

Seedling:
Reconciling Social Housing and access to urbanity in Rio de Janeiro
by
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Bachelor of Architecture
Pontifical Catholic University of Rio de Janeiro, 2017

Submitted to the
Department of Architecture
in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Architecture Studies
at the Massachusetts Institute of Technology
September 2021

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ABSTRACT

This work is a discussion around the potential of "Parcelamento, Edificação ou Utilização Compulsórios" in English: "Compulsory land parceling, building and use" (or CPBU) in the city of Rio de Janeiro. The law exists under the umbrella of the City Statute, a set of laws implemented in Brazil in 2001. It enables municipalities to regulate land use and management towards a more socially inclusive and just environment, acknowledging that the city's social function and the right to the city should be contemplated within the scope of civic rights. CPBU is a way to promote the use of unused and underused land by pressuring the owners of these properties through the increase of property taxation and the eventual seizing of the areas. Some of the measures proposed by the City Statute were widely accepted and are employed in several cities. The main controversy regarding its application, however, revolves around the fact that in many places, it has been used to benefit public-private partnerships, favoring the market logic and opposing the City Statute's primary goal: to promote land tenure regularization and fight land speculation. This work will deal with the current use of this set of laws juxtaposed to the broader theme of social housing.

In this thesis, I argue to overcome this dynamic, limiting the supply and quality of public services and infrastructure. The urban redevelopment of socially unproductive lands by drawing on the CPBU law could render these unused/underused properties profitable for the resident population by focusing on a more accessible and compact city model, for instance.

This work will develop new guidelines for applying CPBU in Rio de Janeiro's Master Plan in two scales. The first scale will be the development of a framework based on the concept of urban analytics. This framework will hierarchize criteria that outputs a new delineation for CPBU; this will be a static representation of the criteria according to the data inputted. The second scale will be a collection of volumes that are in parcels and blocks within the new CPBU delineation. This interscalar effort will attempt to quantify the potential of CPBU applied for social housing in Rio.

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ACKNOWLEDGEMENTS

For many times I was a foreigner, I would like to dedicate this thesis to Rio.

To my advisors, prof. Rafi Segal and prof. Nicholas de Monchaux. Thank you for welcoming me with open arms, for all the opportunities, support, and guidance.

To prof. Roi Salgueiro Barrio, prof. Susanne Schindler, prof. Andres Sevtsuk and Alessandra Fabbri for their advice, patience, and enriching contributions to this thesis.

To all of my Cambridge and Rio friends, you made this journey a little lighter.

To Gabriel Duarte, thanks for always seeing the best in your students.

To João, for being the best companion, with the best shoulder and hearth.

To my uncle, Cesar, for shaping so much of what I am.

To my grandmothers, Yolanda and Maria Fernanda, for being such an example of strength.

To my father, Fernando, for always championing my wills. Without you, I couldn't have done it.

To my brother and my mom, Bernardo and Nyana. You were my first hero and my first love. Thank you for being the high of my days, for the endless calls, and the immense support. All I do is a love letter to you.

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THE LANDSCAPE

Social Housing in Brazil

To contextualize how social housing unfolded in Brazil, I'll borrow the historical narrative and division criteria provided by Nabil Bonduki in the book "The Pioneers of social Housing: One Hundred years of public policy in Brazil." In the book, he introduces the timeline for social housing developments in Brazil over the last 100 years, splitting it into five sections:

- › The production of housing for rent (1889 - 1930),
- › The origins of social housing (1930 - 1964),
- › Urban and housing policies during the military dictatorship (1964 - 1986),
- › Lost decades or the hope of a utopia? (1986 - 2002),
- › National Policy for housing in the XXI century: towards the right to dignified housing? (2003 - 2010)

The production of housing for rent (1889 - 1930)

This phase, which roughly coincides with the Old Republic¹, was characterized by recognizing that workers' housing was a public problem. However, the liberal conception prevailed, along with the notion that there shouldn't be direct intervention in the production and policy of housing.

Bonduki² highlights the Abolition of Slavery in 1888 and the constitution of a free labor market, when the State started considering housing as an issue. Although weak, there is some action on the matter.

The State ended up having an insignificant presence in facing the problem, limited to timid actions, such as favoring tax exemptions, private rentier production, and exercising the power of the health police³, in a hygienist perspective. During this period, the first action of the federal government aimed at actually producing housing occurs with the start of the implementation of the Marechal Hermes neighborhood. A project formulated in 1912 in Rio de Janeiro.

¹ From 1889 to 1930. It marks the end of the Empire in Brazil.

² Bonduki.

Housing was not thought of exclusively as the individual housing unit, but as an autonomous collective nucleus, which included social equipment and the idea of serial production. Regardless of charging a rent below market value, the entrepreneur gained the following benefits: guaranteed rent payment, because it was taken from the payroll itself; lower wages; work of several family members; and worker fidelity, because dismissal would imply in losing your home, preventing the search for another job with better wages⁴.

The construction of workers' neighborhoods was practiced by all levels of government and in many regions across the country. All sectors widely welcomed the stimulus. For hygienists, it was an opportunity to showcase healthy housing practices; for the State, it was an opportunity to parade its efforts to house the poor; for entrepreneurs, it was a chance to increase investment returns⁵.

Without any State protection, workers who were unable to pay the rent ended up looking for accommodation

³ Police law enforcement for urban hygiene policies.

⁴ Bonduki.

⁵ Bonduki.

below the minimum level recommended by health legislation.

Outside the municipal standards, the *cortiço*, or tenement was a generic name for a wide range of collective housing, condemned and stigmatized⁶.

In Rio de Janeiro, since the middle of the 19th century, during the Empire⁷, the tenement had already become a form of accommodation widely used by freed slaves, newly arrived immigrants, prostitutes, and free workers who moved to the city in search of work. In an increasingly populated city, dense and concentrated, exploring tenements was a profitable business because of the barriers for territorial expansion.

Despite the small presence of the State, this phase was essential to shape the idea of a housing complex, or neighborhood, which was consolidated in the following period, with more active State intervention⁸.



Image from a *cortiço* in the central área of Rio de Janeiro⁹



Image from the Marechal Hermes neighborhood project¹⁰

⁶ Bonduki.

⁷ From 1822 to 1889. Brazil was no longer a Portuguese colony, but still a monarchy.

⁸ Bonduki, *Os pioneiros da habitação social - Vol 1*.

⁹ "Saudades D'Além-Mar: A Revista Lusitania e a Imigração Portuguesa No Rio de Janeiro (1929-1934)."

¹⁰ "APAC Marechal Hermes."

The origins of social housing (1930 - 1964)

Vargas' era¹¹ coincides with the rise of social housing in Brazil. The government begins to intervene in both the production process and the housing rental market, abandoning the position of leaving it all to market forces. During the time, Brazil underwent a profound transformation, turning from a liberal standpoint to a populist one. The State began to intervene in all aspects of the country's economic life¹².

This stage marks the recognition of housing as a public good. The government intervenes in the rental market to protect tenants, discourage rent production, and establish mechanisms to facilitate the purchase of lots in installments and promote the self-construction of houses. The State also produces a significant amount of social housing. There is agreement on the private sector's inability to provide housing for the large number of workers who have arrived in cities looking for work.¹³

¹¹ When populist ruler Getúlio Vargas governed the country from 1930 to 1945. He was forced to resign the presidency after an ultimatum by the military.

¹² Bonduki, *Os pioneiros da habitação social - Vol 1*.

¹³ Bonduki.

This period is also characterized by the 1930 Revolution¹⁴ and the revision of legislation that regulated the production of houses by the property portfolios (facilitated financing) of the Retirement Institutes and Pension Funds (IAPs and CAPs).

Housing production begins with the IAPs and CAPs and is delegated to a specific agency, the Fundação da Casa Popular (FCP), the first State entity at the national level dedicated to the production of popular housing, beginning in 1946. However, there was a failed attempt to construct a housing policy aimed at mass production of housing for urban workers, a proposal at the core of the FCP's creation¹⁵.

By producing housing by itself, severely penalizing urban landlords, freezing rents, and ignoring the emergence of slums, the State acted to reduce labor cost, which contributed to the period's high rates of capital accumulation and industrialization effort. Stimulating this

¹⁴ After failing to win the presidential election in 1930, Getúlio Vargas led a military uprising that overthrew Brazil's government.

¹⁵ Bonduki

process appears to be guiding the government's housing policy at the time.

In terms of architecture, the period was distinguished by the incorporation of ideas from the International Congress of Modern Architecture (CIAM) and cutting-edge urban proposals in the construction of residential buildings with the expressive presence of architects, engineers, and urban planners.

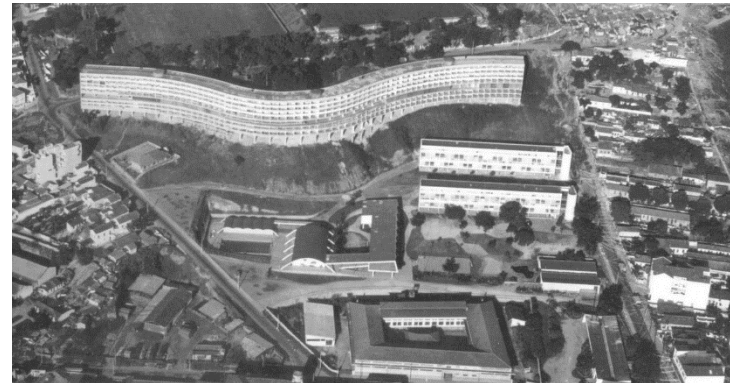
Something to highlight is the boost in the materials industry and construction companies, the spread of new typologies, and a highly relevant experience in developing Brazilian housing policy. As a result, housing creation was diverse, with good architectural projects and an appropriate urban insertion. On the other hand, this production was quite uneven¹⁶.

¹⁶ Bonduki.

¹⁷ Aravecchia-Botas, "Habitação pública e modernização capitalista."



The neighborhood of Moça Bonita, in Rio de Janeiro, built by the IAPI (industrial pension fund) in 1950¹⁷



The Pedregulho complex, designed by Affonso Eduardo Reidy and built by the Federal Government in 1952, initially for its employees in Rio de Janeiro¹⁸

¹⁸ "Clássicos da Arquitetura: Conjunto Residencial Prefeito Mendes de Moraes (Pedregulho)"

Urban and housing policies during the military dictatorship (1964 - 1986)

The third period is marked by the establishment of permanent sources of funds to ensure long-term housing financing and massive production that has included some technological advancement, albeit far below what was needed. Architectural and urban projects, in general, lose the diversity and quality achieved in the previous period. With the military regime's¹⁹ institutionalization of the National Housing Bank (BNH) and the Housing Financial System (SFH) in 1964, a new stage began, which ended in the 1980s²⁰. This stage is distinguished by homogeneity, the carelessness for regional and cultural differences, a disregard for urban projects, and a focus on finance. The creation of SFH, a sustainable financial system with stable resources that is still in use today, was its most significant legacy, even though the system was designed to serve only workers with a steady income and that could afford financing with indirect subsidy.

¹⁹ The Brazilian military dictatorship began in 1964 and lasted until 1985, with successive military governments in command.

The homogeneity of standardized housing, implemented as isolated dormitories, or the precariousness of informal settlements, where self-built and self-financed houses were almost always unfinished, remained for the poor—the BNH-financed housing complexes with large size, remote locations, and uniformity of housing types. In an era of accelerated urbanization and urban periphery consolidation, this low-quality production created the false impression that affordable housing could not coexist with good architecture²¹.

The lack of alternative programs that supported the urbanization of precarious settlements and self-construction of popular housing and providing or financing the purchase of urbanized plots and construction materials made it impossible to meet the poorest and the enormous housing needs.

²⁰ Bonduki, *Os pioneiros da habitação social - Vol 1*.

²¹ Bonduki.

The dictatorship's housing policy did not take more progressive measures to alleviate the issue due to four factors: centralization, rejection of programs and initiatives, a lack of financial assistance for low-income residents, and exclusive methods of housing ownership. It is evident that a financial system based on returnable sources, such as the Housing Financial System, could not face the Brazilian housing challenge of the second half of the twentieth century, exacerbated by rapid urbanization and poverty growth.

Lost decades or the hope of a utopia? (1986 - 2002)

In this period Brazil underwent a revolutionary transition from a dictatorship to a democratic regime. Between the early 1980s' severe economic and political crisis, and the establishment of the Ministry of Cities in 2003, when a new housing policy was established the country suffered a significant impact on the existing financing mechanisms for housing, such as BNH. It became fashionable to refer to the 1980s and 1990s as "lost decades." Bonduki²² highlights that is a purely economic evaluation, based on metrics as low GDP growth.

The strict monetarist policies of the 1990s influenced growth and employment levels, increasing inequality while guaranteeing economic stability. The endeavor to extend neoliberalism encountered political constraints that hindered the deepening of the privatization process, resulting in a certain equilibrium between the State and the market. Despite the increase in poverty, which was manifested in cities by the growth of slums, urban violence, and the population living on the streets, this was the period when democracy was consolidated, and

great legal advances were made, such as the conquest of social rights, environmental legislation, and education and health policies.

Bonduki argues the time was far from "lost"; on the contrary, it was full of social and political energy. Despite its tensions, it resulted in a management paradigm in which participation and social control positively influenced new public policies. This period was marked, on the one hand, by the extinction of the BNH. The absence of a federal housing policy, and, on the other, by the emergence of alternative programs, promoted, in general, by democratic state and municipal administrations, which put into practice proposals emanating from a society that sought to build new paradigms of urban and housing policy.

²² Bonduki.

Throughout the 1990s, concrete experiences of municipal administrations introduced new programs and participatory forms of management, including the adoption of the position that urbanization is the best solution to the problem of insecure urban settlements. After eleven years of mobilization of social movements and political articulation of various segments involved with the urban question, the draft amendment's approval to the Constitution introduced housing as a social right (2000). The City Statute (2001) crowned this process.

However, the use of these instruments was constrained by the master plan, which fell under the jurisdiction of the municipalities, and constituted a critical component of urban transformation for the future of cities. The Statute delegated to the cities the duty of establishing new limitations for the property right, when it said that it is up to the master plan to specify under what conditions a property meets or fails to perform its social purpose.



The Favela-Bairro²³ program sought to improve the urban condition in favelas. It was idealized by architect, and mayor of Rio de Janeiro, Luiz Paulo Conde in 1995.

²³ Image from Jardim Primavera, at: https://pt.wikipedia.org/wiki/Favela-Bairro#/media/Ficheiro:Jardim_Primavera.jpg

National Policy for housing in the XXI century: towards the right to dignified housing? (2003 - 2010)

Bonduki²⁴ points out that we do not have enough historical distance to say with confidence that a new era in the trajectory of public housing policy in Brazil started at the beginning of the twenty-first century. However, the inclusion of the right to housing in the Constitution (2000), the adoption of the City Statute (2001), the establishment of the Ministry of Cities (2003), the development of a new National Housing Policy (2004) and the National Housing Plan (2008) are significant landmarks. Furthermore, the country's economic position had considerably improved, allowing for social and market housing investments. Programs such as the PAC for Urbanization of Precarious Settlements (2007) and Minha Casa Minha Vida (2009) are manifestations of this that new framework.

The Ministry of Cities was established in 2003, with four national secretariats – Housing, Sanitation, Urban Mobility, and Urban Programs – to define sectoral policies and address urban problems. One of the

Ministry of Cities' primary responsibilities was to promote the execution of the City Statute, which was critical to ensuring access to land and allowing the construction of social housing.

By 2006, almost two thousand towns had completed their master plans, with widely disparate outcomes.

The overwhelming majority of these plans foresaw new urban instruments linked to the urban reform agenda, but they were not controlled in such a way that they could be implemented. Consequently, they had no tangible effect on easing access to land for homes or ensuring the social purpose of the land.

Due to the restrictive monetary policy established by the Ministry of Finance and the Central Bank, the Ministry of Cities team faced significant problems in executing the recommendations linked to resources and funding until 2006. Without financial resources, the previous government's FGTS (Federal Pension Fund) initiatives prevailed in the early years, targeting low-income people.

²⁴ Bonduki, *Os pioneiros da habitação social - Vol 1*.

The new National Housing Policy's approach leaned on the idea that, with resources from federal loans, the market's success in servicing the middle and lower-middle classes was critical for addressing the problem of social housing. The Federal Pension Fund resources and the direct subsidies given by the Union's General Budget could be targeted at low-income people. Furthermore, providing alternatives for the middle stratum would be critical to preventing gentrification.

In 2007, the government launched the Growth Acceleration Program (PAC) with the goal of implementing major infrastructure projects. Among its components was a social program, Urbanization of Precarious Settlements, which provided unique budget resources for the housing sector, allowing the country to carry out its largest territorial inclusion.

The new scenario sparked significant investor interest in the Brazilian housing market, which had lagged below its potential for more than two decades. Consequently, there was a significant input of foreign money into the industry. Faced with the need to expand their market, many companies that were traditionally aimed at the upper and upper-middle classes have created

subsidiaries specializing in cheaper products aimed at the lower middle class. This segment grew more robust due to the economic and wage policies of the Lula government.

To satisfy the demand for new projects created by this process, there was a massive hunt for land to construct housing in the following years, in an operation that was dubbed a real estate boom between 2007 and 2008. This demand sparked a land dispute, which had catastrophic consequences for the construction of social-interest housing.

The Constitution and the Social Value of the Land

The notion of the social value of the land is mentioned in the 1988 Constitution and it was heavily influenced by philosopher and sociologist Henri Lefebvre and his notion of the right to the city. The term was coined in the manifesto, "Le Droit à la Ville," published a few months before the May 68 events in Paris.

