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Comparative Analysis on Grid Pattern Layout of Spanish American Colonial Cities

Odicea ANGELO*, Maria LOPEZ* and Atsushi DEGUCHI**

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This paper focuses on the layout pattern of Spanish American colonial cities through the comparative analysis of La Paz of Bolivia and Granada of Nicaragua, which share similarities in the layout pattern and the main elements of city planning addressed by Royal Charter and Law of the Indies. On the basis of field survey and analysis on prescribed regulations, this paper points out the findings of the most representative ordinances. Both cities share similar features as the location of the most important religious and political buildings and infrastructures; Royal Street as a main road of colonial city and patio house as the most representative example of colonial housing. Even though, both cities are based on the same design regulation, they show different forms of blocks layout where no one of them exactly followed the established dimensions. This paper also points out the difference and the present condition of the Historic Urban Centre.

Keywords: Law of the Indies, Grid pattern, Plaza, Patio house, Historic Urban Centre
インディーズ法, グリッドパタン, 広場, 中庭住宅, 歴史的中心地区

1. INTRODUCTION

Before the Spanish colonization, the American continent was occupied by several Indian settlements located mainly in the regions of Mesoamerica and Andes Valleys in the south. There was a vast variety of cultures with different level of development in the field of city planning and architecture that came from simple huts up to complex building structures built by civilizations such as Aztecas, Mayas and Incas.

The arrival of Christopher Columbus to the Caribbean costs in 1492 marked great change in Latin American history that lasts up to date. The colonization of the New World was done in a very short and surprising time, and it is established that over three hundred cities were founded by 1630 (Bernal, 1993).

Consequently, during over three centuries, the grid pattern layout attributed to Royal Chart of 1523 and Law of the Indies of 1573 was implemented in most of Latin American cities until they got their independence from the Spanish Crown at the beginning of nineteenth century. Nowadays most cities still sustain the grid pattern, however a major plaza surrounded by

the most important religious and political buildings is not always the main element of modernized urban structure.

The Royal Chart included what was the most frequent design guideline used in city planning: at the time of making the plan of the place, it had to be divided by its squares, passages and plots following the grid pattern, beginning from the major plaza and designing the streets out from it to the gates and principal roadways, leaving enough open space to continue in the same manner, in the case the population should have greatly increased (Martinez, 2003).

Law of the Indies, which was the compilation of all regulations given over three centuries, regardless of addressing administrative organization it brought up regulations for building new towns, layout and subdivision, however not all the contents of the law were implemented in all colonized settlements due to different conditions such as rapid growth, topography or existing Indian settlements.

Most of Latin American cities keep the original Spanish city as Historic Urban Centre (HUC), these centres that used to be attractive and the main pole of city development, today show different conditions. The economic and social situation that most of these countries went through during the 1970s made the HUC become immigration attracting poles deriving in high density low-income housing, disordered mixed land use,

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low urban fabric in contrast with high rise buildings, congested traffic and large number of street vendors.

Since most of HUC are considered as historical heritage by UNESCO there is the need of improvement in order to make them attractive and liveliness places, therefore the motivation of this research is based on that concept. With the research findings we intent to get better understand in the way of how the law was implemented and how the present condition of HUC is.

By making use of Law of the Indies as one regulation for all colonized settlements, we selected two cities as case studies, La Paz and Granada, both with different physical characteristics. La Paz, located at high altitude with cold weather surrounded by mountains and steep areas, and Granada, located at sea level, on flat place and with hot climate. Through this research we aim to identify the implementation of the law in two different contexts.

2. OBJECTIVES

Historic Urban Centres (HUC) represent one of the most important heritages of Latin American countries recognized by UNESCO World Heritage Convention. However present condition and improvement management differ among them.

This study shows the comparative analysis between two Latin American cities, La Paz and Granada. Although they are located in different regions each one with its own topographic, climatic and social characteristics, the findings evidence many similar features in the way of how Law of the Indies was implemented and how city pattern layout was adapted for each context.

Both cities were consolidated on the basis of a major plaza surrounded by the most important religious and administrative buildings. Even though dimensions and block shapes differ from each other, grid pattern was adopted in fulfillment to Law of the Indies, but the aspects such as topography and former Indian settlements readjusted its implementation.

Following the theories of evaluation, revitalization, preservation and integration of historic contexts to other planning concerns (Norms of Quito, 1967) this study pursues to analyze the main principles of the Spanish American colonial cities by focusing on the case study of La Paz and Granada, it aims the following objectives:

1. To compare the most important city planning ordinances prescribed by Law of the Indies with either their implementation or not in both case studies.
2. To find out similarities and disparities of both cities that followed same city design regulations but located in

different places with different physical characteristics.

3. RESEARCH METHOD

Based on the previous researches on Latin American city planning as well as field survey this study reviews the data as background to understand city planning in other Spanish-colonized settlements in order to link similarities and identify disparities. Afterward, it reviews Law of the Indies concerning to city planning ordinances in order to study the basis of its design guidelines and evaluate the most imperative ordinances for city layout and buildings edification.

Following, the case studies on two cities, La Paz and Granada, this study approaches to show similarities on implementation of city planning regulations. Then a comparative analysis of ordinance implementation focuses on the major plaza as a generator part of the city layout as well as the connecting streets of the centre with the rest of the city.

4. CITY PLANNING PRINCIPLES FOR SPANISH AMERICAN COLONIES

Cities in Latin America were founded following definite policies established by the Spanish Crown where Royal Charter and Law of the Indies were legal dispositions to set up new colonized settlements.

4.1 *Royal Charter of 1523*

The charter established legal and administrative statements about land discoveries, possession and authorities constitutions. It makes references about how to select a proper site for new settlements focusing mainly on territory conditions such as winds, water sources and orientation. However this is not a precise document due to the lack of specific design guidelines as well as site plans (Bernal, 1993).

4.2 *Law of the Indies of 1573*

Different laws, charters, instructions or ordinances were sent to the colony concerned. All of them are dispositions of new settlements that established rules for site selection, layout on an orderly square grid of streets and blocks, their orientation, the major plaza form surrounded by public buildings and housing of the wealthy, the segregation of noxious activities, the disposition of common land, the distribution of city lots and farm, and even the uniform style of buildings (Lynch, 1992).

