International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Scholarly Publisher
RS Global Sp. z O.O.
ISNI: 0000 0004 8495 2390

Dolna 17, Warsaw,
Poland 00-773
+48 226 0 227 03
editorial_office@rsglobal.pl

ARTICLE TITLE	CONFLICT BETWEEN MILITARY ENGINEERING AND THE ROAD AND BRIDGE SERVICE FOR THE RECONSTRUCTION OF THE EL KANTARA BRIDGE IN CONSTANTINE
ARTICLE INFO	Mosbah Zoubir. (2024) Conflict Between Military Engineering and The Road and Bridge Service for The Reconstruction of The El Kantara Bridge in Constantine. *International Journal of Innovative Technologies in Social Science*. 4(44). doi: 10.31435/ijitss.4(44).2024.3047
DOI	https://doi.org/10.31435/ijitss.4(44).2024.3047
RECEIVED	16 October 2024
ACCEPTED	03 December 2024
PUBLISHED	07 December 2024
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CONFLICT BETWEEN MILITARY ENGINEERING AND THE ROAD AND BRIDGE SERVICE FOR THE RECONSTRUCTION OF THE EL KANTARA BRIDGE IN CONSTANTINE

Mosbah Zoubir
Doctor, University of Constantine 3, Institute of Urban Management and Techniques, Architecture, City, Urban Planning, Environment Laboratory (LAVUE) University of Paris X

ABSTRACT

The conflict which delayed the establishment of the El Kantara bridge (between military engineering and the bridges and roads service) was intended to communicate with the railway station and Philippeville on the coast. It made essential the role of Rue Nationale No. 3, between La Brèche, where commercial establishments, stores, warehouses, markets and the train station were concentrated. Also, the decision to reconstruct the El Kantara bridge was imminent. It was to be doubled by the railway network which was designed for strategic purposes by the French army (Shd, 1847). Therefore, the bridges and roads service had complete confidence in establishing the El Kantara bridge, following its experiences and skills carried out across other Algerian colonial cities.

The reconstruction of the communication of the El Kantara bridge was the modern project for military engineering which allowed better exploitation of the colonial fabric of Constantine. This city was built on a rock made up of a large spur limited by the Rhumel ravines, crossed by the EI Kantara bridge which, having resumed service in 1863, was rebuilt in 1950. According to Berbrugger (1856), Constantine, without its numerous bridges spanning the abyss, is something that is difficult to imagine. For once, these gorges, the setting of so many tragic scenes over the centuries, had provided the people of Constantine with choice and completely unique entertainment. Not counting the very decorative but practically unusable natural arch, there are six bridges (Berbrugger, 1856).

KEYWORDS

Conflict, Reconstruction, Bridge, Fortification, Military Engineering, Bridges and Roads

CITATION

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Introduction.

The familiar silhouettes of bridges are so intimately part of the panorama of today's city that there are few postcards without one or other of these bridges. And yet, from 1304 to 1792, that is to say for almost five centuries, no motorable artery crossed the gorges. The endless wars and the numerous sieges suffered by the City of the Rock had taken their toll on the three or four bridges built by Roman architects in solid cut stones (Marion, 1957).

It was the Algerian Historical Society, founded in 1856 by Adrien Berbrugger, of which he was also the first president, which advocated conservation. Both historical monuments and archaeological remains, which had in one of its recommendations, to specially charge the genius with collecting and preserving the antiquities in each place: it is the service, she maintained, which has the personnel and in material terms, the most powerful means of action to achieve the goal we propose (Berbrugger, op. cit.). We then organized the obligatory and destabilizing displacement of the indigenous population from the capture of Constantine, in October 1837, by the expropriation of the largest part of the Casbah and its surroundings, put in place by a strategic plan to install the population coming from Europe (Ibid).

The day after the troops disembarked, the task of carrying out the first surveys of the plans of the occupied towns was assigned to the military engineering service. Indeed, an essential working tool for the strategic knowledge of the urban site both from the point of view of its defense and its military control, the establishment of the plan of a city was placed at the forefront of the concerns of the French expeditionary force. This is how the first map of Algiers, for example, was carried out in 1830 by Captain Morin, followed in 1832 by that of Pelet, measured at 1/25,000 (Ibid).

A new urban strategy transformed the space of the old town which was reminiscent of the Maghreb Middle Ages with its network of beautiful roads from the time of Rome but which had also gradually deteriorated because little thought was given to to maintain it. Wheeled traffic had even become practically non-existent throughout the country. As proof, the state of the streets or rather the alleys of old Constantine, too narrow, steep and cut in several places by stairs, which, in fact, should hardly have been suitable for the circulation of cars but only for portage at animal backs (Marion, op.cit.).

