of the oil refineries; a swing bridge over the Mahmudiah Canal; the expansion of the freight dock, with new cargo-unloading and transport equipment; and the construction of a fertilizer terminal. The first draft of the plan, presented on September 20, 1923, was followed by a variation dated January 1924. The latter reassessed earlier judgments, and stressed the need to complete the oil basin prior to building the fertilizer terminal. In December 1925, instead of scheduling the works, the Egyptian Government appointed a committee of experts, consisting of Luiggi, the Englishman Cyril Kirkpatrick, and the Frenchman Charles Laroche. Their task was to review the three projects for the expansion of the port of Alexandria drawn up by Jondet, Luiggi, and Mazin (1925). After the comparative study of these plans and two meetings with shipowners, businessmen, and representatives from the petroleum industry and other groups involved in the development of the port of Alexandria, the commission wrote up its findings in a report dated February 24, 1926. This document outlined a thirty-year program for developing the harbor. However, the only project excluded from the new plan was the oil terminal (advocated as a main priority by Luiggi). The commission suspended judgment on the subject, suggesting possible alternative locations such as El-Mex, El-Dekheila, and Damietta. The commission had also been asked to study the improvements to be made in the ports of Kosseir, Marsa Matruh, and Damietta. The proposals submitted concerned projects of limited scope. Damietta was to be sounded for seabed excavations. Similarly, dredging was suggested for Marsâ Matrûh. Only at Kosseir was there a proposal to build two new breakwaters.

The body of documents regarding Africa in the *Miscellanea*, which includes historical cartography, plans, reports, and description of construction systems, is a valuable source of information for both historians researching the development of Libyan and Egyptian ports from the late 1800s to the 1920s and businesses in the field of restoration of large structures. It also sheds light on the difficulties European engineers encountered in Africa, involving materials procurement, the availability of skilled workers, and the organization of construction according to strict economic criteria. Finally, it also contains information about the transfer of skills from European to Egyptian technicians, which occurred April 1924-April 1927 following the Act of 1923 demanding the dismissal of foreign officers.

The archives of French construction companies

Dominique Barjot

French companies in the building and public works sector constitute one of the major sectors of the French economy: in 2007, for example, their turnover amounted to 201.2 billion euros (of which 70% for construction and 30% for public works).[439] Moreover, it is an industry that exports a certain amount (12.8% of the total turnover), but this is mostly in the area of public works (33.8% of the total turnover) rather than construction (3.2%). This importance is on a European scale. The French construction industry is in third position behind Germany and Spain. It also features a high level of concentration. A very small number of very large conglomerates dominate, namely Vinci, Bouygues, Eiffage and, far behind, SPIE, Fayat and SPIE Batignolles. The first two are European leaders, ahead of ACS Dragados, a Spanish group, Hochtief, a German conglomerate which is now partly owned by ACS Dragados, and the Swedish group, Skanska.

Historically, and this is found in the uneven international integration shown above, the French construction industry has been dominated by public works companies: what can be observed for companies is moreover found on the side of the authorities, since the Ministry for Public Works, especially its Bridges and Highways administration, has produced much more historical archives than the ministry for Reconstruction, Housing and Town Planning. The spectacular rise of Bouygues since 1950 is an exception.

These characteristics of the French construction industry explain why the large majority of company archives are today accessible in public collections or, more surely again, among those of the major conglomerates. From the numerous takeovers and equity acquisitions and mergers, these have brought into their orbit numerous mid-sized and large companies whose history clearly deserves the interest of academic research. It is thus possible to cover most of the technical specializations that constitute the branch of public works (major civil engineering projects, general earthworks, waterproofing and specific foundations, steel construction, road works and airports, railway construction, maritime and river works, creation of transport and telecommunications networks, water supply and sanitation works, etc.), but also the major building trades (structural and finishing work).

From the point of view of company archives, it is the Vinci group that conserves the richest collection. Its two main French competitors, Bouygues and Eiffage also offer vast, but uneven perspectives to researchers. However, there are numerous collections of varying size and ease of access which can be used for academic research.

A historical leader: Vinci

Managed today by Xavier Huillard, the Vinci group focuses on history as illustrated by its website, as does the publication in 2003, of a major work produced for the group's centenary: The Société Générale d'Entreprises was born in 1908, but it had been in 1899 that the partnership Giros et Loucheur had been founded, from which it comes.[440] This book had been the fruit of a huge amount of archival research. Prepared by a vast doctoral dissertation, itself renewed in a recent publication, this research had been carried out by a team assembled under Dominique Barjot thanks to which it was possible to cover all the trades in which the group is active.

Five founding entities

Vinci was in fact formed from a merger between five major entities. The first was the Société Générale d'Entreprises, founded by two graduates of the École Polytechnique, Alexandre Giros (1870-1937) and Louis Loucheur (1872-1931). After Louis Loucheur's departure in 1916 for high ministerial office (Secretary of State for Artillery and Ammunition, then Minister for Arms), Alexandre Giros managed the company with a staff of managers and with his sons in law, including Jean Matheron, CEO from 1945 to 1971, but also of the Belgian group, SOFINA which remained a shareholder until 1963. In 1966, the SGE passed into the orbit of the Compagnie Générale d'Électricité, then in 1983, of Saint-Gobain and finally, in 1988 of the Générale des Eaux. SGE freed itself from this tutelage in 2000 with its merger

with the GTM group. The SGE has a remarkable collection of archives, which the skill of the men from Saint-Gobain in particular allowed to survive until today. It is especially rich in the area of electrification works and major civil engineering constructions.
The passage of SGE into the Saint-Gobain group resulted in the merger, in 1986 of SGE-BTP, SGE's main subsidiary, with SOBEA, which grouped together all of Saint-Gobain's construction industry activities. Of all of these, the most important was Eau et Assainissement (or Société d'Eau et Assainissement, SOCEA), established in 1918 and whose archives Vinci has taken over. They offer definite possibilities for the study of water supply and sanitation works both in France, in overseas French territories and abroad, directly or through subsidiaries (SOCOMAN, Compagnie Française des Conduites d'Eau). From the abovementioned merger, SOGEA was born, one of the essential components of today's Vinci Construction.
Another of its components was Campenon Bernard, with which SGE merged in 1988. Established in 1920 by Edme Campenon (1872-1962), an unusual businessman, the company owed its success to its partnership with Eugène Freyssinet (1879-1962). He trained remarkable engineers such as Jean Muller (born in 1925). Campenon Bernard thus imposed itself as a world leader in prestressed concrete and a major protagonist in technical progress in the domain of bridge construction. This company's archives therefore appear to be of significant historical interest.
In 2000, SGE merged with Groupe GTM to create Vinci. Now, Grands Travaux de Marseille (GTM) had since the beginning of the 20th century, argued the leadership of public works. Created in 1891, in view of cleaning up Marseille's harbour, GTM then imposed itself, thanks to Charles Rebuffel (1861-1942), in hydroelectric and civil engineering works for harbours. They created a powerful group around them, which was very involved in the Colonial Empire. They also knew to disengage from it after the World War II, in particular under the leadership of René Gonon (1906-2001), to turn successfully towards oil services (ETPM, then a merger in 1982 with Entrepose) and towards the prestressing of concrete. This history can be studied through the archives which are of great interest despite their small quantity.
Between 1985 and 1990, GTM passed gradually under the control of Dumez, one of its main competitors. Created in 1890 by Alexandre Dumez (1864-1932), this company developed significantly after 1945 under the leadership of the brothers Pierre (1901-1970) and André (1903-1998) Chaufour. It became one of the world leaders in terms of large dams. Then, in 1990, the founding family retired, to the benefit of Lyonnaise des Eaux. The impact of this withdrawal is not neutral from an archival point of view: the history of Dumez remains therefore more difficult to study than those of the other four entities. It is therefore necessary to call upon the family's collection of documents.

A vast palette of trades

The Vinci group cannot be reduced to these entities only. The group's archives contain many other treasures, through its different trades. A first area concerns concrete and specific works, thanks to the archives of STUP-Freyssinet, established in 1943 by E. Freyssinet and the world leader in prestressing, those of Sainrapt et Brice and, more recently, of Solétanche-Bachy, world famous specialist in specific works and foundations, or those of Entrepose Contracting. Public works are equally rich in important archives. Among these, pipe laying works with CAPAG CETRA, the company created by Louis Ducatel (1902-1999), but also those of works in the sea and inland waterways (the companies Morillon Corvol et Courbot, Dodin, Caroni) and earthworks (Ruvenhorst et Humbert, Deschiron, Chantiers Modernes). These public works offered very rich perspectives abroad, thanks to the archives of CFE (Compagnie d'Entreprises CFE, the historical leader in Belgium) and its subsidiary Dredging International (ex Ackermans & Van Haaren), inherited from Dumez, as well as those of Taylor Woodrow, one of the five major British companies, taken over by Vinci in 2008.

The Vinci group also contains, in its archives, what is needed to renew the history of building, which is less well known than that of public works. Indeed, the five components mentioned above have all had building subsidiaries: SGE with SICRA and Thinet; SOBEA with Balency-Béarn and Grands Travaux en Béton Armé; Campenon Bernard with Froment Clavier, BATEG; Oger, Génie Civil de Lens and, especially, CBC, which for a time became the competitor of SGE itself; Grands Travaux de Marseille, with UTE (Union Technique d'Entreprises), Grands Travaux du Midi and Petit. The corresponding archives allow, in particular, the heavy industrialisation of building to be studied. A foreign dimension can be given by Norwest Holst, another British subsidiary of Vinci. The archives of Eurovia are of equal interest. Indeed, the Vinci group merged within its own structure the road subsidiaries of SGE (Cochery, Bourdin et Chaussé), of Campenon Bernard (Vialit and Viasphalte, then Viafrance) and of GTM (Entreprises Jean Lefebvre with its subsidiaries Reveto and Salviam-Brun). It is thus possible to write the history of the modern roadway.

SGE and GTM have distinguished themselves in electricity. Consequently, it is hardly surprising that electrical installations and finishing works in buildings can constitute a strength of the archives. SGE was at the origin of the creation in 1977 of CGEE-Alsthom, which subsequently became CEGELEC, born from the merger between its own electrical department, that of Alsthom and, especially that of the Compagnie Générale d'Électricité (CGEE). Now, in 2009, CEGELEC re-entered the Vinci group, joining Vinci Énergies there. This company combines the electrical and network activities of the former GTIE, a subsidiary contributed by the Générale des Eaux, and those of this group's climate engineering business. From the first group, companies that are as interesting from a historical point of view, as Mors, Jean et Bouchon, Clémançon, Garczynski Traploir, Saunier Duval and Santerne emerge. From the second, are Tunzini and Améliorair in France, Wanner and its subsidiaries in Switzerland, Nickel in Germany and TMS in the United Kingdom. Finally, Vinci constitutes privileged access to utilities (transport, major public works). Indeed, before 1946, SGE had been the parent company of one of the largest French electricity companies, while GTM was the initiator in France of parking concessions (Parcs GTM) with SOGEPARC (a company bought by SGE in 1999). While imposing itself as European leader in the field of parking (Vinci Park) and motorways (Cofi-route, ASF, Acoba), Vinci also conquered strong positions in the management of airports and, especially in major structures (Stade de France, bridges over the Tage, the Severn and the Rion-Antirion bridge in Greece). One understands the immense wealth of the Vinci group's archive collection, which is truly essential.

Two major competitors: Bouygues and Eiffage

Opposite Vinci, in Europe stand two major French competitors: Bouygues and Eiffage. Their historical interest is no less important.

Bouygues: a construction and communications group

Created by Francis Bouygues (1922-1993), Bouygues is the most difficult group to access, no doubt because it remains in the hands of a family that has often been attacked and criticised.[441] At the same time, it appears to be less centred than Vinci on construction and utilities. From the beginning, the group combined property development and construction itself: Bouygues Immobilier, through its technical and financial efficiency, even provides an archetype in terms of sales activities. In the same way, the group took an interest in water, taking over SAUR, the third French company, from 1984 to 2003, in television, with its purchase of TF1 in 1981, in mobile telephony (Bouygues Telecom) and even in industry (30.8% of the capital of Alstom since 2006). Nevertheless, construction represents the largest portion (73.6% in 2010). If real estate is left aside, whose history cannot be told without mentioning Bouygues, the archives can be broken down into two groups: Bouygues Construction (29.6% of turnover in 2010) and Colas (37.4%). Through the first, the history of the group's beginnings can be retraced, which remained, until 1986, above all a

construction group. The Bouygues company had been founded on 1 January 1952 and then enjoyed, first thanks to building, then, from the end of the 1960s, from public works, an expansion unequalled in Europe. The Bouygues group grew from within, but also by external development with the acquisition of Quille, in 1965, the takeover in 1973-1974 of the Compagnie Française d'Entreprises, a giant of the public works sector which was at the time in bankruptcy, then the integration in 1986 of Dragages TP, with a very strong presence in Asia and Oceania (Hong Kong, Singapore, Thailand, Malaysia, Australia, New Zealand) and historically of great interest (thanks to its subsidiaries, Entreprises de Grands Travaux Hydrauliques, Régie Générale des Chemins VSL two world famous Swiss companies joined them, the second being the main competitor of STUP-Freyssinet International on the world stage. Between 1975 and 2001 a dependency of Bouygues Construction, Bouygues Offshore, through which the history of oil services in France can be traced (taken over from Amrep, the French leader, in 1984). ETDE is still attached to it, a competitive electrical installation company.

Of all of Bouygues' entities, Colas remains the most open to research. This company is also of all, the most important for the history of road works in Europe and North America. Established in 1929 by Royal Dutch Shell and SGE, it was quickly freed from the control of the second, before passing, between 1958 and 1983, under the control of the Raveau-Cartier group. From that time on, the company experienced rapid growth both internally and from outside (merger in 1983 with Société des Grands Travaux de l'Est). Taken over in 1983 by SCREG, in turn (with its subsidiary Dragages TP) acquired acquired by Bouygues in 1986, Colas imposed itself within this group as the most profitable subsidiary. Successive restructurings led to the integration within this company, of SACER and SCREG Routes respectively in 1996 and 1998, two of the most important French road work companies, then to its diversification into railway works (acquisition of Desquenne et Giral, then of SPIE Rail). It is characterised, among other things, by the excellence of its technical archives.

