BUILDING COMMUNITY IN
PAVÃO-PAVÃOZINHO

ARCHITECTURE AS A PROCESS OF URBAN
UPGRADING IN INFORMAL SETTLEMENTS

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Building Community in Pavão-Pavãozinho
Architecture as a Process of Urban Upgrading in Informal Settlements

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Abstract

Self-built structures in Rio de Janeiro, Brazil are the primary housing reaction to the city's increasing population, densification, and lack of affordable housing. Known as favelas, these communities are often categorized under the same impoverished conditions when in reality; each is uniquely distinct in their character and response to context. As such, architecture that seeks to create longevity and sustainable change must treat each community with distinction.

Upon recognition that favelas are a permanent condition in Rio de Janeiro, this thesis considers self-building as a socially sustainable opportunity to improve impoverished living conditions. In the specific community of Pavão-Pavãozinho, the project proposes a site-specific architecture that seeks to mend the complex relationship between the formal and informal sectors of the city. Through an understanding of existing favela patterns, the design explores how architecture can both integrate and support existing self-building processes.

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Figure 1: Pedestrian Artery in Rocinha

The phrase “proibido jogar lixo aqui”, as seen in the large banner spanning across the alleyway, translates to “it is forbidden to throw garbage here”. This image demonstrates the community’s attempt to maintain a standard of cleanliness within their public realm and reinforces the meaning and care residents have for their home, their favela.

Introduction

Informal settlements and self-construction have become a mainstream housing typology that is present in both developing and developed nations. In conditions where planning institutions are weak and ambiguous, self-construction is the norm¹ and also necessary from a housing perspective. As urban populations continue to grow and cities densify, informal settlements will also multiply, establishing self-construction as a permanent typology for future urban development. As such, architecture that responds to and supports conditions of informality, with the intent of improving these sensitive areas, is both a necessary and prevalent contribution to the contemporary and future practice of architecture.

In both the historic and contemporary discourse of architecture, architects have found value and interest in studying vernacular architecture and informal settlements. The introduction of vernacular architecture to the discourse was firmly established through Bernard Rudofsky’s 1964 exhibition at the MoMA, “Architecture without Architects”. Rudofsky, and others following this growing movement, believed that there was something valuable to be learned from the study of vernacular architecture. The innate and co-dependent relationships between humans, nature, and built form provided an understanding of the human condition at a time when modernism and the machine age were focused on universal ideologies. In this moment, vernacular architecture became a quest for identity through the revival of local culture and a reaction to the universal characteristics of modernism, such as placelessness. Furthermore, there was a strong belief that the unfamiliar language of the vernacular outside of the classic vocabulary of architecture could extend the creative boundaries of architects and their overall understanding of built form.

Today, the question of an architect's social responsibility is a highly relevant discussion. This discussion, and the growing movement of social agency within the discourse and practice of architecture, can be recognized as a response to the rapid urbanization of developing nations as well as the role of communication technology and its ability to spread information regarding critical conditions at a global scale – ultimately reaching architects and students of architecture worldwide. In reality, much of global development and urban growth takes place outside of formal planning processes and instead is carried out in informal settlements and self-building.² Although this thesis focuses specifically on self-building in Rio de Janeiro; informal settlements are not exclusive to Brazil or even South America, rather traditions of self-building in some form are present in nearly every country and on every continent.

In Brazil, the tradition of self-building has been in practice for over a century. Informal settlements, known as favelas, have come to be accepted as a permanent reaction to the country's increasing urban population and lack of affordable housing. The favela typology can be described as self-built, low-rise, high-density housing that develops autonomously without standardized rule or legal land ownership. In the city of Rio de Janeiro, approximately 1.4 million people accounting for 22% of the population live in favelas.³ Prolonged exclusion – socially, politically, and geographically – has marginalized these communities and the residents that live there. As a result, a landscape of polarities across the city defines strict physical boundaries that separate formal and informal neighbourhoods.

Since the initial settlement of favelas in Rio de Janeiro (the late 1800s) until now, they have endured waves of political and social opposition that has strongly threatened their existence. While

some communities could not escape government eviction, driven by industrialization, urban development, and modern ideals of cleansing the city, others consolidated and grew in size and density. Over time, the material palette and construction techniques observed in favelas evolved from temporary wooden shacks to permanent masonry structures. Although favelas still carry with them a degree of negative stigma, they are generally more accepted by the public and even recognized as integral elements of the city's culture and identity.

The research and design of this thesis will focus on the specific community of Pavão-Pavãozinho, located in the heart of Rio de Janeiro. As each favela is unique in their character, location, and response to context – architecture that seeks to heal a specific condition and create longevity must approach the community with distinction. This architectural thesis recognizes favelas as a permanent urban housing condition and considers self-building as a socially sustainable opportunity to improve living conditions in impoverished communities without removal or displacement. Key questions that this thesis will address are; how can the physical and social divide between the informal favela and the formal city be healed? How can existing processes of self-building be integrated into a formal design? And, how can architecture support future self-upgrading without the removal and displacement of homes and people?

The design for this thesis project challenges past and current favela improvement proposals, real and conceptual, that are either too momentary or too universal. Real upgrading projects tend to be too momentary and depend on resources that are determined and supported by the government. Conceptual upgrading proposals tend to be too universal and idealistic, suggesting progressive re-imaginings of the ways favelas could be –

materially and spatially – but failing to suggest realistic and pragmatic means in which the proposed architecture can be continually achieved. In contrast to the aforementioned issues, the design project looks towards a permanent and long-term approach for favela improvement.

To ensure an architectural response that is site-sensitive, a thorough understanding of Pavão-Pavãozinho is required. Following an overview of the neighbourhood's history and development, a collection of favela patterns are identified as a way of unfolding and understanding the complex urban form that manifests from informal self-construction. The research methodology is inspired by Christopher Alexander's theory regarding pattern language and the concept that even in informal settlements, an innate set of building patterns exists that repeats both spatially and materially. The identified patterns observed in site photographs of Pavão-Pavãozinho are organized by scale and later help to form the development of a new formalised architectural language.

Following the design research, the initial thesis questions are addressed at varying scales: the neighbourhood, the building, and the component scales. In this way, the macro and micro conditions of the favela are considered.

At the neighbourhood scale, the architectural proposal offers a moment of connection between the informal neighbourhood of Pavão-Pavãozinho and the adjacent formal neighbourhood of Copacabana. The physical connection is established through a series of private spaces – a workshop, school, and theatre – that are connected by a public pathway. The building sits quietly in the landscape through the use of traditional vernacular materials and rhythmically descends with the existing topography and surrounding buildings, connecting to a sense of place, while the pathway meanders

in and out of the building inviting all those passing between the favela and the formal neighbourhood to participate. By actively participating in the community resource center, existing barriers that separate the formal and informal communities are permeated and a new collective space within the layered fabric is shared by all. Here, architecture plays a role in the creation of spatial agency by providing the opportunity for social relations and healing between informal and formal sectors of the city to occur.

At the building scale, the relationship between hard and soft architectural elements is explored, in both the construction process and the resulting aesthetics. The inclusion of a network of industrial builders, favela builders, and community members to participate in the process of construction is made possible through the division of hard and soft elements. For example, industrial builders may complete the primary structure, favela builders may be responsible for installing infill material, and community members may participate in finishes or interior elements. In this way, architecture is seen as a process that invites the community to participate, thus extending the meaning of architecture to have a political and social impact.

At the component scale, the effectiveness of the architectural proposal as a permanent support for future self-upgrading in the favela is explored in the spatial and object character of the proposed resource center. Spatially, the workshop portion of the building contributes to self-upgrading by providing access to materials, equipment, and education; standing as a point of departure for favela improvement. In its object character, the building expresses materials typically used in the favela for self-construction. The use of materials, however, does not mimic poverty, but rather uses traditional materials in a formal code with the intent of demonstrating construction assemblies

for how the materials could be used in future favela upgrading. The idea is that the building componenets and materials identified in the "Proposed Models" would be available to favela builders through the workshop of which they could continue their own favela upgrading projects.

In conclusion, the thesis project focuses on a site-specific formal architectural proposal that integrates existing processes of self-building through a cohesive architectural language and supports future-self upgrading by acting as a permanent and long-term resource center. The encouragement of sustainable densification is not the promotion of sprawl or the advocate for impoverished living conditions, but rather the acceptance of a real and permanent informal urban landscape with the positive intention of improving the built fabric. Thus, the design proposal, by operating at the neighbourhood, building, and component scales, simultaneously addresses the micro and macro existence of the favela, the universal and the regional.

Notes:

- 1 Christian Werthmann and Jessica Bridger, *Metropolis Nonformal* (Applied Research and Design Publishing, 2015), 10.
- 2 Michael Hooper, "Public Participation: Simple Conceits vs. Complex Realities," in *Metropolis Nonformal*, ed. by Christian Werthmann and Jessican Bridger (Applied Research and Design Publishing, 2015), 104–105.
- 3 Justin McGuirk, *Radical Cities: Across Latin America in Search of a New Architecture* (Brooklyn: Verso, 2014), 106–107.

part one
CONTEXT AND THEORY

F2

01 Confronting Complexity

Juxtapositions in an Urban Setting

A favela can be described as a conglomeration of informal, self-built houses resulting in an informal settlement. Typically, this type of urban housing solution has developed autonomously without regulated planning or legislation. The presence of favelas in Brazil is not a new phenomenon to the recent population growth in the global south. Favelas, in fact, have existed for over a century. What began as a temporary solution for a housing deficit gradually developed and established itself as a permanent urban typology.

1.1 Growing Sentiment

Throughout my childhood, teenage, and young adult life, I have had the great privilege of visiting Brazil on an annual basis. The opportunity to spend a significant amount of time in Brazil, specifically the city of Rio de Janeiro, opened my eyes, ears, and heart to another world; a world that was not part of my daily upbringing in Canada, and a world that holds strong influence on the ways in which I think and am today.

Over time, my awareness of favelas and growing sentiment towards people living in impoverished conditions has grown. My earliest memories are those that occurred from a distance. The drive along the highway from the airport to the downtown area of Rio de Janeiro runs adjacent to Complexo do Maré, a large favela in the Port Area of the city (Figure 3). Access between the highway and the favela was open and transparent and I could explore the favela visually as we drove by. Whenever there was traffic and the car stopped, I took the opportunity to look at the self-built communities and intricate housing clusters. I was astonished, amazed, and intrigued.

Figure 2: Juxtaposition

Figure 3: Views of the Favela from Airport to City Center

Figure 4: Favela Site Visits
a. Rocinha, August 2014
b. Vila Canoas, August 2014
c. Rocinha, February 2015
d. Pavão-Pavãozinho, August 2016
e. Vidigal, August 2016

My first visit into a favela was in August 2008 on a guided tour of Rochina. I remember my father initiating the excursion with the intent of showing my sister and I what life is like for many people living in Rio. My second visit was in August 2014, another guided tour that took me back to Rochina and to a smaller community named Vila Canoas. On this trip, I was able to gain a deeper understanding of the qualities that are unique to different favelas.