According to Benkada (1999), the French colonial enterprise in Algeria in 1830 was first and foremost a military expedition of the highest violence, which inaugurated a completely new phase in the style of colonial wars. There was initially no question of a scientific expedition project, in this case archaeological. As the coastal towns were occupied, the leaders of the expeditionary force noted, with great surprise, that Algeria was a country where the monumental and archaeological heritage was not without interest. So we had the idea that it was necessary to follow this military penetration by an enterprise of scientific exploration whose task would be eminently entrusted to the officers of the technical corps of the army, in particular the "learned weapon" par excellence that is military engineering (Benkada, 2004).

The location chosen in agreement with the chief of engineers for the bridge to be raised above the rhumel ravine provided the means of overcoming the obstacle with the slightest defense. This location is none other than that adopted by the engineer of the bridge and road services, only because of the difference in the solutions proposed by the latter and the military engineering services.

1. Problematic.

Article 1, of the decree of August 4, 1811, maintenance and repair work on standing bridges and drawbridges established for the defense of the Places, or located on defense canals or on flood ditches in the parts of the road which cross the fortifications, are designated under the name of military bridges. And will remain as in the past the responsibility of the Minister of War, and executed by the engineering service. According to Berbrugger (1856), from the 1850s, developers became aware of the particularity and importance of the city's Spanish remains. This interest is also not unrelated to the decision to create in 1854 by Marshal Randon the Commission for general education, historical monuments and archaeological museums of Algeria (Berbrugger, op. cit.).

Isn’t the Rummel the cause of the obstacle to overcome? These dimensions must have seemed unnecessary, given the terms of the decree of January 13, 1813, sovereign in this matter, since it was issued solely with the aim of avoiding conflicts between the engineering and bridges and roadways services, relating to bridges. To be built in the kilometer zone of the place. However, Marshal Randon's initiative did not stop there. To give to local historical studies the power and effectiveness, which result from the association of the efforts of all competent men; he caused the establishment of a special society in the capital of Algeria (Berbrugger, op. cit.)

He also posed a question of law: Since the road and bridge service built bridges over the rivers for which they were responsible, why would the military engineering services want to build them over those, which escaped their knowledge ?

2. Historical Features of The El Kantara Bridge.

According to Moukraena (2015), an inscription discovered on the bridge, dating from Roman times, comes from a now destroyed monument. Ch. Vars observed that the letters appearing on the inscription, with a height of 37 cm, are highly representative and in line with the architectural characteristics of the monument, which makes it possible to place it in the Antonine era due to the impressive appearance of the pillars and their seats from the 2nd century (Moukraenta, 2015).

The first bridge with a siphon aqueduct was built by the Romans in Antiquity. Thanks to the publication of a letter by Laurent-Charles Féraud, it is possible to establish a date for the construction of the bridge, placing it at the time of Constantine, around the year 335 AD. This bridge is therefore considered one of Constantine's achievements, undertaken approximately two years before his death. However, this opinion is not unanimously accepted according to Stéphane Gsell (Ibid).

It collapsed in the 13th century (Yver. G, 2010) and on its remains, a new bridge was built. Its construction, ordered by Salah Bey in 1792 (Moukraenta, 2015) (fig. No. 01), was entrusted to its Maltese

architect Bartolomeo (Yver, op. cit.). It was then made up of 4 stone arches. In 1836, it was the scene of unsuccessful assaults by the French army during the siege of Constantine (Yver, op. cit.). The reconstruction of the new El Kantara bridge was decided in 1860 and was released to traffic in 1863. The bridge was made up of a main metal arch resting on two stone piles (Moukraenta, op. cit.) (Fig. No. 02).

