Typological Transformations in a Same Shape

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Abstract. The following article, is a critic essay about social housing currently produced in Brazil, specifically the one produced by Grupo SP. Part of a 25 offices list that AU-Architecture magazine considered the new generation of architects in the country; Grupo SP is the only with significant number of social interest projects.

The article aims to identify patterns used in the design of social housing through the study of two projects developed to competitions: “House in Luanda: Patio and Pavilion” (2010) and “Green Housing in Brasília: the situation of Vila Planalto” (2011). Therefore, all the projects go through a process of two and three-dimensional redraw in AutoCad and Sketchup. Redrawing allows the recognition of generic shapes, and identification of pattern generators of form, geometries and proportions, plan-altimetric grids and structural modulations.

It’s concluded that the two works analysed start from the same base-cell, which shows to be current in the Grupo SP developed work. Yet the arrange of base-cell is conditioned by the edictals of competitions, results in distinct compositions and relations between public and private – Patio house (Luanda) sets up a semi-private expansion space for the house. While neighbourhood house (Brasilia) breaks the boundary between public and private.

Keywords. Typology, Social Housing, base-cell.

Introduction - Social Housing, a typology?

The analysis of social interest projects developed by SP Group, from São Paulo, Brazil - House in Luanda (2010) and Green Housing in Brasilia (2011) - draws attention to their similarities. We may highlight the similarity of formal arrangement of both basic housing units, as well as the organization and space distribution inside them, suggesting the adoption of the same typological scheme in both projects.

The main goal of the following analysis is analyse, comparatively, how the same typology addresses different project problems imposed by different contexts. The project House in Luanda is a response to an international contest launched by the Lisbon Architecture Trienial 2010/2011. The bases of the competition establish the design of a low cost patio-house, located on a flat area near the city limits of Luanda1. The Green Housing in Brasilia, specifically in Vila Planalto, responds to a Latin American contest - Holcim Awards - which seeks to encourage the development of sustainable and innovative constructions that are focused on the future2. Both projects were never built.

Although the two contests present specific demands and distinct assumptions, SP Group chooses to approach a common subject: social housing. In these cases, they propose houses that are defined by the spatial articulation, in one or two floors, of a standard module.

1. THE UNIVERSAL CELL “H” AND ITS EXTENSIONS

In the proposals developed for Luanda and Brasilia, one can notice that in two rectangular prisms we have the dry areas. Social and intimate sectors are apart, each one in a prism. Another two smaller sized geometrical rectangular prisms, shelter the wet areas: the kitchen and the bathroom (figure 1).

Figure 1. Identification of pure volumes that compose both projects. Font: LEITE, 2015
In this regard, it is important to notice that other Social Housing projects, developed by SP Group, are also organized through the articulation of a pattern module or an 'universal cell', as in the Cônego Vicente M. Marinho Group of apartments (2004) and the "CAIXA" project (2004), both in São Paulo. In these cases, the cells multiply vertically, shaping buildings in height and are defined by the articulation of a prism with free plan and another secondary prism, with wet areas (figure 2).

![Figure 2](image-url) (a) “CAIXA” basic cell (2004); (b) Cônego Vicente M. Marinho group of apartments (2004) basic cell. LEITE 2015

By decomposing the form, one can observe that the formal strategy is a juxtaposition of volumes. At each dry volume it is juxtaposed a smallest volume which contains the wet area (figure 3a). The two volumes, now composed, stay parallel, face to face and the space between them sets a semi-private patio, pointed in yellow in figure 3c. A connecting element between the two resulting volumes is added to the composition (figure 3b) setting the final form shaped 'H' (figure 3c).

![Figure 3](image-url) (a) Juxtaposition of volumes; (b) Connecting element in red; (c) final shape. LEITE, 2015.

This element creates the access areas and connects the block headed to the intimate areas (red) and the block headed to social and service areas (orange and yellow) (figure 4).

These areas are strictly related to the central patio, to where all the rooms open themselves through glazed panels. It works like a natural extension of all ambiances.
The interior of the house is characterised by non-partitioning of the space; the only existing walls are the exterior ones. Both blocks have a free plan and a circulation developed in their periphery (figure 5).

However, the spaces that require privacy, like bedrooms, are suggested by the furniture. In the resulting layout, one can observe that each cell has a maximum capacity of five people, considering two people by each double bed, and one by each single bed.

In order to make a spatial analysis, one must have in consideration that these are small sized houses (Luanda 26.25 m² and Brasília 33.75m² covered area) - in which small subtleties set big changes. In Luanda the double bedroom is configured as a suite, with a private bathroom. However, as it is not expected the construction of another bathroom in the cell, the peripheral circulation that connects the dorms to the bathroom compromises the privacy of that room (figure 6 a). On the other hand, in Brasilia, the bathroom is slightly displaced, and its access door aligns with the wardrobe, shaping a neutral entry, ensuring more privacy to the room (figure 6 b). In both projects exists a more confined double room - it is not necessary to cross it to access to another room. In other hand, the centralized position of the “single room” compromises his privacy.

