Transformations in Medieval Fez: Almoravid Hydraulic System and Changes in the Almohad Walls

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During the Almoravid and Almohad periods, Fez acquired a great importance which was materialized in a great number of constructions and transformations in the town. The aim of this paper is to discuss the significance of these medieval works and their importance in the development of Fez between the 11th and 13th centuries. In this way, we analyze two samples of these works: the Almoravid hydraulic system built by Yūsuf Ibn Tāšufīn, including the 'water dispenser' of Būjlūd, and the Almohad transformations in the military constructions of Fez, especially the defensive system of Bāb Sāgma. Beyond a brief historical introduction of the city during the Almoravid and Almohad periods, a section about written and archaeological sources and the detailed description of both constructions, we have included a discussion section with the interpretation of the main reasons why the Almoravids and Almohads developed this kind of works in the town. This fact was related to religious and political reasons, deeply connected to the ideas of control, power and exaltation of governors of both dynasties. Moreover, we include the analysis of the type of decoration known as 'false bonding' (*falso despiece*) that appears in the complex of Bāb Sāgma. For the presence of this ornamentation, typically used during the Almohad period, as well as for the references of the written sources, we propose a revision of the traditional Merinid chronology suggested for this military construction.

Keywords: Almoravids, Almohads, Fez, hydraulic constructions, military constructions, 'false bonding' (*falso despiece*) decoration.

1. Introduction

In this paper we present our study of the hydraulic system of Fez built by Yūsuf Ibn Tāšufīn and the transformations in the wall during the Almohad Caliphate. This work is appropriate and well-timed because, despite the importance of Fez between the 11th and 13th centuries, it has not been yet deeply studied. There are only some works about specific buildings (as the books about the Qarawiyyīn or the Andalusi mosques, written by H. Terrasse) and other general works about the medieval town. Concerning the

hydraulic system of Fez, our starting point has been the works written by T. Madani. Within his work written in 1998-1999, he describes the distribution of the hydraulic system in a very detailed way. Nevertheless, in this work it does not specifically analyze the Almoravid network. A more complete work is his PhD dissertation, where he describes in detail the hydraulic system of Fez, as well as the most important part of the system: the 'water dispenser' of Būjlūd (Madani, 2003: part 2, chapter 3, section B-1a). On the other hand, regarding the Almohad urban transformations of the town, they have not been studied in detail. They were only succinctly described by H. Gaillard (1905: 36-42) and A. Gaudio (1982: 37-40) in theirs monographs about Fez.

For all these reasons, we have elaborated this paper to discuss the significance of these medieval works and their importance for the town. In the first place, we have begun with some references about the written and archaeological sources that we have employed for our study. Moreover, we include a description of the system of decoration known as 'false bonding' (*falso despiece*) and its relation to the chronological aspects of the Almohad constructions. Following this point, we have included a brief historical introduction to the town of Fez in the Almoravid and Almohad periods, and later on we have continued with the detailed description of the Almoravid hydraulic system and the transformations of the wall during the Almohad Caliphate. After the exposition of the data, we have elaborated a discussion section with the interpretation of the Almoravid hydraulic system. We analyze the causes and the importance of its construction, and we also refer to its significance related to religion and the ideas of power and supremacy of the Almoravid governors. Concerning the Almohad transformations, we focus on the interpretation of the complex of Bāb Sāgma and its relation with the Almoravid hydraulic system. According to this study, the decorative remains of 'false bonding' and the remains of octagonal towers in this defensive area, we propose a new chronological

hypothesis to the complex of Bāb Sāgma, which gives a new meaning to the Almohad works in Fez.

We finish our study with some summarizing conclusions about what the Almoravid and Almohad works supposed to the development of Fez between the 11th and 13th centuries.

2. Written and Archaeological Sources

The role of medieval written sources is essential for the study of Fez during the Almoravid and Almohad periods. Within this frame, the *Kitāb al-Anīs al-Muṭrib bi-Rawḍ al-Qirṭās*, written by Ibn Abī Zar‘ in the 14th century, is probably the most important one. This source can be considered as a chronicle of the town of Fez, since its foundation by the Idrisī dynasty until the Merinid period. Concerning the presence of the Almoravids in the town, the most important part of this source is the fragment dedicated to the entrance of Yūsuf Ibn Tāšufīn in Fez:

> Cuando entró en ella [Yūsuf Ibn Tāšufīn] la fortificó y mandó derribar los muros que dividían la barriada de al-Qarawiyyīn y la de al-Andalus, haciendo que formasen una sola ciudad; hizo edificar mezquitas en los barrios y calles; y, si encontraba una calle sin ella, obligaba a sus vecinos a construirla, dándoles los materiales necesarios; construyó baños, fondaques [*funduqs*] y molinos, arregló los zocos y los embelleció. Permaneció en Fez hasta el mes de Ṣafar del año 463 (noviembre de 1070) (Ibn Abī Zar‘, 1964: 273).

This text, which has been quoted quite literally in the *Kitāb al-Istiqṣā*[1] (al-Nāṣirī, 2001: 197), describes all the works that Yūsuf Ibn Tāšufīn developed in the town. Among the constructions, the building of the new walls is highlighted, and the hydraulic works are also mentioned. But the importance and description of the last ones are compiled in

[1] This text, written in the 19th century, reproduces some passages of the *Rawḍ al-Qirṭās*. This particularity is one of the main characteristics of the Arabic written sources, due to their compiler character.

another written source: the *Description of Africa* written by Leo Africanus in the 15th or 16th centuries (Leo Africanus, 2004: 230). Thanks to both written sources (Ibn Abī Zar‘ and Leo Africanus) and to the archaeological works (Madani, 2003: part 2, chapter 1, section B-3a) these works can be attributed to the Almoravids.

The reading of written sources has been one of the main steps of our study. They do not provide only historical data, but they provide as well a lot of information about the different constructions of the medieval town. For the chronological ascription in the case of the Almoravid works, these data are fundamental. Concerning the Almohad works in Fez, the most important source is the *Kitāb ta'rīkh madīnat Fās, al-Ma'rūf bi-Zahrat al-Ās fī binā' madīnat Fās*, written by Abū-l-Ḥasan ‘Alī al-Jaznā'i in the 14th century. This source describes the evolution of Fez since the Idrisī foundation until the Merinid period. Relating to Almohad transformations, it indicates the main works carried out by the Caliph Abū Yūsuf Ya‘qūb (al-Manṣūr) and his son (the Caliph al-Nāṣir) and relates the principal components of the town during this period:

> Au temps des Almoravides, et après eux, des Almohades, Fès atteignit un degré de félicité [...]. C'est surtout au temps de l'Almohade El-Mansoûr et de son fils Mohamed En-Nâsir (qu'il en fut ainsi). Il y eut alors à Fès 785 oratoires, 42 chambres d'ablutions, 80 fontaines, 93 bains, 472 moulins hydrauliques, 89,236 maisons, 17,041 «masriya», 467 fandaqs, 9,082 magasins de vente ; il y avait une qisariya dans chaque ‘adoua de Fès et, également dans chacune, un atelier pour frappe de la monnaie. On y comptait en outre 3,094 de tanneurs, 116 ateliers de teinturerie, 12 ateliers pour la confection des barres de fer et de cuivre, 11 verreries, 135 fours à chaux, 1,170 fours à pain, 400 machines en pierre pour faire le papier ; tout cela était à l'intérieur de la ville. En dehors des murs il y avait 180 ateliers de céramique. Cette (statistique) a été copiée par le «mochrif» ‘Ali ben ‘Omar El-Aoûsi, qui a déclaré l'avoir copiée (sur celle qui avait été écrite) de la main de... mochrif de la ville (de Fès) au temps d'En-Nâsir fils d'El-Mansoûr (al-Jaznā'i, 1923:81-82).