Eiffage: a culture of independence

Today Eiffage is placed in the fifth rank of European construction companies.[442] Like Vinci, it is characterised by its attachment to a long history (see its website). This is largely thanks to the personal interest in history of its founder, Jean-François Roverato. This group was created from the merger in 1992 of Fougerolle and Société Auxiliaire d'Entreprises (SAE), two companies whose archives are of exceptional historical interest: the first for the history of civil engineering, especially through the saga of the Fougerolle brothers and then the recovery by Paribas, from the middle of the 1960s, the second, for its successful conversion from public works to buildings during the thirty glorious years [1945-1975], then its international breakthrough.

The Eiffage group is doubly original. Firstly because twice, the group had recourse to the acquisition of companies by its employees in order to retain its independence: in 1991, at Fougerolle, faced with Générale des Eaux; in 1992-1993, during the acquisition of SAE. The second reason lies in the variety of trades featured in this group. It became the French, if not the European, leader of structural steel. Its history can also be reconstructed through its archives: the current Eiffage Constructions Métalliques company comes from the merger within the Compagnie Française d'Entreprises Métalliques (ex subsidiary of CFE) of Moisant, Laurent, and Savey, the Établissements Daydé, Baudet, Donon and Roussel, Eiffel (see the Archives Nationales du Monde du Travail in Roubaix and the collections of the Musée d'Orsay), of the Société de Paris-Argenteuil (ex Établissements Joly), Société des Ponts et Travaux en Fer (ex Établissements Joret), and of Société Schwartz-Hautmont.

Eiffage has interesting archival collections concerning the history of reinforced steel: Entreprises Limousin, Établissements Fourré & Rhodes, Société Nouvelle de Constructions et de Travaux (SNCT), et Travaux Hydrauliques d'Entreprises Générales (THEG). The same applies, with more gaps, to

building. To subsidiaries of SAE (Camus, Dumont et Besson, Labalette, Schwartz-Hautmont), those of Quillery which joined this group in 1985, were added (Cogetravoc et Société Nationale de Construction) as well as those of Fougerolle itself (Fougerolle Construction, SNCT, then l'Avenir, the largest workers' production co-operative in the building sector). The group is no less rich in the area of public works, alongside SAE (Stribick, Castelles Frères and especially André Borie) like Fougerolle (Delens and, especially Ballot, essential for the history of dams).

Eiffage, even today, has a large presence in the roads sector, especially in the area of technical innovation. The group has contributed significantly to the construction of roads in concrete (Soliditit Français, then SAFRA-TP, Gaillédrat), in asphalt (Soliditit) and in bitumen (Société Chimique et Routière, Gerland), especially for motorways (Beugnet). In the same way, the group has been very active in the area of electricity (Forclum, Clémessy) and became so as regards concessions (Millau Viaduct, parking, now the Autoroutes Paris Rhin Rhône).

Other collections: variety, but uneven value

In the French construction industry, there are other groups of interest from an historical, and sometimes archival, point of view. Such is the case for SPIE and the companies that have come from this group.

SPIE: A major historical inheritance

Today, SPIE is limited to electrical installations and networks, turned more towards industrial processes, transporting and finishing works.[443] This has not always been the case. The SPIE of today is the heir of SPIE Batignolles. This large company, which for a time, in the 1970s, was the French leader in the construction industry, was born in 1968 from the merger of the Société de Construction des Batignolles (the major collection of the Archives Nationales du Monde du Travail in Roubaix), established in 1846 by Ernest Goüin (1815-1885) and of its parent company since 1953, the Société Parisienne pour l'Industrie Électrique. In 1972, the Compagnie Industrielle de Travaux (CITRA), the public works subsidiary of the Schneider group, was merged into SPIE Batignolles. The archives are conserved at the head office of SPIE. SPIE Batignolles attracted to its orbit numerous interesting companies: Truchetet et Tansini in public works; SPIE in engineering; Coignet in building and civil engineering; Trindel and CEEMTP in electrical installations; Drouard and Comstock (United States of America) in railway works.

Other collections relating to BTP

A certain number of small and medium sized companies still retain their own archives, such as Chagnaud, a group that has remained independent until today and whose archives seem to be complete.[444] Similarly, Chagnaud, led by Léon Chagnaud (1860-1930), played a major part in underground works (first crossing of the metro under the Seine between Châtelet and Saint-Michel) and in the boring of major tunnels (Lötschberg, the Rove), before launching the era of great dams (Éguzon-sur-Creuse). It was especially active in Algeria (the large rockfill dams of Ghrib and Bou Hanifia, the port of Mostaganem) and created in mainland France very large projects (cutting off the Rhone at Génissiat, the power station of Donzère-Mondragon, dam of Grandval). In the *Archives Départementales*, interesting collections can also be found, thus for the Pascal contractor in Grenoble, or at the Archives Nationales du Monde du Travail in Roubaix, those of the Caquot, Pelnard et Considère firm. In recent years, around the Fayat family, a true construction group has formed, today fourth in rank in the construction industry. It combines interesting entities arising in some cases from steel construction (Castel et Fromaget, Joseph Paris) compaction (Rincheval and in Germany, Bomag), foundations (Franki Fondations, with very rich archives in Belgium), and from earthworks (Bec Frères, Razel, which was the number one in Europe from the 1970s to the 1990s.)

Interest of the archives of large groups which have public service concessions

Finally, a certain number of archives can be found within the large groups which have public service concessions.[445] GDF-Suez partly comes from Lyonnaise des Eaux. Now, within the bosom of this company, Ineo and Ondeo can be found. The first of these companies is in fact the result of a merger between the GTME group (former subsidiary of GTM), Entreprise Industrielle, emanating from the former Durand group nationalised in 1946, specialising in electrical installations (structural work and through its subsidiary, Verger Delporte, finishing works). This company has also inherited, through GTME, electrical installations. Ondeo is only the new name given to the company Degrémont, the world leader in hydraulic engineering. As for Véolia Environnement (ex Générale des Eaux), it offers, with the SADE and the Tuyaux Bonna, remarkable sources for the history of waterworks in France.

Ultimately, without it being possible to speak of comprehensiveness, it is clear that in France there are a very large number of archives of construction companies. The problem is in access which is often difficult, because the absence of adequate classification and accommodation, the common use of private providers, like the familial character of some archives often constitute an obstacle. The experience of the archives from the Hersent group incites us to re-read *The Little Prince* and more precisely, the episode of the fox: access to the archives often requires a long winded approach. Finally, the interest, especially for the history of techniques, of archives of construction materials groups (e.g. Saint-Gobain or Lafarge) should not be forgotten.

Notes

Introduction

1 Especially in the context of the European project "Shared Heritages: knowledge and know-how applied to the architectural and urban legacy of the 19th-20th centuries in the Mediterranean" (Euromed Heritage II, 2002-2005), followed by a study of the Suez Canal towns, funded by the French National Research Agency ("Isthmus" project, 2008-2011).

2 Mercedes Volait, David Peyceré, *Architectes français au sud et à l'est de la Méditerranée : guide de recherches dans les archives déposées à l'Institut français d'architecture*, numéro spécial de *Colonnes*, n° 21, February 2003.

3 The documents of which provided the basis for three architectural monographs: *Port-Saïd, Architectures XIXe-XXe siècles*, Cairo: IFAO, 2006; Claudine Piaton (dir.), *Ismaïlia, Architectures XIXe-XXe siècles*, Cairo: IFAO, 2009 ; Claudine Piaton (dir.), *Suez, Histoire et architecture*, Cairo: IFAO, 2011.

4 Ezio Godoli, Anna Nuzzaci, *L'Associazione Nazionale per soccorrere i Missionari Italiani e i suoi Ingegneri*, Florence: Maschietto Editore, 2009.

Part one
CITIES AND NETWORKS

Business networks abroad

Beyond the Haine: The growth of the Belgian company Baume & Marpent

1 In addition to the Baume & Marpent archives conserved at the Écomusée of Bois-du-Luc, see Alain Dewier, Karima Haoudy, Jean Puissant *et al., Baume & Marpent. De la Haine au Nil… Itinéraire d'un géant*, La Louvière: Écomusée du Bois-du-Luc, 2008, p. 21-37; *Mémoires d'une région: Le Centre, 1830-1914*, [exhibition catalogue] Morlanwelz: Musée Royal de Mariemont, 1985, p. 20-26, 28; Raymond Dehaen, Georges Place, "Baume et Marpent," in *Nos industries au passé*, Haine-Saint-Pierre: Publications du cercle d'histoire et de folklore Henri Guillemin, 1981, p. 73-97; Lionel Wiener, *L'Égypte et ses chemins de fer*, Brussels: Weissenbruch, 1932; Éric Warte, "Les archives de Baume & Marpent," *Patrimoine industriel Wallonie-Bruxelles*, n° 25, Feb. 1993, p. 14-17.

2 Until 1947, the successive directors were descendants of the Delbèque-Moyaux dynasty. Ginette Kurgan-Van Henterijk, Serge Jaumain, Valérie Montens, *Dictionnaire des patrons en Belgique*, Brussels: De Boeck, 1996, p. 476.

3 The foundry changed its name several times. It was successively called: in 1870, the Société Delbèque et Cie; in 1879, the SA des Usines et Fonderies de Baume; in 1882, the SA des Usines Baume-Marpent; and finally, in 1913, the SA Baume & Marpent (*Mémoires d'une région: Le Centre, 1830-1914*, *op. cit.*, p. 20).

4 See *infra*, the article by Karima Haoudy, "The Casablanca Summer Theatre by Baume & Marpent."

5 Register of minutes of the Board of Directors meetings from 1 March 1930 to 20 October 1938, meeting held on 2 January 1933 (Baume & Marpent collection).

6 Register of minutes of the Board of Directors meetings from 21 February 1902 to 27 May 1913, meeting of 21 March 1905 (Baume & Marpent collection).

7 See Michel Thiry, "Raccourcir le temps et l'espace: la conquête du rail par Baume & Marpent," in *Baume & Marpent. De la Haine au Nil…Itinéraire d'un géant, op. cit.*, p. 129-164.

8 Musée royal de Mariemont, *Archives Fonds Faider concernant Baume & Marpent*, Historique de l'entreprise, p. 2

9 Baume & Marpent restored the platform of the Eiffel Tower for the International Exposition dedicated to Art and Technology in Modern Life (Baume & Marpent collection, Fréderic Vande Vijver Gift, Egyptian Division, file on the ribbon-cutting at a factory in Elisabethville, undated [c. 1953], p. 2.

10 Lionel Wiener, *op. cit.*, p. 176.

11 See *infra* Isabelle Sirjacobs, "On either shore: Baume & Marpent's Egyptian bridges."

12 Register of minutes of the Board of Directors meetings from 21 February 1902 to 27 May 1913, meeting of 7 September 1912 (Baume & Marpent collection).

13 Register of minutes of the Board of Directors meetings from 1 May 1930 to 20 October 1939, meeting of 7 March 1932 (Baume & Marpent collection).

14 See *infra*, I. Sirjacobs, *op. cit.*

15 Louis Dupont, "Le Nouveau Pont à deux voies sur le Nil aux abords de la station d'Imbaba," *Revue de l'Association des ingénieurs de l'École des mines de Mons*, 1924, p. 573-615.

16 *Division d'Égypte. Note de Jean Lemaigre*, 1953 (Fréderic Vande Vijver Gift, Baume & Marpent collection, Écomusée du Bois-du-Luc).

17 *Division d'Égypte. Schéma organique de la Division d'Égypte*,1 January 1954 (Fréderic Vande Vijver Gift, Baume & Marpent collection, Écomusée of Bois-du-Luc)

18 In 1937, the situation changed with the political context, as we will see later. The Anglo-Egyptian Treaty of 1936 and the Montreux Convention of 1937 which ended the system of capitulations changed the profile of foreign companies' staff.

19 Register of minutes of the Board of Directors meetings from 21 February 1902 to 27 May 1913, meetings held on 14 February 1905 and 14 April 1905 (Baume & Marpent collection).

20 Register of minutes of the Board of Directors meetings from 6 June 1913 to 30 June 1923, meeting of 27 November 1913 (Baume & Marpent collection).

21 *Ibid.*, meeting of 3 March 1914 (Baume & Marpent collection).

22 Correspondence from 13 December 1929 to 22 May 1942, letter of 13 December 1929 (Baume & Marpent collection).

23 Register of minutes of the Board of Directors meetings from 1 May 1930 to 20 October 1939, meeting of 9 March 1937 (Baume & Marpent collection).

24 Register of minutes of the Board of Directors meetings from 1 May 1930 to 20 October 1939, meeting of 3 July 1937 (Baume & Marpent collection).

25 Correspondence from 13 December 1929 to 22 May 1942, letter of 10 March 1936 (Baume & Marpent collection).

26 Report by Jean Carton de Wiart during his stay in Cairo from 15 to 19 May 1953 (Fréderic Vande Vijver Gift, Baume & Marpent collection)

27 Register of minutes of the Board of Directors meetings from 6 June 1913 to 30 June 1923, meetings of 18 September 1920 and 29 November 1920 (Baume & Marpent collection).

28 Register of minutes of the Board of Directors meetings from 1 March 1930 to 20 October 1939, meeting of 7 March 1932 (Baume & Marpent collection).

29 *Ibid.*, meeting of 3 December 1931 (Baume & Marpent collection).

30 Jean-Édouard Goby, "Farid Boulad Bey (1872-1947)," *Bulletin de l'Institut d'Égypte*, vol. 29-30, 1946-1948, p. 22-36.

31 Farid Boulad bey, "Sur le calcul des poutres principales des ponts tournants sur couronne de galets," *Congrès international de la construction métallique. Résumés des mémoires*, Liege, Techniques des Travaux, 1930, p. 5.

32 Farid Boulad bey, "Compte rendu de ma mission aux deux congrès internationaux du béton et béton armé et de la construction métallique tenus à Liège du 1er au 7 septembre 1930," *Bulletin de l'Institut d'Égypte*, vol. 13, 1930-1931, p. 42.

The National Ironworks of Savigliano on the Mediterranean Rim

33 The bridge was opened on June 10, 1889. Nowadays it is part of the Adda-Nord Natural Park of the Region of Lombardy, cf. www.parks.it/parco.adda.nord.