This past summer was my most recent and intensive visit. Knowing that I would embark in this direction for my thesis; I took it upon myself to visit the favela at an intimate level with intentional research purposes. Over the years, my father and I have made close acquaintances with the local surf community and surf instructors. This connection enabled me to visit the favela with a local rather than on a guided tour. Visiting both Pavão-Pavãozinho and Vidigal in August 2016 with a local resident was vastly different compared to the previously guided tours. Although I am an outsider to the favela and always will be, this experience gave me first-hand insight into the community structure and a more sensitive position.

Over the years, my connection and interest towards favelas has continued to grow. The more I visit Brazil and the older I become, the more acutely aware I am of the polarized situation that Rio de Janeiro faces. This, along with the friendships I have made in Rio, has contributed to a personal interest in researching favela communities.

1.2 Defining the Favela

The favela is not limited to its physical existence alone but lives in the social, political, and geographical realms simultaneously. The manifold culture and technical meanings of favelas have led to a wide range of definitions from both

official and unofficial sources. The ambivalence of definitions imposed on the favela limits the technical proficiency for scientific data sampling, for example gathering accurate demographic information on favela neighbourhoods. Because of the variety of definitions assigned to different quantitative databases, there is a resulting inconsistency on the methods and tools used to measure various and complex aspects of the favela.¹ This variance in definition has led to complications when approaching the favela, architecturally and otherwise.

1.3 Documenting the Favela

In the past, favela neighbourhoods went undocumented. Their undocumented status is attributed to the fact that at the beginning of their existence, favelas were thought to be temporary settlements and many people hoped for their eventual eradication. However, even when favelas gained a degree of permanency, the attempt to document them was never at par with documentation of the formal city. When favelas have been included in city maps, they are scribed in an uncertain and less committed strategy compared to mapping techniques for areas of the formal city.² Furthermore, the undocumented status has also resulted in strong political, social, and geographic exclusion, where favelas are not fully accepted by the formal city and those living there are often stigmatized.

The challenges of documenting informality, from a purely geographical and mapping perspective, are recognized in this thesis. The constant evolution, densification, and labyrinth nature of the favela make it near impossible to gain accurate and up-to-date spatial and demographic information. The indeterminacy of data on informality makes favelas particularly vulnerable to fabrication, manipulation, and experimentation.³ As a result,

representations of the favela are extremely subjective to whoever is interpreting them, where pictures are only moments whose subject matter will surely change, maps are at best tracings of aerial photographs, and descriptive memoirs are highly personal memories. With that said, this thesis will attempt to approach the favela from a balanced perspective of subjective and objective understanding. Personal experiences will surely influence the ideas of architectural theory and the design project; however, these personal observations of the favela will undergo a rigorous understanding of the existing context that attempts to approach them objectively, honestly, and openly.

1.4 Categorization

The fluency in definitions and the inaccuracy of data have led to categorization and a universal approach when confronting favelas. The problem is definitions are far too broad to accurately describe individual conditions of each favela; and as such favelas are not recognized as unique and individual entities, when in reality they each have their own personal character and inner governance. Each community differs greatly in their geographical location, size, population density, demographics, character, and political and social structures.

The tendency is to assume all favelas are the same and suffering from the same problems, furthermore and even worse to view all people from the favela as simply favelados, people who live in the favela, and not as independent individuals. Recognition of categorization led to the decision of choosing a particular favela in which to continue with the design research process. As each individual favela is highly complex and established, it is necessary to approach them with distinction.

The argument and support for finding a local

solutions is encouraged by multiple theorists and practitioners. Christian Werthmann and Jessica Bridger in *Metropolis Nonformal* acknowledge that slum conditions and the informal and formal binary is a global condition – but at the same time encourage that designers, planners, and others deeply immersed in this context respond to the specific conditions in which they are operating.⁴ Furthermore, in an interview on forensic architecture, Eyal Weizmann discusses the place of theory and criticism, presumably in architecture, within the context of political and anti-colonial struggles. He argues that in order to be effective it is not only important but extremely necessary to name names and analyze specific situations.⁵ In the context of Brazilian favelas, this is an applicable theory because rather than working with abstract categories or universal ideologies, there becomes a shift in scale and focus to respond to a local condition.

1.5 Defining the Scope

As the complexity of the favela has been briefly discussed, it is important to define the scope of what this thesis will and will not address.

Architectural interventions implemented by the government or NGO's have had to be concerned with circumstances that go beyond the creation of architecture. Details of policy and financial resources have limited the opportunity for creatively improving the living conditions of the favela as there is much more pressure at the government level for creating measurable and immediate improvement because of the use of public money. Free from these circumstances, this thesis is an opportunity to imagine what could be. The nature of the thesis and its place in an educational setting provides room for hypothesizing and conceptual exploration. That is not to say that a top-down approach or dystopian

future will be envisioned, it is only to state that through the vehicle of a thesis there is room for exploration and imagination beyond the hard facts and harsh realities regarding the favela.

Beyond the discussion of built form, there are many issues in the favela that, although prevalent, will not be addressed in detail. These include social matters of violence, gang activity, and drug trafficking, as well as purely organizational issues such as garbage and sewage removal. Although these are unavoidable realities of the favela, attention will be placed on the development of built form and the patterns of self-building that are innate to the favela.

To address a real and concrete problem, the thesis responds with a sensitive and pragmatic offering of one possible way to support self-construction in a specific location. The ability for architecture to play a role in shaping our cities, specifically its role in healing the tensions that exist between the prominent conditions of informal and formal, will be explored at multiple scales within the thesis.

Notes:

- 1 Hugo Carneiro Leao de Mesquita, *Popular Urbanization Strategies in Sao Paulo: A Morpho-Typological Study of Selected Inner-City Squatter Settlements*, PhD Dissertation (Zurich: ETH, 2016), 323.
- 2 Daniela Fabricius, "Resisting Representation," *Harvard Design Magazine*, no. 28 (2008): 6.
- 3 Ibid., 6.
- 4 Christian Werthmann and Jessica Bridger, *Metropolis Nonformal* (Applied Research and Design Publishing, 2015), 10.
- 5 Yve-Alain Bois, "On Forensic Architecture: A Conversation with Eyal Weizman," *October* 156 (2016): 119.

02 Favela History

From Temporary Solution to Permanent Settlement

Favelas in Rio de Janeiro began as temporary settlements constructed from wood that eventually evolved into more permanent masonry constructions. In chronological order, the following chapter discusses major political moments and movements that have contributed to the existence and growth of favela communities. These include the abolition of slavery, domestic and international migration, the period of military dictatorship, the eventual democratic acceptance of the situation, and finally current government and NGO initiatives to improve favela neighbourhoods and the lives of residents.

2.1 Origins and Staking Territory

The birth of favelas can be attributed to an influx of domestic and international migration that occurred at the end of the 19th century.¹ Domestic migration began with the abolition of slavery in 1888. Following the abolition, former slaves of a predominantly African demographic moved from poor rural areas to larger metropolitans in search of jobs, opportunity, and access to resources. Additionally, international migration was the result of a new foreign immigration policy that attracted a lot of international workers.² As such, a rapid increase in population took place and cities began to densify at an unprecedented rate.

As cities densified, the need to create homes for the large influx of domestic and international migration resulted in the development of both informal and formal housing. In the early 1900s, informal housing took the form of clandestine land settlements as the underdeveloped country lacked strong urban housing policies. In need of a place to live, new migrants began to construct homes on vacant land in and around the city, occupying spaces

Figure 5: Wood Constructed Favela
Gordon Parks, 1961

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that had been deemed unsuitable for living such as marshlands and steep hillsides, initiating both the geographic exclusion of these communities. Later on formal social housing projects, such as Pedregulho Housing Complex by Affonso Eduardo Reidy built in 1946, were built and intended to house civil servants working and receiving a lower income.

Specifically, in the center of the city where favelas tended to develop on the slope of steep hillsides, there came a topographical split that defined the social and geographical landscapes of the city.³ This split created a vertical isolation of favela communities, despite the intense proximity and adjacencies of wealthy residential neighbourhoods.⁴ Centrally located favelas on hillsides are by no means the sole topographical and geographical condition, as many communities stretch over flat terrain at the periphery of the city. However, hillside favelas will be the geographical condition of focus as that is the terrain of Pavão-Pavãozinho, the chosen community of interest.

In Rio de Janeiro specifically, the first favela, Morro da Providência, began with the occupation of soldiers. The story goes that veterans returning from the Canudos War arrived in Rio with the promise of land and housing. Upon arrival, they found neither and took to the hill to build their own settlement. Because of the initial promise of land and the government's lack of follow through on this promise, the soldiers were permitted to stay on the hill and thus the birth of Morro da Providência, Rio's first favela. This favela still exists as a strong and thriving community today.

2.2 Rural Roots

As the favela was initially meant to be a temporary solution to the urban housing deficit, their early forms were of wood and wattle and daub construction. For the wood constructions, a post-and-beam system served as the primary structure with extended stilts to level the house and conquer the steep terrain. Planks of wood were used as both cladding and lateral support while scrap metal served as a roofing material to enclose the dwelling. The structures, reminiscent of a barn typology, reflect the rural roots of early plantation migrants and favela builders from the countryside. The rural roots of these communities further persisted through the development of small-scale agricultural practices as a primary resource for food.

The growth of favelas at this time was a result of true community building. Friends, families, and neighbours would gather together on weekends to participate in helping each other build, expand, and improve their houses; "a collective endeavor that involved no money transactions."⁵ Early settlers

Figure 6: Wood Constructed Favela

Photo by Christopher Henning
Credit: The Black Star Collection, Ryerson
Image Centre, Toronto, Canada

Original Caption: Henning Christoph, [On the hillsides around Rio, thousands of poor Brazilians live in slums called "favelas"], ca. May-June 1977, gelatin silver print.

Figure 7: Conceptual Diagram of Wood Construction

were not concerned with defining strict property lines between units. This communal approach to land resulted in a dispersed pattern of wooden shacks that stood detached from one another and connected by informal footpaths. This strategy of developing houses defines an important pattern for the spatial organization of favelas. In contrast to typical urban planning methods where circulation is the first element to be considered, favelas developed by first building houses followed by footpaths and eventually infrastructure.

2.3 Military Dictatorship and Eradication

An important political rupture would change the form and fate of favela communities. In 1964, Brazil's democratic government was overthrown by a military coup which began the era of an authoritarian military dictatorship. At the same time, the influence of modernism in architecture and urban planning encouraged a movement of urban cleansing, creating a fear of removal for many residents. This fear was further enforced by the development of wealthy and tourist neighbourhoods in the central and south zones of the city, areas with high property value. As the development of the formal city continued, removal became a constant source of concern for favela residents. As such, people were reluctant to invest a lot of resources into improving their wood constructions in fear of eviction.

"The response to informality has clearly evolved over time in Brazil. In the 1960's, widespread evictions and the destruction of homes cleared ground in informal settlements for the construction of high-density residential high-rises, which were always outside the financial reach of those who had lived in the slums they replaced. This helped to push social housing and low-income people to the peripheries of Brazilian cities. These peripheral informal settlements, islands of informality close to city centers, and even swaths of seemingly "formal" informal areas persisted and grew as the cities of Brazil expanded rapidly."⁶

When the dictatorship period finally came to an end in 1985 and the country re-entered democracy, the government and NGO's began to pay more attention to favelas and initiated various upgrading programs.

