

The Morphological Lecture of the City through Historic Military Architecture

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Abstract: Military architecture during the viceregal period, in what is now Mexico, was based on a strategy of defense. It was designed by the Spanish crown, constructing systems mainly made of fortifications and walls entrusted to military engineers that used renaissance military treatises as a model. The work shown here is about the historic reading of two Mexican cities that were fortified during the viceregal period. The first one is the port of Veracruz, the walls and the systems built during this time left scars that established the urban development of the city, and that nowadays are perceivable even after the disappearance of the majority of its elements. The second example is the city of Campeche, which holds a category of World Heritage, and that in its fortified systems, partially conserved, show their imprint in the city that has developed from them. Both examples allow us to analyze how the techniques of historical reading, at urban level, allow us to obtain parameters of validation and establish lines of intervention that preserve the urban architectural patrimony. Hence the importance of their teachings and applications in education centers relative to the conservation and patrimonial restorations.

Key words: military architecture, military engineering, viceregal engineering, Mexico, world heritage

1. Introduction

The methodology used to make the morphology analysis in both cities was the same in each case, as a first step we collected the historical dates from ancient resources emphasizing the city configuration, as a second step we made a cartographic and historical analysis using plans related to the past, in order to show the urban design evolution with defined periods according to historical information, as a third step we analyzed exclusively the military component, represented by fortified systems and big walls, analyzing the elements that give us, information about their uses and urban shapes.

The next step is the morphological evolution from urban treaties and former documents, creating with it models, by analyzing evolution under significant facts, in case of lacking historical evidence a hypothesis is made, based on the documents analyzed, with these plans generated from research, we create schemes showing the both cities evolution. Our goal is to find, into nowadays urban design, the vestiges and data, that could give us physical evidences about the hypothesis made during this work, getting with it a urban plan in aerial view, showing different interest zones that let us know the past and present information about urban design to keep going the research in colonial urbanism, architecture and military urban design.

2. The Military Engineer, As A Generator Model

The fortifications building preamble is engineering, military first and then specialized, although man has always made engineering, the renaissance set it as a defined profession. Renaissance represents an

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evolution without preceding in many areas, such as artillery underwent significant changes that had their main impact with innovations in the field of military engineering and design mainly fortifications. Jacob Burckhardt cited by Gonzalez Says *The renaissance, made war to become art* [1].

The study can be added into one of the three action lines, referent to the military architecture derived from European nation problems in sixteenth and seventeenth centuries, being Africa one of them, the Aragón crown as the second one, arriving to southern France and the Italian territories, and the third in Latin America, being important examples all of those cities [2].

The historical moment is very important to engineering development, influenced by the Spain appearance as world power and ideological tendencies from Renaissance, so we can consider that the sixteenth century was a technological revolution, not in technique but how to apply. The analysis framework will be the fortification buildings in military engineering, and this will be immersed in the process as a political satisfying and practical tool. *The Spain of Felipe second used science to serve their political interests, training professionals capable of advancing in their progress to advance their progress* [3].

The so-called Spanish Golden Age of Spain led to a nation seeking to recover their territories to the most important and powerful empire of the sixteenth century, this type of status has a number of situations that development caused by having this situation in Europe and the world. To achieve this consolidation Crown relies on science and therefore in technological applications, including Philip II has in service in the court several operators in different areas, some of them had been working since his father Charles I was emperor. Garcia Tapia and Carrillo Castillo (2002) say:

Using a comparison according to the Renaissance style in vogue at the time, the imperial Spain aspired to embody leadership in this process the role of Rome Pliny, we should not forget that the military and administrative territorial expansion that took out during the sixteenth century the fastest and huge witnessed by history until then, could not have taken place without the support of a parallel scientific and technological development [4].

A visible example can be seen in the new cities, which we are analyzing two of them, the cities creation concept as a colonization scenery with all the intrinsic factors is one of the major tools used. In the same Peninsula underpin the engineering power:

Philip II after the Portugal succession came to Lisbon as a Roman emperor in triumph, accompanied by military engineers, members of his state and war councils, also the engineer Juan Bautista Antonelli was triumphantly received with villages neighbors applause from villages through he traveled during his navigation by the Tajo [3].

The works are commissioned to consolidate control over the communication channels, generating a waterway that stretches across the peninsula, activating mainly the movement of goods but also of troops, providing territorial control. Then observe a dichotomy in the use of engineering, being consolidation and territorial protection in the case of fortress.