34 Giuseppe Pistone, Vittorio Nascé, Anna Maria Zorgno, Clara Bertolini, Vincenzo Ilario Carbone, Roberto Roccati, *Il Ponte di Paderno: storia e struttura*, Milano: Electa, 1989; Vittorio Nascé, "Restoration of a 100 Year Old Iron Bridge, Paderno," *Structural Engineering International*, vol. 3, n° 1, 1993, p. 37-38. See also the recent study by Rosalba Ferrari, Mattia Facheris, Egidio Rizzi, "Structural Analysis of the Paderno d'Adda Bridge (Italy, 1889)," *Structural Analysis of Historic Construction,* n° 133-134, 2010, p. 459-465.

35 Louis Petitmermet, "Notes sur quelques travaux maritimes exécutés en Grèce," *Bulletin technique de la Suisse romande*, 30e année, n° 1, 1904, p. 1-10.

36 On the history of the Vallianos Library of Athens see the recent book by Vassilis Colonas, *Ernst Ziller, Architect (1837-1923)*, [exhibition catalogue], Athens: National Gallery, March 22-August 31, 2010.

37 Francesca Filippi, *Da Torino a Bangkok. Architetti e ingegneri nel regno del Siam*, Bologna: Marsilio, 2008.

38 In 1930, the Board of Directors at SNOS consisted of: Paul Doat, Adriano De Sauvage Vercour, Pierre Liénart, Ernesto Ferro (President), Felice Guidetti Serra, Virgilio Abbona, Amedeo Poli. See Ivan Balbo, "La Società Nazionale Officine Savigliano," in Sergio Soave (ed.), *Storia di Savigliano. Il '900*, Savigliano (Cuneo): L'Artistica, 2006, p. 194.

39 "L'attività delle Officine di Savigliano all'estero (esecuzioni e progetti)," *Bollettino Tecnico Savigliano***,** a. III (1929), n° 4-5, p. 204

40 Ivan Balbo, *op. cit.,* p. 189-223.

Hennebique's organization in the countries of the Mediterranean Basin: Establishment and communications strategies

41 See the correspondence in the design file "Immeuble à bureaux et comptoirs (Istanbul)," Fonds Hennebique, CNAM/SIAF/Cité de l'architecture et du patrimoine/Archives d'architecture du XXe siècle, 76 IFA 1039/40.

manuscript, Fonds Hennebique, no call number assigned.

43 From 1904 on, engineer-agents Seigle-Goujon for Algeria and Reymond for Tunisia are mentioned. From 1906 to the World War I, Reymond managed the two agencies from his office in Tunis.

44 "La Turquie. Dix ans de béton armé (1902-1912)," *Le Béton armé*, n° 180, May 1913, p. 66.

45 Projects whose advertising character tended to legitimise the use of reinforced concrete, especially for prestigious private projects or for major public commissions. Letter from Edmond Bechara (engineer in Beirut), 19 April 1894, fonds Hennebique, 76 IFA 1001/14.

46 "La construction en Afrique du Nord," *Le Béton armé*, n° 322, Dec. 1934, p. 1150.

47 We are thinking in particular of Clamar et Allens, based in Marseille, the Italian firm Porcheddu and the Sociedad anónima de Construcciones y Pavimentos based in Barcelona.

48 "Grande mosquée de Damas (Syrie) : reconstruction," fonds Hennebique, 76 IFA 1001/14.

49 See especially the design file, "Pont-route non identifié (Tunisie)," fonds Hennebique, 76 IFA 1059/33.

50 Letter from Paul Piketty to Armand Considère, 2 December 1903, fonds Hennebique, no call number assigned.

51 Comment by Mr. Leflot (Hennebique's agent in Marseille) during a meeting of agents on 26 June 1922 (minutes of the meeting of 26 June 1922, p. 32-33, fonds Hennebique, no call number assigned.

52 G. Fréville, "*Le Béton armé* aux colonies," *Le Béton armé*, n° 48, May 1902, p. 172-175.

53 Jean-Michel Leniaud, Béatrice Bouvier, *Les Périodiques d'architecture, XVIIIe-XXe siècle : recherche d'une méthode critique d'analyse*, Geneva: Librairie Droz, 2001, p. 174.

54 "Le Béton armé en Égypte," *Le Béton armé,* n° 48, May 1902, p. 171.

55 See especially the letters exchanged for the overpass at Gabbari train station in Alexandria in 1905, fonds Hennebique, 76 IFA 1098/4.

56 In the context of the construction of the overpass at the Gabbari Station in Alexandria, for example, Hennebique wrote to its Cairo agent Émile Servin: "We will give the bridge a pleasing appearance so that it can be compared to metal bridges," fonds Hennebique, 76 IFA 1098/4.

57 Letter from Émile Servin to Hennebique, dated 26 November 1905, subject: "Pont du Gabbary," fonds Hennebique, 76 IFA 1098/4.

58 "Projet de construction du Pont-Viaduc de la Gare de Gabbary en béton armé, système Hennebique : description et conditions de l'entreprise," p. 19, fonds Hennebique, 76 IFA 1098/4.

59 Letter from Émile Servin to Hennebique dated 26 November 1905, subject: "Pont de Gabbary," fonds Hennebique, 76 IFA 1098/4.

60 The binding joists are the real support of the floor, running from wall to wall, and carrying the bridging joists above and the ceiling joists below.

61 See *infra* in the annexes the article by Simon Vaillant presenting the Hennebique archives.

Perret Frères, architect/contractors in North Africa

62 Guy Lambert, *L'architecte et la figure de l'expert au service de l'État sous la IIIe République. Cultures et stratégies professionnelles. Autour de Paul Guadet (1873-1931)*, doctoral thesis, François Loyer (supervisor), Université Versailles-Saint-Quentin-en-Yvelines, July 2007, 2 vol., 745 p.

63 Given to the Conservatoire National des Arts et Métiers in 1959, they were deposited with the Archives Nationales in 1989, which very shortly afterwards sent them to the Centre d'Archives d'Architecture du XXe Siècle, at the time part of the Institut Français d'Architecture. They can be consulted there. The inventory and a large selection of images from the collection are accessible through the online database Archiwebture.

64 Through the two works by Maurice Culot, David Peyceré, Gilles Ragot (dir.), *Les Frères Perret, l'œuvre complet*, Paris: Norma, 2000 and Joseph Abram, Jean-Louis Cohen and Guy Lambert (dir.), *Encyclopédie Perret*, Paris: Éd. du Patrimoine/Le Moniteur, 2002. In this publication, see the articles of Guy Lambert, Jean-Louis Cohen, Franz Graf "Agence-Entreprise" section, p. 47-67, and especially "Algérie," p. 55-59, "Cathédrale d'Oran," p. 75-87, "Maroc," p. 356.

65 Jean-Paul Cêtre, Franz Graf, "Oran: le chantier de la cathédrale comme leçon structurelle et commerciale," in *Encyclopédie Perret, op. cit.*, p. 76.

66 For a subtle presentation of these networks and discussions on Perret's borrowings from Egypt, see the article "Egypt" by Mercedes Volait in *Encyclopédie Perret, op. cit.*, p. 357-360.

67 Izik Aydemir, "Turquie," in *Encyclopédie Perret, op. cit.*, p. 367-368.

Italian construction companies in Egypt

68 See several articles from the Cairo daily newspaper *L'Imparziale*: "I nostri operai ad Assuan," December 17, 1898; "Per gli operai di Assuan," December 24, 1898; "Gli operai italiani ad Assouan," January 14-15, 1900.

69 "L'industria italiana in Egitto," *L'Imparziale*, May 4, 1892, and "La Società Metallurgica Italiana," *L'Imparziale*, October 25, 1898.

70 "Note alessandrine. Industria italiana in Egitto," *L'Imparziale*, March 7, 1927.

71 See Milva Giacomelli, *Ernesto Basile e il concorso per il museo di antichità egizie del Cairo 1894-1895*, Florence: Edizioni Polistampa, 2010, and Ezio Godoli, Mercedes Volait (ed.), *Le concours international de 1894 pour le musée des Antiquités égyptiennes du Caire*, Paris, Picard: Paris 2010.

72 "La posa della prima pietra," *L'Imparziale*, July 13, 1898.

73 Cesare Brunelli, *Emanuele Dentamaro sue costruzioni in Egitto*, Cairo: Stabilimento Tipografico F. Filelfo, 1910, p. 38.

74 A relief map of the oasis commissioned from cartographer François Pellegrin by Dentamaro and Gusman was presented at the Exhibition of Italians Abroad in Turin in 1911.

75 C. Brunelli, *op. cit.*, p. 97-125 and p. 47-63.

76 *Ibid.*, p. 82.

77 *Ibid.*, p. 75-81.

78 *Ibid.*, p. 72.

79 I am grateful to Filippo Cartareggia Jr., Marcello Cartareggia, Laura Cartareggia, and Federico Cartareggia, all of whom provided me with information, documents, and pictures regarding the Dentamaro & Cartareggia business.

80 After Dentamaro's death, Cartareggia continued operating alone in Egypt. Business was interrupted in 1940. Cartareggia was in Italy at the time, and Mussolini's declaration of war prevented him from returning to Alexandria. In 1943, at the liberation of Rome "he remained hidden, because his feelings were well known, as he had lived his life in Egypt with and among the British," in *Note sul Comm. Filippo Cartareggia*, Private Archives of Filippo Cartareggia heirs, Monza, p. 1-3.

81 In Sudan, a quarry and stone cutting mill (in partnership with Sasso & Bracale) for the Jabal Awliy dam; a general post office and the Comboni College (1929) in Khartoum; pipework on Gezirah plain; the Gebel Aulia water tank (1939-?); homes for the settlements at Gebel Aulia and Sileitat (with Sasso & Bracale).

82 On behalf of the Italian Government, it built the Asmara-Keren railway section in Eritrea (1912-13).

83 G. Spitaleri, *Costruttori italiani in Egitto Filippo Cartareggia*, Alexandria: Tipografia A. Procacci, 1933, p. 11-12.

84 *Ibid.*, p. 14.

85 "Vita alessandrina. Il prosciugamento del lago di Hadra," *L'Imparziale*, August 6-7, 1925.

86 "La "Cornice di Alessandria e Sidki Pascià "Un'intervista all'Ahram," *Il Giornale d'Oriente*, December 15, 1933, p. 7.

87 Malak Badrawi, *Isma'il Sidqi 1875-1950. Pragmatism and Vision in Twentieth Century Egypt*, Richmond, Surrey: Curzon Press, 1966, p. 108-141.

88 G. Spitaleri, *op. cit.*, pp. 41-55.

89 "Un avvenimento," *L'Imparziale*, November 2, 1913.

90 The works carried out in Jerusalem include: the restoration of the Sanctuary of the Flagellation (1924-29, architect Antonio Barluzzi); the Monument to the Fallen of the Great War (1927, architect John Burnet); the Rockefeller Museum (1930-35, architect Austen St. Barbe Harrison); the headquarters of Assicurazioni Generali of Trieste (1934-36, architect

Marcello Piacentini); the airfield. On behalf of ANMI he built hospitals in Amman (1925-27, architect A. Barluzzi) and Haïfa (1933, engineer Carlo Buscaglione).

91 *International Register of Telegraphic and Trade Addresses 1938-1939*, New York, 1939.

92 *Memorandum* sent by S. E. Federzon. Gr. Ufficiale Ernesto De Farro. 1898-1934, *Documento di operosità*, in Archivio storico della Federazione nazionale del Cavalieri del Lavoro (Rome), Envelope LXII, position 6.

93 See Marta Petricioli, *Oltre il mito. L'Egitto degli italiani (1917-1947)*, Milan: Bruno Mondadori, 2007 (Ricerca), p. 4-6.

94 See Mohamed Awad, *Italy in Alexandria. Influences on the built environment*, Alexandria: Alexandria Preservation Trust, 2008.

Organizing the territory

From one shore to the orther: Baume & Marpent's Egyptian bridges

95 From 1898, the Cockerill factory at Seraing supplied the first Belgian locomotives to Egypt. Ten years later, the companies from the Centre region created numerous exchanges with the Egyptian Department for Haulage and Rolling Stock. The Franco-Belgian company Ateliers de La Croyère produced the first tender locomotives with simple stringers, intended for maneuvers and for the suburban trains on the line to Mataria, 20 km from Heliopolis. Between 1890 and 1900, Egypt ordered almost 174 locomotives from the Franco-Belgian company. The Forges, Usines et Fonderies of Haine-Saint-Pierre and other factories from the Hainaut also participated in the Egyptian railway rush. Belgium ranked among Egypt's top locomotive suppliers between 1852 and 1914. See Lionel Wiener, *L'Égypte et ses chemins de fer*, Brussels: Weissenbruch Ed., 1932, p. 260.

96 General Report of Baume & Marpent, 1910 (Baume & Marpent collection, BAUM 15, Écomusée du Bois-du-Luc).

97 Karima Haoudy, "De la Haine au Nil, ou sur les traces du géant industriel Baume & Marpent," in Marie-Cécile Bruwier (dir.), *Mémoires d'Orient. Du Hainaut à Héliopolis*, [exhibition catalogue] Morlanwelz: Musée Royal de Mariemont, May 7-October 17, 2010, p. 279-288.

98 See *supra*, Karima Haoudy, "Beyond the Haine: The growth of the Belgian company Baume & Marpent."

99 Jean-Édouard Goby, "Farid Boulad Bey (1872-1947)," *Bulletin de l'Institut d'Égypte*, vol. 29-30, 1946-1948, p. 22-36.

100 Karima Haoudy, "Poursuite de l'itinéraire: un faisceau de dons qui convergent vers le Nil," in *Baume & Marpent. De la Haine au Nil... Itinéraire d'un géant*, La Louvière: Écomusée du Bois-du-Luc, 2008, p. 174.

101 *L'Ossature métallique*, n° 1, Jan. 1940, p. 7.

102 Production catalogue, undated [1950] (Baume & Marpent collection, BAUM 143, Écomusée du Bois-du-Luc).

103 Copy-letters of F. Gonze, letter of 31 January 1951 (Baume & Marpent collection, BAUM 33, Écomusée du Bois-du-Luc).

104 File "Situation Baume & Marpent 1954" 1954-1955 (Baume & Marpent collection, BAUM 13, Écomusée du Bois-du-Luc).

105 In 1962, Baume & Marpent was merged into the company Bouchout et Thirion and combined to form "Baume Marpent, Thirion Réunis"(BMT). BMT currently continues its activities in the Flemish region. Nothing survives on the sites of Haine-Saint-Pierre and Morlanwelz.

