

Formalizing the Informal

Morphological Exploration of the Redevelopment of Angola's *Musseques*

By

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A thesis submitted to the Faculty of Graduate and Postdoctoral
Affairs in partial fulfillment of the requirements for the
degree of

Master of Architecture, M.Arch. (Professional)

Carleton University
Ottawa, Ontario

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Fig. 1: *Mussequete* inside the municipality of Cazenga

Abstract

Rapid and unplanned urban growth threatens the sustainable development. In most cases cities lack the necessary infrastructure to absorb new populations and the appropriate policies to assure that the benefits of city life are equitably shared. This is particularly true of Sub-Saharan Africa, as epitomized by Angola's capital, Luanda. A decade removed from civil war, the city is reeling in response to its exponential growth.

Building on the work of local NGOs and academic researchers, this thesis offers strategies and proposals for the redevelopment of Luanda's informal settlements.

In so doing, it attempts to address the physical and social issues of these settlements, considering how best to ensure a sensitive and appropriate reorganization of portions of the city to the benefit of residents. Indeed, handled properly, the redevelopment of the city's informal settlements presents a

significant opportunity to improve the economic circumstances of slum dwellers,
and not just their housing.

Acknowledgments

This thesis has been a truly fulfilling experience from start to finish. The work I've produced is a reflection of my curiosity about architecture on an urban scale as well as an expression of my desire to engage and address the international informal housing crisis through critical design initiatives.

I would like to express my sincerest and utmost gratitude towards my advisor, Professor Benjamin Gianni of the Azrieli School of Architecture and Urbanism at Carleton University, for his untiring enthusiasm and support during this experience. His excellent, insightful and thorough advice has been essential for the completion of this thesis and invaluable to my growth as an aspiring architect. Prof. Gianni's door has always been open for me (literally and metaphorically), even through his term on sabbatical, allowing this thesis to be my own but also steering me in the right direction wherever and whenever

necessary.

I must also express my warmest appreciation towards Allan Cain, architect, specialist in project planning and urban development, Director of the Development Workshop Angola, and Canada's honorary Consul in Angola. With over 35 years of experience in developing countries, consulting on and leading research projects for the World Bank and UN Habitat, Mr. Cain has greatly influenced the direction of this thesis. He generously facilitated my research trip to Angola, where I was fortunate to meet many the brilliant minds and researchers associated with the Development Workshop Angola. I would also like to thank Ilidio Daio, lead architect and project manager at GTRUCS Architecture Office for sharing his extensive knowledge of the areas under consideration. Thanks, too, to Sylvia Croese, urban sociologist and the PEAK Urban Research Officer at the African Centre for Cities, for her insightful knowledge of the socio-

economic issues surrounding developing countries. A warm thank you to Antonio Frank, a lecturer at the Hague University, whose PhD research is focused on governance and security in Angola's informal urban settlements. To Arsénio Sebastião, for his endlessly friendly attitude and for graciously hosting me at his place in Kilamba for a whole weekend, I am graciously thankful. A final acknowledgment to all others not mentioned, who made my research trip a memorable and fruitful experience.

Finally, I would like to express a very profound gratitude to my parents for providing me with their unfailing support and the encouragement throughout my years of education. This thesis would not have been possible without them.

Forward

This thesis is the result of close to a year of research on informal settlements in Sub-Saharan Africa. Together a review of literature, on-site field research, and design exploration contributed to my understanding of the issues associated with slum redevelopment and the urban poor. I am extremely fortunate to have been able to learn from local professionals and researchers in Luanda, Angola, notably Allan Cain. While taking full responsibility for the work presented, I have benefitted from collaboration, with fellow M.Arch. candidate. David Anderson. Working closely together under the guidance of our advisor, Prof. Benjamin Gianni, David and I have both focused on the redevelopment of musseques (the local term for slums or informal settlements) in Luanda for our theses. Our thesis work is complementary inasmuch as we have focused on different sites and different housing typologies. Having travelled together Angola in October of 2018, David and I benefitted from the same contacts with local experts and

sources of information. Throughout the course of our thesis research, we have shared contextual and historical background information, resources, data sets, and research notes, as well as engaging in an ongoing discussion. This interaction had led to a more thorough and comprehensive understanding of the conditions of the informal settlements in Luanda. That said, our written documents have been prepared separately, without consultation.



Fig. 2: Map of Angola in the context of Africa

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List of Terms

slum

1. A group of individuals living under the same roof in an urban area who lack one or more of the following:
 - i. Durable housing of a permanent nature that protects against extreme climate conditions
 - ii. Sufficient living space which means not more than three people sharing the same room
 - iii. Easy access to safe water in sufficient amounts at an affordable price
 - iv. Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people
 - v. Security of tenure that prevents forced evictions¹

“The word ‘slum’ often can carry derogatory connotations, as well as suggest that a settlement needs replacement through legitimized eviction of its residents. It

¹ UN Habitat. The State of the Worlds Cities 2006/2007: Globalization and Urban Culture. London: Earthscan, 2004

is a difficult term to avoid, however, for many reasons. First, some networks of neighbourhood organizations choose to identify themselves with a positive use of the term, mainly to neutralize these negative connotations. Second, the only global estimates for housing deficiencies, collected by the United Nations, are for what they term 'slums'. And third, in some nations, there are advantages for residents of informal settlements if their settlement is recognized officially as a 'slum'; indeed, the residents may lobby to get their settlement classified as a 'notified slum'.²

² Cain, Allan. "African Urban Fantasies: Past Lessons and Emerging Realities." *Environment and Urbanization* 26, no. 2 (2014): 561-67. http://dw.angonet.org/sites/default/files/online_lib_files/Cain - African urban fantasies past lessons and emerging realities - E&U April 2014.pdf.

informal settlement

1. Areas where groups of housing units have been constructed on land that the occupants have no legal claim to, or occupy illegally.
2. Unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorized housing).³

In many contexts the terms “slum” and “informal settlement” are used interchangeably. Although the word “slum” often carries negative connotations, the terms are used interchangeably throughout this thesis and apply directly to the case studies and sites discussed. The word *musseque*, which is the local Portuguese term for slums or informal settlements, is also used in the text and in citations.

³ OECD Statistics Directorate. OECD Glossary of Statistical Terms - Informal Settlements Definition. Accessed March 26, 2019. <https://stats.oecd.org/glossary/detail.asp?ID=1351>.

urbanization

1. The quality or state of being *urbanized* or the process of becoming *urbanized*

urbanize

- a. To cause to take on *urban* characteristics
- b. To import an *urban* way of life to

urban

- i. Of, relating to, characteristics of, or constituting a city⁴

Generally, urbanization refers to the shift of populations – and overall

percentages of populations in a given country or region – from rural to urban

areas.

⁴ "Urbanization." Merriam-Webster. Accessed March 26, 2019. <https://www.merriam-webster.com/dictionary/urbanization>.

transit camp

1. A place where refugees stay in tents or other temporary structures when they have nowhere to live permanently⁵

In the context of in-situ slum redevelopment, transit camps are typically places to which residents are relocated – on a temporary basis – while the land they occupied undergoes redevelopment. Transit camps can be disruptive to the lives of displaced residents inasmuch as they are frequently located at some distance from the original settlement, and residents may be forced to remain there for extended periods of time (sometimes permanently). That said, the community remains together throughout the duration of the redevelopment.

⁵ "Transit Camp." Cambridge Dictionary. Accessed March 26, 2019. <https://dictionary.cambridge.org/dictionary/english/transit-camp>.

tenure

1. Being the legal owner of land, a job, or an official public position, or the period of time during which you own it⁶

In the context of informal settlements, tenure typically refers to the legal right to occupy the land, and the terms of reference under which this right is exercised (freehold, leasehold, rental agreements, etc.).

self-build

1. A way of building your house yourself⁷

Self-building is a common practice among residents of informal settlements. Self-building is a vital component to the social fabric of the urban poor, especially as it allows for the opportunity to expand one's dwellings as circumstances change.

⁶ "TENURE | Meaning in the Cambridge English Dictionary." Cambridge Dictionary. Accessed March 26, 2019. <https://dictionary.cambridge.org/dictionary/english/tenure>.

⁷ "SELF-BUILD | Meaning in the Cambridge English Dictionary." Cambridge Dictionary. Accessed March 26, 2019. <https://dictionary.cambridge.org/dictionary/english/self-build>.

chain migration

1. An activity that "moves sets of related individuals or households from one place to another via a set of social arrangements in which people at the destination provide aid, information and encouragement to new migrants"⁸

floor space index (FSI)

1. Floor Space Index (FSI); is a measure of built density. It describes the ratio between the gross floor area of building on a lot or given site to the area of the site in question. An FSI of 1, for example, means that the entire site has been built out at the equivalent of one story (or half the site has been built out at two stories, etc.). It is also known as Floor Area Ratio (FAR).

⁸ Saunders, Doug. Arrival City: The Final Migration and Our next World. Toronto: Vintage Canada, 2011. P.46

units per acre or hectare (UPA/UPH)

1. Units per Acre or Hectares; describes number of residential units per acre or hectare of land (UPH or UPA). It is a measure of residential density. It is normally applied to residential areas of cities.

persons per acre or hectare (PPA/PPH)

1. Persons per Acre or Hectare; describes the number people living and working on a given acre or hectare of land (PPA or PPH). It is measure of overall population density, not just residential density. It is normally applied to mixed-use areas of cities and to commercial centers.⁹

⁹ Gianni, Benjamin. "Introduction to Urbanization." Interview. November 6, 2018. The definitions of FSI, UPA and PPA were all explained during this interview.



Fig. 3: Map of Angola

Introduction

The developing world is undergoing rapid urbanization. While the United Nations estimates that just over 50% of the global population currently lives in urban areas, it is anticipating that the number will rise to 75% by 2050.¹⁰ Otherwise stated, some 1.9 billion people – 25% of the global population of 7.7 – will be moving from the countryside into cities in the next 30 years. By and large, rapid urbanization is occurring in the most densely populated and least urbanized areas of the world, namely Asia and Africa. It is especially acute in Sub-Saharan Africa. As reported per Center for Strategic & International Studies “The global share of African urban residents is projected to grow from 11.3% in 2010 to 20.2% by 2050”¹¹ and urban centers will “play a critical role in fighting poverty and sustaining economic growth.”¹² The number and rate at which rural-

¹⁰ Awumbila, Mariama. "Drivers of Migration and Urbanization in Africa." *United Nations*, September 7, 2017, 2-5. <http://www.un.org/en/development/desa/population/events/pdf/expert/27/papers/III/paper-Awunbila-final.pdf>.

¹¹ Saghir, Jamal, and Jena Santoro. "Urbanization in Sub-Saharan Africa: Meeting Challenges by Bridging Stakeholders." Edited by Jamal Saghir and Jena Santoro. Center for Strategic & International Studies.

¹² Ibid.

to-urban migration is occurring is largely responsible for the rapid proliferation of what we often refer to as slums. Today, an estimated 55.25% of Sub-Saharan Africa's population lives in slums.¹³ The lack of housing – affordable or otherwise -- in these regions contributes to the spread of informal settlements, exacerbating the challenges that rural-to-urban immigrants face in adapting to new lifestyles. That said, such settlements frequently provide crucial social and economic networks.

On a global city scale, slums and urban poverty pose immense challenges to equitable and environmentally sustainable growth. Historically, urbanization is associated with social transformation and economic mobility, which have facilitated greater geographic mobility, longer life expectancies, lower fertility, and ageing populations.¹⁴ Cities have long been important drivers of economic

¹³ Saghir, Jamal, and Jena Santoro. "Urbanization in Sub-Saharan Africa: Meeting Challenges by Bridging Stakeholders." Edited by Jamal Saghir and Jena Santoro. Center for Strategic & International Studies.

¹⁴ "World Urbanization Prospects." Department of Economic and Social Affairs, 2014.

development and poverty reduction, providing crucial links with rural areas, between cities, and across international borders. Global focus must be directed towards supplying the infrastructure and developing the strategies necessary to accommodate rapid urbanization, without compromising the informal social fabric on which inhabitants depend to survive and thrive.

Inadequately managed and haphazard urban expansion in rapidly urbanizing regions leads to sprawl, pollution, and environmental degradation.¹⁵ Paired with unsustainable production and consumption patterns, many countries, including most in Sub-Saharan Africa, face the seemingly insurmountable challenge of addressing the fact that a majority of their populations occupy haphazardly constructed informal settlements. These settlements or “slums” account for

¹⁵ Saghir, Jamal, and Jena Santoro. “Urbanization in Sub-Saharan Africa: Meeting Challenges by Bridging Stakeholders.” Edited by Jamal Saghir and Jena Santoro. Center for Strategic & International Studies.

approximately 62% of the population of towns and cities in sub-Saharan Africa.¹⁶

Lack of tenure aside, such settlements subject hundreds of millions to significant health and safety risks that limit human potential.¹⁷ On the flip side, however, the social networks and economic opportunities (formal and informal) fostered by these informal settlements are frequently crucial to the longer-term success of inhabitants.

The opportunity to engage a global problem coupled with the potential to bring my developing architectural expertise to bear on improving the lives of slumdweller was a key motivation in the choice of thesis topic. In pursuing this topic, I've been fortunate to benefit from the involvement and expertise of Allan Cain, Director of the Development Workshop, Angola with whom I made contact

¹⁶ Smit, Dan. *Incrementally Securing Tenure: An Approach for Informal Settlement Upgrading in South Africa*. Hatfield, South Africa: Urban LandMark, 2010.

¹⁷ Belsky, Eric, Nicholas DuBroff, Daniel McCue, Christina Harris, Shelagh McCartney, and Jennifer Molinsky. "Advancing Inclusive and Sustainable Urban Development." *Joint Center for Housing Studies of Harvard University*. November 2017.

through my thesis advisor. DW Angola is a non-profit organization working to assist in developing policies and programs for human settlements and self-help housing. The opportunity to work with DW Angola and to leverage Mr. Cain's expertise led to the choice of Luanda as a focus for the study. As a result of travelling to Luanda to conduct research under the auspices of DW Angola, I was able to collect valuable research material, United Nations-backed surveys, data sets, and government sponsored papers. These resources were exceptionally helpful in setting the context and helping me to set priorities with respect to what I might be able to contribute to the larger goal of improving living conditions for residents of Luanda's informal settlements.

As urbanization is a longstanding, global phenomenon largely associated with economic and social development, there are numerous case studies, strategies and models to draw upon when considering ways to address the upgrading or

redevelopment of informal settlements. Approaches to redevelopment included the "in-situ" model, known locally as the "Favela-Bairro" model (named after the urban upgrade process in Latin America) and the "Singapore Model". While the "in-situ" approach privileges redevelopment without relocating residents, the "Singapore" model moves slumdwellers to new housing elsewhere the city in order to facilitate redevelopment. While both approaches have both advantages and drawbacks, the "In-Situ" model was chosen as the preferred method of redevelopment for a variety of reasons (explained below).

Many of Luanda's neighborhoods were excellent candidates for redevelopment and the city offered several precedents for how redevelopment might be approached. After consultation with local experts, however, the Onze de Novembro was chosen as the focus of the exploration. Its proximity to Luanda's urban core coupled with the relatively low density at which it has been built out

make Onze is a favorable candidate for redevelopment. In addition to being the subject of numerous demographic and sociological studies, the Cazenga municipality in which Onze de Novembro is located was the subject of a recent master planning exercise, for which extensive documentation was produced.

With an estimated population of 100,000 inhabitants and a somewhat regular street grid,¹⁸ the Onze neighborhood is largely self-built and is completely devoid of functioning infrastructure. Existing water and power networks are non-operational, and the area lacks both storm and sanitary sewers. Given the varying levels of informality, interventions in the Onze neighborhood are best addressed on a block-by-block basis.

This thesis explores the redevelopment of Onze at both the urban scale (to formulate street grids, target block sizes and densities) and the building scale

¹⁸ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

(unit sizes, configurations, materials, construction methods, etc.). The proposed redesign of the area is informed by and, where feasible, attempts to maintain the existing fabric, notably major roads, select tertiary streets and, in some cases, entire blocks. By engaging residents as producers, consumers and self-builders, and by applying strong policies to new flexible, freehold, replacement housing, this thesis hopes to harness the economic energy of the neighborhood. In addition, however, accommodations have been made for a significant private-sector investment in the area. In exchange for the right to develop approximately 30% of the overall neighborhood, the private sector will take primary responsibility for constructing the replacement housing. As part of its contribution to public-private partnership, the municipality of Cazenga will assume responsibility for demolition and for the provision of infrastructure, both hard and soft.

Background and Historical Context



Fig. 4: Informal settlements that have manifested near the coastal centre of Luanda.

Historical Context of Angola

While rapid urbanization is occurring throughout sub-Saharan Africa, rural-to-urban migration in Angola was largely driven by war and civil unrest. After a protracted war of independence from Portugal (1961 to 1975),¹⁹ Angola descended into civil war that uprooted almost a quarter of the country's rural population.²⁰ The People's Movement for the Liberation of Angola (MPLA) battled for governance with National Union for the Total Independence of Angola (UNITA). Displacing residents from rural lands was a tool of warfare throughout the span of the civil war. Rural settlements were attacked, families forced to flee, and entire villages pushed into provincial cities in a campaign to get them under rule of one or another faction.²¹ In addition to politically-driven forced relocation

¹⁹ Cain, Allan. "Angola Land Resources & Conflict." Land and Post-Conflict Peacebuilding - UNEP Earthscan/Routledge Vol. 2 (2013): 179.

²⁰ Cain, Allan. "Angola Land Resources & Conflict." Land and Post-Conflict Peacebuilding - UNEP Earthscan/Routledge Vol. 2 (2013): 181.

²¹ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

programs, Angolans, fled to cities in search of safety. Cities were unprepared and ill-equipped to handle such a large influx of people.

Luanda, the city most affected by chain migration (See Fig. 5), was originally laid out for a population of approximately half of a million. By the time the War of Independence ended in 2002, the city's population had grown to 2.55 million.²²

Although municipal officials anticipated that many of the new arrivals would return to the countryside at the end of the conflict, this proved not to be the case.²³ The unofficial benchmark for re-establishment into a new city is 2 years; if conflicts are not resolved within the 2 years of displacement migrants are significantly less likely to commit to returning to their place of origin.²⁴ As a result Angola transformed from a majority rural to a majority urban population

²² Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

²³ Cain, Allan. "TERRA: Urban Land Reform in Post-War Angola: Research, Advocacy & Policy Development." Edited by Development Workshop Angola. *Centre for Environment & Human Settlements*, 2005: 21-22.