Moreover, after many years of city foundations, there was such a large number of legal dispositions that the Indies Council was unable to cope with. These documents showed some contradictions, had solutions for specific sites or dispositions that were never applied. In 1550, facing this problem, the viceroy Luis de Velazco ordered to compile all

these dispositions created in the process that took over hundred years to organize and finally published in 1680 (CEHOPU, 1989). Therefore, it could be said that the recompilation of Law of the Indies, which included 148 ordinances, are town planning regulations as a result of experiences as well as some idealized and abstract theories that never came into practice, such as the dimension of the major plaza that seemed to be oversized.

4.3 Historic background of grid pattern layout

All city planning regulations prescribed by Law of the Indies were based on the grid pattern layout which seemed to be as means of exerting control from great distances and creating recognizable places. Nevertheless it is important to point out that the grid pattern was not an original model of design made and imported by Spain to the New World.

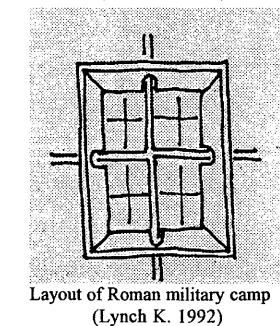
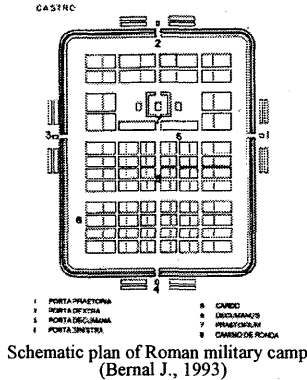


Fig. 1 Grid pattern layout background examples

There were different sources for the Spaniards to elaborate all dispositions focusing on a formal planimetric unit with orthogonal prototype. For instance, looking at many medieval European cities where orthogonal plans were implemented, the model of ancient Roman cities can be mentioned as examples which were characterized by concepts of regularity, rationality and space control throughout geometric layouts. It is an urban shape predetermined by the rectangular grid as a part of complex engineering and administrative system originated in the military camps called "Castrum" and "Decumano" with the crossing ways set in a rectangular square (Lynch, 1992) (Fig. 1).

This organization and its straight layout allowed the suitable disposition of human and material sources to consider this orthogonal pattern as a symbol of Catholicism in the Christian kingdoms of Iberian Peninsula in contrast to maze arrangement of Hispanic-Muslim cities (CEHOPU, 1989).

Another theory points out that at the beginning of XV century the friar Francisco Eximenis published "Dotze del Crestia" that is a religious city with square-shaped blocks where the location of the most important city buildings is established, yet these regulations were not accepted in Europe due to different political and social circumstances. However, as

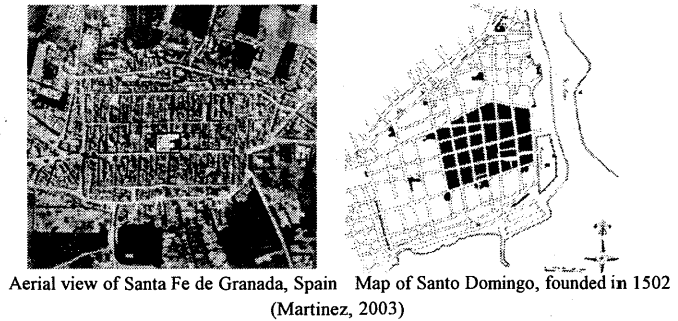


Fig. 2 Former medieval city as layout example

soon as the New World was discovered, the conquerors tried to take these ideas back to be implemented (CEHOPU, 1989).

During the Christian reconquest of the Iberian Peninsula up to 1490, there were series of more or less autonomous city-states which served to occupy and organize territory regained from the Moors. These cities which obtained a systematic approach to town planning could also be possible precedents for Law of the Indies (CEHOPU, 1989). For example, the foundation of Santa Fe near Granada, Spain in 1492, could possibly work out as a precedent for delineating the regular plan of Santo Domingo in 1502 which was based on the grid pattern (Martinez, 2003) (Fig. 2).

The Islamic City Model had also influence on the grid pattern layout, with a sense and origins opposite to Roman cities, irregular and flexible layout but orderly urban shape. In the Spanish American colonial cities, the most remarkable element influenced by this model was the concept of block units or districts adding in the process of urban growth in a morphological and compact shape as well as the internal design of "Patio House" typology to be explained in the following chapter.

In conclusion, it can be understood that there is not a unique source of origin of the grid pattern layout dictated by Law of the Indies. Therefore the Spanish American colonial cities are the result of previous experiences to colonization as well as the result of chronologic events during process of cities foundations that took place in Latin America.

5. LATIN AMERICAN CITIES LAYOUT

5.1 Expansion of colonization

The Spanish colonization process of what it is now the American continent started from the Antilles, which worked out as platform to access to three main points: Panama, Mexico and mainland (Colombia and Venezuela) and as a connection from these three main points to the rest of the continent. Besides these expanding nucleus, there were direct focuses from Spain towards Rio de la Plata (Argentina, Paraguay and Uruguay).

Before the XVII century many of the principal

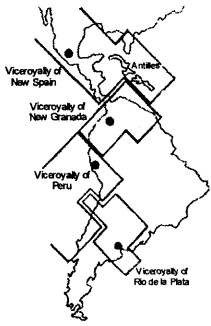


Fig. 3. Location of viceroys in America

administrative centers of Latin America were founded, and there was a large network of settlements going from California to Patagonia with the main aim of urbanizing. These administrative centers called viceroys were the major territorial and politic administrative system in order to control all colonized settlements through an articulated system of spatial domain (Fig. 3).

5.2 Grid pattern as common layout

Many cities were founded on existing Indian settlements but usually with city planning regulations brought up by the conquerors. The implementation of these regulations with functional as well as physical features has derived on the existence of many similar cities along the Americas (Fig. 4).