Bridges as ambassadors: Hennebique's expansion in North Africa

106 Letter from B. Reymond, general manager of the Tunis office, to Hennebique, 7 December 1906, about a bridge over the El-Kebir wadi at Blida (Algeria) (Fonds Hennebique, CNAM/SIAF/Cité de l'architecture et du patrimoine/Archives d'architecture du XX^e siècle, 76 IFA 1196/4). Imagining, as here, that competitors were seeking the same goal was all the more of a motivation for taking special care with the matter.

107 Letter from François Hennebique to Armand Considère, 3 July 1895, cited by Gwenaël Delhumeau, *L'Invention du béton armé. Hennebique 1890-1914*, Paris: IFA/Norma, 1999, p. 150. A corporate discourse specific to the field of bridge construction falls within this strategy: see " La construction des ponts au XX^e siècle. Les ponts Hennebique ," *Le Béton armé*, n° 90, Nov. 1905.

108 These are the only two projects of this type reported in northern Africa before 1905: "Ponts exécutés en système Hennebique," *Le Béton armé*, n° 81, Feb. 1905, p. 17.

109 Letter from Reymond to Hennebique, 15 June 1907, fonds Hennebique, 76 IFA 1262/10. See also, "*Le Béton armé* en Tunisie. Le pont de Béja," *Le Béton armé*, n° 109, June 1907, p. 84-86.

110 Hennebique had agencies in Egypt, Algeria and Tunisia. But, due to a vacancy in the Algiers office, Reymond, the Tunis agent, played a dominant part in both countries. In Morocco, where an agency was opened just before the World War I, Hennebique did not design any bridges before the 1930s.

111 Letter from Bonduelle & Thibault to Hennebique, 30 September 1905, fonds Hennebique, 76 IFA 1143/27.

112 Letter from Hennebique to Louis Didier, 2 February 1907, fonds Hennebique, 76 IFA 1160/10.

113 "La construction des ponts au XX^e siècle. Les ponts Hennebique," art. cit. is announced as "a work of propaganda and publicity dedicated to public authorities careful about the interests granted to them."

114 Respectively, the terms of André Costaz, civil engineer to Constantine (13 November 1906 for a bridge at Biskra in Algeria, fonds Hennebique, 76 IFA 1221/4) and Coustolle, chief engineer (letter to Hennebique, 18 December 1906, fonds Hennebique, 76 IFA 1150/34, about a bridge to be constructed on the El-Harrach wadi at Maison-Carrée).

115 Letter from Reymond to Hennebique, 19 June 1907, about the bridge over the Smar wadi at Maison-Carrée in Algeria, fonds Hennebique, 76 IFA 1161/43.

116 Letter from Émile Servin in Cairo to Hennebique, 23 December 1905, about an overpass to be constructed at Gabbari train station in Alexandria, fonds Hennebique, 76 IFA 1098/4.

117 Undated letter from Hennebique to the "directeur général des villes et bâtiments" of the Egyptian state, fonds Hennebique, 76 IFA 1052/7.

118 *Ibid.*

119 "Description générale", undated, fonds Hennebique, 76 IFA 1052/7.

120 Letter from Reymond to Hennebique, 24 November 1905, fonds Hennebique, 76 IFA 1153/7.

121 Paul Gallotti, "De l'esthétique dans la construction des ponts," *Le Béton armé*, n° 95, April 1906, p. 45-56.

122 *Ibid.*, p. 52.

123 Letter from Didier to Hennebique, 6 October 1905, fonds Hennebique, 76 IFA 1142/8.

124 "Pont sur l'oued Damous. Plan n° 1. Ensemble du pont." 14 October 1905, fonds Hennebique, 76 IFA 1142/8. In contradiction with the legend, the drawing is dated September 1905.

125 "La construction des ponts au XX^{e} siècle. Les ponts Hennebique" art. cit., p. 154.

126 "De l'esthétique dans la construction des ponts," art. cit., p. 53.

127 *Idem*, p. 56.

128 *Idem*, p. 52.

129 *Ibid.*

130 Letter from Servin to Hennebique, 31 December 1909, fonds Hennebique, 76 IFA 1353/5 about a bridge over the Farkha canal in Alexandria.

131 Letter from Reymond to Hennebique, 19 June 1907, fonds Hennebique, 76 IFA 1262/10, about a bridge over the Tessa wadi in Tunisia.

The Porcheddu company and projects for reinforced concrete water tanks: Building models and construction-site experiences (1912-1933)

132 Giovanni Antonio Porcheddu (1860-1937), civil engineer and industrialist, earned two degrees from the Polytechnic of Turin, in 1890 and 1892. See Riccardo Nelva, Bruno Signorelli, *Avvento ed evoluzione del calcestruzzo armato in Italia:il sistema Hennebique*, Milan: Edizioni di Scienza e Tecnica, 1990, p. 20-26.

133 *Il Cemento*, n° 1, 1912.

134 A particularly significant date, because it coincides with the great International Exhibition of Modern Decorative Art in Turin. The number of projects implemented by Porcheddu increased from 72 in 1901 to 119 during the yearlong exhibition. Cf. Rossana Bossaglia, Ezio Godoli, Marco Rosci, *Torino 1902. Le arti decorative internazionali del nuovo secolo*, Milan: Fabbri, 1994.

135 *Le Béton armé*, n° 21, 1900, p. 4.

136 "Relevé de travaux exécutés," *Le Béton armé*, 1900.

137 *Le Béton armé*, n° 38, 1901, p. 18-19.

138 *Le Béton armé*, n° 226, 1926, p. 209.

139 Esparto is a grass grown for its fibers, used in making ropes and nets.

140 The documentation concerning this construction site is stored at Polytechnic of Turin, Department of Building and Territorial Systems, Porcheddu Archive, *Zone diverse*, Tripoli 1912, dossier 4167.

141 The contract was dated February 15, 1912 with delivery scheduled for May 6. Instead, effective delivery was made on August 5, 1912. Engineer Bordoni was project manager and test coordinator on behalf of the company.

142 Porcheddu Archive, *Zone diverse*, Tripoli 1912, dossier 4167, expert opinion of Engineer Menlio Lega filed at the Court of Tripoli April 9, 1923. Of great interest is also the relationship between Maison Hennebique and the magazine *Le Génie colonial. Revue d'Architecture Construction, Matériel & Travaux publics aux colonies*, directed by architect Louis Siffert, which began publishing in 1900.

143 *Ibid.*, "Altra relazione di altro informatore privato," September 12, 1929.

144 Ezio Godoli, Anna Nuzzaci, *L'Associazione Nazionale per soccorrere i Missionari Italiani e i suoi Ingegneri*, Florence: Maschietto Editore, 2009. Schiaparelli directed the Egyptian Museum of Turin and was president of the Italian archeological mission in Egypt.

Settlements

Félix Paponot's canal-construction camp in the Isthmus of Suez

145 For more on the organization of the worksites, see Nathalie Montel, *Le chantier du canal de Suez (1859-1869)*, Paris: Presses de l'ENPC/In Forma, 1998, p. 80-85.

146 This canal linked a branch of the Nile to the Red Sea. It was probably dug during the 26th Dynasty (7th century BC). Depending on the level of the Nile and the willingness of the dominant power, it functioned to varying degrees until the early 4th century AD.

147 Nathalie Montel, *op. cit.*, p. 53 and Nicolas Michel, "La Compagnie du canal de Suez et l'eau du Nil," in *L'Isthme et l'Égypte au temps de la Compagnie universelle du canal maritime de Suez, 1859-1956*, Cairo: IFAO (forthcoming in 2013).

148 Letter from Félix Paponot to Prince Hussein Pasha, Minister for Public Works, 29 April 1874, archives Paponot.

149 Agreement of 2 July 1874 (18 Gawadaweh 1291) between the War Ministry's Division of Public Works and the Paponot Company, signed by Hussein and Paponot; letter to Charles de Lesseps in 1887, archives Paponot.

150 "Société pour l'étude pratique de la participation du personnel aux bénéfices de l'entreprise," *Bulletin de la participation aux bénéfices*, t. 9, n° 9, 1887, p. 173

151 *Élargissement du canal de Suez*, Cosne-sur-Loire: Imp. Bourra, 1883; *L'Égypte, son avenir agricole et financier*, Paris: Baudry, 1884; *Sur la mer intérieure d'Afrique*, Cosne-sur-Loire: Imp. Bourra, 1886; *Achèvement du canal de Panama. Étude technique et financière*, Paris: Baudry, 1888; *Suez et Panama, une solution*, Paris: Baudry, 1889; *Doit-on reprendre les travaux avec des capitaux privés*, Paris: Baudry, 1889.

152 Letter from Paponot to his mother, 8 January 1861, archives Paponot.

153 Nathalie Montel, *op. cit.*, p. 18.

154 The site of Ramses (Rhamsès in Paponot's archives) is cited in the Bible (Exodus, 1:11) as one of the warehouses built by the Hebrews. It is

commonly placed at Tell el-Maskhutah where the triad of Ramses II was discovered by the scholars of Bonaparte's expedition.

155 Agreement between de Lesseps and Paponot dated 25 February 1874, archives Paponot.

156 Félix Paponot, *L'Égypte, son avenir agricole et financier, op. cit.*, p. 217 and photograph, archives Paponot.

157 With the exception of the naos of Ramses II, which has been on view in the garden of the Cairo museum since 1968.

158 Letter from Félix Paponot to the Prince Hussein Pasha, Minister for Public Works, 29 April 1874, archives Paponot.

159 Letter from Félix Paponot to Ferdinand de Lesseps, Rhamsès, 23 January 1877, archives Paponot.

160 Nathalie Montel, *op. cit.*, p. 221.

161 Letter from Ferdinand de Lesseps to Félix Paponot, Paris, 19 November 1877, archives Paponot.

162 Thank you letter from Ferdinand de Lesseps to Félix Paponot, Paris, 21 November 1877, archives Paponot.

163 Letter to Charles de Lesseps, 1887, archives Paponot.

European construction companies in the towns along the Suez Canal

164 Juliette Gallois, "Le patrimoine archivistique de Suez", *Cahier de l'association du souvenir de Ferdinand de Lesseps et du canal de Suez,* n° 1, 2009, *La Compagnie de Suez et l'Égypte,* p. 6-19.

165 See for example: Nathalie Montel, *Le chantier du canal de Suez (1859-1869)*, Paris: Presses de l'ENPC/In Forma, 1998; Caroline Piquet, *La Compagnie du canal de Suez. Une concession française en Égypte*, Paris: PUPS, 2008; Hubert Bonin, *History of the Suez Canal Company (1858-2008)*, Geneva: Droz, 2010.

166 Term used by the Company to designate any outside firm.

167 There were also many Egyptian companies active there, especially in the field of earthworks, but because our study focuses on European companies, we shall not present them.

168 See for example the mine towns of the western United States, or South America. John S. Garner, *The Company Town. Architecture and society in the early industrial age,* New York: Oxford University Press, 1992.

169 The freshwater canal planned at the same time as the maritime canal connected the Nile to Ismailia and served both to supply freshwater to the town and to allow navigation of small vessels.

170 Nathalie Montel, "Ismaïlia (Égypte): une ville d'ingénieurs", *Revue du monde musulman et de la Méditerranée*, n° 73-74, 1994, p. 245-260. The plan was apparently the work of three engineers: Voisin, Viller, and de Montaut. As for the initial plan for Port Said, it was signed Voisin (Roubaix, Archives nationales du monde du travail (ANMT) 1995 060 4152).

171 Plan of Port Said: sketch in the July 1, 1859 report by the chief of works to the management committee.

172 Camps 1861-1869, ANMT 1995 060 4390.

173 Report by the chief of works, 15 November 1859, ANMT 1995 060 4390.

174 Constructions at Port Said (1904-1951), ANMT 1995 060 3153.

175 Constructions at Ismailia (1885-1955). Contracts for the Company circle and office additions for Marino and Bevilacqua; contracts for the circle and housing for Williamson, ANMT 1995 060 3174.

176 Letter from the chief agent to the director, 7 February 1914, ANMT 1995 060 3230.

177 Archimede Petraia created the workers' cooperative of Port Said and the chief engineer's mansion at Ismailia for the Company. In partnership with A. Impellizzieri, he erected 25 workers' lodgings at Port Fuad with materials salvaged from the demolition of old workshops (1920-21). In 1914, Alberti received the contract for the Company doctor's villa at Port Said (ANMT 1995 060 3152) and in 1948, the nursery school and beach facilities in Port Fuad (Archives of the Canal Authoritiy, Ismailia) and the renovation and extension of the school at Port Fuad (Archives of the Ploërmel Brotherhood, 404/3). He also erected the church of Port Said in 1934. The works were carried out under Company supervision but not under its responsibility (ANMT 1995 060 3152). Spiro Scarpa erected the Port Said dispensary in 1936 and then its extension in 1951 (ANMT 1995 060 3151).

178 ANMT 1995 060 3139 and 1995 060 3230.

179 Management committee meeting of 1 August 1907, ANMT 1995 060 3139.

180 ANMT 1995 060 3153.

181 http://www.patronsdefrance.fr/Database/Acteur_fr.php (accessed on 1 Decembre 2011). Bertagnol also built the Port Fuad courthouse (ANMT 1995 060 3156).

182 ANMT 1995 060 3228.

183 Two of the 17 other competing bids were from Société des Forges et Chantiers de la Méditerranée and Sautter and Eiffel for iron lighthouses. Sautter retained the right to supply the electrical equipment (ANMT 1995 060 4472).

184 http://suezcanal.bibalex.org/ (accessed on 1 Decembre 2011): letter dated 12 October 1860, C^{ie} de Suez to M. Coignet.

185 N. Montel, *op. cit.*, p. 309-310.

186 François-Léonce Reynaud (1803-1880), French architect and engineer, head of the Lighthouse Service from 1846 to 1878.

187 ANMT 1995 060 4472.

188 Port Said, sale n° 53, ANMT 1995 060 3576.

189 Charles & Auguste Bazin & C^{ie} supplied and shipped Company worksite equipment from Marseille.

190 See *supra*, Karima Haoudy's contribution.

191 ANMT 1995 060 3172.

192 ANMT 1995 060 3228.

193 NMT 1995 060 3138 and the Archives of the Canal Authority at Ismailia: plans and photographs of the workers' town for the mines at Dourges, in France, were on file in the Company's architectural office.

194 Cairo, Archives of the Heliopolis Oases Company: plan of the Arab quarter.

195 In particular, the Perret Frères church in Le Raincy (1923); Paul Tournon's, in Aubergenville (1928); H. Petrus Berlage's in The Hague (1927); and D. Otto Bartning's in Cologne (1928). Published in J. G. Wattjes, *Moderne Kerken in Europa*, Amsterdam: Kosmos, 1931.