On the other hand, the information in the *Rawḍ al-Qirṭās* is essential to know the Almohad works in Fez and the transformations of the wall. This source describes the destruction of the walls of Fez by the Caliph ‘Abd al-Mu’min and its reconstruction by the caliphs Abū Yūsuf Ya‘qūb (al-Manṣūr) and al-Nāṣir (Ibn Abī Zar‘, 1964: 377-378). The main components of the town (Ibn Abī Zar‘, 1964: 93-96) are also described in this source in a similar way than Al-Jaznā’i does. To know these reforms is also necessary to analyze the news provided by Ibn ‘Iḏārī (1963: 268-273) and Ibn Ṣāḥib al-Salāt (1969: 15), contemporaries to the Almohad period.

Besides the written sources, the historiographical approach has been an important part of our research. For the study of the Almoravid hydraulic system, the reading of the works written by T. Madani has been our starting point. In these texts, the composition of the hydraulic network is very well described. Furthermore, they include a description of the archaeological works related to this system which have been developed in some parts of Fez. These archaeological works and the material remains of this network have been deeply studied and described in the following sections of this paper. The direct analysis of the material remains has constituted and important part of our work, both for the study of the hydraulic system built by the Almoravids and for the changes made by the Almohads in the wall. In the case of the Almoravid works, the most important remain of the hydraulic system in Fez is the water dispenser of Būjlūd[2]. Nevertheless, there are other material remains across the town that we have also studied and included in our work, as the Almoravid bridges, the remains of the Merinid wheel or the canalizations and wall situated near Bāb Sāgma.

[2] We would like to thank to Muhsin al-Idrisi and the staff of the Inspection de Monuments and Sites Historiques de Fès for the possibility of visiting the water dispenser in order to study directly the material remains of this Almoravid construction.

For the attribution of the Almohad chronology to the works on the wall near this gate, we have studied the 'false bonding' decoration[3]. This is a type of decoration used by the Almohads to adorn their fortifications. It is a very useful tool to date the Almohad fortifications and walls, because, for the moment, it has been only found in Almohad buildings (Villalba Sola, 2015a: 4). The use of this type of decoration began during the Caliphate of Abū Yūsuf Ya'qūb Ibn 'Abd al-Mu'min Ibn 'Alī and it achieved its splendor with the Caliph Abū Yūsuf Ya'qūb (al-Manṣūr), who ordered to execute this type of decoration in other towns in North Africa, as in the wall of Rabat (Villalba Sola, 2015b: 260-261), the Qaṣba of Marrakech (Villalba Sola, 2015b:176), and the wall of Safi (Villalba Sola, 2015b: 334-335). All these examples could be connected to the remains of 'false bonding' near Bāb Sāgma in Fez.

This decoration was created with vertical and horizontal lines superimposed in the rammed earth, simulating blocks of stone. It may be made of different materials like plaster, lime, clay or graffiti on the wall.

There are three types of this decoration that were used together or separately. The first one is the imitation of blocks of stone. The second one is the decoration with only horizontal lines, which can be seen in the Alcazaba of Badajoz (Spain) (Márquez Gallardo, 2011: 10; Villalba Sola, 2015b: 395-424). The third one is the imitation of 'false bonding' in masonry as the decoration of Torre de los Pozos (Cáceres, Spain) (Márquez Bueno; Gurriarán Daza, 2006: 90). On the other hand, the lines that create

[3] The 'false bonding' decoration was already analysed by M. Gómez-Moreno Martínez (Gómez-Moreno Martínez, 2004) and L. Torres Balbás (Torres Balbás, 1973). During the last years, this type of decoration has been recognized as one of the main characteristics of the Almohad architecture. Due to this specificity, it has been used as a reliable dating system. Among the authors who support this hypothesis, the following ones can be highlighted: R. Azuar Ruiz and his research group (Azuar Ruiz, 2005; Azuar Ruiz; Llopis García; Lozano Olivares; Menéndez Fueyo, 1998; Lozano Olivares; Menéndez Fueyo; Azuar Ruiz; Llopis García, 1996), M. A. Tabales (Tabales Rodríguez, 2002, 2004), P. Gurriarán Daza and S. Márquez Bueno (Gurriarán Daza; Márquez Bueno, 2003; Gurrián Daza; Sáez Rodríguez, 2002; Márquez Bueno; Gurriarán Daza, 2006, 2008, 2012), J. M. Márquez Gallardo (Márquez Gallardo, 2011; Márquez Gallardo; Martínez Núñez; Domínguez García, 2013) and B. Pavón Maldonado (Pavón Maldonado, 1992). Other specific references are included within the works of D. Villalba Sola (Villalba Sola, 2015a, 2015b).

this decoration can be plain or decorated with geometric patterns, epigraphy or plant motifs. Good examples of these ornaments are found in Alcalá de Chivert (Castellon, Spain) (Azuar Ruiz, 2005: 125), Baños de la Encina (Jaén, Spain) (Ferrer Morales, 1996: 8-9; Villalba Sola, 2015b: 476-482) or Rabat (Morocco) (Villalba Sola, 2015b: 260-261) (figure 1).

3. Historical Introduction

The city of Fez was conquered by the army of Abū Bakr and Yūsuf Ibn Tāšufīn for the first time in 1069, but it was not definitively submitted to the Almoravid rule until 1075 (Ibn Simāk, 1951: 41). The conquest of Fez represented a milestone for the Almoravids, due to its status of an outstanding religious centre since its foundation (Marcos Cobaleda, 2015: 167): it was the most important religious centre in the Maghreb and it continued with this status during the Almoravid period.

After 1069, Yūsuf Ibn Tāšufīn brought artists, craftsmen and engineers from Cordoba, and he ordered lots of works in the town: he destroyed the ancient wall which divided Fez into two different parts (the Qarawiyyīn and the Andalusi ones). He ordered the construction of a new unique wall to combine the different parts of the town into one, which was replaced by the Almohad wall (Terrasse, 1955: 27). Moreover, the Almoravid emir promoted the economic life thanks to the building of many *funduqs* and the organization of the souks (Ibn Abī Zar‘, 1964: 273), and he provided the city with an important hydraulic network, with public baths (ḥammām) and several watermills[4] (Leo Africanus, 2004: 230). Furthermore, new mosques were built for the different quarters, and during the government of ‘Alī Ibn Yūsuf it was necessary to enlarge the Qarawiyyīn mosque due to the great development that the town underwent during the

[4] A detailed study about the watermills of Fez has been published by T. Madani (Madani, 2008).

