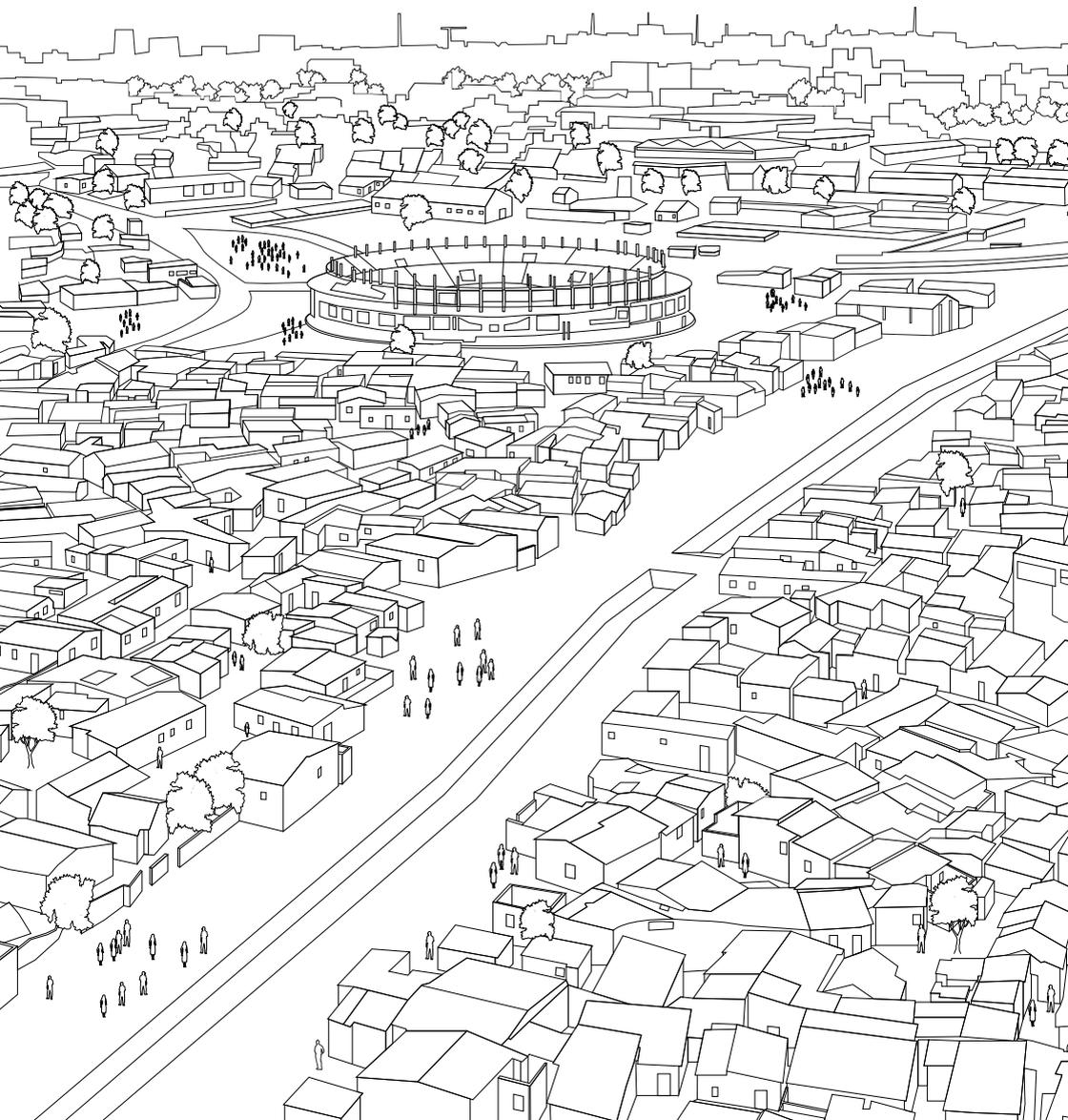


LUANDA, URBAN SUPERIMPOSITION

OPERATION OF PRACTICAL AND PUNCTUAL ARCHITECTURE



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Abstract

The global urbanization today faces a natural population growth concentrated in developing countries, which involves a constant and uncontrolled expansion of slums and informal settlements. Most of the modern global cities of the southern hemisphere are composed, in a high percentage, as poor or living below the poverty line.