2.4 Mobilization and Acceptance

As a result of strong political forces felt during the military dictatorship, a favela mobilization movement emerged. This movement gained internal momentum from favela residents but was further supported by many outsiders who were beginning to accept favelas as an integral layer to the

Figure 8: Favela Eviction
Photo by Christopher Henning
Credit: The Black Star Collection, Ryerson Image Centre, Toronto, Canada

Original Caption: Henning Christoph, [Claiming that the large rock on the hillside threatened their homes, the Brazilian government ordered the residents of slums to clear out. The forced evacuation caused bitterness among the residents, who were offered no housing to replace the old, and who felt that the rock story was only a cover-up for land speculators who wanted to build something else on the site.], May/June 1977, gelatin silver print.

Figure 9: Favela Eviction
Photo by Christopher Henning
Credit: The Black Star Collection, Ryerson Image Centre, Toronto, Canada

Original Caption: Henning Christoph, [In one of Rio's most crowded "favelas," poor people who have been ordered by the government to clear out - on the grounds that their houses were threatened by a huge rock on the hillside - load their belongings onto trucks. The evacuation, ordered by the government without a thought as to where the people should live afterwards, caused intense resentment among Rio's poor.], May/June 1977, gelatin silver print.

Figure 10: Axo of Masonry Construction

cultural and social fabric of the city. One such undertaking was the right to land ownership and settlement. Although residents legally did not own the land on which they and their families had occupied for several decades, they felt it was within their rights to defend their homes and demand ownership. As such, resident associations appeared in many favelas and worked to create more legitimate community structures by documenting existing homes and providing addresses. These associations, along with a growing acceptance towards favela communities, contributed to the transition of favelas into permanent neighbourhoods.

The permanency of favelas is observed in the material transition from wood to masonry. By cause of the resident associations, the fear of favela eviction subsided and people began to invest in the material and structural quality of their homes. Despite the growing improvement of favela structures, the transition from temporary wooden shacks to a more permanent material palette of masonry was a slow operation. With limited money and resources available, residents would build in phases by deconstruction one wooden wall and reconstructing it with concrete structure and masonry infill block (Figure 11).

The introduction of new materials did not only alter the aesthetic appearance and structural integrity of the self-built homes, it also changed the relationship between the builder and their home. New materials called for new construction techniques, such as the act of mixing cement, pouring concrete, and laying bricks. As a result, more skilled labour was required. Remaining within the self-built favela network, skilled workers emerged as a result of gaining knowledge through construction jobs in the formal sector and further passing the knowledge down to the informal setting. Even though there were advancements in the materials and construction techniques, favela building and refurbishment continued to be a community effort composed of close friends and families. Many dwellers preferred to work within their closed circles so that payment could be negotiated more intimately.⁷ Although more skills were sometimes required, from the 1990's onward favela construction continued to involve a "network of related people and building professionals within the community."⁸

In addition to the introduction of new materials changing the shape of the favelas, the emergence of commercial activity within the informal neighbourhoods also began to have consequences on spatial patterns in the favela. Favelas were no longer a sole solution to the housing deficit, they began to consolidate and diversify internally; meaning that new functions beyond residential were introduced, such as commercial businesses, daycares,

Figure 11: Diagram of Transition between Wood and Masonry Constructions

schools, and religious spaces. These functions, specifically commercial businesses, operated and still operate today outside of any regulated system. The introduction of these services made favelas self-sustaining neighbourhoods and created micro cities with the larger city of Rio de Janeiro.

As the country became more politically open, favelas became recognized as major contributors to the social and cultural fabric of the city. In an attempt to effectively upgrade impoverished living conditions that plague the favela, more accurate studies are being undertaken to identify major issues and to determine which aspects are possible to improve. As a result, their physical connection to the city is strengthened through the provision of basic infrastructures, such as water and electricity. Furthermore, their legal and social existence has also improved. In the 10 Year Master Plan of Rio de Janeiro, created in 1992, the right to property ownership was officially recognized as an important step towards permanence and general acceptance for favela communities.

"In the 1990s, slum-upgrading programs became a popular response to the poor living conditions in informal areas. These programs ranged from improving homes and establishing public space to providing services, which a huge range in outcome quality."⁹ Upgrades such as these played a role in shaping the physical, social, and demographic characteristics of the favela. For instance, paving the streets increased vehicular accessibility which in turn led to more commercial activity, transportation of materials goods, and eventually favela tourism. In summary, the result of slum upgrading tends to lend results that extend further than the initial intention. Examples of favela upgrading programs include Favela Bairro, Morar Carioca, and Minha Casa Minha Vida.

Favela upgrading projects continue to be a relevant discussion in the contemporary discourse of architecture as they remain a prominent and prevalent endeavour. Never has there been a decline in favela growth and as such, the continuation of upgrading projects and their integration into the formal city persists in a wide variety of forms. Despite the progress Brazil has made in the last two decades, the country itself remains politically corrupt and favelas continue to grow at an expedited rate. As such, this thesis looks towards how architecture can support existing processes of self-building and support future self-upgrading in a continual and permanent method.

Notes:

- 1 Hugo Carneiro Leao de Mesquita, *Popular Urbanization Strategies in Sao Paulo: A Morpho-Typological Study of Selected Inner-City Squatter Settlements*, PhD Dissertation (Zurich: ETH, 2016), 22.
- 2 Ibid., 22.
- 3 Daniela Fabricius, "Resisting Representation," *Harvard Design Magazine*, no. 28 (2008): 8.
- 4 Ibid., 8.
- 5 Hugo Carneiro Leão de Mesquita, *Popular Urbanization Strategies in Sao Paulo: A Morpho-Typological Study of Selected Inner-City Squatter Settlements*, PhD Dissertation (Zurich: ETH, 2016), 131.
- 6 Adriana de Araujo Larangeria, "Informal Settlements in Latin America," in *Metropolis Nonformal*, ed. by Christian Werthmann and Jessican Bridger (Applied Research and Design Publishing, 2015), 131.
- 7 Hugo Carneiro Leao de Mesquita, *Popular Urbanization Strategies in Sao Paulo: A Morpho-Typological Study of Selected Inner-City Squatter Settlements*, PhD Dissertation (Zurich: ETH, 2016), 134.
- 8 Ibid., 134.
- 9 Adriana de Araujo Larangeria, "Informal Settlements in Latin America," in *Metropolis Nonformal*, ed. by Christian Werthmann and Jessican Bridger (Applied Research and Design Publishing, 2015), 132.

03 Self-Building Culture in the Favela

Foundations and Traditions

As previously mentioned, self-building in Brazil has existed for over a century. Informal settlements, known as favelas, were constructed out of necessity as a reaction to the growing urban population and the lack of either affordable or available housing. Over time, these self-built communities have become a permanent urban form and their own building typology within major urban centers. The pursuit of studying vernacular architecture and informal settlements is not a new area of research, however, the understanding that architecture embodies a responsibility for social agency has been a recent and growing trend. This chapter will discuss the foundations and traditions of self-building culture within the context of Brazilian favelas.

3.1 Subversive Construction

In both the present and the past, the growth of favelas operates subversively and outside the realm of standardized construction. The degree of autonomy achieved through self-building has rendered the favela a resilient built form. This autonomy allows people to make use of their own efforts and resources, particularly in circumstances where the government has been unable to provide adequate and appropriate housing. Certain attempts from the government, for instance providing social housing on the periphery of the city, have been unsuccessful as they promote long commutes for residents to their jobs and displace them from the resources and opportunities available in the city.

Presently, favelas that are centrally located have reached their outer limits in growth. In order to adapt to this densification and provide more housing, two things are happening. The first is the vertical stacking of the units. Rooftops act as flat concrete slabs with unfinished rebar protruding from the columns,

Figure 12: Mural in Pavão-Pavãozinho

The mural, photographed on a recent August 2016 site visit, is located in the community space of a public school on the border between the favelas of Pavão-Pavãozinho and Cantagalo. Completed by a local artist, Celio Silva, the work is an expression of the vibrant and colourful character found in the favela.

signifying an opportunity for upward expansion. The second is the subdivision of existing units into smaller ones to create rentable property and the opportunity for capital.

3.2 Dwelling

Beyond the functional aspect of favelas to provide housing for nearly one-third of Rio de Janeiro's population, many people identify with favelas from a social perspective. The favela has many meanings for those who reside there; home, familiarity, community, and place. The dense and richly layered fabric fosters a multiplicity of interactions that contribute to the identity and culture felt within these close-knit communities. The social networks that are created within favelas hold great value to residents as they tend to rely on friends and family members for support that is otherwise lacking or difficult to come by from basic civic institutions.

Within the discussion of informal settlements and favelas specifically, there is an element of personal thought in the making process of self-building one's home. Thoughtfulness to building a place for oneself is evident in the decorative ornament witnessed on homes within the favela neighbourhood. The resourcefulness can be observed in the self-built forms whose tightly knit built fabric creates a strong identity and sense of place. Furthermore, beyond the individual home, gathering spaces such as bars, restaurants, and fruit markets occur within the tightly knit fabric that contribute to the sense of place.

This feeling of identifying with a place or the act of being within is often described in architectural discourse as dwelling. In Martin Heidegger's "Building, Dwelling, Thinking" he describes the word dwelling in its original German translation *wohnen*. "Wohnen means to reside or stay, to dwell at peace, to be content; it is related to words

that mean to grow accustomed to, or feel at home in, a place."¹

3.3 Expressions of Identity

In a positive light; informality and autonomy in self-building allow the opportunity for self-expression. For this reason, there are many creative and resourceful people striving in these communities, making the most out of what they have. The cultural identity of the favela is expressed by local artists and the many local community projects that are in place. In these expressions, the favela is depicted as a vibrant community through the use of bright colours, playful forms, and active streetscapes. This sense of place, created through the processes of self-building over many years, contributes to the culture and identity.

3.4 Incremental Growth

Incremental growth, growth that happens additively over a period of time, allows favela communities to adapt to the changing needs of the residents. The favela as an urban form is constantly developing and expanding in an incremental process through additions determined by the needs of the residents. This form of growth, in tandem with the practice of participatory design, stands as a platform for which to appropriately and architecturally approach the informal and irregular landscape of the favela. The following quotation from Alejandro Aravena describes the nature of incremental construction in self-built conditions.

"The idea of house as process acknowledges deep-rooted local self-construction traditions that have disappeared from contemporary building cultures in most parts of the developed world, but that remain highly active, visible and significant in the third world."² Additional principles encouraged by Aravena and Elemental include the understanding

of architecture as an ongoing experience that accepts change and chance as positive factors.³

Within the context of Brazilian favelas, the tradition of self-construction remains the most prominent method of building. As such, an architectural intervention that has the goal of providing improved and dignified living conditions to areas of informality must follow and respect the existing order of growth and expansion. To establish a method of incremental growth, these existing self-building processes must be continued into the formal architectural proposal. In this approach, self-building maintains the traditional craftsmanship of the area that is inherent to the local, vernacular condition.

Notes

- 1 Martin Heidegger, "Building, Dwelling, Thinking", in *Poetry, Language, Thought* translated by Albert Hofstadter (New York: Haper Colophon Books, 1971), 345.
- 2 Alejandro Aravena, "Elemental Interview," *The Real Perspecta* 42 (2010): 97.
- 3 Ibid., 89.

part two
DESIGN RESEARCH

04 Community of Pavão-Pavãozinho

A Story of Upgrades

In order to focus on a local condition, the specific community of Pavão-Pavãozinho is chosen. This favela is located in the Zona Sul region of Rio de Janeiro between the affluent and tourist neighbourhoods of Ipanema and Copacabana. Cultivated on a small hill, the favela is home to approximately 5000 inhabitants. The community is bordered by the formal city to the east and the south, a neighbouring favela community to the west (Cantagalo), and a steep inclining hill to the north. The reason for choosing the specific community of Pavão Pavãozinho was primarily based on access and location.