Almoravid period. All these works have been described by the *Rawḍ al-Qirṭās* and the *Kitāb al-Istiqṣā*[5]:

> فلما دخل يوسف بن تاشفين مدينة فاس، أمر بهدم الأسوار التي كانت فاصلة بين المدينتين، عدوةالقرويين وعدوة الأندلس، وصيرهما مصرا واحدا، وحصّنها وأمر ببنيان المساجد في شوارعها وأزقتها، وأي زقاق لم يجد فيه مسجدا عاقب أهله، وأمر ببناء الحمامات، والفنادق، والارحاء، وأصلح بناءها، ورتب أسواقها، وأقام بهاإلى صفر من سنة ثلاث وستين وأربعمائة (صفر 463/ نفمبر 1070-1071).
>
> (al-Nāṣirī, 2001: 197)

Thanks to these improvements in the town, introduced by the Almoravids, Fez acquired the aspect of a great city, with an important cultural development (Sijelmassi, 1991: 30). Nonetheless, in 1145-1146, the town fell under the power of the Almohads after seven months of siege, until its tax collector betrayed the Almoravids and opened the gate to Almohad army (Lévi-Provençal, 1929: 148; Ibn ʻIḏārī, 1963: 268-273; Ibn Abī Zarʻ, 1964: 377). Before this treason, ʻAbd al-Muʼmin ordered to cut the river and used the power of water to destroy Bāb al-Silsila (also known in the sources as Bāb al-Khūkha) and part of the wall. One year after the conquest, the Caliph ʻAbd al-Muʼmin ordered to demolish the walls of the city that had not been destroyed during the siege:

> Mandó derribar las murallas de la ciudad y se hicieron en ellas muchas brechas y muy anchas, y dijo: "Nosotros no necesitamos muros; los muros son nuestras espadas y nuestra equidad". Siguió la ciudad de Fez sin muros hasta que los rehízo su nieto al-Manṣūr, quien murió después de haberlos comenzado y los terminó su hijo Muḥammad al-Nāṣir el año 600 (10 de septiembre del 1203 a 28 de agosto del 1204) (Ibn Abī Zarʻ, 1964: 377-378).

In this succinct text, Ibn Abī Zarʻ describes some of the Almohad changes in Fez. Thanks to al-Jaznāʼi, we are also aware of another transformation carried out by the

[5] Translation: 'When Yūsuf Ibn Tāšufīn entered the town of Fez, he ordered the destruction of the walls which divided the two towns, the riverside al-Qarawiyyīn and the Al-Andalus one, and he turned it into a unique capital, and he fortified it, and he ordered the building of mosques in the streets and the quarters, because there were no mosques for the population in every quarter, and he ordered the building of baths, *funduq(s)* and watermills, and he repaired its buildings, and he organized its souks and he remained there until the month of Ṣafar of the year 436/ November of 1070-1071'.

caliphs Abū Yūsuf Ya‘qūb (al-Manṣūr) and al-Nāṣir. Between 1184 and 1205 Fez was completely renovated, increasing the number of mosques, baths (ḥammām), *funduqs*, ablution houses and factories (al-Jaznā’i, 1923: 81-82). The Almohads also improved the water supply system of the city, creating a new dam on the Maṣmūda River, aqueducts, and canalizations (al-Jaznā’i, 1923: 135, 173). Furthermore, the most important renovations carried out during this period were the transformations in the Qarawiyyīn and Andalusi mosques. The first ones were funded by the Qarawiyyīn mosque itself, while the reforms in the Andalusi one were funded by the Caliphate, because the Almohads tried to turn it into the Friday mosque of the town (Villalba Sola, 2015b: 511-520).

The Almohad government in Fez ended with the surrender of the city to the Merinid emir Abū Yaḥyà Ibn ‘Abd al-Ḥaqq in 1248 (Ibn Abī Zar‘, 1964: 558).

4. The Almoravid Hydraulic System in Fez

The town of Fez was very well provided by water from the Fez and Sebū Rivers. Nevertheless, it was necessary to develop a system which would provide water to the town, both for the domestic use and for the irrigations of the main gardens (Wilbaux, 2001: 165), like the Douh gardens (Sijelmassi, 1991: 30). The presence of both rivers facilitated the construction of an important hydraulic network.

The first branches from the Fez River within the town were made by the Zenete emir Dūnās Ibn Hamama, between 1037 and 1049. But after the Almoravid conquest of the town, Yūsuf Ibn Tāšufīn called craftsmen from Cordoba and ordered to build other secondary and tertiary branches (Madani, 1998-1999:123-124). The result was a complex hydraulic system, built from a double branch which allowed to provide water to mosques, houses and ateliers, as well as evacuate residual waters. This system was described by J. Leo Africanus as follows:

> Por dos lugares entra el agua en ella [Fez]; un brazo del río pasa por Fez la Nueva, es decir, por el sur, y el otro entra por poniente; ya en la ciudad el agua, se abre en muchos canales, para los hogares de los ciudadanos los más, y también para la corte real y para otras casas. También cada templo y santuario dispone de agua, así como las posadas, hospitales y *madrasas* que allí hay (Leo Africanus, 2004: 230).

The hydraulic network of Fez is divided into three parts. The first one is formed by the water source named Rās al-Mā', which enters the town throughout the big water dispenser of Būjlūd, centre of the hydraulic system built by the Almoravids. The second one is situated between the water dispenser and the exit of the town from the opposite side. It has lots of branches, due to the great slope of the land. The third phase of the system is located outside the town, in the point where Fez and Sebū Rivers meet. The major part of the canalizations of this hydraulic network is subterraneous. They are approximately 2 m wide and 1 or 2 m high. The canalizations were covered by a vault of bricks (Madani, 1998-1999: 131-132).

Before entering the town, the Fez River is divided into two branches near the Agdāl Garden, in the southwest of the town. The branch named al-Fajjālīn is 1,550 m long and enters the town across the Janān al-Sabīl Gardens. Along the path of this canalization, fifteen watermills have been detected (Madani, 1998-1999: 136; Madani, 2008: 47). It has other secondary branches. The first one, named al-Lamṭiyyīn, is 260 m long and goes out of the garden though a horseshoe opening. It travels toward the qaṣba Būjlūd in the open air and disappears under the houses. This branch follows along the walls of the town and finally reaches the great water dispenser of Būjlūd. In this part of the hydraulic system, the branch named al-Bū'nānīyya appears. It is 180 m long and goes out from the water dispenser towards the town, passing under the stores on the right side of the Ṭal'a al-Ṣagīra street. After 16.50 m, the water reaches a small dispenser. In this point, the branch named Qanṭarat Būrūs (640 m long) starts its course.

This secondary branch is one of the steepest of the whole water system, with a slope of 9% (Madani, 1998-1999: 138). For this reason, along its course it had six waterfalls. In these places, there would have been some watermills (as it is mentioned in the written sources) which would allow to achieve a better exploitation of the water from the Fez River (Sijelmassi, 1991: 30). A large part of this canalization ran under the houses, although the other part was in the open air. At its end, it meets the second branch of the hydraulic network, named ʻAyn Azlīṭan. At this point, the 220 m long of Rḥa al-Šams branch starts. There is also another branch: the Zuqāq al-Ruwāḥ, which is 800 m long. In this latter, it is possible to count four waterfalls and multiple tertiary branches. In the second division, the Zuqāq al-Ruwāḥ branch joins the Rḥa al-Šams one (Madani, 1998-1999: 135, 138).