The author points out that in the construction of capitalist urban space, there is a conflict between exchange value and use-value, or between the mercantile dimension of urban areas and urban life in the city, considering time and history. Lefebvre argues that the right to the city is the right of inhabitants to urban life and everything that it can represent as a place for meetings and exchanges²⁵; He also highlights the destruction of traditional sites to construct new neighborhoods, roads, and buildings, reflecting on the disintegration of community life/history promoted by modernist urbanism²⁶.

²⁵ Lefebvre et al., *Le droit à la ville*.

²⁶ Lefebvre et al.

Although in the Constitution, the land's social value is not clearly defined, in the City Statute, two key points are fighting against real estate speculation and promoting land tenure regularization²⁷.

Within the City Statute, the term acquires a more practical meaning, also related to the notion that urban space is valuable beyond its economic aspect. In this sense, I will continuously draw on arguments from to author/activist and planner Erminia Maricato, precisely because of her involvement and advocacy, but also critic to the City Statute apparatus.

Maricato argues that private property in Brazil exists by convenience. When dealing with minorities and poor communities, the State doesn't have the same respect for the notion of property as when dealing with developers and wealthy landowners²⁸ - and that the City Statute could be an important tool to overcome that scenario. The social function of the land will be the main argument for the use of CPBU.

²⁷ Fiorillo, *Estatuto Da Cidade Comentado*.

²⁸ Maricato, *Para entender a crise urbana*.

The City Statute

The inclusion of instruments that comprised the notion of the city's social function for urban environments was a demand for the 1988 Constitution. For the first time in Brazil's history, a Constitution included a chapter for urban policy, providing a series of instruments to guarantee the right to the city and the defense of the social function of the land.

However, the text required more specific legislation. To implement the Constitutional principles, it was necessary to develop a set of urban guidelines and instruments at the national level; to guarantee that municipalities had Master Plans that could incorporate these more comprehensive legislations.

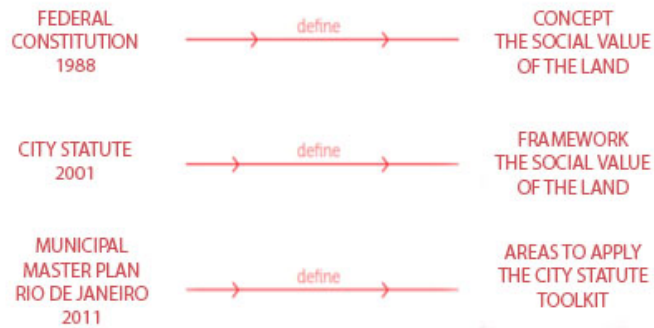
This complementary national law, which became known as the City Statute, was finally approved in July 2001. The Statute works as a kind of "toolbox" for a local urban policy, defining the framework for Brazilian cities.

The City Statute implementation's primary instrument is the Municipal Master Plan, which must spatially define this urban legislation. It is mandatory for municipalities²⁹:

- › With more than twenty thousand inhabitants;
- › The Members of an "area of special tourist interest" or an area where there are activities with a significant environmental impact;
- › That want to apply "Compulsory parceling, building and use of property" in urban areas.

²⁹ "Cartilha de Instrumentos Do Plano Diretor - Parcelamento Do Solo."

The Master Plan for each town determines the mobilization of the instruments and the way they are applied. Therefore, the direction of intervention when using this " toolkit " concerns the municipalities' political process and civil society's broad engagement.



Law organization: translated from Sao Paulo Illustrated Master Plan³⁰

The Statute requires the master plan to at least draw the areas in which the following tools apply³¹:

- › Compulsory parceling, building, and use of property;
Requires the owner of an urban property to build or use undeveloped, unoccupied, or empty areas and buildings.
- › Pre-emption Rights;
It is the municipality's right to be the first to acquire an urban property if it is for sale.
- › The right to grant costly building rights and change land use;
Upon payment of an amount, the right to build beyond construction potential or change the expected land use.
- › The right to create Urban Operations Consortiums;
Sharing competences concerning joint ventures and resources between private initiative and public authorities

³⁰ "Plano Diretor Estratégico - Lei N°16.050 de 31 de Julho de 2014 Texto Da Lei Ilustrado.Pdf."

³¹ "Instrumentos Do Plano Diretor."

- › The right to transfer building rights.
Authorization to transfer building rights from one property to another when the owner donates property to the government.

When the set of laws was first approved, Erminia Maricato and fellow professor and urbanist João Sette Whitaker wrote an article warning about the chances that the apparatus could be less useful than what was expected:

"At first sight, the City Statute seems to be a huge advance. A closer analysis allows us to verify that many of these gains to society are difficult to implement. Firstly, because the City Statute links the new instruments to the existence of a Municipal Master Plan, which on the one hand, is good, but on the other hand, is at risk of hanging on for several years in the city councils. Many of the instruments mentioned, or even many of the text formulations, allow different interpretations.

³² Maricato and Ferreira, "Estatuto da Cidade: essa lei vai pegar?"

For instance: Urban Operation Consortium establishes the possibility of partnerships between the public power and the private initiative in the urbanization of the city, and can both bring benefits to society or reaffirm the absolute logic of the market."³²

In recent years, studies have found that the City Statute legislation's instruments were delineated in many municipal Master Plans but poorly regulated and applied³³.

³³ Araújo, Siqueira, and Chrispim, "Aplicabilidade dos instrumentos de política urbana: o caso do plano diretor de São João da Barra – RJ."

Compulsory Land Parceling, Building, and Use of Urban

Land

"Compulsory land parceling, building, and use of urban land" or CPBU, is a law within the City Statute, with it, considering the city zoning, the public administrator may require that the owner with land use occupation below the zoning coefficient to parcel, build, or use that land³⁴.

The owner must be notified of the underutilization by the city hall and, within one year, present a project for land use that fits the zoning. In case this doesn't happen, the municipality may progressively increase tax rates on the property and eventually expropriate it, with the owner being compensated with public debt securities in the precatory system.

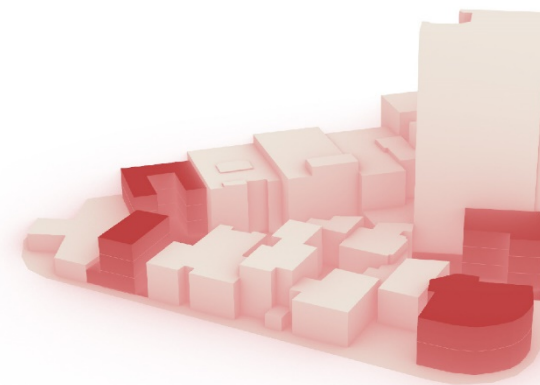
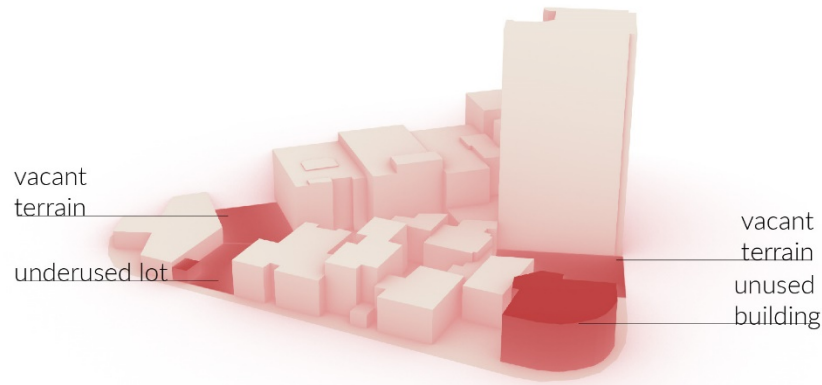
This law is one of the least utilized within the City Statute apparatus. The majority of cities don't even have a survey of which lands could be subject to it, with Sao Paulo being one of the only exceptions³⁵.

³⁴ "Cartilha de Instrumentos Do Plano Diretor - Parcelamento Do Solo."

³⁵ Denaldi et al., "A aplicação do Parcelamento, Edificação ou Utilização Compulsórios (PEUC)."

Vacant Land:	Underused properties:	Unused buildings:
Terrains over 500 sqm with FAR = 0	Terrains over 500 sqm with FAR lower than the zoning parameters	Buildings with more than 60% of the units unoccupied for over a year.

Vacant Land:	Underused properties:	Unused buildings:
Parcel or Build	Parcel or Build	Use



PEUC guidelines: adapted from Sao Paulo Illustrated Master Plan³⁶

³⁶ "Plano Diretor Estratégico - Lei Nº16.050 de 31 de Julho de 2014 Texto Da Lei Ilustrado.Pdf."

THE FIELD

Why Rio?

Sprawl and informality without growth

Urban informality and sprawl in Rio are the two significant reasons that justify the importance of land redevelopment for social housing; they also show how the urbanization process occurred in the city. Despite recent low populational growth, much is being built in the city, especially in neighborhoods with less infrastructure, pressuring urbanization and causing significant internal populational movements. The consequences of uneven infrastructure availability in the city vary between the noblest areas' overvaluation and the deterioration of neighborhoods in the suburbs, reinforcing territorial inequalities³⁷.

Even with population growth at low and stable rates, the urban fabric of Rio de Janeiro continues to expand; this

³⁷ Carneiro et al., "Espriamento Urbano e Exclusão Social. Uma Análise Da Acessibilidade Dos Moradores Da Cidade Do Rio de Janeiro Ao Mercado de Trabalho."

is one of the fundamental questions about the role to be played by urban planning in this context.

The municipal Master Plan subdivides the city into five "Areas de Planejamento" or AP, in English, Planning Areas.

AP1 corresponds to the central area; AP2 the south and part of the north; AP3 the suburbs; and AP4 and AP5 the city's west side³⁸. This description will be expanded further in another chapter, but its important to have the division in mind.

The IBGE Census of population and households³⁹ indicates two migrations taking place in the city: one of continued migration to the west, in particular in the last decade, with most significant population growth taking place in AP4 and AP5, and the other, less intense, of return to the most central neighborhoods of AP2 and AP1. If at first, the return to the central neighborhoods seems optimistic (after the region suffered years of population loss with a high stock of employments and available infrastructure) there is no clear evidence that

³⁸ "Plano Diretor de Rio de Janeiro - RJ."

³⁹ "IBGE | Censo 2010 | Resultados."

shows any improvement on reverting the current status quo of the real estate market. The developments are aimed, above all, at middle- and high-income families. The minimal performance of social housing programs in the central area, and the incredible rise in property prices since 2008 are signs of the increasing segregation process in the city, which traditionally has pushed the most impoverished population to the favelas, to the west, and to metropolitan peripheries⁴⁰.

The expansion in the northern part of the west zone, as of 2009, was driven by the "Minha Casa Minha Vida" program. The program subsidized the acquisition of houses/apartments for families with an income of up to R\$:1.800. Within the program's scope, approximately 75% of the licensed units are located in the west zone (AP4 and AP5). That is a crucial indicator of the State's stance on the housing issue, that results in an enormous urban-environmental liability. Dispersion of urbanization and growth of urban informality occur concurrently and are the main actors in Rio's urban dynamics.

⁴⁰ Caminha, "A OCUPAÇÃO DE IMÓVEIS NA CIDADE DO RIO DE JANEIRO."

⁴¹ "IBGE | Censo 2010 | Resultados."

Demographic data indicates the city's movement towards the west and the gradual increase in the population living in slums, both in absolute and relative terms. The city's excessive expansion results in increasingly complex urban problems, particularly concerning infrastructure and mobility; urban informality also increases. According to the Census⁴¹, in 1980, the population living in favelas was 14.09% of the city's total; in 1991, it was 16.10%; in 2000 it was 18.65% and in 2010 it was 22.04%. This urbanization process is advancing, with discontinuities, and its occupation is intensified over areas with less or no infrastructure, leaving a trail of underutilization in old neighborhoods⁴². The phenomenon of urban informality in Rio de Janeiro is not restricted to favelas. However, this is its most visible face and for which the available data allows the most reliable dimension. Clandestine and irregular subdivisions are another informal settlement pattern that is also quite expressive and independent of income. The direct association between poverty and urban

⁴² Barandier, "Negligência urbanística e projeto urbano na Cidade do Rio de Janeiro."

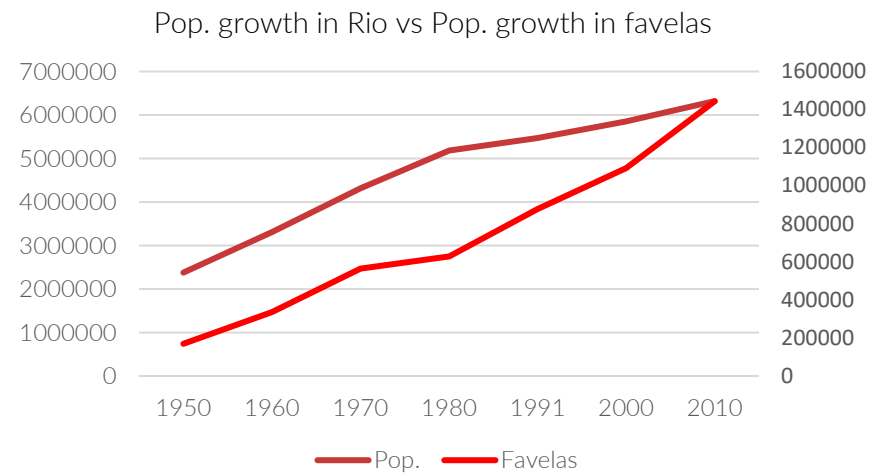
informality, in the form of cause and consequence, conceals other elements associated with the phenomenon and, in a way, naturalizes and feeds prejudices. A significant part of the city is still built outside of the urban legislation and the urban control system, largely based on the traditional planning model - modernist, functionalist, technocratic, and elitist. A form of urbanism that, according to Erminia Maricato, "does not commit to concrete reality, but with an order that concerns only part of the city"⁴³.

The prioritization of urban developments in the city's management (licensing) is currently disassociated from the ordinary urban planning process and reduced to specific revisions of the rules and their partial and discretionary application in the licensing, which could have contributed to inertia to the urban development logics of Rio de Janeiro. The execution of a series of public space qualification works carried out for the Olympics, and the World Cup had a significant impact when the city seemed to reconstruct its image.

⁴³ Maricato, *Para entender a crise urbana*.

⁴⁴ Nunes and Moura, "Urban Imaginary and Conjuncture in Rio de Janeiro."

However, in the long run, a culture of urban network projects wasn't constituted, nor were the bases and practices of operational urbanism reformulated, nor urban processes that tend to produce an unequal city reversed⁴⁴.



Pop. growth rates: image based on data from IBGE from 1950 to 2010⁴⁵

⁴⁵ "IBGE | Censo 2010 | Resultados."



Urban sprawl: image from Google Earth - 1986



Urban sprawl: image from Google Earth - 2020

Lack of available space and sprawl consequences

Rio de Janeiro suffered from a historical process of exploiting natural areas and populational growth that culminated in several environmental vulnerability problems, which are, in their majority, a consequence of the uncontrolled growth in areas at risk. Some of the most significant issues are floods and landslides. Considering the city's geographical characteristics, including the topography, conservation areas, and fragile soil, one can understand a little better why the environmental risks are so accentuated.

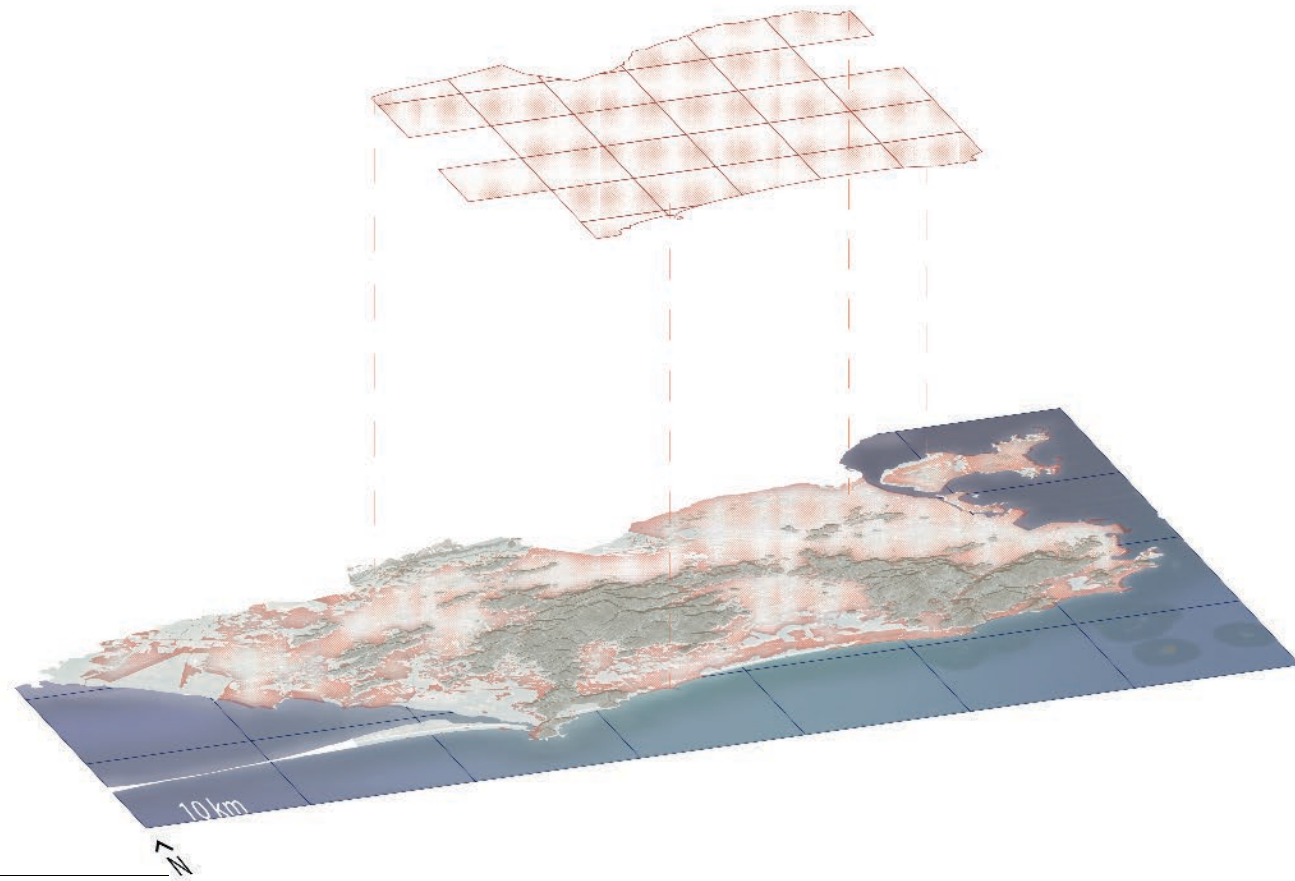
According to geographer Coelho Netto (2005), two phenomena of different natures and socioeconomic interests contribute to increased occupation in hillsides and close to river beds, increasing the risk and environmental vulnerability. She argues the first is the historical process of uneven settling and construction of favelas, associated with the population's impoverishment, often close to places offering paid work. This process started in the first decades of the

twentieth century when industrial (mainly textile/construction) evasion happened. It intensified after the '80s, including high-risk areas, as already mentioned (steep and unstable slopes and river beds in the river lowlands)⁴⁶.