196 Olivier Cinqualbre, "Le pavillon de chirurgie d'Ismaïlia. Chronique d'une modernité refusée", in *L'Isthme et l'Égypte au temps de la Compagnie universelle du canal maritime de Suez, 1859-1956*, Cairo: IFAO (forthcoming in 2013).

Kosseir, a phosphate-shipping town

197 According to the early 12th-century geographical dictionary by Yâqût, *Mu'jam al-Buldan*, the name El Quseir or Al-Qusayr (depending on the transliteration from Arabic) derives from *qasr*, meaning "fort."

198 The name that appears in the Statute of 1912 was printed on the company's letterhead until 1949, but on other documents, the company bore different names. Early documents refer to it as the Società Italiana per l'estrazione e il commercio dei fosfati (Italian Company for the Extraction and Trade of Phosphates) (and it is still qualified as "Italian" by the Egyptians, leading to misunderstanding). After 1933, when IRI bought the company, the name was shortened to SEF, acronym of Società Egiziana Fosfati.

199 The Banco di Roma was both a commercial bank and an investment bank, engaging in corporate equity financing.

200 The English name always appears in the company's documents. It was used in Egypt from the time of the English occupation until after the end of World War II.

201 The largest settlement was at Wadi Semiuki, at the source of the stream. It consisted of a main building, named Villa Italia, which resembled a sort of Alpine shelter, and housed sales offices. It was surrounded by small dwellings.

202 The ruins of the historic port and of the ancient city Quseir al Qadim ("Quseir-the-Old"), located less than 8 km north of today's city, are still visible. See D. Harre-Robert, "Al-Qusayr, histoire et patrimoine au service du renouveau d'une ville portuaire périphérique," in E. Denis (ed.), *Villes et urbanisation des provinces égyptiennes. Vers l'écoumènopolis*, Paris: Karthala, Cairo: Cedej, 2007, p. 329-364.

203 Discovered by geologists T. Barron and W. F. Hume.

204 Crookston sold them to Ditta Panelli & Figli, but the company was short on funds. Banco di Roma took over the concessions through one of its subsidiaries, Società Romana Solfati which founded the Società per l'escavazione e il commercio dei fosfati (Company for the excavation and trade of phosphates) for the purpose, and locked up considerable sums.

205 Already a member of Regio Servizio Minerario Italiano (Royal Italian Mining Service), and author of Carta geologica d'Italia (Geological Map of Italy), Cortese left the Geological Office in 1892, to dedicate much of his career to the mining problems of private industry. He also made many contributions as a correspondent member of Reale società geografica italiana (Royal Italian Geographical Society).

206 "Traversata del Deserto Arabico da Chena a Cosseir. Note di viaggio del socio corrispondente, ing. Emilio Cortese (con una cartina nel testo)", *Bollettino della Società Geografica Italiana*, n° 2, 1912, p. 143-165.

207 Archivio Storico Banco di Roma, III. Consiglio di Amministrazione, Libri dei Verbali, 821, *Processo verbale 26 ottobre 1912*. The statute is stored in the Archivio Storico Banco di Roma (Historical Archives of Banco di Roma), VII. Presidenza, sottofasc. n. prov. 9.

208 Archivio Storico Banco di Roma, XI. Uffici, 9. Personale, 7. Fascicoli del personale, 1/C, sfc. 8, b. 62, e VIII. Presidenza, 1. Archivio Alfredo Benincore, 3. Carteggi di amministratori, sfc. 96, b. 6.

209 The unpublished letters are stored in the Archives of Riccardo Decima.

210 In a letter to Mussolini dated April 11, 1927, Economic Affairs Minister Giuseppe Belluzzo claimed to have secured for the State the control of Kosseir's phosphorite mine in Egypt, thwarting the plans of Guido Donegani, at that time a governor on the Board of Mines and CEO of the Montecatini company (Acs, *Pres. Cons. 1931-1933*).

211 ASIRI company files, red numbering, SEF Società Egiziana per l'Estrazione e il Commercio dei Fosfati, Untitled documentation, Dossier ex Istituto liquidazioni 1927-1952, Acs 040.

212 *Le miniere di fosfato di Kosseir*, Milan: Rizzoli & C., 1932.

213 See R. Quartararo, "L'altra faccia della crisi mediterranea (1935-1936)", *Storia contemporanea* vol. 13, n° 4-6, 1982, p. 808-810.

214 The company published *The phosphate mines of Kosseir*, Cairo-Rome: Editalia, 1954.

215 The first class was held on March 19, 1932, in the unfinished building. Later, it was named for G. B. Belzoni at a ribbon-cutting ceremony conducted by Roberto Cantalupo. The first Italian school in Kosseir, founded by the Franciscan Brothers, was still open.

216 The church was demolished in 2007 and replaced by a new building.

217 The building was reopened in 2007 after a four-year restoration project supervised by architect A. M. Salama.

218 Other examples can be found in Jeddah, Saudi Arabia; Suakin, Sudan; and Massawa, Eritrea.

219 Sabaudia is a city built south of Rome in 1933-1934, as part of Benito Mussolini's project to reclaim the Pontine Marshes.

Excavating the company town: Small Moroccan mining cities in European

220 Basic information on mining town settlement strategies under the French Protectorate in Morocco can be found in: Archives Nationales de France Section Outre-Mer [ANFSOM] - 2 G 51 / 2, Direction Fédérale des Mines et de la Géologie. Daniel Rivet has written a useful introduction to these strategies: Daniel Rivet, "Mines et politique au Maroc, 1907-1914," *Revue d'Histoire Moderne et Contemporaine*, n°. XXVI, 1979, p. 568.

221 By the early 1800s, "geographical missions" to Morocco had already been undertaken by such countries as Spain, Germany, the United Kingdom, Belgium, and France.

222 For the colonial politics related to mining see: Yusif A. Sayigh, *The Economies of the Arab World: Development since 1945*, London: Croom Helm, 1978, p. 593-596.

223 The *Bureau de Recherches et de Participations Minières* (BRPM) was founded by the Royal Decree of 15 December 1928 as a special agency

promoting mining research and enabling state intervention in mining. Its chairmen included French mining engineers Léon Migaux, René Vigier, and André Henri Louis Bouillot. Their biographies and references to archives can be found at www.annales.org/archives, consulted January 1, 2012.

224 A detailed overview of the agencies that invested in the economy of the Protectorate can be found in: Georges Hatton, *Les enjeux financiers et économiques du Protectorat marocain (1936-1956). Politique publique et investisseurs privés*, Paris: Publications de la Société française d'histoire d'outre-mer, 2009. Earlier publications on the subject include: Albert Ayache, *Le Maroc, bilan d'une colonization*, Paris: Éditions sociales, 1956 and Charles F. Stewart, *The Economy of Morocco, 1912-1962*, Cambridge, Mass.: Harvard University Press, 1964.

225 See René Gallissot, *Le Patronat européen au Maroc - action sociale, action politique (1931-1942)*, Rabat: Éditions techniques nord-africaines, 1964; Abdel Aziz Belal, *L'Investissement au Maroc (1912-1964) et ses enseignements en matiere de developpement economique*, Paris: Mouton, 1968; Stuart Michael Persell, *The French Colonial Lobby*, 1889-1938, Stanford, CA : Hoover Institution Press, 1983.

226 The *Archives Nationales de France*, F14: Travaux Publics is an excellent source for clear information on railroad and road construction in North Africa. Specific sources on the large-scale infrastructure and building program in Morocco initiated by General Lyautey and implemented by engineers like Édouard Joyant (after 1913) at the Direction of Public Works can be found in the Centre des Archives Diplomatiques de Nantes (CADN), especially in the archive entitled 'Protectorat Maroc'. The sources within this sub-archive, on the 'Direction des Affaires chérifiennes,' 'Services Territoriaux du Protectorat,' and especially 'Fonds iconographique Maroc,' are especially relevant to the history of the mining towns.

227 For the role of the engineers of the Ponts et Chaussées in this venture see Jean-Charles Fredenucci, "L'entregent colonial des ingénieurs des Ponts et Chaussées dans l'urbanisme des années 1950-1970', *Vingtième Siècle. Revue d'histoire*, n° 79 (Jul.-Sep., 2003), p. 79-91 and Vacher, Hélène, "Les figures de l'ingénieur colonial à la fin du XIX[e] siècle: la formation de la Société française des ingénieurs coloniaux et de l'Ecole spéciale des travaux publics," *Le Mouvement social*, n° 189 (Oct.-Dec., 1999), p. 47-65.

228 The fact that mining was a significant factor in modernization has been researched by social scientists. See for instance: Jean-Pierre Trystam, *L'ouvrier mineur au Maroc. Contribution statistique à une étude sociologique*, Paris: Larose, 1957.

229 Numbers of inhabitants are according to the 2004 census (*Recensement général de la population et de l'habitat*).

230 A good information source for the activities of OCP is the Médiatheque of the Centre de Recherches et d'Études sur les Societés Méditerranéennes (CRESM) in Aix-en-Provence. It contains reports on the housing in mining centers such as C. Jest, *Habitat du Personnel Journalier Permanent de l'Office Chérifien des Phosphates– Centre de Khouribga* (1957) and Grigori Lazarev, Paul Pascon, *Gestion des villages miniers*, Rabat: OCP, 1969. A general introduction to the role of the OCP in Morocco can be found in Mohammed Menouar, *Le Rôle de l'entreprise publique au Maroc. Le cas de l'OCP*, Lille: unpublished thesis, 1985. Of special interest for their iconographic material are the reports by the Capitaine De La Porte Des Vaux, *Le Prolétariat marocain et l'Office Chérifien des Phosphates à Khouribga, 1re partie, Les conditions du travail*; 2e partie *La Vie dans les Villages*, CRESM, (Doc. 33-1 et 22-2).

231 An in-depth analysis of Khouribga can be found in: Mohammed Sahsah, *Khouribga: Genèse d'une ville minière 1921-1994*, Université de technologie de Belfort-Montbéliard, 2010, and Hervé Bleuchot, "Une ville minière marocaine : Khouribga," *Revue de l'Occident musulman et de la Méditerranée*, n° 6, 1969, p. 29-51. More general discussions are given by Paul Pascon, Grigori Lazarev, "Les villages miniers de la région de Khouribga," *Notes Marocaines de Géographie*, n° 14, 1960, p. 39-58, and René Duchac, "Propositions pour une recherche sur le développement de Khouribga," *Revue de l'Occident musulman et de la Méditerranée*, n° 7, 1970, p. 49-69.

232 Edmond Brion (1885-1973) was trained as an architect at the École Nationale Supérieure des Beaux-Arts in Paris. He worked in Casablanca between 1918 and 1960. He worked with Auguste Cadet from 1920 to 1935. Despite an extensive search, we found no public archival sources available on this architect. An introduction to the work of Brion and Cadet can be found in Meffre, Gislhaine, *Architecture marocaine du XX[e] siècle: Edmond Brion et Auguste Cadet*, Mohammedia: Editions Senso Unico, 2010.

233 The Archives of Émile Aillaud contain documents pertaining to the project in Khouribga. They can be found in Paris, Cité de l'Architecture et du Patrimoine, Centre d'archives d'architecture du XX[e] siècle, Fonds Émile Aillaud.

234 Documents on adult education within the OCP that also refer to the schools were produced by the INFA (Institut national pour la formation des adultes) and the CUCES (Centre universitaire de coopération économique et sociale). They can be found in the Centre de documentation sur la formation et le travail du CNAM, Paris. These include: A. Bercovitz, *L'Éducation permanente à l'Office Chérifien des Phosphates*, Nancy: CUCES-INFA, 1964, and M. Morin, *Formation et éducation permanente à l'Office Chérifien des Phosphates – Attitudes et représentations*, Nancy: CUCES-INFA, 1966.

235 The Société Anonyme d'Ougrée-Marihaye was a Belgian company that focused on coke and iron production, rolling, and casting. The Ougrée-Marihaye company archives are in the Belgian State Archives, Liege - Fonds Cockerill (AEL-FC). They have been catalogued by Anne-Catherine Delvaux, *Inventaire des archives de la Société anonyme d'Ougrée-Marihaye (1835-1955)*, Liège: Archives de l'Etat à Liège, 2011.

236 A large set of photographs of the town and mining activities of Imini Bou Tazoult can be found in the Centre des Archives Diplomatiques de Nantes (CADN), Collections d'origines privées, Fonds Jacques Belin, "Maroc," 1940-1961.

237 Sources on the SACEM can be found in: Centre des Archives Diplomatiques de Nantes (CADN), especially in the sub-archive entitled 'Protectorat Maroc', section 'Direction des Affaires chérifiennes.'

238 Marchat Henry, "La France et l'Espagne au Maroc pendant la période du Protectorat (1912-1956)," *Revue de l'Occident musulman et de la Méditerranée*, n° 10, 1971, p. 81-109.

239 Archives on the settlements in Spanish Morocco in general, and on the urban planning and architecture of Laayoune in particular, can be found in the Spanish Archivo General de la Administración (AGA), Alcalá de Henares. Fund: África (15); Archivo de Historiales de Unidades. Instituto de Cultura Militar. Madrid; Archivo General Militar. Instituto de Historia y Cultura Militar. Ejército de Tierra. Ministerio de Defensa. Segovia; Capitanía General de Canarias. Servicio Topográfico, Santa Cruz de Tenerife.

240 The architects included Alejandro Tiana González (Housing, Pabellón del Comandante Delegado), Cayetano Aguado Saralegui (Consultorio, or dispensary) and Don Diego Méndez (Church).

241 An introduction to these new typologies is given in: J.P. Capote, R. Estalella, and J. Serrano-Súñer, "Viviendas de nativos en El Aaiún," *Cuadernos de arquitectura*, n° 70, 1967, p. 40-41.

Part two
BUILDING AND EMBELLISHING

Architecture

The documentation concerning hospitals and schools in the ANMI archives

242 The organization's headquarters are located at 256 Via Cavour in Rome.

243 Regarding all of ANMI's works, see Ezio Godoli, Anna Nuzzaci, *L'Associazione Nazionale per soccorrere i Missionari Italiani e i suoi Ingegneri*, Florence: Maschietto Editore, 2009

244 The Italian State deemed it convenient to put the Association in charge of the education and health care of Italian communities abroad. As a result, ANMI primarily focused on building schools and hospitals for the Italians.