²⁴ Ibid.

during a conflict-ridden period when resources were extremely scarce. Ad-hoc “refugee camps” in and around cities coalesced into informal settlements. With the formal economy crippled by decades of war, new arrivals were forced to depend on a growing informality for their livelihood.

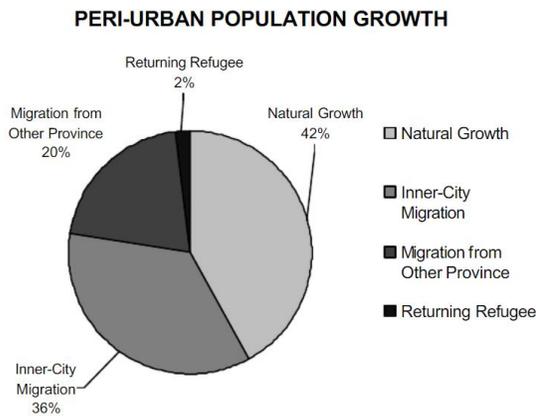


Fig. 5 Reasons for chain migration³⁷

During the war, informal economies were focused on the exchange of imported goods.

As some family members returned to claim back their rural land after the Civil War,

however, a direct link was created between the rural and urban economies.²⁵ The

transferring of imported goods from urban areas to less developed areas through family

²⁵ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

members greatly expanded the informal economy (See Fig.6). This self-created informal means of economic prosperity fueled the growth of informal settlements in and around Angola's urban centers. As a result, the population of Luanda expanded from 2.55 to 7+ million between 2002 and 2018.²⁶ Not everyone, however, managed to prosper from the growing informal economy; along with the prolonged and unregulated growth of informal settlements came a significant increase in poverty rates. Urban growth outpaced economic growth and investment in infrastructure, leaving the country with limited resources to address the rapid spread of slums.²⁷

²⁶ Cain, Allan. "TERRA: Urban Land Reform in Post-War Angola: Research, Advocacy & Policy Development." Edited by Development Workshop Angola. *Centre for Environment & Human Settlements*, 2005:23.

²⁷ Cain, Allan. "TERRA: Urban Land Reform in Post-War Angola: Research, Advocacy & Policy Development." Edited by Development Workshop Angola. *Centre for Environment & Human Settlements*, 2005:24.

IMPORTANCE OF INFORMAL EMPLOYMENT IN THE URBAN ECONOMY

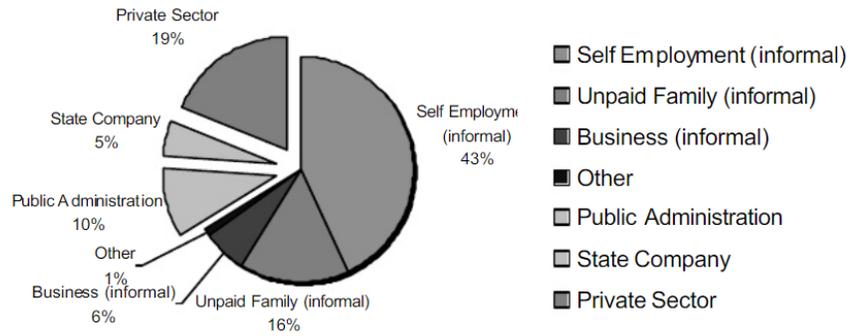


Fig. 6: Employment through informal economies³⁷

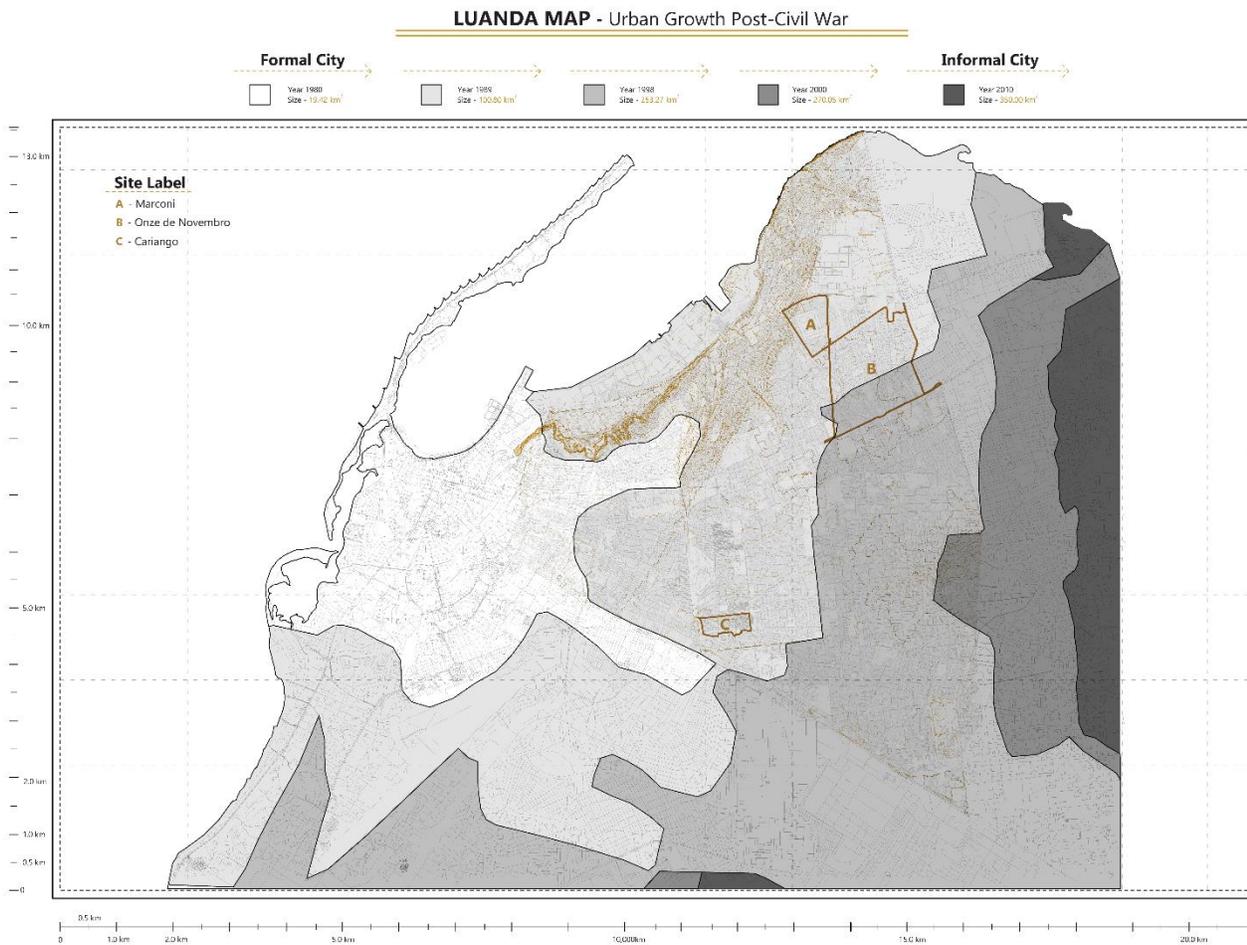


Fig. 7: Urban Growth Map in the post-war era

Foreign Investment and Urban Development

Little urban planning had been undertaken in Angola in the waning years of the Civil War (i.e., the late '90s and early 2000s). After the war, the government began to focus on the country's rapidly changing urban and economic landscapes. It was around this time the Angolan government decided to appeal to the international community for help in reconstruction efforts. Unfortunately, the timing of these requests coincided with the escalation of conflicts the Middle-East,²⁸ shifting international focus (with exception of China) from Africa to Iraq and Afghanistan. Consequently, reconstruction efforts were funded primarily through partnerships with foreign investors, and focused on resource extraction, notably oil and diamonds. In exchange for access to oil, China began rebuilding roads, railways and other such basic infrastructure.²⁹ A spike in oil prices created

²⁸ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

²⁹ Cain, Allan. "Alternatives to African Commodity-Backed Urbanization: The Case of China in Angola." *Oxford Review of Economic Policy* 33, no. 3 (2017): 478-95.

what ultimately proved to be an unsustainable dependence on oil as a source of revenue.

Generally, cities grow in tandem with economic development and industrialization. For the reasons stated above, however, urban growth in Angola outpaced economic growth. Oil extraction requires significant capital investment and is highly dependent on skilled workers. In Angola's case, rather than investing in programs to train the local population, most workers were imported from elsewhere.³⁰ As such, the people of Angola did not benefit from job-creation related to the oil industry and most economic growth came as a by-product of exports and the taxing of private companies. Revenues went directly into coffers of a government which was widely considered to be corrupt.³¹ While

http://dw.angonet.org/sites/default/files/online_lib_files/cain_2017_alternatives_to_commodity-backed_urbanization.pdf.

³⁰ Stormyhr, Even, *The Norwegian Paradox - Oil in Angola*. 2018.

³¹ Almeida, Henrique. "Angola Vows to Fight "Cancer of Corruption as Economy Recovers." *Bloomberg.com*. November 22, 2018. Accessed March 24, 2019.

offshore oil reserves made Angola one of the richest countries in Africa, it did little to address or ameliorate living conditions in its cities. Angola became increasingly dependent on Chinese expertise and credit to fund upgrades to urban infrastructure, running up a debt of US\$ 15 billion.³² In his paper entitled *African Urban Fantasies*, Allan Cain describes the situation as follows: "Rather than investing in in-situ urban upgrading or in strategic urban infrastructure geared to slum prevention and land readjustment, quick fix solutions were offered by Chinese and other international investors. There was no adequate preliminary assessment to determine the affordability of land and housing markets or to gauge urban management capacity before these projects were initiated."³³

<https://www.bloomberg.com/news/articles/2018-11-22/angola-vows-to-fight-cancer-of-corruption-as-economy-recovers>.

³² Cain, Allan. "African Urban Fantasies: Past Lessons and Emerging Realities." *Environment and Urbanization* 26, no. 2 (2014): 561-67. http://dw.angonet.org/sites/default/files/online_lib_files/Cain - African urban fantasies past lessons and emerging realities - E&U April 2014.pdf.

³³ Ibid.

With aspirations to transform Luanda into an international hub for investment, the government began the dark process of pushing residents out of the more favorably located informal settlements to the far periphery of the city. Based as they were on South African precedents, these early efforts at 'slum eradication' became known locally as the "Apartheid Model".³⁴ Although not racially motivated as was the case in South Africa, this morally questionable practice continued until quite recently (2010).

³⁴ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

Need for Land Reform

As a result of four decades of war and millions of people being forced off their land, Luanda became a haven for migrants who settled into *musseques* in and around the expanding city. As described by Allan Cain, "Prior to their independence in 1975, the Portuguese created a colonial land management system to legalize the appropriation of African peasant lands for settler-farmers' use. These practices continued until independence in 1975, when the new Angolan government affirmed the constitutional role of the state as the owner of all land."³⁵ The nationalization of land ownership has had severe consequences on the people of Angola and on urban growth over time. As a result, the private sector (primarily foreign investors) was reluctant to provide financing and/or to invest in real estate due to insecure land tenure and the lack of legislative and

³⁵ Smit, Dan. *Incrementally Securing Tenure: An Approach for Informal Settlement Upgrading in South Africa*. Hatfield, South Africa: Urban LandMark, 2010.

judicial reforms necessary to support a functional land market.³⁶ Secondly, government control of land removed the onus on people to improve the land they occupied, nor could they benefit directly from increases in land values. Land could be subject to expropriation at any point to pave way for commercial development or other government-backed initiatives. Staggeringly, over 80% of the residents of Angola have no clear legal title to the land they occupy (See Fig. 7), and almost three quarters of Luanda's population lives in peri-urban *musseques*.³⁷ Land tenure reform may be the best way to address the lack of private investment in housing. A large part of the problem stems from the fact that, while having to depend on high-interest loans inasmuch as they have no equity, the urban poor have virtually no access to credit as means to advance their economic circumstances. Furthermore, municipalities cannot raise revenue

³⁶ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

³⁷ Cain, Allan. "Land for the Urban Poor in Post-War Angola: Socio-Economic Exclusion - Land, Credit and Basic Services." *Adequate and Affordable Housing for All: Research, Policy, Practice*, June 24, 2004. https://www.academia.edu/38563680/Land_for_the_Urban_Poor_in_Post-War_Angola_Socio-Economic_Exclusion_-land_credit_and_basic_services.

through property taxes, greatly limiting their efforts to address the many challenges at hand.

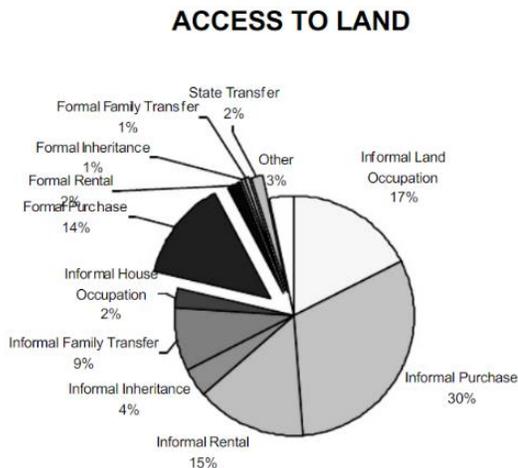


Fig. 8: Land tenure issues³⁷

Immediate land reform is needed to mobilize the informal population and involve them in the improvement of *musseques*. For the reasons mentioned above, **access to land tenure** is fundamentally to urban reform. From there, **access to credit** must be addressed through investment programmes in the informal economy, savings structures and micro-loans, which are widely considered to be one of the most effective approached to reducing urban poverty.³⁸ Finally,

³⁸ Cain, Allan. "Land for the Urban Poor in Post-War Angola: Socio-Economic Exclusion - Land, Credit and Basic Services." *Adequate and Affordable Housing for All: Research, Policy, Practice*, June 24, 2004. https://www.academia.edu/38563680/Land_for_the_Urban_Poor_in_Post-War_Angola_Socio-Economic_Exclusion_-land_credit_and_basic_services.

attention must be given to **access to basic services** in peri-urban slums. In the absence of municipal infrastructure, residents of informal settlement pay much more for water and other essential needs than those living in urban centres. As a result, the bulk of the population uses less of these basic services and are forced to neglect basic hygiene and health.³⁹ The need for land reform is at the core of many of the hardships that Angolans face. In the absence of formal tenure, virtually every piece of land in Angola is bought and sold "off the record," and very illegitimately. Efforts are currently being undertaken to create land claims maps that may help the citizens with respect to acquiring and proving rights to land titles.⁴⁰ The off-the-books process of land buying further discourages investment in housing, increasing the importance of and dependence on the informal economy through Luanda. Without tenure rights, people are reluctant to

³⁹ Cain, Allan. "Land for the Urban Poor in Post-War Angola: Socio-Economic Exclusion - Land, Credit and Basic Services." *Adequate and Affordable Housing for All: Research, Policy, Practice*, June 24, 2004. https://www.academia.edu/38563680/Land_for_the_Urban_Poor_in_Post-War_Angola_Socio-Economic_Exclusion_-land_credit_and_basic_services.

⁴⁰ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

maintain their homes, pay for services, or contribute taxes, further alienating the population from legitimate participation in the political and economic life of the country.

Luanda, the Capital of Angola

Luanda, Angola's capital, comprises a metropolitan population of over 7 million people, counting the peri-urban informal settlements littered around the city.⁴¹

The city has long served as Angola's primary port and economic hub; it is also the country's commercial, industrial and cultural center. With the election of a new federal government in 2017 came a shift in policies and a new focus on the long-term effects of unplanned urbanization, especially in Luanda. Many are hopeful that significant policy changes will enable Angola to address issues that have

⁴¹ Cain, Allan. "Luanda's Post-war Land Markets: Reducing Poverty by Promoting Inclusion." Urban Forum24, no. 1 (2012): 11-31. http://www.dw.angonet.org/sites/default/files/online_lib_files/Cain - Luanda Post War Land Markets - Urban Forum 2013.pdf.

long been ignored and/or the country has not been a position to address.

Four decades of conflict severely crippled the formal housing market. Coming out of the Civil War in 2002 the country faced severe housing shortages. These shortages, in turn, drove inner-city property prices (including rents.) to astronomical levels, making Luanda one of the most expensive cities in the world in which to live. Oil exports from the early 2000s to about 2010 made Luanda a strong business centre, fueling the construction of mega-projects along the city's coastline. The precipitous drop in oil prices, however, coupled with corruption and administrative mismanagement, have seriously stalled Luanda's economy. Construction on dozens of projects ground to a halt, leaving what has the potential to be beautiful coastline largely neglected. In 2008, the federal government announced a plan to construct upwards of 1 million houses

throughout the country by 2012 in an attempt to eradicate *musseques*⁴², most of which are located in Luanda. By 2010, the Angolan government declared the housing deficit to have reached 1.9 million units, concluding that an estimated 91% of the urban population lives in substandard conditions.⁴³ The most notable and comprehensive housing projects are generally those executed by private sector development in what are considered 'satellite cities' and 'rehousing zones'.

Housing Redevelopment Projects

Numerous efforts have been made to address housing shortages in Angola over the past decade, largely related to foreign investment tied to resource extraction. Many of these projects have not appropriately considered the cultural and socio-economic characteristics of the residents for whom they are intended; "foreign"

⁴² Smit, Dan. *Incrementally Securing Tenure: An Approach for Informal Settlement Upgrading in South Africa*. Hatfield, South Africa: Urban LandMark, 2010.

