Industrial Heritage of the City of Granada: The Water Well "Santa Clara" in "La Vega De Granada"

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Abstract. This paper presents the history and the recovery works of the water well "Pozo de Santa Clara". This construction dates back to 1923 and was intended to supply water to the agricultural area around the city of Granada, Spain, called "La Vega de Granada". The construction of the well is contemporary to the industrial development carried out in the city of Granada: the sugar industry based on the cultivation of sugar beet, the development of electric trams, the opening of the brewery "Cervezas Alhambra", the construction of the most important avenue of the city "La Gran Vía", etc. The water well had been abandoned since the 70's of the 20th century and the new owner, grandson of one of the first owners, started the restoration to protect the heritage and give it other uses than the one it was originally built for.

Keywords: Granada heritage · Water well · Vega de Granada · Old pump

1 Introduction

La Vega de Granada is an area located in the province of Granada in Andalucia, Spain (Fig. 1). The territory is surrounded by different towns and areas of the province: Los Montes to the north, the town of Guadix to the east, the Alpujarra Granadina to the southeast, the Lecrín Valley to the south, the town of Alhama to the southwest and the town of Loja to the west. It is made up of more than forty villages, generally small and with a population density higher than the average for the province. Of all of them, the most popular is the city of Granada, which is at the moment, and has been in the past, the historical capital.

Mainly La Vega is a flat area characterized by alluvial soils of excellent agricultural fertility thanks to the water of the Genil river and its tributaries. It presents architectural and technical vestiges of the industrialization started around the beetroot in the last

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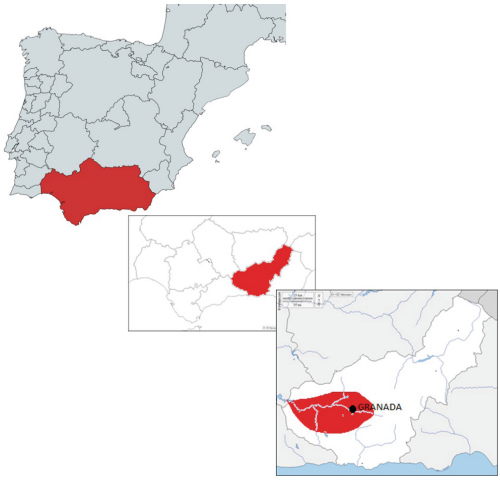

Fig. 1. Localization of La Vega de Granada in Andalucia, Spain

quarter of the 19th century and first third of the 20th century. It also presents archaeological remains and architectural heritage related to the different forms of agricultural exploitation throughout the centuries, from the Romans to the Arabs, from which it receives most of its legacy although there are studies of activities in the zone dated in the Paleolithic, Neolithic, and Age of Metals periods [1]. The fluvial genesis of La Vega composed of sediments giving permeability and drainage is the origin of good aquifers and natural reservoirs or warehouses used since ancient times to use the winter waters from Sierra Nevada during summer or dry periods by extracting them in springs, wells and waterwheels.

La Vega de Granada has been the economic engine that has led to human settlements, not only in the capital but also in the towns nearby. Due to the richness of the soil and the abundance of water different kinds of crops have been allowed. Among the crops that have contributed significantly to the economic development of the region are cereals and vegetables, very appreciated, up today, in the local gastronomy. Some other crops have been of great interest: hemp and flax, beets and tobacco. Special mention deserves the industrial plants used to supply other industries such as silk (18th–19th centuries) or the intensive cultivation of beets in the early and mid-twentieth century for the production of sugar. Unfortunately, these industrial crops declined after 1930.

2 Social-Historical Context

2.1 The Importance of La Vega for Granada. History of La Vega

"La Vega de Granada" and the territory that surrounds the Genil river, have been populated since Prehistory [2]. Thus, different vestiges can be found such as the site of "Las catorce fanegas" dating from the Neolithic. It is believed that these settlements were small huts that were inhabited only in summer and spring since it is assumed that the area was swampy and uninhabitable in autumn and winter.

Later, in the era of metals, there were settlements of the Argar culture in some areas of La Vega such as Armilla or La Zubia. Likewise, Phoenician remains, funerary remains, from the 8th century BC have been found like the mounds of Pinos Puente. These Phoenician remains suggest that La Vega was already generating agricultural resources. Proof of this is the Iberian site of the Mirador de Rolando (5th century BC), where farm devices have been found.