The second is a movement originating from the most privileged class searching for a better quality of life in the mountainous forest environment and the escape from urban violence. This has led to the advance of formal constructions on the slopes despite the restrictions imposed by environmental and urban-planning legislation, including the Municipal Masterplan. This occurs mainly because of access to natural/scenic resources. Together with construction contractors and real estate companies, this portion of the population pressures the government for an urgent revision of the legislation that restricts these slopes' occupation. In these regions, most of the city's forest remnants are located.

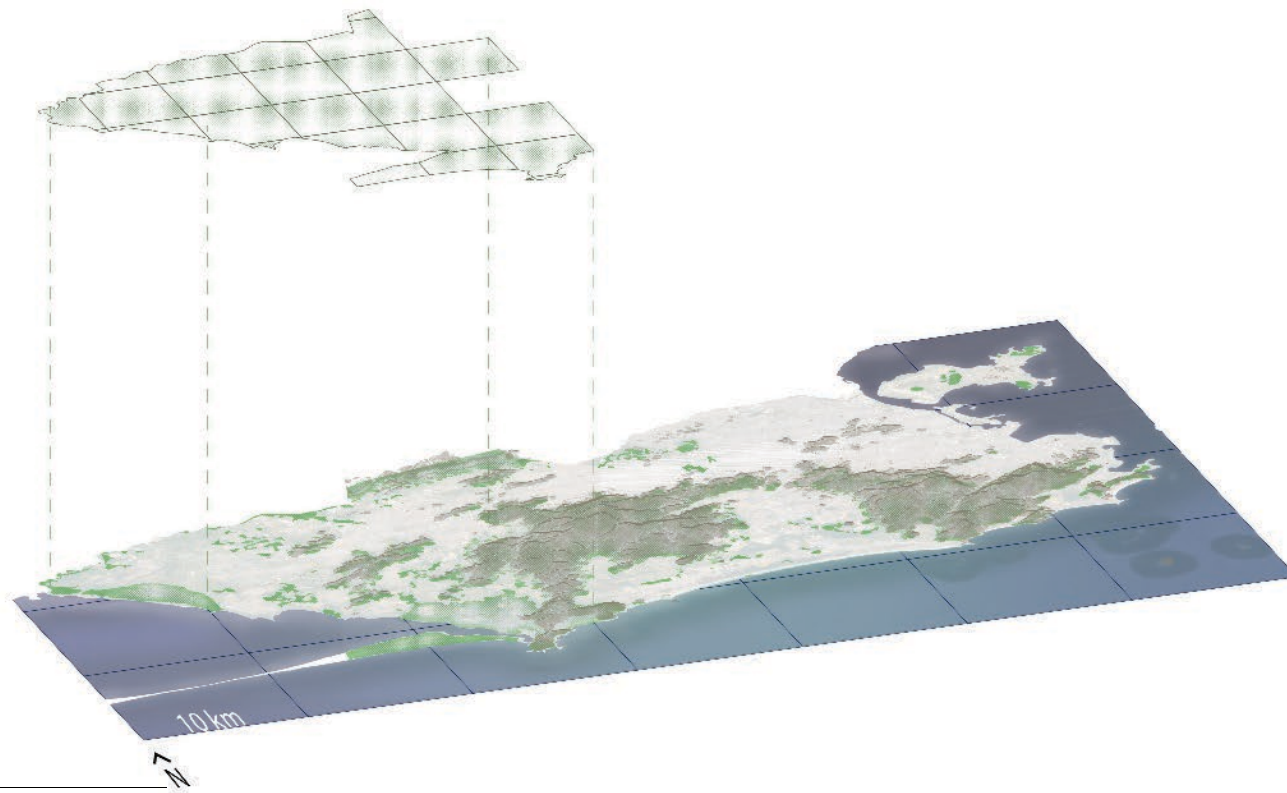
⁴⁶ Netto, "A interface florestal-urbana e os desastres naturais relacionados à água no maciço da tijuca."

The image below is based on data from IBGE⁴⁷ (Brazilian Institute of Statistics) and it shows the portion of land in Rio that is currently occupied, which totals more than 50% of the territory.



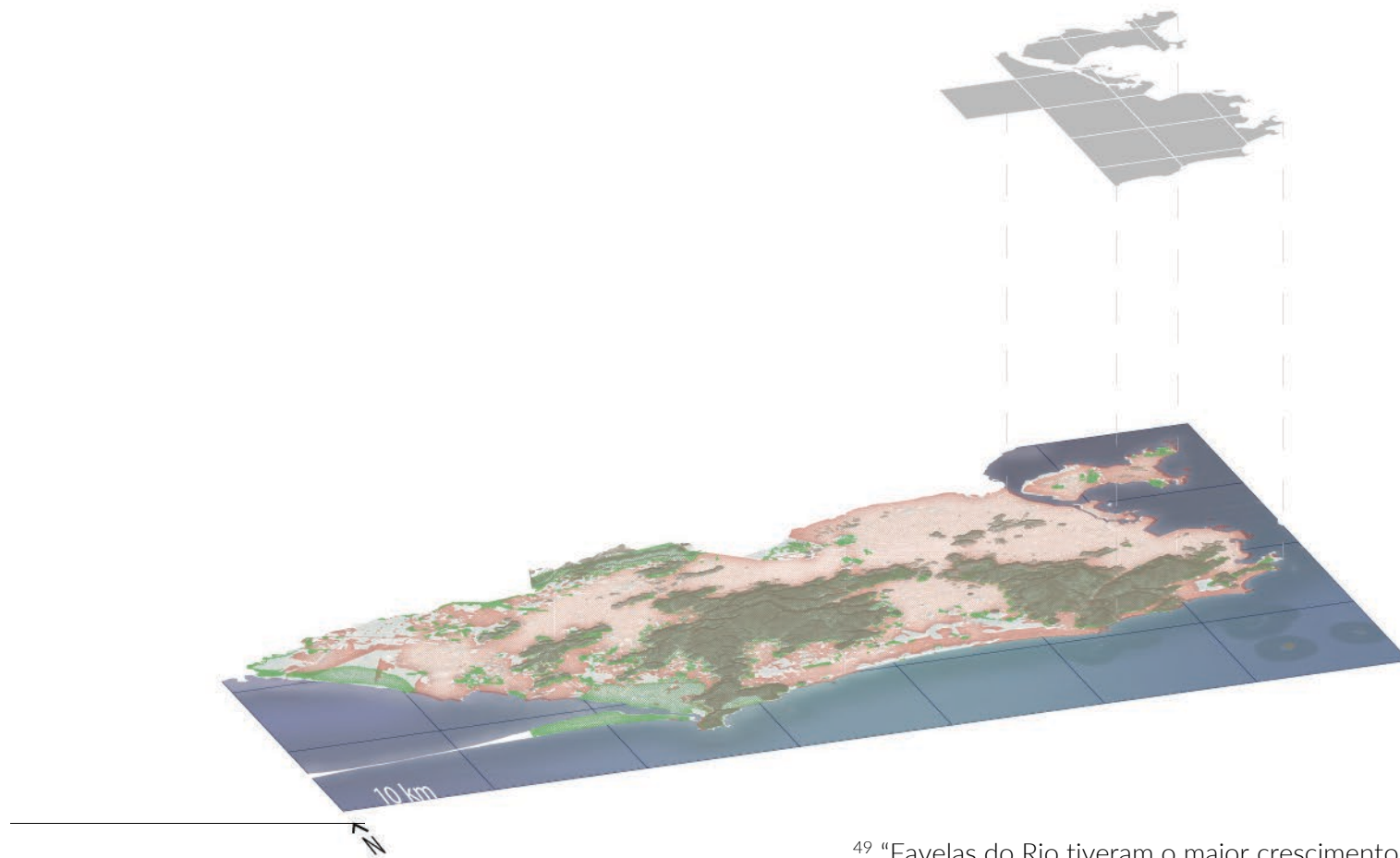
⁴⁷ "IBGE | Censo 2010 | Resultados."

In this map we see which portions of the city are currently preserved by legislation⁴⁸. These correspond to areas with high preservation status and areas above 100m. These areas total approximately 30% of Rio's territory.



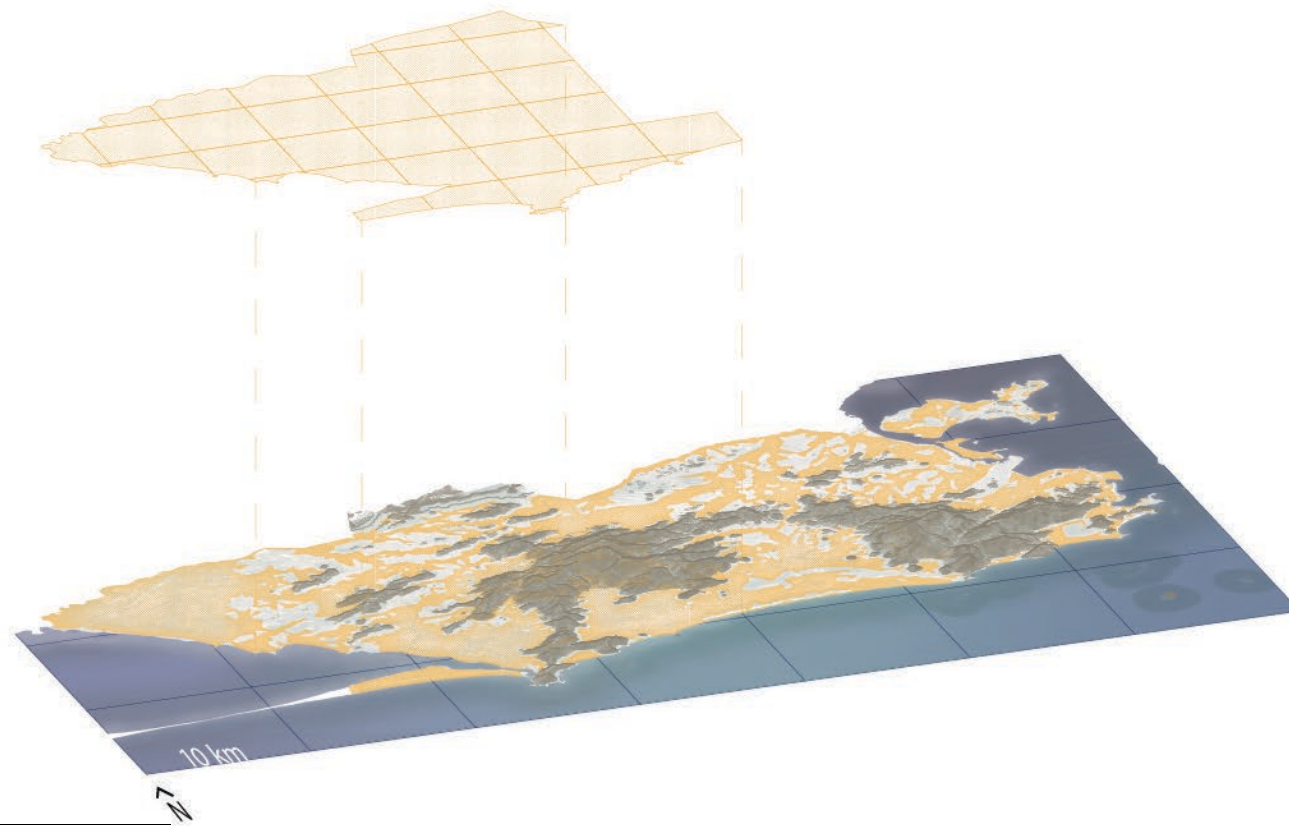
⁴⁸ "Data Rio."

Areas that are neither occupied nor conservation areas total less than 20% of the city's territory. In recent years the sprawl in Rio has been more intense. It's estimated that just within the favelas there was a growth of 330.000sqm between the years of 2016 and 2017⁴⁹.



⁴⁹ "Favelas do Rio tiveram o maior crescimento territorial desde 2012."

The image below shows which parts of Rio have highly fragile soil⁵⁰. If we consider only the plain terrain, that totals more than 50% of the area. Several environmental vulnerability issues, including floods and landslides, happened within the city in the last five years.



⁵⁰ "Inea0121705.Pdf."

The City Statute in Rio:

The Municipal Master Plan of Rio de Janeiro:

As previously mentioned, the City Statute establishes the foundations for city planning in Brazil and, together with the 1988 Constitution, may be regarded as the primary legal foundation for the growth of cities. In that apparatus is the requirement for Municipal Master Plans for urban cities.

The Municipal Master Plan establishes public order and social interest norms that govern the use of urban property in the interests of the collective good, security, and well-being of citizens, as well as ecological balance, to ensure sustainable development and the fulfillment of the social function of the city and urban property.

The current Municipal Master Plan for Rio de Janeiro⁵¹ was adopted in 2011. The plan must be updated every 10 years and reviewed every five years, which means a new plan is scheduled for 2021.

Instruments for building, environmental and urban regulation, planning, land use and occupation, cultural and ecological guidance, and management of financial and budgetary services are provided to execute its recommendations. Another goal is to direct the activities of public and private actors involved in urban development by identifying priorities for allocating resources and investments.

⁵¹ “Plano Diretor de Rio de Janeiro - RJ.”

Rio's planning scheme can be divided into three main scales; the first scale includes planning sectors and sub-sectors, zones and sub-zones; and qualifiers such as central neighborhood areas and commercial streets.



The second scale within the Master Plan for Rio de Janeiro (2011) relates to its administrative boundaries, each neighborhood is inside a planning area (AP). Most statistics refer to this scale or the neighborhood scale. The municipality was divided into five planning areas composed of different neighborhoods.



The five planning areas are the following:

AP1:

Comprehends the central and port areas of Rio de Janeiro, it's the smallest AP in size, but the one that concentrates the majority of jobs.

AP2:

The south zone, it's the AP with the higher property values and where the most valued beaches are concentrated, such as Leblon, Ipanema and Copacabana.

AP3:

The north of Rio is one of the places that were firstly developed in the city, until the 18th century it was basically an agriculture area. After 1906, with the Perreira Passos⁵² urban reform and the central evasion, the area became populated. During the 30's there was an attempt to industrialize it, specially because of the railroads, but with time most companies relocated or went bankrupt, leaving innumerable urban voids.

AP4 and AP5:

Are also called the West Zone of Rio de Janeiro. AP5 is the largest AP and the one with more vacant land. The urban drawing for AP4 was conceived in the 60's by the modernist architect Lucio Costa, but the plan was never fully implemented.

⁵²The mayor of Rio at the time, Pereira Passos promoted an urban renewal like what happened in Paris with Haussmann. With the destruction of the tenements,

part of the people moved to the outskirts of the city and the other part climbed the hills, originating the favelas.

The third scale incorporates these five areas and groups them into four regions, called Occupation Macrozones, these Macrozones establish broader guidelines for occupation.