⁴³ Smit, Dan. *Incrementally Securing Tenure: An Approach for Informal Settlement Upgrading in South Africa*. Hatfield, South Africa: Urban LandMark, 2010.

approaches have been awkwardly grafted into the urban fabric of Luanda. A notable example of this is Kilamba, the largest Chinese development project in Africa. Stretching along the outskirts of Luanda, this 30-square-kilometer satellite city comprises some 700 apartment buildings (ranging from 5 to 14 stories) and accommodates roughly 200,000 residents (See Fig. 8).⁴⁴ The Chinese developers constructed this project far from the city centre to alleviate housing pressure in the core and take advantage of lower land costs. Notably absent, however, is the infrastructure (roads and public transportation) necessary to connect the project back to the city. The commute into the city is unbearably long (2-4 hours, to cover a distance of about 40km). Aside from a few schools and shops, employment opportunities are notably absent in Kilamba, nor has it been designed to support informal economic activity. With little to no connection to

⁴⁴ "History." Kilamba. December 18, 2015. Accessed March 26, 2019. <https://kilamba-info.com/history/>.

life as it is conducted elsewhere in the city, Kilamba resembles some of the more notorious and sterile modernist housing projects built in New York in the post-war period. The fact that it is considered by residents as a relatively desirable place to live speaks volumes about the poor state of housing in Luanda.

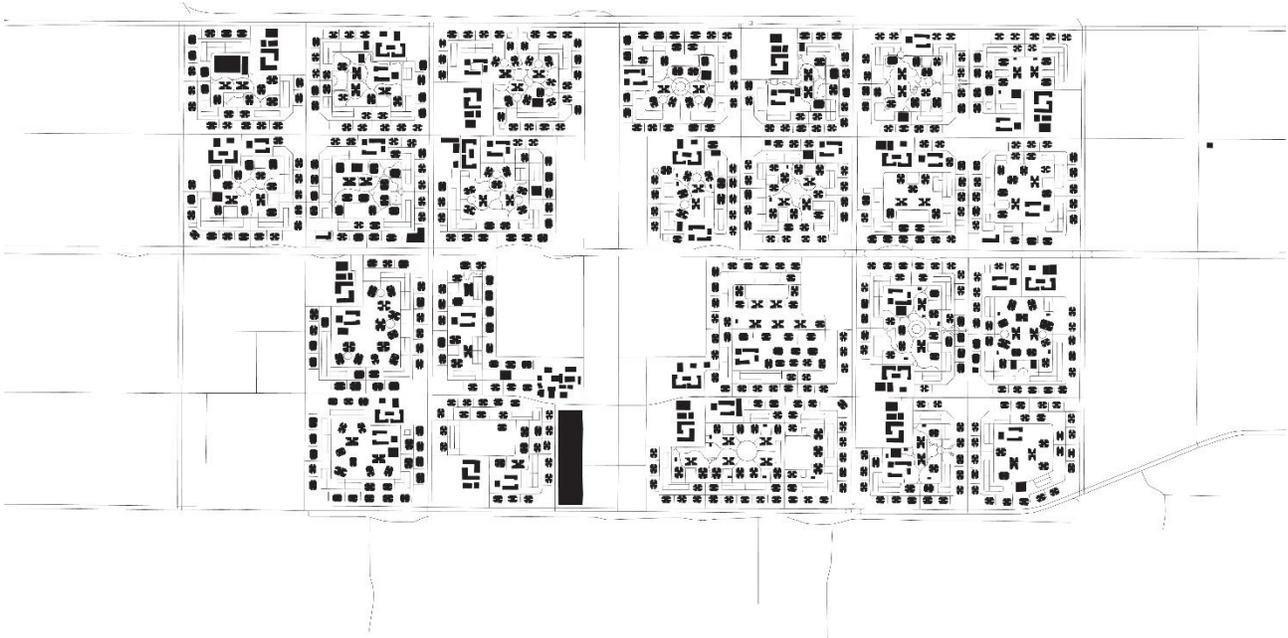


Fig. 9: GIS extracted plan of Kilamba



Fig. 10: The typical view down a street in Kilamba

Another example of a large-scale housing project is Zango, also located about 40km from the center of Luanda. Zango is one of the largest rehousing zones in the city. Comprising 36,300 houses – a combination of one-story semi-detached units and apartment buildings (See Fig.10),⁴⁵ the project was created to rehouse those displaced from areas designated as 'high risk,' primarily due to the lack of

⁴⁵ "Zango: Plans Unravel." UrbanAfrica.Net. April 01, 2014. Accessed March 26, 2019. <https://www.urbanafrica.net/news/zango-plans-unravel/>.

infrastructure. Over time, much of the lower-scaled fabric of Zango has transformed through self-building, additions have been made to and between structures. Despite its distance from the core, Zango is a relatively desirable location, largely because it is much more affordable. In both cases, rents are subsidized in order to encourage people to move away from the urban centre of Luanda.



Fig. 11: The rehousing zone of Zango

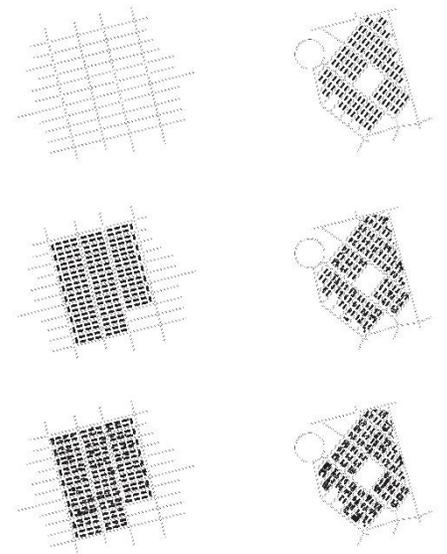


Fig. 12: Plans of neighbourhoods in Zango

Luanda Master Plan Efforts

Notable attempts by the state to address shortages in housing and infrastructure

include a major master planning exercise. On March 1, 2018, the Council of

Ministers of Angola approved the Metropolitan General Director Plan of Luanda,

prepared by the firm of Broadway Malyan. The goal of the plan was to ensure

that future public and private investments would support common, shared goals

for the city's expansion.⁴⁶ The master plan was intended to promote a more

integrated city through strategic upgrades to infrastructure, new schools and

hospitals, improved transportation, and through the preservation of

⁴⁶ Cain, Allan. "Law Approval Master Plan of Luanda." Aprovação Da Lei Plano Diretor De Luanda - O PAÍS 1 De Março 2018. Accessed March 26, 2019. <http://www.dw.angonet.org/forumitem/aprova-a-o-da-lei-plano-diretor-de-luanda-o-paa-s-1-de-mara-o-2018>.

environmental and cultural assets. Ambitious in scale and scope, implementation of plan was put on hold due to lack of funding. Rumors of scandal also surrounded the plan inasmuch as it was commissioned by the daughter of the former president, who, with estimated worth of 3.1 billion, is now considered to be the richest woman in Africa.⁴⁷

⁴⁷ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

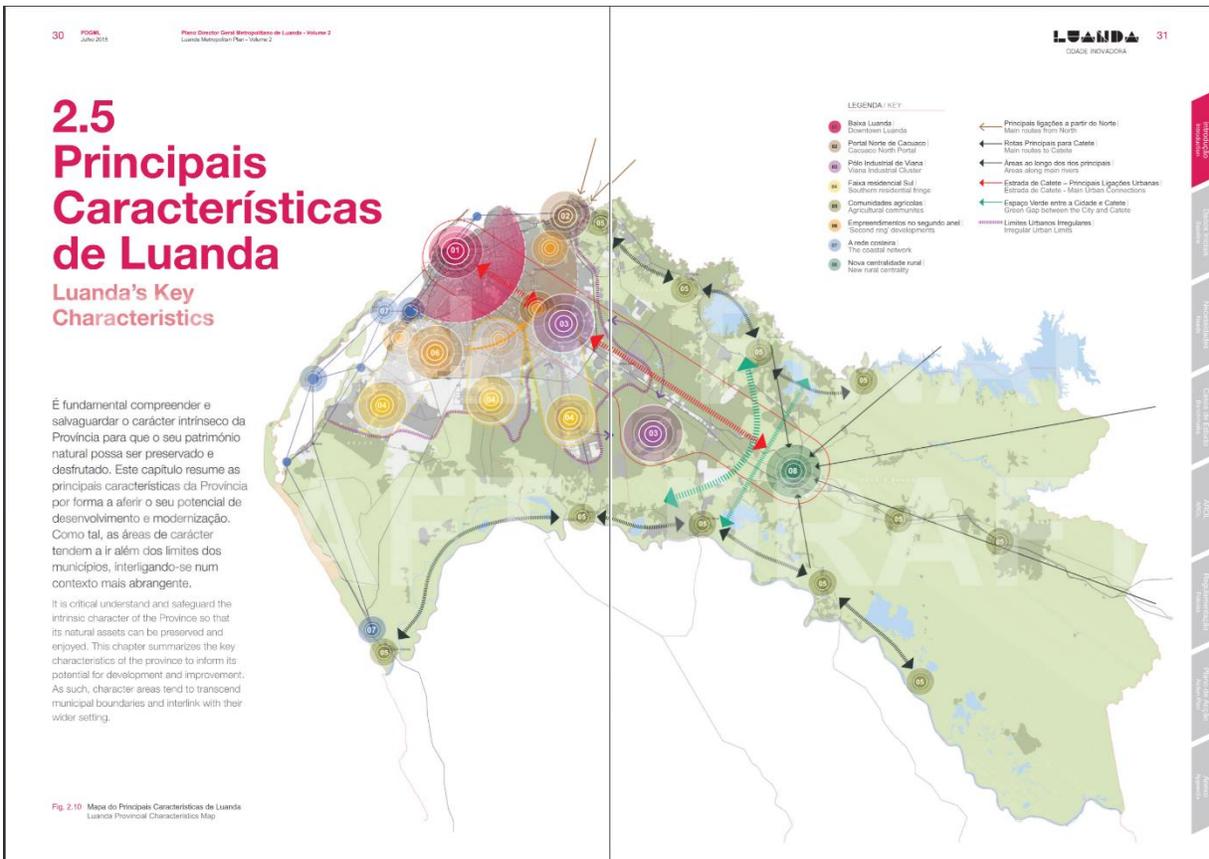


Fig. 13: A page from Broadway Malyan's Luanda Master Plan

Following this, a less ambitious redevelopment plan was drafted by the GTRUCS

Architecture Office for several of the municipalities that comprise metropolitan

Luanda, namely Cazenga, Sambizanga and Rangel. The plan was the product of a

collaborative partnership with internationally renowned architecture firm

Snohetta. Among other things the it raises the importance of land tenure as an

This master plan illustrates the GTRUCS office's intentions with parcelling out land development zones, private development zones, and areas of open space.

The Master Plan was used as a comparative tool in determining to what extent the urban fabric of different *musseques* in the area were planned to be kept.

Identifying Areas of Focus

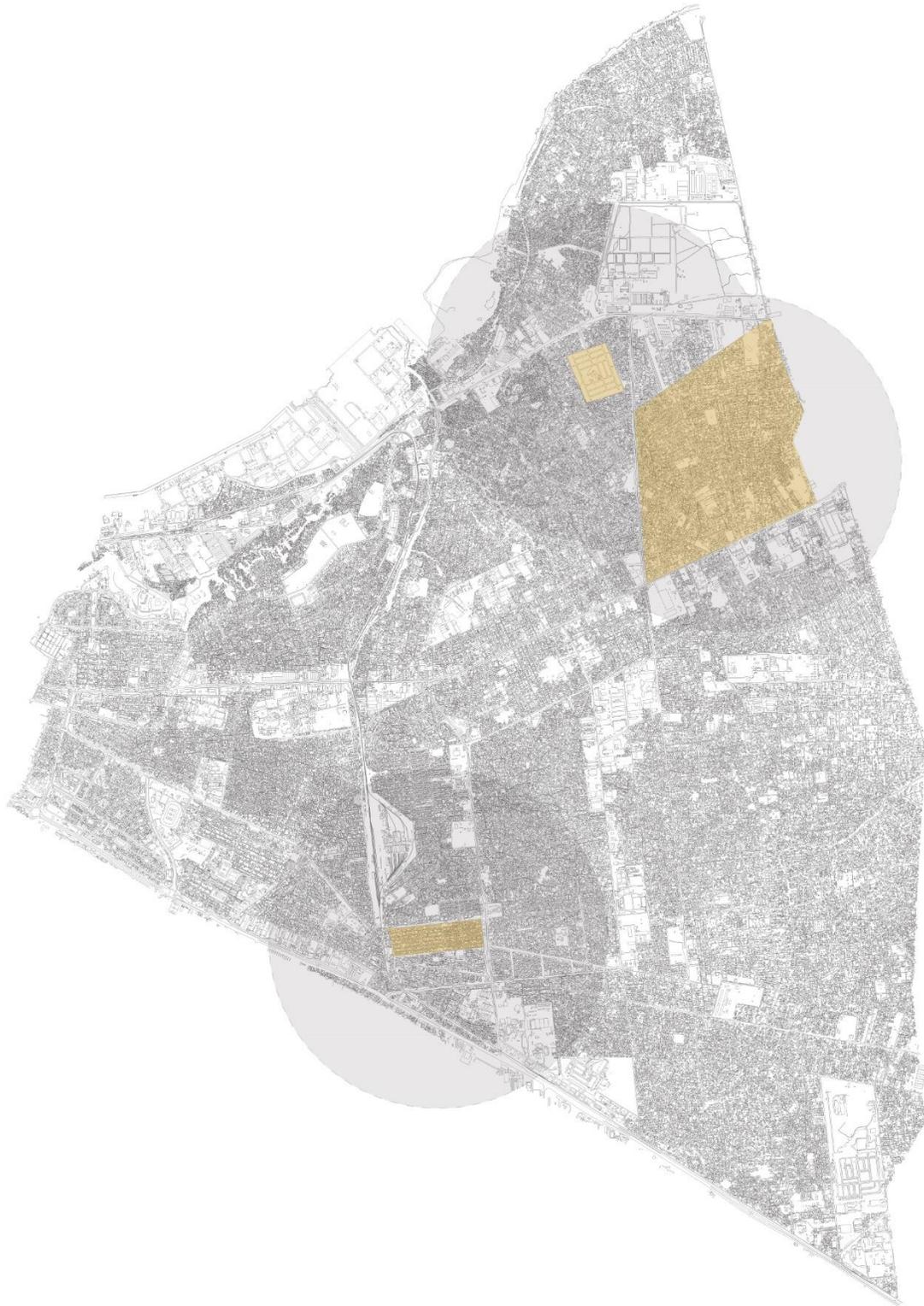


Fig. 15: GIS extracted plan of the Cazenga municipality, and the three sites of focus

Home to between 800,000 to 1.1 million people, Cazenga is the most densely populated of Luanda's seven municipalities. It is also very favorably located, immediately east of the city center. As informal settlements comprise much of the municipality, Cazenga presented itself as a great area in which to explore redevelopment -- building on the work undertaken by GTRUCS. By way of kick-starting the design exploration, I looked at several slums upgrading and redevelopment projects undertaken in and around Cazenga. While significantly smaller and less ambitious than Kilamba and Zango, these efforts were more relevant to the goal of in-situ redevelopment. The following sites were the main neighbourhoods studied as potential redevelopment sites, while in Luanda.

Marconi

The Sambizanga Requalification Project, the largest redevelopment effort in the municipality of Cazenga, was funded by Chinese investors in 2014 in

collaboration with development firm *Kora Angola*. Known colloquially as

Marconi, the project followed the in-situ redevelopment model, taking advantage of a site previously occupied by radio towers to construct replacement housing.

The availability of a large, vacant site immediately adjacent to the areas targeted for redevelopment, obviated the need for transit camps and temporary

displacement. Upon completion, residents of the adjacent informal settlements

were to be moved into the higher-density replacement housing, opening up

larger and larger areas for redevelopment in successive phases. Residents would

either pay or be reimbursed for the difference in value between the properties

they vacated and the ones into which they were moved.

Despite the favorable terms of reference, Marconi is generally considered to be a

failure. In great part this relates to the government's failure to leverage the value

of the land by selling portions to the private sector in order to fund future phases

of the development. Instead, funds dried up after only 30 buildings were constructed (about 25% of the projected build-out)⁴⁹ and only two of these are currently inhabited. Furthermore, in its overall form, the Marconi development closely resembles Kilamba. Like Kilamba, it takes little consideration of social or economic life of the residents it was built to house or the networks, social and economic, necessary to their survival.



Fig. 16: A photo of the Marconi redevelopment project

⁴⁹ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

Cariango

Cariango is an informal settlement in Cazenga that has undergone a 'Favela-Bairro'-style upgrade, meaning that new infrastructure was introduced without demolishing or disturbing existing structures. This was possible due to the regular street grid, which remained largely intact over the decades in which informal building took hold. While in-situ upgrading of infrastructure was not the original plan of the government, plans to demolish and rebuild the area were halted due to lack of funds. Interestingly, instead of buying new sewer and water pipes, a new layer was added above the existing roads, creating a unique condition in which the ground floors of most dwellings are one meter below the adjacent streets. (Fig. 16)

The infrastructure upgrades, which took more than a year to complete, have

greatly improved the wellbeing and livelihood of the community.⁵⁰ Included in the new infrastructure was free Wi-Fi, which has made communication between the self-governing organizations within the *bairro* possible. Informal social networks – including those associated with governance -- are essential parts of the fabric of *musseques* due to government neglect. The redevelopment process also eliminated a number of small alleyways making the neighborhood easier to patrol and keep safe. Access to municipal infrastructure has encouraged residents to expand vertically, within their property boundaries. Atypical of most informal settlements, then, many houses in Cariango are now two-stories.

Cariango has served as both a case study for how upgrading might be done within an existing street network and an example of how the introduction of infrastructure can both facilitate and encourage higher residential densities.

⁵⁰ “Site Visit and Discussion with the Locals in Cariango” Interview by author. October 11, 2018



Fig. 17: Photo showing units recessed into the ground



Fig. 18: Photo of a Cariango street

Onze de Novembro

Onze de Novembro, an extremely large informal settlement within the municipality of Cazenga, presented a very enticing case study and potential site of focus for this thesis. Despite the presence of power lines, water pipes, and a network of streets, the *bairro* is largely devoid of functioning infrastructure.