245 The Ernesto De Farro company, on behalf of ANMI, carried out the planning, execution, and construction supervision of the Luxor girls' school in 1928.

246 Italy enacted new standards for school architecture by ministerial decree dated May 4, 1925.

247 In use throughout France from the end of the 18th century, the pavilion style of hospital construction was exported and spread throughout Europe along with the revolutionary ideas. It was a standard for hospital construction until the 1950s. In Italy proper, one of the earliest examples is the Umberto I hospital in Monza, with single-story pavilions arranged around a covered central courtyard, and separated by a broad central street, dividing men's from women's wards.

248 On hospital construction, see Hermann Distel, "La moderna edilizia ospedaliera," *Edilizia Moderna*, 7/21-22, 1936, p. 8-19 and Giulio Roisecco, "Tecnica dell'organismo ospitaliero," *Architettura*, 19/5, 1940, p. 229-240.

249 Ettore Signori, *Relazione e Progetti presentati dall'ing. Ettore Signori al Consiglio degli Istituti Ospedalieri*, Cremona: Tipografia Sociale, 1890.

250 For the hospitals of Rhodes, Tripoli (Lebanon), and Haifa see "I nuovi ospedali chirurgici di Rodi, Tripoli del Libano e Haifa in Palestina," *L'Ospedale Maggiore: Rivista scientifico-pratica dell'Ospedale Maggiore di Milano ed Istituti sanitari annessi*, n° 2, 1934, p. 111-121.

251 The estate of the former Sultan Moulay Abd al-Hafid, it was a property consisting of a vast garden, a large central palace with two smaller adjoining buildings, and other small detached structures.

252 See Vilma Fasoli's article above, "The Porcheddu company and the projects for reinforced concrete water tanks".

253 See Milva Giacomelli, "L'Hôpital colonial italien Giuseppe Garibaldi à Tunis de Cesare Valle" in Ezio Godoli, Silvia Finzi, Milva Giacomelli, Ahmed Saadaoui (ed.), *Architectures et architectes italiens au Maghreb. Actes du colloque international tenu aux Archives nationales de Tunisie, Tunis, 10-12 décembre 2009*, Florence: Edizioni Polistampa, 2011, p. 84-99.

Hennebique reinforced concrete constructions in Eastern Algeria

254 See *supra* Christel Frapier and Simon Vaillant, "The organization of the Hennebique firm in the countries of the Mediterranean Basin: Establishment and communications strategy"

255 Claude Lützelschwab, *La Compagnie genevoise des Colonies suisses de Sétif (1853-1956). Un cas de colonisation privée en Algérie*, Bern: Peter Lang, 2006.

256 Henri Busson," Le Développement géographique de la colonisation agricole en Algérie," *Annales de géographie*, 7th year, n° 31, 1898, p. 34-54.

257 "This concentration of capital and the market justifies the urban residence of the main farmers, whose activity is above all commercial,"in André Prenant, "Facteurs du peuplement d'une ville de l'Algérie intérieure: Sétif," *Annales de géographie*, 62nd year, n° 334, 1953, p. 434-451.

258 Fonds Hennebique, CNAM/SIAF/Cité de l'architecture et du patrimoine/ Archives d'Architecture du XXe siècle: "Amphores"(vats) for M Germain in 1924; cellar (vats and amphorae) for William Morris and Miller in 1916 made by the Losio company of Philippeville (76 IFA 2652/17); malthouse (vats and silo) Wolf in 1932; between 1926 and 1928, a series of constructions (mills and silos) for the Société Commerciale des Colons Algériens made by Losio (76 IFA 1868/15; 76 IFA 2072/14).

259 Fonds Hennebique, 76 IFA 123/27.

260 Fonds Hennebique, 76 IFA 123/23.

261 Zahia Mihoub Soudani, *Transactions foncières, marché foncier, Patrimoine*, Doctoral dissertation supervised by Abderrahim Sekfali, Université Mentouri Constantine, 2007 (http://www.umc.edu.dz/theses/sociologie/SOU1006.pdf) (accessed on 23 December 2011).

262 Fonds Hennebique, 76 IFA 2532/3.

263 Fonds Hennebique, 76 IFA 1962/6.

264 Fonds Hennebique, 76 IFA 3230/21.

265 Jean Médecin was the architect of several villas in the Moorish style in Nice. A special thanks to Ms. Roberte Dallo, Architectural Heritage Dept., City of Nice, for this information.

266 Fonds Hennebique, 76 IFA 2013/1, letter from the Algiers office to Hennebique Paris dated 6 March 1928.

267 Hubert Bonin, "Les Banques et l'Algérie coloniale: mise en valeur impériale ou exploitation impérialiste?," symposium *Pour une histoire critique et citoyenne. Le cas de l'histoire franco-algérienne*, 20-22 juin 2006, Lyon, ENS LSH, 2007, http://ens-web3.ens-lsh.fr/colloques/france-algerie/communication.php3?id_article=201 (accessed on 26 December 2011).

268 Fonds Hennebique, 76 IFA 108/15 and 76 IFA 1977/17.

269 Fonds Hennebique, 76 IFA 2552/23; *Le Béton armé*, n° 214, Dec. 1925.

270 Fonds Hennebique, 76 IFA 2582/2.

271 *Le Béton armé*, n° 178, Jan. 1913.

272 Fonds Hennebique, 76 IFA 2582/2 and 76 IFA 2582/1.

273 Fonds Hennebique, 76 IFA 2651/18.

274 Fonds Hennebique, 76 IFA 1210/8.

275 Fonds Hennebique, 76 IFA 2010/3 and 76 IFA 2127/24.

276 Notarized deed, M[e] Henri Joseph Olivié, notary at Setif, Algeria, dated 25 November 1961.

277 Maurice Villard, Yves Brassard, *Les Hauts Plateaux sétifiens, Vol I: Leur histoire des temps immémoriaux à 1962: Sétif*, Béziers: Amicale des hauts plateaux sétifiens, 2002.

278 The information is given by a former inhabitant of Chrea: http://jean.salvano.perso.sfr.fr/Blida/CHREA-darnatigues.pdf (accessed on 23 December 2011).

279 Fonds Hennebique, 76 IFA 2582/1: letter from M. Charbonnières to M. Hennebique, 10 January 1915.

280 *Le Béton armé*, n° 214, Dec. 1925

281 Fonds Hennebique, 76 IFA 1378/6.

282 Fonds Hennebique, 76 IFA 121/14; 76 IFA 1426/20; 76 IFA 1173/26.

283 The Hennebique archives mention two names of architect's agencies at Setif: "MM. La Chazelle et Du Merlin"and "MM. La Chapelle et Dumoulin". It is clearly the same agency, but, with the current level of knowledge, it has not been possible to establish its exact name

The Hennebique agency and the figures of modernity in Algiers

284 "Le mouvement de la construction à Alger," *Journal général des Travaux publics et du bâtiment*, 24 July 1934, p. 1.

285 René Lespès et Paul Messerschmitt, "Alger 1935. La ville, le port, le tourisme", *Chantiers nord-africains*, 1935, p. 214.

286 Celebrated in splendor, the Centenary, a symbol of colonial success, was supposed to promote Algiers as a great North African capital, but the event failed to eclipse certain policy lapses.

287 Boussad Aiche, *Architectures des années trente à Alger. Les figures de la modernité*, doctoral dissertation Sylviane Leprun (supervisor), Université Bordeaux 3, Oct. 2010, p. 71-72.

288 See the Hennebique archive collection (presented in the appendices) as well as the archives of building permits of the wilaya of Algiers (formerly the Conseil populaire de la ville d'Alger (CPVA)).

289 The agency first opened at 12 boulevard Baudin (now rue Amirouche), before moving to the new building at 10 rue Berthezène (now rue Docteur-Saadane).

290 Ch. Monfort, "Le premier immeuble en béton armé construit à Alger," *Chantiers nord-africains*, March 1929, p. 201-202.

291 This assertion is slightly exaggerated. Reinforced concrete had been used in construction well before this date, such as the cathedral of Oran in 1913 with its reinforced concrete cupola made by the Frères-Perret company (see *infra* David Peyceré's contribution). It had also been used in public works in Algeria during the 1920s, especially for the construction of irrigation dams.

292 Building permit archives (Wilaya d'Alger): authorization to erect the building at 10 rue Berthezène in Algiers, Charles Montaland (arch.), Charles Bonduelle (eng.), Architect's note. See also the Fonds Hennebique 76 IFA 1769/14.

293 Charles Montaland, "Immeuble moderne à Alger," *Chantiers nord-africains*, Jul.-Aug. 1929, p. 459-460.

294 Boussad Aiche, "Figures de l'architecture algéroise des années 1930: Paul Guion et Marcel Lathuillière," in Myriam Bacha (ed.), *Architectures au Maghreb. Réinvention du patrimoine (XIX[e]-XX[e] siècles)*, Tours: Presses universitaires François-Rabelais, 2010, p. 270.

295 "Le nouveau garage des établissements J. Vinson à Alger," *Chantiers nord-africains*, May 1931, p. 483-490.

296 According to Françoise Choay, these ideas, appearing at the time of the consolidation and spread of modern architecture, became its principal characteristics (see Françoise Choay, "Espace et architecture," in *Encyclopaedia Universalis*, vol. 8, Paris: Encyclopædia universalis, 1995, p. 688).

297 "Deux immeubles à Alger. Architecte René Lugan," *Chantiers nord-africains*, May 1934, p. 388. Fonds Hennebique, 76 IFA 102/32 and 3171/8.

298 Fonds Hennebique, 76 IFA 102/34 and 3126/17.

299 "Immeuble à Alger, rue Denfert-Rochereau," *Chantiers nord-africains*, Jan. 1935, p. 32.

300 "Deux immeubles à Alger," *Chantiers nord-africains*, May 1934, p. 388.

301 L. Barré, "Considération sur *Le Béton armé*," *Chantiers nord-africains*, Feb. 1929, p. 193-196; L. Decoufle, "La conception des ouvrages en béton armé," *Chantiers nord-africains*, March 1929, p. 219-322; Fernand Puget "Les ciments ordinaires, leurs propriétés et leur fabrication en Algérie," *Chantiers nord africains*, Oct. 1929, p. 503-512.

302 Fonds Hennebique, 76 IFA 1836/3.

The Casablanca summer theatre by Baume & Marpent

303 Denise Gonçalves, *La contribution belge à l'architecture métallique pour l'exportation au XIX[e] siècle: les usines de Baume-Marpent et les Forges d'Aiseau*, doctoral dissertation, Luc Genicot (dir.), Université catholique de Louvain, 2 vol., 1997.

304 Register of minutes of the Board of Directors meetings from 1 March 1930 to 20 October 1939, meeting of 17 September 1932 (Baume & Marpent collection, Écomusée du Bois-du-Luc).

305 *Ibid.*

306 *Ibid.*, meeting of 27 October 1932.

Artistic craftsmanship

Art and luxury in the details: Italian interior decorators in modern Egypt, 1859-1967

307 With special thanks to the Istituto Italiano di Cultura of Cairo and the Centro Archeologico for having facilitated the bibliographic research and to Renato Gaeta, Enrico Nistri, and Roberto and Guido Parvis for having supplied information on their families.

308 See L. A. Balboni, *Gli italiani nella civiltà egiziana del secolo XIX*, Alexandria: Penasson, 1906, vol. II, p. 99-102.

309 Archivio storico della Fondazione Nazionale dei Cavalieri del Lavoro (AFNCdL), file related to Giuseppe Parvis. With special thanks to Ezio Godoli for this reference.

310 L. A. Balboni, *op. cit.,* p. 99 and G. Corona, "Giuseppe Parvis," in *L'esposizione italiana del 1884 in Torino illustrata,* Milan: Sonzogno, 1884, p. 273 states that Parvis studied at the Accademia Albertina. From the file on Parvis kept in AFNCdL it follows that Parvis attended in Turin the "Moncalvo" engraving school of Gabriele Capello.

311 G. Corona, *op. cit.,* p. 273.

312 AFNCdL, file related to Giuseppe Parvis.

313 See Giulia Fava-Parvis Bernocco, *A bordo del Persia: impressioni e ricordi,* Turin: G. B. Paravia e C., 1900, pp. 33-45, S. Romano, *Italiani ed istituzioni Italiane in Egitto,* communication sent to the Committee of Palermo of the Società Dante Alighieri during the meeting held on August 13, 1905, Palermo 1905, p. 16-17.

314 See "Il signor Parvis. Industriale italiano domiciliato al Cairo," in *L'Esposizione Universale di Vienna del 1873. Illustrata,* Milan: Sonzogno, 1873, p. 355.

315 See "Uno sguardo all'Esposizione egiziana," in *L'Esposizione universale di Filadelfia del 1876. Illustrata,* vol. II, Milan: Sonzogno, 1877, p. 106 and "Le rarità della Sezione Egiziana nel Main Building," p. 275.

316 See "I mobili dell'italiano Parvis," in *L'Esposizione di Parigi del 1878. Illustrata,* vol. I, Milan: Sonzogno, 1878, p. 304, 632.

317 See G. Corona, "I mobili", in *L'Esposizione Italiana del 1881 in Milano. Illustrata,* Milan: Sonzogno, 1881, p. 193-195 and "Il salotto in stile arabo di Giuseppe Parvis," p. 254-255.

318 See *L'esposizione italiana del 1884* in *Torino. Illustrata,* Milan: Sonzogno, 1884, p. 310. Parvis is included in the list of the members of the 7th Division, 8th class (Industries of metal tools and furniture) awarded a gold medal.

319 See *Esposizione Nazionale del 1898. Catalogo Generale,* Turin: Roux Frassati, 1989, p. 370 and "Gli Italiani all'estero premiati," *L'Imparziale,* n° 338-339, 4-5 December 1898.

320 See Manfredo Cagni, *Egitto,* Turin: Carlo Clausen, 1897, p. 216-219. "Quaderni dell'Istituto di Studi Verdiani," n° 4, p. 142 states that Parvis was commissioned with the mirrors for the Opera House.

321 See "Al palazzo di Koubba," *L'Imparziale,* n° 302, 29 October 1897. Parvis designed the main wood staircase for the palace restoration.

322 See G. Fava-Parvis Bernocco, *op. cit.,* p. 33-45 and S. Romano, *op. cit.,* p. 15-16.

323 See E. D. Bigiavi, *Dell'opera degli Italiani in Egitto. Relazione presentata al Comitato "Italiani all'Estero" all'Esposizione di Milano,* Lenghorn: Stabilimento Tipografico S. Belforte & C., 1906, p. 47-48.