The philosophical tendencies generated in the time gave a "scientific" aspect to the court of Charles V, but mainly to his son Philip II court , who concerned about registering the time which he lived and the way things were made, the court circle of specialists in science and technology provided services based on their own applications that gave additional power but framing justification in scientific activities often commissioned and performed by service engineers [...] Power has always controlled science because of its control power grows and is perpetuated. The Spanish monarchy tried to control everything related to the territories under his domain [...] [3].

This differentiation of activities among engineers focused on fortification buildings and military aspects, and engineers non related with it becoming in the future civil engineering, Fortress construction and design, weapons, war tactics, siege machines were a productive area, because war was a recurring activity. This current division between military and civil engineer that was not formerly so clear, can be seen in word origins: Technique from the Greek (techne), becoming "ars" in Latin concept were the word "art" comes from, defined by The Royal Spanish Academy ass a r set of precepts and rules to do something in a correct way, adding that the arts are divided in two, liberal and mechanical, it is also everything made by industry and man ability [5] if you look carefully art and technique have the same origin, being synonymous, Thus we understand that engineers and architects activities are not separated at source, "the architect and engineer functions were not only inseparable, but often their professions used interchangeable terms" [1].

Before talking about other issues we must define briefly the origins of engineers to narrow the diverse nature presented, being two main sources, first, institutions founded for this purpose, created to train specialists and technicians who would perform engineering work, the other derived from the learning and specialization by contacting people who carried out the tasks described, most of the first engineers came from military education also people who came from foreign countries under Spanish domain, The Mathematics Spanish Royal Academy tried to remedy the lack of technicians born on the peninsula, letting people have math education established. Many people went to those curses including writers, artist trying to expand their knowledge.

Spanish royal academy of mathematics was to remedy the lack of technical born on the peninsula that would have established an initial training in mathematics. These chairs not only would people who would like to dedicate to engineering, to be public led many people of different activities will take the chairs , including writers and artists who wanted to incorporate this knowledge into their own [6].

Territorial fortification was important to keep them under control, military architects begin to apply their knowledge about building art, but there must have been present a military always, the architect as the project expert, and the military as the defense expert, over the time both would become one [3] the conquered territorial defense and attack machines and defense are the first major applying area for engineers.

The fortified cities and defense systems are completely mixed up in the military aspect, an important part of this work is derived from the analysis of these components, to discuss how to design and its relation to existing and non-existing physical work, we used some military treaties with certain applying at the time mentioned.

3. The Military Treaties as An Information Source

The importance of treaties is that they are like a graphic record of applied knowledge, there is where we can see the vision that specialists had; treaties are a thematic work that shows graphically and written series of knowledge, based in a regulator character, having as a finality to let anyone following its indications could develop the topics treated in it.

Prints can be considered as a logical manifestation of knowledge generally accumulated over many years, and this practice has gone through the technical-academic strata, which is the level where it is generated, among other things have as objective to regulate an activity, to indicate a how to do vision; through history there have been times when knowledge has been written and recorded in order to leave a testimony about how things are done or a developed knowledge.

In Gold Times a diverse genre of production works were generated, proliferating this type of work over the time to leave a register (Martinez) Treaties of the sixteenth century are also inspired by the most famous ancient treaty X architecture by Vitruvius which inspire Alberti to gets his De re edificatoria, both existing treaties and evidence of use at the time mentioned. For example Vitruvius mentions in his first book, chapters IV (Election healthy parages), V (walls and towers buildings), VI (of the line distribution and status of the buildings walls inside) aspects considered 1500 years after within the design of fortifications [7].

Almost in all of those treaties authors try to fill a gap and provide a product they believe will help the practice of the profession, Fr Laurentius of St. Nicholas, specifies that his treaties brings together everything that is needed for the construction performance.

For our study, treaties have a pragmatic purpose and this helps us to find how technology was applied, analyzing what these works say about military engineering, we'll find some of the technological applications used on the viceroyalty stage. Because of the space for this paper will place one of the analyzes performed, however it is worth to mention that several military treatises of the time were looked for the study:

The Theory and Practice of fortification and defense measures as these times by Christobal de Rojas perfectly exemplifies the preparation that military engineers had, in the Rojas case, his preparation allowed him to write a treatise to use in campaign, aimed the construction of fortifications, which gives it a very important practical character.