The second branch of the Almoravid hydraulic system is the ʻAyn Azlīṭan branch, which is 830 m long. This one separates from the al-Lamṭiyyīn branch after crossing the water dispenser of Būjlūd. It runs through the quarter with the same name and continues its way to join the Rḥa al-Šams branch. Its slope was of 7.5%, and it had three waterfalls with watermills (Madani, 1998-1999: 135).

The branches mentioned above constitute the most important ones of the Almoravid hydraulic system. Nevertheless, there were also other ones which started in the Janān al-Sabīl Gardens and served to supply the Andalusi quarter (figure 2). All of these branches have been systematized by T. Madani, as it is shown in the table 1.

Within this hydraulic system, the water dispenser excavated in 1993 was an essential piece (Madani, 2003: part 2, chapter 3, section B-1a). It organized the division of the branches of the river after entering the town. This construction was built in brick and rammed earth (although the original materials are hardly seen due to the deep restoration of the complex in recent times). Three semicircular arches are open in the

entry wall (figure 3). Behind the arches, there are three small rooms covered with barrel vaults. In each room, a canalization where the water entered the complex breaks the enclosing wall in the upper part. In the case of the central room, the water fall allows to action the two millstones of an ancient watermill (Madani, 2003: part 2, chapter 3, section B-1a). The ground is at three different heights for a better exploitation of the system. On the opposite side of the ensemble, there are three segmental arches of brick situated close to the ground which allow the water to exit the dispenser. The arches are staggered: the central one is the lowest one, the right one is situated in an intermediate level and the left arch is the highest one (in the same way that the arches in the entry wall). The canalizations poured the water into the branch located opposite them, thanks to several secondary branches. In the case of the extreme canalizations, the branches were located on both sides of the water dispenser. The central one poured the water directly into the open air irregular central space. The secondary branches, which connected the left entry canalization with its corresponding output, are the most complex ones (figure 4): from the exit of the water through the left semicircular arch, a narrow canalization took the water into a small square tank (Madani, 2003: part 2, chapter 3, section B-1a). In the low part of the tank there is a small hollowness that allows the passage of the water into a similar tank and, later on, guides it to the exit. The canalizations on the right side are less complex and more organized than the left ones. They run underground, but there are several orifices open to the outside. This part of the system is in charge of distributing the water towards the area of the Ṭal‘a al-Ṣagīra (Madani, 2003: part 2, chapter 3, section B-1a).

Situated close to the water dispenser, it has been possible to study part of the al-Fajjālīn branch during the works of rehabilitation of the Bū‘nānīyya madrasa (Madani, 2003: part 2, chapter 1, section B-3a). This building was built in the 14th century, during

the Merinid period, over ancient Almoravid constructions which were supplied by water tanks from this branch of the hydraulic system. During these works, a pool was found on the right side of the qibla of the small oratory. Oriented southwest to northeast direction, it was made by bricks joined by a lime mortar and decorated with polychrome tiles. Besides the pool, there are remains of the basin which supplied water. It was composed by two perpendicular ceramic pipes 0.24-0.25 m long, with a diameter of 0.11 m (Madani, 1998-1999: 126-127). This kind of pipes was very common during the Almoravid period, and they were used, for example, in the Palace of ʻAlī Ibn Yūsuf in Marrakech[6]. In the courtyard of the madrasa the archaeologists found both stone and brick floors at a level of -2.20 m. In the northern part and at a lower level, there was an opening to an ancient canalization. This canalization consists of a gallery covered by a brick vault, and its floor was at a level of -3.40 m. Its width was between 1.60 m and 2 m and its height was 1.80 m. Its 0.50 m thick floor was made with medieval pottery, stone and bricks, and the walls were made with stone. It is thought that it was uncovered at the moment of its building, but with the subsequent expansion of the city it was necessary to cover it (Madani, 1998-1999: 127-128; Madani, 2003: part 2, chapter 1, section B-3a).

In another place of the town, besides Bāb Sāgma, there are some remains of the ancient hydraulic system. Despite the Almoravid origin of the network, the preserved installations have been deeply transformed over the years, because the hydraulic system was employed during several centuries in the town. In one photography taken between 1916 and 1920 by Joseph Bouhsira[7] (figure 5), the presence of the water implies that the system was in use at least until that moment. The photography was taken from a little bridge over one of the branches of Fez River. From this point, between the river and the

[6] Some of these pipes are preserved in the National Archaeological Museum of Rabat.
[7] Exposition *Galerie de l'Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.

wall where Bāb Sāgma is open, two canalizations lead the water into a storage pool. On one side of this pool, there are four semicircular arches made of brick and opened under the wall of rammed earth (figure 6). Through the arches, four canalizations distributed the water to different areas of the city.

Along the complex hydraulic system, the Almoravids built many waterwheels, due to the slope of the terrain. Contrary to the assertions of G. S. Colin (Colin, 1932: 24), in the case of Fez, these waterwheels were not used only for the irrigation of the gardens, but they also constituted an essential element within the circuit for the distribution of water across the city. They were made entirely of wood (that is why they have not been preserved) with the wheel anchored to a basement made of stone. A great Merinid waterwheel with 26 m of diameter is preserved as part of the hydraulic system of the Janān al-Sabīl Gardens (Dezarozière and Bressolette, 1938: 629). Although it was built by the Merinids, it is integrated within the Almoravid hydraulic network. Subsequently, a similar waterwheel would have been built by Yūsuf Ibn Tāšufīn or his son ‘Alī Ibn Yūsuf in that place, and it would have been replaced by the Merinid one (figure 7). On the other hand, thanks to the great hydraulic network built by the Almoravids, the town of Fez had lots of public fountains which supplied water to the population inside the town.

Concerning the hydraulic engineering, the Almoravids built several bridges to communicate the quarters located on both sides of Fez River. Only two bridges, which were probably made by the Almoravids, have been preserved. Both are built with bricks and rammed earth, but they have been hidden by the streets and buildings of the town. This type of constructions was refereed by J. Leo Africanus and by al-Jaznā’i as follows:

> Il [Yūsuf Ibn Tāšufīn] avait également réuni les deux ‘adouas (des Andalous et des Qaraouiyîn) par des ponts pour le passage de l’une à l’autre. Le premier de ces ponts fut celui d’*Abou Tóba* que restaura l’Émir Abou Sa’îd ‘Otmân (le Mérinide) – qu’Allâh lui accorde Sa Miséricorde ; le second fut celui d’*Abou Barqôqa*, le troisième celui de *Bâb es-Selsela*, le quatrième, celui *des Sabbâghîn*, le cinquième, celui de *Kahf El-Waqqàdin*, le sixième, celui d’*Er-Remîla* (al-Jaznā’i, 1923: 75-77).

One of the most important bridges in medieval Fez was the Bīn Lamdūn one (Pickens, 1995: 34). Its name comes from the Arab expression ‘bayna al-Mudun’, i.e. ‘between the towns’. This bridge joined the quarter around al-Qarawiyyīn mosque and the Andalusi quarter, and probably it could be identified with one of the bridges named by al-Jaznā’i. At the moment of its construction, the water passed through three semicircular arches made of brick, but currently only the central one is preserved (figure 8). The other Almoravid bridge which remains is the al-Tarrāfīn one (VV. AA., 2000: 88). Its original name was Bāb al-Silsila Bridge (al-Jaznā’i, 1923: 76), and it is located close to al-Qarawiyyīn mosque. It has preserved a unique arch made of brick where the water passed through. In the upper part, it has small stores on both sides, which hide the original appearance of the bridge (figure 9).