This agrarian activity intensified with the Roman colonization. There are archaeological and toponymic remains that indicate the presence of Roman villas in La Vega and along the Genil river (around 2nd century). An example of these remains is the town discovered in Los Mondragones, in the city of Granada. At that time, it is thought that olive trees were grown in the higher areas, and cereals and vegetables, fruit trees and wines were grown in "La Vega".

It was not until Islamic times that La Vega was equipped with irrigation systems. The irregularity of rainfall had led farmers from different historical moments to come together to collect water and organize its use in what have been called irrigation communities. The Muslims incorporated the knowledge and practices about irrigation into the local culture and established water infrastructures. In La Vega, one of these associations was created: the Community of Irrigators of the "Acequia Gorda del Río Genil" (Big Ditch of Genil River), which organized and managed the irrigation of a part of La Vega since the 11th century, although it is thought that the origin, and part of the infrastructures, could have been from Roman times. The Acequia Gorda continues operating [3] nowadays. Other ditches in La Vega were Arabuleila y Tarramonta, very much connected with the well of the work.

On the other hand, since the 13th century there is evidence of the existence of rules to regulate the distribution and use of the waters of the Genil River. These norms were translated and used later in the time of the Catholic Monarchs, after the Conquest of Granada in 1492. These norms, used by the Arabs, are still in force, with some minor modifications [3].

As a consequence of the need to supply more water to La Vega, it was necessary to carry out wells, some for the direct supply of crops, and others to incorporate water into the aforementioned "Acequia Gorda". As a proof of the interest in the existence of wells for supply is that today, the "Acequia Gorda" has the contribution of 8 wells with a depth of more than 150 m each [3].

2.2 Industrialization of Granada

The industrialization of the city of Granada is closely linked to LaVega del Río Genil. The industrial take-off of Granada took place in the last third of the 19th century and lasted until the first third of the 20th century and is mainly linked to the sugar industry [4].

It is in those years that electricity was introduced in the city (1892) and the sugar industries of La Vega were created and expanded, which in 1890 were seven of them [5]. At the same time, and as a support to the industries, the most important street, La Gran Vía, (High Street) known in its day, as Gran Vía del Azúcar (High Street of the Sugar) and later of Colón (1890–1925) was urbanized and put into service [4].

Likewise, as part of the modernization of the city, in 1904 the routes of the Electric Tramways of Granada [6] began. The trams were developed to connect La Vega and its towns, with the city, to allow the transfer of goods and people. Some other events took place around the industrialization and the modernization of the zone: in 1922 the Armilla aerodrome was created which, since 1925, has been called Dávila Aerodrome, in memory of Luis Dávila Ponce de León and which is still in service today as the Air Force Base [7]; in the same year, 1925, the Alhambra brewery (1925) began its operation among other industrial facilities in the city.

It was in this industrial environment that the construction and installation of the Santa Clara well began. Thus, the well was related to industry in two ways. Firstly, it was developed due to the need for water for the sugar industry, and later for the tobacco industry, and secondly, the industrial development of the region was used to incorporate an unconventional industrial equipment for the extraction of groundwater.

3 The Water Well of Santa Clara

The Santa Clara Well is an industrial agricultural construction dating from 1923. A stone tombstone with the inscription of the date of construction is at the main entrance of the building (Fig. 2).

It is a two-storey building that protects the Santa Clara Well and serves as a home and warehouse for the maintenance inside which, in the center of the room is the well. It is located in an area of La Vega de Granada close to Granada capital, about 4 km from the city. At the time of its construction, the well belonged to the "Cortijo del Pino" an agricultural estate belonging to both the town of Churriana de la Vega and the city of Granada as shown in the plans of Fig. 3. The "Cortijo del Pino" is a typical construction of La Vega and it is one of the oldest that has been preserved. The construction of the Cortijo dates from 1873 and has been owned by the same family since 1940, the year in which the current owner's grandmother bought it.

Fig. 2. The stone tombstone at the entrance of the house (owner's collection).

3.1 History of the Water Well

The "Pozo de Santa Clara" is a unique facility in La Vega de Granada, as traditionally irrigation was done through irrigation ditches and floods and not through well irrigation.