This challenge of our century, to date, has often dealt with two main approaches, the first, with the actual lack of interest on the part of various governments and institutions or, secondly, with the drastic intervention of demolition acts to remove communities and neighbourhoods to make way to useful areas for massive real estate speculation.

Such an important issue needs to be addressed, it cannot be ignored, and the demolition and relocation in decentralized areas are rarely the solution. In fact, what the sphere of demolishing destroys are not only the buildings, but also a dense network of personal relationships, memories and thoughts, which, together with what has grown over a long period, create the spirit of the place and the community. The dismantled communities suffer greatly, so much so that it is normal that attempts to regain possession of those areas or adjacent areas, creating many hardships and social tension.

Local policies that take into account the real needs of the majority of the population, and which are inserted in a context of general organization are necessary to create a balanced, sustainable and conscious consolidation of communities, neighbourhoods and connections; it thus seeks to avoid uncontrolled expansion phenomena that create reality unsustainable housing density and the growing of informal invasion of areas unsuitable because of environmental problems.

It is conceivable to interpret this urban situation, with architectural approaches in their strategies to develop topics such as incremental building, such as grafting in breast to spontaneous settlements of ecological infrastructures and public spaces, such as modular housing for families and health and hygiene facilities and finally, as the development of practical construction techniques. The action of the superimposition and the adding these elements creates new connection patterns that are inserted into the not consolidated existing urban built up texture, outlining a slower local development, but steady and gradual.

This type of small scale and interconnected architecture has the ambition to be able to be implemented and contextualized on a large scale, and to make changes that result in a new shared and procedural aesthetic.

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Global analysis, the overall situation

Nowadays, the phenomenon of overpopulation is a major issue and, now more than ever, topical. The UN estimates predict that with the current growth rate of world population will reach 8.5 billion people by 2030, 9.7 billion in 2050 and 11.2 billion in 2100. So, within 85 years the world population will grow by more than 32%.

More than half of the this growing population lives in cities, in urban areas growing that often give rise to the megalopolis of tens of millions of inhabitants, like Tokyo, Shanghai and Mexico City. But this ratio, already impressive, could rise further in favour of the metropolis and to the detriment of rural areas, with more than six billion people will be "citizens" in 2045 according to the latest World urbanization prospects, from United Nations.

The countries where the population will grow the most are the ones still considered "developing". Just consider that in the ranking of the world's countries with the highest birth rate, the first nine positions are occupied by all African countries (Niger, Mali, Uganda, Zambia, Burkina Faso, Burundi, Malawi, Somalia and Angola). In these countries the birth rate (births / 1,000 inhabitants) is between 41 and 46, while the mortality rate is between 10 and 15¹.

This uncontrolled growth generates imbalances that have led to today that more than one billion people live in slums, urban areas with very low levels of hygiene, safety, services, and often without the basic elements that allow subsistence. Every year the population of slums grows by 25 million units². Uncontrolled urbanization is to be analysed taking into account basic factors such as overcrowding, need for basic housing units, the expansion in urban areas not minimally adequate and the lack of basic services such as water and sewage.

This expansion will put administrators of these city-states before several challenges, such as providing universal access to education, health services and energy, transport, and to a healthy and sustainable food from the point of view of production. "The thing you have to be scared about this situation is that governments do not make appropriate plans to cope with the growth, which is already in place," said John Wilmoth, director of the Un Population Division. "The management of urban areas has become one of the major challenges for sustainable development in the 21st century."