According to the current Master Plan of Rio, the Macrozones are⁵³:

Controlled:

Where population density and construction will be limited, urban renewal should preferably take place through the reconstruction or conversion of existing buildings, respecting the predominantly residential areas and in places where the infrastructure is sufficient;

Encouraged:

Where population density, construction intensity, increase in economic activities and large equipments should be stimulated, preferably in areas with greater availability or potential for infrastructure implementation;

Conditional:

Where population density, construction, and the implementation of economic activities will be restricted according to the capacity of the infrastructure networks and subordinated to environmental and landscape protection areas, being able to be progressively expanded with the contribution of private resources;

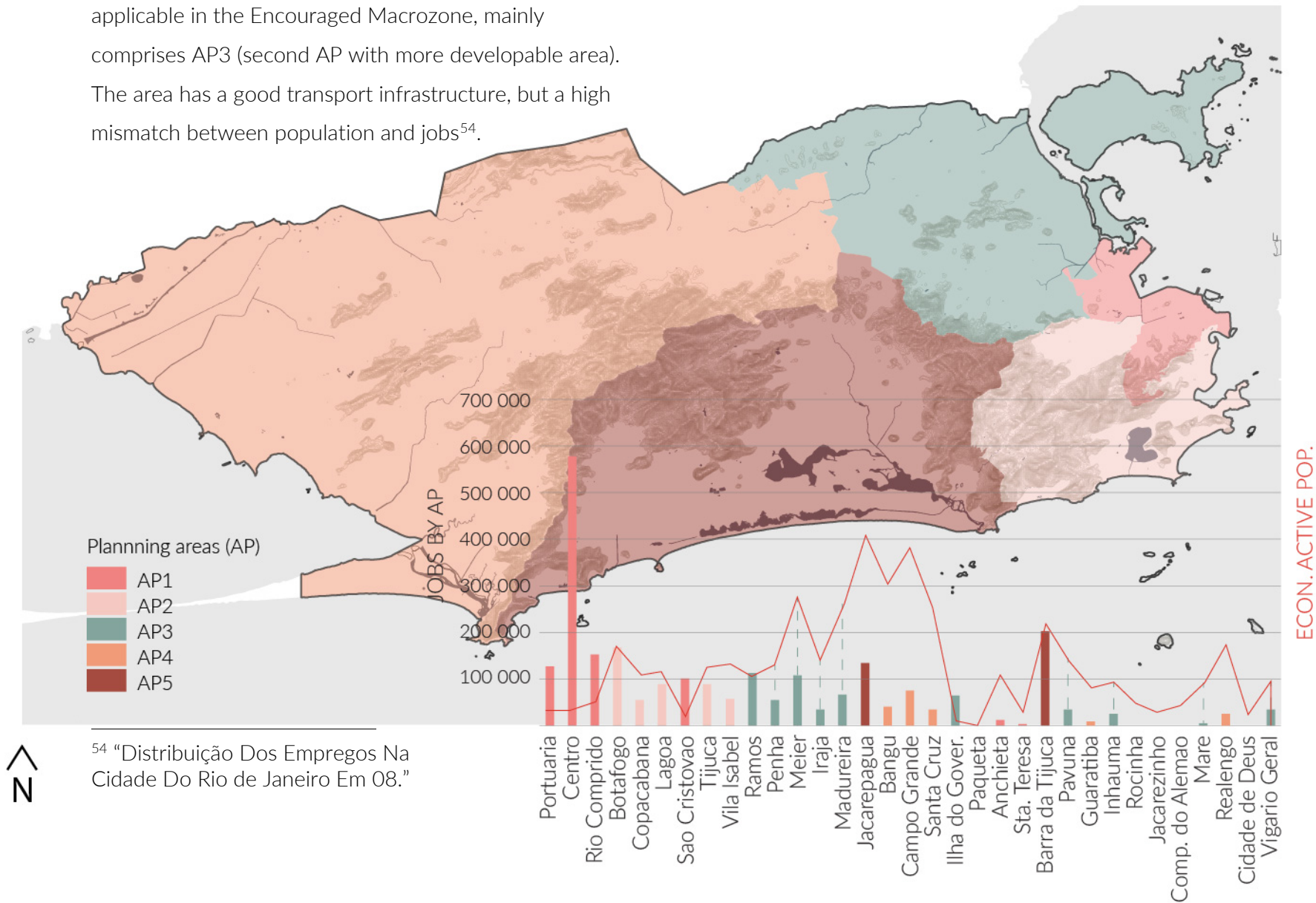
Assisted:

Population density, increase in economic activities, and the implementation of economic attractors should be accompanied by public investments in infrastructure and measures to protect the environment and agricultural activity.

⁵³ "Plano Diretor de Rio de Janeiro - RJ."

CPBU current scenario:

Within the Master Plan definition, CPBU in Rio is only applicable in the Encouraged Macrozone, mainly comprises AP3 (second AP with more developable area). The area has a good transport infrastructure, but a high mismatch between population and jobs⁵⁴.



⁵⁴ "Distribuição Dos Empregos Na Cidade Do Rio de Janeiro Em 08."

CPBU vs. Urban Operation Consortium:

In 2007 Brazil was chosen to host the 2014 World Cup, and in June 2008, Rio de Janeiro was officially announced to host the Olympic games in 2016. Since then, these events have been the focus of significant investments made in Rio. The process had great financial, environmental, and social costs, including the expropriation of more than 600 families, just in the Olympic Villa area. Arenas, villas, corporate buildings, museums, and real estate launches were built, but many promises that could benefit local communities remained on paper⁵⁵.

This process mobilized public and private agents, in different partnership models, mainly based on the City Statute. The main legacy of these spectacularized works is a more expensive, exclusive, and fragmented city. Segregation is not only a mirror of social status but a factor that contributes to accentuating these inequalities. The fragility of social relations contributes to the increase in urban violence in the context of intolerance and discrimination, promoted by segregation.

⁵⁵ Faulhaber and Azevedo, *SMH 2016*.

To mention some examples of these incongruencies: during the Olympic works period, there were mobility proposals executed, but the transportation associated with housing and work demand didn't come through. More than one-fifth of the population of Rio de Janeiro lives in slums; the South Zone (AP2) and the Center (AP1) concentrate more than half of all jobs in the city. More investments could have been made in affordable housing in the central region or on trains to the suburbs. A cycle path was made to link AP2 to AP4, but nothing connecting neighborhoods to the BRT stations that lead to the North Zone of Rio (AP3).

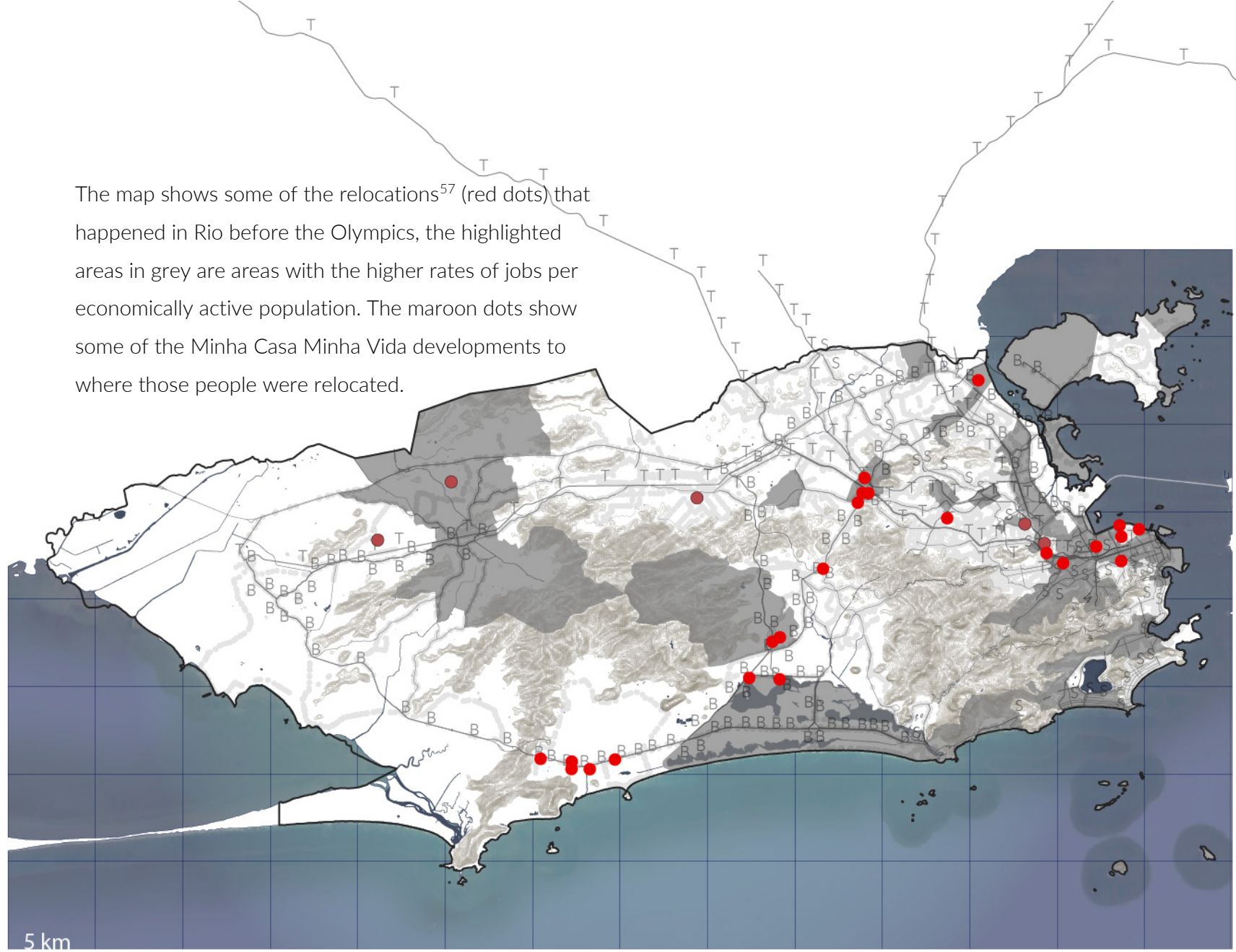
CPBU was never used, and Urban Operation Consortium was used to make possible all of the World Cup/Olympic works in Rio; the final result was the subversion of the original intentions of the City Statute: To fight real estate speculation and promote land tenure regularization.

The main controversy regarding its application revolves around the fact that the legislation favors public-private partnerships in most cases and excessively bureaucratizes the legislation that renders land

ownership relative to its use. That is the case with CPBU since the use of the law requires the delimitation on the Master Plan and the municipality to actively survey the areas that are subject to it and notify/police the owner from two to five years to check if the land is being used. There is a gap in how the tools within the City Statute are spatialized. Several municipalities have the entire city under the Urban Operation Consortium criteria, and CPBU is only applied to one zone⁵⁶.

⁵⁶ Denaldi et al., “A aplicação do Parcelamento, Edificação ou Utilização Compulsórios (PEUC).”

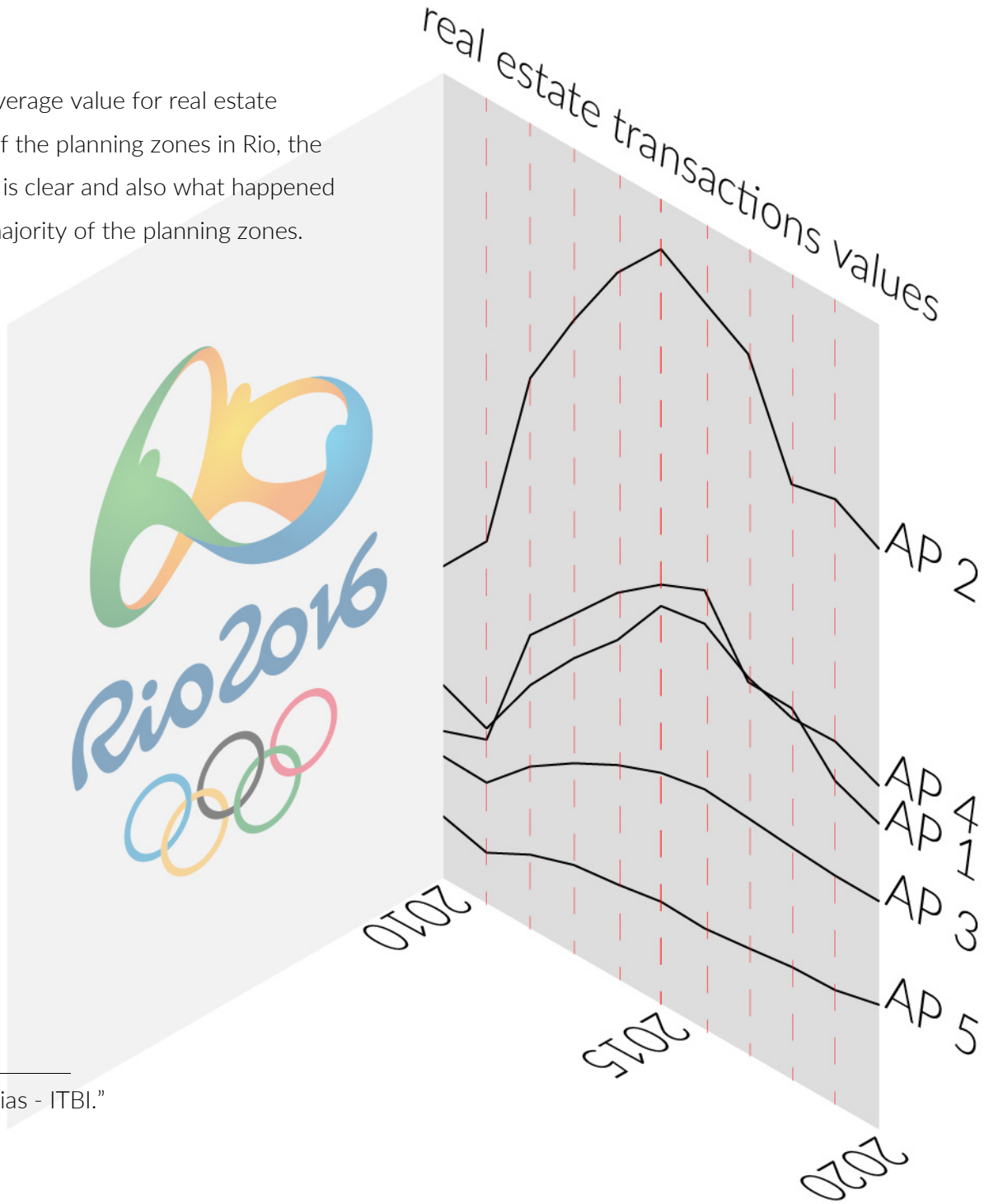
The map shows some of the relocations⁵⁷ (red dots) that happened in Rio before the Olympics, the highlighted areas in grey are areas with the higher rates of jobs per economically active population. The maroon dots show some of the Minha Casa Minha Vida developments to where those people were relocated.



- Relocations before the Olympics
- MCMV
- removal

⁵⁷ "Megaeventos | Heinrich Böll Stiftung - Rio de Janeiro Office."

The image shows the average value for real estate transactions⁵⁸ in each of the planning zones in Rio, the impact of the Olympics is clear and also what happened after the event in the majority of the planning zones.



⁵⁸ "Transações Imobiliárias - ITBI."

THE SEEDS

New CPBU delineation

My main argument is that this law shouldn't be applied in the macrozone scale but a scale with a smaller grain, like the sub-zones and sub-sectors, and be subject to criteria that would include access to work.

Given that the original idea behind the City Statute is to recognize the social value of the land and to prevent speculation, I'm proposing criteria that relate to that notion, including the job x population ratio and the Social Progress Index⁵⁹. This last index considers other major factors in sub-indexes such as basic human needs, foundations for well-being and opportunities. These contain indexes like access to healthcare, housing, clean water, sewage, schools, environmental quality and social inclusion.

This work will use urban analytics to structure decisions on land use and occupation policies, specially the ones related to mobility infrastructure and housing deficit.

⁵⁹ "Índice de Progresso Social Do Rio de Janeiro."

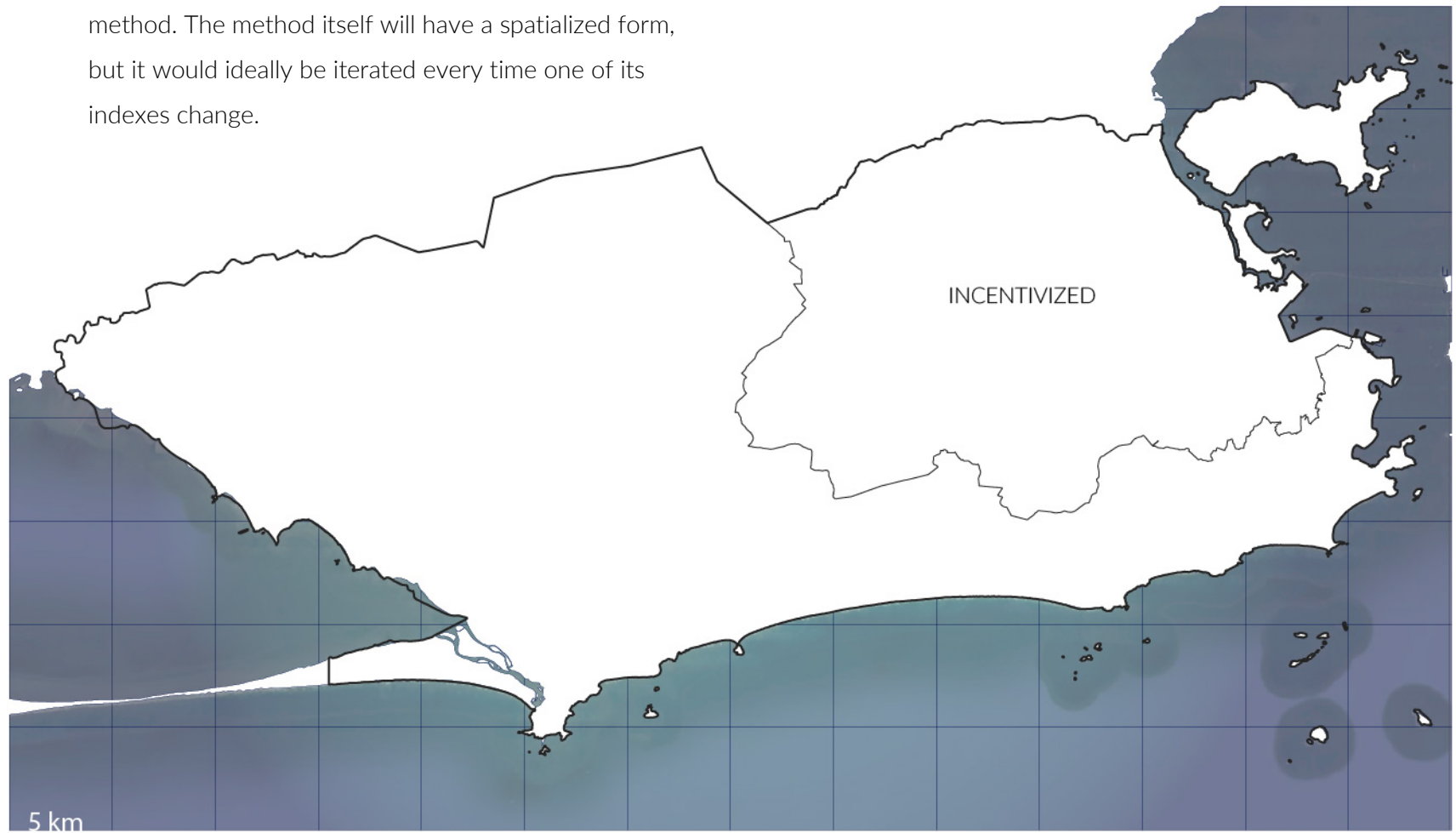
The project takes advantage of localized information to advise the new delineation, and the compiled information advises the design process by providing urban configurations simulations from objectively quantifiable data insertion. These tools will be used mainly for the new CPBU delineation and for what I call a catalog of parcels.