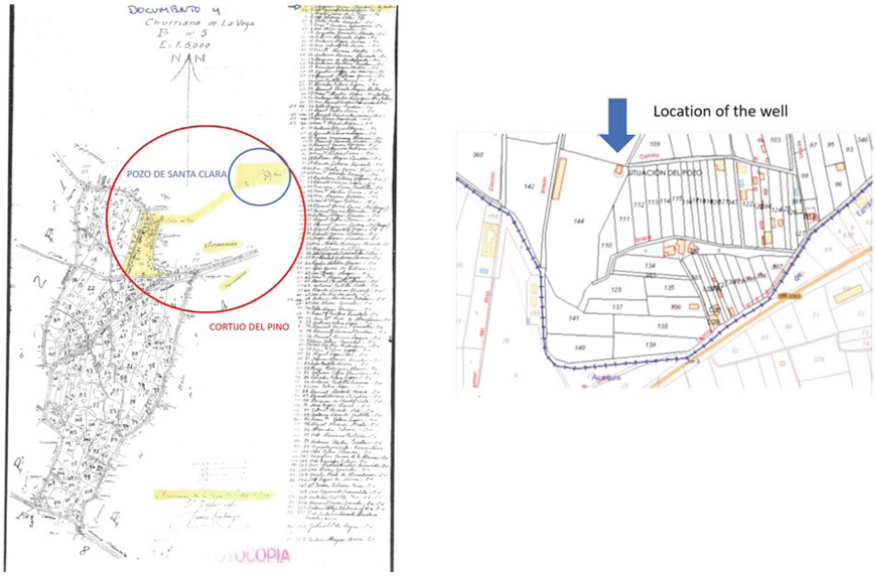

Fig. 3. Location of Cortijo del Pino and the Well Santa Clara in Churriana de la Vega and adastral representation and information of the "Pozo de Santa Clara" (owner's collection)

In fact, wells in the Vega became widespread with the introduction of diesel engines in the second half of the twentieth century, since before that there was hardly any quantitatively significant extraction of groundwater. Therefore, the Santa Clara well, dated 1923, is one of the oldest documented wells in the Vega of Granada and its existence must be related to the sugar industry. As mentioned above, the well is part of the "Cortijo del Pino" which was purchased in 1940 by the grandmother of the current owner of the well. The well was in operation until 1970's of the past century when it finally dried up [8].

It is an emblematic place that has been the subject of paintings such as the one shown in the image in Fig. 4 by the painter Francisco Carreño. It has not only been an emblematic place but also an enigmatic place since there is even a legend about the well and the man in the well that the tradition of the town of Churriana remembers and that

Fig. 4. "Pozo de Santa Clara" by Francisco Carreño (owner's private collection).

has given rise to a story-legend (Fig. 5) by the writer César Elvira [9] and to an escape room game (Fig. 5).

Fig. 5. Cover of the book "La leyenda del pocero de Santa Clara" and poster announcing the escape room "La leyenda del pocero".

3.2 Building and Civil Engineering

The building consists of a rectangular open plan of one room with a sloping gabled roof with ceramic tiles. In one side, a turret stands for housing the original electrical transformer (today located in the outer turret). Figure 6a shows the current state. The area occupied by the building is 92.40 m^2. The house is built with 50 cm wide enclosures made up of mixed stonework masonry and solid brick walls framing gaps and giving strength to the walls. The sloping roof is made up of poplar logs beams, planking, insulation and ceramic tile (Fig. 7). The building follows the vernacular architecture of agricultural spaces, such as farmhouses.

Fig. 6. The House of the Well. a) View from the rear part of the building. b). Inside the building, in the center, the well (owner's collection).

Inside, close to the center of the room, appears the well. It is made of masonry and is protected by a locksmith railing. As it can be seen in Fig. 6b it is a huge well with 3 m of diameter and up to 45 m deep. In order to do works of maintenance, an access to the bottom is provided through a helical staircase (Fig. 8) of 50 cm wide. The staircase descends 30 m to the platform where the electric motor of the water extraction system is located. The building containing the well was thought for maintenance and to be the living place of the well man. Just above the well a skylight allows light to enter the building.