In the social block, the position of the kitchen also changes. In Luanda, the kitchen relates to an undetermined space, that merges with the circulation (figure 6 a). In Brasilia, the location of the kitchen articulates best with the dining area, setting two areas: kitchen/dining and living (figure 6 b).

We observe that the cells address the basic demands of living: sleep, sanitize and do the basic needs; prepare meals; eat and live. To account for the needs of future expansions, as an extra room or space work, the designs incorporate different strategies.
In Luanda, it is predicted the addition of a block juxtaposed transversely on the previous blocks, with staircase aggregation in the central courtyard, which allows the vertical transition. The housing unit is now organized on two levels (figure 7 a).

![Figure 7. Third moment (a) House in Luanda (2010); (b) Green Housing in Brasilia (2011). LEITE, 2015.](image)

In Brasilia, we witness a dismembering of “H”. The prisms corresponding to social and intimate sector, no longer need to be parallel front to front, and are now able to slide on the ground. Often, the connecting element between both volumes that existed in the base form “H” disappears (figure 7 b). There is a new smaller block that comes from the reconfiguration of the intimate block (figure 8 a). The position of this new composite element is relatively flexible: parallel or perpendicular to the other blocks (figure 8 b and c).

![Figure 8. Green Housing in Brasilia (2011). LEITE, 2015.](image)
2. ANALYSIS OF THE MODULATION OF THE CELL

The planimetric analysis reveals distinct grids in both projects.

In Luanda, the modulation of 4 x 4 organizes the unit. Two parts are construction, and two are courtyard (figure 9 a). One grid of 2.5 x 2.5 meters designs the form, the location of the humid blocks, the proportion of the patio and the placement of the furniture (figure 9 c). In the third moment another prism is overlaid and it is also contained in this grid. The design of the humid block occupies half module (figure 9 c). Thereby, the project respects in its entirety that modulation.

![Figure 9. Planimetric analysis of House in Luanda (2010). LEITE: 2015.](image)

If in Luanda the composition is guided by a modulation of 4 x 4, in Brasilia, the composition of 8 x 9 is ruled by modules of 1.25 x 1.25 meters (figure 10 a). This grid interferes directly in the volumetric composition, in the position and design of the humid blocks, in the furniture layout and in the definition of the glazed facade design (figure 10 b). It is a symmetric project following two axes. The square A is a mirror of the square D; the square B is a mirror of the square C (figure 10 c).

![Figure 10. Planimetric Analysis of Green Housing in Brasilia (2011). LEITE, 2015.](image)
In altimetry, the house in Luanda preserves the grid of 2.5 x 2.55 meters. The grid is three-dimensional (figure 11).

![Figure 11. Altimetric analysis of House in Luanda (2010). LEITE, 2015.](image)

In Green Housing in Brasilia it is possible to see 1.25 meters as the three-dimensional rule, but only in the humid blocks (figure 12). A three-dimensional rule doesn’t exist.

![Figure 12. Altimetric analysis of Green Housing in Brasília (2011). LEITE, 2015.](image)

The modular design indicts the use of prefabrication, as verified in both projects. It is predicted the prefabrication of a precast concrete C (figure 13 a), with the measures 10 x 2.5 x 2.5 m in Luanda and in Brasilia 2.75 x 2.75 x 11 m. On site, the concrete C is juxtaposed (figure 13 b) and in Luanda can be stacked (Figure 13 c).

![Figure 13. (a) Precast concrete C; (b) Juxtaposed structures; (c) House in Luanda (2010). LEITE, 2015.](image)

3. OPENINGS AND SOLAR ORIENTATION

In both projects we observe that the treatment of the facades favours the physical and visual relation of the ambiances with the central courtyard, instead of the solar orientation impositions. This way, in the interface with the patio, the prims are sealed by a single glazed surface, which is opposed by the blind treatment of the other faces. The element of connexion between the two prims has also partial shading functions (figure 14).
One modulation of 1,25 meters rules the squareness of both projects: in Luanda, 8 sliding frames (figure 15 a); and in Brasilia 9 window frames (figure 15 b).

The facades of both projects differ in the location of the hydraulic block. They also differ in the hydraulic blocks. In Luanda, there are two opposed openings in the side walls of each hydraulic block (figure 16 a) and, in Brasilia, there is just one window in the facade facing the patio (figure 16 b).

In Luanda, in the dry blocks, the design of the openings is free from the prefab concrete structure. According to the solar orientation, it is anticipated the opening or closing of the side planes, as well as the roll-back of the glass surfaces from the shape limits, improving its shading (figure 17).

3. CELL-SITE
3.1 Lot

In House in Luanda, the lot isn’t defined, described only as “a flat plot in the outskirts of Luanda” (figure 18 a). It is proposed the settlement of 27 housing units for approximately 135 people. The terrain is
organized from the shape “H” of the base module. The blind facades of this module define the boundaries of the plots (figure 18 b). The units are juxtaposed in the land - two consecutive blind facades - (figure 18 c) or interspersed (figure 18 d).