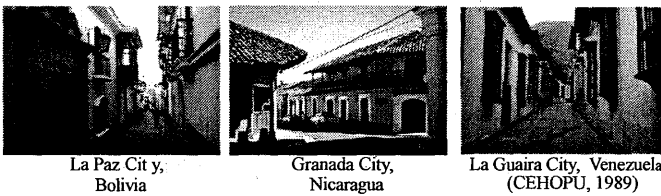
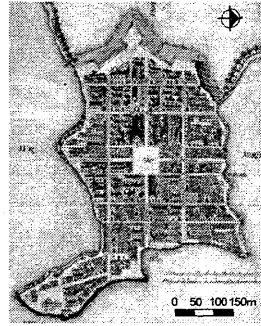


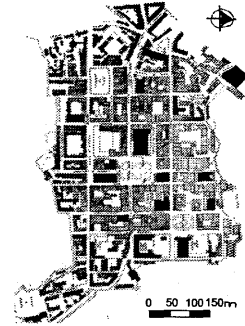
Fig. 4 Similar view of Latin American cities

Most of the Latin American colonial cities were structured with a major plaza as basic and generating element of the city which is organized around it. The plaza was considered as the city centre, not only due to its geometry but also as a vital and symbolic space, it was the meeting place of social activities. Altogether with streets both elements made up the public space. The blocks that surrounded the major plaza were occupied by the most important religious and government buildings such as: Royal Palace, *cabildo* (City Hall) and cathedral. And the near by located were destined to the conquerors and most important officers (Law of the Indies).

As mentioned before, there were specific regulations to the concerned settlements to be used as parameters to design site plans. For example, in the case of Panama City the Audience of Panama remitted in 1673 to the Spanish Crown the plan of how the city could look like following the given ordinances. Figure 5 shows two site plans, the first is the one sent to Spain by XVII century and the second is the HUC (1973), comparing both it can be pointed out that there are not many differences from the original design idea. The city has the proposed major plaza located in the core surrounded by similar block distribution and disperse settlements in the periphery; it almost has a perfect orthogonal road system however blocks



Map of Panama City, 1673
CEHOPU, 1989



Map of Panama City, 1973
CEHOPU, 1989

Fig. 5 Comparison of maps on two different periods

subdivision seems to be not proportional to each other. Although the dimensions of blocks and plots differ from the original plan, the main idea based on the concept of the grid pattern has been implemented (CEHOPU, 1989).

In the case of Mexico City, the shaped square was implemented in most of its blocks. In the existing Indian ceremonial center the most important religious and political buildings were located originating a large space for the major plaza. And in the case of Argentina, the location of colonized settlements were based on the territorial structure defined by the main trading routes. The tendency was to arrange the layout according to grid pattern where the plaza was again the core of the settlement (Conti, 2003).

From the first foundations, La Isabela (1493), Santo Domingo (1502) and La Havana (1511), which had semi-regular patterns, the grid pattern layout continued a process of improvement in order to obtain equal block dimensions.

6. CASE STUDIES

6.1 The settings

Two different cities were selected as case studies, La Paz and Granada. Both located in different regions of the American continent with different geographic, topographic, climatic, and social characteristics (Fig. 6 and 7). But both were based on Law of the Indies as only one regulation tool, so we aim to compare the implementation of its ordinances in two completely different contexts trying to link similarities and to identify differences.

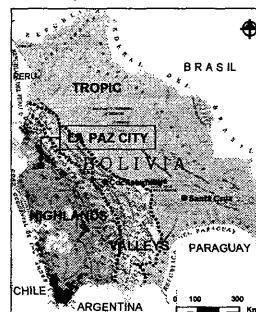


Fig. 6 Map of Bolivia

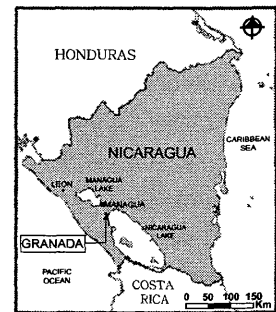


Fig. 7 Map of Nicaragua

6.2 La Paz City

La Paz, the capital city of Bolivia is located at 3,600 meters above sea level with population of 789,585 inhabitants and area of 191.5 Km² (Census, 2001). Spaniards settled down on an existing Indian settlement, nevertheless due to natural conditions they had to move into the valley of Chuquiago to found the city of Our Lady of Peace on October of 1548 which is now called La Paz. The conquer was supported by the fact of La Paz' strategic location which was going to work as control and link post between other colonized settlements and goods transportation as well as its rich gold-bearing places.

It is only in 1550 when the design of the Spanish city starts; this process of urban consolidation took about the first half of the century divided into four phases as follows:

1. **Indian settlements:** Spaniards established temporarily on an existing Indian settlement, which was triangular in shaped delimited by two rivers. Two plazas were designed; one with irregular form for the Spaniards and another rectangular shaped for the Indians. Both faced the city hall as authority symbol and the Catholic Church as religious one.

2. **Spanish city:** On the left side of Choqueyapu River the Spanish city started to be designed, not only to be finally established but also to apply the separation of Spanish population from Indians. Its strategically decided location, surrounded by rivers and north mountain, protected it from invasion and enabled water-supplement to it. In addition, its higher location enabled to put the Indian settlements under a visual control.

3. **Indian parish:** Spanish settlements had to be separated from Indian's, which had to be river shore located. The first three parishes had a religious building and a plaza surrounded by housings. These settlements had not specific urban design as the Spanish city did, whose streets were irregular, and there was strong influence from Indian's culture in the urban structure.

4. **Creation of reductions:** The difference between reductions¹⁾ and Indian parish is that for the first one, the Spanish model had a regular plaza as central element and grid pattern as layout.

6.3 Granada City

Granada, the third major city of Nicaragua, is located in the southwestern part of the country. It occupies an extension of 9,07 km² with population of 75,564 inhabitants (INEC, 1995).

The city was founded by Spaniards on December of 1524 on the shore of Nicaragua Lake in the Pacific region. It was the main center of commerce due to the strategically connection of the lake with the Caribbean Sea. According to the Administra-

tive Division of the Spanish American Colonial cities, Granada was under the control of New Spain Viceroyalty and military governed by the Captaincy of Guatemala.

Granada was founded next to two Indian settlements, "Xalteva" and "Cuiscoma", on east-west directions according to topographical conditions. The Spanish city was established between two streams with the major plaza as urban nucleus surrounded by the most important buildings, twelve streets aligned north-south and east-west as the main and unique access on direction to Nicaragua Lake. The new center established by Spaniards as a political center, and the main Indian settlement of "Xalteva" was connected by a principal axis called "Royal Street".

7. COMPARATIVE ANALYSIS ON IMPLEMENTATION OF REGULATIONS

Making use of some of the important ordinances prescribed by Law of the Indies that contain the main elements to set up a Spanish-American colonial city layout such as site selection, starting point of the city as well as structure, major plaza characteristics, number of streets concerning to major plaza, street type and street connection between major plaza and city expansion, and finally buildings location, we elaborate a comparative analysis between their implementation on the structure of both cities; La Paz and Granada.