Sanitary and storm sewers are non-existent. To date, no attempts have been made to upgrade the neighborhood, which is home to approximately 100,000 residents. Interestingly, various levels of informality are present in the neighborhood. At the largest scale, the neighborhood benefits from a relatively hierarchical and continuous network of roads that host a variety of commercial activities. Problems arise, however, at the scale of the block – the depth of many of which has encouraged the proliferation of warrens of alleyways. Largely inaccessible, these small passages constitute health and safety hazards. Local police are unable to patrol and/or access many of the units buried within the

dense and irregular fabric. That said, significant and respected social hierarchies have developed to bridge the gap between the community self-governance and municipal authorities. Despite its flaws, then, the presence of road networks and layers of social organization make this neighborhood an excellent candidate for redevelopment. (See Figure 30) *Formalizing the Informal* proposes a comprehensive redevelopment strategy for the Onze de Novembro *bairro*. Working with (and adjusting, where necessary) the existing road network, this thesis proposes a phased redevelopment that avoids the need to relocate residents.



Fig. 19: One of many alleyways in Onze



Fig. 20: Municipal administration centre of Cazenga



Fig. 21: A main road running through Onze de Novembro, showing lively informal markets

Precedent Study

Literature Review

The choice to focus on Luanda as a subject for my Masters thesis was influenced by the opportunity to contribute to a body of research effort that was already underway. The Development Workshop Angola received funding from the International Science Council to study Luanda's slums. The ISC's *LIRA* initiative, under which funding was made available, seeks to "increase the production of high-quality, integrated, solutions-oriented research on global sustainability in Africa, through multiple published proposals."⁵¹ Explained simply, the funded proposal explores different ways of upgrading densely dispersed informal settlements in order to build upwards rather than outwards.⁵² In so doing, it

⁵¹ "What We Do." International Science Council. Accessed March 27, 2019. <https://council.science/what-we-do/funding-programmes/leading-integrated-research-for-agenda-2030-in-africa>.

⁵² Visagie, Justin. "Realising the Potential of Urban Density to Create More Prosperous and Liveable Informal Settlements in South Africa and Angola." *LIRA 2030*.

addressed the impacts of land readjustment, slum upgrading, urban density, affordable housing and holistic planning on the economic transformation of informal settlements. A second proposal funded by LIRA focusses on putting together an international data set help achieve the Sustainable Development Goals (SDGs) established by UN Habitat as a benchmark.⁵³ It highlights the eleven urban development goals for the global community which are fundamental for equitable and healthy living conditions. Together the two *LIRA* initiatives address a more inclusive, sustainable and participatory urban planning and policymaking process for the development of informal settlements. I've drawn on them in my proposal for the phased redevelopment of Onze de Novembro.

⁵³ Croese, Sylvia, and Allan Cain. "Advancing the Implementation of the Sustainable Development Goal 11 in Africa." *LIRA 2030*.

Pertinent Theses

The global phenomenon of urbanization has been thoroughly studied and documented. I have drawn on their work of several Carleton students who have addressed slum redevelopment for their M.Arch. theses. Sarah Hormann's *Architecture of Assimilation* and Jayla DeKraaker's *Resilient Transitional Housing* both look at a vernacular approach to supplying housing in China's rapidly growing cities. Their theses focus on the issues of rural-to-urban migration, questioning whether the generic, high-rise housing to which most migrants are directed impedes their assimilation into the urban environment.



Fig. 22: A diagram from Jayla DeKraker's *Resilient Transitional Housing* thesis

Other theses that informed my study were *UKUBUTHA*, by Nicole Moyo and *No Strings*

Attached, by Gillian Walczak. The former focused on the need for infrastructure in the

townships of South Africa, a topic very relevant to the situation in Angola. It helped me

understand the cultural, socio-economic, and physical needs of slum dwellers and

challenged me to consider all facets of the lives of the urban poor in Sub-Saharan Africa.

Gillian Walczak's thesis proposed a redevelopment strategy for the Kathputli Colony in

Delhi, India. The approach taken in redeveloping a large-scale neighbourhood in *No*

Strings Attached became a key stepping stone for my work in Luanda.



Fig. 23: Diagrams from Gillian Walczak's *No Strings Attached* thesis

Other Influences/Precedents

Over the course of the thesis research I looked also at several built precedents in

various locations around the world. It was important to identify and dissect slum redevelopment projects to better understand the terms of reference under which the built form was conceived and produced. The work produced by Alejandro Arevana's ELEMENTAL office was of particular interest. Internationally renowned for its incremental and sustainable approach to design, the firm's projects included several examples of freehold housing that were especially relevant to this project.

Having identified the importance of ensuring proper land tenure in the redevelopment of Onze, I determined that freehold units should play a key role.

Arevana's *Villa Verde* and *Quinta Monroy* projects in Chile were excellent examples of low-cost, freehold social housing projects. Of particular interest was their simple, modular design, and the architect's consideration of social needs of the inhabitants. As the urban poor of Africa have much in common with those in

Latin America, I was impressed by the emphasis the architect placed on socio-economic inter-dependency, affordability, and on the accommodations made for self-building. ELEMENTAL's Monterrey project in Mexico was also a valuable precedent. Despite being duplex housing, it represents a great strategy for achieving compatible, high-density social housing. Efficiency is crucial in projects of this type. The final precedent important for this thesis, was the *Donnybrook Quarter* in London (UK), designed by Peter Barber Architects, Winning the prestigious "Innovations in Housing Competition"⁵⁴, this project features a block of low-rise, street-oriented social housing that creates strong spatial connections with the adjacent neighbourhood. Donnybrook demonstrates the possibility of achieving high densities without going above three stories. Dedicated terrace spaces for each unit, balconies overlooking the internal streets, and the

⁵⁴ "Donnybrook Quarter." Architizer. Accessed March 27, 2019. <https://architizer.com/projects/donnybrook-quarter/>.

opportunity for personalization (whether through self-building or not) are among the reasons this project was an important inspiration for my thesis.



Fig. 24: Donnybrook Quarter precedent study



Fig. 25: ELEMENTAL's Quinta Monroy social housing

On-Site Research

The opportunity to travel to Luanda and work alongside Allan Cain and the Development Workshop Angola was infinitely more rewarding than I could have imagined. Having access to a rich collection of resources provided by the Workshop was invaluable. The ability to tour Onze de Novembro afforded me an

understanding of the social and physical structure of the neighborhood in a way reading about it never could. Having the opportunity to speak with local stakeholders and neighbourhood administrators (albeit with translators) was especially helpful in establishing the terms of reference for the final proposal. I am deeply indebted to those in Luanda who took the time to accommodate me on field visits, interviews, and general inquiries.

Methods and Considerations

Standard Redevelopment Methods

Given their scale, informal settlements in urban areas play a significant role in determining prosperity at a national, and even global level. Despite this, research on their impact on society is lacking. Such settlements have the potential to foster human progression by linking rural-urban migrants to the services and livelihoods concentrated in cities.⁵⁵ Redeveloping these slums to harness the entrepreneurial potential of the human being and to promote economic transition is an increasingly important aspect of global wellbeing. Successful redevelopment strategies exist around the world; outlined below are the four general models.

⁵⁵ Turok, Ivan, Justin Visagie, and Joshua Budlender. "Urban 'Slums' and Social Mobility." Edited by Ivan Turok. *Human Sciences Research Council*. London, UK.

In-Situ Redevelopment

- In-situ translates to “on-site.” This strategy offers slum dwellers new housing on or near their existing dwellings. In favorable locations, in-situ redevelopment often leverages land as a resource with which to partner with the private sector, mitigating the financial and logistical burdens placed on the state. In higher-density slums, where phased redevelopment is not possible, in-situ redevelopments may require temporary relocation to transit camps. The nature and duration of these temporary relocations will affect the longer-term effectiveness of the strategy. In-situ redevelopment is the strategy proposed for the redevelopment of Onze de Novembro. Given the phased strategy, however, coupled with the availability of a small parcel of vacant land on which to kick-start the redevelopment, there should be no need for temporary displacement to transit camps.

Relocation

- This approach shifts residents from informal settlements to formal ones, typically, at some distance from the original site. Relocation is deployed when informally occupied land is considered to be of a particularly high value (e.g.,

in or close to the core, a subway stop, etc.) and/or when the informal settlement occupies environmentally sensitive land (e.g., steep slopes or flood prone areas). While the new housing is typically of a substantially higher quality, the location is generally less favorable with respect to access to employment and transportation. Relocation also puts residents at a disadvantage to the degree that it disrupts social networks.

Retrofit

- Without necessarily reconstructing homes, this strategy introduces infrastructure upgrades into existing neighborhoods. Fraught with logistical challenges, retrofits are generally only possible when there are regular networks of streets and public rights of way and where informal slums have not developed on environmentally sensitive areas. Focused on infrastructure (water, sewers, etc.) retrofits generally do not address the quality, density or

soundness of informally built structures. This model closely resembles the

Favela-Bairro model mentioned earlier.

Slum Clearance

- This term refers to the act of demolishing the existing informal fabric to make place for new construction. Most often, this strategy is paired with an in-situ or relocation strategy in order to provide for the people affected by the clearance. Slum clearance was the principal method of driving out the urban poor to the periphery in what was described as the 'Apartheid model', during the early 21st century in Angola.⁵⁶

⁵⁶ Gianni, Benjamin. "Introduction to Urbanization." Interview. November 6, 2018. The terms outlining the four urbanization models were all explained during this interview.

The Redevelopment of Onze de Novembro

To date, no redevelopment efforts have been undertaken in Onze de Novembro, nor has it been considered for upgrading by the state administrators. The *bairro* makes up a large portion of the informal settlements that comprise the municipality of Cazenga. With an estimated population of 100,000 in an area of 2.8 km², it is likely that the area has been considered too large to be a candidate for redevelopment.⁵⁷ The master plan proposals produced by GTRUCS and Broadway Malyan pay little attention to the existing fabric of Onze, instead proposing entirely new blocks and road networks (minor and major). Neither plan appears to have considered community input or the needs of the urban poor (although pockets of land have been set aside for social housing in the GTRUCS plan). Local land use regulations, to the extent that they exist at all, are not widely

⁵⁷ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

followed.⁵⁸

Despite its perceived shortcomings, I believe Onze is an excellent candidate for redevelopment. In taking this on as a thesis project, my goal was to provide an architectural vision that would respect and respond to the social and economic needs of the community while significantly increasing the built density. Previous redevelopment efforts in Cariango -- notably Marconi -- largely ignored these issues. Addressing the challenges facing this *musseque*, namely the lack of basic infrastructure, low densities, lack of land tenure, and the disorganized pattern of passageways at the scale of the block became key goals for my thesis. Proposing 'in-situ' redevelopment, without the need for relocation or transit camps, meant devising a phased and iterative plan.

With respect to residential density and the ratio of schools to households, I used

⁵⁸ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

the targets set for the Marconi redevelopment (see set of assumptions in Appendix C below). Understanding that Marconi failed largely due to lack of government funding, it was essential to consider partnerships with the private sector both to assure the project's financial feasibility and to leverage the expertise required to bring it to fruition. Based on Gillian Walczak's research on similar partnerships in Delhi, I made the assumption that the private sector would finance and construct the replacement housing in exchange for title to, and the right to construct market-oriented housing on 30% of land.⁵⁹ Given Luanda's severe housing shortages – both for low and middle-income households – the value of this land would be extremely high. The government, in turn, would be responsible for delivering cleared land to its private-sector partners and for providing water, sewers and power. It would also guarantee any loans that its

⁵⁹ Cain, Allan. "Introduction to Angola." Interview by author. October 08, 2018.

private-sector partners might need to procure. Given Angola's dire need for foreign-investment, encouraging such public-private partnerships highly desirable.

Choosing Onze de Novembro as the focus of the investigation was an easy decision. Located only 10km from the inner core of Luanda -- to which it is connected with an established road network-- Onze is conveniently located with respect to numerous commercial and social services, and to a number of employment opportunities. Onze's location makes it highly attractive to private investment. Moreover, as the area is in close proximity the Marconi site, the decision to focus on Onze enabled me to engage in a dialogue with fellow thesis student, David Anderson, i.e., to learn from each other by comparing and contrasting different approaches to redevelopment. While Mr. Anderson focussed on multi-unit housing that would likely function under a condominium

designation and preclude self-building, I focused on freehold housing. And while the areas around Marconi were completely devoid of road networks (necessitating a “clean-slate” approach to redevelopment), I was able to experiment with maintaining portions of the existing fabric of Onze.

Understanding the Urban Fabric

Developing appropriate phasing strategies and testing density targets required an iterative, bottom-up approach. As noted, many levels of informality exist within the informal settlement itself. As a point of departure, I documented different areas and conditions within the *bairro*, calculating existing densities to verify targets. I then attempted to identify different spatial morphologies within the *musseque*. Drawing on Ilidio Daio’s presentation (on behalf of GTRUCS office), three main spatial conditions stood out 1) the main access roads, 2) the

alleyways and, 3) the patio (the courtyards around which clusters of houses were organized). As seen in Fig. 25, these three spatial conditions help to structure the social fabric of the community, and, as such, became key elements to incorporate into a responsive redevelopment building typology. Further explanation is provided below in the section entitled ***Courtyard Building Type***.



Fig. 26: Aerial photo showing the 3 spatial conditions (left), an alleyway (top-middle), a main road (top-right), and the interior courtyard (bottom-right)

I began the process of calculating residential density by isolating contrasting fabrics within the Onze *bairro*, classified through three levels of block organization. (See Appendix B) Determining these block typologies facilitated the examination of the overall site. Every block was categorized and placed into one of the three block types defined as:

Block Type 'A'

Block Type 'A' is characterized by relatively regular street networks, similar to those seen in developed areas. Residences in these blocks typically face a well-defined road, obviating the need for alleyways and clusters of inaccessible units. The depth of the block type 'A' is generally in line North American standards, namely between 40m-60m deep,⁶⁰ with minor roads further dividing the blocks into reasonable sizes. As such Block Type 'A' has

⁶⁰ Gianni, Benjamin. *Urban Design Schematics and Building Blocks*. 2018.

been characterized as a “single-depth block.” The regular road networks create clusters of these rectangular blocks.

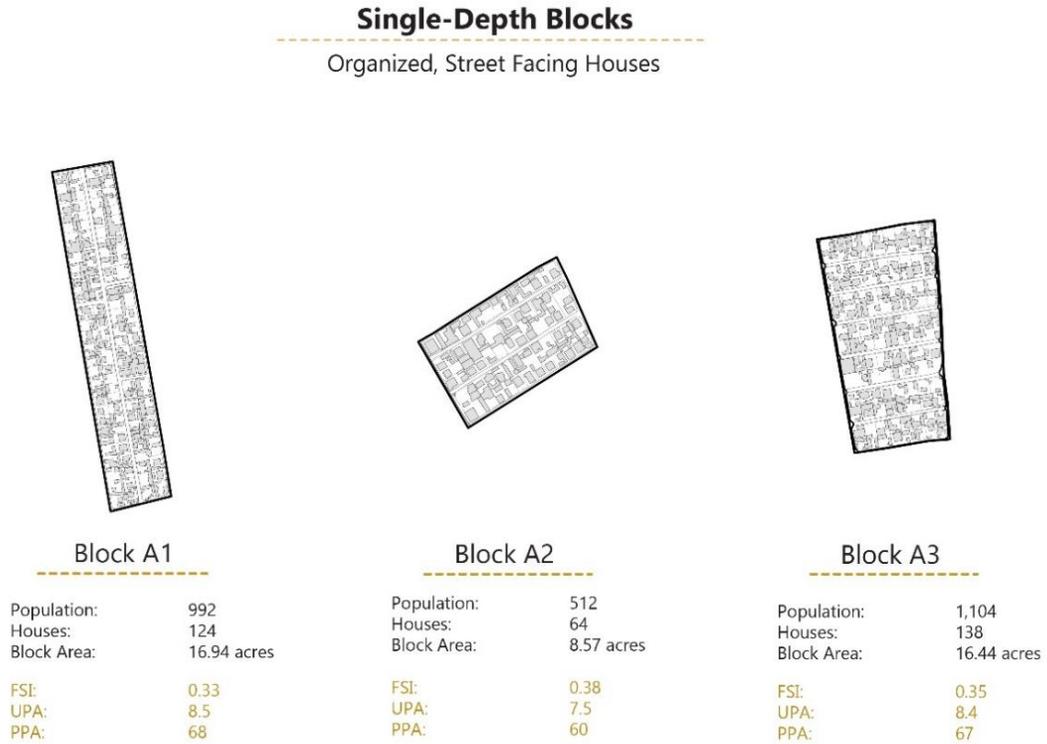


Fig. 27: Block Type 'A' broken down and calculated for density

The results of this analysis show that block type 'A' averages:

FSI: 0.35

UPA: 7.8

PPA: 62

Block Type 'B'

Block Type 'B' can be defined as a hybrid between organized and informal. In most cases, the residential fabric in these blocks is organized, with laneways running parallel to adjacent streets. These laneways are necessitated by the depth of block Type 'B', some of which are in excess of 150m. The dead-end and/or winding nature of these laneways can make it difficult to find/access units and present safety concerns for inhabitants. Given their relatively regular shape, these blocks can be salvaged through the introduction of minor streets to break them up.

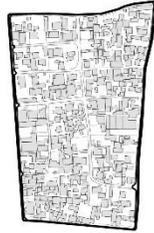
Semi-Organized Blocks

Deeper, Organized & Gridded Blocks



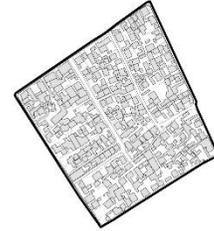
Block B1

| | |
|-------------|-------------|
| Population: | 2,512 |
| Houses: | 348 |
| Block Area: | 39.84 acres |
| FSI: | 0.36 |
| UPA: | 8.7 |
| PPA: | 70 |



Block B2

| | |
|-------------|-------------|
| Population: | 1,568 |
| Houses: | 196 |
| Block Area: | 16.63 acres |
| FSI: | 0.36 |
| UPA: | 11.8 |
| PPA: | 94 |



Block B3

| | |
|-------------|-------------|
| Population: | 1,408 |
| Houses: | 176 |
| Block Area: | 18.80 acres |
| FSI: | 0.44 |
| UPA: | 9.4 |
| PPA: | 75 |

Fig. 28: Block Type 'B' broken down and calculated for density

The results of this analysis show that block type 'B' averages:

FSI: 0.38

UPA: 9.5

PPA: 76

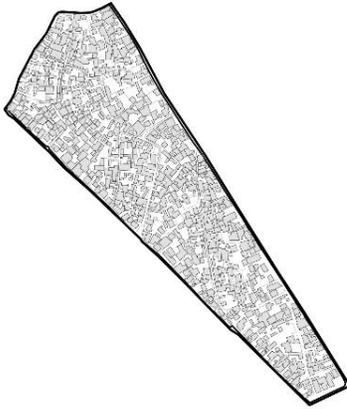
Block Type 'C'

Block Type 'C' can be characterized as informal – both in its shape and its internal organization. As such, these blocks – and the fabric they accommodate – may need to be cleared and redefined. The fabric is largely irregular, densities are a bit higher, and units can be difficult to find/access from major roads – especially as portions of these blocks can be quite deep. The standard of living within block Type 'C' tends to be lower than the previous two.