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Africa, urban challenge

The overall population of the African continent, which today is 1.022.234.000 inhabitants, according to the UN prevision will amount to 1.562.047.000 in 2030 and will likely exceed two billion (2.191.599.000) within the first fifty years of the century. In 2030, even the regions that today have the lowest rate of urbanization will be a majority with a population living in cities.³ In 2030, Africa's urban population, 748 million, will exceed the total population of Europe, 685 million.⁴ The "village Africa" is becoming the Africa of the cities. A huge boost to the urban growth that leads to the disruption of traditional institutions of settled communities, and more than an incremental change or process, is now a tumultuous shock. Suffice it to say that in the majority of African states, 50-100% of the population lives on less than 1.25 USD a day.⁵ This data reveals the emblem of uncontrolled urbanization, an informal urban fabric composed of slums, where people are forced to survive by using the most varied forms of sustentament, often illegal. In critical situations the urbanized areas are reached and overcome peaks of 75%⁶ of residents living in the slums, from Cairo, passing through Nairobi, Lagos, Dakar, Luanda, arriving in Cape Town, the majority of the population survives in informal settlements.

The African urban challenge is having to cope with the increased natural population failing to provide and replenish the healthy development of the city, but the urban solutions are put to the test. African urban model is indistinct, difficult to read and classificate. The contrast is between the city and the historic western sprawl post-war, with the generic city, the southern city of the world.

It is possible that the city of globalism, the decomposed and decayed cities, the African megacity, is operational nursery alternative solution to northern cities, forms perhaps even to imagine.

"Africa's urbanization should not necessarily be seen as problematic. The challenge of urban sustainability requires attention for the city seen as opportunities based on people." It imposes the thought that the invention of our time is archaeological research, revelation and discovery of existing, what makes sense for the world today, the need for adherence to the deep structures, primitive and archaic, of being on Earth and its Care.



Territorial framing

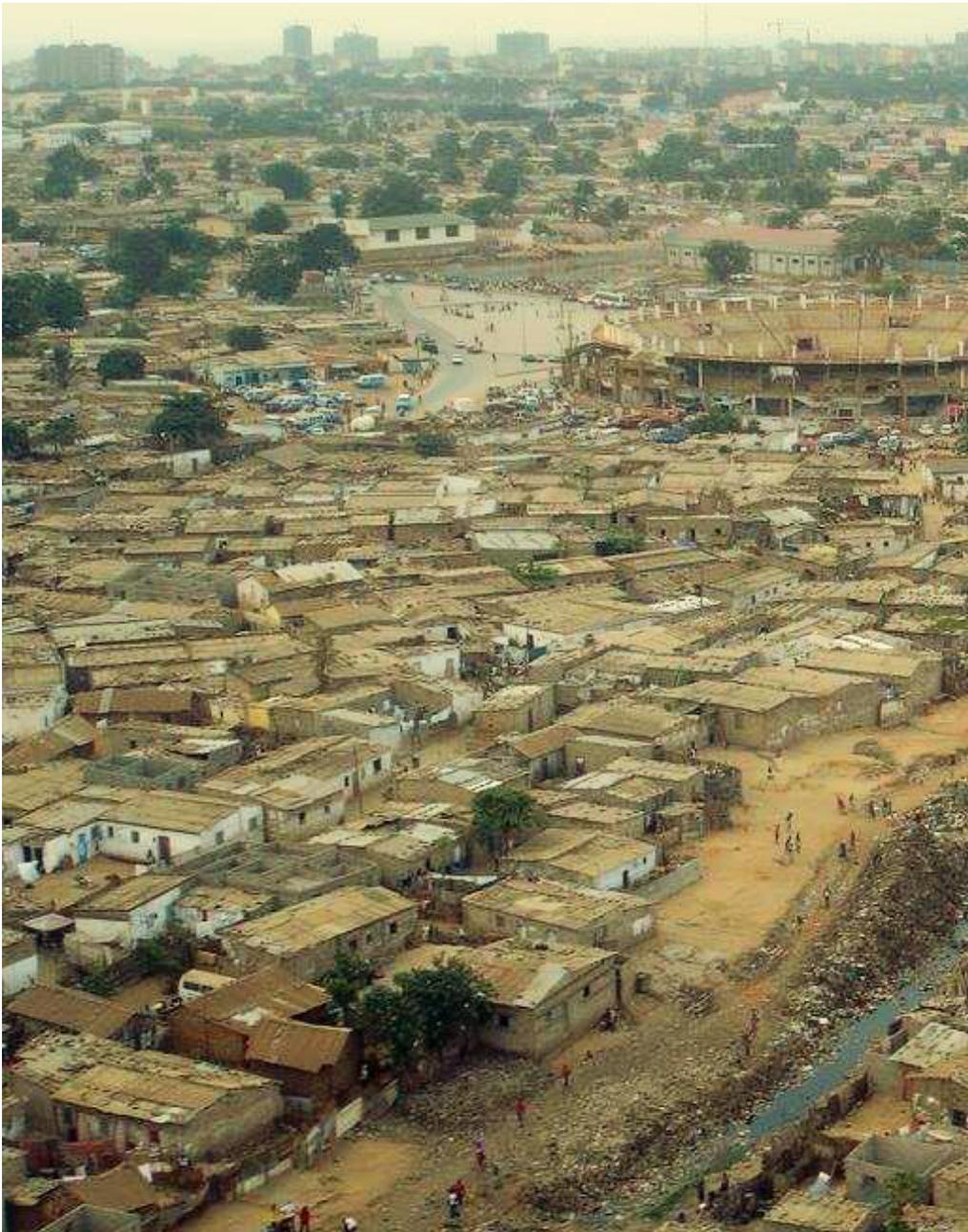
Luanda, formerly named São Paulo da Assunção de Loanda, is the capital and largest city in Angola, and the country's most populous and important city, primary port and major industrial, cultural and urban centre. Located on Angola's coast with the Atlantic Ocean, Luanda is both Angola's chief seaport and its administrative centre. It has a metropolitan population of over 6 million. It is also the capital city of Luanda Province, and the world's third most populous Portuguese-speaking city, behind only São Paulo and Rio de Janeiro, both in Brazil, and the most populous Portuguese-speaking capital city in the world, ahead of Brasília, Maputo and Lisbon.