The initial depth of the well was 35 m (about a 9-storey building) but in the 50s of the 20th century, due to the decrease in the water table of "La Vega", the former owner of the well and father of the current owner, began to deepen it to the current deep of 45 m (12-storey building). The work was carried out manually. The hollows of the scaffolding used for its excavation and interior reinforcement can be still observed.

Fig. 7. Detail of the wooden roof and the skylight. (owner's collection).

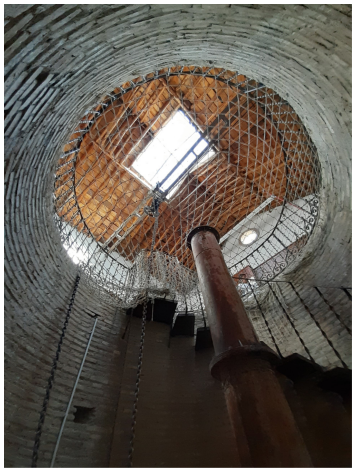

Fig. 8. The access to the well and the helical staircase. From the inside of the well (owner's collection).

An iron cast beam has been located bellow the wooden roof and over the well clamped in two opposite walls of the building in order to support a small bridge crane (Fig. 9).

Fig. 9. Clamped beam to support the bridge crane. (particular collection).

Regarding the inputs, something that is really important for an industrial set up, the distribution of electrical energy both for the house and for the engine of the water extraction system has been installed from the moment in which the "Casa del Pozo" was built. Likewise, the building has a drinking water network for human consumption.

3.3 Mechanical-Fluid Engineering

The raison d'être of this building was to supply irrigation water to the lands of the "Cortijo del Pino" and other lands adjacent to it. As mentioned above, "La Vega de Granada" bases its wealth on traditional crops, mainly vegetables and also crops for supplying industries, all of them with a great need for water. Taking advantage of the impulse of the industrialization of the region, in the first third of the last century, the owners of the Cortijo, proceeded to the installation of an innovative system in the agricultural sector of the time and in the region, introducing a pump extraction system equipped with an electrical engine. The idea behind this installation was to reach a great depth to achieve a large water flow from the aquifer, impossible with the procedures and technology used so far. In this sense, the use of industrial equipment such as the engine, generally reserved for other activities such as transport, in an agricultural installation, was a milestone in "La Vega".

The industrial equipment consists on a pump and the correspondent engine and the pipe. To install these elements, an iron cast bridge crane supported by the clamped-clamped beam was used. All together are the mechanical-hidraulic part of the water well.

The bridge crane, Fig. 10, is mechanical a device, quite simple in concept, but was a very important part of the well by the time of the construction as it was a unconventional

element in the agricultural environment of La Vega that help to the installation of the rest of the elements. We can say that it was a landmark in the recent history of La Vega.

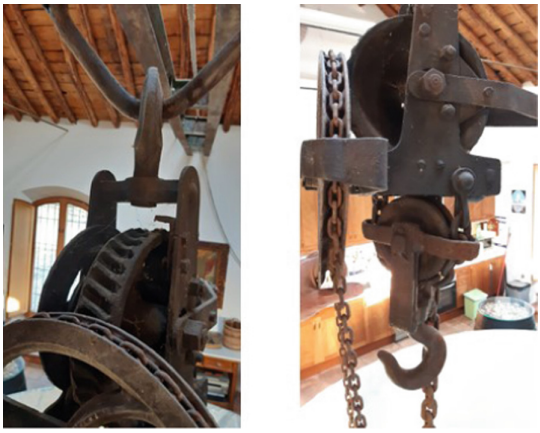

Fig. 10. Details of bridge crane. (owner's collection).

The old engine of the well can be seen in Fig. 11a. This part is located at about 30 m of depth from the ground floor of the building and is accessible by the mentioned staircase. Figure 11b shows the metal plate with the main properties of the engine. Although we do not know exactly when the pump was installed, the plate gives us some information. The manufacturer of the motor was the company CENEMESA, created in 1930 in Córdoba (Spain). Therefore, the engine has to be dated after 1930, but no later than that to the owner's knowledge. As can be seen, although the plate is quite deteriorated, it is an asynchronous motor with a power of 100 HP, usually used in other types of industrial assemblies.

Fig. 11. a) Details of the engine and the extraction pipe and b) the dataplate of the engine. (owner's collection).