Over the past century, the community of Pavão-Pavãozinho has experienced many changes from both political and social forces. In more recent decades, the development of this particular favela has become a mixture of informal self-construction with simultaneously implemented formal infrastructure. The formal infrastructure implemented as favela upgrades is due in part to the community's central location and manageable size but also because of one significant political figure, Leonel Brizola. Brizola is a socialist politician who advocated for children's education and rights to land ownership. The implementation of formal upgrades to improve basic infrastructure and access to education has influenced the spatial organization and existing patterns of growth within the favela.

The history of Pavão-Pavãozinho as a community for upgrades makes it an interesting urban site in which to continue the process of upgrading and to explore the potential for architecture to participate in this process. The following timeline presented in this chapter focuses on major moments and movements and how these have contributed to the development of Pavão-Pavãozinho.

Figure 13: View of Pavão-Pavãozinho from the Top of Morro Dois Irmãos

Figure 14: Location Map

- informal neighbourhoods
- formal neighbourhoods
- Hotel Panorama

4.1 Settlement

The original settlement of Pavão-Pavãozinho traces back to the early 1900s following the flow of internal and external migration (described in chapter two). The original name of the favela began as “Pavão” translating in English to peacock. When the favela later expanded in size the second title “Pavãozinho” meaning little peacock was added.

Throughout the 1930s and 1940s, informal settlements across the city experienced a general fear of eviction. As the city of Rio de Janeiro began to feel the impact of industrialism and modernism, there became a growing interest in developing the formal city particularly the wealthy and tourist neighbourhoods of Zona Sul. Furthermore, modernist ideals of cleansing the city promulgated fear of eviction among favela residents, who were and still today, occupy land illegally. Despite the pressure of favela eradication, the community of Pavão-Pavãozinho managed to escape eviction and grow. The location of the favela on a steep slope presented topographical challenges to developers and may have helped to secure the existing favela community.

4.2 Hotel Panorama

During the mid-1960s, Brazilian tourism started to increase and Hotel Panorama was built on the hillside directly in between Pavão-Pavãozinho and Cantagalo. The intent of Hotel Panorama was to provide tourists with accommodations and a nightclub overlooking an unprecedented view of the Lagoon and the Atlantic Ocean. Along with the hotel, a massive elevator was constructed to provide guests easy access to the hotel from the ground level of the formal neighbourhood in Ipanema. Although Hotel Panorama experienced a brief moment of popularity, the establishment was not successful and closed approximately one decade following its inception.

After the owners of Hotel Panorama abandoned the building, the adjacent communities of Pavão-Pavãozinho and Cantagalo steadily grew around the deserted establishment. The large building and elevator infrastructure would later serve useful to the community of Pavão. However, at the time it stood as a contrasting modernist structure to the developing self-built neighbourhood encompassing it. Within a short period of time following the abandonment, Leonel Brizola took ownership of Hotel Panorama.

Brizola's intention with Hotel Panorama was to establish a CIEP (free public school) that would serve up to 4000 children from Pavão-Pavãozinho and Cantagalo.¹ His hope for the CIEP was to create a catalyst for neighbourhood

improvement by educating the youth. The massive elevator, originally the entranceway to the former Hotel Panorama, became one of the most important features of the school as it allowed for access from a residential street, located just adjacent to the favela, to the entrance of the school. The elevator is 12 stories tall and only stops at grade and at the entrance to the building.² The transformation of Hotel Panorama marked the beginning of Brizola's influence on the communities of Pavão-Pavãozinho and Cantagalo. He would later continue upgrading projects within these two favelas.

4.3 Resident Associations

During the 1970s, fear of eviction among favela residents materialized again due to the authoritative military regime (1964–1985) that held political power at the time. Despite this tense moment for favelas, Pavão-Pavãozinho managed to escape eviction once again. The favela continued to grow in both the horizontal and vertical directions. In resistance to the military regime and in fear of favela eradication, many communities formed residents associations to provide a measure of land rights and ownership to favelas residents. These organizations, however, were not recognized by any formal institutions but provided an important point of communication between formal and informal institutions.

The central location of Pavão-Pavãozinho provides abundant opportunities for work and resources in the adjacent and affluent neighbourhoods of Ipanema and Copacabana. Due to the central location, land and housing within the favela were in high demand and an opportunity to gain capital among residents. The local resident association absorbed the role of irregular real-estate brokers and developers who took it upon themselves to add subdivisions and new settlements on the hill.³

Pavão-Pavãozinho continued to grow adjacent to the upper-class neighbourhoods surrounding it. In the early 1980s the majority of houses remained wood construction, however, with the introduction of new materials, houses towards the bottom of the hill began transitioning into concrete and masonry materials. The material transition of favelas into more permanent structures introduced new types of commercial activity into the previously residential communities. The introduction of commercial activity marks a time when communities began to diversify internally. By diversifying their internal functions and increasing neighbourhood resources, favelas were on their way to becoming self-sustaining communities; cities within cities.

In 1982, Leonel Brizola was elected as the state governor for Rio de Janeiro. He became popular among the lower class as he strongly advocated for the improvement of public education and the regularization of land tenure among favela dwellers. As the settlement continued to grow and expand, open plots of land became extremely rare. As a result, the settlement began to densify vertically by building floors on the flat roofs of existing houses.

Further upgrades implemented by Brizola included the construction of concrete retaining walls to prevent landslides and the construction of a funicular tram. The new funicular tram connected the base of Pavão-Pavãozinho with the uppermost extremities and significantly improved vertical access within the favela. Not only did the increase in vertical access provide transportation, it allowed for further consolidated building to continue up the hill with the tram aiding in material transportation. In addition to the retaining walls and tram, Brizola also committed state and municipal utilities to provide water, sewage, electrical, and trash services to Pavão-Pavãozinho and Cantagalo.⁴

Figure 15: Boundary of Growth
a. April 19, 2002
b. May 25, 2016

In these two aerial images, the pink line marks the growth of informal expansion over a fourteen year period. In image “b” it can be observed that several houses have been built above the pink line as well as densification of homes in the upper right portion. From these images, it can be concluded that Pavão-Pavãozinho is reaching the limits of its horizontal growth, firmly bound by the formal city to the south and challenged by steep topography towards the top of the hill. Future expansion and densification of Pavão Pavãozinho is likely to occur internally and vertically.

4.4 Current Condition

Brizola's efforts in improving infrastructure and access to education within the communities increased the desire to live in both Cantagalo and Pavão-Pavãozinho, in addition to their prime location for jobs in the neighbouring wealthy and tourist areas. For that reason, rental rates are high in these communities and houses continue to be built and subdivided to accommodate the growing population and opportunity for capital gain. Today, the community continues to densify and grow vertically. Although the favela is occupied by a permanent UPP station, the community remains dominated by criminal activity and drug trafficking. These aspects are not the focus of the thesis, however, they are important to mention and inform the reader of the unfortunate violence that persists.

The history of upgrading in Pavão-Pavãozinho makes it an interesting community in which to continue the process of upgrading and the role that architecture can play in that. In addition to its history, the location of the community adjacent to Ipanema and Copacabana set the scene for an architecture that connects the informal favela to the formal city.

Notes:

1 Bryan McCann, *Hard Times in the Marvelous City: From Dictatorship to Democracy in the Favelas of Rio de Janeiro*, (Durham and London: Duke University Press, 2014), 97.

2 Ibid., 113.

3 Ibid., 112.

4 Ibid., 113–114.

Figure 16: Aerial View of Rocinha from the Top of Morro Dois Irmãos

05 Unfolding Complexity

Existing Processes of Growth

Similar to any urban area, informal settlements undergo a process of growth in their evolution. This growth differs from that of the formal city due to the subversive existence of informal settlements and their operation outside of any regulating body or standards. Their subversive existence allows them to autonomously respond and adapt to changes that occur within their social, political, and physical parameters. As a response to these external forces, the favela grows incrementally without a predetermined or known end, rendering them a resilient form with a strong dynamic character.

Over time, the dynamic character has come to accept all forms of development. Currently, the contemporary condition of the favela is no longer solely self-built, but rather includes a mix of informal, semi-formal, and formal development. Although favelas began as solely informal, they have since undergone multiple formal upgrades carried out by the municipality as well as NGO's, particularly since the growing trend of favela acceptance, integration, and upgrading that began in the late 80s and early 90s. This chapter will discuss the processes of growth within informal settlements and various research approaches to understanding and unfolding informal growth. It will also introduce the research method developed defined as *Identifying Favela Patterns* and discuss the intent and value of this method to the design project as well as its limiting factors of the overall research approach.

5.1 Morpho-Typological Approach

A recently published PhD Dissertation by Hugo Mesquita from ETH Zurich titled "Popular Urbanization Strategies in São Paulo 1970-2014: A morpho-typological study of selected inner-city squatter settlements" documents the development of four favelas in São Paulo, Brazil. Morpho-typological is

interpreted here as an understanding of favela growth based on repeating patterns and changes in the built form at the urban scale.

One of the intents of the dissertation is to establish a systematic research model under which favelas can be understood, analyzed, and compared. Through intensive data collection, cartographic analysis, and inductive field research, Mesquita establishes a series of analytical tools for decoding the processes of spatial consolidation in popular settlements. Popular settlement is a term used throughout his dissertation and is synonymous with the term favela. In Mesquita's own words:

"This dissertation makes a contribution for urban and architectural discussion by amplifying knowledge on the socio-spatial evolution of informal settlements; by testing new applied research instruments for charting popular urbanization practices in urban contexts; as well as by providing a systematic research model that can be easily expanded to further case-studies, potentially fostering further knowledge of these widely unknown territories under a comparative framework."¹

Throughout his dissertation, Mesquita promotes the use of his systematic research model to research other communities under the same framework. Through an open-ended research model, Mesquita provides a provisional construction that is susceptible to adaptation in other contexts. He supports the application of his model to other constructs; "...considering the large number of favelas and the wide variety of physical, social and cultural conditions from which they arise, it would be valuable to expand our model to numerous other case-studies. The widening of case studies would not only test the limits of its applications, it would also allow systemizing further knowledge under an even broader comparative framework."²

Due to a lack of legitimate cartographic information of Pavão-Pavãozinho, as well as the limited time-frame of the thesis and the need to develop a design component, the systematic research model developed by Mesquita was not applied to analyze Pavão-Pavãozinho. Furthermore, a comparison between favelas was not part of the initial intent of the thesis. However, Mesquita's work has helped to inform the understanding of the overall evolution of Pavão-Pavãozinho at the urban scale. For example, how the introduction of commercial activities changed spatial patterns and social organization within the favela.

In conclusion, Mesquita's work is more of an analysis and assessment of existing conditions as a means of developing a systematic framework for comparison of popular settlements. This thesis looks towards the next step of imagining the ways in which favelas can continue to grow in a socially responsible way by integrating elements of formal architecture.