Fig. 29: Block Type 'C' broken down and calculated for density

Informal Blocks

No Structure, No Street Grid



Block 1C

| | |
|-------------|-------------|
| Population: | 2,816 |
| Houses: | 352 |
| Block Area: | 35.62 acres |
| FSI: | 0.46 |
| UPA: | 12.5 |
| PPA: | 79 |



Block 2C

| | |
|-------------|-------------|
| Population: | 784 |
| Houses: | 98 |
| Block Area: | 12.59 acres |
| FSI: | 0.38 |
| UPA: | 7.8 |
| PPA: | 62 |



Block 3C

| | |
|-------------|-------------|
| Population: | 1,856 |
| Houses: | 232 |
| Block Area: | 22.25 acres |
| FSI: | 0.38 |
| UPA: | 10.4 |
| PPA: | 83 |

The results of this analysis show that block type 'C' averages:

FSI: 0.42

UPA: 9.7

PPA: 77

As noted in figures 27 – 29 above, the average densities calculated for all three block types allowed me to estimate an overall density for Onze de Novembro. As the bulk of the structures are only one story in height, the existing FSI and UPA are significantly lower than that was planned for the Marconi redevelopment – which was comprised of 4-story structures. Additionally, the urban fabric of *bairro* Onze, while largely informal, is significantly less dense and more regular than the informal settlements surrounding Marconi. In some instances, lots are as large as 20m by 20m.⁶¹ For this reason it can be argued that a redevelopment strategy comprised of 2- and 3-story freehold dwellings, while lower in density than multi-unit buildings, would be sufficient to increase the residential density. Moreover, free and clear title to the land and the building that sits on it would both simplify the process of regularizing land tenure and accommodate self-

⁶¹ "General Assumptions and Breakdowns." E-mail message to author. March 18, 2019. An email thread containing Ilidio Daio, Professor Benjamin Gianni, and colleague Mr. Anderson regarding presumed conditions of Luanda.

building over time.

Within the boundaries of each block exists a sub-level of informality that is vital to the fabric of Luanda's *musseques*. When determining where and how to intervene, it was necessary to assess potential access to infrastructure (e.g., proximity to streets), the social structure and the urban fabric. By cataloguing these elements, I was able to identify a variety of elements, ranging from sewage and drainage and electrical groundwork to informal markets. The catalogue dissects Cariango, Onze de Novembro, and Marconi. The cataloguing of this information can be found in Appendix A.

Salvagable Road Network

Phase 1: Main Roads
Phase 2: Tertiary Roads



Fig. 30: A diagram showing the major + tertiary roads, essential to keeping the fabric of Onze

Establishing the Parameters for Urban Redevelopment

In consultation with my advisor and Allan Cain, it was determined that a redevelopment of Onze could – and therefore should -- 1) be comprised of low-rise dwellings, the organization of which respected the existing organization of the *musseque*, 2) be undertaken without resorting to relocation or transit camps, 3) benefit from a partnership with private-sector developers based on an exchange of land, 4) be designed to accommodate self-building so that owners could expand/transform their dwellings over time and, 5) address the issue of land tenure. Clear legal title to their dwellings (and in this case, the land on which they sit) is the first step in enabling the urban poor to make the transition to the middle-class. It would also enable the municipality to collect property taxes which, among other things, would allow them to recoup its investment in infrastructure.

There were lessons to be learned by looking at previous attempts at redevelopment in Cazenga municipality, namely Cariango and Marconi. Marconi's widely spaced, mid-rise buildings seem to ignore the importance of cohesion between social (public) and private life. As a result, the informal economies that normally operate in Angolan neighborhoods are largely non-existent on the site – as is vegetation and the ability to personalize space. In Cariango, the infrastructure upgrades were a major boost to the livelihoods of the inhabitants. According to the locals, levels of safety and happiness were greatly improved,⁶² As the structural soundness and overall quality of housing were not addressed, however, the capacity to add on to existing structures is greatly limited. The redevelopment of Onze de Novembro will attempt to avoid the shortcomings of these projects while working in tandem with appropriate policies.

⁶² "Site Visit and Discussion with the Locals in Cariango" Interview by author. October 11, 2018

Design Proposal

PHASE I: Rationing the Freehold Unit

Based on the analysis of Onze de Novembro, it was fitting to apply a phased and incremental redevelopment strategy. Choosing the freehold unit, as previously stated, addresses the issue of land tenure. The use of the freehold building type can be justified inasmuch as 1) the units are wholly owned within the boundaries of the lot lines, 2) it enables owners to expand units upward (and/or outward onto terraces -- see designs below), 3) this expansion allows for the possibility of a rental unit at the ground floor, with a corresponding increase in residential density, 4) it allows for the incorporation of private outdoor spaces in the design of all units and, 5) units are designed to address cultural preferences and climatic conditions (cross ventilation etc.). Working within the framework of freehold

units has also allowed me to explore different building types and variations thereof. In all cases, unit designs work with the existing urban fabric of Onze. It also bears noting that the generic block sizes with which I'm working would also accommodate multi-unit buildings in locations where a higher density might be desirable.

The proposal explores two freehold types: row houses and courtyard houses.

The repetitive nature of the row house allows for maximum density and efficiency; it is also the most cost effective. It is ideally suited for blocks with a depth of between 40 and 60 meters. Through design exploration I determined that the zero lot-line courtyard type is more efficient in shallower blocks, as units can be built back-to-back as well as side-to-side. It also offers greater flexibility with respect to shared outdoor spaces. Both types accommodate expansion and self-building, whether upward (an additional story) or outward onto upper-level

terraces. Residents will be at liberty to maximize their buildable area without encroaching on the spaces occupied by others. The daily life of Angolans is lived mostly outside of the house and as such, relationships between neighbours are quite strong. The design of both types will reflect this.

Row House

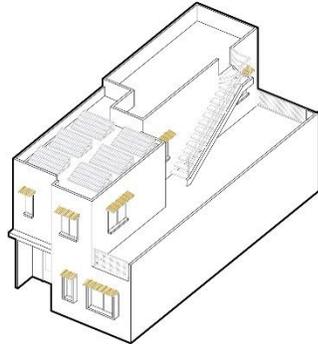
I began my exploration of the row house by working with a standard 6m x 12m footprint on a 6m-wide lot, whose depth varies with the depth of the block. The dimensions corresponded with the module commonly used for row houses in North America.⁶³ Over the course of the design process, however, the length of the house expanded to 13m. While this building type incorporates no courtyard at grade, it accommodates a terrace at the 2nd level, whether at the back or side of the house. Depending on the

⁶³ Gianni, Benjamin. *Urban Design Schematics and Building Blocks*. 2018.

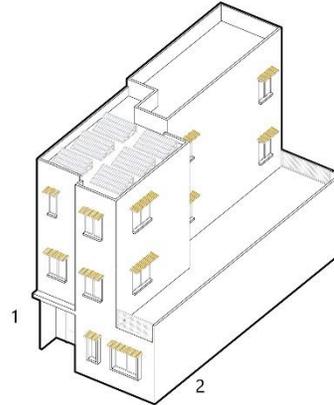
depth of the block, there is also room for a small yard at the rear of the dwelling. In the context of typical block, all row houses front streets, from which they can be accessed directly, and back onto a mid-block laneway, from which they are accessible by car. All units are provided with a garage at grade at the rear.

From the outset I made a distinction between the rowhouses facing East-West streets (row house Type A), which were intended to be primarily residential, and those along north/south streets (row house Type B), which were intended to support small-scale commercial activity at grade. Pre- (base) and post-transformation phases of each are shown in the figures below.

East-West Residential Unit Type "A"

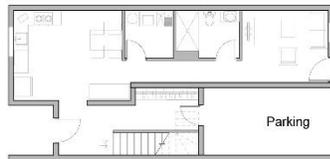


1. Standard Unit Type "A"
 GFA - 106 sq.m.
 3 Bed, 2 Bath
 Terrace - 35 sq.m.

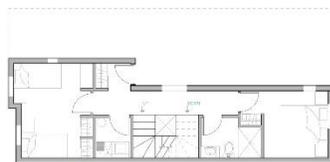
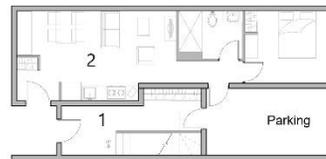


1. Transitioned Unit Type "A"
 GFA - 108 sq.m.
 3 Bed, 2 Bath
 Terrace - 35 sq.m.

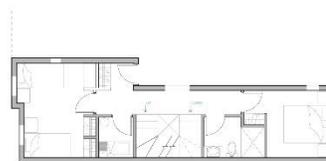
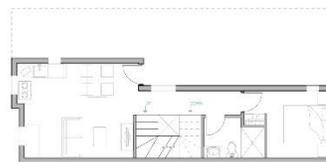
2. Rentable Unit Type "A"
 GFA - 46 sq.m.



Ground Floor



Second Floor



Third Floor

Fig. 31: The plans for Unit Type 'A', strictly hosting residential along E-W streets, whose units are flexible to change as economy matures

East-West Residential Unit Type "A"

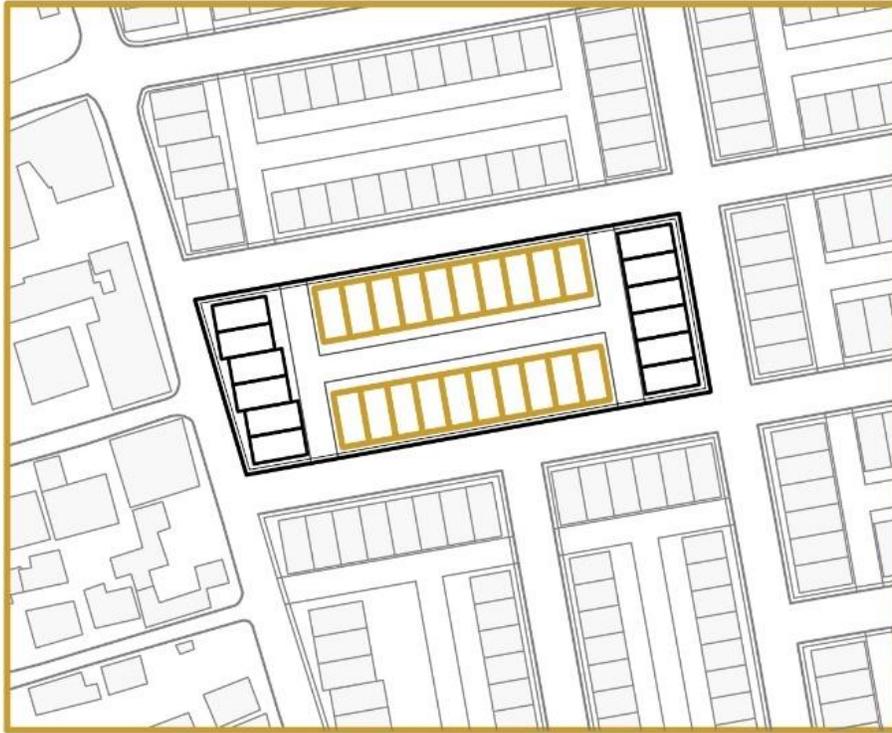


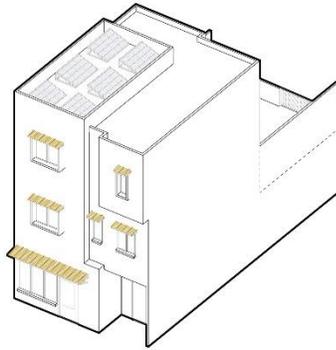
Fig. 32: Unit organization within a typical block

The Unit Type 'A' starts off as a 2-storey, 3-bed, 2-bath unit of 85 sq. meters. If and as homeowners wish to expand, the dwelling can transform into a 3-storey, 3-bed and 2-bath unit with a separate, 1-bedroom, 1-bath rental unit at grade.

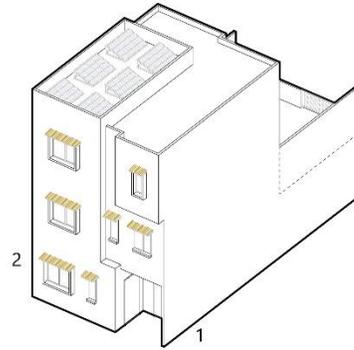
Above the first story, a continuous, north/south terrace divides adjacent units

from each other. These breaks between houses allow sunlight into the middle of the block. The split along the long dimension of the lot is inspired, in part, by ELEMENTAL's Quinta Monroy housing in Chile.

North-South Commercial Ground Floor Unit Type "B"



1. Standard Unit Type "B"
 GFA - 108 sq.m.
 3 Bed, 2 Bath
 Terrace - 32 sq.m.
 Commercial - 46 sq.m.



1. Standard Unit Type "B"
 GFA - 108sq.m.
 3 Bed, 2 Bath
 Terrace - 32 sq.m.
 Commercial - 46 sq.m.
 2. Rentable Unit Type "B"
 GFA - 46 sq.m.

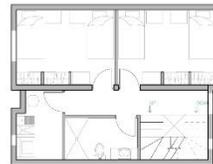
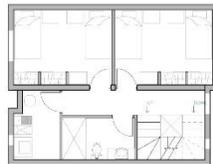
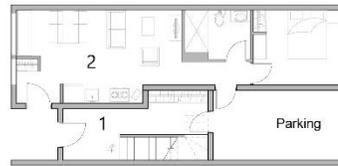
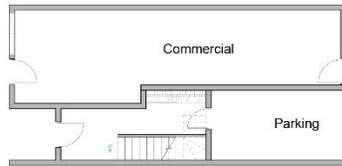


Fig. 33: The plans for Unit Type 'B', hosting ground floor dedicated commercial and running along N-S streets, whose units are flexible to change as economy matures

North-South Commercial Ground Floor Unit Type “B”

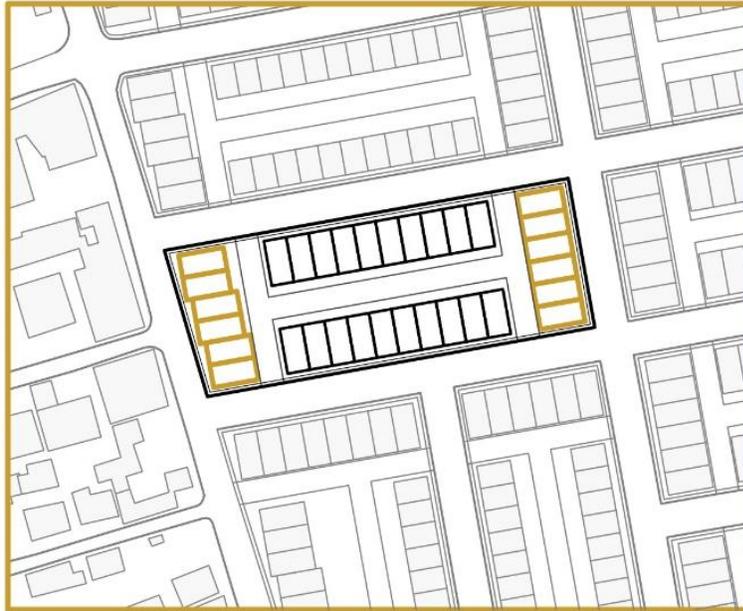


Fig. 34: Unit organization within a typical block

The Unit Type ‘B’ is a 3-storey dwelling that incorporates a 3-bed, 2-bath unit on levels 2 and 3 and commercial space (along with a rear-facing garage) at grade. If and as homeowners wish, commercial space can be transformed into a 1-bedroom rental unit. This unit type includes a generous terrace at the 2nd level at the rear of the house. Adjacent units form a continuous 3-story street wall along north/south streets.

Phase 1 of unit types 'A' and 'B' is the base unit replacement housing, as provided by the private-sector proponent. Phase 2 represents opportunities for expansion and/or transformation by owners.

Courtyard Buildings

The design of the courtyard type was not based on any particular precedent but rather resulted from the need to accommodate shallower blocks (i.e., those with a depth of less than 40 m). Shallow blocks, in turn, were a result of attempting to accommodate portions of the existing fabric of Onze (as outlined in Appendix A). Arguably the courtyard type also resonates with many of the existing dwellings in the informal settlement, which are organized around grade-level courtyards. As noted above, the zero-lot line building offers the ability to develop at higher residential densities as units can be built back-to-back as well as side-to-side. Each of the 4-unit modules are organized around a subdivided courtyard as seen in Figure 36.

