ABSTRACT

This paper sets out to analyse the historical and architectural factors that have contributed towards creating the city walls of Granada. The chronology of the construction evidences a continuity in the building of them over a period of six hundred years beginning in the 8th century and ending in the 14th century, successively enclosing the different parts of the city. Significant sections of these impressive walls still exist today; others have gradually been disappearing as a result of the urban development of the city. In their method of construction they differ little. Nevertheless, the form of repair carried out over the years has varied greatly.

Interesting literary descriptions exist which make reference to the character of the walls and the effect they had on travellers who arrived in the city. It is possible to learn how they looked by way of this ample iconographic material which allows the diverse images that they created to be reconstructed. It is necessary to take all of this into account when considering the urban development of the walls and their environs.

The walls have always contributed towards the evolution of their surroundings - on some occasions the old structures of the walls being incorporated into new buildings. This process was the norm throughout the 19th century. The walls were used as party walls or exterior walls of new buildings, and at times were even opened out in order to create windows and doors for the buildings that backed on to them - a common practice in many cities. On other occasions, parts of the walls were knocked down or crumbled due to constant neglect. The latter is evidenced even now by the walled areas which are still in existence.

The problem with the restoration of these walls is not only a technical one but also one of how to restore the areas surrounding them - although
conservation of materials is difficult, the most serious deterioration of these Granadine walls is due to the degeneration of the areas in which they are to be found. Even small efforts made towards maintenance, and an overall project to deal adequately with the environs, would bring some sort of solution to the serious problems which the conservation of this evocative architecture presents.

**History and analysis of building methods**

It could be said that the city walls of Granada constitute an entity which has evolved in accordance with the city's urban necessities to which they originally served as a defence. If this understanding is correct, by carefully analysing the various aspects of construction, clear differences should be revealed. The distinct phases of construction can then be studied by considering previous research carried out, and, more significantly, not only the techniques used in building the walls, but also the techniques with which they were systematically repaired can be ascertained.

It is apparent that many of these walls have been repaired again and again, but never with the idea of a true restoration in mind. Only towards the end of the last century and at the beginning of this one were these repairs approached with a sense of the concept of restoration. The most significant, both in quality and the amount of work done, occurred as a result of the declaration of the walls of the Albayzin as a national monument by R.O (Real Orden) on 6th July 1922 (G a c e t a 12.7.1922). We can therefore state that there exist, in relation to each period of history, techniques of construction, revealing only slight variations, and techniques of repair and restoration which, owing to their character and the philosophy applied, show the chronology of the action taken.

**Alcazaba Cadima**

The most ancient walls, which could be called the first, are the Alcazaba Cadima (8th century). They were built from a mixture of river pebbles, lime and sand, and were consolidated in the 11th century by Zawi ben Ziri, who gave them their name the "Zirita" Walls. The towers are supported in the corner by a bond of sandstone from La Malahá, alternating four blocks of stone laid longways with two laid sideways.

The section which is still preserved today corresponds to the northern sector and is approximately 500 m. long. It is made up of a thick wall with rectangular and semi-circular towers backing onto it which have been partially rebuilt at their base with shorings of brick and covered with cement mortar.

It was the custom to measure the height of the wall according to the number of "tapías" [each block in a rammed earth wall] used in its construction. The exterior faces show distinctive horizontal alignments which correspond to the holes or "mechinales" originating from the use of "agujas" or "cárcceles" [horizontal wooden struts] whose
function was to support the "tapiales" or wooden casing used to hold the shape of the wall during construction.

The Alcazaba Cadima has high walls of up to 16 "tapias" on their exterior face. The height of each one of these varies between 60 and 80 cm.

Alcazaba Gidida

In the 11th century, a significant growth in the population made it necessary to create a new ring of walls. This new citadel, called Gidida, was constructed in the same way with river pebbles, lime and sand, but was reinforced with stones and bricks, and numerous repairs with Portland cement are apparent. It constitutes one of the most typical stretches of wall in the urban landscape of Granada. Puerta Monaita, rebuilt with bricks and masonry, is a clear example of reconstruction undertaken with the intention of recuperating the original architectural shape and size.

The walls reached this gate by changing direction, and closed the second ring referred to above. Of this wall hardly anything remains. However, two towers and the remains of one section can be clearly distinguished and these were built with identical methods to those described above.

In the 11th century the "medina" [traditional Arab city] was constructed. The second wall formed part of the third walls which enclosed this area, being the section from Puerta Monaita to Puerta Elvira, from where the third walls began. No remains are in evidence of these latter walls.

In the 14th century, four "arrabales" [districts within the Arab city] existed, the Albayzin being one of the most important. The wall of this "arrabal" was constructed between 1329 and 1359. It created another walled enclosure in the city, climbing as far as the present-day hermitage of San Miguel Alto and continuing to the Puerta de Guadix Baja. This stretch is known as Carea de Don Gonzalo. It was first given its name by Vico in his "Plataforma", written in 1612 and Bermúdez de Pedraza (1699).

An important part of the walls is still conserved today. Their shape is regular all the way along, perhaps as a result of the fact that they were planned in their entirety and the building works were carefully organised.
The wall is continuous and narrow, not exceeding 1.2m in width. Its side elevation is cut in the form of a series of steps, using between 6 and 8 "tapias" which were shaped in such a way as to adapt to the slopes of Cerro de San Miguel. The homogeneity in the height of each one of the "tapias" should be noted, oscillating between 82 and 86 cms. This dimension is the norm in the fortification of hispanic-muslim cities, given that it coincides noticeably with two "codos" of 42 cms each, or one "vara" of 83.59 cms. (traditional measures).