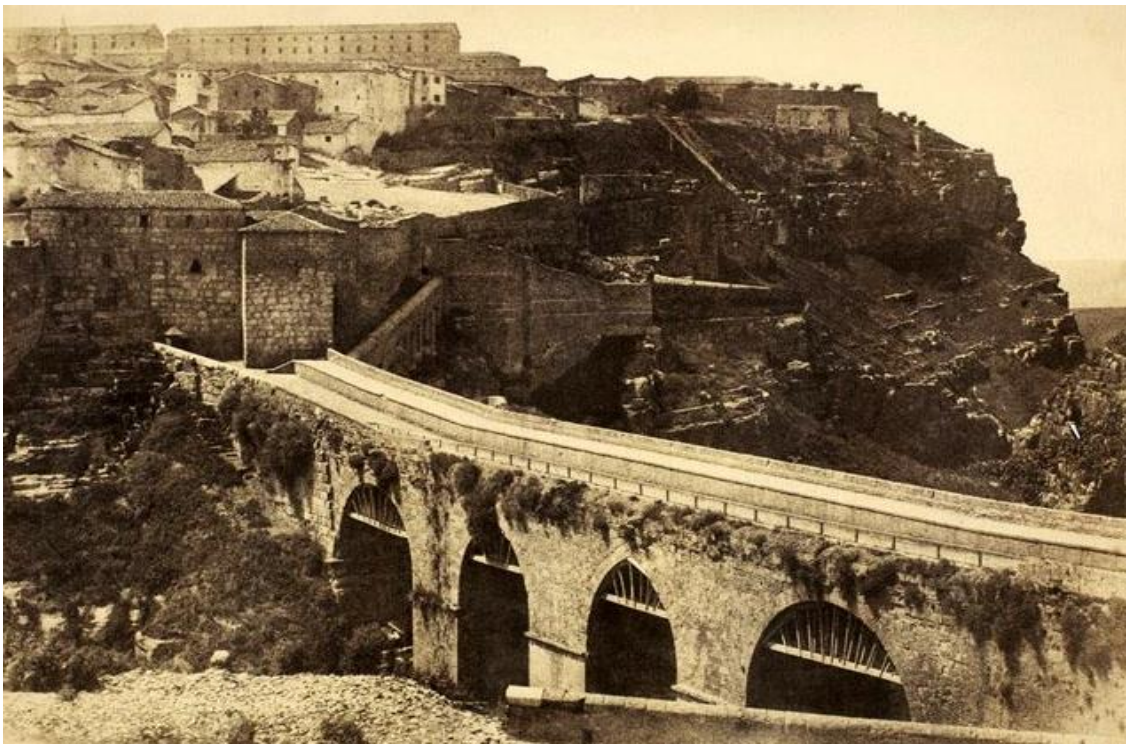

Fig. 1. El Kantara Bridge, built by Salah Bey, 1792.
Source: Greene Johon Breasley 1856

Fig 2. El Kantara Bridge, built during the French capture, 1863.
Source: National Archives of Algiers, 2018

Since the 17th century, European powers (France, Spain, Great Britain) had advanced cartographic science and the art of fortifications in their colonial possessions (Boutier, 1989). Overall, emphasizing this aspect, Martha D. Pollak notes that the plans drawn up by military architects came to play a crucial role in understanding the city as an entity. Embraced at a single glance, this faithful abstraction proved to be a powerful instrument for manipulating and transforming urban form by the architect and urban planner (Pollak, Martha. D, 1989).

This colonial transformative military penetration created a segregative and exclusive social mobility of the indigenous families of the Place, in order to contribute to the modification of the military sphere and to the voluntarily technological environmental and politico-economic evolution of the extension of the city by the bridge in question in communication with the road and the railway station (Berbrugger, op. cit.).

It was planned to create a permanent archaeological commission (whose members would be taken from each locality, from engineering, bridges and highways, civil buildings, etc.) which would oversee the collection of collectibles, their arrangement and conservation. There is not one of our correspondents who did not accept this honorable mission with pleasure (Berbrugger, op. cit.).

In this context, Oscar Mac Carthy, geographic engineer of the corps of engineers, used all his talent as a draftsman and cartographer to generalize, from the 1860s, the plans of large Algerian cities such as Algiers (1/5000 plan, 1862; , 1867).

The reconstruction of the El Kantara bridge led to a monumental gate which, having become unsuitable, was destroyed in 1922. It was profoundly altered in its shape in 1951. It was made up of four stone arches. This first bridge in the city included a siphon aqueduct, built by the Romans during antiquity. He did not understand the surroundings, the bridges and roads department only intended to design them in the final project.

The need for the reconstruction of a new viaduct did not have any defensive considerations which would have come to oppose the execution of the project presented by the bridges and roads department. Mining chambers, according to the project, would be erected by the engineering department, and established in the arch closest to the city, to destroy it if necessary ; this arch will not have a 10 meter opening.

The railway route was more military in the extent of the fortification zone. Marshal Vaillant, in his letter of December 22, 1857, starts from the accomplished facts. The station was definitively fixed on the right bank of the Rhumel by ministerial decision of June 22, 1858. This railway line had to be developed in a hilly region, which required considerable civil engineering work : it directly required two tunnels. It was indeed necessary to communicate with the town and with the one which would later be established at Coudiat Aty, by crossing the ravine on a bridge.

There was also another question to be addressed at the same time, that of the expansion of the city on the Coudiat Aty side, so the location of the station greatly depended (Berbrugger, op. cit.).

However, the civil services, Bridges and Roads, Civil Buildings and Roads, etc., continued to produce, as part of their mission, rich and varied cartographic documentation on the physical data of the urban site. It was the time of the creation of large French companies which often carried out an appreciable, even dominant, part of their activity in foreign countries and the colonial Empire. As for the bridges and viaducts of this period, it is they who will mark the history of French civil engineering (Tsakopoulos, 1994).