7.1 Site selection

The ordinance 111 of Law of the Indies points out the characteristics of site selection, which had to be in an elevated location with means of fortification and fertile soil, plenty of land for farming, fresh water as well as native population. Ease access and exit open to the north wind and, in the case of coast side, consideration should be paid to the quality of the harbor and that the sea does not lie to the south or west and not near lagoons or marshes in which poisonous animals and polluted air and water breed as possible as it can be.

The selection of La Paz location, first on a cold and dry place of Andes plateau and finally moved to the Chuquiago valley was determined not only due to its beautiful landscape and gold-bearing places but also since it could work out as commercial post between Potosi (richest silver and gold mining) and the commercial network with other colonized settlements. The Spanish city was located higher than the Indian settlements and surrounded by two rivers to be water supplied and protected from any kind of Indian rebellion. The existing Indian settlements influenced in the city layout since the grid pattern had to be adjusted to the Indians disperse settlements, where the grid pattern and straight streets became irregular.

The site selection of Granada corresponded to the location of Nicaragua Lake and its connection with the Caribbean Sea by the navigable San Juan River only 18kms awys from the Pacific Ocean, which originates a natural canal between Atlantic and Pacific Oceans. These geographic characteristics drew the Spaniards' attention as a economic superiority of commercial routing, as well as the fertile land suitable for agriculture, water supply to be easy to obtain and the presence of two Indian settlements. With these important conditions, Granada was founded with sustaining those principles of settlement.

In both cities, the creation of connecting commercial routes to settle down in suitable agricultural land and existing Indian settlements had common characteristics for choosing these locations as feasible foundational sites.

7.2 City structure

La Paz as well as Granada were founded before the publication of Law of the Indies in 1680 and even before its proclamation in 1573. In addition, event hough both of them were founded on different ages they share several similarities in their structure.

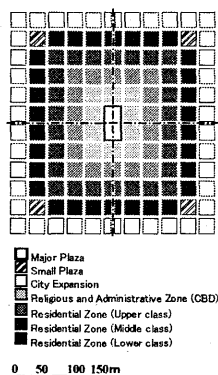


Fig. 8 Spanish- American colonial city structure

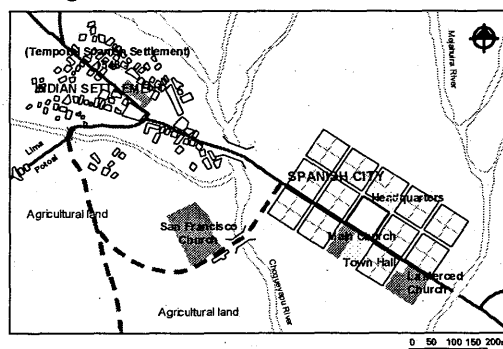
in which horses are used and for any other celebrations that should be held (Law of the Indies) (Fig. 8).

La Paz was designed based on social-class where the Indians were not allowed to enter. The surrounding area of the major plaza was considered as the Central Business District (CBD) where the most important religious, government and commercial buildings were located. In addition to the CBD buildings the housings of the upper class and government officers were located. Behind this area, the middle class had right to live and the low income groups were located in the periphery of the city. The urban growth was expected to be proportional based on the grid pattern.

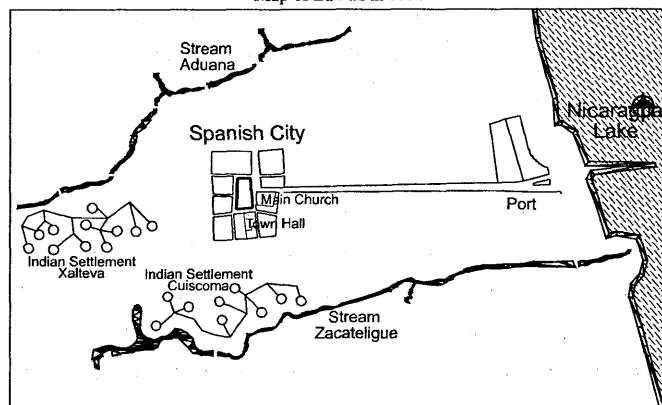
Evidently, the starting point of La Paz city was the square-shaped major plaza surrounded by the most important buildings. Equal dimensioned 14 blocks based on the plaza size

were traced to be occupied by the conquerors. The new settlement morphology, where more of its residents were soldiers, seemed to be a military camp like the Roman *Cardo* surrounded by Indian settlements.

Afterward, more new blocks were added, and the symmetric and square form was modified due to the topographical considerations owing to La Paz different topographic levels and a number of rivers that run through. However, even there was a established Spanish city there was an existing Indian settlement that influenced in its layout. The conquerors could not implement the regulations on the existing settlement and tried to adapt the regulations to what was existed, the result was irregular shaped blocks and variety of dimensions as seen in Figure 9.



Map of La Paz in 1550



Map of Granada in 1524

Fig. 9 Plan of the Spanish cities.

In the case study of Granada, the Spanish city structure is similar to La Paz. The city plan was divided into blocks, streets and irregular lots which differs from the La Paz case, beginning from the major plaza which represents the foundational point. Also with the most important buildings as well as upper class housings followed by middle class were separated from Indian settlements, avoiding contact insofar as possible. The Spanish city kept its original site foundation, which differs from the case of La Paz. It had to show the presence of Spaniards in such a way that when Indians saw their imposing architectural buildings, they admired and respected the presence.

The port and fortress were two particular differences in the structure of the city due to its geographical location in the shore of Nicaragua Lake. The two fortress were built after the foundation, one inside the city and the other in an island at 312km of distance in order to protect the city from pirate attacks. Nevertheless, the city expansion was interrupted by several pirate attacks, and rebuilt again and again based on the same grid pattern layout and the same foundation place as well. Figure 9 shows the design of both cities at the foundation time.

7.3 Major plaza

Law of the Indies pointed out that the size of the major plaza should be proportioned to the number of inhabitants, taking into consideration the intention in Indian towns is that they would increase, and thus the plaza should be decided upon taking into consideration future population growth. It should be not less than two hundred feet wide and three hundred feet long, nor larger than eight hundred feet long and five hundred and thirty three feet wide. A good proportion was six hundred feet long and four hundred wide according to ordinance 113 of Law of the Indies (Fig. 10).