324 See S. Romano, *op. cit.,* p.15-16.

325 See L. A. Balboni, *op. cit.,* vol. III, p. 353-354, E. D. Bigiavi, *op. cit.,* p. 47-48, C. Myntti, *Paris along the Nile: architecture in Cairo from the Belle Epoque,* Cairo: The American University in Cairo Press, 1999, p. 14.

326 See L. A. Balboni, *op. cit.,* vol. III, p. 355-357, G. B. Danovaro, *L'Égypte à l'aurore du XXe siècle,* with a preface in Italian by Pr. L. Balboni, Alexandrie: Lagoudakis Ed., 1901, p. 84, E. D. Bigiavi, *op. cit.,* p. 47-48; *Torino 1911. Esposizione internazionale delle industrie e del lavoro per il 50° Anniversario della Proclamazione del Regno d'Italia,* Catalogo Generale Ufficiale, Turin: Fratelli Pozzo Arti Grafiche, 1911, p. 535.

327 S. Romano, *op. cit.,* p. 15-16.

328 *L'Imparziale,* n° 88, 29 March 1898.

329 "L'arte italiana in Egitto," *L'Imparziale,* n° 291, 1 April 1897.

330 S. di Monsanquirico, "L'arte italiana in Egitto," *L'Imparziale,* n° 9, 8 March 1892. The author responds to a negative review of Parvis's furniture published in a French magazine.

331 See "La visita del Re del Siam allo stabilimento Parvis," *L'Imparziale,* n° 318-319, 14-15 November 1897; "A proposito del laboratorio di Parvis," *L'Imparziale,* n° 356, 22 December 1897, quoting a passage in the "Egyptian Gazette" stating that Parvis' workshop is a beloved destination of foreigners; G. Fava-Parvis Bernocco, *op. cit.,* p. 42; S. Romano, *op. cit.,* p. 15-16; K. Baedeker, *Egypt and the Sûdân. Handbook for travellers,* Leipzig, 1914, p. 41. G. Fava-Parvis Bernocco and K. Baedeker point out that Parvis's plant is located in the old Musky bazar close to Muhammad Ali square.

332 Giuseppe Parvis was nominated Cavaliere della Corona di Italia in 1872 and Cavaliere del Lavoro in 1907, died on September 19, 1909 in Saronno.

333 See "Una visita di S. E. Paternò e del conte Volpi allo stabilimento Parvis," *L'Imparziale,* Feb. 14, 1930.

334 See Michele Cennamo, *Materiali per l'analisi dell'architettura moderna. La prima Esposizione Italiana di Architettura Razionale,* Naples: Fausto Fiorentino, 1973, p. 261 and Maria Concetta Migliaccio, "Parvis, Fernando ," in *Architetti e ingegneri italiani dal Levante al Magreb 1848-1945,* E. Godoli et M. Giacomelli (ed.), Florence: Maschietto, 2005, p. 267. Fernando Parvis was born in Cairo on June 30, 1901, and attended the school of architecture at La Sapienza University in Rome from 1922 to 1926.

335 See R. P., "Cronache romane. La mostra d'arte marinara," *Emporium,* v. LXVII, n° 398, 1928, p. 118-124. Parvis took part in the exhibition presenting the furniture of a child's cabin on a steamer.

336 See G. Galassi, "Un problema Egiziano. Cerco stanza," *Il Giornale d'Oriente,* November 30, 1932. Galassi actively opposed further production in the Arabian style. Parvis agreed to that in a letter of response (see "Per la modernità della casa," *Il Giornale d'Oriente,* November 3, 1932).

337 For Parvis's works, see: "L'inaugurazione del galleggiante sul Nilo della Sezione Nautica delle O.G.I.E," *Il Giornale d'Oriente,* April 24,1934; the "Arredamento al Cairo. Arch. Fernando Parvis," *L'Architettura,* November 1935, p. 646-650; "Prima visita al Dopolavoro," *Il Giornale d'Oriente,* February 19, 1935; "L'inaugurazione degli uffici dell'UTRAS al Cairo," *Il Giornale d'Oriente,* May 8, 1938; and "La cerimonia inaugurale della Mostra italiana del Turismo al Cairo," *Il Giornale d'Oriente,* February 20, 1933.

338 The sources are unclear as to the date when the Berté workshop became active: 1899 (see *Annuario generale delle collettività italiane all'estero e degli importatori e esportatori italiani,* Trieste: Stabilimento Tipografico Mutilati, 1935, p. 198), 1904 (see "Il lavoro degli Italiani all'estero. La ditta V. Berté e V. Gaeta. Premiato Stabilimento d'Arte per i lavori in ferro," *Il Giornale d'Oriente,* March 8, 1936), 1907 (interview with Renato Gaeta).

339 *Annuario Illustrato della VI Fiera del Levante di Bari*, Milan Rome 1936: Arti Grafiche Bertarelli. Incorrectly mentioned as Berle &. V. Gaeta, the company is exhibitor no. 493 and is included in the section "Art industries," category "wrought iron works." As for the title of official purveyor to the royal house, we refer to an interview with Renato Gaeta. For the information about the awards the company received during the exhibitions, see "La visita del Ministro d'Italia allo Stabilimento del ferro battuto "Berté e Gaeta," *Il Giornale d'Oriente*, March 10, 1938.

340 See "La visita del Ministro d'Italia," art. cit.

341 Bibliographic sources note that the furniture in white metal was much admired (see "Il lavoro degli Italiani"art. cit.).

342 See "La visita del Ministro d'Italia," art. cit.

343 See *Annuario degli italiani d'Egitto*, Alexandria, 1933, p. 196; *Annuario degli italiani d'Egitto*, Cairo, 1939, p. n.n.; *Annuario generale*, op.cit., p. 232; A. Belluomini Pucci, "Presenze, immagini, caratteri dell'Oriente a Viareggio nel Novecento," in "Presenze straniere e minoranze religiose a Viareggio, figure, documenti, testimonianze," *Quaderni di storia e cultura viareggina*, n. 2, 2001, p. 167-185.

344 See *Torino 1911..., op. cit.*, p. 725.

French metal craftsmen active in the southeast Mediterranean area during the twentieth century

345 This research will soon be published in France: Karin Blanc, *Ferronnerie en façade et au salon*, Saint-Rémy-en-l'Eau: Monelle Hayot (forthcoming in 2012).

346 Maurice Culot, Anne Lambrichs, *Albert Laprade, jardinier, urbaniste, dessinateur, serviteur du patrimoine*, Paris: Norma, 2007, p. 205.

347 Joan Kahr, *Edgar Brandt, Master of Art Deco Ironwork*, New York: Abrams, 1999, p. 220.

348 Martin Fraudeau, *Ambassades de France, Le Quai d'Orsay et les trésors du patrimoine diplomatique*, Paris: Perrin, 2000, vol. I, p. 155-163.

349 Archives Paul Kiss, Fontenay-sous-Bois.

350 Auction sale catalogue, M^e^ Bernard Oger and M^e^ Etienne Dumont, Paris, May 21, 1990.

351 Archives Paul Kiss, Fontenay-sous-Bois.

352 Henri Clouzot, *La ferronnerie moderne*, II, Paris: Charles Moreau, 1928, pl. 30.

353 See Mercedes Volait, *Architectes et architectures de l'Égypte moderne (1830-1950): genèse et essor d'une expertise locale*, Paris: Maisonneuve et Larose, 2005, p. 353.

354 Peter Sulzer, *Jean Prouvé. Œuvre complète, 1. 1917-1933*, Berlin: Wasmuth, 1995, p. 178-182.

355 Louis Aubry, "Émile Robert," in Victor Champier, *Les industries d'art à l'Exposition universelle de 1900*, Paris: Revue des arts décoratifs, 1902, p. 71-75.

356 Archives Schwartz-Hautmont, Neuilly.

357 *La Construction moderne*, July 19, 1931, p. 671-672.

358 Raymond Subes, *Ferronnerie moderne. Un choix de réalisations récentes des maîtres ferronniers*, Paris: Vincent, Fréal et Cie, 1948, pl. 27.

359 With Henri Prost, Antoine Marchisio designed the hôtel La Mamounia in Marrakesh, a mixture of traditional and Art Deco architectures, in 1923.

360 Raymond Subes, *op.cit.*, pl. 28-29.

361 Paul Tournon archive, Cité de l'architecture et du patrimoine, Centre d'archives d'architecture du XX^e^ siècle.

362 Salon des artistes français, Paris, *Catalogue des œuvres exposées*, 1923.

363 Archives Georges Vinant, Montargis.

364 J. Starkie Gardner, *Ironwork, Part II: Continental ironwork of the Renaissance and later periods*, London: Victoria and Albert Museum, 1930 (reed. 1978), p. 5.

Rehabilitation

The "restoration" of the Muhammad Ali Mosque in Cairo, 1931-1938

365 Paula Sanders, *Creating Medieval Cairo, Empire, Religion and Architectural Preservation in Nineteenth-Century Egypt*, Cairo: AUC Press, 2008; Mercedes Volait, *Fous du Caire: excentriques et amateurs d'art islamique en Égypte (1867-1914)*, Forcalquier: L'Archange Minotaure, 2009.

366 Fonds Hennebique, CNAM/SIAF/Cité de l'Architecture et du Patrimoine/ Archives d'Architecture du XX^e^ siècle, 76 IFA 14/7.

367 Alaa El-Habashi, "The preservation of Egyptian cultural heritage through Egyptian eyes: the case of the Comité de Conservation des Monuments de l'Art Arabe," in Joe Nasr and Mercedes Volait (dir.), *Urbanism – Imported or Exported? Native aspirations and foreign plans*, Chichester: Wiley-Academy, 2003, p. 155-183.

368 Charles Andreae, "Umbau der Mohammed Ali Moschee auf der Zitadelle von Kairo", *Schweizerische Baukunst*, vol. 110, n° 9, 1937, p. 95-101 (the identification and translation of which I owe to Maryse Bideault); Fonds Hennebique, 76 IFA 3306/1, Ministry of the *Waqf, Projet de mise en état de la mosquée du Grand Mohammad Ali Pacha à la Citadelle, Collection de dessins*, Cairo 1933, and correspondence; Paris, collection of the author, Ministry of the *Waqf, Projet de mise en état de la mosquée du Grand Mohammad Ali Pacha à la Citadelle, Rapport*, 1931-1933, Cairo, 1933 and correspondence; Paris, collection of the author, *Procès-verbaux des séances du Comité de conservation des monuments de l'art arabe* [CCMAA] (1882-1951).

369 Works in 1899-1900: CCMMA year 1899, 260^th^ report of the technical section and *Rapport...*, p. 11, 33.

370 Until then, it had been the responsibility of the Office of Mosques, another service of the Ministry of the *Waqf*, an authority equivalent to an administration of Faiths.

371 Biographical information in Mercedes Volait, *Architectes et architectures de l'Égypte moderne (1830-1950): genèse et essor d'une expertise locale*, Paris: Maisonneuve et Larose, 2005, p. 421.

372 Biography online on the site of the Zurich Polytechnic Institute, with an indication of the archives available, http://www.library.

ethz.ch/de/Ressourcen/Digitale-Kollektionen/Kurzportraets/Charles-Andreae-1874-1964 (accessed 7 January 2012).

373 A specialist in hydraulic engineering of Russian origin, who spent his entire career in Egypt, where he had emigrated after the revolution of October 1917 (Obituary on the ICE site).

374 Most were carried out by the Russian-born civil engineer Gregory Tschebotarioff (1899-1985), a specialist in soil mechanics. After spending seven years at the Egyptian State Buildings service, Tschebotarioff emigrated to the United States of America. He taught at Princeton, then distinguished himself as a consultant on major international projects, "Gregory P. Tschebotarioff, Dr Ing 1899–1985", *Géotechnique,* vol. 36, n° 1, March 1986, p. 137-138.

375 Charles Andreae, *op. cit.,* p. 95.

376 Ministry of the *Waqf, Projet de mise en état de la mosquée du Grand Mohammad Ali Pacha à la Citadelle, Rapport, op. cit.,* p. 46-47.

377 *Ibid.;* Office international des musées, *La Conservation des monuments d'art et d'histoire* [presentation at the Athens Conference, 21-30 Oct. 1931], Paris: Institut international de coopération intellectuelle, 1933.

378 Charles Andreae, *op. cit.,* p. 99.

379 Fonds Hennebique, 76 IFA 3306/1.

380 The company is still active in Aarau in Switzerland. See its site: http://www.rothpletz.ch/frameset.htm (accessed on 12 January 2012).

381 See the entry on him in the *Dictionnaire historique de la Suisse* (DHS), http://www.hls-dhs-dss.ch/textes/f/F4671.php (accessed on 10 January 2012); Hans G. Wägli, "Ferdinand Rothpletz (1872-1949)"in Robert Kaufmann, *Sechs Schweizer Alpeningenieure*, Meilen: Verein für Wirtschaftshistorische Studien, 2001, p. 69-83.

382 CCMAA, *Procès-verbaux des séances du Comité et rapports de la section technique, Exercices 1933-1935,* Cairo, 1940, p. 114-115.

383 Charles Andreae, *Auszug aus Notizbüchlein*, manuscript conserved at Zurich, ETH, Bibliothek, Archive und Nachlässe, Hs 1002: 6 to 28 Dec. 1929.

384 CCMAA, 1940, p. 114. Léon Rolin mentions that the Rothpletz & Lienhard company had taken over engineer W. Stross's business in Egypt (Fonds Hennebique); it also had worksites at Beirut and Baalbek (Charles Andreae, on 15 October 1933). W. Stross worked on the project for the Mosque as a consultant.

385 Fonds Hennebique, 76 IFA 3349.

386 Photograph albums conserved at Zurich, ETH, Bibliothek, Archive und Nachlässe, Fonds Charles Andreae, Ms Hs 1002:10 and Hs 1002:11 and private archives of Pierre Rothpletz in Aarau.

387 Ibrahim Adham el-Damirdash, *Das Stahlgerüst für den Umbau der Mohammed Aly-Moschee auf der Citadelle zu Kairo*, Zurich: Leemann, 1936, 4 p.