3. Competition for The Reconstruction of Communication.

This bridge having to communicate the Place with the external works of Mansourah and Sidi M'cid, we were forced to admit some fortification, to prevent any surprise. The Marshal could tell them : “If the place is attacked, you will blow up a span. We will then deprive ourselves of important communication from the start of the siege.” History is there to prove that there was either too much haste or too much slowness in blowing up the great bridges in military operations, and that the fate of places and armies was often compromised (Shd, op. cit.). According to Malverti, bridge and road engineers, under the weight of military authority in Algeria, were forced to accept this cumbersome supervision.

Furthermore, the almost total absence of civil services capable of taking charge of public works meant that civil engineers had little choice, in this case, to completely dispense with the assistance of engineering engineers who were, like Malverti, 1870 rightly points out.

It appears, according to the Marshal, from these remarks that the natural consequence was the extension of the limits of the fortification zone, adopted in 1854 solely as a result of the location chosen for the railway station. The limits of the reserved land were placed at the top of the rocks which form the counterscarp of the Place and surround the recess to be placed at the head of the bridge.

In this regard, the director of military engineering was trying to prove that the El Kantara bridge cannot be distracted from the engineering department which will build it alongside the major fortification works, due to its establishment in this location which entirely modifies the routes since it passes 10 meters above the old door. According to Andoval, from the beginning of the conquest, a man like the director of military engineering at Constantine did not seem to hold civil services in high esteem. He had excluded them, in particular the Bridges and Roads, from all operations to open new roads, and had civil engineers replaced in military territories by military engineering officers (Andoval, 1867).

If he had divided the work, there would have been two administrations assigned to constructions of the same type, which could not be accepted in the interest of good service. The engineering department was not happy with the choice to maintain the rights granted by the decrees and legislation in this area. However, if we return to the ministerial decisions of March 25 and August 5, 1843, we see that they were only the formalization of a state of affairs, which was that of the placing under supervision of military engineering, of the services civilians in public works. This did not fail to revive the quarrel which had already existed in France, in the 18th century, between military engineers and civil engineers (Picon, 1989).

The military authority had studied two projects in other positions. The first opened out in front of the entrance to the ravine to the south, and at the site of the Roman bridge. This position was perfect, it gives easy communication with the Mansourah and is well flanked by the fortification. But the difficulty is the difference in level of the escarpments on the two sides : that of the city dominates the opposite one by 17 meters. It was impossible to organize reasonable communications to reach the different parts of the city. The second position was satisfactory for military interests. It was the one in the extension of rue Vieux, above a natural arch. There the bridge was possible, it would have dominated the station, would have been an easy communication for the fort of El M'cid and would have at the same time satisfied the interests of the city, by opening almost to the center. Ultimately this solution was abandoned because of the large section of the ravine at this point. The expense for the bridge would have been double that of the bridges that had been designed around the point of El Kantara.

The engineering engineer presented a project for a bridge whose axis was a little to the right of that of the ancient Roman bridge, with a length of 146 m to the point where it approached the fortification, following its great elevation at the above the El Kantara gate. The work would be extended further to reach the line of defense that he would be obliged to support. This layout remains rational, following the engineer's ideas for the construction of bridges, and presents itself a little obliquely relative to the major communication in the interior. It consists of a vault system of the type adopted for railway viaducts and, for the crossing above the ravine, of a sheet metal hourglass with a span of 56 m.

4. Who Will Be Responsible for Rebuilding The Bridge?

The bridge and road engineer, Lebier Jules, defined the fortification zone set by the Minister of War, by decision of December 11, 1854. The military reserves only extended as far as the right bank of the Rummel (fig. No. 03).

The bridges and roads department takes as its limit point A of the right bank measured at water level, which gives a variable limit depending on the floods of the Rummel. It seems to him that the limit must be at point B, the top of the bank which is part of an invariable line. During a river, the true limit is the top of the banks. This establishes that the axis of the bridge corresponds to its limit, therefore the route on this communication is longer on the side of the fortification zone. The proposed bridge largely meets the conditions set out above, it is military, it is established on a defense canal because the ravine is considered as a defense of the Place.

According to the senior engineering officer, Lacoste François-Xavier, article 4 of the decree of August 4, 1811 is also the guide for mixed works in the kilometer zone of the Place. Article 13 of the decree of August 16, 1853 (the provisions of which were adopted by the chief of engineers), although it was not promulgated in Algeria, fell entirely within the remit of the engineers. In 1845, following the upheavals in the urban fabric of Algiers, a decision of the Governor General of August 4, 1845 regulated the naming of streets, squares and promenades. But the basic text which regulates the conflicts of jurisdiction between the different services on the questions of roads, town planning and public works, is, without doubt, the decree of the Ministry of War of January 27, 1846, relating on the distribution of public works between the different services (Shd, 1870).

This decree clearly specifies, notably in its article 7, that the lifting of plans of towns and population centers, whether old or to be created, and the reduction of alignment plans belong to the civil territories in the service of Civil Buildings and to the military and Arab territories in the service of engineering (Ibid).