The most important aspects of his work have to do with utilitarian issues from design, going through the stroke and building administration work, his treatise begins defining what should be a military engineer, the main knowledge they must operate and own, for Rojas are three main things you need to recognize: first geometry, second arithmetic and third the choice of the site. For the first point, writes:

Three things must concur in the soldier or engineer who wants to deal perfectly the fortification matter. First, to know a lot of math: if possible, the first six books of Euclid, and the eleventh and twelfth because they'll absolve all concerning doubts Later on the second which is the arithmetic writes: ... the second is the arithmetic, used to account for the expenditure to build that will be offered before or after it is made, and for construction to measure distances and proportions.

This aspect is important because it incorporates management aspects work, including planning costs and finally to the third: the third, and the most important for the fortification, is to know recognize recognize the position where fortress or castle must be done. To Cobos Guerra (2004) there is an influence settled into the configuration bastioned systems, and he analyzes from the Escriva treaty to the Rojas, placing it among 1538-1599 the last two thirds of the sixteenth century, however military treaties are present from previous centuries, such as Durero treaty [1] who speaks about military architecture and urbanism, having as a base design, strongholds, elements that define and characterize the military architecture of the Renaissance and later.

These formal elements clearly identified on origin sources are the parameters that establish the current reading remains and traces; they provide a reading guide about development of the city from the military centers.

4. The Two Studied Cities

In México two of the most important coasters cities of the Mexican Golfo because of their commercial character were Veracruz and Campeche, the first one was and still being the most important port of Mexican territory, was an entrance and exit door, for communication and everything toward the then Viceroyalty of New Spain. About Humboldt mentions the Veracruz port importance with an average of 400 to 500 shipping, received in the same period that Acapulco was receiving 10 [8], is also important to say the market managed through Veracruz such as silver, cacao, snuff. Also European products had selling restrictions such as paper, iron, oil and silk [2].

The second port to analyze is Campeche, located on the Yucatan peninsula territory, that administratively worked as a captaincy most of the Viceroyalty stage, through this port were extracted "palo de tinte" tree, Woods, and some other products as cacao and snuff.

Both were fortified to protect them from the pirates attacks, González T. [8] emphasizes on the natural character from this binomial, in this way the Crown was protecting the city, the port and the merchandise that temporarily was stored waiting to be moved.

4.1 Veracruz

The Veracruz foundation responds to a strategy well defined by Hernan Cortés to emancipate from Cuba's guardianship government, by founding a town council with agents and a cabildo, Cortés sets as authority and general captain, begins sending letters to the monarch, avoiding the intermediary Velázquez the Cuba governor. The Veracruz port election changed many times, obeys to the best location ever that would become the principal port of Latin America. So then here is the question ¿How related was the need for defense with the election of the current location for the Villa Rica de la Veracruz. The place has been modified, but is still possible to read some aspects from historical cartography, the location directly across from the island of San Juan de Ulua and sandbar known as "La Gallega", the location of a river that flows into the now called the Zamora park. The island to build a fortress that covered the city (in fact the fortress built into this island has the same name) and the sandbar known as "La Gallega" that limits the approach zones to the fortress and the city, finally in this analysis the river gives to the settlement the freshwater required.

Veracruz has less pirates attacks tan other ports, just two registered one on 1568 and the other on 1683 [9] being the second perpetrated by Lorence de Graff "Lorencillo", leading big devastation and bad memories for residents, causing the Wall building because of the port importance. The engineers work was constant. Laorden [10] registered the next engineers list from Veracruz: Bautista Antonelli on 1590, Pedro Ochoa de Legazmion, both intervened in the urban design. On 1615 Adrian Boot, Marco Lucio on 1656, Francisco Pozuelo de Espinoza on 1683 and Jaime Frank on 1689, on 1722 the engineer Blondeux Luis Diez Navarro, on 1754 the engineer Carlos Lujan, on 1764 Pedro Ponce, on 1800 Constanzó y Mascaró. If we look at the dates, the engineers who worked for the Wall building after the Lorencillo attack were Franck y Pozuelo de Espinosa [10].

The Veracruz Wall had not big dimensions, Montoya says: 3.2 m height and 2.5 km of perimeter [9] but it had various bulwarks and doors, to have a reference about their location and characteristics, we can see Casimiro Castro's lithography that shows a city configuration with the port, is important to mention the transcendental character from the sea door, that worked as a custom supervising all entries, even though this door doesn't exist anymore we can find one similar in the Tlacotalpan river in a smaller scale, evidently influenced by the principal port.

The only survivor from all the analyzed system is the San Juan de Ulúa fortress and Santiago's bulwark,, although the Wall began to be demolished since XIX century, significant changes have emerged from the port adaptations, done by Porfirio Díaz on the XX century to increase the capacity of the port, considered the most important of the country.