388 Andreae, *op. cit.,* p. 100.

389 CCMAA, 1940, p. 186.

390 Nicholas Warner, *The Monuments of Historic Cairo,* Cairo: AUC Press, 2005, p. 163.

391 CCMAA 1941-45 period, p. 269-270; Kamel Osman Ghaleb, *Le Mikyas ou nilomètre de l'île de Rodah,* Cairo: imprimerie de l'IFAO, 1951.

Imagination, design, technique: Three European projects for Abu Simbel

392 John Lewis Burckhardt, *Travels in Nubia,* London: John Murray, 1819, p. 91. John Lewis Burckhardt (1784-1817) was a Swiss-born explorer and orientalist best known for his discovery of Petra in 1812.

393 Giovanni Battista Belzoni, *Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs and Excavations in Egypt and Nubia,* London: John Murray, 1820, p. 213-214. Born in Padua, Giovanni Battista Belzoni (1778-1823) is considered a forerunner of modern egyptology.

394 On the construction and significance of the temples see Christiane Desroches-Noblecourt, *The World Saves Abu Simbel*, Vienna: Koska, 1968.

395 In 1946, when the Nile almost overflowed the dam built by the British in 1902 (already raised in 1912 and in 1933), the authorities decided to build a larger dam 6 km upstream of the old one.

396 Prior to the High Dam, the level of the Nile at Abu Simbel was 120 m above sea level; at the end of 1967 the water level reached 170 m above sea level, about 50 m higher.

397 The decision was approved at an executive council meeting held in Paris from November 27 to December 4, 1959.

398 A leading figure in Catholic associations, Vittorino Veronese (1910-1986) was Director-General of UNESCO from November 1958 to 1961.

399 World Appeal of Vittorino Veronese, UNESCO Director-General, March 8, 1960. See www.numibia.net/nubia/salvage2.htm, (accessed on November 12, 2011).

400 André Malraux (1901-1976), a leading figure in 20th-century artistic and cultural debate, also worked as an archeologist in central Asia: he was Minister of Cultural Affairs in the Charles de Gaulle governments from 1958 to 1968.

401 Speech by A. Malraux at UNESCO in Paris, March 8, 1960.

402 See "Statement by President Gamal Abdel Nasser of 20 June 1961 on the preservation of Abu Simbel Temples"in *UNESCO/CUA/109, Information about the international campaign to save the monuments of Nubia,* Progress of the campaign from 1 May to 4 August 1961, Annex III.

403 Established in 1947, the engineering firm Coyne & Bellier specialized in the design of great dams including the Kariba dam on the Zambezi (1959).

404 Established in 1957 at Rome, Italconsult is one of the main engineering firms specialized in design and execution of transport and hydraulic works; in the early 60s it acted as consultant to the Ministry of Agrarian Reform, on reclamation work in the Delta, on the central stretch of the Nile and on Upper Egypt.

405 Cf. André Coyne and Joseph Duffaut, "Considérations techniques concernant la conservation sur place des monuments de Abou Simbel et de Philae," Report of the meeting of international experts held in Cairo on 1 October 1959.

406 Pietro Gazzola, "La cultura mondiale e il salvataggio di Abou Simbel," *Rivista di Studi Politici Internazionali,* 2, 1961, p. 195.

407 See Bureau d'études André Coyne et Jean Bellier, *Avant-projet des ouvrages de protection des Temples d'Abou Simbel*, Paris, October 1960. The dossier, consultable on http://www.unesco.org/new/en/unesco/resources/online-materials/publications/unesdoc-database, comprises four volumes: the main report, designs, four issues of technical documentation (natural conditions, material to use, work concept, construction); explanatory graphic material.

408 With his degrees in civil engineering and mathematics, Gustavo Colonnetti (1886-1968) was one of Italy's leading engineers. In 1944, the provisional government appointed him to restart research in Italy and from 1945 to 1956 he chaired the "Consiglio nazionale delle Ricerche e della Ricostruzione" (later CNR).

409 Pietro Gazzola (1908-1979), who held a degree in Architecture from Polytechnic (1932) and one in Arts from Milan State University (1934), followed the teachings of Camillo Boito, Luca Beltrami, Gustavo Giovannoni and Ambrogio Annoni. In 1952 UNESCO appointed him specialist for monuments and archeological digs. In 1960, his mission to Nubia started the archeological campaign there. For more on Gazzola see Claudia Aveta, *Pietro Gazzola. Restauro dei monumenti e tutela ambientale*, Naples: Edizioni scientifiche italiane, 2007.

410 On Riccardo Morandi (1902-1989) see Lara Vinca Masini, *Riccardo Morandi*, Rome: De Luca, 1974; Giorgio Boaga (ed.) *Riccardo Morandi, Bologna: Zanichelli, 1984; Giuseppe Imbesi, Maurizio Morandi, Francesco Moschini (ed.), Riccardo Morandi. Innovazione tecnologia progetto*, Rome-Reggio Calabria: Gangemi, 1991.

411 Italconsult S.p.a, Imprese italiane all'estero S.p.a., Ing. Lodigiani S.p.a., *Saving the Temples of Abu Simbel*, Preliminary Design, 6 vols. Rome, November 1960.

412 The section entitled "Operazioni statiche e meccaniche" dealt with problems concerning lifting operations, describing the degree of interdependence between the structures and mechanical action by the set of hydraulic jacks.

413 Appointed by letter of 19 December 1960, the other experts were Ivan Komzin (USSR), Hans Joachim Martini (German Federal Republic), Alfred Stucky (Switzerland), Edward E. White (USA), George Radchenko (USSR).

414 In view of the technical complexity of the Italian plan, the Egyptian government appointed a Supervisory Committee chaired by Hassan Zaky with three members nominated by the Norwegian and Swedish governments: Laurits Bjerrum (Oslo), Anton Brandtzaeg (Trondheim), Arvid Hedvall (Gothenburg).

415 Giuseppe Lodigiani, "Appunto per la serata del Rotary di Milano: Abu Simbel. Il salvataggio del tempio di Ramsete II," 15 January 2001, typed copy, p. 10.

416 Formed *ad hoc*, the consortium included Grands Travaux de Marseille from Paris, Hochtief from Essen, the Italian group Impresit-Girola-Lodigiani (Impregilo) from Milan, Skanska and Sentab both from Stockholm, and the Egyptian firm Atlas.

417 Giuseppe Lodigiani, "Appunto per la serata del Rotary di Milano," *cit.* p. 15-16.

418 The archeologists wanted the fewest cuts possible, even if bigger blocks meant higher costs for lifting and transport. It was finally decided that the façade blocks would not exceed 30 t and cut surfaces of 15 m^2. The rest would not exceed 20 t. with cut surfaces of 12 m^2 (wall blocks) and of 10 m^2 (vault blocks).

419 In addition to the monumental blocks, there were the 6,800 blocks of hill rock to be used to recreate the surroundings of the temples.

420 At the end of March 1966, the High Dam Management Department decided to raise the maximum level of the artificial lake, making it necessary to remove the first 31 blocks of the smaller temple, already in their final places, in order to raise the floor and then put them in place again.

421 Tourist services and a ventilation system were to be placed between the temples and the intrados of the cupolas. The cupola of the Great Temple represents a great technical achievement: 60 m deep, 25 m high, and 45 m wide, it supports a load from 20 t/m^2 at the top to 70 t/m^2 at the base.

422 For the completed plan see also Karl-Heinz Martini, *Abu Simbel*, Essen: 2R-Druck, 1965; Sergio Frascarelli "Lo spostamento dei Templi di Abu Simbel," *Rivista tecnica dell'Ance – L'Industria delle Costruzioni*, March-April 1969, VBB Vatten-byggnadsbyrån, *The Salvage of the Abu Simbel Temples*, Concluding Report Stockholm 1976. Paola Latini, "Quarant'anni di opere," *Progetto & Pubblico*, no. 20, p. 36-45.

423 Marco Ferrante, "Quando le nostre aziende riuscivano a salvare i Faraoni," *Il Sole 24 Ore*, 17 February 2011, p. 17.

424 For the material collected for this essay, we wish to thank, in alphabetical order, Roberto Brizi (director of the Italconsult archive), Dr. Alberto Franchi (Politecnico di Milano), engineer Vincenzo Lizier, engineer Enrico Lodigiani (Lodigiani private archive), Dr. Antonio Migliacci (Politecnico di Milano), engineer Gianni Porta (Impregilo S.p.a., South Africa Branch).

Annexes : A brief survey of the archives

425 http://archiviodistatotorino.beniculturali.it/Site/index.php/il-patrimonio/percorsi/storia-industriale-del-900

426 http://www.biblio.polito.it/it/biblioteche/bca.html

427 Lidia Arena, Laura Biscaro Parrini, Cristina Delpiano, Michele Sisto (ed.), *Archivio Storico della Società Nazionale delle Officine di Savigliano. Elenco di versamento ordinato*, January 2003.

428 Now known as the Centre d'Archives d'Architecture du XX^{e} Siècle of the Cité de l'Architecture et du Patrimoine (Paris).

429 Since 2011, all issues of *Le Béton armé* have been accessible in digital format on the document portal of the Cité de l'Architecture et du Patrimoine, thanks to a partnership with the university library of Ghent.

430 From 1902 to 1967, the head office of the Hennebique company was at 1 rue Danton in Paris.

431 The entire archive is downloadable. It can be accessed via the online database *Archiwebture*: http://archiwebture.citechaillot.fr/awt/

432 The IRI (Institute for Industrial Reconstruction) was established on January 24, 1933 as a temporary public authority, to deal with a serious financial and industrial crisis centering on Italy's three major banks: Banca

Commerciale Italiana, Banco di Roma, and Credito Italiano) caused by the revaluation of the Lira (1927) and Wall Street's collapse (1929). The Institute took over the banks, restructured them, and reorganized their stakes in company equity, by separating retail banks from investment banks. Having survived Fascism, it was one of the major engines of post-war reconstruction and development of the country, until the 1970s. It was closed in 2000.

433 The sale of the company to the United Arab Republic was not settled until 1971. A share of SEF remained Italian (50%) and was absorbed by Sofin in 1968; capital gains were recorded in IRI's accounts until 1985.

434 Ildo Pellegrini (posthumous), *Agordini a Kosseir. Storia di una comunità nelle miniere di fosfati in Egitto*, Feltre: Agorà, 2011.

435 Many thanks to Renza Maroso Pellegrini for this information. Decima arrived in Kosseir in 1921. Expert in mining, he graduated from the school of Agordo and studied construction engineering with Bibolini, a professor at Politecnico di Torino. See entry in *Chi è? Dizionario degli italiani d'oggi,* Rome: Formiggini, 1936.

436 The lost drawing for the gable of Kosseir's church is published in *Centenario dell'Istituto tecnico Minerario, Agordo 1867-1967*, Agordo: Comitato per le celebrazioni centenarie, 1967, p. 97.

437 The documents related to the authorizations for the construction of Kosseir's church were stored among the files of *Propaganda Fide*, Fondo Copti 1480/28. The correspondence started in 1928, ten years before the construction of the church. The correspondence between the Sacred Congregation for the Eastern Churches, the Apostolic Delegate, and the Franciscan Vicar General surrounds issues related to ownership of the building by the Catholic rather than the Coptic Church, which had jurisdiction over the area. The matter was resolved with a complicated use agreement.

438 The archives contain: Poste e telegrafi, no. 133, *Società Marconi*, 1912, file 1, p. 15-18. In the section of commercial affairs: *Radiocollegamento Italia-Egitto*, 1924-26, p. 18/1 -18/5 and *Fosfati in Egitto*, no. 4, 1919-1923. In the section Cairo Embassy: *Trasporto di fosfati (Istanza Banco di Roma*), no. 155, 1916, f. 7, p. T; *Missione Francescana di Kosseir*, n° 237, 1930, file 22, p. A/54; *Fascismo Kosseir*, n° 265, 1932, file 5, Stampa/5; *Ferrovia Kosseir*, 261, 1932, p. B/7; *Forniture Tosi*, no. 313, 1938, file 4, p. B/7. The drawings concerning Kosseir's school, in ASMAE, *Fondo disegni architettonici inediti*, p. Egitto, coll. prov., founded by M. C. Migliaccio, are published in Ezio Godoli, Milva Giacomelli, *Architetti e ingegneri italiani dal Levante al Magreb 1848-1945*, Florence: Maschietto, 2005, p. 163.

439 See in particular, Dominique Barjot, *La Grande entreprise française de travaux publics (1883-1974)*, Paris: Economica, 2006; *Travaux publics de France. Un siècle d'entrepreneurs et d'entreprises*, Paris: Presses de l'École des Ponts et Chaussées, 1993; with Jacques Dureuil (dir.), *150 ans de génie civil: une histoire de centraliens*, Paris: Presses Universitaires de Paris Sorbonne (PUPS), 2008.

440 Dominique Barjot, *La trace des bâtisseurs: histoire du Groupe Vinci*, Paris: Vinci, 2003.

441 See our publication due to appear in 2012: *Francis Bouygues: aux origines d'un leader mondial de la construction et des services publics*, Paris: Economica. See also, "L'ascension d'un entrepreneur: Francis Bouygues (1952-1989)," *XX^e siècle: Revue d'histoire,* n° 35, July-September 1992, p. 42-59.

442 Dominique Barjot, *Fougerolle. Deux siècles de savoir-faire*, Paris: Éditions du Lys, 1992 ; Pierre Jambard, *Un constructeur de la France du XX^e siècle. La Société Auxiliaire d'Entreprises (SAE) et la naissance de la grande entreprise française de bâtiment (1924-1974)*, Rennes: Presses universitaires de Rennes (PUR), 2008.

443 Jean Monville and Xavier Bezançon, *Naître et renaître. Une histoire de SPIE*, Paris: Michel de Maule, 2010. See also: Rang-Ri Park-Barjot, *La Société de construction des Batignolles. Des origines à la Première Guerre Mondiale*, Paris: PUPS, 2005 ; Anne Burnel, *La Société de construction des Batignolles de 1914 à 1939. Histoire d'un déclin*, Geneva/Paris: Droz, 1995.

444 Arnaud Berthonnet, *Chagnaud Construction. Histoire et renaissance d'un grand bâtisseur*, Paris: Insiglo, 2007.

445 Dominique Barjot, "Public utilities and private initiative. The French concession model in historical perspective," *Business History*, vol. 53, n° 5, August 2011, p. 782-800.

Index of the names of contractors [C], engineers [E] and architects [A]

Illustration credits

For the most part, authors replicated the place names printed in the sources. These may vary depending on the system of transliteration from Arabic and name changes over time.

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