On a short piece where he explains the term urban analytics, urban planner, geographer and spatial data scientist Michael Batty⁶⁰ writes:

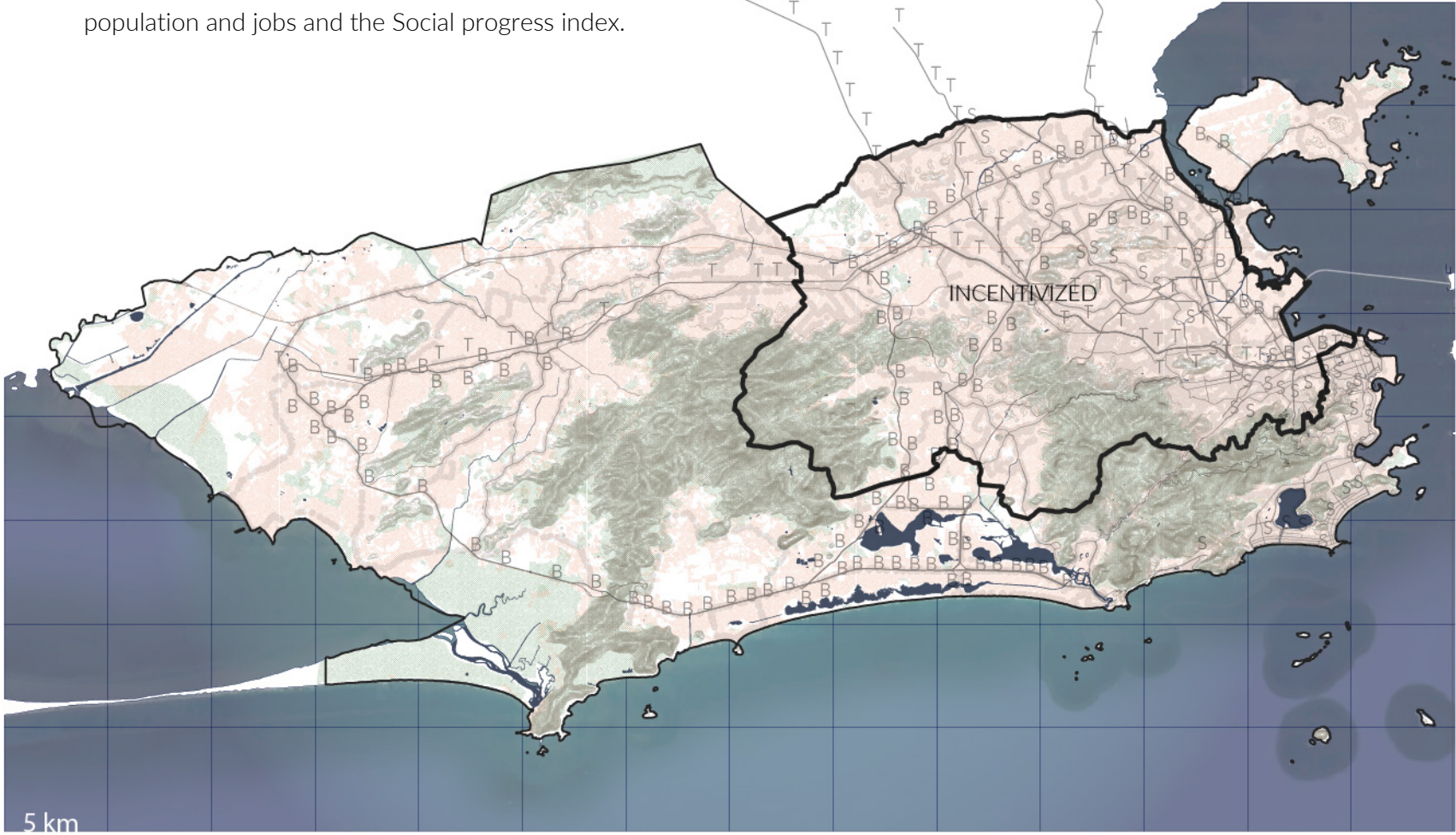
" And last but not least, urban analytics should deal with Environment and Planning, the main title of this journal still, for therein lies the motivations for developing these ideas in the first place, so we can provide more sustainable and livable cities than anything we have achieved or even attempted so far."

⁶⁰ Batty, "Urban Analytics Defined."

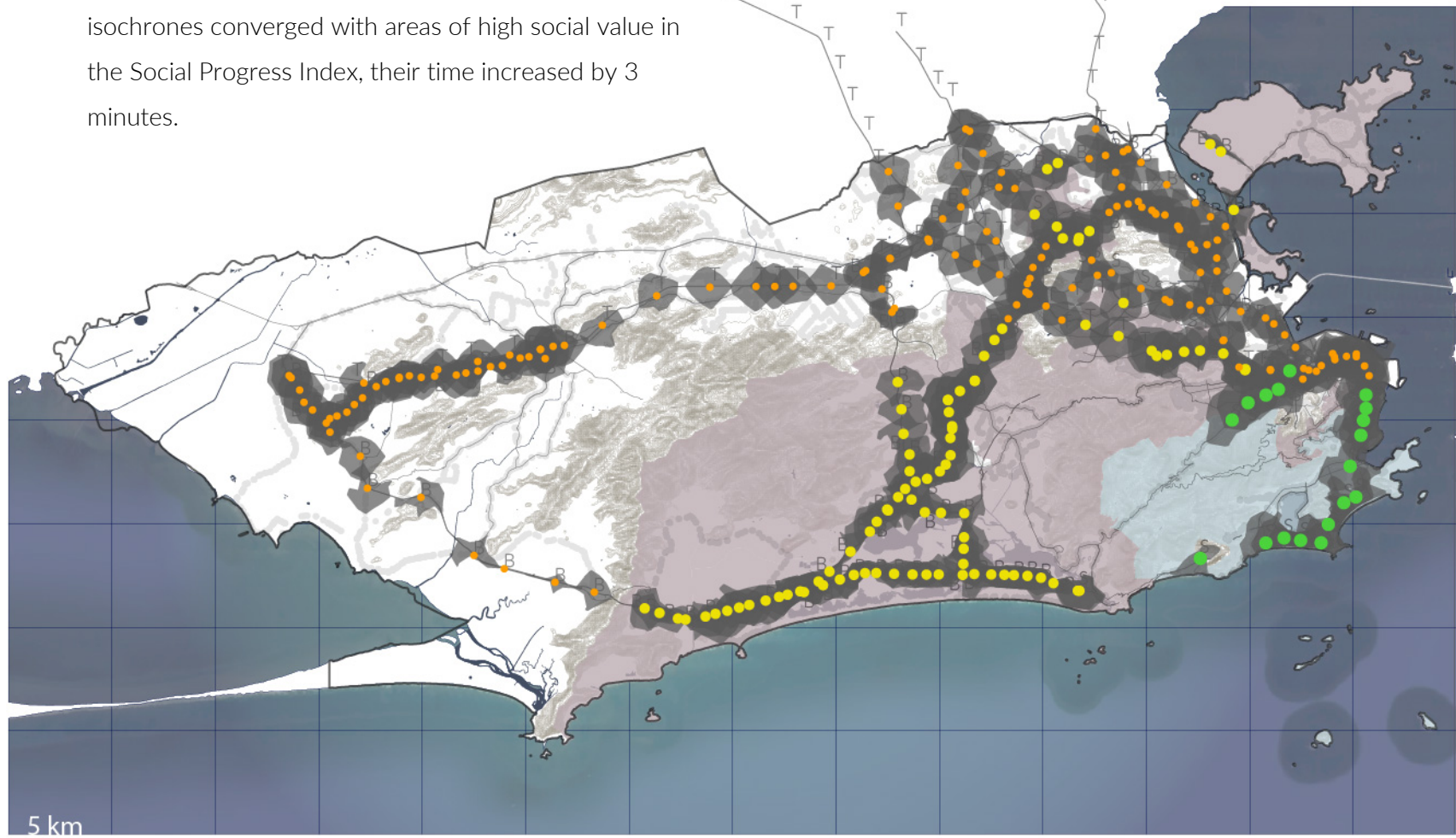
This notion of having a static masterplan, that in Rio, lasts for 10 years, and in which the criteria for the decision making can be cloudy, will be defied by a clear method. The method itself will have a spatialized form, but it would ideally be iterated every time one of its indexes change.



The new CPBU delineation will move from an arbitrary and centralized area to a disperse configuration that derives from the reach to transportation, the ratio of population and jobs and the Social progress index.

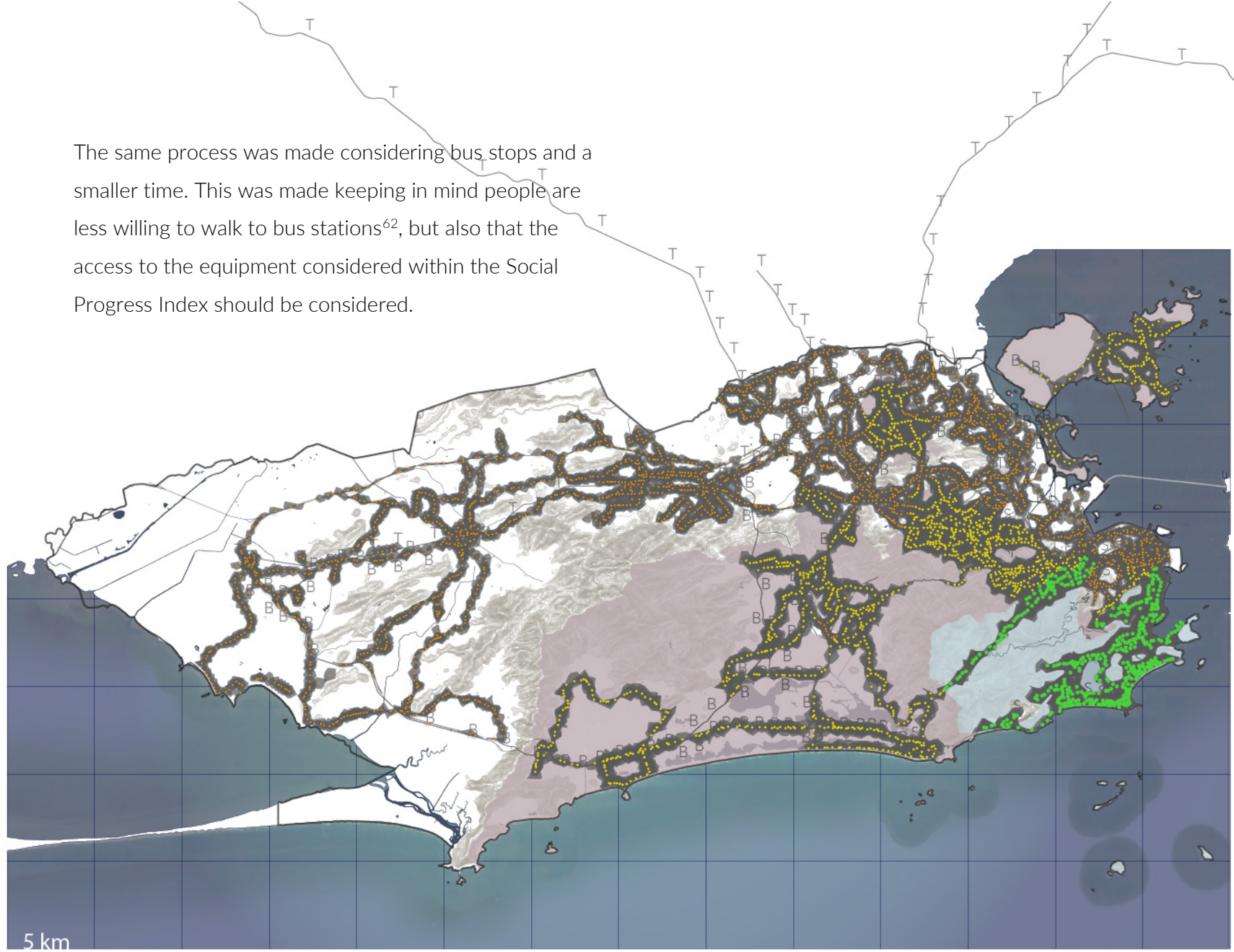


For the new delineation criteria, the preponderant factor was access to transportation, for that isochrones from the main transportation modes⁶¹ were traced. If these isochrones converged with areas of high social value in the Social Progress Index, their time increased by 3 minutes.



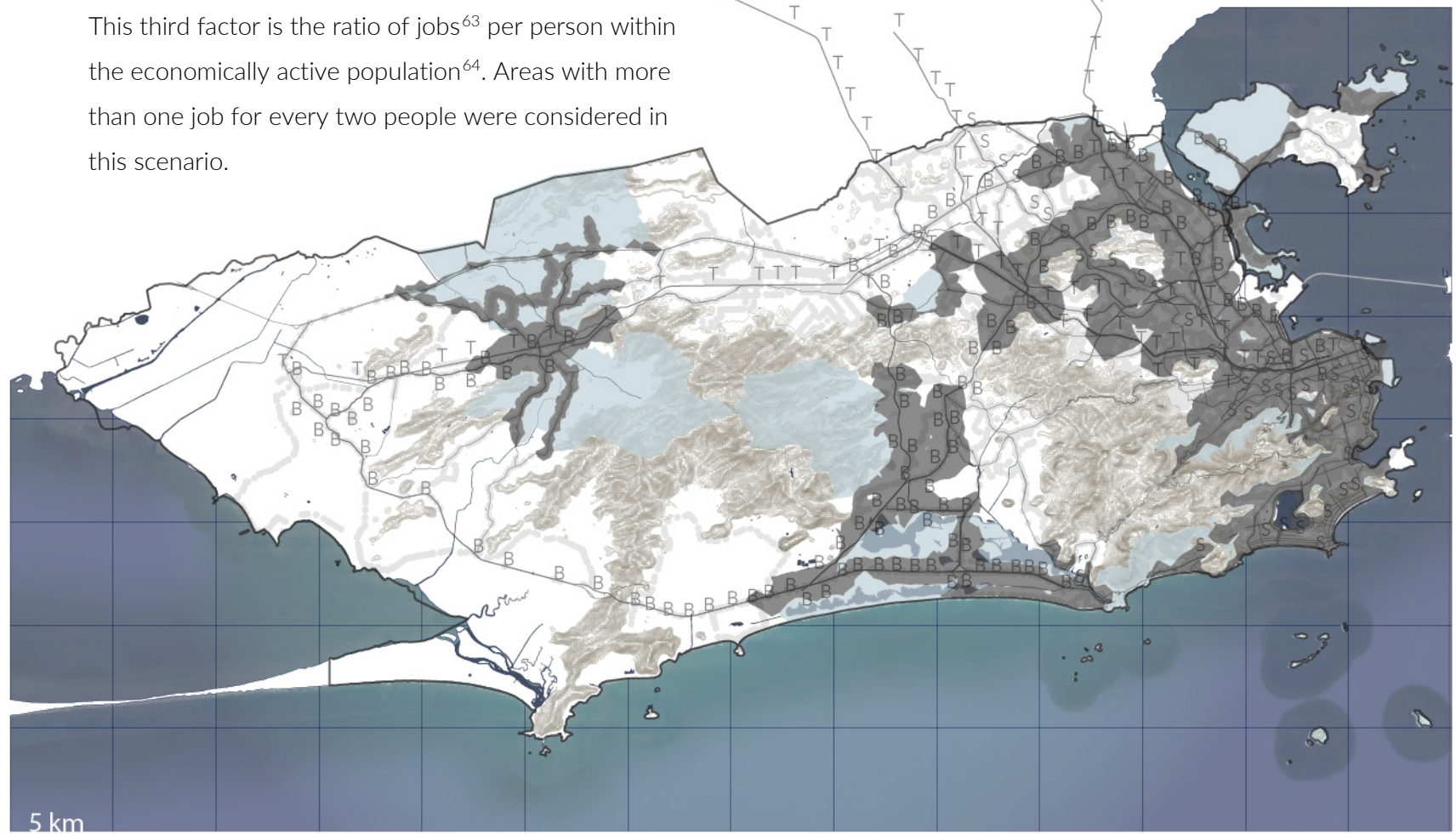
⁶¹ "Atlas_2017_Sistemas_de_Transportes - Visão Geral."