East-West Residential Courtyard Unit Type "C"

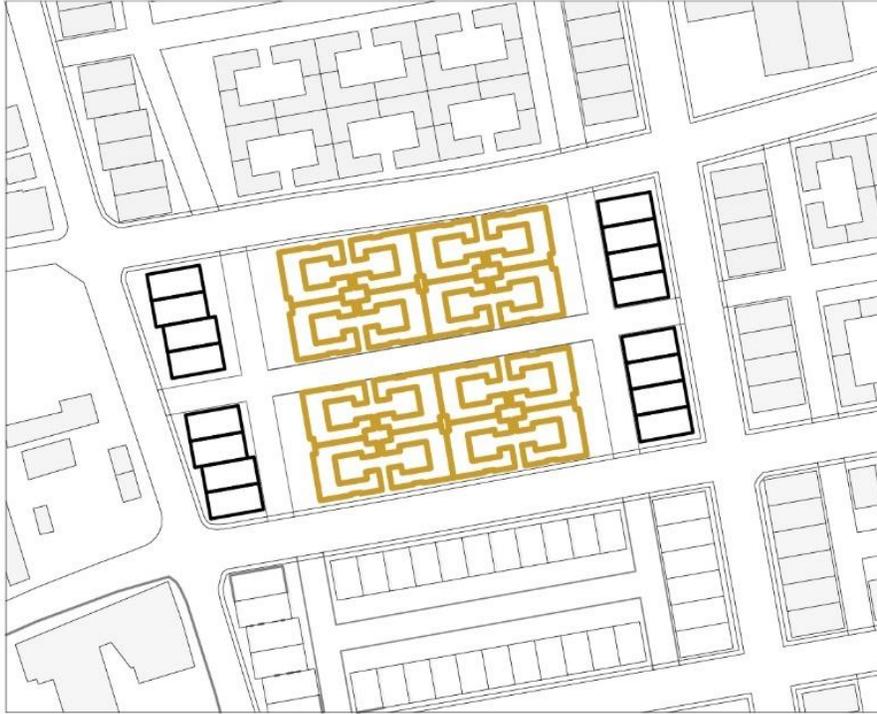
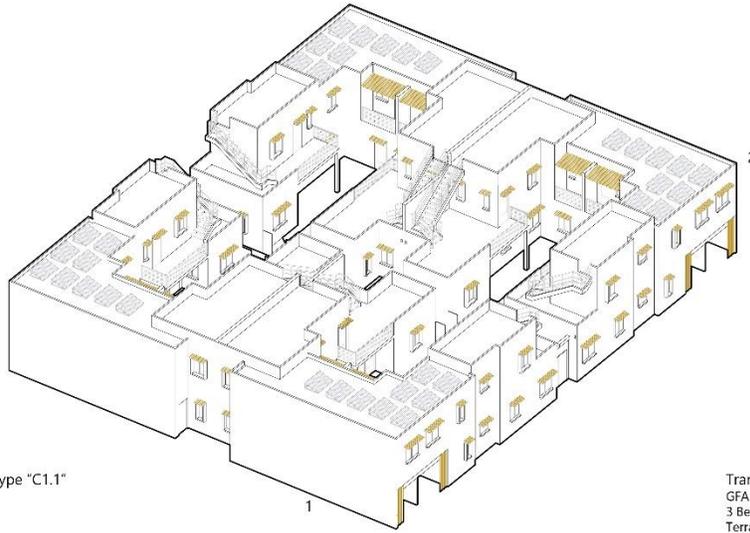


Fig. 35: Unit organization within a typical block

East-West Residential Courtyard Unit Type "C"



1. Standard Unit Type "C1.1"
 GFA - 106 sq.m.
 3 Bed, 2 Bath
 Terrace - 20 sq.m.
 Private Courtyard - 32 sq.m.

Transitioned Unit Type "C1.2"
 GFA - 106 sq.m.
 3 Bed, 2 Bath
 Terrace - 20 sq.m.
 Private Courtyard - 32 sq.m.

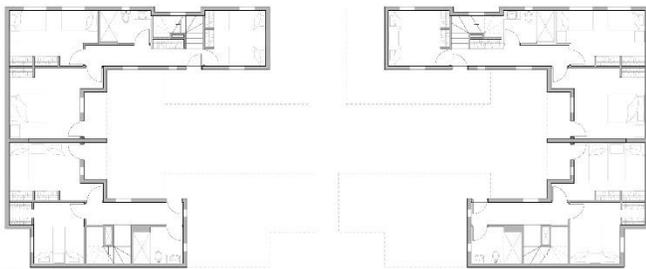
2. Standard Unit Type "C2.1"
 GFA - 123 sq.m.
 3 Bed, 2 Bath
 Terrace - 32 sq.m.
 Private Courtyard - 28 sq.m.

2. Transitioned Unit Type "C2.2"
 GFA - 100 sq.m.
 3 Bed, 2 Bath
 Terrace - 24 sq.m.
 Semi-Private Courtyard - 28 sq.m.

3. Rentable Unit Type "C3"
 GFA - 36 sq.m.



Ground Floor



Second Floor

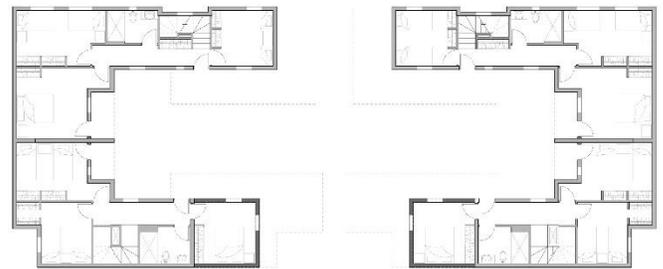


Fig. 36: Unit Type 'C': four, 2-story units are arranged around a courtyard, which is subdivided for the private use of each of the dwellings. Each dwelling also has dedicated terrace space at the 2nd level.

Unit Planning: Standards and Assumptions

Much of the research leading to the design involved setting, testing, and modifying goals for the typical unit in Luanda. In so doing I was able to draw on local stakeholders and architects in Luanda. Based on data provided by GTRUCS office, the standard replacement should accommodate a household of eight people,⁶⁴ with some variation for larger and smaller households. Standard units should include three bedrooms (1 for the parents, 1 for the boys, and 1 for the girls), but should also adapt to accommodate grandparents or visiting relatives. All rooms should have windows, and the unit as a whole should benefit from multiple orientations and cross ventilation for passive cooling. In addition to meeting these standards, all units I've designed include a laundry room and a garage. As explained in Appendix A, Angolans place a high priority on private

⁶⁴ Daio, Ilidio. "Architecture & Planning in Luanda." Interview by author. October 10, 2018.

automobiles as means of transportation. Households that do not have access to cars can use the garage for storage, economic activities, or to expand their living space.

Both the row house and the courtyard type are designed to transform over time to adapt to changing economic circumstances and household structure. Units can subdivide and portions can be rented out should the owners wish to generate income. Each unit has access to a generous, private outdoor space directly accessible from the kitchen. Where such spaces are adjacent to each other (as with the courtyard dwellings) attempts were made to mitigate the negative effects of proximity, i.e., seeing and hearing neighbors. In all cases, residents would be given title to their units, allowing security of tenure and enabling self-building. Roofs of each unit are equipped with photovoltaic panels, with portions designated for other uses (e.g., drying laundry).

This thesis proposes several unit types and variations specific to the block depth and orientation of streets. Both row house types work within the same 6 m x 13 m footprint with a load bearing running the long dimension down the middle to accommodate the standard 3m precast concrete beams used in residential construction in Luanda. Modular design keeps construction costs low and make the units easier to transform. The east/west Courtyard (Type 'C') is also based on a 3m module. Light wells were introduced along the lot-line party walls to allow for cross ventilation. Courtyard dwellings are organized into modules of four units, which are mirrored along both the vertical and horizontal axes.

Figure 37 shows initially, how these unit types are deployed in the larger urban fabric.

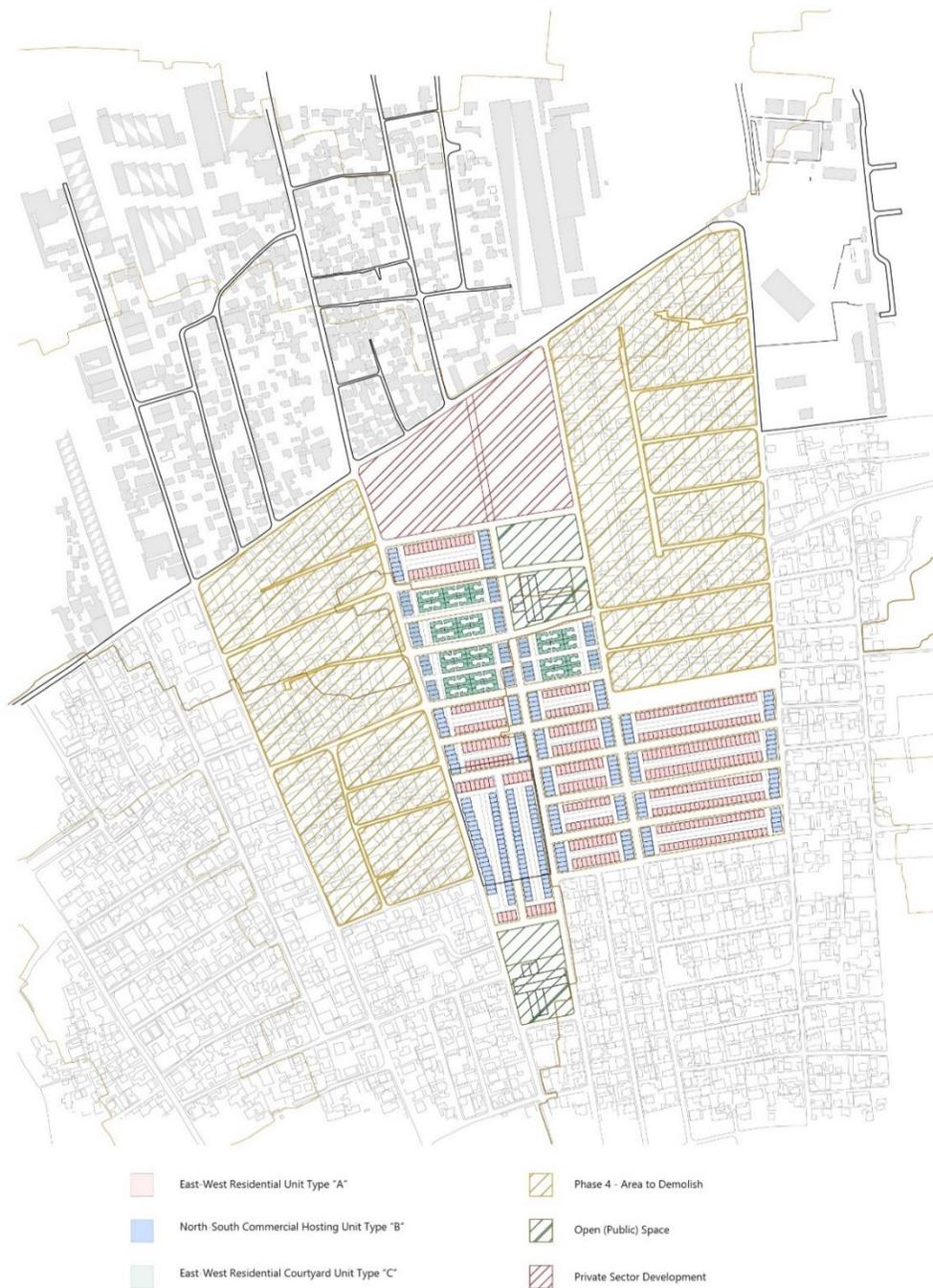
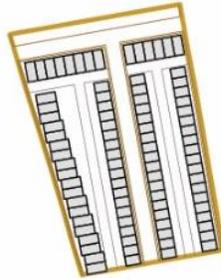
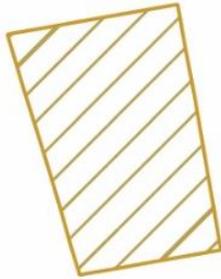


Fig. 37: The redevelopment proposal with a legend indicating where the three-unit types will be deployed, as well as the location of schools, open (public) spaces, and areas set aside for private-sector development

PHASE II: Initial Site of Intervention

The in-situ redevelopment plan for Onze began with a search for an empty site on which to begin constructing replacement dwellings. I was able to identify a small open lot with an area of 3.67 acres. Using the rowhouse type, I was able to fit 90 units on the site, primarily Type 'B'. While my preference is for blocks that run east/west (along which all residential units receive north light), the dimensions of this site necessitated north/south blocks.

Having built out this site to its maximum capacity, I was able to shift my attention to adjacent blocks. Understanding that I could demolish blocks containing equal to/or less than the 90 new constructed, I identified five adjacent blocks could be demolished. Together they comprised an area of 10.85 acres or approximately three times the area of the initial site. (See Fig. 38)



Phase 1 of the "Favela-Bairro" inspired re-urbanization starts with this initial empty site. It produces 90 new built freehold units which paves way for further development in the later phases.

Fig. 38: Diagram will show the initial site of intervention as well as the proposed development on that site. The diagram will be used to ration the incremental redevelopment through increased density.

PHASE III: Incremental Urban Redevelopment

In addition to providing housing of a higher quality and density, the goal of the redevelopment was to regularize the urban fabric. Such regularization, would respect, wherever possible, the existing urban structure so that transformation could be done incrementally, in phases. Moving forward with the phased redevelopment, the following assumptions were used:

- Blocks should be between 40 and 60 meters deep and no longer than 240 meters long (with blocks less than 40m best suiting the courtyard unit),⁶⁵
- Wherever possible, blocks should run east-west with east/west streets being primarily residential in nature,
- North/South streets will support both residential and commercial activities; as such, units on these streets should be flexible enough to support ground floor commercial,
- All units should have a street address and be accessible by a 9-meter fire-lane.

Along with the above, targets for density and for the ratio of schools to

⁶⁵ Gianni, Benjamin. *Urban Design Schematics and Building Blocks*. 2018.

households were set (See Appendix C). The incremental redevelopment of Onze de Novembro is predicated on the assumption that each successive phase of development produces higher densities than the previous phase, creating a snowball effect of redevelopment across the entire site.

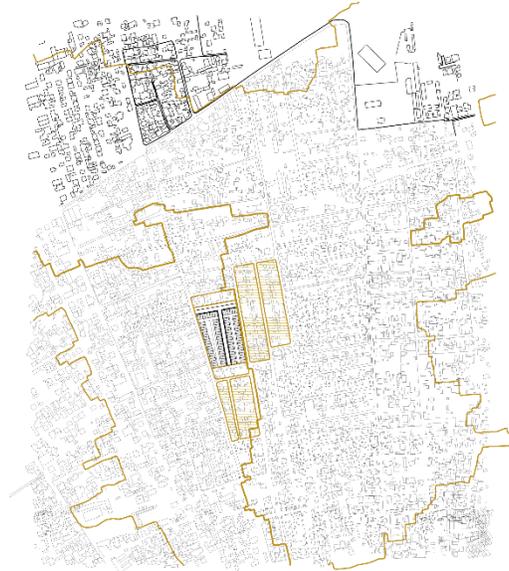
Remembering the collaboration with the private sector was key to the undertaking, it became a priority to develop in such a way the 30% of the land under redevelopment could be transferred to private-sector partners for market-oriented development. The arterial road along the northern boundary of the area under consideration connects directly into Luanda's central business district. As such, it is likely the most suitable (and valuable) area for private-sector development. With this in mind, phasing was undertaken to move in the direction of this artery as quickly as possible. By the 3rd phase of redevelopment, the private-sector was given their portion of the land, as seen in Figure 39. From there, the redevelopment process was free to spread to the East, South and West – with the goal of redeveloping the entirety of Onze de Novembro.

INCREMENTAL PHASING

Onze de Novembro Redevelopment Plan

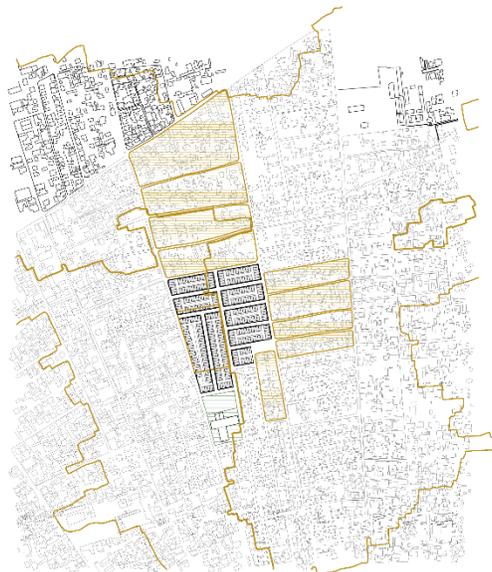
Phase 1

Units Built: 90
Acres Developed: 3.7
Acres Freed for Redevelopment: 10.6



Phase 2

Units Built: 234
Acres Developed: 10.6
Acres Freed for Redevelopment: 33.8
Public (Open) Area Freed: 0.9
1 School Built

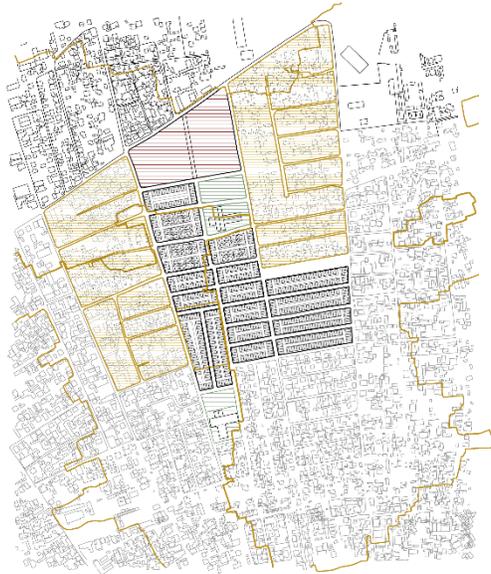


INCREMENTAL PHASING

Onze de Novembro Redevelopment Plan

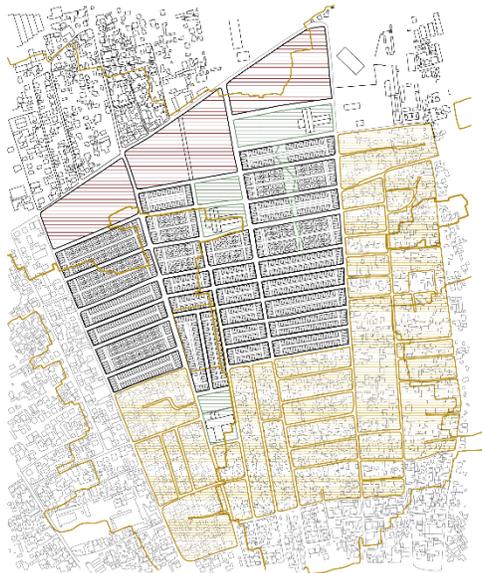
Phase 3

Units Built: 460
Acres Developed: 33.8
Acres Freed for Redevelopment: 45.2
Private Development Area: 9.6
Public (Open) Area Freed: 3.1
1 School Built



Phase 4

Units Built: 812
Acres Developed: 45.2
Acres Freed for Redevelopment: 72.5
Private Development Area: 18.3
Public (Open) Area Freed: 5.3
1 School Built



INCREMENTAL PHASING

Onze de Novembro Redevelopment Plan

Onze de Novembro Redevelopment Plan

Units Built: 1596
Units Demolished: 779
UPA: 23.6
Private Development: 29%
Open (Public) Area: 13%



Fig. 39: Set of diagrams showing the process of the phased development through to the 5th phase. Increased density in development allows for increased areas for successive incremental development.