Historical facts

Portuguese explorer Paulo Dias de Novais founded Luanda on 25 January 1576 as "São Paulo da Assunção de Loanda", with one hundred families of settlers and four hundred soldiers. In 1618, the Portuguese built the fortress called Fortaleza São Pedro da Barra, and they subsequently built two more: Fortaleza de São Miguel (1634) and Forte de São Francisco do Penedo (1765-6). Of these, the Fortaleza de São Miguel is the best preserved.⁷

Luanda was Portugal's bridgehead from 1627. The city served as the centre of slave trade to Brazil from circa 1550 to 1836.⁸ The slave trade was conducted mostly with the Portuguese colony of Brazil; Brazilian ships were the most numerous in the port of Luanda. This slave trade also involved local merchants and warriors who profited from the trade.⁹ During this period, no large scale territorial conquest was intended by the Portuguese; only a few minor settlements were established in the immediate hinterland of Luanda, some on the last stretch of the Kwanza River.

In the 17th century, the Imbangala became the main rivals of the Mbundu in supplying slaves to the Luanda market. In the 1750s, between 5,000 to 10,000 slaves were annually sold.¹⁰ By this time, Angola, a Portuguese colony, was in fact like a colony of Brazil, paradoxically another Portuguese colony. A strong degree of Brazilian influence was noted in Luanda until the Independence of Brazil in 1822. In the 19th century, still under Portuguese rule, Luanda experienced a major economic revolution due, also, to the fact that in 1844, Angola's ports were opened to foreign shipping.





By 1850, Luanda was one of the greatest and most developed Portuguese cities in the vast Portuguese Empire outside Continental Portugal, full of trading companies, exporting palm and peanut oil, wax, copal, timber, ivory, cotton, coffee, and cocoa, among many other products.