5.2 Pattern Approach

Building on concepts and an understanding of Christopher Alexander's theories, the idea is that informal settlements contain their own innate pattern language. Although outside of any regulating process, informal settlements contain a set of repeating patterns that are innate to the existing culture of self-building and directly connected to the site in which the settlement is built. In order to integrate a formal architecture into a complex and dynamic built fabric, in a harmonious and sensitive manner, it is necessary to understand existing patterns and processes of growth inherent to the favela. An understanding of these patterns and how they contribute to the development of the favela plays an important role in making a lasting and socially sustainable architectural impact within the informal context.

The pattern approach is supported by Christopher Alexander's the *Timeless Way of Building* and *A Pattern Language*. In these publications, Alexander discusses various patterns from the scale of the town and building to that of constructing a detail, which he presents in a straight linear sequence. Although the patterns are interconnected on many levels, their didactic presentation in a linear sequence allows one to understand them in an organized hierarchy, in which the larger patterns cannot exist without the support and connection to smaller patterns.

In *A Pattern Language*, Alexander firmly states that the patterns presented are not the end all but rather the beginning of a set of patterns in which he encourages and supports others to continue the practice of developing their own patterns. As such, the theory of pattern finding is continued into the context of informal settlements, particularly the favela and even more specifically the community of Pavão-Pavãozinho. However, rather than "patterns", the proposed built elements will be referred to as "models" as a way to distinguish the new language developed for this thesis and set distance from Alexander's theory.

The idea of patterns is further supported by Ruhal Mehotra's (architect, urbanist, and professor) ideas of the kinetic city or kinetic urbanism. He uses these terms to describe characteristics of flux and motion that are pertinent in informal conditions. He describes kinetic urbanism as "...not perceived by architecture or cohesive urban gestures, but by spaces which hold associative values and are supportive of lives where patterns of occupation determine its form as well as its perception."³ The favela, by being kinetic, allows for incremental shifts and responses to changes in the surrounding environment. The changes are satisfied by the flexible arrangement of patterns and leads to incremental growth that is characteristic of

informal settlements.

By being open to and accepting the existing set of patterns, architecture and urbanism can begin to integrate informal components into the formal proposal in the consideration of flexible environments and versatility in a way that the fixed aspects of the built environment are open to incremental growth, ultimately facilitating environments that accept the existing patterns of growth.

5.3 Identifying Favela Patterns

As a way of understanding and unfolding the complexity of the favela, repeating patterns have been identified. In a similar fashion to Alexander, the patterns have been organized by scale starting from the largest addressing the urban relationship, to the smallest concerning materials. Expanding on Alexander's organizational methods, these patterns have been further subdivided into categories based on their pragmatic functions.

The collection of patterns observed in the favela is derived from a method referred to by Eyal Weizmann as the architectural-image complex.⁴ The architectural-image complex is essentially research completed within the realm of the image, that is to say, the use of photographs to extract information through visual observation. The process involves the exploration of photographic space to draw connections and relationships that exist within physical space. This understanding of the genetic code of the favela required an investigative process of a series of images that by themselves cannot be understood, but as a whole create a metadata or library of patterns. In this way, an investigative-journalistic dimension is part of the design research and connected to ideas of forensic architecture supported by Eyal Weizmann.

LIBRARY OF
EXISTING FAVELA
PATTERNS

- urban relationship
- flexibility and growth
- structure
- infrastructure
- openings
- materials

The first strategy used for this design-research was to consider the patterns at a multiplicity of scales, from the scale of the neighbourhood to the scale of the component. This approach to scale responds to the macro and micro conditions of the favela. The second strategy to understanding the patterns was to separate them into their respective categories denoting function. The separation of patterns into categories is a method of deductive research, but does not mean to simplify or generalize the built condition in any way. It only serves as a method of organization and personal understanding.

The followings pages are a collection of patterns organized into different categories. The images and text determine the function and purpose of each building element in the daily operations of favela life and their symbolic importance as elements of architecture (when applicable). The method of researching the architectural-image complex allows for an understanding of existing processes of growth through the identification of repeating informal building patterns. Identifying favela patterns has been useful in outlining a common shared language and understanding of how the basic elements of informal settlements are configured in space. The endless configuration of patterns is the quality that creates the dense and layered urban fabric of the favela. With the infinite variety and combinations of building elements, the patterns must coexist with each other. In conclusion, identifying these patterns has been a way of understanding and unfolding the complexity of the built form, but also understanding the social forces and daily activities that produce these elements, their configurations, and their coexistence in the production of social cohesion and economic activity.

5.4 Limitations of Research Method

The limiting factor of the research method – identifying patterns through site photographs – is that the photographs only capture a small fragment of the favela as a whole and as such, provides a limited quantity of knowledge collected at a specific time and of a specific favela. Furthermore, the photographs are also captured through the biased lens of the author and therefore add a layer of subjectivity to the research. With that layer of subjectivity acknowledged, the following method of identifying favela patterns from the established architectural-image complex (site photographs) took on a subsequent and highly object oriented approach. In conclusion, the identified patterns offer a sound fragment into what exists in the ever changing, growing, and dynamic conditions of the favela complex.

Notes:

- 1 Hugo Carneiro Leão de Mesquita, *Popular Urbanization Strategies in Sao Paulo: A Morpho-Typological Study of Selected Inner-City Squatter Settlements*, PhD Dissertation (Zurich: ETH, 2016), 131.
- 2 Ibid., 328.
- 3 Ruhal Mehrotra, "Kinetic City, Ephemeral City," in *Metropolis Nonformal*, ed. by Christian Werthmann and Jessican Bridger (Applied Research and Design Publishing, 2015), 84.
- 4 Yve-Alain Bois, "On Forensic Architecture: A Conversation with Eyal Weizman," *October* 156 (2016): 125.

Library of Existing Favela Patterns
Urban Relationship

Figure 17: Urban Relationship Patterns

- a. Land Value**
Favelas, particularly ones that are centrally located and built on hills, are said to have the best views in Rio. For that reason, and the fact that they are close to the urban center, favelas are located on prime real-estate with a high land value.
- b. Commercial Establishments**
Commercial amenities in the favela are located closest to the base of the hill. This location allows them to transport goods more easily from the formal city. In addition, the highly trafficked location of people exiting and entering the favela increases business.
- c. Boundary of Horizontal Growth**
Favelas grow as far outward as possible until they reach their horizontal limits or boundaries (established neighbourhoods, transit routes, geographical or environmental barriers), then they densify internally through vertical stacking of units.
- d. Adapted Construction Techniques**
Construction techniques are often adopted from what is being done in the formal city. This method of appropriation is not uncommon when informal settlements exist in close proximity to urban areas.
- e. Development in Proximity to Resources**
Favelas are most developed at the base of the hill as this area is closest to the formal city (materials, resources, access). In the case of favelas that are constructed on a hill, poorest people and least developed homes are often located at the upper most extremities.
- f. Subversive Order of Development**
Houses are established first, followed by pedestrian circulation, and finally basic infrastructure. As a result, the circulation weaves through and around existing houses, taking a secondary position in the hierarchy or development.

Library of Existing Favela Patterns
Flexibility and Growth

Figure 18: Flexibility and Growth Patterns

- a. Unit Sub-Division**
Units are sub-divided into rooms and apartments and rented for capital gain.
- b. Stacking Forms**
The form of the stacked unit is always dependent on the footprint of the first unit at grade.
- c. Family Growth**
Vertical stacking of units occur as families grow.
- d. Flat Roof as Enabler of Vertical Extension**
Flat roofs and rebar left open signifies the opportunity and likelihood that another unit will eventually be built on top.
- e. Method to Extend Upper Floor Plate Span**
Diagonal structural support members are used to extended the floor plate of new units stacked on existing ones.
- f. Reflection of Capital**
The growth and quality of individual units are based on the owner's personal economic resources.

Library of Existing Favela Patterns
Structure

Figure 19: Structure Patterns

a. Formally Informal Grid
The guiding grid or unit of measure in residential favela construction is 3mx4m.

b. Column Extension
To combat the steep slope and level the floor plates, columns are extended to meet grade and are met and supported by poured concrete foundations.

c. Standard Construction
Typical favela construction is poured reinforced concrete columns and slabs with non-structural in-fill materials, most commonly clay or concrete block.

d. Open Rebar
The open rebar signifies future expansion, symbolic of change or something new coming in the future.

Library of Existing Favela Patterns
Infrastructure

Figure 20: Infrastructure Patterns

a. Relationship between Water and Stairs
Water infrastructure (provided by the municipality) is commonly coupled with stairs and existing vertical circulation.

b. Electricity (Gatos)
Electricity in the favela illegally taps into the formal system, most of the time getting electricity for free. As a result, a tangled web of wires is not an uncommon sight in the favela.

c. Potable Water
Potable water is stored on flat concrete roofs/future floors and ground pumped from collective sources at the base of the hill.

d. TV Satellite Dish
Interestingly enough, almost every home in the favela has a television and a satellite dish. When walking through the favela, its like walking from one TV program to the next.

e. External Plumbing
As plumbing is thought of after the initial house construction, it is often located externally.

Library of Existing Favela Patterns
Openings

Figure 21: Opening Patterns

a. Garage Doors as Connectors and Protectors
Garage doors are used in commercial units located at grade to allow access and create a pedestrian flow into the business establishment. The use of this element provides liveliness to the adjacent circulation route, but also provides a measure of security when needed.

b. Aesthetic Protection 1
Metal grates on doors provides security and protection.

c. Opaque or Open
Certain opening elements, for example shutters are operable but at the same time opaque. This allows for air flow and natural sunlight to enter at times, but also has the potential to close up and create a protected and secure envelope.

d. Aesthetic Protection 2
The metal panel provides security into the entrance and created an intermediate space.

e. Awnings as Signifier of Entrance
Awnings signify entrance into residential units.

f. Corrugated Steel Decking
Corrugated steel decking is used as a provisional and temporary device to provide semi-enclosed shelters on rooftops.

Library of Existing Favela Patterns
Materials

Figure 22: Material Patterns

a. Terracotta Screen
Terracotta screen is used on balconies and windows to provide a degree of privacy but also allow for ventilation and sunlight to enter closed or semi-enclosed spaces.

b. Tiles
Tiles are often used when they can be afforded financially, although not always the same in appearance, they reflect early Portuguese colonization and their use of tiles in architecture.

c. Terracotta Block
Terracotta block is used as an infill material between the concrete column structure. Often times it is left raw and exposed, however when finances permit it is covered with plaster and painted.

d. Stucco/Plaster
Painted plaster and stucco overtop of terracotta infill blocks, a traditional building technique also used in the formal city.

e. Wood
Historically wood was used for both cladding and structural purposes. Now, wood is mainly used for temporary roof structures and used as the formwork for concrete columns and slabs.

f. Creative Uses
Using materials in a creative way for an expressive aesthetic, in this case the end of a plastic bottle and concrete

How can the physical and social divide between the informal favela and the formal city be healed? How can existing processes of self-building be integrated into a formal design? How can architecture support future self-upgrading without the removal and displacement of homes and people?

Library of Proposed Favela Models

Neighbourhood Scale

Establishing a physical connection between formal and informal neighbourhoods.

Building Scale

Integrating self-building within the formal construction process through the consideration of hard and soft elements.

Component Scale

Establishing a permanent resource accessible to the community as a long-term solution for self-upgrading.