The same process was made considering bus stops and a smaller time. This was made keeping in mind people are less willing to walk to bus stations⁶², but also that the access to the equipment considered within the Social Progress Index should be considered.



⁶² "Atlas_2017_Sistemas_de_Transportes - Visão Geral."

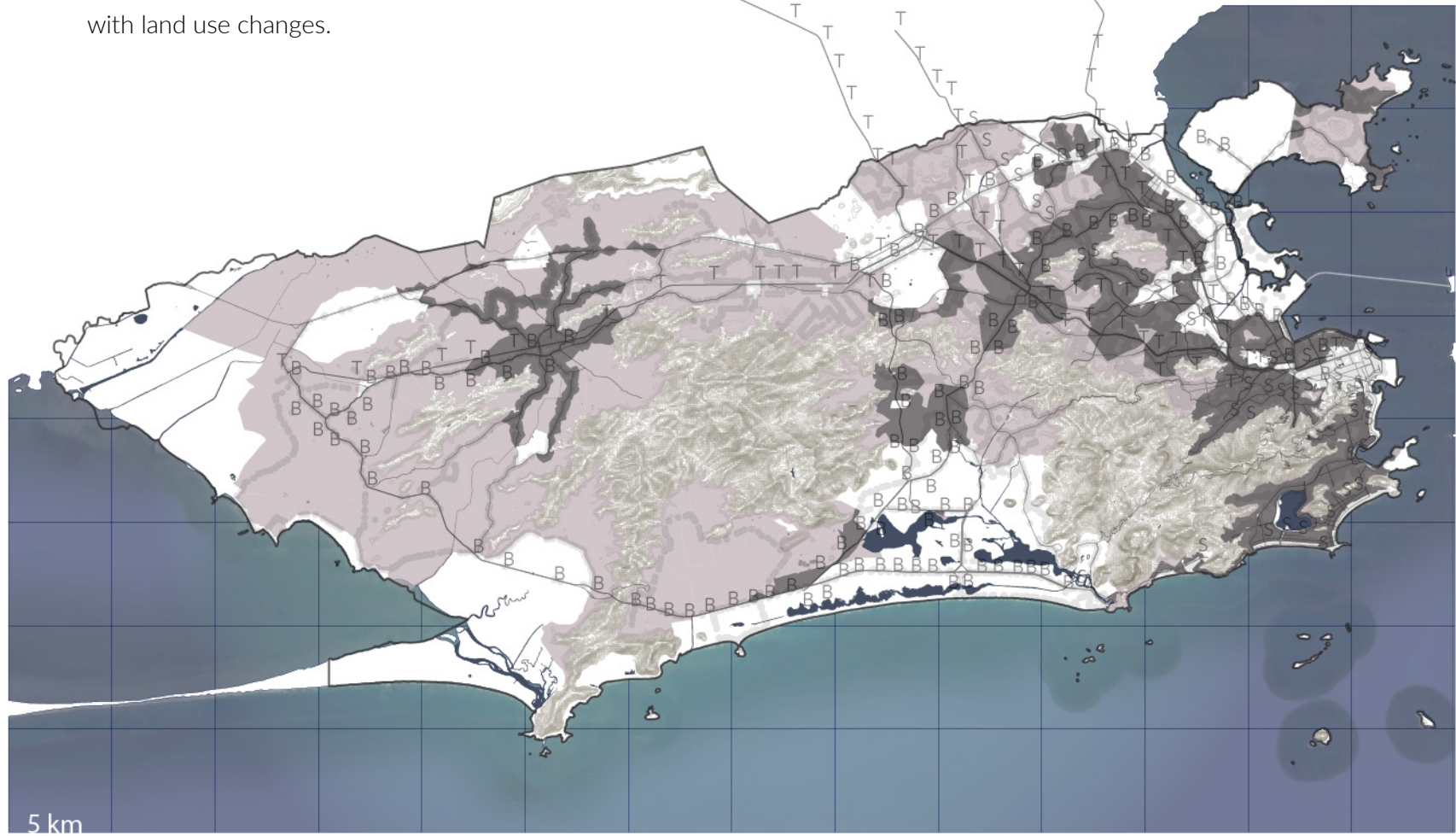
After the junction of the isochrones from all transportation modes considering the increase by the Social Progress Index, a third factor comes into account. This third factor is the ratio of jobs⁶³ per person within the economically active population⁶⁴. Areas with more than one job for every two people were considered in this scenario.



⁶³ “Relação Anual de Informações Sociais (RAIS) - Base dos Dados.”
⁶⁴ “IBGE | Censo 2010 | Resultados.”

^
N
Job vs EAP
1 job per 2

The last delineation step was to include only the areas that are currently delimited as residential⁶⁵ in the Master Plan. That would also eventually be revisited with land use changes.



Legend

- Residential use
- CPBU area proposal

⁶⁵ "Subzonas e Subsetores."

Catalog of Parcels

Given the new CPBU delimitation, this section of the work will be an attempt to use blocks that are within that area, and the parcels within such blocks, to conceptualize building volumes. These building volumes correspond to the largest building capacity with the current legal constraints for FAR, BCR, setbacks and height.

Another constraint for these volumes, that doesn't necessarily relate to the planning requirements, but to the implementation of social housing, is to maximize the horizontal occupation of the parcels and avoid volumes with more than 4 floors; that comes from the need to avoid building elevators, which would make construction and building management significantly costlier.

The methodology to choose the blocks had to do with three factors, the first was to choose three blocks by AP; the second was to choose two of those blocks in the planning zone with the largest area and one in the second planning zone with the largest area; the third was to choose blocks that had characteristic typologies

within those zones. This effort was made in an attempt to emulate something like a "fitness" index for the blocks, or how many of the parcels within those blocks would be fit for being used to implement social housing.

The delimitation for the parcels was based on current constructions, given that the information is not publicly available.

The cost for the parcels was made using the ITBI⁶⁶ value (tax for real estate transactions) and the given areas.

Since the ITBI value was not available for the same time frame in all the required areas an average of the last 10-years was made (2010-2020) for the neighborhoods in which the blocks are located.

To test multiple terrains for the potential to implement social housing parcels with less than 500sqm were also considered, although they are outside the scope of the law. Parcels were discarded if smaller than 300sqm or if the dimensions didn't allow for building and circulation within the law requirements.

⁶⁶ "Transações Imobiliárias - ITBI."

There was also an attempt to quantify the structural needs of each volume and to use that in a cost calculation for each of the parcels.

The main goals of this catalog of parcels will be: 1- to identify if construction costs within the parcels are comparable to the to the costs financed by the Minha Casa Minha Vida program; 2- to use the ratio for “usable parcels” in an attempt to predict the amount of social housing units that could be implemented in abandoned properties⁶⁷ within the city, by planning zone.

⁶⁷ Souza, “ANÁLISE ESPACIAL E GESTÃO MUNICIPAL DE VAZIOS URBANOS NO RIO DE JANEIRO.”

AP1



All images from Google StreetView

Planning Area: 01

Block: 01

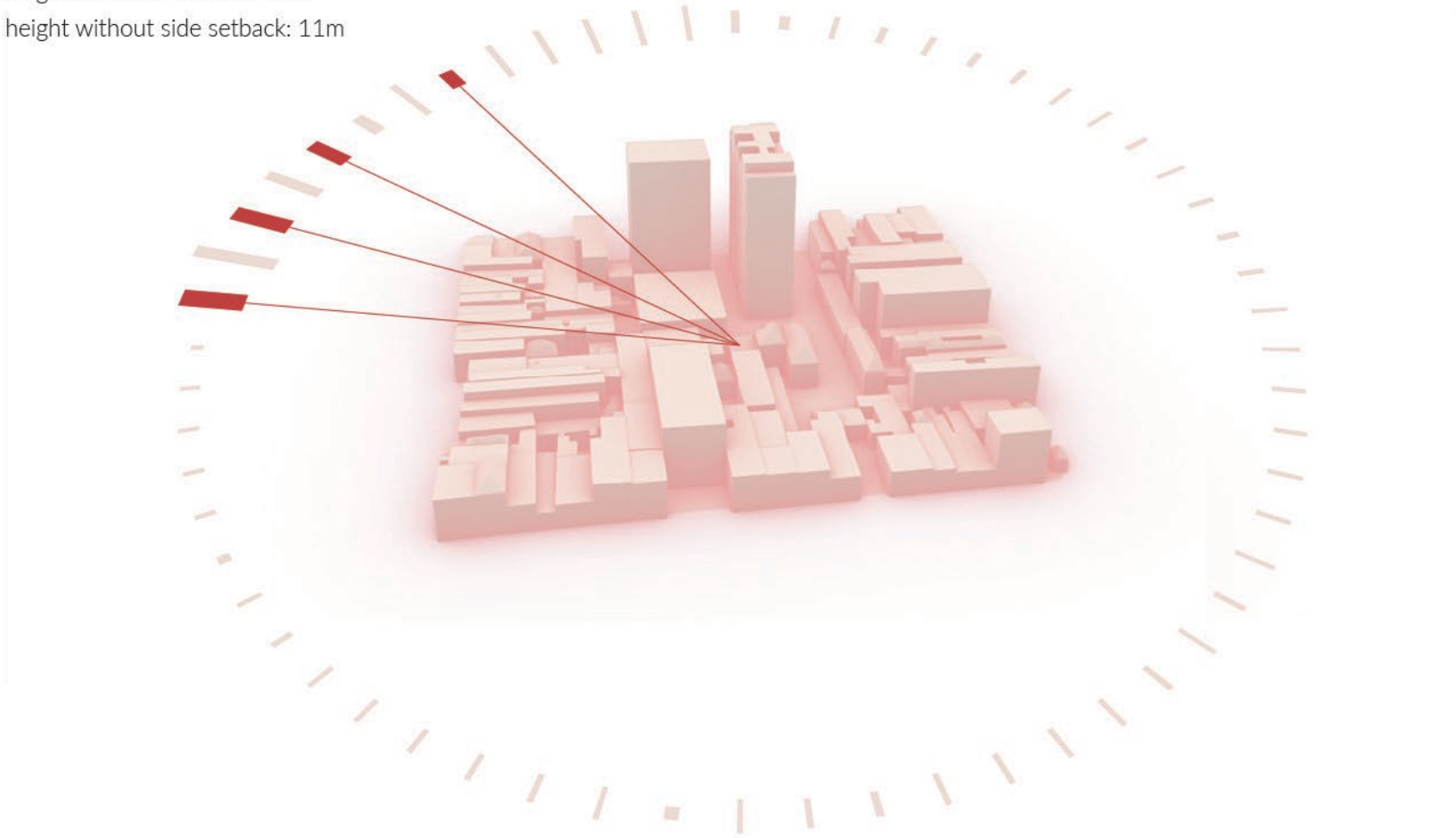
FAR: 5

BCR: 70%

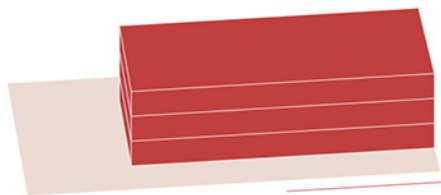
street setback: 7m

height with side setback: 11m

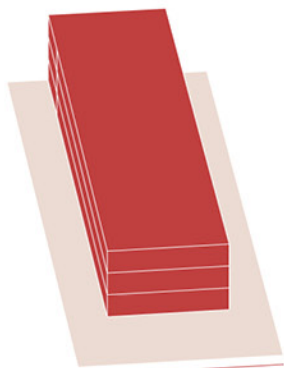
height without side setback: 11m



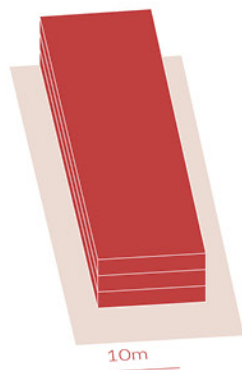
12 units
approx. 42 sqm
terrain:
R\$ 171971
construction:
R\$ 1843771



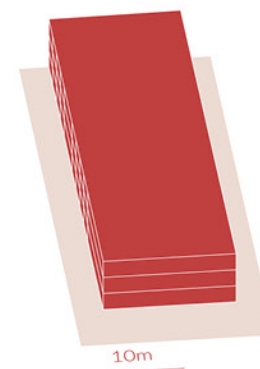
21 units
approx. 44 sqm
terrain:
R\$ 277377
construction:
R\$ 3406147



36 units
approx. 44 sqm
terrain:
R\$ 419321
construction:
R\$ 5887432



42 units
approx. 46 sqm
terrain:
R\$ 480921
construction:
R\$ 7194046



Planning Area: 01

Block: 02

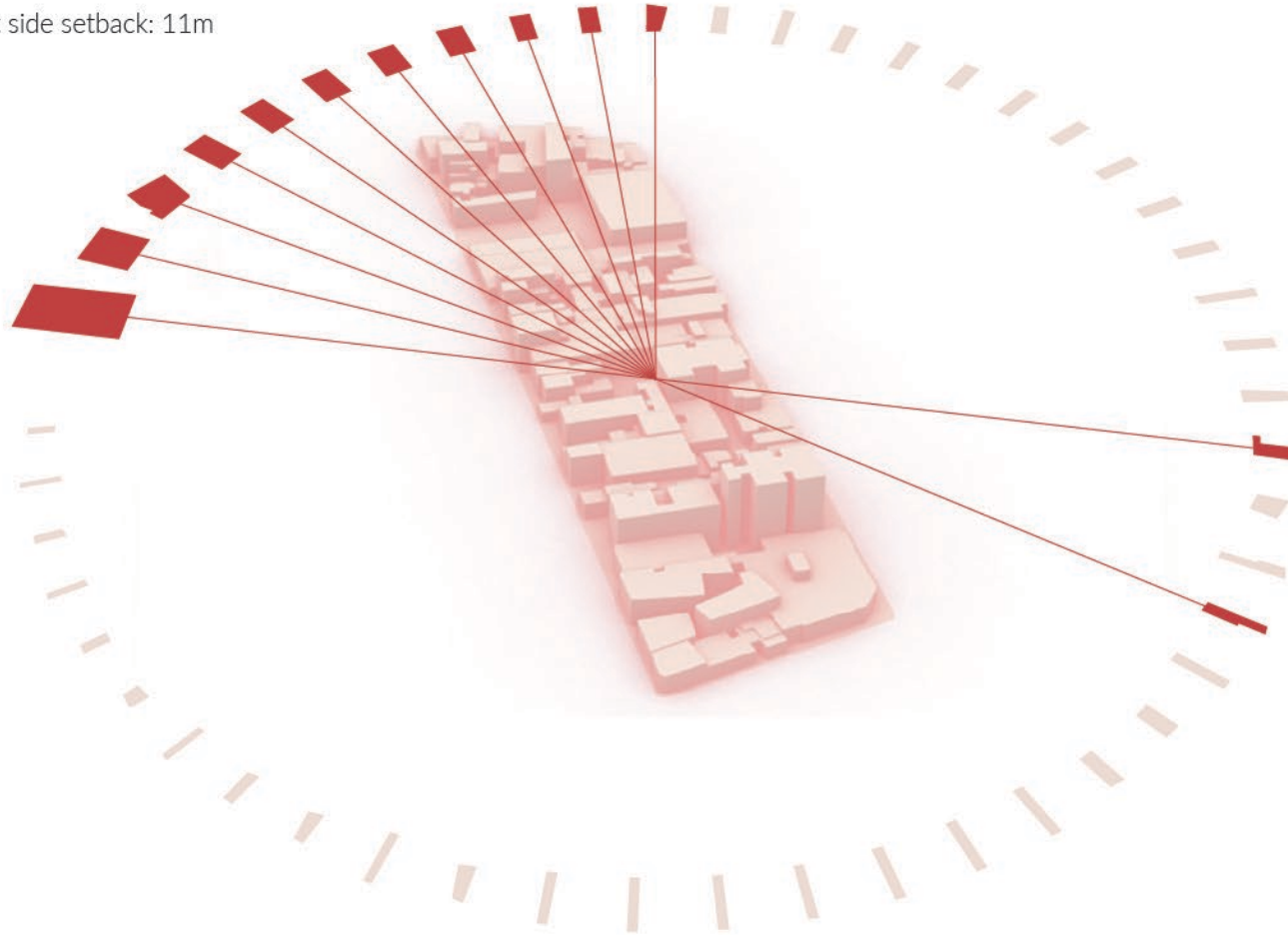
FAR: 5

BCR: 70%

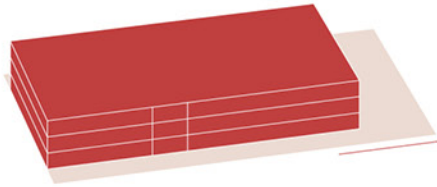
street setback: 7m

height with side setback: 11m

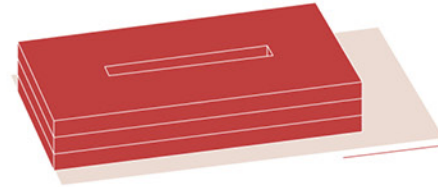
height without side setback: 11m



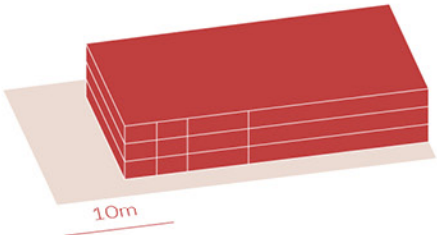
33 units
approx. 46 sqm
terrain:
R\$ 379410
construction:
R\$ 5623292