It is certain that if in 1836 Marshal Clauzel had found such shelters in the vicinity of the El Kantara gate, he would have taken the Place saying : here is a beautiful bridge which will open up in front of considerable cover, it will be necessary to defend the head, just as the military engineers proposed to defend its outlet into the Place. It would certainly have led to the placement of a crenellated reduction on the right bank.

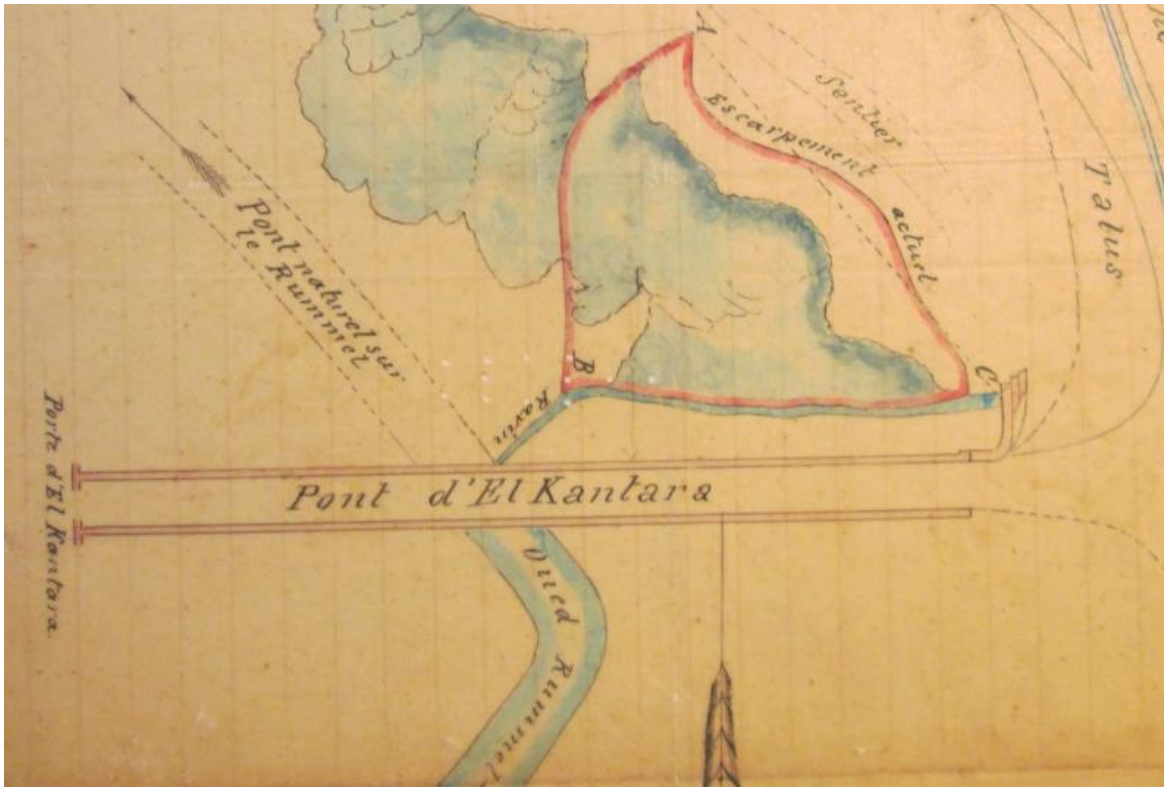

Fig. 3. Plan of the El Kantara Bridge project, 1860.
Source: Archives, Bibliothèque de Vincennes, Paris, 2014

5. Unsuccessful Attempt to Influence The Implementation of The Project Study.

The director of military engineering regretted the location where cut stone quarries abounded, beautiful quarries were nearby, while there were no projects to take advantage of the latter. Iron and cast iron are means used by modern engineers since the industrial century, while masonry work is part, will be transmitted to posterity, like that of the stone constructions of the Romans. Given the enormous expense that the construction of such a bridge would involve, the military service would not have made any comments about the project of that of the civil service, if it had not been aware of the memorandum that Captain Denfert-Rochereau had made it appear on the barrel vaults.

This distinguished officer who was under the orders of the director of engineering, followed the paths traced by the military engineers Méry and Yron Villarceau, and had managed to find the equation of the pressure curve and the firmness to be given to the vaults.

There is a great advantage in that the resultant pressure passes in the middle of the thickness of the segments and can move in one direction or the other, following accidental overloads, without coming too close to the extrados and from the lower surface, nor deviate too much from the normal direction. It is obvious that the above conditions had to be met. The discovery of the vault form of Captain Denfert Rochereau was considerable in the art of bridge construction, it gives the two advantages of economy in the use of materials and elegance.