06 Building Community

Design Intent and Overview

The design project explores the ways in which a formal architecture can support informal processes of self-building. The thesis questions mentioned earlier are as follows: how can the physical and social divide between the informal favela and the formal city be healed? How can existing processes of self-building be integrated into a formal design? How can architecture support future self-upgrading without the removal and displacement of homes and people? These questions are explored at three different scales: the neighbourhood, building, and component scales.

At the neighbourhood scale, architecture is used to establish a connection between the informal favela and the adjacent formal neighbourhood. At the building scale, the participation of residents and favela builders is explored through the distinction of hard and soft architectural elements. At the component scale, the long-term impacts of developing a material and component library and how this can enable favela residents for future upgrades and improvements is explored. The three-fold approach attempts to harness the complex condition of the favela in its macro and micro existence. In conclusion to these three design questions, the intent of the design is to heal current tensions that exist between formal and informal neighbourhoods, and develop an architecture that assists in improving impoverished conditions in the favela without removal or displacement of homes and residents.

6.1 Addressing a Problem

One past approach to improving living conditions for favela residents has been to build government housing on the outskirts of the city and relocate dwellers to the periphery of urban centers. The problem with this approach is that favela residents are removed from their everyday surroundings – access to

Figure 23: Summary of Design Process

the formal city, integrated network of friends and family, and their autonomous ability to self-build as needed. In addition, as discussed in Chapter 3: Self-Building Culture in the Favela, the meaning of home and place to those that live in favelas as well as the value of these communities to the culture of vibrant character of the city is recognized. As such, the preservation and improvement of favela communities, over forms of removal and displacement as practiced in the past, is the approach taken here. This is achieved by providing the community with the tools and resources in which to enable themselves, acknowledging the creative and industrious self-built solutions that already exist in the favelas, and catering to the existing skill set of favela builders in the on-going improvement their own living conditions.

The integration of existing processes of informal self-building is directly derived from the research of favela patterns presented in Chapter 5: Unfolding Complexity. The identified patterns describe existing favela growth at multiple scales (urban relationship, flexibility and growth, structure, infrastructure, openings, and materials) that are present in the contemporary expansion of favelas. In order to integrate these existing processes of growth, a "Library of Proposed Favela Models" has been developed that is a combination of existing patterns with the introduction of several new ones. The purpose of developing the proposed library is to integrate existing processes of growth with new ones as a way to formalise the informal and develop a coherent and cohesive architectural language.

6.1 Border Site

The relationship between informal and formal conditions in the city of Rio de Janeiro is both compelling and complexing. Geographically, favelas communities and the formal city are

physically separated by natural boundaries of rivers and hills as well as manmade boundaries of walls and fences. Politically, favelas are not recognized as legitimate settlements and residents that live there are not granted equal civil privileges. Lastly, from a social perspective, residents are burdened with a negative stigma that has been manifesting for more than a century. However, despite the aforementioned circumstances and the many further degrees in which favelas are separated from the formal city, the existence of both conditions is interestingly reliant upon a co-dependent relationship.

The functions of the formal city depend on the services of favela residents while favela residents rely on the income and resources provided by the formal city. This is especially true for the community of Pavão-Pavãozinho due to its central location and access to jobs as well as other civic amenities. In summary, the favela and the city, morro and asphalt, rely on each other. The intense dichotomy and separation that exists between the two conditions – in the geographical, political, and social territories – are bonded through the co-dependent and binary relationship of daily human activity.

The complex social and political condition between the juxtaposing contexts lends a highly controversial territory upon which to investigate an architecture of connection. However, with the notion that architecture can positively impact the built environment, the proposed architecture offers a sensitive integration of formal and informal neighbourhoods in attempt to bridge and build community.

Within the theme exploring the integration of formal and informal, a site on the border between the opposing conditions is chosen. The site for the proposed project is located on the property of an

existing school complex called Solar Meninos de Luz (Children of Light). The front (south) of the property borders the formal neighbourhood and is the main access to the school complex. The back of the property (north) borders the favela and is adjacent to an important community space called the quadrant. These spaces, as well as unique physical conditions of the site are discussed on the following pages.

Figure 24: Project Site Location within Existing Context 1:750

Existing Site Conditions

Figure 25: Diagrams of Existing Site Conditions
a. Solar Meninos de Luz
b. The Quadrant
c. Concrete Boundaries
d. Connecting with Architecture

a

Solar Meninos de Luz, a catholic school that has been established for 32 years, plays an important role in the community by offering affordable and quality education to children from the communities of Pavão-Pavãozinho and Cantagalo. Their mission is to transform adolescents in vulnerable situations. In addition to serving youth, the school has night and weekend programs available to adults and families, thus extending its positive influence and presence to the larger context of the community. The school complex consists of four educational buildings (converted from previously residential homes), one administrative building, one sport complex, and one community theatre. The buildings, although physically separate, are unified by the site boundary and painted a prominent green colour. The architectural intention is to integrate into this existing school and respond to the educational program and building on the existing landmark of community.

b

As an existing civic space, the quadrant to the north of the proposed site plays an important role for the favela community by offering a large and centrally located area for gathering. The open space is defined by a row of self-built residences that line the northern perimeter and a concrete retaining wall that acts as a separator to the south. The importance of the space to the community is witnessed in the fact that it is one of the only open areas within the favela that remains unbuilt. Currently, soccer posts exist in the middle for play ,while further research has revealed the sites use for political and peaceful protests. The vitality and neighbourhood camaraderie felt in the quadrant is celebrated in the architecture as the proposed workshop becomes an extension of the outdoor quadrant.

c

A 10m tall concrete wall stands on the border between Solar Meninos de Luz and the quadrant. The wall serves a functional purpose, by acting as a retaining wall, but also stands as a physical symbol for the social and political divide between favelas and the formal city. In most areas of the city there is a strong presence of walls and boundaries. Walls in the formal city are in place mainly for security and protection and are most commonly used for residential buildings, schools, and other civic buildings. These walls line the sidewalk and are monitored by porters or guards who work full-time in the building. In the favela, there are no walls between individual residences, but there are often walls defining separation between the informal and formal neighbourhoods. Part of the concept for the proposed design will be to connect the adjacent formal and informal neighbourhoods and begin to break down these existing barriers and boundaries.

d

The current demolition of one of the school buildings, along with the proposed demolition of the theatre building, creates an opportunity upon which to connect the informal to the formal neighbourhood and permeate the existing wall condition that serves to separate these adjacent entities. An additional area of importance that must be recognized is the existing green space. The terraced landscape currently exists as a wild garden with the intention of introducing urban agriculture when funding permits. The proposed design considers the importance of maintaining this critical green space and the three large trees located on the terrace. From an urban perspective, there is a lack of grass and park space within the dense fabric of Rio de Janeiro, and as such, there is an opportunity for this vegetated space to become an important connection to nature within the site of the school.

07 Library of Proposed Models

Developing a Formal Architectural Language

The favela is a complex urban organism that is composed of an endless multiplicity of patterns; these patterns of been identified and described in Chapter 5: Unfolding Complexity and play an important role in unfolding the complex spatial composition of the contemporary favela. Furthermore, these patterns describe the elements that are self-built by residents and support the autonomous and continued growth of the favela.

When questioning what the future growth of favelas will be like, how architecture can support this growth, and how this might be deployed in a slightly more standardized manner, it has become a crucial design move to integrate the existing patterns into the formal proposal. Integrating existing patterns ensures a smooth transition for growth that is sustainable moving forward (because they are growth patterns that are already familiar to residents). From the identified patterns, a new library has been developed for the formal design proposal that integrates some of the patterns from the previous chapter but also introduces new ones. This process can be described as a way of formalising the informal, taking existing self-built patterns and developing them as part of a formal architectural language.

In this approach, existing processes of growth are acknowledged, accepted, and integrated as part of the proposed architecture, maintaining the vernacular conditions and local building processes. They range in scale from the urban to the material with specific functions, much like the ones listed in the previous chapter. This architectural language is used in a repetitive nature throughout the proposed building. The intent is to develop a set of hierarchies repeated throughout the design and form a common and unifying language that bridges the formal and informal landscapes – essentially taking from the informal language and implementing it into a formal organization. As the favela is

Public Path

The public pathway weaves itself around and through the programmatic and semi-private spaces of the workshop, school, and theatre. The connection between informal and formal areas of the city invites everyone to engage and participate in the new collective community space.

Flat Roof as Enabler for Vertical Extension

Similarly to many constructions in the favela, the roofs of the proposed building are left flat and open for vertical extension as needed by the community and the school. In the meantime, the roof is available as a useable outdoor space.

Concrete Slab and Column Structure

A straightforward concrete slab and column structural system follows a grid of 6mx8m (expanded from the original 3mx4m identified in the favela). The system is considered a hard elements and acts as a standardizing framework in which to hold soft elements and a degree of flexibility and opportunity for future expansion.

Permanent Roof Structure

Signifies a finished form and the end of vertical construction on that particular building volume.

Temporary Railing

The railing is used as a "cap" on rooftops that are both active, but left open for future construction. It continues a similar language used in the roof structure.

Passive Ventilation

Passive ventilation techniques such as cross-ventilation and nighttime cooling are used to ventilate and provide improved air quality to interior spaces. Addressing the issue of poor air circulation and moist interiors which is a problem to many favela homes.

Bamboo

Bamboo as an available and renewable resource is used to denote openings to the building. Bi-folding doors are used at the building's numerable entrances while sliding screens are used for exterior window shading.

Terracotta Screen Block

Terracotta screen is used to demarcate semi-private and transition spaces (i.e. circulation or rooftops). It allows for ventilation into the interior of the building and strongly relates to the common use of the building material in the favela.

Metal Mesh Screen

A metal mesh screen is used consistently throughout the building to demarcate the public pathway.

Lightweight Concrete Block

Concrete block is used as an infill material to provide security and solidity. Concrete block is an affordable and available building material in Brazil which is commonly used throughout both the formal and informal sectors of the city.

flexible and dynamic, by integrating existing process of growth from the favela patterns, the proposed building can reflect these characteristics.

Figure 26: Proposed Favela Models

08 Neighbourhood Scale

Connecting the Formal and Informal Landscapes

At the scale of the neighbourhood, the building creates a physical connection between the adjacent informal and formal neighbourhoods through a series of terraced indoor and outdoor spaces. These spaces include a workshop, a school, and a theatre that are connected by a public pathway. The pathway serves as an additional point of access for residents to move between the formal city and the favela. It weaves alongside and through the building spaces inviting the community into the newly established social space. By actively participating in these spaces, the existing concrete walls that bound the site and create a hard separation between formal and informal contexts are permeated. The permeation and cross-pollination of formal and informal extends meaning beyond the physical existence of the building and challenges existing social and political stigmatizations associated with the tensions between the city and its favelas. By bridging the juxtaposing neighbourhoods through a public pathway, architecture exists as a collective space that is inclusive of both formal and informal and strives to integrate, rather than privatize space. From an urban perspective the connection of formal and informal results in a new collective, shared, and democratic use of space.

The existence of the building as a connector between formal and informal stands quietly in the existing context by using traditional vernacular materials and stepping down with the site topography. In that way, the building is respectful of the existing site and the social responsibility of designing in a controversial context.