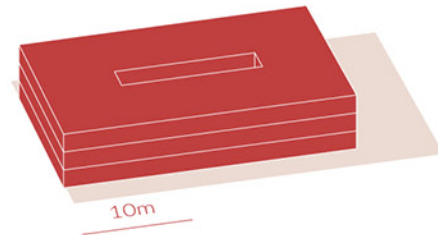
30 units
approx. 45 sqm
terrain:
R\$ 364090
construction:
R\$ 4933756



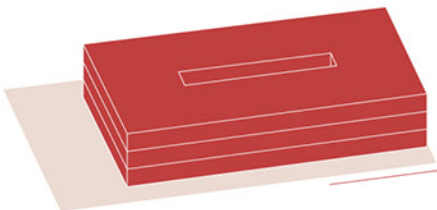
30 units
approx. 44 sqm
terrain:
R\$ 338081
construction:
R\$ 4860784



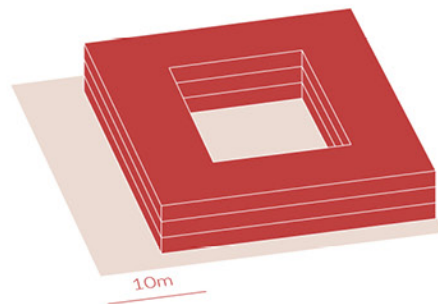
33 units
approx. 38 sqm
terrain:
R\$ 342191
construction:
R\$ 4567328



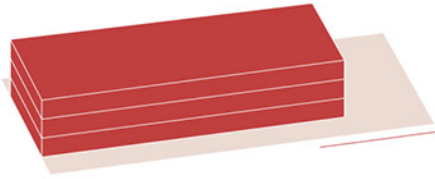
36 units
approx. 36 sqm
terrain:
R\$ 353296
construction:
R\$ 4766866



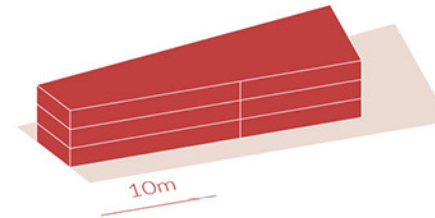
51 units
approx. 39 sqm
terrain:
R\$ 614024
construction:
R\$ 7387596



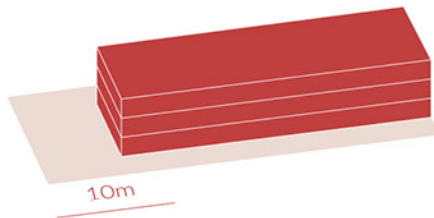
18 units
approx. 45 sqm
terrain:
R\$ 241176
construction:
R\$ 3001885



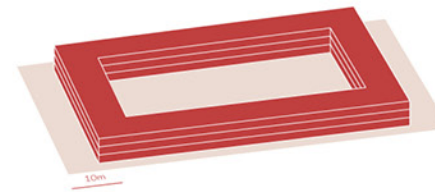
12 units
approx. 50 sqm
terrain:
R\$ 213330
construction:
R\$ 2214359



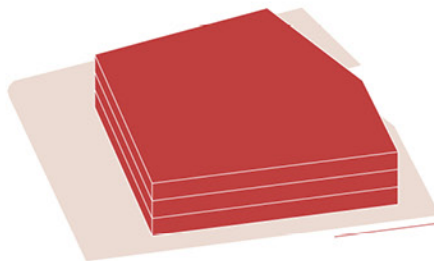
15 units
approx. 48 sqm
terrain:
R\$ 225920
construction:
R\$ 2679035



84 units
approx. 43 sqm
terrain:
R\$ 1482228
construction:
R\$ 13381001



36 units
approx. 48 sqm
terrain:
R\$ 525206
construction:
R\$ 5308719



Planning Area: 01

Block: 03

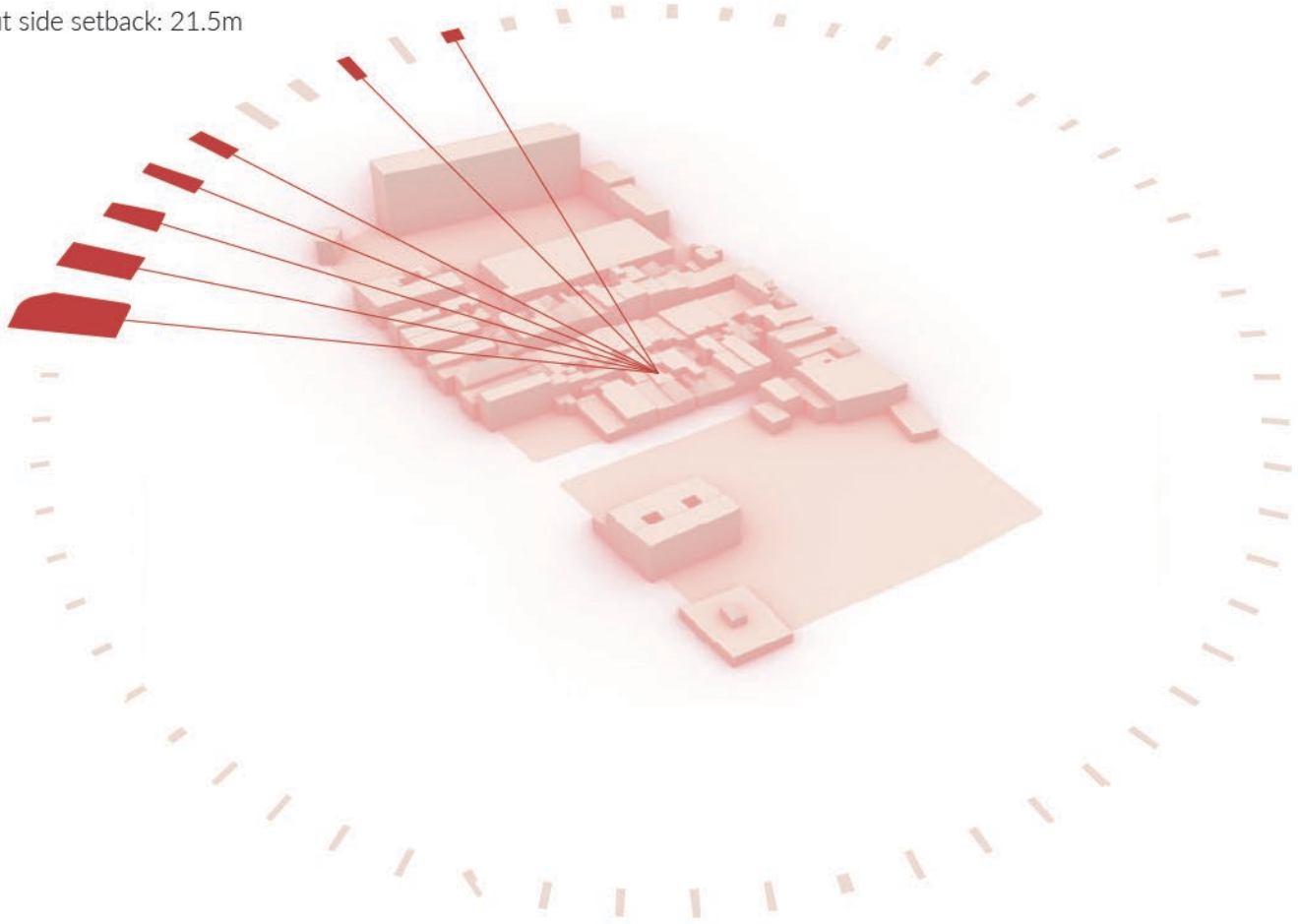
FAR: 3

BCR: 85%

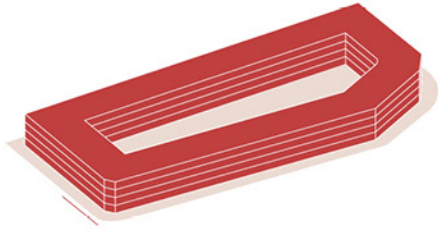
street setback: 3m

height with side setback: 21.5m

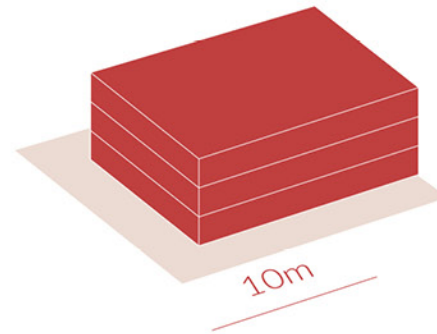
height without side setback: 21.5m



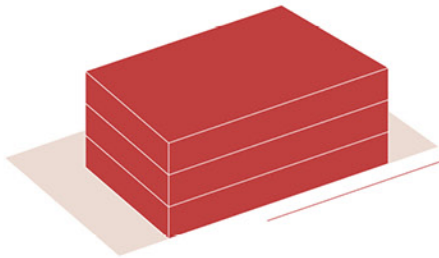
148 units
approx. 47 sqm
terrain:
R\$ 1610500
construction:
R\$ 31084412



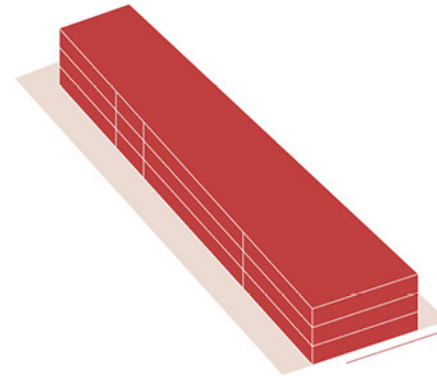
12 units
approx. 40 sqm
terrain:
R\$ 130744
construction:
R\$ 1755947



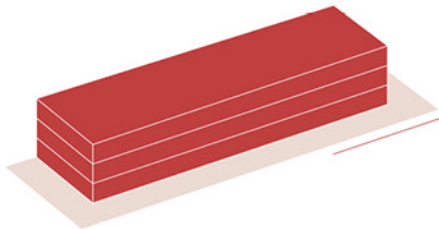
6 units
approx. 52 sqm
terrain:
R\$ 95620
construction:
R\$ 1155260



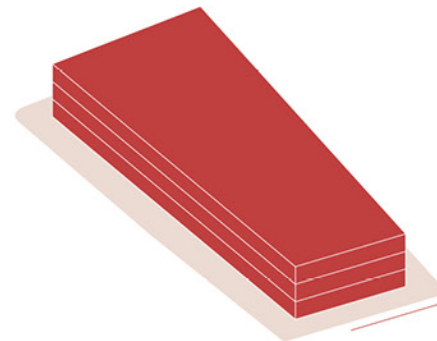
30 units
approx. 47 sqm
terrain:
R\$ 368109
construction:
R\$ 5199336



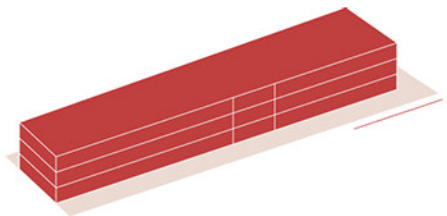
6 units
approx. 52 sqm
terrain:
R\$ 95620
construction:
R\$ 2693184



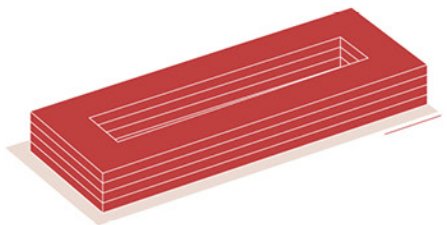
42 units
approx. 45 sqm
terrain:
R\$ 460610
construction:
R\$ 7002086



24 units
approx. 44 sqm
terrain:
R\$ 289572
construction:
R\$ 3928527



80 units
approx. 50 sqm
terrain:
R\$ 834898
construction:
R\$ 14793788



Planning Area: 01

Block: 04

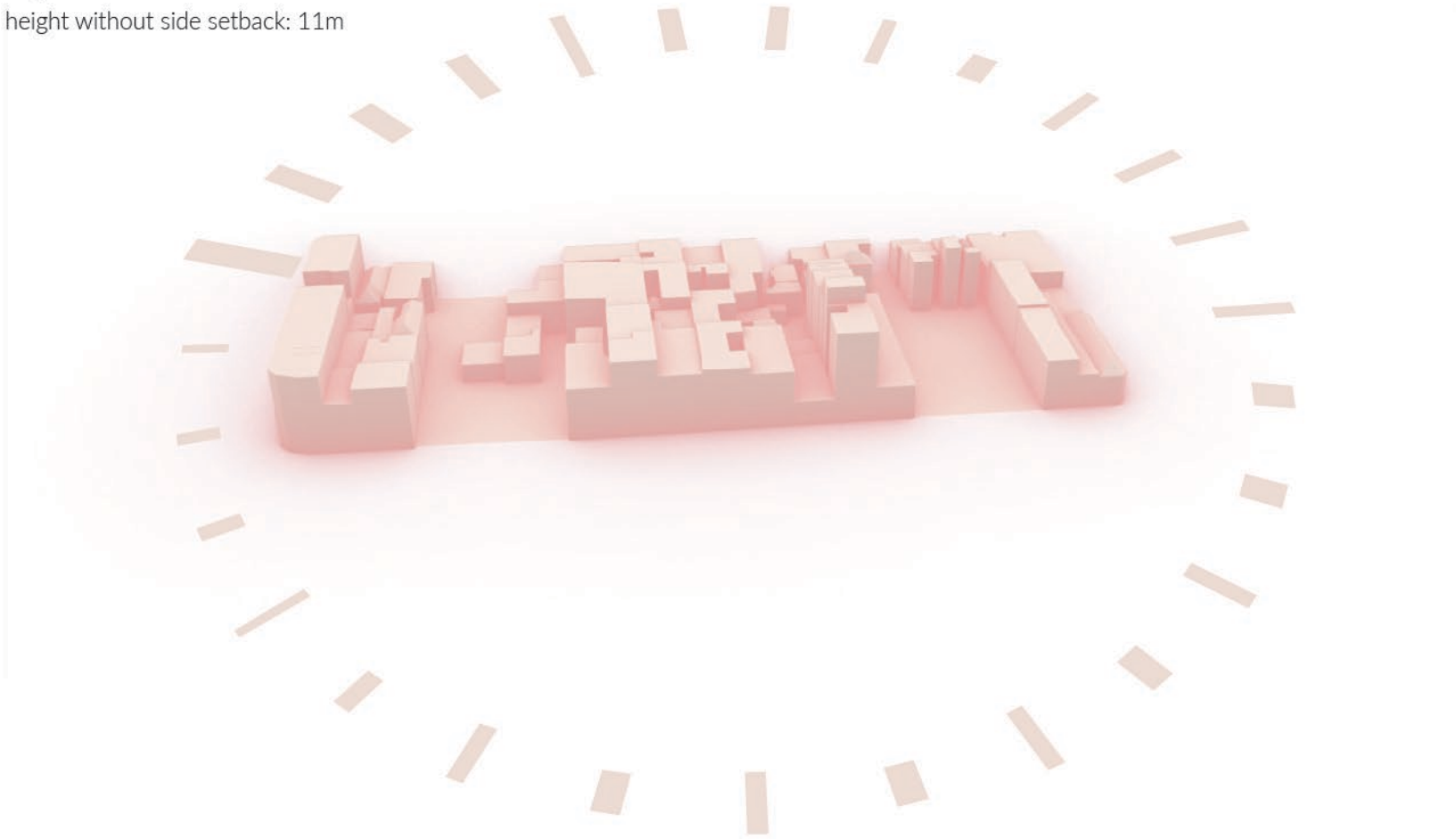
FAR: 5

BCR: 70%

street setback: 7m

height with side setback: 11m

height without side setback: 11m



AP2



All images from Google StreetView



Planning Area: 02

Block: 01

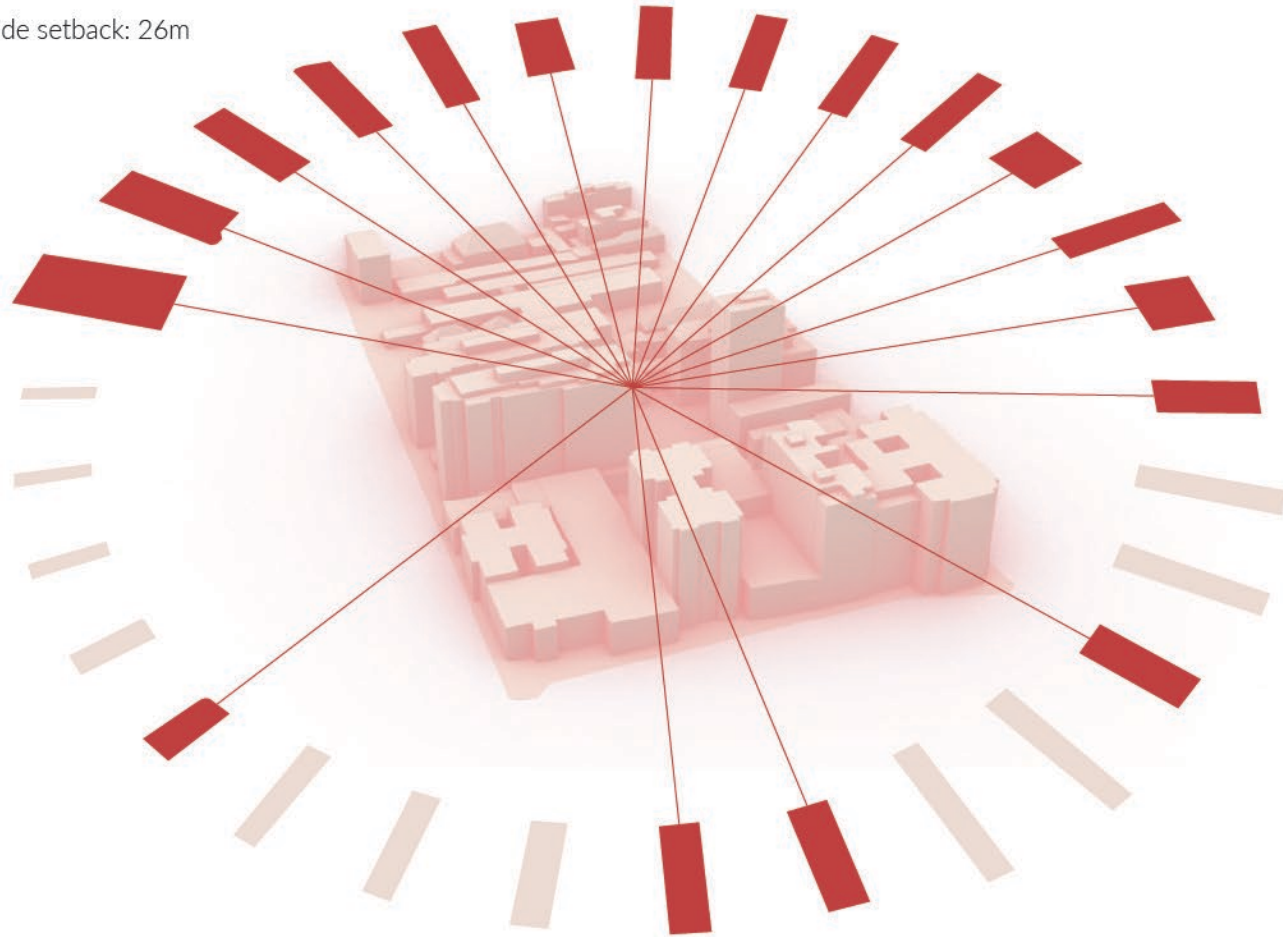
FAR: 3.5

BCR: 70%

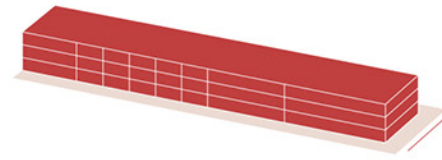
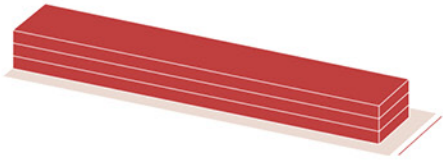
street setback: 3m