At the same time surveyors, managers and administrators of the cities created in Algeria between 1840 and 1860, the military engineers demonstrated great pragmatism in their work. This quality allows them to develop urban tools applicable to very different localities. It is assessed in two main elements of their work : the ability to project into the future and to envisage from the development of the project ; and the evolution of these plans over time (Malverti, op. cit.).

For the head of engineering defending the memoir of Captain Denfert-Rochereau, the time has arrived to take advantage of the discoveries made to abandon the heavy constructions of our viaducts borrowed from Roman models, to obtain more elegant and equally stable forms. The case that presented itself was chosen by nature to receive an application of the new methods, because they found in the ravine, abutments of indefinite resistance. The engineer cannot propose in the position he has chosen a stone bridge of great span, because due to the great depth of the obstacle to be crossed, he could hardly establish arches (Shd, op. cit.).

Prior experience was required and they proposed doing it in the quarry, with a section of bridge segments which would then be used in construction. The evaluation of this experience could be set at 15,000 francs. The bridge, whatever project was adopted, had to be built by the engineering department. Military engineers had proposed the pile bridge project of the size of the Denfert Rochereau system. In the event that it is adopted, we are asking for a sum of 15,000 francs to carry out an experiment on the stability of the arches, whose segments are established in such a way that the uniform pressure curve passes through their middle.

We believe that, given the results announced by the theories best established by men of Science, this request is not exaggerated ; if the Denfert system combines, we will achieve an enormous saving in public works (Shd, 1855).

6. Replica of The Bridges and Roads Service.

The head of engineering found in his archives a conference report, relating to the construction of this bridge, of August 25, 1855, drawn up in execution of a letter from the governor general of July 23, 1855. The opinion of the director of fortifications, of October 2, 1855, had not been processed without the knowledge of the engineering department. Likewise, the opinions of Colonels Ribot and Breton, in the conferences relating to the railway, had estimated the expense of the street and the bridge which would have to be built near the location of the station. The engineer indicated that the head of engineering placed the limit of the left bank of the Rhumel at the top of a 48 m high bank instead of placing it at water level.

In this case, the boundary markers were placed by his service near the waterfalls, near Sidi Rached at the water level and he concluded that his predecessors had interpreted, like the bridges and roads service, the ministerial decision of December 11 1854. After having sought, through the interpretation of existing decisions and regulations, to extend the fortification zone so as to include a greater length of the projected bridge, the director of engineering proposed to cancel all the decisions taken and to extend this area so as to embrace the entire space occupied by the bridge and its surroundings.

This is why the same service requested authorization to build the part of the bridge located in the fortification zone, following article 13 of the decree of August 16, 1853. The first studies of the railway date from 1852, the decision which fixes the limits of the military land is of December 11, 1854. The Minister of War knew, in making this decision, that these studies placed the station near the El Kantara bridge. The old bridge existed at that time and it was with full knowledge that the minister understood it, authorizing the final projects to be made and the work to be carried out, even in the fortification area.

So the service was not aware of the law authorizing the engineering service to construct, outside this zone, works which were within the remit of the bridges and roads. Antoine Picon explained this rivalry between engineering engineers and road engineers in France by the fact that the former had the advantage of precedence and undoubtedly superior scientific training. The Corps of Bridges and Roads was created in 1716 to deal mainly with the construction of roads and bridges, while military engineers had long ago carried out strongholds and hydraulic works (Picon, op. cit.).

Finally, the civil service, invited the chief of engineering, who had not directly responded to the question asked by the latter, asked him to examine the project that he deemed suitable in the interest of defense. The arrangements adopted by this service could be compatible with good defense conditions, and the location chosen was dictated by the layout of the premises. If the Denfert-Rochereau bridge was defensive because of the presence of the small arch with a 6 m opening and a 5 m jamb on the town side. Nothing was simpler than to combine a similar arrangement with those adopted by bridges and roads.

The bridges and roads department had supported the work carried out by its services such as those of Algiers and Oran. The proposals of the bridges and roads service on decisions and regulations in the defense works of the Place were the most important of all the civil services. The first incumbent in Oran was the engineer Pézerat, then the engineer Auguste Aucour des Ponts et Chaussées who very quickly revealed himself to be a valuable collaborator, even commanding the esteem of the military engineers. We relied heavily on the Bridges and Roads service which, through its organization and its long tradition, was the service which offered the most valuable guarantees for the study and execution of the works (Malverti, op. cit.).

7. Observation of Actors.

The mayor at the time did not want to address the points in dispute between the road and bridge administration and military engineering. It limits itself to the attention of these services on the usefulness of maintaining the works of the siphon which ensures the water supply of the city, expressing the desire that the new bridge of El Kantara be arranged in such a way as to receive several additional siphons at a later date. General Creully, responsible as director of fortifications in Constantine, conferred with the chief engineer on the route of the railway, following the minutes of January 12, 1853.