PHASE VI: Axonometric and 3-Dimensional Renders



Fig. 40: Street view render of Row House Unit Type "A"



Fig. 41: Courtyard balcony view render of residential Unit Type "C"



Fig. 42: Bird's eye view render of the row house and courtyards arranged into blocks

Conclusion

Building on the extensive research undertaken by DW Angola and its affiliates, this thesis seeks to map out a strategy for the phased redevelopment of Luanda's Onze de Novembro neighborhood. The challenge was to do this in such a way as to minimize the impact on residents and without disrupting existing social networks. The replacement housing had to accommodate a range of economic activities – both formal and informal -- in the short term, while being market-friendly enough to transition to stable, middle class housing in relatively short order. As they were to be given title to the replacement units into which they were relocated, residents were being provided with a valuable commodity that would significantly change their economic circumstances.

Careful urban ideas, appropriate densities, and sensitive incremental development were all components of a successful redevelopment. Luanda's

economy is weak and government coffers are low – largely due to corruption.

Most residents live in low-density informal settlements which stretch far out onto the urban periphery. By regularizing land title and forging partnerships with the private sector, this project aspires to address the concerns and issues discussed at length in this document.

Were I to have the opportunity to continue working on this project, the next steps would include:

- Presenting the project to stakeholders in Luanda (including private developers) for further feedback.
- Further research in to the legal and policy frameworks that could make this happen, including further research into similar projects elsewhere.
- Further research into construction materials and methods in Luanda

As a final note, the building designs proposed in this thesis are not intended as definitive recommendations for the musseques of Luanda. Rather, they are

intended as placeholders to test strategies and provide a vision for what a redeveloped Onze de Novembro might look like. As the design investigation of this thesis moved iteratively between the urban scale and the scale of the unit, the proposed buildings are largely the embodiment of targets and assumptions. At this stage in the investigation it was important to formulate simple, legible solutions with which to determine and demonstrate what was possible.

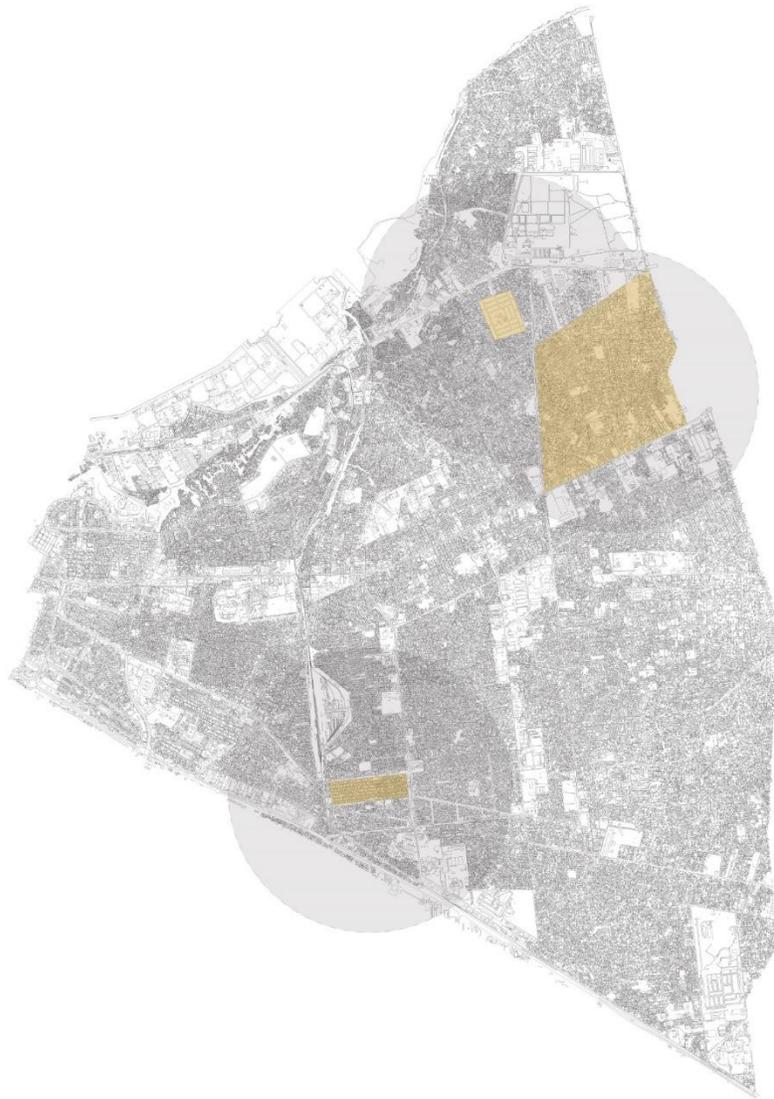
While this thesis focused on freehold housing, the larger redevelopment of Onze would likely include a variety of types of replacement housing, including low-rise, multi-unit buildings. And while a thoughtful, practical and flexible approach to the built environment is crucial to the success of any redevelopment, it is equally important that the process be guided by the appropriate policies and procedures. The overarching goal of this thesis is to propose a viable means of

moving the Angolans to a higher standard of living while increasing the housing supply (both market and subsidized) in the process.

Work on this topic will continue well beyond the academic term. I am hoping to work more extensively with Allan Cain and DW Angola to identify new ways of redeveloping Luanda's slums.

Appendix A: Urban Fabric Catalogue

CATALOGUE



Etai Atias

CATALOGUE

Table of Contents

CARIANGO ----- **3**

- INFRASTRUCTURE
 - Sewage and Drainage
 - Street Lights and Electrical
 - Road Conditions
- SOCIAL STRUCTURE
 - Informal Life
 - Street Width
 - Transportation Culture
- URBAN FABRIC
 - Typical Block
 - GIS Data

ONZE DE NOVENBRO ----- **6**

- INFRASTRUCTURE
 - Sewage and Drainage
 - Street Lights and Electrical
 - Road Conditions
- SOCIAL STRUCTURE
 - Informal Life
 - Street Width
 - Car Presence
- URBAN FABRIC
 - Typical Block
 - GIS Data

MARCONI ----- **9**

- INFRASTRUCTURE
 - Sewage and Drainage
 - Street Lights and Electrical
 - Road Conditions
- SOCIAL STRUCTURE
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 - Street Width
 - Car Presence
- URBAN FABRIC
 - Typical Block
 - GIS Data

CARIANGO

Infrastructure

Electrical Stability

Cariango is littered with working street lights, electrical poles and electricity boxes. The presence of electricity uplifts the living conditions and content of the inhabitants. As such, government introduced free Wi-Fi to the entire neighbourhood.



Sewage and Drainage

Sewage caps can be seen around the neighbourhood. Paved roads allow for proper sewage and drainage in the streets. Proper sewage and drainage remedies the recurring issue of flooding in the area.

Road Conditions

Cariango went through upgrading a decade ago, adding a level of paved concrete road to the infrastructure of the area. This added an element of navigability, safety and formal order within a somewhat informal settlement.

CARIANGO

Social Structure

Informal Markets

Although having gone through a government sponsored upgrade of infrastructure, the informal markets of Cariango are still alive and well. A majority of the country lives off of these markets.



Transportation Culture

The presence of cars found throughout Luanda is evident in Cariango. Cars can be found everywhere in the area showing signs of importance of transportation.

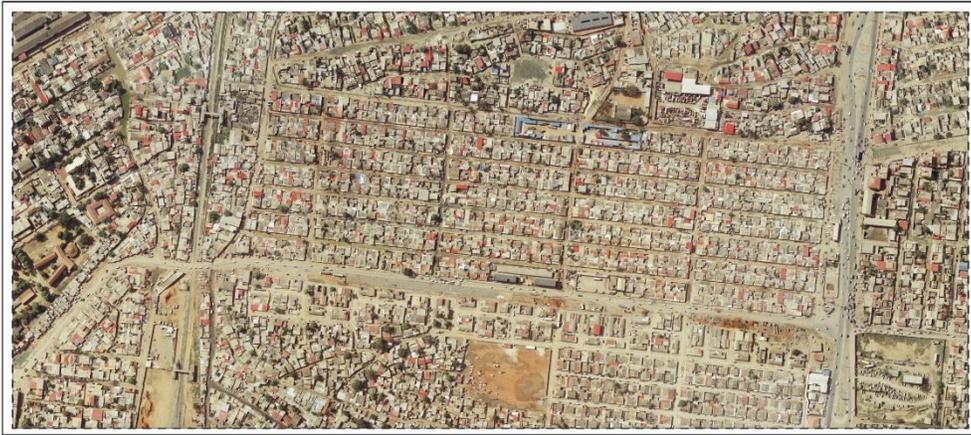
Street Width

The width of the streets is a vital component to the social fabric of the area. Houses in close proximity to one another encourages a cohesive social lifestyle, and the street widths of Cariango promote this culture.

CARIANGO

Urban Fabric

Hi-Res Aerial Shot



GIS Data



The ability to obtain high quality and very accurate data from the research trip allows for careful analysis of the site. Cariango is an area with a very organized and structured street grid. This in essence has led to easy upgrading and improves the health, safety and overall will to improve one's own living conditions to maintain and uphold a higher standard of living. Informal sprawl is limited to the confinements of the proper street grid, ensuring no alleyways caused by thick block widths.

ONZE DE NOVEMBRO

Infrastructure

Road Condition

The earth of Onze de Novembro is a clay soil. As the site has never been properly developed, the area is prone to flooding. Roads are very wide in some cases, and very narrow in others. No proper boundaries are set into the fabric.



Sewage and Drainage

Onze de Novembro lacks any clear and distinct form of drainage or sewage. As a result, trash can be oft found laying along the road, and flooding is a constant issue in the area. Sewage pipes are said to be present in the infrastructure, however do run water through to the inhabitants.

Electrical Stability

Electrical lines are running through most major streets and sub streets, however much like most of the infrastructure in the site, they do not provide electricity to the people of the area.

ONZE DE NOVEMBRO

Social Structure

Informal Markets

Being an informal settlement void of any upgrading or urban intervention, Onze de Novembro inhabitants live mainly off of informal economies. Informal markets as such are vital for their daily life.

Transportation Culture

Luanda's urban sprawl has reached a level to where cars have become a primary and necessary means of life for Angolans.



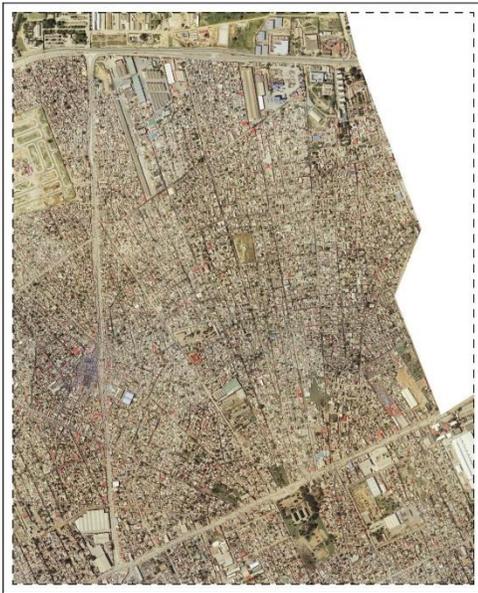
Street Width

The width of the streets is a vital component to the social fabric of the area. While the road width is larger than the standard, social life still thrives due to the informality of the streets. Improper streets mean sprawl onto the road networks become common.

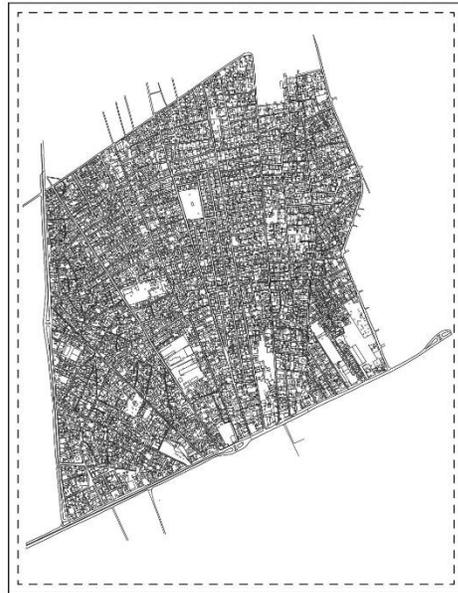
CARIANGO

Urban Fabric

Hi-Res Aerial Shot



GIS Data



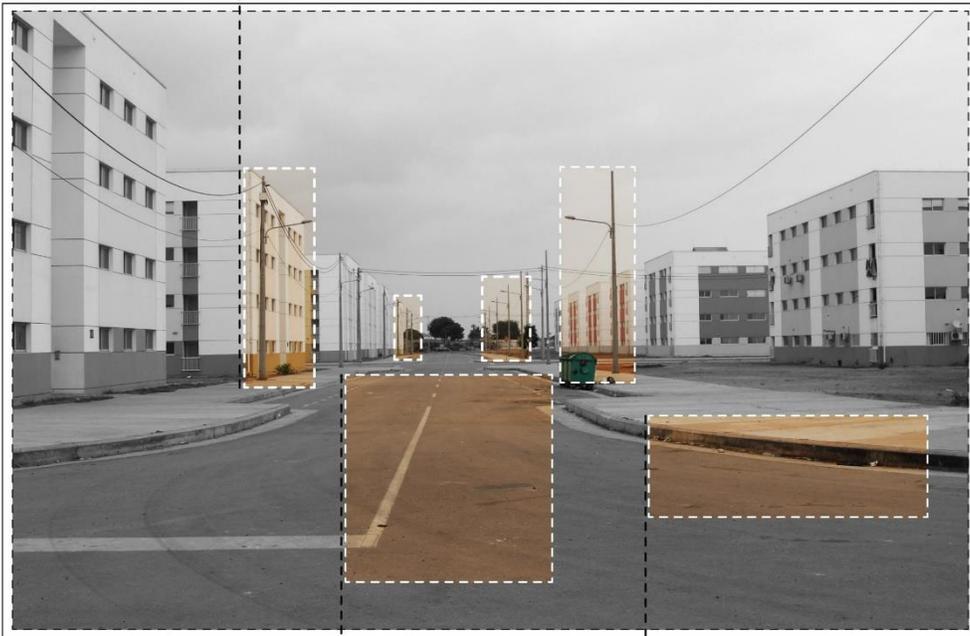
The ability to obtain high quality and very accurate data from the research trip allows for careful analysis of the site. Onze de Novembro is a large site populated largely under informal conditions. Roads are not paved, there is no electricity, nor running water. Sewage, drainage and other basic infrastructural needs are also neglected. While there exists some level of structure within the road networks, there are prevalent issues of navigation, policing, and basic healthy living due to the aforementioned reasons.

MARCONI

Infrastructure

Electrical Stability

Marconi is a fresh development on a previously empty lot. Electricity is present throughout the built project, and sourced through to the buildings that have been completed.



Road Conditions

An established road network has been established, with proper block organization. Lane lines are drawn into the paved roads.

Sewage and Drainage

As Marconi is a new development built in partnership with private investors, the area is complete with all the necessary sewage, drainage, and other such basic infrastructure.

ONZE DE NOVEMBRO

Social Structure

Transportation Culture

The presence of cars, or lack thereof in this case, demonstrates the lack of inhabitants in the area. Marconi is an unsuccessful project, as shown by lack of any social living characteristics, such as cars.

Informal Markets

While Marconi planned for density upgrading, the project was done vertically, creating a culture of disconnect and social neglect. There is no opportunity of informal economies to thrive through the rigidly built infrastructure of the site.



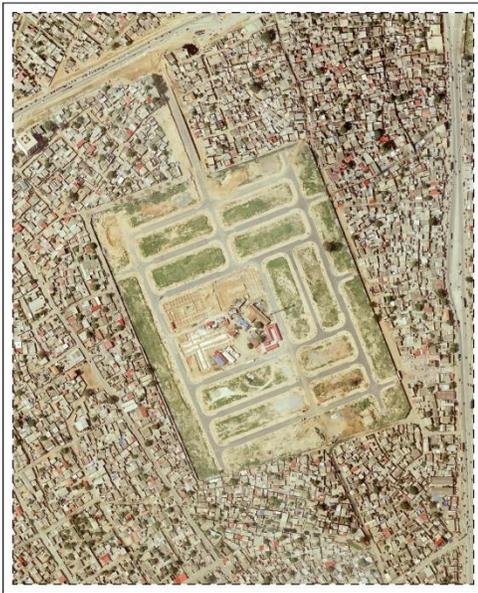
Street Width

Marconi's buildings do not consider the importance of social life in the designed project. The lack of proximity between buildings show a lack of importance set into social interactions between the inhabitants. No character to the units of the inhabitants are a result as such. Distance between across the street spans 34m, quite a large distance to travel from 1 unit to another.