Figure 27: Building in Existing Context with Extruded Path

Journey through Public Pathway

The public pathway offers a connection between the informal favela and the formal city. Let us imagine the journey passing through the building from the perspective of a favela resident. Beginning in the quadrant, an informal civic gathering space in the favela, one is welcomed by the community workshop whose bi-folding bamboo doors open up to provide space as an extension of the courtyard. Moving past the workshop, one can turn right and descend along the public path. It is here that an entrance into the existing school (Solar Meninos de Luz) is located. This access points makes it easy for mothers and fathers to drop their kids off at school as they head to work in the formal city. Continuing the descent down the public path, one turns a corner and passes a multipurpose community studio that can be used both publicly (by the community) and privately (by the school). Once again, bi-folding bamboo doors are used as an architectural language to signify opening. If one is not participating in the activities of the community studio, they can descend down a set of stairs to arrive at the top of the informal performance space. At this point, there is another secured entrance into the existing school to accommodate students coming from the other direction. Finally, descending down the last series of stairs one arrives at the formal city.

The programmatic organization of space, along with visual perspectives, are described on the following pages.

Figure 28: Public Pathway through Building

c
[+0m]
[+3.3m]

Figure 29: Levels 1+2 Formal Connection
a. Public Entrance and View from Street
b. Private School Courtyard
c. Axonometric Floor Plan Level 1+2

- 1 outdoor theatre
- 2 delivery ramp
- 3 loading
- 4 material storage
- 5 semi-sheltered courtyard
- 6 existing school house

d
[+6.6m]

Figure 30: Level 3 Classrooms and Multipurpose Community Studio
a. View from Lower Garden Terrace towards School
b. Public Pathway
c. Public Pathway
d. Axonometric Floor Plan Level 3

- 1 multipurpose community space
- 2 public pathway
- 3 classroom
- 4 exhibition
- 5 student workshop
- 6 lower garden terrace
- 7 main entrance to classrooms from existing private school grounds

c
[+9.9m]

Figure 31: Level 4 Classrooms
a. View of Interior Hallway Condition
b. Entrance into School from Path
c. Axonometric Floor Plan Level 4

- 1 public path and school entrance
- 2 classroom
- 3 exhibition
- 4 student workshop
- 5 upper garden terrace

a

b
[+13.2m]

Figure 32: Level 5 Workshop
a. View of Workshop from Quadrant
b. Axonometric Floor Plan Level 5

- 1 public pathway
- 2 community workshop
- 3 quadrant
- 4 rooftop for expansion
- 5 stack towers for ventilation

a

b
[+16.5m]

c
[+19.8m]

Figure 33: Level 6 + 7 Workshop
a. View of Workshop from Pedestrian Path in the Favela
b. Axonometric Floor Plan Level 6
c. Axonometric Floor Plan Level 7

- 1 public pathway
- 2 community workshop
- 3 rooftop for expansion

09 Building Scale

Integration of Hard and Soft Elements

At the building scale, the integration of formal and informal conditions is considered in the hard and soft elements of architecture. Hard elements are considered as major structural members such as slabs and columns that would be implemented at the industrial scale. Soft elements can be either infill materials or finishing touches that could be carried out by community members, thus inviting a process of participation. In this approach, the impact of architecture is recognized beyond its finished form by considering the ways in which self-building can be incorporated as part of the process. Within the context of approaching slums architecturally, there is an enmeshed relationship between architecture as product and production, and the social forces that are required to produce built form. The social forces building in the favela include a mixture of formal industrial builders carrying out upgrading projects, and community members that have been self-taught in favela construction.

The integration of self-building and soft elements within hard elements has been explored in two chosen portions of the building, the school and the theatre. Both fragments investigate the application of the Library of Proposed Favela Models and visually demonstrates the identification between hard and soft elements of architecture. Beyond the integration of models into the design, these spaces incorporate low-tech assemblies that offer spaces of architectural quality considering elements of privacy, air, and light. Elements of privacy, air and light are important when considering the favela context. As stacked houses are so close together, the size of openings are compromised to provide a measure of privacy. This compromise however is met with interiors spaces that lack light and adequate airflow, resulting in dark and stuffy living conditions.

Building Fragment 1: Classroom
Hard and Soft Elements

The diagram to the right outlines the hard and soft elements. For the construction of the classroom fragment, the hard elements including structural columns and poured concrete floors would be completed by industrial builders. The soft elements, including the laying of lightweight concrete block, terracotta screen block, and other finishing components, would be carried out with the help of favela builders as well as community members.

As the climate in Rio de Janeiro is mainly a cooling issue, the proposal uses low-tech strategies for passive ventilation over a high-tech HVAC system. To achieve this, the following techniques are used:

- Poured concrete slabs as a thermal mass
- Operable windows for fresh air with bamboo shading devices
- A ventilation tower to facilitate night time cooling (night time cooling occurs when the outdoor temperature drops and the warmer interior air rises through the tower to escape)
- Use of terracotta screen block in the hallways, as a porous and permeable façade, to further the idea of fresh air and ventilation

Identifying and distinguishing between the hard and soft elements, particularly what is done at the industrial scale versus the self-built scale, allows for a clear opportunity of community participation in the building of the resource center. In this way, not only does the resource center offer built opportunities in its completed construction, it also provides the opportunity for participation and community building in the construction of the resource center itself.

Figure 34: Building Fragment 1

Exploded axonometric demonstrating the hard and soft building elements.

***hard elements are listed in bold**
*soft elements are listed in regular

Building Fragment 2: Community Theatre
Hard and Soft Elements

Similarly to the building fragment on the previous page, the diagram outlines the hard and soft elements, considering both the industrial and self-built scales, and the opportunity for community participation in the construction of the resource center.

The passive ventilation technique applied in this building fragment is cross ventilation from the operable windows and the operable bi-folding bamboo doors. When the space is in use, both sides can become open to offer fresh air into the interior. The external bamboo window element, in this case, is used less for shading (as this direction faces north and the project location is below the equator) and more for privacy against the busy street and adjacent residential buildings.

Using the volume of the multipurpose community studio to cover the space below creates a sheltered outdoor condition that is a prominent feature in tropical climates. The space, referred to as the outdoor theatre space, can serve as an opportunity for formal community performances or more informally, as a gathering space for students and people from both the favela and the formal neighbourhood. Lastly to note is the angled roof component that formally signifies the limit of vertical construction on a flat roof and aesthetically references the existing favela typology.

Figure 35: Building Fragment 2

Exploded axonometric demonstrating the hard and soft building elements.

***hard elements are listed in bold**
*soft elements are listed in regular

10

Component Scale

Opportunity for Future Self-Upgrading

The component scale considers how the proposed architecture can support future self-upgrading in the favela. Rather than proposing a new form of housing, the resource center recognizes that favela builders are capable of constructing their own homes, and instead provides the necessary tools and know-how for continued favela improvement. Given the supporting resources, new favela constructions and improvements can adopt spatial and material assemblies of architectural quality, addressing the aforementioned conditions of privacy, light, and ventilation.

The resource center provides the opportunity for future self-upgrading in both its spatial and object character. Spatially, the building program contributes to self-upgrading by providing access to materials, equipment, and education. The workshop portion, located adjacent to the favela, opens up to act as an extension of the courtyard, igniting the area with energy and community activity when in operation. In its object character, the building expresses typical materials and patterns prevalent to the favela as identified in the Library of Proposed Models. The intent is not to mimic poverty, but rather to use the patterns in a formal code. The building elements in the Library of Proposed Models (with room for expansion to include more materials if and when needed) would then be available to favela builders interested in self-upgrading their own homes. In this way, the final form of the community building establishes itself as a long-term and permanent resource for self-upgrading.

The concept of providing resources for building and enabling favela residents to carry on their autonomous construction style in a positive way is supported by Jane Jacobs. In *The Death and Life of Great American Cities*, Jacobs speaks of the perpetual slum, one that is never ending and ever changing. She argues

that the only way to overcome the conditions found in slum living is not to gentrify or relocate its dwellers, but to unslum the slum. "To overcome slums, we must regard slum dwellers as people capable of understanding and acting upon their own self-interests, which they certainly are. We need to discern, respect and build upon the forces for regeneration that exist in slums themselves, and that demonstrably work in real cities."

The workshop, as well as the Library of Proposed Models, offers a standardized and semi-controlled provision of building elements. The dissemination of building elements allows for micro scaled interventions to occur throughout the favela and begin a semi-formal and self-constructed urban transformation of an impoverished condition. As such, the repetition of building elements offers an opportunity to standardize the informal built environment to a certain extent, but at the same time avoids prescribing what the favela may or may not need. The open approach permits multiple combinations of the proposed models and allows for a degree of flexibility depending on the type and scale of upgrading being carried out.

The approach incorporates the idea of hard and soft elements, described in the previous chapter. Depending on the type and scale of the upgrading, multiple combinations of hard and soft elements from the Library of Proposed Models can be applied. For example, if a vertical stack of 3 or 4 units collectively decided to demolish and rebuild, the major structural frame (hard elements) would be carried out with the help of the workshop. The infill and finishing materials (soft elements) could then be completed by favela builders and community members. This approach is not unlike the "half of a house" concept presented by Alejandro Aravena from Elemental where the hard and necessary elements are provided for and the soft later carried out by the home owner. However, the concept is a

little looser than Elementals because rather than providing a ridged boundary in which self-building can occur on an empty site, the idea is that the required building elements would be provided for and that they could adapt to whatever condition the upgrade required.

At this moment in the project, autonomy and control is given back to community residents by optimizing self-building and the skills that favela builders and community residents already possess in the making of their own homes. At the component scale, the diverse combination and application of the proposed favela models addresses the dynamic character of the favela and allows future self-upgrades to happen as determined by the community. By providing a permanent resource center that serves as a logistical material and educational resource, the local community is enabled and encouraged to take part in improving their built environments, thus allowing the semi-formalisation of an informal building process to occur.

Figure 36: Library of Proposed Models

Notes:
1 Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961), 271.

Degrees of Self-Upgrading

In order to demonstrate how the proposed architecture supports future self-upgrading, two conditions are looked at in detail. As this would ideally be carried out by favela builders, the proposals that follow in this chapter and merely suggestions of how future self-upgrading might occur. The two conditions being explored consider varying degrees of upgrading and are located within the quadrant space.

- 1 The first exploration takes place in an existing building supply store. This store is an essential resource to the community as it provides building materials, ideally coming to work in harmony with the proposed resource center and workshop. In this example, a full demolition and reconstruction of hard and soft elements is considered. This degree of improvement could be used throughout the favela for specific residences that are in a highly impoverished state and in need of total reconstruction.
- 2 The second exploration takes place in an existing stacking of residences. Here, one wall is in poor condition due to evident moisture damage. Rather than a full deconstruction and reconstruction, the idea of removing and replacing a single wall (soft element) within the frame of the existing structure (hard element) is proposed.

Figure 37: Degrees of Self-Upgrading
a. Building Supply Store in Existing Context
b. Site Plan 1:500 with Proposed Building
and Explorations for Future Favela Upgrades

Figure 38: Quadrant Panorama
Identifying Upgrades

1 Hard and Soft Elements

This upgrade explores the idea that perhaps a micro community of friends or family who have their units stacked on top of one another might collectively decide to demolish their current "tower" and rebuild with the help of the proposed resource center.