In 1889, Governor Brito Capelo opened the gates of an aqueduct which supplied the city with water, a formerly scarce resource, laying the foundation for major growth. Like most of Portuguese Angola, the cosmopolitan¹¹ city of Luanda was not affected by the Portuguese Colonial War (1961–1974); economic growth and development in the entire region reached record highs during this period. In 1972, a report called Luanda the "Paris of Africa." Throughout Portugal's Estado Novo period, Luanda grew from a town of 61,208 with 14.6% of those inhabitants being white in 1940, to a wealthy cosmopolitan major city of 475,328 in 1970 with 124,814 Europeans (26.3%) and around 50,000 mixed race inhabitants.¹² Luanda has also become one of the world's most expensive cities.¹³

By the time of Angolan independence in 1975, Luanda was a modern city. The majority of its population was African, but it was dominated by a strong minority of white Portuguese origin. After the Carnation Revolution in Lisbon on April 25, 1974, with the advent of independence and the start of the Angolan Civil War (1975–2002), most of the white Portuguese Luandans left as refugees,¹⁴ principally for Portugal, with many travelling overland to South Africa. There was an immediate crisis, however, as the local African population lacked the skills and knowledge needed to run the city and maintain its well-developed infrastructure. The large numbers of skilled technicians among the force of Cuban soldiers sent in to support the Popular Movement for the Liberation of Angola (MPLA) government in the Angolan Civil War were able to make a valuable contribution to restoring and maintaining basic services in the city. In the following years, however, slums called *musseques* — which had existed for decades — began to grow out of proportion and stretched several kilometres beyond Luanda's former city limits as a result of the decades-long civil war, and because of the rise of deep social inequalities due to large-scale migration of civil war refugees from other Angolan regions. For decades, Luanda's facilities were not adequately expanded to handle this massive increase in the city's population. After 2002, with the end of the civil war and high economic growth rates fuelled by the wealth provided by the increasing oil and diamond production, major reconstruction started.¹⁵

Urban districts types development

The massive urban population growth and expansion of the city of Luanda in recent decades has been caused by the concatenation of two main factors, firstly the migration of much of the population in the cities, in searching of a job but also to escape from Civil War fought in the countryside. In the other side to increase the phenomenon has accrued a natural population growth with unprecedented rates. These phenomena could be passed on urban design, which can define the city as "no masterplan city", as the population explosion in such a short span of time has prevented a control which is intended urban design. This sprawl has given rise to various types of city neighbourhoods, characterized mostly by informal settlements.

Luanda in 1964

In this period, it shows peri-urban areas relatively limited in parts high around the central urban area, but also the existence of some informal occupations within these, in renovation (*Musseques em transição*) and in the periphery (*Musseque Antigo*). However, overall the city is limited in its area, as are peri-urban areas.

Luanda in 1974

There was a consolidation of the internal urban settlement, but with no expansion, while informal settlements began to increase, even there a few areas where there is a stricter control of

land use. Some, however, have been consolidated, although not entirely official and the remainder is used by the people who re-arrange it.

Luanda in 1986

The consolidation of the urban core stopped, with the conversion to informal occupation of areas in the city centre and informal settlements scattered in the peri-urban areas, including outlying areas (Peripheral slums) in Samba (South), Cacuaco (East) and Viana (Southeast).

Luanda in 2001

The essentially linear growth of peri-urban settlements along the three main roads leading traffic in and out of town (east, south and Southeast) remained due the rapid peripheral occupation.

The settlements before outlined have been incorporated within settlements more or less informal although some nuclei of new settlements (new settlements) are interspersed with those.

“Bairro Populares”

Residential project built by the Government between the years 60 'and 70'. After independence was reused to reallocate the inhabitants of musseque. By the time the initial order of government residences, even with rudimentary services, has gone from getting worse, with informal settlements and shacks that have gradually increased the density of the consolidated pre-existing tissue.

- high level of poverty, with a qualified majority of very poor;
- Low level of supply of services (little house has running water, the cover of the electrical system is irregular and there is no sewage);
- There are some public schools, a public hospital and some recreational areas; there are also many private schools and health centers;
- The houses are mostly colonial-style low cost and built ceramic blocks and have zinc and cement ceilings;
- The housing occupancy density levels are between moderate to high (average of three people per room);
- The time of construction of the houses is between 21 and 30 years
- Most acquired land by purchase, lease or informal
- Most feel safe in their homes;

“Musseque Antigo”

Informal neighbourhood that grows starting from the urban settlements of the black population, expands spontaneously. A type that occupies free zones by increasing urban density, often these are industrial areas, railroad edges or landfills. uses the services of the adjacent neighbourhoods.