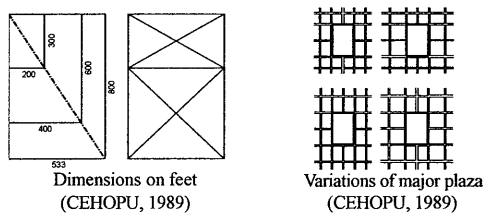


Fig. 10 Proportional dimensions of major plaza

In the case of La Paz, the adapted form was a square of 84 by 84 meters. Compared with the established smallest plaza dimensions 60 by 91 meters the plaza has a difference of 24 meters in its width and 7 meters in its length. The dimension might have been given according to the population number that in 1550 was only about 2,000 inhabitants. However, it is important to mention that just after the arrival of conquerors, a former plaza was established on the Indian settlement, and that irregular shaped plaza did not follow at all the prescribed regulations since it had been the result of adaptation on the existing Indian settlement which was completely irregular and spread.

If we overlay the original layout dimensions of both cities on the implemented plans, it can be seen that in La Paz, the area occupied by the major plaza and surrounding blocks do not have much difference (5ha to 6ha), but the distribution and dimension of blocks are different as well as in Granada which area is larger than La Paz' and the original (5ha to 9ha) (Fig. 11). The major plaza shape and dimensions do not follow

the regulation with the prototype plaza. However, it could be the result of other previous experiences and implementation of a more simple solution as leaving a single block void like the case of many other cities. The major plaza of Granada almost followed the minimal dimensions prescribed in Law of the Indies, but with an irregular rectangle shape surrounded also by irregular blocks. The four corners of the major plaza were oriented according to the main four winds as prescribed.

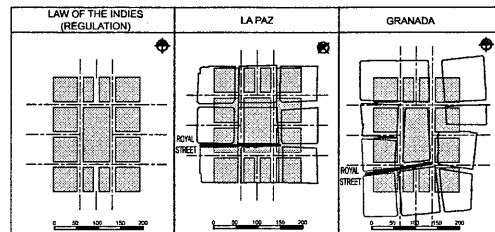


Fig. 11 Overlaying of original layout and implemented plans

An important element to consider is the fact that depending on the context, Law of the Indies was implemented and adjusted in different ways where as a result of practice, the new plaza variations were designed.

An important element that La Paz and Granada share is the Royal Street, which was the most important city road, and in the present it still fulfills pedestrian function.

Figure 12 shows the comparison between the major plaza in both cities and it is identified that the dimensions and shape were not implemented but in the case of Granada, it occupies almost the same area and the same perimeter of the established plaza, but La Paz' is larger in extension. In both cases, the most important buildings surrounded the major plaza, nevertheless in case of La Paz, there was not a specific building for the vicerealty.

	Major Plaza Characteristics				Main Building Location			Main Road
	Shape	Width (m)	Length (m)	Area (m ²)	Cathedral	City Hall	Viceroy Palace	
Law of the Indies		90.00	122.00	7320.00	o	o	o	
La Paz		84.00	84.00	7056.00	o	o	x	
Granada		a. 51.30	b. 117.65	5825.35	o	o	o	
		c. 63.00	d. 122.80					

Fig. 12 Comparison on elements of major plaza characteristics

Neither in La Paz nor in Granada, the regulations of Law of the Indies concerning to the major plaza were strictly implemented, however on the basis of what was established new types of plazas were implemented according to each settlement' characteristics.

7.4 Distribution of streets from major plaza

Law of the Indies pointed out that from the plaza should begin the four principal streets, one from the middle of each side, and two streets from each corner of the plaza; the four

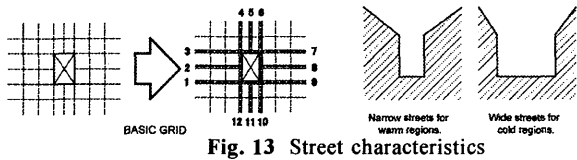


Fig. 13 Street characteristics

corners of the plaza shall face the four principal winds (East, West, North and South), because in this manner, the streets running from the plaza would not be exposed to winds flow, which would cause much inconvenience (Fig. 13).

In La Paz, there were two streets from each corner of the major plaza, each of them about 10 meters wide. The law established that in places with cold weather the streets should be wide and in hot places they should be narrow, in La Paz all of them are narrow contrary to what was established. It was planned to make the streets continuous along the urban growth, but the natural constraints made the streets to be oriented by the topography conditions.

On the other hand, the streets of Granada are oriented according to the principal winds, but instead of twelve streets, it has only nine. Two of them from the middle of east and west sides and the remaining seven from the corners of the plaza. Like La Paz' streets, Granada's streets also lack the portals prescribed in the ordinances, and most of the streets are wide, contrary to regulations for hot places like in Nicaragua.

7.5 Block subdivision

Law of the Indies established that the land and boundaries assigned to settlements should be distributed by the following manner:

1. Building lots (solares).
2. Adequate public grounds (ejidos).
3. Pasture (dehesas) to provide plentiful grazing for the stock that inhabitants must have.
4. Portion for the support of the municipal government (propios).

The remaining land and boundaries should be divided into four parts: one of these portions, which they should select, should be for the person obligated to found the town. The other three they should divide into equal out lots (suertes) for the settlers (Law of the Indies, Ordinance 90)

Blocks were going to be dimensioned on proportion to the major plaza considering the population growth. In La Paz, the blocks were eighty four meters by each side where the total area was 7,056 m²; every block divided into four equal squares called solares (1,764 m² area; 42.00 meters by 42.00 meters). Contrary to Granada where the block shape was irregular and all of them had different dimensions and consequently different size. However, in both cases, the lots had large area allowing the construction of big houses.(Fig. 14).