5. The Almohad Transformations in the Wall

The Almohad conquest supposed an important regress for Fez, because, during the siege of the city, the Caliph ‘Abd al-Mu’min ordered to cut the flow of water from the river and use its force to destroy the wall:

> Cortó el río que la atraviesa, con tablas, maderas y construcciones hasta que se remansó el agua en el llano que hay encima de la ciudad y llegó hasta su campamento; entonces rompió la presa, y el agua bajó de golpe contra la ciudad, derribó la muralla y destruyó más de dos mil casas, pereciendo mucha gente, pues el agua casi llegó a invadirla por completo. Entró ‘Abd al-Mu’min en Fez y

> perdonó a sus habitantes, excepto a los almorávides, a los que mató por impíos; mandó derribar las murallas de la ciudad y se hicieron en ellas muchas brechas y muy anchas (Ibn Abī Zar‘, 1964: 377).

In this text, all the events about the demolition of the wall are described, as well as partial destruction of the town. But Ibn Abī Zar‘ did not include the date when ‘Abd al-Mu’min ordered to destroy the remains of the wall after the conquest. According to al-Jaznā’i, this event happened in 1147-1148 (al-Jaznā’i, 1923: 78). In this way, Fez remained without walls until the caliphate of Abū Yūsuf Ya‘qūb (al-Manṣūr), because ‘Abd al-Mu’min gave priority to Marrakech and his son Abū Ya‘qūb Yūsuf to Seville. For this reason, Fez did not evolve until the government of Abū Yūsuf Ya‘qūb (al-Manṣūr), when the caliph ordered to rebuild the wall. At the same time, other transformations took place in the city, like the reform of the Andalusi and Qarawiyyīn mosques, as it has been already mentioned.

> En l’an 542/1147-1148, l’Emir ‘Abd el-Moûmen ben ‘Ali ordonna de démolir la plus grande partie des remparts; ils restèrent ainsi jusqu’à ce que Ya’qoûb el-Mansour (l’almohade), se mit à faire relever ce qui avait été détruit; le fils de celui-ci, Abou ‘Abd Allâh En-Nasir acheva ce travail [...]. C’est En-Nâsir également qui fit construire la porte d’Ech Chari’a dans l’état où on la voit encore (al-Jaznā’i, 1923: 78-79).

Regarding the walled area, it was wider than the Almoravid one. In the Almohad period, its limits were the same than the actual limits of Fez al-Bālī. More than a half of the Almohad wall still remained (figure 2). However, this wall has undergone several restorations and transformations until today. For this reason, it is very difficult to discern the original Almohad elements, since its technical construction (the rammed earth) has continued in use over the centuries (figure 10).

The Almohad wall of Fez was similar to the Almohad walls of Rabat and Marrakech. Those walls were made with rammed earth and basements of stonework, and they have quadrangular towers attached to the wall. In the case of Fez, this characteristic can be observed next to Bāb al-Gīsa, where it is also possible to find the remains of small caves which were used as accommodation for incurable patients and leprous (figure 11) (Ibn Abī Zar‘, 1964: 81). Regarding the gates of the city during the Almohad period, they were listed by al-Jaznā’i as follows:

> Les portes de Fès sont: Bâb El-Fotoûh, Bâb El-Khoûkha, Bâb Beni Msâfer, Bâb El-Djîsa, Bâb Aslîsen et Bâb Ech-Charî’a. Cette dernière est une porte si haute que le cavalier porteur d’un étendard élevé ainsi que le lancier armé d’une longue lance peuvent la franchir sans avoir á incliner l’étendard ou à abaisser la lance. Elle a été nommée Bâb El-Mahroûq, à cause d’El-‘Obaïdi, le rebelle des montagnes d’Ouazzân dont, lorsqu’il fut pris et mis à mort, la tête fut suspendue au fronton de Bâb Ech-Charî’a, tandis que son corps fut brûlé (Mahroûq) sous cette porte. Cet événement eut lieu le jour où furent montés les vantaux de la porte, par ordre du Commandeur des Croyants, Mohammed En-Nâsir, fils d’El-Mansoûr, en l’an 600 (1203-1204) (al-Jaznā’i, 1923: 79-80).

The location of five of these six gates is known, as it is shown in the plan represented on the figure 2: Bāb al-Khūkha, Bāb Msāfir, Bāb Gīsa, Bāb ‘Ašīsan and Bāb al-Šarī‘a. Most of these gates have already existed in the Almoravid period, as Bāb al-Khūkha. This gate was destroyed by ‘Abd al-Mu’min, and it is still known as ‘the gate of Almohad destruction’, although it was rebuilt by the grandson of ‘Abd al-Mu’min as the other gates of the city. The same happened in the case of Bāb al-Kanīsa, destroyed by ‘Abd al-Mu’min and rebuilt by al-Nāṣir in 1205. After its reconstruction, it changed the name into Bāb al-Jawja (Ibn Abī Zar‘, 1964: 80-81). Nevertheless, remnants of those times are only present in two current gates: Bāb al-Gīsa and Bāb al-Mahrūq (Terrasse, 1968: 55).

Bāb al-Gīsa is located in the northern part of the rampart, and its structure is one of the best preserved, as it can be seen on the photography taken by Joseph Bouhsira between 1916 and 1920 (figure 12). The original name of this gate was Bāb al-'Ajīsa, but it was renamed after being rebuilt by al-Nāṣir:

> Duró la puerta de 'Adjīsa en su estado en el resto de los días del imperio Zanāta y todo el tiempo de los Lamtūna hasta los días del Príncipe de los creyentes Abū 'Abd Allāh al-Nāṣir, el almohade, cuando mandó reedificar el muro de la ciudad que había arrasado su abuelo 'Abd al-Mu'min en el año 540. Edificó más arriba de Bāb 'Adjīsa, y cerca de ella, una puerta grande a la que llamó también Bāb 'Adjisa, y dejó la Bāb 'Adjīsa antigua como estaba. Después mandó cambiar su nombre y dejar de referirla a 'Adjīsa; para ello la gente suprimió el 'ain y metió en su lugar el alif y el lam, con lo cual la llamaron Bāb al-Djīsa y duró esta puerta como la edificó al-Nāṣir hasta que se cayó, arruinó casi toda en el transcurso de los años. Súpolo el Emir de los musulmanes Abū Yūsuf Ya'qūb b. 'Abd al-Ḥaqq estando en al-Andalus, expidió una orden desde Algeciras, para que se restaurase (Ibn Abī Zar', 1964: 83-84).

This information is essential to analyze this gate within the Almohad period, because the Merinid restoration introduced an important change in its original structure. This gate has a bent entrance inside a rectangular bastion. It opens through a pointed horseshoe arch framed by a lobed arch, a characteristic composition of this period. Inside the gate, the garrison bench is preserved under a pointed horseshoe arch. In origin, the gate had two rooms that nowadays belong to a private residence. The only visible parts of these structures are the entrance arches (figure 13). In relation to the decoration of the gate, nothing has remained but two small flowers in the barrel vault. These flowers are very similar to the decorative motifs found on the miḥrābs of Tīnmal and Kutubiyya mosques.