The wall was built according to the "tapial calicastrado" system, which consists of making a "careado" or rendering for the interior of the wooden casing with a mortar richer in lime than the mixture used to fill the interior of the wall. In this way, when the mixture is rammed and sets, the rendering fuses with the other materials, guaranteeing a perfect adherence and an extremely resistant surface.

The city walls constructed in the 14th century do not show the holes of the "agujas" on their exterior. Instead the "agujas", which do not span the whole wall, were inserted into each of the wall faces to the extent of a third of their width. After their removal, the exterior hole is concealed with the same mortar used in the manufacture of the rendering. The facade would have appeared smooth and monolithic, and only the deterioration suffered as a result of the passing of the centuries reveals the signs of the earthen walls beneath.

This is the stretch of wall where the greatest number of repairs has been carried out, a fact which is highlighted by the brick and stone rubble to be found at its base.

The whole wall was built with the "tapial calicastrado" technique, and restoration carried out with brick and stone especially at the base, just as described in the previous paragraph, numerous restored areas being covered with cement rendering. The wall is conserved to a surprising extent despite having been partially destroyed in the past by torrential rainfall a fact which is evident from its many reconstructions. Gómez Moreno refers to how one of the solid walls of the ramparts gave way in a storm in 1629.
The use of new materials in the restoration of the city walls: results

Many factors are made evident in a first analysis of the state of conservation of this defensive architecture which was built with very simple techniques. The use of cement to repair or restore (depending on the particular case) significant parts of these walls has, with time, revealed a series of serious problems which must be taken into account in any proposed restoration. The fact that cement is not sufficiently porous, in contrast with the earth of the "tapial", generates areas which do not allow the wall to breathe, as the original materials did. Moreover, we must bear in mind that cement is a more rigid material than the "tapiales", which may aggravate the deterioration of the parts in contact with it, finally producing the separation of the cement from the other materials. The thermic expansion of cement, moreover, can be double that of earth or brick, which in a climate such as that of Granada, with great variations in temperature, gives rise to internal tensions, producing cracks and accelerating the process of decay and ruin of the walls. Cement mortar has a high density and high thermic conductivity which can increase the likelihood of the existence of humidity and condensation. However, not only physical phenomena make it inadvisable to use cement, but also chemical ones. Cement, as it contains soluble salts, provokes deterioration due to crystallisation of these salts if dampness exists.

Due to the above, it can be seen that the use of materials similar to those used in the original construction of the walls, with the same resistance, elasticity and porosity etc., is advisable when undertaking any restoration.

Nevertheless, if indeed the use of cement has been a determining factor in the problems which the walls of Granada suffer as regards conservation, this aspect is by no means the only nor the most important cause of their current state, although it is true that in recent years this particular problem has become more evident.

The existence of rising damp must be regarded as an important factor in the deterioration of materials, also impairing their aesthetic aspect. It would be convenient to channel the course of waste water as well as rainwater away from the walls, which, by eliminating any contact with them, would resolve the problem. The deterioration caused by rainwater, being of low intensity, could also be avoided by way of covering the top of the walls with an impermeable surface.

The concept of restoration and the city walls of Granada. Suggested solutions to an existing problem

The first thing to be done when founding a city was to build its walls, being an urban and defensive concept more than anything else. The repair of city walls has therefore been a constant factor in the history of cities. In his first book, Vitruvio talks of city walls, and says that by considering them, one can understand the city. To the walls, he attributes the possibility of defence, based on the fact that they have numerous deceptive twists and turns.

However, these days, with all the culture of restoration behind us, repair work should not be regarded in isolation from other factors. These relate not only to the restoration of the architecture but also to what has come to be called the "restoration of the environs". On numerous occasions when we have to try to conserve architecture, we are faced with a fundamental question. What does "conservation" mean? León Battista Alberti in Restauro X book, refers to the scars of time and use. His commentary is endowed with an extraordinarily powerful insight. He cites very interesting examples and affirms a surprisingly modern concept: "each piece of architecture is a case in isolation."

In recent years an archaeological concept of great interest has been formulated, which has highlighted many key factors. The so-called "concept of stratigraphy" has emerged which puts forward the argument that in some instances, the walls do not only have one
stratum, but many. The difficulty in establishing these various strata, although important, should be submitted to relevant criteria. The oldest part is not always of most value. Every act of repair or restoration to a part of urban structure is always an alteration. Conservative restoration does not exist.

Two factors related to the environs of the city walls are the new buildings in contact with them and vehicles, which alter the eloquent and suggestive character of this peculiar architecture. Another aspect is the concept of green zones. The solution is not always to plant trees - it is necessary to evaluate what should be done in every case. An interest in flanking the walls with green zones is evident in some instances, created with the best of intentions but whose results are, to say the least, debatable.

It would be interesting to take methodical restorative steps which would take into consideration the aesthetic totality of the walls, the gates and the surrounding areas. It would be advantageous to submit the walls' exteriors to a careful cleaning and restoration which should show up their original texture. These steps, in all cases, should be accompanied by a systematic acquisition of further knowledge and checked with documents originating from archives and historical research, both being indispensable elements in the proper process of comprehension and of historical and critical judgement. This would guarantee a rigorous return to the authenticity of architectural writing, and would avoid the occurrence of restoring buildings to their original state, which may result out of place in the light of current views on restoration of monuments. After these actions, for the most part of conservation, it would be advantageous to set out a formula, which abandoned the absolute respect for the monument and for its transformations over the centuries, and which took shape as an art of our era, recuperating the natural value of the city walls and incorporating them into our current way of life.

Bibliography


- GOMEZ MORENO, M., "Guía de Granada", Imp. de Indalecio Ventura, Granada, 1892.