The tunnel under Sidi M'cid, the embankment or trench road, the station and the particular constructions which will tend to be established around it, would form cover for the defense of the Place. This enclosure, leaning on the cliffs of the ravine, was naturally unassailable. Due to this circumstance, the military did not require the track to be moved back beyond the limits of the land subject to definitive easements, nor did it subject the execution to special conditions which could aggravate the difficulties of this important undertaking.

In 1857, other routes were proposed which brought the railway line to the left bank of the Rummel and placed the station above the Bardo, near the Porte Valée. Marshal Vaillant adopted this idea then abandoned it. The considerations according to which he rejected the station project at El Kantara were foreign to the defense and he expressed opinions roughly similar to those of General Creully, following the letter of November 22, 1857 addressed to the Governor General.

In the early days of colonization, public works were entrusted to military engineers, who, from 1843 (ministerial decisions of March 25 and August 5, 1843), carried out their functions with civilian personnel. By royal order of April 15, 1845, public works came under the remit of the Director of the Interior. The ministerial decree of January 27, 1846 clearly demarcates the responsibilities of military engineering and civil services. In civilian territory, military engineering is now only responsible for work falling under the Ministry of War. In military territory, he is responsible for everything (National Archives, 1998).

General Creully's observation: Certainly, I am not of the opinion that military servitudes and defensive conditions should not be taken into account, but I believe that if there are ever possible and suitable concessions, it is for a locality like that of Constantine. He continued, “I am in no way opposed to the arrival of the tunnel under the square itself, I am not asking that we make too great sacrifices to see the entrances and exits of these tunnels.

What makes me reject the company's route to the right bank of the Rummel is less the cover that this route could give to the enemy than necessity. This would lead to having to build many bridges to communicate with the city, that is to say with the parts of the city where mainly the natives (the enemies) are. What is necessary is that the European portion of the city, that is to say, what is near the Porte Valée is also close to the arrival station and in great and easy communication with this station” (Shd, 1857).

8. Necessity of The Final Choice of The Place of Establishment of The Bridge

Marechal Vaillant finally abandoned the route of the left bank, and the following year gave his support to the route of the Lacroix company, which is the same as in 1852 and 1857. He was able to convince himself of the impossibility that There would be many bridges across the ravine, as he had believed. It resulted from the various opinions that neither General Creully nor the Marshal Minister of War in 1857, nor the fortifications committee, which was aware in 1854 of the opinions of 1852 on the first studies of the railway, were ever concerned with a high degree of the dangers that their proposals could raise for the defense of the Place.

The tunnel under Sidi M'cid and the arrival station at El Kantara, in the fortification area, were no longer as necessary as they had appeared to the committee in 1854, and the re-establishment of the El Kantara bridge It required nothing but good organization of the enclosure at its outlet into the square. Therefore, there would no longer be any serious reason to refuse what was requested in the minutes of September 11, 1860 while respecting the articles.

Article 8 of the decree of January 27, 1847, specifies: although the bases according to which the leveling and alignments which were to be carried out in each locality, had to be previously determined by the special commissions composed in the capital of district by: the Deputy Director of the Interior and Public Works, the President, the Mayor of the city, the head of engineering, the engineer of Bridges and Roads, the head of the Estates Service, three notable residents who own urban buildings (Ibid).

The engineer of bridges and roads had the power for his service to build the entire El Kantara bridge, half of which belonged to him by right, and the other half of which, included in the zone, should be built under the terms of the decree, by engineering officers. Since sharing was not possible, this was obviously one of those exceptional cases that the decree provided for, and the question did not seem to be able to be resolved other than in favor of the bridges and roads service.

As a result, in 1842, the Director of the Interior asked the Ministry of War, his supervision, to create a body of architects within his administration. General Bugeaud, governor general at the time, more favorable to taking charge of public works by military engineering, was strongly opposed to it. However, a year later, the War Ministry reversed its decision and provided, by ministerial decisions of March 25 and August 30, 1843, the civil administration with a new service: the Civil Buildings and Roads Service (Burth- Levetto, 1872).

In this vein, there was no need to discuss the counter-project presented by the chief of engineers. The engineers of the bridges and roads department nevertheless took pleasure in recognizing the merit of the excellent study carried out by Captain Denfert Rochereau. But they could not go so far as to ask with the head of engineering, that civil service do in this circumstance so important for the interests of the city of Constantine, the application of an entirely new method, which the theory can undoubtedly justify , but which no experience had established (Shd, 1860).

They would have liked the question of the location of the bridge, closely linked to that of the road to be opened between El Kantara and Porte Valée, to have been more carefully examined. Indeed, the bridge placed at the outlet of Rue Vieux, provided a solution much more favorable to the interests of the city, in two very distinct districts: a European part, and another Arab part, which the government had seriously attached itself to keep (fig. No. 04).