Regarding Bāb al-Mahrūq, it was quoted in the sources as Bāb al-Šarī'a, but its Almohad name was Bāb al-Mahrūq, which means 'the burnt', due to the burning of a

rebel in front of this gate during the Almohad period, as al-Jaznā'i describes (al-Jaznā'i, 1923: 79-80). This gate led into the Almohad palatal area, hence its importance, but it has undergone many transformations over the centuries. Bāb al-Mahrūq had a similar structure than Bāb al-Gīsa: it was located inside a rectangular bastion and flanked by a square tower. The entrance is opened through a pointed horseshoe arch, demarcated by a plain frame. In this gate no decoration has been preserved and the facing of rammed earth (still visible on a photography taken by Joseph Bouhsira in 1920) (figure 14) has also disappeared.

On the other hand, the rebuilding of the Almoravid qaṣba (the qaṣba Būjlūd), destroyed by 'Abd al-Mu'min, is described in several sources. This qaṣba was rebuilt by al-Nāṣir, and it was used for the creation of a new palatal area in Fez al-Jadīd:

> Abou 'Abd Allâh En-Nâsir acheva ce travail. Ce dernier souverain fit rebâtir la qasba qui est encore sur la rivière. Or de l'avis unanime de ceux qui ont visité les constructions royales dans les divers pays, cette qasba n'a pas sa pareille, à cause de la rivière que le partage en deux. C'est En-Nâsir également qui fit construire la porte d'Ech-Charî'a dans l'état où on voit encore' (al-Jaznā'i, 1923: 79).

This qaṣba was composed of two parts: the first one was the Almoravid qaṣba Būjlūd rebuilt by the Almohads, and the second one was a new qaṣba, identified as the Qaṣba Nouar. Both constructions were separated by a canalization belonging to the hydraulic system of Fez, described in the sources like a streambed. According to the sources, this qaṣba was one of the most exceptional of the Almohad Caliphate, along with the ones of Marrakech and Seville. Despite its importance, it would be necessary an archaeological study to know its original structure, because its unique remains are the wall and two gates: Bāb al-Mahrūq and Bāb Būjlūd.

Finally, there were some small fortifications outside the city, which formed a defensive area around Fez. This system was used by the Almohads to ensure the defense

of the most important places. Good examples of that practice are the fortifications located in the mountains around Tīnmal and the fortifications around the city of Seville. According to the sources, the Caliph al-Nāṣir built a fortress outside Fez, on the south of the town: Burj al-Makūb.

Another Almohad fortification mentioned in written sources is a ribāṭ located outside Bāb al-Šarī'a (Ibn Abī Zar', 1964: 558), but the exact location of its remains is unknown. For this reason, it is necessary to accomplish a new archeological and historical research in this area.

Therefore, although the Almohad arrival to Fez supposed a regress in the evolution of the city, the situation changed with the governments of Abū Yūsuf Ya'qūb (al-Manṣūr) and al-Nāṣir. They gave back to Fez its past glory and it became one of the most prosperous cities of the Almohad Caliphate, with one of the most advanced defensive systems in North Africa.

6. Interpretation of the Almoravid Hydraulic System and the Almohad Transformations in Fez

The hydraulic network of Fez, according to the above presented analysis, was one of the most outstanding Almoravid hydraulic works, following the hydraulic network of jettaras of Marrakech[8]. This type of constructions was a priority in the Almoravid government. In the same way as in other Islamic societies, they were considered as pious endowments. In addition to the essential need of supplying water, this pious character was one of the main reasons why the Almoravid emirs built hydraulic constructions in the most important cities of the empire. Besides the great hydraulic infrastructures of Marrakech and Fez, there were other hydraulic constructions funded

[8] For more information about the hydraulic network of jettaras which supplied water to Marrakech, see Marcos Cobaleda, 2010: 747-765.

by the Almoravid emirs, such as the Qubbat al-Bārūdiyyīn in the Ibn Yūsuf mosque (the Almoravid Friday mosque) of Marrakech, the ensemble of fountain and cistern of the Alcazaba of Almeria (Spain)[9] or the Albolafia wheel of Cordoba (Spain). In the case of the Qubbat al-Bārūdiyyīn, the consideration as a pious endowment is more obvious, because it was a religious building: the ablutions complex for the Almoravid Friday mosque in the capital of the empire.

Nonetheless, the place that the hydraulic constructions of Fez occupy in the Almoravid engineering is especially outstanding: they were the first ones built by this dynasty, and they were built in a very well supplied water town (Fez had two rivers and lots of streams around it). The latter fact invites to ask the following question: why did the Almoravids decide to build this great system in a town where, in essence, it was not a priority? To answer this question, we propose two main reasons: the first one is the previously mentioned relation between the hydraulic constructions and pious endowments. In the case of Fez, despite the fact that the primitive hydraulic system to supply water to the town was not an Almoravid construction, the modifications introduced by the engineers from Cordoba under the orders of Yūsuf Ibn Tāšufīn should be substantial due to the changes of the town after 1069: after the conquest of Fez, Yūsuf Ibn Tāšufīn destroyed the walls that divided the town in two parts (the Qarawiyyīn and the Andalusi ones) and he unified the town with the building of a unique wall. These works as well as other ones carried out in the town, besides the building of watermills and other hydraulic constructions, are narrated by the *Rawḍ al-Qirṭās* (Ibn Abī Zar‘, 1964: 273), the *Kitāb al-Istiqṣā* (al-Nāṣirī, 2001: 197) and Leo Africanus (Leo Africanus, 2004: 230). As Yūsuf Ibn Tāšufīn is described as a very pious man in the written sources, it is not surprising that he developed the great

[9] For more information about the ensemble of fountain and cistern of the Alcazaba of Almeria, see Marcos Cobaleda, 2011: 448-465.

hydraulic works in Fez as a pious endowment. If we also consider that Fez was the most important religious centre in the Maghreb during the second half of the 11th century, and it maintained its status during the Almoravid period, the interpretation of the hydraulic constructions made by Yūsuf Ibn Tāšufīn as pious endowments is fully justified.

The other main reason we propose to explain why the Almoravids developed works in the hydraulic system in Fez is related to both ideas of control and power. To consider this point, it is necessary to return to the canalization located under the courtyard of the Bū'nānīyya madrasa. This canalization led directly to the nearest Bāb Būjlūd. It is known that it supplied water to an important building of the Almoravid period (Madani, 2003: part 2, chapter 1, section B-3a). This significant building would be located in the place of the Merinid madrasa, and it was named by T. Madani as 'al-Qaṣr' (Madani, 1998-1999: 130). For the employment of this name, this building was probably the residence of the Almoravid governors inside the qaṣba Būjlūd (Terrasse, 1968: 17). This qaṣba was the most important military construction of Yūsuf Ibn Tāšufīn after the conquest of Fez (VV. AA., 2000: 52). It was located to the west of the town (Terrasse, 1937: 27), in the highest part of Fez, as it is common in other great Islamic cities. It was situated outside the wall of the town, because it constituted a defensive enclosure, with its own wall. Inside the qaṣba, only the houses of the military chief and the Almoravid army were located. Moreover, in this place several warehouses and silos were placed as well. They were intended to supply the population in case of siege (Cherradi, 1996-1997: 7). At last, within the enclosure of the qaṣba there was also a mosque built by Yūsuf Ibn Tāšufīn (Terrasse, 1937: 27). However, this entire emplacement was destroyed during the Almohad period, and it was replaced in the 17th century by a large square built by Mūlāy Idrīs (Sarāj: 45) opposite Bāb Būjlūd. It is significant that the main element of the hydraulic system built by Yūsuf Ibn Tāšufīn

(the water dispenser of Būjlūd) was also located in this place, to the right of the Merinid gate which substitutes the original Almoravid access to the town. This important piece of the system was in charge of distributing the water to different parts of the town. For its location just next to the qaṣba Būjlūd, the water supply in case of siege was guaranteed. In this way, the control over the water of the Almoravid governors was total. This fact can be interpreted as a symbol of power and supremacy: those who could control the water supply could control the political life of the town and the Empire.