- high level of poverty (55%), with some aggregates in the category of needy (37%);
- Inadequate supply or non-existent, public services such as water (No pipes for water), no electric cover or sewage;
- There are some public and private schools, some health centers and recreational areas;
- The houses are mostly built with cement blocks or bricks and has zinc or asbestos cement roof;
- There is a high density of housing occupancy per household;
- Most homes between 1 and 5 years, with a range that goes from less a year over 40 years;
- Most managed the land for informal purchase (land market);
- Most feel safe in their homes;

“Musseque ordenado”

Type often built as an extension of "bairros populares", it is the result of the natural growth of the informal city of the colonial period. Having a high neighbourhood social capital is always organized to resist migratory pressures and to install services for the community. This situation has the potential to be easily transformed, to make a regular municipal district.

- Moderate to high levels of poverty, as 60% of households poor;
- Inadequate supply of services (there are few piped water connections, irregular electric cover and there is no sewage);
- There are some public schools, a public hospital, but no recreation area;
- The houses are mostly built with cement blocks or bricks and has zinc or asbestos cement roof;
- The house occupation density is moderate to high;
- The houses date back between 21 and 30 years, with a range that goes from less than a year more than 40;
- Most acquired the land through formal or informal purchase (land market);
- Most feel safe in their homes;

“Musseques em transição”

Located in close proximity to markets and services such as roads, it is characterized by informal settlements of new construction and buildings occupied illegally on multiple levels. There has been a slow improvement due exclusively to private investment.

- high level of poverty, since there is a very high number of families very poor (60%), and 37% aggregates need in the category of needy;
- The services are inadequate or non-existent (there is no running water, no electric cover, or sewage)
- There is no public schools, no hospitals, or recreational areas, but there are some private schools and health centers in the surrounding areas;
- The houses are mostly built with concrete blocks, they are not plastered and have zinc and cement ceilings;
- Strong density for housing;
- The most frequent residence time is between 1 and 5, with a full period from less than one year up to 30 years;
- Most acquired the land through informal purchase (land market);
- Most feel safe in their homes;

“Musseque periferico”

Neighbourhood that is localized on the edge of the built up city, developed thanks to migrants who move away from the center because of overcrowding and high prices. This implies a shift away from labour and services. The density of the built remains low, with almost temporary type constructions, but which improve gradually over time.

- It offers the highest level of poverty of all types, because the number of deprived people (more than 84%);
- Basic services like electricity, water and sewage systems there aren't (Most people buy water tanks nearby area, because there is no running water);
- There are no schools or public hospitals (there is a private school and probably two health centers);
- The houses are mostly built with cement blocks and have

ceilings zinc or asbestos cement, with a temporary layout; • It has the highest density per aggregate of all types;

- Most homes have between one and five years in length, with a full period from less than one year to 17 years;
- Most acquired land through informal purchase;
- Most feel safe in their homes;

“Novos Assentamentos”

Construction projects subsidized by the government or by international investment, are mainly intended for employees of large national and multinational companies. The structure consists of a series of condominiums on more levels, the residents participate to the formal economy of the city.

- relatively low poverty level, since about 36% of respondents It is part of the high-income group;
- The running water and electricity are provided by Sonangol - the company national oil company - owner of the condominium, but the supply It is inadequate and irregular;
- there are still public schools, or hospitals, or recreational areas in condominium complex, although they were placeholders for this effect, but there are some private schools and private practice;
- The construction material used in the construction of houses is of good quality;
- Little house occupation density (only one to two people per each bedroom);
- Most homes have between one and five years;
- Most have legal documents of ownership, or promised them one when the payment is completed;
- Most feel safe in their homes, thanks to security system.

Study of urban connection elements

The approach to the local problem starts from the reading of the elements of the urban system, the extrapolation of these components is needed to understand their common sense, which brings out their inter-being, placing them as elements both interconnected, both of connection. The roads, which converge in the city center; green areas, spread and scattered scrub in the urban texture; the water system, which is essential for the basic needs of water; and finally the typological distribution settlement, are the key issues identified in the reading, which allow, from the urban scale, moving to the local level to be taken and reinterpreted in the design process.