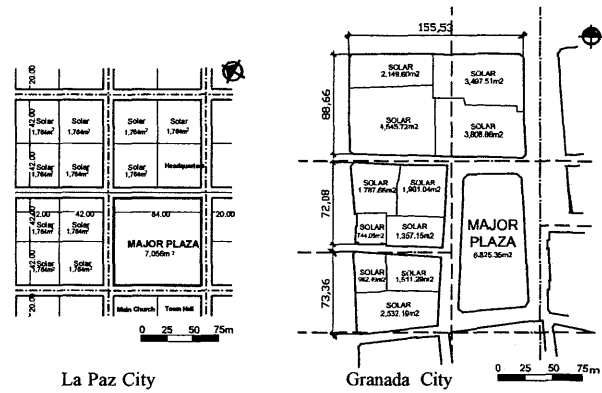


Fig. 14 Block subdivision at foundation time

At the time of La Paz foundation, there were about 24 lots equally distributed out of 27. However, not later, the solares were subdivided into smaller plots due to increase of population and land speculation. In the case of Granada, the exact quantity of lots during its foundation is not precise but the existing data allows to get a reference number. They were not equally distributed and subdivided as the solares in La Paz.

By making use of existing maps we intend to illustrate the lot transformation from the foundation time to the present in all blocks that surround the major plaza. Although in both cases the maps do not follow a perfect sequence, the series of maps could work out to get understanding about the transformation trend (Fig 15 and 16).

In La Paz, considering that by the foundation time (1548) there were only 27 lots, 99% of the lots located in the major plaza surrounding blocks were subdivided by 1976; only the cathedral lot remains up to date. 59% were not modified, 12% unified and 29% subdivided by 1995. In 2004, where 69 is the number of lots, the trend of subdivision decreased to 20%, but the phenomenon of unification which is 25%, which is almost twice than ten years ago, is increasing because it could be attributed to the construction of high-rise buildings or commercial centers using larger plots.

In Granada, by the foundation time (1524), there were approximately 32 lots located in the surrounding blocks of the major plaza, and just 17% of them were subdivided by 1893. Almost fifty years later, by 1940, 75% were subdivided and 25% not modified. Finally, 1.5% were unified, 16.5% not modified and 82% subdivided by 2004. The reference data indicates that the phenomenon of land subdivision is significant comparing with unified and not modified lots. This parameter shows that the lot area has large dimensions from foundation time, and gradually has being subdivided due to urbanization and land speculation. This is also common characteristic in both cases of study but with the difference that recently in La Paz had experienced the unified land phenomenon.

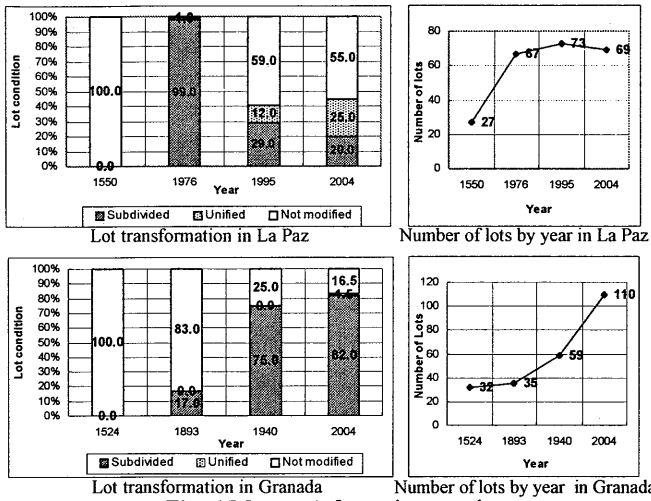


Fig. 15 Lot transformation trend

In order to obtain the findings we used the former map (foundation time) considering the number of lots in both cities, and we compared lot by lot with the following maps obtained from each city's city hall (La Paz 1548, 1976, 1995, 2004; Granada 1524, 1893, 1940, 2004) as a result we could construct the lot transformation plan in the surrounding blocks of the major plaza.

7.6 Building location

Law of the Indies pointed out that building sites should be distributed to the settlers by drawing lots. These should continue from those adjoining the main square, and those left over should remain to grant to new settlers or whatever would be their will. Furthermore, it must be always followed by the ground plan for the new town (Ordinance 127).

There were assigned specific lots or complete blocks for the most important buildings, especially for the ones that ruled religious and political power. Through their imposing

architecture, those buildings had to be identified from any location, and had to show the Indian population the power and control of the Spain Crown over them.

Besides the location of the church, it had to be place for the council and cabildo house (City Hall) surrounding the major plaza. Only for the upper class and government officers' lots facing to the major plaza could be used as housings. Taking as example the surrounding blocks of the major plaza from both cities La Paz and Granada, as well as comparing the foundation date with the present, it can be seen that still these two powers, religious and political, are located in the same place and spread out to some other lots.

In the case of La Paz, although institution is the second larger land use, 22%, commerce has occupied most of the area with 36.4%, disappearing completely the residential lots. Education covers the 8.5%, but this is a result of land use change. The former colonial houses became museums or education centers. Religion is located in the same lot as well as the main political nation power, Presidential Palace. New land uses appear in this area, recreation and health with 2 and 1% as seen in figure 18 compared with the Granada case where housing represents the highest percentage of land use with 38% followed by roads with 21% which are wider comparing with La Paz and ordinances. Other important land uses are commerce with 14% that recently have been increasing due to tourist industry and institution with 12% occupying still the surrounding lots of the major plaza as it was during foundation time. Then 7% of the major plaza as open space followed by mixed use (housing and commerce), and finally religion by the Cathedral.

It is seen the changing and increasing uses, but it can be pointed out that the main administrative, political and religious functions remains up to date.

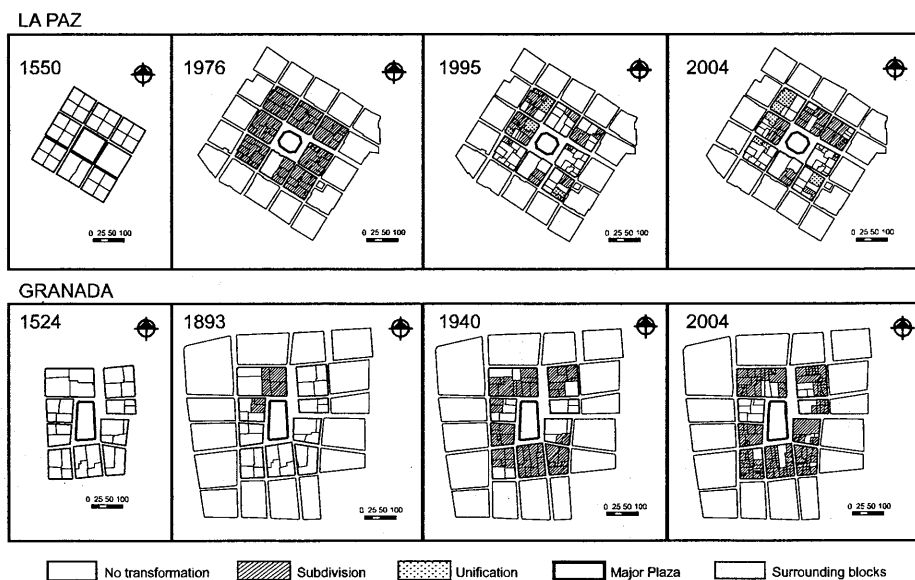


Fig. 16 Graphic comparison of lot transformation in surrounding blocks of major plaza