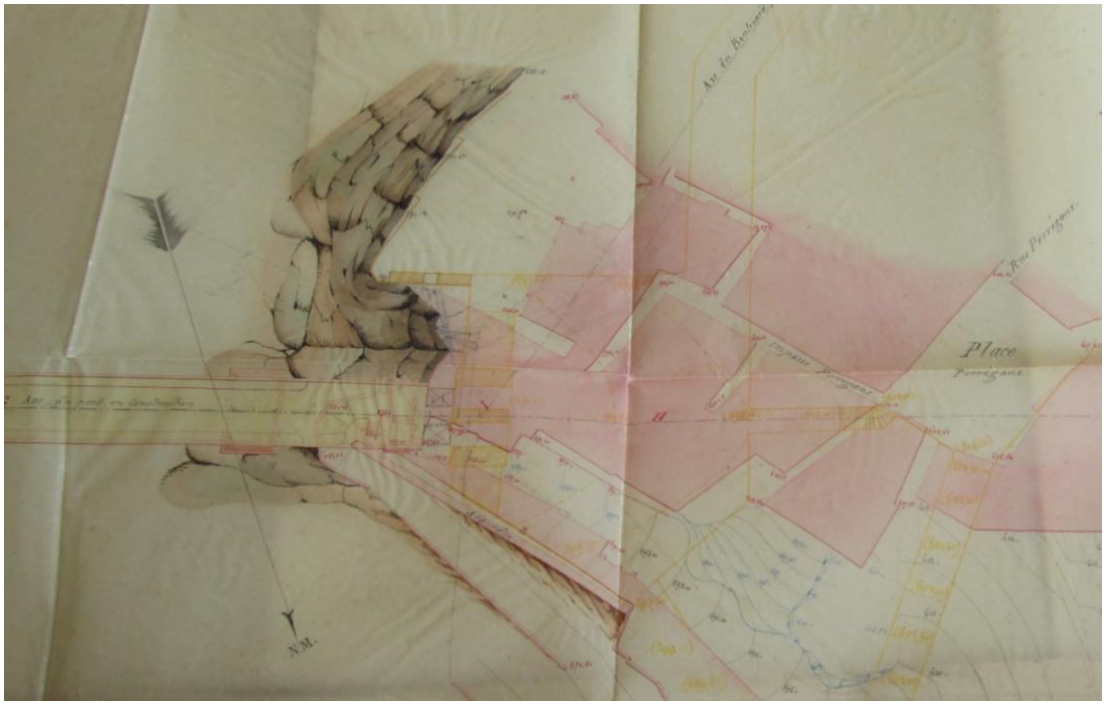

Fig. 4. Overall plan of the outlet of the El Kantara gate, 1861.
Source: Archives, Vincennes, Paris, 2014

On the contrary, who knows what would happen to the Arab quarter that the main road linking the El Kantara bridge, the Porte Valée and the new district of the right bank would cross diagonally (fig. No. 05). Perhaps an interest of this nature deserved that we sacrifice five to six hundred thousand francs (Dubost, 1860).

Fig. 5. European district on the right bank El Kantara bridge, 1958.
Source: Library of the Wilaya of Constantine, 2008

Conclusions.

This political-military creation, structurally based on the dominant factor or central role of the extroverted economy, focuses mainly on the development of resources mainly oriented towards the metropolis, on the one hand, and on the other hand, on the encouragement of colonial military authority, necessary for Europeans seeking land to expand on Constantine. Hence the abandonment of the transformation of the medina, given the advantages provided by the extension of the colonial city extra-muros (Shd, 1888).

The colonial economy required the communication of the El Kantara bridge with the establishment of the railway station in relation to the ports of Philippeville and Bône, then to the metropolis. The execution of Constantine was considered by the municipal council not only as a line of penetration, from a commercial point of view (of exploitation of the agricultural and mining resources of Constantine), but also, as a means of extending influence French throughout Algeria… (Ibid).

The execution of this project, for the outskirts of the city side, will result in notable changes in the layout of El Kantara Square and Military Street. The engineering department had planned stairs and ramps which would become useless if the planned viaduct was adopted. It is essential to point out that when in 1854, the Minister of War had fixed the limits of the fortification zone on the side of the ravine, there was no question of constructing large buildings on the right bank whose elevations would have weakened the fortifications of Constantine.

The communications were all military and the bridges and roads service had taken the initiative for this project which was presented to the Minister of Algeria, who granted a fund of 400,000 francs for its construction for scientific interest...etc. This precise knowledge of the spaces where they operated influenced the nature of the projects they carried out (Picard, 1996). However, in Algeria more than in other countries, they were the instruments of the transition to colonial modernity (Benkada, 2002).

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