Local reality, intervention area

Understanding how the interconnection on both scales leads to a clear prediction of the problem at the local level, this then reveals how the four components can be used in district size as driving forces to outline a strategy based on the essentiality of the problem.

The intervention area was selected based on an urban scale analysis of different neighborhoods. according to this can be classified as *Musseque antigo*, an old informal settlement that approaching to more established central neighboring take ingadvantage of its services. A type that expands itself spontaneously occupies free zones by increasing urban density, that often are industrial areas, railroads edges or landfills.

In the specific case it's located near the neighborhood of an old sewer channel and confined with *Bairro Popular*, a consolidated historical district and roads of connection to the city center. This conformation has been interpreted as a potential strength for the intervention of requalification and reorganization of the *musseque*.

Specifically in the district, the movement axes depict uncontrolled development; the population density is caused by an obligatory exploitation of the minimal spaces. These spaces are not developing on more layers, which generates a congestion effect. The density also relates to an absence of green and open areas, creating an overlapping between the social life that takes place on the road and the mobility features characteristic of the road itself. Finally, the presence of a water channel is not adequately and efficiently used as a source relevant for performing basic needs for the life of the *musseque*. The precariousness conditions of the neighborhood designed have to be seen as an element generator and motivator for change, wanted by the locals, but never undertaken due to lack of management and convergence of energies unconsciously within it.

General strategy diagram

The strategy of intervention, after identifying the critical components which make up the local system, it acts by using these as elements of transformation, making a reinterpretation, in a general reorganization of the structure of the system itself, a re-organization, non invasively, poses new dimensions of space, which work together and enhance the musseque, places that are pre-existing are to be preserved.

Diagrammatically the adapted strategy consists of four main layers; the first is composed of the existing built up, modified only with slight interventions of removal of redundant structures; the next level is characterized by the redefinition of the street public space, with expanding and expansion operations. As for grafting, the third layer, fits in the district texture being composed of new local vegetative species, to improve the bioclimatology of new public spaces.

In conclusion, the last level, consists of an architectural and infrastructural intervention, which is composed of various modules which sporadically adorn the existing structures whilst underlining the new open spaces which were previously redefined.

Intervention process operation

The overlapping of the various levels operation leads to the definition of new settlement areas. The reading and subsequent actions that created the new master plan for the neighbourhood should be narrated in detail.

The pre-existing tissue was analysed and structures, buildings and ruins that could be eliminated because of low utility were identified. The demolition operation started from the identification of main roads. Existing redundant structures which bordered the pre-existing roads were selected to be removed; this is because the roads and public spaces in musseques often become congested due to the fact that the various forms of mobility coexist with social life itself, as well as the varying forms of informal trade, which then take place in it. Decongestion occurs once the spaces are opened, therefore, these new public spaces act as vent outlets adjacent to the "road system".

The results of the action of space clearing should not be to undermine the characteristic informal organic nature of the slum and its extensive network of personal relationships, memories and thoughts, which, together with what has grown during a long period, create the spirit of the place and its community.

Masterplan, “Musseques em Evolução”

The overall masterplan comes as a combination of many minimal acts performed, who work together both through existing established connections, and with the new interventionary skywalk connections designed to alleviate mobility problems, ensuring the necessary density, but also reinterpreting it. Thus the elements to be considered are outlined. Elements which require a different concept of the connections as elements of the urban movement but also as the exchanges of neighbourhood sociability.

The project relies on the existing pattern without imposing or contrasting it, but generating a flexible and indefinite structure, that it fills, in time, only the necessary, a system reduced to the minimum to be more efficient.

Masterplan, zoomed ground floor

Down scaling, the zoom presents the character of the new emerging space. The structure typology and the opening from the road revolves around the junction of the new vegetation, which changes the spatial quality making itself complementary to existing structures, the new forms of settlement and the hygienic / sanitary items.