2 Soft Elements

This upgrade considers the fact that in certain living agglomerations it may only be possible to make minimal upgrades. Here, the removal and rebuilding of a single wall is explored.

1 Hard and Soft Elements

The first exploration considers a total demolition and reconstruction, upon the hypothetical condition that a stacking of family units might collectively decide to rebuild completely. The approach would be similar to Elemental where the hard structural elements are provided for and the soft elements can later be completed by the residents and or favela builders. Where the approach differs is in the scale and the site context. Rather than build a large number of skeleton frames on a brown field site, the upgrades would happen at an incremental scale in an already densely built and populated context.

The upgrade proposal borrows ideas of structure and materials from the resource center and the proposed models, specifically techniques of ventilation. Furthermore, the proposal introduces the idea of ventilated and nested space. The ventilated space is coupled with the primary public circulation and would hold less private dwelling spaces. This space then connects to nested and private spaces which are serviced by a ventilation tower that helps to facilitats night time cooling. Ventilation is considered heavily in both of the explorations as it was one of the main concerns noted on the site visits. Observed were poorly ventilated spaces with mold on the ceilings and walls, resulting in poor indoor air quality.

Figure 39: Upgrade Exploration 1
a. Existing Condition
b. Proposed Upgrade

b

2 Soft Elements

The second exploration considers the self-upgrading of a single wall, focusing on the replacement of solely the soft elements. As seen in the site picture showing the existing conditions, it is clear that a washroom and kitchen space exist beyond the deteriorated wall. This is evident by the terracotta screen block, the exterior plumbing, and the moisture damage. Therefore, the existing space of a washroom and kitchen requires ventilation, but at the same time privacy.

The upgrade proposal incorporates material and building concepts from the Library of Proposed Models such as passive ventilation. Further application of these archetypes are outlined in the diagram on the opposite page.

In order for future self-upgrading to occur, these soft elements would be available through the workshop in the resource center. The upgrade could either be carried out by favela builders, or by community residents with the help and construction knowledge from favela builders. The workshop space would provide opportunity for that learning and transfer of knowledge to occur. The demolished wall, although in a poor state, could be recycled in a way that enhances the quality of the built environment within the community. For example, in-fill for future gabion retaining walls when needed.

Figure 40: Upgrade Exploration 2
a. Existing Condition
b. Proposed Upgrade

b

Figure 41: Future Self Upgrading

This aerial image shows the potential of the resource center to act as a permanent support for the community, updating structures in the favela as well as accepting additions and changes to itself.

- 1 upgrade 1
- 2 upgrade 2 (beyond)
- 3 expansion to resource center

Future Expansion of the Resource Center

In addition to the resource center providing opportunities for self-upgrading in the favela, the building and the models are also configured for future expansion of the resource center itself. Following the same concept as the favela upgrades, the resource center is expanded on by using materials and components from the Library of Proposed Models. Again, the idea is that this would be carried out in conjunction with both the school and the favela community, so the proposal offered on the following pages is just one suggestion of what could be possible. The image to the left shows an additional level added to the school portion and two additional levels (one left half open) on the workshop portion. Both are completed with the familiar rooftop structure, following the formalised architectural language developed throughout the project. Also indicated are the two explorations for upgrading. Through this image, one can see the development of a formalised architectural language, first employed in the permanent resource center, and second deployed throughout the favela. With the permanent resource center in place, future self-upgrading is both supported and encouraged, ultimately enabling favela residents to participate in upgrading and building their community.

Reflection

Informal settlements, particularly favelas, are complex subject matters to consider architecturally. Although they are a type of inhabited built form, their subversive operation and existence outside of any regularized process makes them difficult to grasp in what is often a well thought and highly premeditated practice. However, the idea that a built form which grows so spontaneously and unpredictably, yet somehow still manages to function in its own way, is probably the most intriguing element for approaching this subject matter.

This thesis recognizes that the growth and development of favelas occurs by self-construction in an incremental process. As such, the architectural proposal developed intends to become part of this process (past and future) in order to offer and enable opportunities for improved favela growth. In terms of the future, the impact of providing a permanent and long-term resource center in which favela residents can begin to upgrade their homes, was only touched on the surface in this thesis with two investigations. Further research might investigate the variety of housing typologies in the favela (for example, single storey, double storey, specific footprints) and how one might approach an upgrade depending on the specific condition. As well, a better understanding of what type of condition constitutes an upgrade could lead to a framework for assessing the urgency of which an upgrade should be implemented. Further to this, it would be interesting to integrate building materials and components that are part of any favela deconstructions into the formal architectural language of the Library of Proposed Models as a way to recycle and reuse them, thus creating a closed cycle and continuous material supply to support future upgrades.

appendix a

SITE VISITS

Site Visit to Pavão Pavãozinho

In the summer of August 2016, the first site visit to Pavão Pavãozinho was made. The following text describes the journey through important landmarks and memorable moments as experienced on the visit.

01 / Meeting Point at the Beach

Standing on the pedestrian path, I take in the infamous black and white sidewalk designed by Brazilian landscape architect, Robert Burle Marx. Looking around, the built fabric predominantly consists of mid-rise residential apartments in various shades of pastel. At street level, the majority of apartments are gated with the few exceptions of some that have restaurants and bars.

02 / Entering the Favela

Walking away from the beach, I notice the building typologies remain the same, however the programmatic activity at grade changes. Commercial businesses such as grocery stores, newspaper stands, juice bars, retail shops and banks take the place of gated interior lobbies for residences. The entrance to Pavão Pavãozinho is just off the main street of Rua Sá Ferreira. When entering the favela, I notice immediate changes to the built environment, beginning with a steep elevation change.

03 / The Street

As I turn off Sá Ferreira, I immediately ascend a steep and curved road brimming with energy. The street is busy with both pedestrian and vehicle traffic while the sidewalk remains occupied with market vendors selling fresh fruit, vegetables, and meat. From the main street, I take a steep set of stairs to reach a secondary circulation artery solely for pedestrians.

04 / The Quadrão

The first memorable space is the quadrão or quadrant. The quadrant is lined by self-built homes and is clearly an important space to the community; evident by the fact that it still exists as an open space not yet built upon. Soccer posts and evidence of community based activity are observed here.

05 / UPP Juxtaposition

As I continue, I pass the local UPP station, as this favela was pacified in 2008. I notice an interesting juxtaposition between the UPP building and an existing self-built residential construction. The UPP building follows a similar structural logic of concrete columns with masonry infill. However, there are noticeable differences between the finished plaster and colour, as well as the consistency in building materials and components. Interesting to note is the way the self-built structure steps back, away from the street. Most likely for structural reasons, however, this is a method used to address the "human scale" of buildings while still achieving vertical density.

06 / Hotel Panorama

My journey takes me to a school and community center; the former Hotel Panorama. As it was a previously existing building, the form is drastically different to the surrounding self-built homes. Here, the current CIEP School is reminiscent of modern architecture in Brazil by the use of concrete, large spans for open spaces, and a curved hallway.

07 / House

From the main horizontal circulation, we turned left up a steep set of stairs (vertical circulation accompanied by water drainage, see stair and water condition in existing patterns). The interior of the house was modestly furnished and kept clean, despite the small size and lack of storage space. If any improvements could be made to the interior it would be the implementation of added windows or a porous condition to allow for fresh air flow. The humid climate of Rio causes the interior of poorly ventilated spaces to be damp and stuffy.

08 / House in Construction

In this fragment, I am able to see a house in construction. There, two men, void of any safety measures are removing wood formwork from a

poured concrete beam. A picture of the construction from afar captures one the workers holding his finger up at me indicating no pictures. After a little explanation and discussion, we are able to go see the construction up close. It is then that I discovered the plastic yellow tubes incorporated into the formwork to accommodate electrical infrastructure to the home.

09 / Descending on the Train

To exit the favela I descend by the train, a funicular tram built in 1984. In the train I am able to take a video of the descent, capturing many different types of self-built construction.

Figure 42: Site Visit to Pavão Pavãozinho

This map shows the journey of the site visit to Pavão Pavãozinho taken in August 2016. Important landmarks noted on the site visit have been extracted and described in text on the previous page.

Figure 43: Documentation of an Existing Self-Built Favela Home
 a. Level 1 Floor Plan
 b. Level 2 Floor Plan
 c. Section
 d. Elements

Site Visit to Solar Meninos de Luz

In the winter of February 2017, the second visit to Pavão Pavãozinho was made, this time focusing on the school compound to the south of the quadrant named Solar Meninos de Luz.

On this site visit, I was able to meet with the director of the school who took me on a tour of the grounds and explained in greater detail the role that the school plays in the community and their hope in providing educational opportunities to children in impoverished situations.

a. Sequence 1

A series of images showing the condition and character of the existing school grounds. The school's separate buildings are consolidated aesthetically by a prominent green exterior paint; an existing feature what was integrated into the proposed design through the finish of the ventilation towers.

b. Sequence 2

Images showing the current conditon of the existing garden terraces.

Figure 44: Site Visit 2
a. Sequence 1
b. Sequence 2
c. Map

c

appendix b

MODELS

Process: Site Model of Existing Condition

Figure 45: Site Model 1:100
a. Existing Site
b. Level Topography
c. Reveal
d. Observe Existing Structure

Process: Context Model with Proposed Massing

Figure 46: Site Model 1:500
a. Existing Site
b. Demolish Existing School and Theatre Buildings
c. Initial Proposed Massing
d. Initial Roof Exploration

Process: Circulation Model

Figure 47: Circulation Model
a. South
b. East
c. North
d. West

Process: Partial Design Model Presented at SCR

Figure 48: Partial Design Model
a. Aerial 1
b. View from School Grounds
c. View from Favela
d. Aerial 2

Final: Context Model

Figure 49: Final Context Model
a. Aerial 1
b. View from the East
c. View from the West
d. View from the Favela
e. Aerial 2

Final: Sectional Model

Figure 50: Final Sectional Model
a. Section
b. East Elevation
c. Public Pathway
d. Entrance to Public Pathway from Favela
e. North Elevation
7. Rooftop with Ventilation Towers

appendix c

DRAWINGS

PREVI

ELEMENTAL

DISPLACEMENT

CRITICAL POSITION IMPROVEMENT WITHOUT DISPLACEMENT

INFORMAL SETTLEMENT
IMPROVEMENT

DISPLACEMENT AND BUILDING
ON A BARE CONTEXT

Figure 51: Early Concept Sketches

Figure 52: Site Plan 1:500

Figure 53: Level 1 Floor Plan 1:400

+ 0.0m

Figure 54: Level 2 Floor Plan 1:400

+ 3.3m

Figure 57: Level 3 Floor Plan 1:400

+ 6.6m

Figure 58: Level 4 Floor Plan 1:400

+ 9.9m

Figure 59: Level 5 Floor Plan 1:400

+ 13.2m

Figure 60: Level 6 Floor Plan 1:400

+ 16.5m

Figure 61: Level 7 Floor Plan 1:400

+ 19.8m

Figure 62: Section AA 1:200

Figure 63: Section BB 1:200

Figure 64: Section CC 1:200

Figure 65: Section DD 1:200

Figure 66: Detail Wall Section 1:10

Figure 67: North Elevation 1:200

Figure 68: South Elevation 1:200

Figure 69: West Elevation 1:200

Figure 70: East Elevation1:200

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