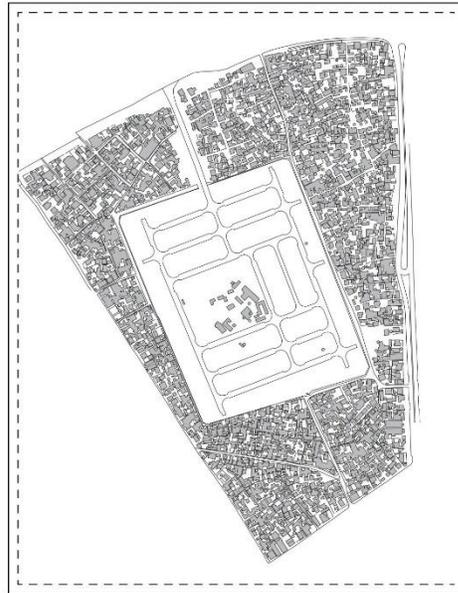
MARCONI

Urban Fabric

GIS Data

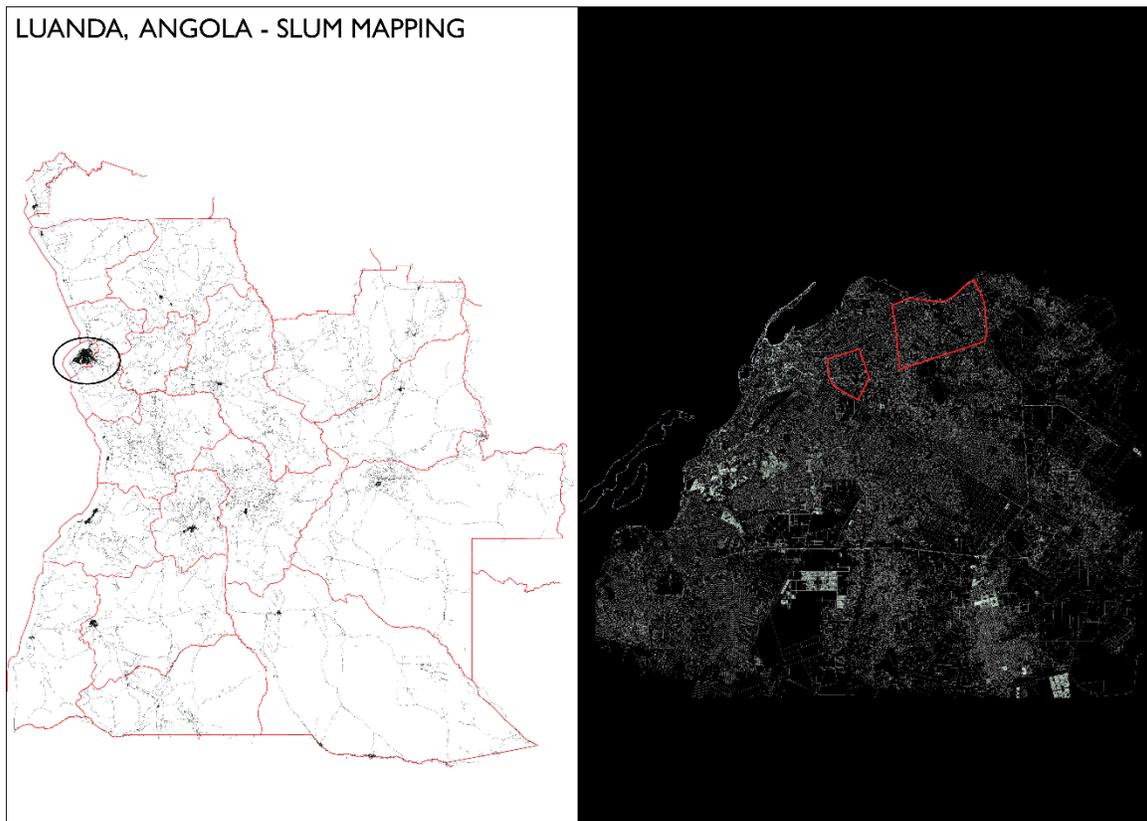


GIS Data



Marconi was a re-urbanization project completed with aid of private investors, backed by the Angolan government. Due to the lack of care for socio-economic planning, this project never was completed, and remains a half-finished ghost town in the middle of a very densely populated Cazenga municipality. The GIS data and aerial photos allow for careful dissection of the site and the goals attempted to be achieved for Marconi. This data allows for me to analyze and understand the main targets sought by the government for new development in informal settlements. Density targets, schools per capita, and other necessary figures were determined due in large part to the figures planned for Marconi, all aided with the data obtained for this site.

Appendix B: Concept Maps



SLUM DENSITY & DEVELOPMENT MAPPING

CAZENGA SLUM - LUANDA, ANGOLA
POPULATION: 800,000 AREA: 37km²



OTTAWA, CANADA



CAZENGA SLUM - LUANDA, ANGOLA
POPULATION: 800,000 AREA: 37km²



KISERA SLUM - NAIROBI, KENYA
POPULATION: 100,000 AREA: 4.5km²



LOS ANGELES, USA



KAYELITSMA SLUM - CAPE TOWN, SOUTH AFRICA
POPULATION: 400,000 AREA: 38km²



LONDON, ENGLAND



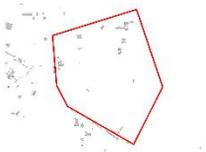
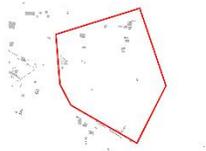
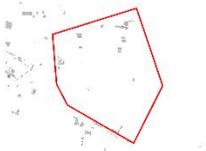
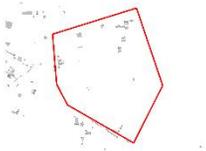
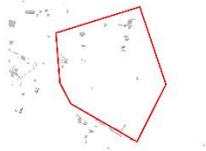
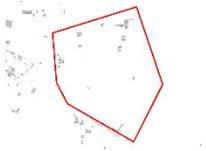
CIUDAD NEZA SLUM - MEXICO CITY, MEXICO
POPULATION: 1,300,000 AREA: 64km²



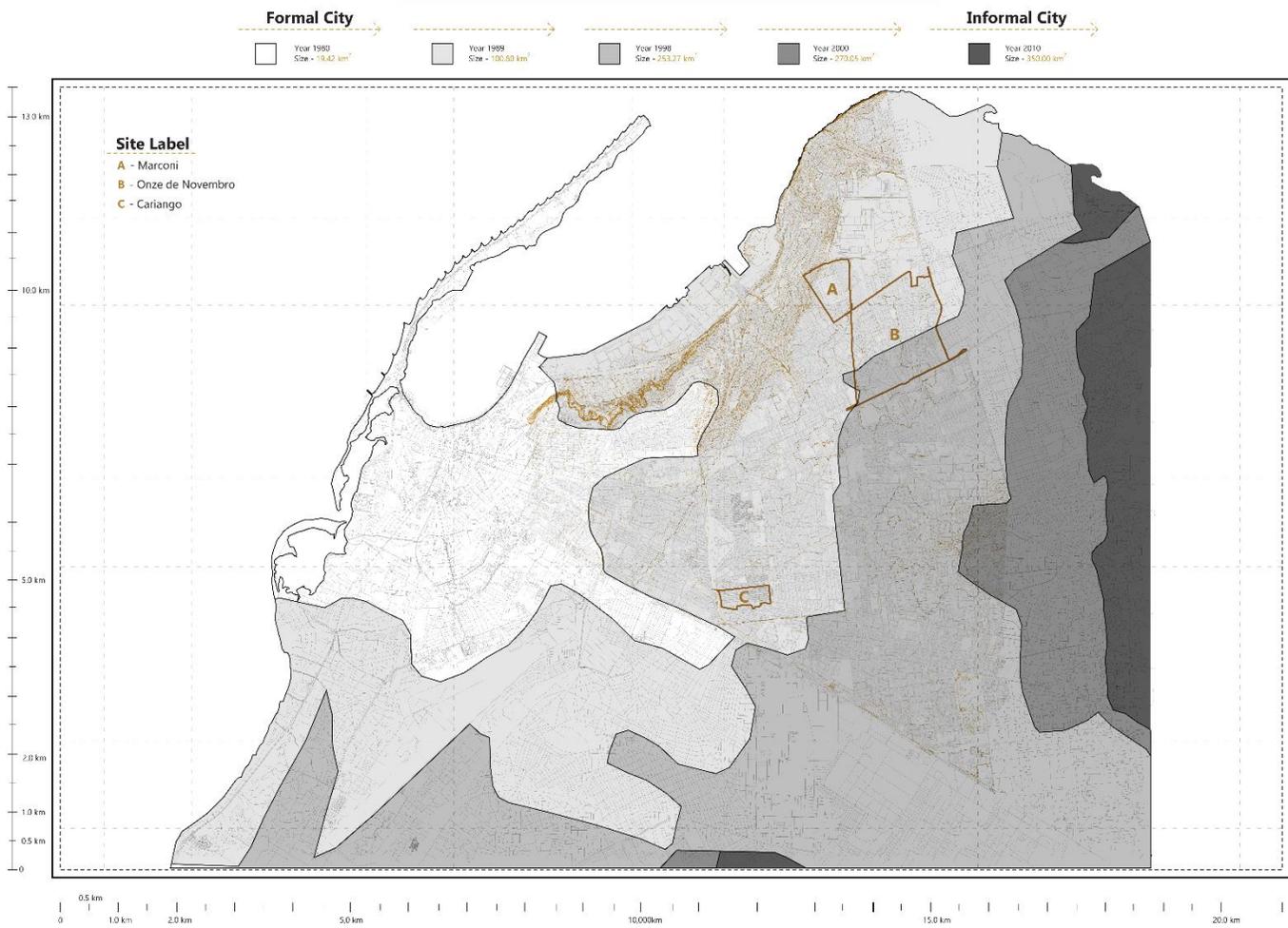
PARIS, FRANCE



BRALAY SLUM - MUMBAI, INDIA
POPULATION: 1,000,000 AREA: 2.20km²



LUANDA MAP - Urban Growth Post-Civil War



CAZENGA MAP - SITES OF FOCUS

Cariango Site

House Count - 742 FSI - 0.25
Site Size - 73.3 acres UPA - 10.1
Population - 5,536 PPA - 80.9

Marconi Site

House Count - 2,492 FSI - 0.43
Site Size - 150.7 acres UPA - 16.5
Population - 19,936 PPA - 132.3

Onze de Novembro Site

House Count - 11,218 FSI - 0.39
Site Size - 608.1 acres UPA - 16.1
Population - 85,146 PPA - 128.8



ONZE DE NOVEMBRO - Urban Development Strategy

Analyzing Infrastructure and Phasing

Remanaging Existing
Street Networks

Salvagable Road Network



Analyzing Redevelopment and Phasing

Initial Moment of Redevelopment and Plan of
Proposal for Future Development in Phasing

Re-Development Phases



ONZE DE NOVEMBRO MAP - Block Typology

Block Mapping

Different Block Typologies Identified

Typology Breakdown

Three Types of Fabric



Single-Depth Block



Organized Block



Informal Block



ONZE DE NOVEMBRO MAP - Block Typology

Single-Depth Blocks

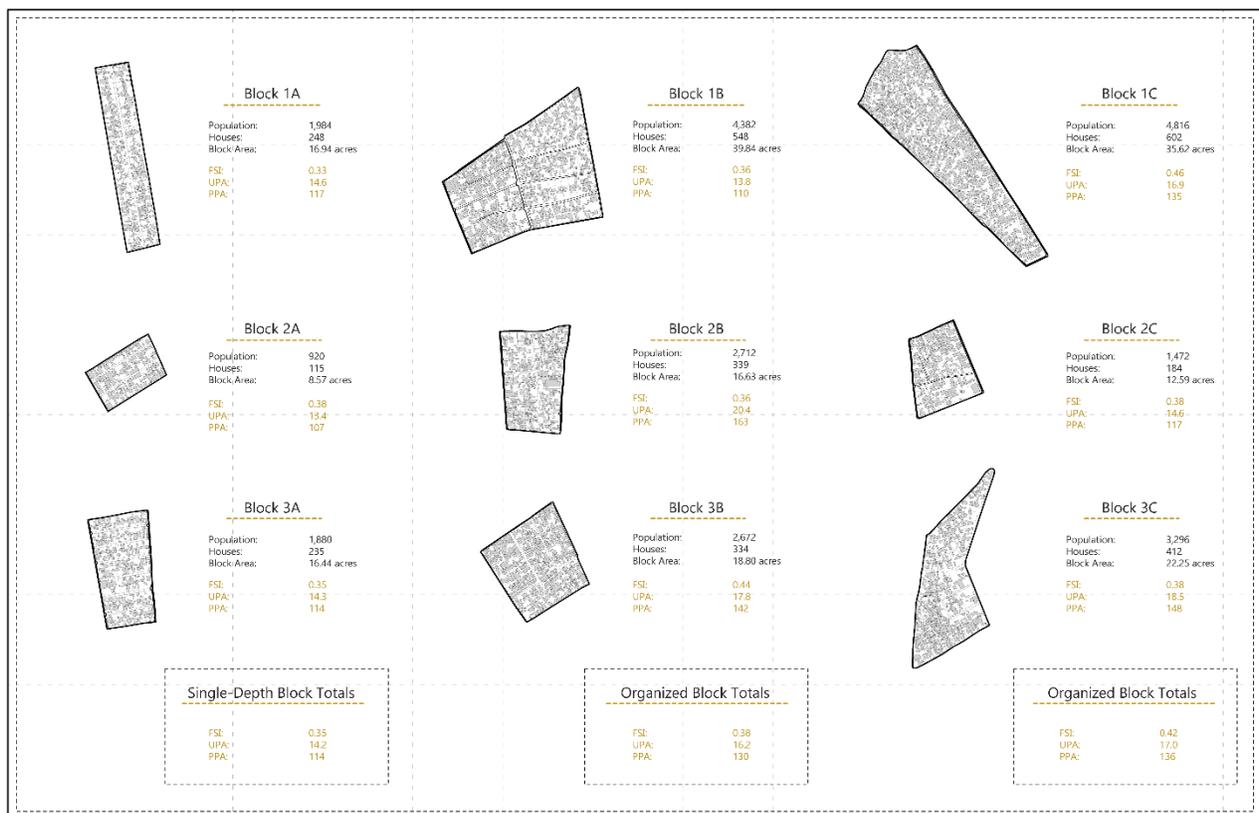
Organized, Street Facing Houses

Organized Blocks

Deeper, Organized & Gridded Blocks

Informal Blocks

No Structure, No Street Grid



Appendix C: Assumptions

Moving forward in my thesis, my advisor and I have produced this short document of assumptions and targets that has been informing my process and design along the way. Investigating the area of Onze de Novembro, housing prototypes for free hold units have been developed. Of important note, this set of assumptions has gone through a very iterative approach, with the discussions with locals informing the design, but also with the design informing the targets. The idea is that the housing solutions can be used to redevelop the urban fabric moving outwards (in collaboration with Mr. Anderson's thesis proposal). The following pages are a summary of the assumptions and targets that have driven my project, all of which have been affirmed by local architect Ilidio Daio. Where thorough rationales were followed and developed, I wish to validate these assumptions with local knowledge and help identify what could be addressed more appropriately going forward.

General Assumptions:

- That existing residential densities would be at least doubled but in no case would necessitate building more than three-story-high dwellings.
- Existing residential density in area under investigation in Onze: 9 UPA
- Target residential density for replacement housing in redeveloped areas of Onze: 18 UPA
- That redevelopment will produce the following in terms of land use:
 - 50% residential as replacement housing for existing neighborhoods residents (at target densities listed above)
 - 33% for private sector development
 - 17% for schools and open spaces (not including streets, private yards, etc.)
- That the private sector would take primary responsibility for the construction of replacement housing in exchange for the right to build market housing on approx. 1/3 of the redeveloped land.
- That the city would cover the cost of demolition, roads and utilities for all areas, except those set aside for private-sector housing.
- That redevelopment would be handled in a phased fashion, as follows (See Figure 39)

- Onze de Novembro phased redevelopment will be sensitive to the fabric, and will attempt to maintain all major arterial roads, and tertiary roads wherever possible to ensure an appropriate intervention (See Figure 30)
- In the first phase, replacement housing would be built on a parcel of serviced, vacant land.
- When new housing is completed, residents from abutting blocks move into the new housing.
- The land vacated by those moving into the new housing would then be redeveloped. The land would be serviced, and the urban grain would be adjusted in the process.
- As new housing will be built at a higher density than existing housing, the areas available for redevelopment would increase with each successive phase. Thus, each phase would enable:
 - Larger and larger amounts of replacement housing to be built
 - Areas to be opened up for schools, at one school per 500 residents.
 - Areas to be opened up for recreation (with priority given to space adjacent to schools and to flood prone and other environmentally sensitive land).
 - Areas to be opened up for private sector development.

Urban Level:

- That, in addition to providing housing or a higher quality and density, the goal is to regularize the urban fabric.
- That such regularization, would respect, wherever possible, the existing urban structure so that the transformation can be done incrementally, in phases.
- That typical blocks should be between 40 and 60 meters deep and no longer than 240 m long.
- That blocks will generally run East-West.
- That East-West streets will generally be more residential in nature (with the exception of major East-West arteries which will occur approximately every 1.5 km) while North-South streets will be more commercial in nature and support a greater variety of building types and uses.
- That major, commercial-oriented streets will be a minimum of 15 m wide, not including sidewalks.
- That minor streets will be a minimum of 9 m wide, not including sidewalks.

- That mid-block laneways will be a minimum of 6 m wide (but need not include sidewalks).
- That all units will have a street address – and direct access from a street.
- That, except for areas designated as open space, none of the targets will be met by building on flood prone or other environmentally sensitive areas.
- That private-sector, market-oriented development be given priority for land adjacent to major arteries – largely because this housing is likely to be constructed at higher densities than the replacement housing and because this housing is likely to include commercial at the base.

Unit Level (replacement housing):

- That the average dwelling unit will include 3 bedrooms and 1 bath and be in average 106 sq. m.
- That housing will be designed to transition from lower-income to middle-class housing, with a corresponding drop in the number of residents per unit.
- That, wherever possible, portions of the units will be able to be hived off and rented out to generate income for owners/primarily residents.
- That all units will benefit from cross ventilation.
- That all units – whether individually or through a home owners association – will benefit from solar energy (i.e., will be able to tap into a solar array).
- That, in design of individual units, aggregations of units, and in the overall urban plan, accommodations will be made for a range of non-residential uses. These would include:
 - Ground-floor commercial on units fronting on North-South streets.
 - Flexible ground-floor spaces on units facing East-West streets. Such spaces could be used as workshops or warehouses in the short term but transition to private garages as the neighborhoods mature and the demographic profile of the residents improves.

- That freehold housing will be provided to accommodate a variety of ownership options. In all cases, however, residents would be given title to the units they occupy.
- That attempts be made to provide a dedicated, off-street parking space for every unit of replacement housing.

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