In Fig. 12a, the long pipe for the extraction of the water can be observed going up in the center of the well. In the past, when the well was in operation, once the pipe reached the ground floor of the building it got out of it following the direction drawn, in Fig. 13a, in red. Outside, the pipe continues to the final part of the installation as shown in Fig. 13b. Also a detail of the pipe outside the building can be seen in Fig. 12b.

3.4 The Restoration

The restoration and rehabilitation of both the well and the house began in 2010 at the initiative of the current owner.

The restoration lasted 2 years and consisted on the recovery of the house and its reconditioning as a museum site and location, on the one hand, and the recovery of the civil part of the well, on the other. In Fig. 14 the architectural drawings of the building are shown. Figure 15 shows the comparative dimensions of the well and the house.

Regarding the recovery of the well, vertical masonry and locksmith work was carried out. As for the mechanical-hydraulic part, the motor was cleaned up and refurbished, although it has not been put into operation due to the low groundwater level and the fact that the well is currently dry.

Fig. 12. The extraction pipe of the well a) seen from the bottom b) outside de house. (particular collection).

At present "La casa del Pozo" is in the process of being declared "Bien de Interés Cultural (BIC)" (Asset of Cultural Interest) by the Junta de Andalucía, as it is an agro-industrial installation almost one century old. According to the "Ley de Patrimonio Histórico de Andalucía" [10] (Andalusian Historical Heritage Law), both the well house and the well fall within the cases of the classification of article 25 relating to the cultural interest of the Patrimonio Inmobiliario (Immovable Heritage): Sites of Ethnological Interest and Sites of Industrial Interest. In order to achieve the status of BIC, a report on

Fig. 13. Direction of the pipe a) inside the building and b) outside the building

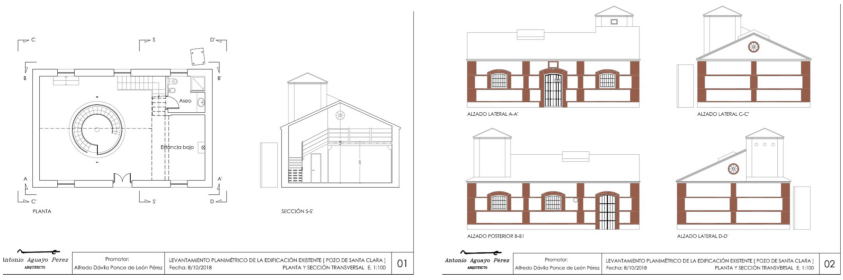

Fig. 14. Architectural drawings of the building for the restauration

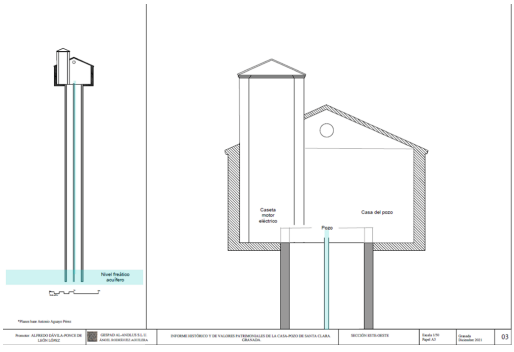

Fig. 15. Comparative dimensions of the well and the house

the historical and heritage values of the well has been commissioned by the owner, part of whose conclusions are reflected in this work [11]. The "Santa Clara well" will join, in this way, other ethnographic and industrial "Bienes de Interés Cultural" of Granada, such as the "Casa Molino del Marqués de Rivas" and "La Azucarera de San Isidro y el Ingenio de San Juan", a flour mill and a sugar factory, respectively [12].

4 Conclusions

This paper presents the history and the recovery works of the water well "Pozo de Santa Clara". In the first part, an introduction to the importance of "La Vega" for the city of Granada thought the history. The well, dates back to 1923 and was intended to supply water to the lands of the "Cortijo del Pino" and the surrounding area. It has shown to be contemporary to the industrial development carried out in the city of Granada: the sugar industry. The new owner, grandson of one of the first owners, started the restoration of the well, abandoned in the the 70's of the 20th century, to protect the heritage and give it other uses than the one it was originally built for. In the paper we also describe the building and mechanical-hidraulic equipment.

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