For this need of control of the water supply (which was not exclusive for the Almoravid period), in other parts of the town several military constructions associated to the hydraulic system can be found. That was the case, for example, of Bāb Sāgma. In that point, before entering the town, the water was stored in a pool with four canalizations that led the water towards the town, throughout the wall. Nonetheless, in this case the hydraulic system was built before the wall, since this military construction is not an Almoravid work. The defensive complex of Bāb Sāgma has been traditionally dated to Merinid period, with the rest of the walls of Fez al-Jadīd. According to Ibn Abī Zar‘, Fez al-Jadīd was founded in 1276 by the Merinid emir Ya‘qūb Ibn ‘Abd al-Ḥaqq:

> El 3 de chawwāl (21 Marzo de 1276) mandó el emir de los musulmanes, Abū Yūsuf, construir Fez el Nuevo; se abrieron los cimientos sobre el río de Fez y se comenzaron los trabajos aquel día. Cabalgó el emir de los musulmanes y asistió a la delimitación y la apertura de los cimientos. Los alfaquíes Abū-l-Hasan ben al-Qattān y Abū Allāh ben Mubarak, consultaron los augurios; el horóscopo fue feliz y el tiempo, propicio. Bendición suya y de buena estrella es que nunca ha muerto en ella ningún Califa ni ha salido de sus puertas enseña que no venciese, ni ejército que no triunfase. También en chawwāl mandó construir la alcazaba de Mequínez y su mezquita (Ibn Abī Zar‘, 1964: 607).

In this text, the astrological studies for the construction of the new city and its founding date are described. Nevertheless, it does not indicate if in this place there were any

previous constructions and it does not mention the Almoravid hydraulic system of this area, thus we cannot rule out the preexistence of some kind of construction in this place. On the contrary, when al-Jaznā'i counts the buildings of Fez in the Almohad period, he says that he has included the ones of Fez al-Bālī, Fez al-Jadīd and the Jewish quarter:

> Et s'il avait tenu compte de la Ville Blanche (Fès ejjdid) [Fez al-Jadīd], du Mellah et de toutes les grottes existant aujourd'hui à Fès, la statistique aurait bien dépassé ces chiffres (al-Jaznā'i, 1923: 83).

This allusion to Fez al-Jadīd could be a mistake, but it is also possible that the author refers at this point to some construction located in the place occupied by Fez al-Jadīd, and he uses the Merinid name 'Fez al-Jadīd' because he lived in that period, when this new part of the city was constructed and known with that name. On the other hand, the presence of the decorative remains of 'false bonding' in the defensive complex of Bāb Sāgma indicates that this part could have been built during the Almohad period. This defensive ensemble was built over one part of the Almoravid hydraulic system. The complex is composed by a fortified rectangular square, with two gates at the ends of the rectangle. If we observe the map of Fez al-Jadīd, this area has a strange structure that has no clear role in relation to the rest of Fez al-Jadīd. As the wall of rammed earth was built over the Almoravid canalizations, they were vaulted. This wall was covered with a facing of 'false bonding' (figure 6) which can be observed both on the walls over the Almoravid canalizations and on the towers of the gate that leads into Fez al-Jadīd: Bāb Dkaken (figure 15). This decoration was created with vertical and horizontal lines, which simulate blocks of stone made in plaster.

The facing of 'false bonding' is a typical Almohad decoration of fortifications raised during this period. It was given four kinds of uses: firstly, it served to hide the unions of the rammed earth factory; secondly, it was used to simulate a stone building

in order to convince the enemy that it was a stronger fortification; thirdly, it represented the power of Caliphate; and finally, it was meant to disseminate the Almohad doctrine (it was completed with epigraphic inscriptions), as it has been documented in different examples. As a typical Almohad ornamentation, the use of this decoration in a building that has been considered so far as a Merinid work is very strange. For this reason, we think that it is essential to carry out an archaeological analysis of this area which would allow to reconsider its chronology.

Moreover, in this defensive set of Bāb Sāgma, there are other components connected with the Almohad period, as the use of double gates and, especially, the use of octagonal towers, characteristic for the Almohad defensive architecture. In the latter case, there are two octagonal towers preserved at the entrance of the defensive complex of Bāb Sāgma (figure 16). These towers were built in rammed earth and they are very similar to the Albarrana towers of Jerez de la Frontera (Spain). For this reason, we consider that these towers could be ancient Albarranas. This kind of defensive towers was detached from the curtain wall and connected to it by a bridge or an arcade and, in this specific case, its function would consist of defending the set of Bāb Sāgma and the ancient Almoravid hydraulic system. In fact, this type of towers was used during the Almohad period to defend strategic points and water sources.

On the other hand, as it has been already mentioned, Ibn Abī Zar‘ did not indicate the existence of any buildings in the area where the Merinids built Fez al-Jadīd. However, we are aware of the preexistent Almoravid hydraulic system and the existence of the Almohad ribāṭ located outside Bāb al-Šarī‘a (Ibn Abī Zar‘, 1964: 558). The exact location of this fortification is unknown, but it was probably situated in the place behind Fez al-Jadīd. Moreover, we know the allusion of al-Jaznā’i to the buildings of Fez al-Jadīd in the Almohad period (al-Jaznā’i, 1923: 83). These references could explain the

decorative remains of ‘false bonding’ placed in the wall near Bāb Sāgma and the two octagonal towers associated to this defensive ensemble, as well as the possibility of the survival of some remains from an Almohad fortification used in the Merinid construction of Fez al-Jadīd. The Almohad fortification could have been connected to the control of territory and Fez River, and this fact would explain why it was built over the Almoravid hydraulic system.

The idea of defending the water sources was constant during the Almohad period, because the control of water was essential to ensure the life in the city. We can find examples of this idea in the coracha towers of the Alcazaba of Badajoz (Spain), and the missing coracha fortification of Silves (Portugal), described in the sources. In this last case, the sources indicate the existence of a small fortification that defended the water intake along the Arade River (Lopes, J. B. da S., 1844: 108).