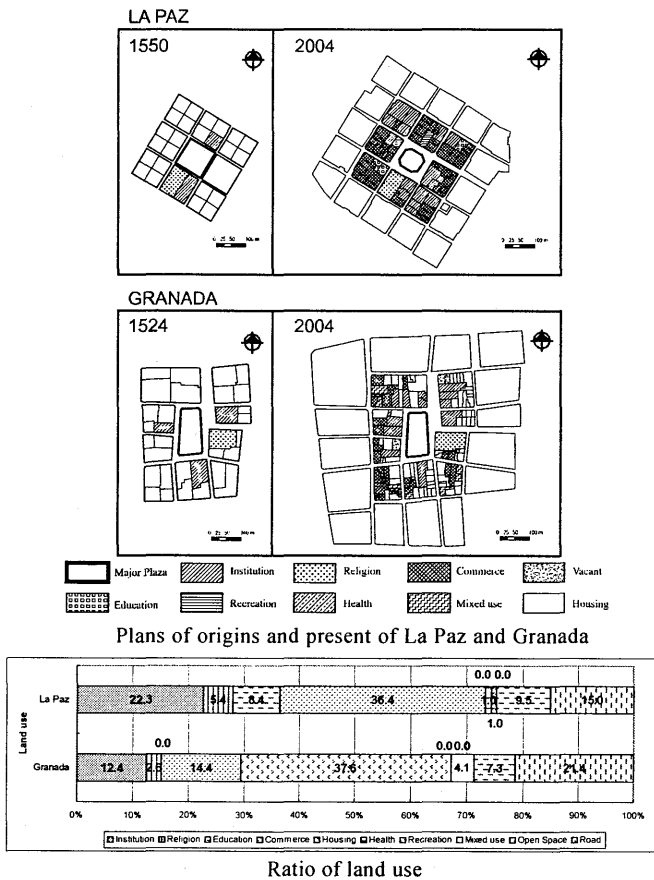


Fig. 17 Existing land use of surrounding blocks of major plaza

In order to construct the land use map of both cities, we made use of the origins plans and the current plans as well as survey.

Architecture for housing had also had a particular character that remains up to now. Patio house typology is the main example of colonial housing. The original shape and large area of the lots allowed to construct big housing, this lot area was extremely big (most of the times a quarter of an entire

block). However it could not be maintained any longer after some years of foundation due to rapid urbanization and land speculation.

The large size characterized the colonial housing by being very spacious with many rooms, and destined to specific activities. The design, as well as the idea of city form, was also according to a nucleus point, the garden. The function of the garden was to enjoy the natural light and ventilation of the rest of the housing throughout surrounding corridors not only as circulation elements to communicate all rooms but also as social space (Fig. 18).

In La Paz as well in Granada, the patio house typology still remain, and some of them keep their original form and distribution and others have been modified by the addition or subtraction of rooms. The façade has a continuous height of construction of two or three stories in La Paz and mostly one in Granada. Therefore, it could be established that there was a low rise urban fabric.

Churches were the most important buildings and built in quantity as a sign of Catholicism. The main church was usually built in front of the major plaza, but in some other cases, they were built specially on the former Indian temples site in order to evangelize. Through the particular architecture Spaniards also wanted to show the Indians the control they had over them. In both cities, the location type still prevails, but in the case of La Paz, the buildings were reconstructed after the end of colony in the same location assigned by the conquerors (Fig. 19).

In addition to building types, Granada has fortress typology that does not exist in La Paz. This was a special characteristic for coast cities in order to protect and defend the territory from pirate attacks and foreign invasions.

Housing examples	La Paz			Granada		
	Floor Plan	Facade	Interior	Floor Plan	Facade	Interior
PATIO HOUSE One Patio						
PATIO HOUSE Two Patios						
PATIO HOUSE Three Patios						

Fig. 18 Patio House typology

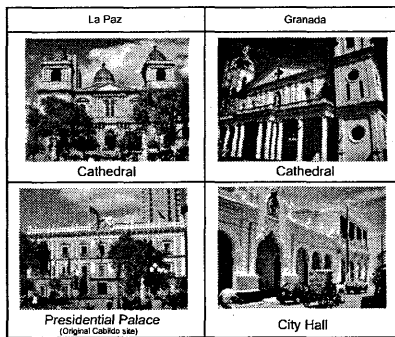


Fig. 19 Existing important buildings facing major plaza

8. PRESENT CONDITION OF HUC

Most of the former Spanish American cities after the independence from Spain became important development poles in Latin American countries that today represent their Historic Urban Centres (HUC) and show a different physiognomy. The layout was on the basis of the CBD, which concentrated the political power and religious buildings around the major plaza.

To date, in the case of La Paz, the main difference between the former model and the existing is that the city has an enlarged version, where low income groups and upper class neighborhoods are located in opposite directions completely outside from the HUC. The most important political, religious, and in addition, commercial activities are still concentrated in the CBD. Following the natural canyon made by Choqueyapu River, a main axis has become the most important boulevard that somehow divides the HUC into two areas; east and west. Along the main axis that runs the HUC length, many high-rise buildings have been built where some old colonial houses have been thrown down. The upper class had moved to the city southern at lower altitude in better climatic conditions and better facility equipped neighborhoods. The remaining Spanish colonial houses shelter middle and low-middle class residents, and patio house typology is gradually becoming slums since most of them are rented to many tenants who live in poor residential condition (Fig. 20).

The HUC covers 112.76 hectares with 16,489 residents (INE, 2001); its boundary was defined by local government in 1976 on the basis of historic and architectural concepts in order to safeguard historical heritage which was the result of Spanish conquer and relationship with existing Indian settlements.