This composition generates small areas of shared social spaces inside the neighbourhood. The aerial connection itself, in some spots, generates spaces which can be added to the structure. Different functions interpreted by the inhabitants, this includes elements such as urban gardens, co-working spaces and playground areas for children.

Plan of the architectural system

The interpenetration of space is filled in the resulting gaps by modular components that interact with each other and with the context, so the inhabitant does not abandon their place of settlement, but extends it, occupying structures and rooms that regenerate space by establishing a relationship of respect with the composition of existing settlements, preserved as vernacular pre-existence. The intervention approach also solves practical problems, such as the use of water and the provision of sanitary facilities connected to the sewage system, to do this a water tank and sanitary modules consist of showers, toilets and sinks are strategically placed in new public spaces.

Sections and Elevations

Detailed sections highlight the concatenation sequence of the project idea. At ground level, the system works as before, but meeting and enlarging the focal points designed to serve the residents of shared public or semi-public spaces, almost non-existent in the previous configuration. At the aerial level, rather light connection catwalks modules on columns and small garden patios are useful to improve the density of the slum, not eliminating it, but re-valuing it in a healthy way. A layer that works in height by adding a spatial plan to the mono-dimensional one. The air passages open up new footpaths that speed offsets from various strategic points, relieving congestion of the road system and overcoming obstacles like the water channel itself and the intricacies of the urban pattern. In addition, it gives vent and light points emerging from the residential single floor construction, which tend to be shady, dark and stuffy.

Architectural design process

The starting point has been to size a living module which can be adapted to the context and the spatial dimensions of the musseque system. The basic unit which results is seen as a decisive element of the immediate need for new houses. It can be altered and adjusted using simple mathematical operations, creating a multitude of installation options. The square shape defined can be lifted up on stilts, doubling the space, it is halved by creating a different function or extruded by expanding its housing capacity.

The proposed modularity is designed to simplify the insertion operations into the existing fabric and at the same time lightweight construction of housing units enables their easy assembly and possible modification of the layout over time.

Architectural models abacus

On the architectural scale, the practical typology of intervention has led to the design of basic and essential facilities to foster new living rooms for the expanding district. The basic module of 5x5 meters is doubled and lifted onto pilotis or stilts to become shared hygienic services. So, the basic structure will develop a series of options that can be selected and adapted and promptly incorporated into new or existing obtained voids. The various types added to or subtracted from the basic design module create a new space inside the musseque pattern, a space that fits due to the functionality of the proposed structures, becoming complementary to the older buildings of the musseque itself.

The layout consists of a living area that can be changed during the day, moving from the conviviality of meals until the distribution useful for rest, leaving to the inhabitants the possibility to design their space as needed.

Details, base module composition

On a technical level, the basic structure consists of a *Eucalyptus camaldulensis* wood beam and columns system; starting from the pile foundations, which guarantee not only the most economical choice but also the most efficient, providing benefits for the single-deck modules, which detached from the soil, avoid problems such as rising damp and mold.

The structural system is made from a lightweight structure consisting of beams and columns that generate the frame that supports a perimeter infill structure nailed to the vertical joists.

In covering the structure ends with corrugated aluminium sheet fixed to the wooden joists.

The pilotis of the raised module are made up of columns that interlock, engaging with those of the upper floor, dividing the structure for an easy assembly.

The entire design approach is based on proposing a number of potential actions, such as taking advantage of the local fragility, define an organizational proposal for the musseque and its inhabitants. So the minimal interventions are generators of design freedom, by the inhabitants themselves. The architectural choice is based on practicality, providing the opportunity to the community to build up together the various new modules inserted in the pre-existent pattern, in line with the historical traditions of African communities. An architecture of participation which, if organized well it allows to build the necessary conformity with the necessities of the inhabitants themselves.

The alleged simplification of this process, bump into the reality, shows how the timing are different from the classical approaches but looking further, has the goal of ensuring a development, yes slow, but steady and gradual. An approach that sees the designer as an organizer and teacher, able to develop the necessary awareness of the social utility of its work and popularizer of skills useful to the community, in which even the inhabitants rediscovers its share of responsibility.

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