With this system, aerial photos, and the cadastre, the lines marking the ancient coast before Díaz modifications were located; it was also possible to locate the lines to the missing fortress. Is important to mention that this research compared documental and graphic information with the port current state, to locate the urban scars and with this the original urban shape, outlining a morphological study related to the fortress system.

4.2 Campeche

Campeche precedents, begin with the Granada agreements given to Montejo, asking by these documents two fortresses constructions:

First of all I give you license and faculty to conquer and colonize Yucatan and Cozumel islands, being obliged to carry, from this, our kingdoms or out of them, people not forbidden, to go to those islands to colonize with two villages or more, as you wish-where you consider the most convenient place. And to take at least a hundred men to do two fortresses. Fortresses were built one in the Campeche's port and the other inland, from the second mentioned there are only remnants an interior Wall, the city disappeared almost totally by the XX century, depriving the city of a unique inland architecture fortress example. The fortresses built in the XVI century in the Campeche's coast is the most complete fortified system core of the New Spain, it is true that the majority of fortifications are isolated we can't ignore that Campeche is the best and well conserved from México and one of the most complete in America, that's why it has been declared World Heritage.

Montejo executed Carlos V orders and established a Little fortress in Campeche like a Little tower fortress, the original neighborhood is conserved as San Francisco neighborhood and it's occupied by náhuatl people coming from the mexican center to support building and colonization, mayas people chose Santa Ana neighborhood, and mulattoes who helped with shipbuilding stayed in San Román located in the southern area, in the center of the city with a checkerboard stroke design and the main square next to the sea, San Francisco city is placed.

The order registered the next military engineers working in the port: Marco Lucio in 1670, in 1680 Martin de la Torre, Jaime Franck in 1700, in 1704 Juan de Ciscara, Luis Bouchard in 1705, 1766 Juan de Dios González, in 1779 A. Crame, in 1778 Rafael Llobet and in 1802 Juan José León, Laorden (2008, p. 98), just as many ports this one had several pirate attacks since XVI century, Montoya registers twelve [9] the most important Works related to the remains of the Wall visible nowadays were started on 1686 and were finished eighteen years later with a 6.00 m height and 2.5 km perimeter, eight bulwarks and two fortresses plus reinforcements and a tinderbox [9], through this maps analyze and historical planes we can register the changes on the defense system in different stages, with this we can demonstrate the city construction and shape [11]. The system remain complete until XIX century in which stared it's paused demolition, supposedly because of health reasons surviving by the XX century just a half the canvas door earth.

Campeche's population is identified with the pirate topic, that's why the wall and bulwarks reconstruction has been a recurring measure, also the World Heritage declaration has led economy sources to the city, contributing to the easy urban reading.

This perceptible configuration is part of their heritage values, for example the current Street follows the ancient fortress line, that's why the Street is a site vestige from the original construction, just one of remaining doors is original (the earth one) the other from the sea side is a reconstruction, that can be seen on it is material, also we can noticed that the San Francisco and the San Roman doors have disappeard with it corresponding Wall canvas, another important element is the extramural neighborhood trace conserved, allowing the special Reading, a good example would be the main square started, once the fortress demolition began, turning into the main square until now, and it's also declared as world heritage.

5. Conclusions

Urban changes generated from historical-social side, transform the ancient cores, that can be well understood just through the architecture and military urbanism knowledge, in this way city signals acquires meaning.

Since the XIX century to the XX century, city changes Works have been constant, trying to incorporate a new dynamic, adding to this transcendental projects as the Veracruz port extension during Porfirio Díaz government and the Campeche jetty extension, in the XX century we can find changes to the trace and urban configuration from both ports, transformations still happening, The San Juán de Ulua island joined to the Veracruz port, disappearing his bulwark defensive character to turn into an artificial peninsula, allowing to close the port, The San Juan the Ulua Castle one for the biggest fortresses in Mexico stays in the middle of the new peninsula. Over the time the building port in this area, has settled the construction among cranes and containers risking to lose the heritage in a several state.

Urban analysis through it is origin configurations, military and urban treaties, urban theories, leaves lines of research that can be followed to generate knowledge related to the urban configuration and modifying factors, city reading and shape study, established conservation parameters, these are specific to each urban center according to the origin and evolution, while these are not common, the study methodology can be, by justifying studies about site evolution, conservation arises from the site knowledge, it's diffusion and the actor identification according to the place.

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