Concerning the ‘false bonding’ decoration, the remains of Fez are similar to other Almohad examples, as those in Paderne Castle (Portugal) (Catarino; Inácio, 2005: 284), Alcacer do Sal Castle (Portugal) (Carvalho, 2001: 197), Cáceres walls (Spain) (Márquez Bueno; Gurriarán Daza, 2006: 90), Niebla walls (Spain) (Pavón Maldonado, 1992: 134), Castillejo de los Guájares (Spain) (Villalba Sola, 2015b: 487-488) and in Safi walls (Morocco) (Villalba Sola, 2015b: 334-335). For its characteristic of composition and thickness, it is possible that the ‘false bonding’ of Fez was created between the caliphates of Abū Yūsuf Ya‘qūb (al-Manṣūr) and al-Nāṣir, at the same time when the main Almohad works of Fez were carried out (Villalba Sola, 2015b: 289-291, 321-331). Nevertheless, its precise chronology will not be known until an archaeological study is carried out in this area. On the other hand, it is also possible that all these characteristics, connected with the Almohad period, were transferred from the Almohad architecture to the Merinid one in the early Merinid Emirate.

However, both these decorative remains and the octagonal towers are essential to the history of Fez, because these elements placed Fez at the forefront of the defensive systems during the Middle Ages. Moreover, the use of this decoration turned the Almohad constructions of Fez into outstanding works, in the way that remains of ‘false bonding’ have been only preserved in other three cities in North Africa: Marrakech, Rabat and Safi. The same happens with the octagonal towers, preserved only in Marrakech and the ribāṭ of Tīt. All these examples date from the Almohad period.

In this way, the importance of Almohad reforms in the wall of Fez is clear, as well as the need of new archeological studies to know the real chronology of this complex.

7. Conclusions

According to the previous study, due to the huge volume of constructions built during the Almoravid and Almohad periods, we can conclude that Fez acquired a great importance in those times. In the case of the Almoravids, the great transformation of the hydraulic system and the construction of its water dispenser were one of the most outstanding Almoravid engineering works, both in the city and in the whole empire. On the other hand, despite the first destructions made by ‘Abd al-Mu’min, the Almohads enlarged Fez and made highlighting transformations on its military constructions: they built the wall in the current area of Fez al-Bālī, as well as the outside defensive system around Fez, including the ribāṭ and the small fortifications.

Concerning the Almoravid hydraulic system, we can conclude that its transformation is related, on one hand, to pious endowments, as in other Islamic societies. In the case of Fez, this character of the hydraulic constructions is linked to the own status of the city as an important religious centre, as well as to the condition of Yūsuf Ibn Tāšufīn as a very pious man and to the fact that this great work was not a

priority, due to the presence of two main rivers and several streams. On the other hand, this latter circumstance is connected to the fact that the hydraulic system of Fez can be interpreted as a representation of the ideas of control and power. In some cases, these hydraulic constructions were related to the military ones, as shows the analysis of the water dispenser and its relation with the qaṣba Būjlūd, as well as the case of the wall near Bāb Sāgma. In this last sample, the same idea of control and power is present in the Almohad construction: on one hand, the control of water was fundamental for the survival of the city; and on the other one, the supremacy of the Almohad power was exalted through the employ of the 'false bonding' decoration. This type of ornamentation was unusual in North Africa (it has been only documented in three other samples in Marrakech, Rabat and Safi) and its use has been always related to the representation of the power of the Almohad Caliphate.

These facts (both the construction of the Almoravid hydraulic system and the Almohad transformations of the walls and defensive area around the town) turned Fez into one of the most advanced medieval cities of North Africa, as well as into a symbol of the manifestation of the power of both Berber dynasties. Nevertheless, despite the knowledge of these constructions and transformations stated in written sources, the archaeological works are necessary to broaden the knowledge of the Almoravid hydraulic network and to define the proposed Almohad chronology for the complex of Bāb Sāgma.

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Tables

Table 1. Branches of the hydraulic system systematized by T. Madani (Madani, 1998-1999: 138).

	Name of the Branch	Length (m)	Slope (%)	Number of Waterfalls	Number of Registered Watermills
1	Jarḏān (al-Fajjālīn slope)	375	0.3	0	-
2	Al-Lamṭīyyīn	260	2	1	1
3	Al-Bū‘nānīyya	180	3.5	3	3
4	Qanṭarat Būrūs	640	9	-	3
5	Zuqāq al-Rwāḥ	800	85	4	6
	Zuqāq al-Rwāḥ (2)	80	-	3	3
6	‘Ayn Azlīṭan	830	7.5	3	5
7	Rḥa al-Šams	220	4.5	0	-
8	Al-Fajjālīn	1,550	5	7	15
9	Al-Zḥūl (wādī river)	850	4	1	8
10	Al-Ḥāmiyya (slope)	600	1.3	1	1
	Al-Ḥāmiyya (centre)	160	1.2	1	1
	Al-Ḥāmiyya (support)	460	4.5	3	3
11	Rās al-Jinān	1,060	7.5	13	5
12	Al-Ṣawwāfin	470	12.5	12	6
13	Šīn Mliḥ	765	8	5	1
14	Al-Zbal	720	7	0	-
15	Maṣmūda	1,150	-	-	3
16	Al-Maqḥafīyya	200	1	1	6
17	Sidi Mgḥit	1,100	3.5	0	0
18	Al-Šrāšar	-	-	-	-

Figure captions

Figure 1. Types of Almohad ‘false bonding’ decoration. Top left Alcazaba de Badajoz (Spain), top right Torre Redonda Cáceres wall (Spain), down left Castillo de Baños de la Encina, (Jaén, Spain), down right Castillo de la Mola (Novelda, Spain), down center, Alcazaba de Badajoz (Spain).

Figure 2. Map of the hydraulic network and Almohad walls of Fez. D. Villalba Sola.

Figure 3. Water dispenser of Būjlūd, entry wall.

Figure 4. Water dispenser of Būjlūd, secondary branches on the left side.

Figure 5. Hydraulic system near Bāb Sāgma between 1916 and 1920, photography by J. Bouhsira, Exposition *Galerie de l’Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.

Figure 6. Hydraulic system near Bāb Sāgma in 2008, with decorative remains of ‘false bonding’.

Figure 7 (a). Merinid waterwheel in the Janān al-Sabīl Gardens in 1916, photography by J. Bouhsira, Exposition *Galerie de l’Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.

Figure 7 (b). Merinid waterwheel in the Janān al-Sabīl Gardens in 2008.

Figure 8. Bīn Lamdūn Bridge in 2008.

Figure 9. al-Tarrāfīn Bridge in 2008.

Figure 10. Wall next to Bāb al-Gīsa.

Figure 11. Remains of leprous’ cave next to Bāb al-Gīsa.

Figure 12 (a). Bāb al-Gīsa in 2008.

Figure 12 (b). Bāb al-Gīsa, photography by J. Bouhsira between 1916 and 1920, Exposition *Galerie de l’Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.

Figure 13 (a). Interior structure of Bāb al-Gīsa.

Figure 13 (b). Almohad decorative remains of Bāb al-Gīsa.

Figure 14. Bāb al-Mahrūq, photography by J. Bouhsira between 1916 and 1920, Exposition *Galerie de l'Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.

Figure 15. Decorative remains of 'false bonding' in Bāb Dkaken, photography by J. Bouhsira between 1916 and 1920, Exposition *Galerie de l'Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.

Figure 16. Octagonal towers of Bāb Sāgma, photography by J. Bouhsira between 1916 and 1920, Exposition *Galerie de l'Institut Français de Fès*, Maison de la Photographie de Marrakech, 23rd September – 31st October 2011.