Figure 18. (a) images of outskirts of Luanda; (b) proposed organization; (c) illustration of modular aggregation, House in Luanda (2010). LEITE, 2015

This proposal is dynamic because, although it does not predict the increase of housing units, it considers the possibility of an increase of the density. The SP Group designs a possibility of evolution of urban network in three phases (figure 19). We estimate that the populational density may increase more than 70% (approximately from 135 to 240 inhabitants).

Figure 19. Possibility of urban network evolution, House in Luanda (2010). LEITE, 2015.

The implementation of sustainable housing in Brasilia was planned in Vila Planalto, between Minas Gerais street, Brasilia street and V1pa 4 and 5 streets (figure 20 a). A zone with a great view to the Paranoá lake. It was proposed the creation of approximately 172 residences, aggregated horizontally in a dynamic way. Although it doesn’t have physical limits, a grid about the plan reveals - as in Luanda - the blind limits of the “H” rule the distribution of the units in the field (figure 20 b).
The form “H” displayed in the project as “base module” is used in only 39 of 172 predicted units (figure 21 a). The dismemberment of the initial shape allows the resident has some liberty defining the final plan of the house.

Three scenarios are considered: the “H” keeps as a base (39 units) (figure 21 a); the blocks slide on the field but the connection element is held (69 units) (figure 21 b); the connecting element disappears (64 units) (figure 21 c).

In the suggestion of organization of the land, there is a very recurrent plot (37 units) that belongs to the last group of situations where the connecting element disappears (figure 22).
4. Relations between units and public space

The way public space is organized is distinct in the two projects, as well as the relations between each unit and the scales of the interventions. If in Luanda the area is approximately 708m$^2$ in a plot with approximately 7440 m$^2$, in Brasília reaches 5805 m$^2$ in a plot with approximately 65000 m$^2$. The parceling of the land in Luanda defines three quarters, which geometry it’s not strict (figure 23 a). The pedestrian and road circulations are usually peripheral, but there is an exception when the pedestrian circulation rips two ample paths between the houses (figure 23 b).

All the plots have immediate contact with a pedestrian path. The contact of the unit with the circulation can be done in three ways: a) the base cell immediately perpendicular to the circulation, allowing the access to the “interior of the quarter” by its centre (figure 24 a); b) a block parallel to the circulation above the base cell (figure 24 b); c) base cell perpendicular to the circulation, retreated on the field (figure 24 c).

Despite that the House in Luanda generates a pattern where it is possible to configure patios, the privacy of these is dependent on the neighbouring lot configuration, as in the following example (figure 25).
In Brasília, the interior of the quarter doesn’t exist. The way the units are displayed in the field allows walking routes throughout of land not built (figure 26). There are no physical barriers between the units.

The primary access roads are the ones that already exist in the city, peripheral to the terrain. From these accesses two complementary systems are defined: collecting and connecting streets between the main roads; and service roads of housing units, which closes in cul-de-sac (figure 26). The parking lot has no specific location, occupying residuals areas. Group SP designs a pedestrian circulation corridor, away from automobile traffic streets, that connects the plots to the public areas, where it is predicted the creation of sports courts.

The contact of the unit with the circulation can be done in many ways, due to the variation of configurations allowed. However, it is known that the unit will always have two fronts, one facing the street traffic and the other focused on pedestrian circulation.

The introduction of green areas increases the settings of possible interfaces of the unit with peripheral circulations. Given the project extents, it is used a zoomed sample to illustrate the various possibilities (figure 27).

Thus, the two cases set different privacy degrees. In Luanda, the units almost close in themselves (figure 28 a), in Brasília, the public and private spaces blends (figure 28 b), compromising the privacy of the units. This collectivization of space can be a design intent, as the SP Group explicit references to Oscar Niemeyer’s work in the definition of sustainable housing project in Brasília.4
FINAL CONSIDERATIONS

At first analysis, the similarities between the two projects are evident. There is also a typological relation between the unit's definition and other projects of SP Group.

It is in urban analysis that the two proposals are most distant and where the different project’s intentions are visible. In Luanda the positioning of the units on the ground creates courtyards that, although open, configure intimate spaces; in Brasilia it is the ideal community that is valued.

However, both proposals respond to modern principles. In ancient cities, with roots before the modernism, the border between public and private is easily identified: the street and the square are the public spaces; the interior of the block is the private space. In the modern urbanism, space is collectivized, for all the people and all uses. It is this collectivization of space that we witnessed in both projects, although with a greater emphasis on the Brasilia project.

One should take into consideration that these two projects start from the same base, but the problems they propose to answer are distinct. Still, we can consider that there is an evolutionary process from Luanda to Brasilia, if we consider that Brasilia breaks the rigidity of the modulation, winning in spatiality in the unit, and in flexibility in urban terms.

References