The HUC of Granada continues being an important nucleus of administrative, economic, politic and religious functions. The city, after being destroyed several times, was always rebuilt trying to keep the same grid pattern layout up to date. Its expansion was limited by natural borders like Nicaragua Lake on the east as well as the natural preservation area of Mombacho volcano.

Nowadays the city has become an important touristic

place to visit because of its well maintained Spanish colonial urban shape as well as its architectures, in which the patio houses are the most representative that in many cases keep their original structure and construction materials.

The upper class still lives in HUC, and is the owner of most of traditional patio houses, due to this well maintenance the prices have considerably increased in recent years. In the present, tourist industry represents one of the main economic activities that strongly influences the existing land use. The commercial sector has been expanded and many colonial houses have become hotels.

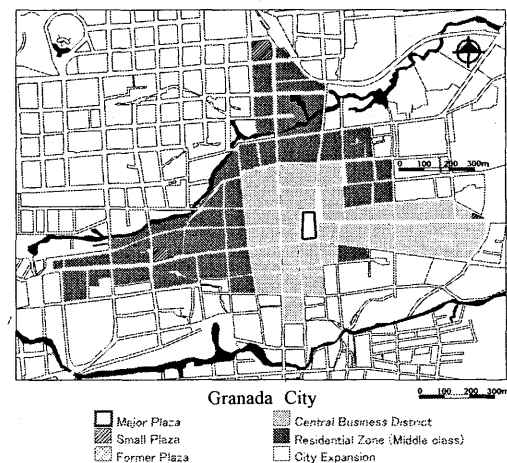
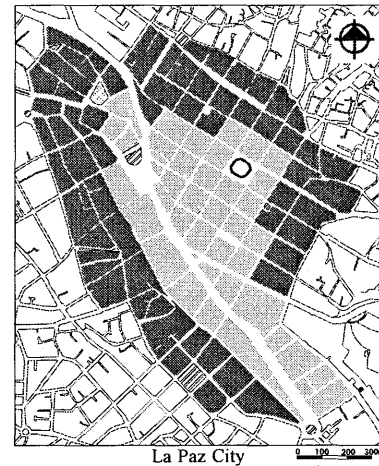


Fig. 20 Existing structure of Historic Urban Center (HUC)

The boundary of Granada' HUC was defined because of the existence of four main heritage edifications; to the north by the old Train Station, to the south by the Market Place, to the east by Guadalupe Church and to the west by the fortress. And the rest is on the basis of existence of traditional and historical buildings as well as former Indian settlements. Today, the HUC covers 93.46 hectares with 6, 189 residents (INEC, 1995)(Tab. 1).

Nowadays, although most of the blocks keep their original shapes in both cities, there have been many modifications inside them.

The three prevalent land uses in La Paz are commercial

Tab. 1 Historic Urban Center characteristics (HUC)

LA PAZ			GRANADA		
Area (ha)	Population	Density (inh/ha)	Area (ha)	Population	Density (inh/ha)
112.76	16489	146.2	93.46	6189	66.22

50%, residential 12% and institutional 8%; in the case of Granada, are residential 50.3% followed by commercial 10.2% and mixed use (residential and commerce) with 5%. (Fig. 21). Road also has a high percentage in the HUC of Granada, and it represents 30% of land uses due to wide dimensions and some labyrinth streets created after the foundation period for military strategies (Land use map; survey).

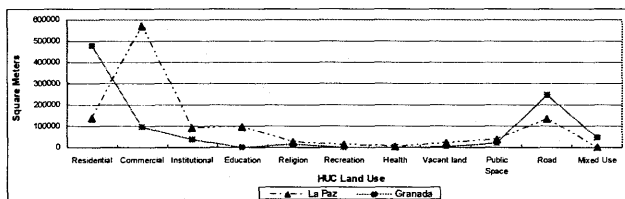


Fig. 21 Existing land use in HUC of both case studies

Finally, one of the elements that characterized the Spanish American colonial cities was the large size of lots. To date, as a result of transformations in the HUC of La Paz, there are 1830 lots, and 1489 lots in Granada. In both cities, 200m² to 500m² area is the predominant lot size. In La Paz it is equal to 54.6% and in Granada 48%, the lots larger than 1,500 m² in both cities cover less than 10%. To get better understanding, Figure 22 shows the comparison of lot area between both cities (City map; survey).

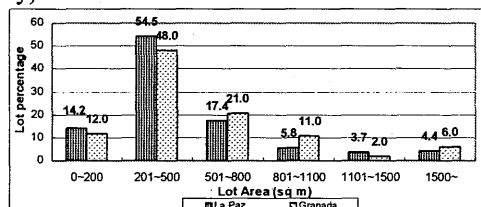


Fig. 22 Comparison of lot area in HUC

9. CONCLUSIONS

Law of the Indies, even published long after the foundation of La Paz and Granada, has been a determinant regulation to implement the grid pattern as city layout. However the orthogonal planimetric model was not a new pattern designed by Spain brought up to the New World, and it has been the result of experiences previous to conquer.

Most of the important ordinances such as location of major plaza, surrounding blocks or building location, were useful keys for city design in both case studies, nevertheless the regulations were not fully implemented due to different aspects.

Comparison of grid pattern in such diverse cities as La Paz and Granada reveals some similarities and contrasts.

Stressing at the similar aspects, the location of major plaza is the main common element as starting point of the city. However, the established dimensions were not followed, and it seems to be, due to prototype over sizing, the real context of each city and the existing Indian settlements which were characterized by disorder and irregularity.

Dimensions of blocks, lots and streets vary greatly in Granada, but in La Paz, they were more rational shaped and dimensioned. Location of most important buildings still prevails up to now, with the difference that in La Paz, the original buildings had to be reconstructed.

The patio house is a common typology, which in both cities the housings with one, two or three patios can be still found. In Granada, some of them became hotels due to touristic attraction the area has, and in La Paz most of them became slums due the large number of tenants who live in poor residential condition. This factor influences greatly to the present condition of HUC, whereas in Granada it is still maintained with the original idea of Spanish city, in La Paz there is a trend towards transformation due to the construction of high-rise buildings.

To conclude, it can be pointed out that even though the regulations prescribed by Law of the Indies were mostly not feasible to be implemented due to its oversized dimensions or abstract and idealized theories, they worked out as guidelines for the design of what the American continent is now by making use of grid pattern layout by creating a sense of place and sense of future expansion.

NOTES

- 1) Places that were managed by the missionaries independently

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