height with side setback: 32m

height without side setback: 26m

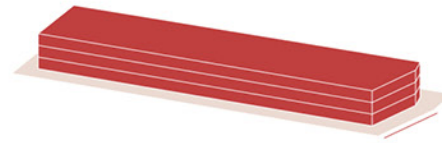
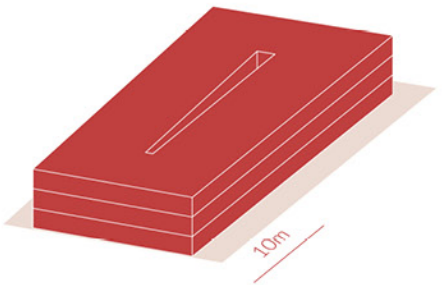


42 units
approx. 44 sqm
terrain:
R\$ 4367286
construction:
R\$ 6892313



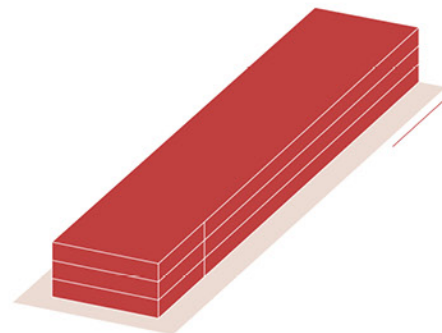
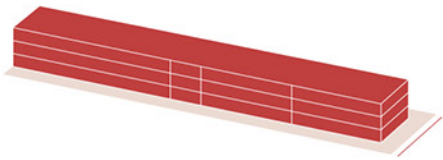
42 units
approx. 46 sqm
terrain:
R\$ 4419571
construction:
R\$ 7069659

54 units
approx. 38 sqm
terrain:
R\$ 4425059
construction:
R\$ 9249667



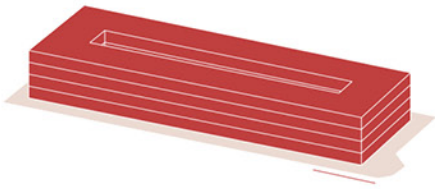
45 units
approx. 50 sqm
terrain:
R\$ 5154095
construction:
R\$ 7610307

36 units
approx. 44 sqm
terrain:
R\$ 3930737
construction:
R\$ 5827288

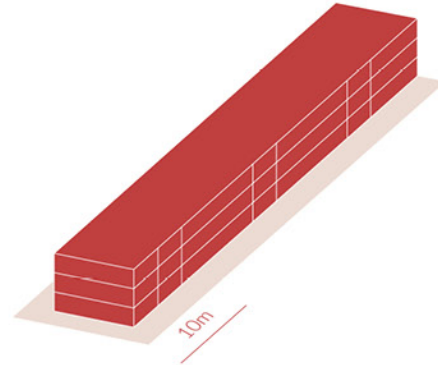


51 units
approx. 45 sqm
terrain:
R\$ 5100377
construction:
R\$ 8430739

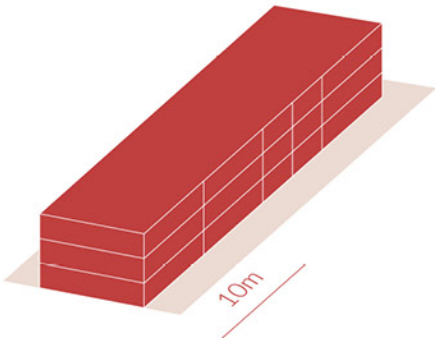
72 units
approx. 49 sqm
terrain:
R\$ 6800664
construction:
R\$ 12966469



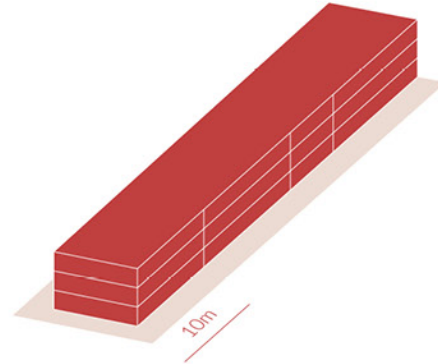
36 units
approx. 46 sqm
terrain:
R\$ 4204407
construction:
R\$ 6167212



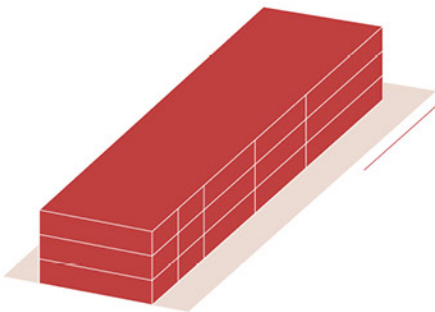
24 units
approx. 46 sqm
terrain:
R\$ 2831798
construction:
R\$ 4076526



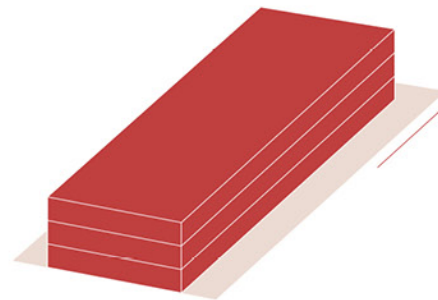
39 units
approx. 46 sqm
terrain:
R\$ 4361581
construction:
R\$ 6583470



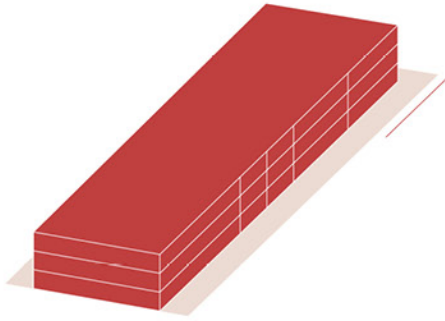
27 units
approx. 44 sqm
terrain:
R\$ 2948942
construction:
R\$ 4404447



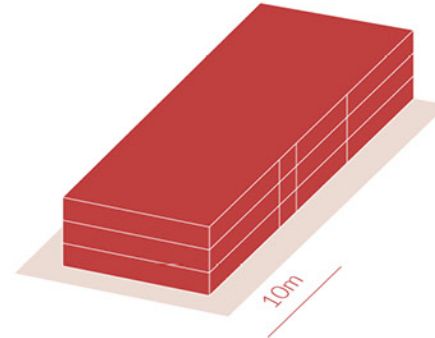
30 units
approx. 47 sqm
terrain:
R\$ 3246136
construction:
R\$ 5184645



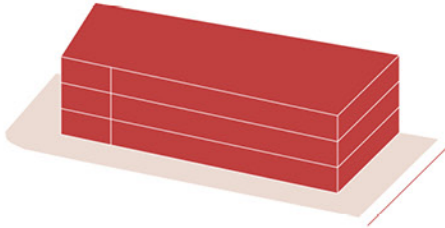
54 units
approx. 46 sqm
terrain:
R\$ 5256818
construction:
R\$ 9076780



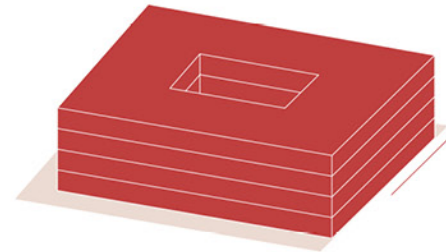
36 units
approx. 47 sqm
terrain:
R\$ 3701704
construction:
R\$ 6219540



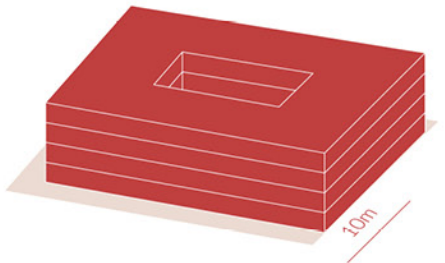
15 units
approx. 48 sqm
terrain:
R\$ 1716646
construction:
R\$ 2678449



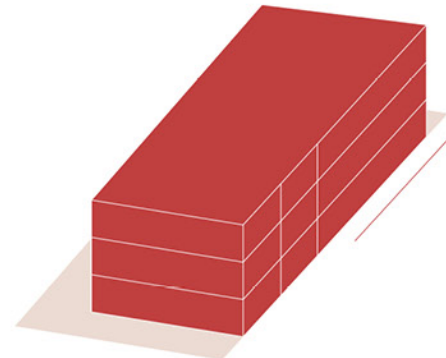
48 units
approx. 47 sqm
terrain:
R\$ 3862528
construction:
R\$ 7675761



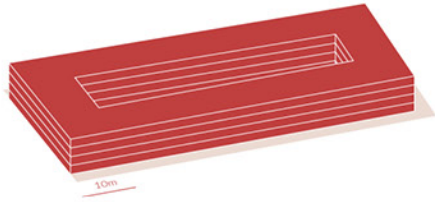
48 units
approx. 49 sqm
terrain:
R\$ 4070521
construction:
R\$ 8054371



15 units
approx. 42 sqm
terrain:
R\$ 1532083
construction:
R\$ 2349946



136 units
approx. 42 sqm
terrain:
R\$ 10497120
construction:
R\$ 21293686



Planning Area: 02

Block: 02

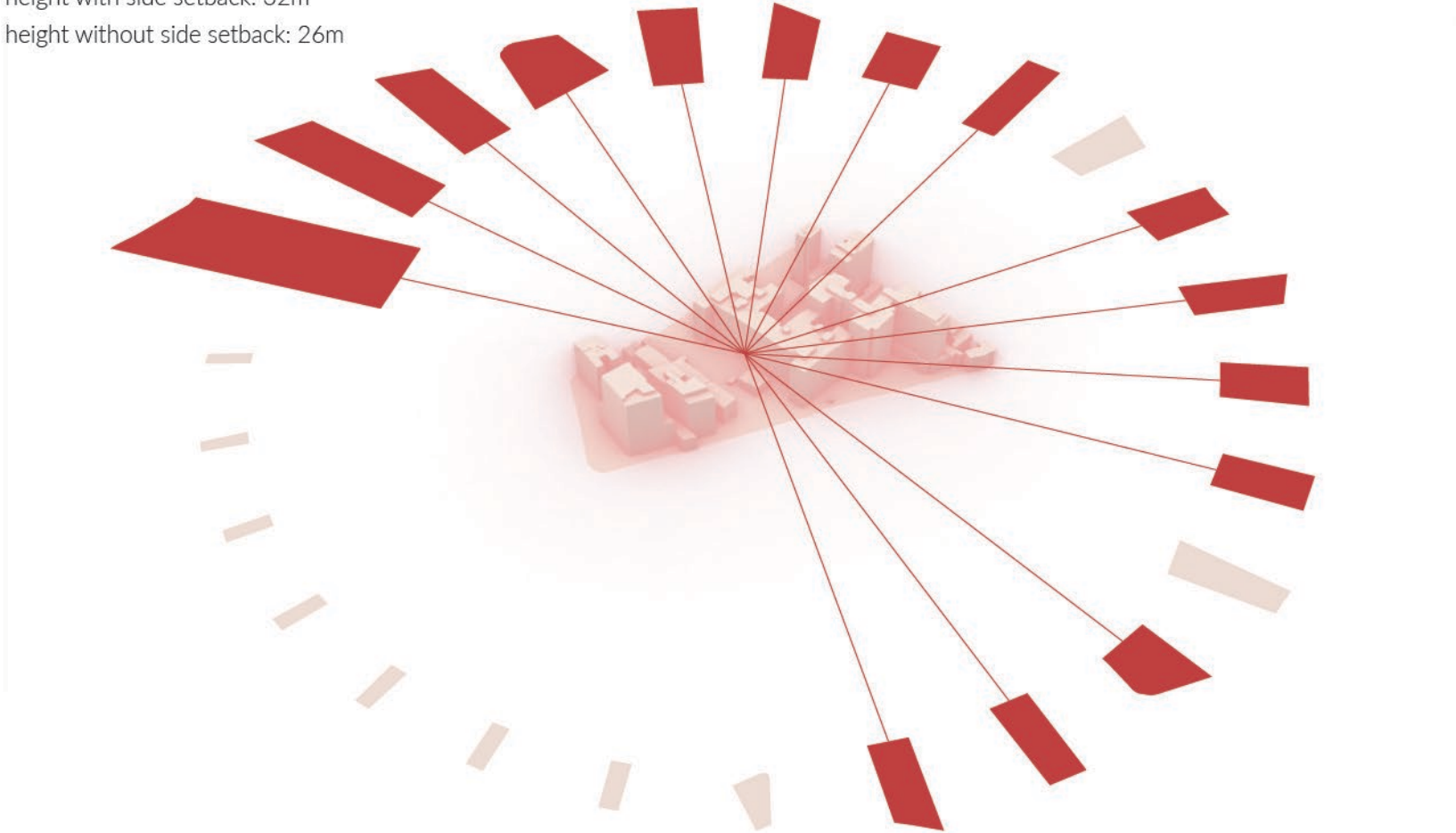
FAR: 3.5

BCR: 70%

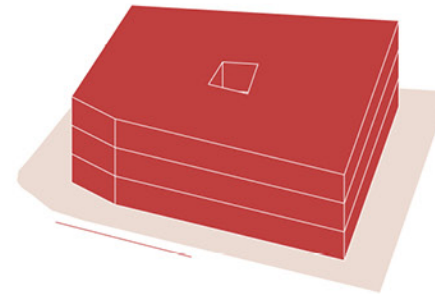
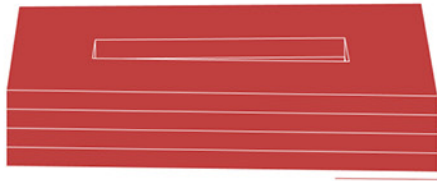
street setback: 3m

height with side setback: 32m

height without side setback: 26m

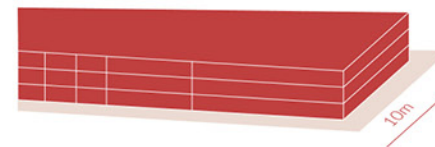
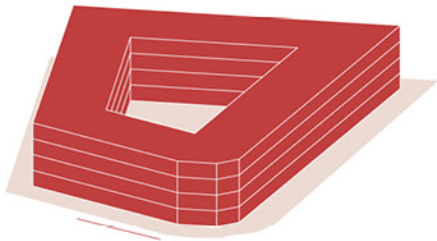


80 units
approx. 37 sqm
terrain:
R\$ 3600347
construction:
R\$ 9868546



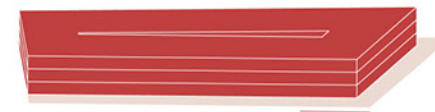
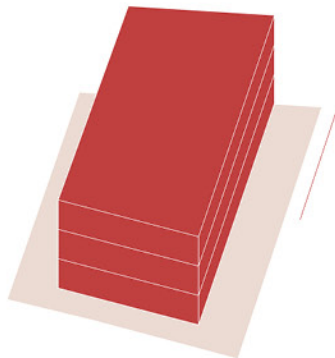
27 units
approx. 41 sqm
terrain:
R\$ 2819012
construction:
R\$ 3910872

92 units
approx. 39 sqm
terrain:
R\$ 7491689
construction:
R\$ 14984647



39 units
approx. 46 sqm
terrain:
R\$ 3878865
construction:
R\$ 5783801

45 units
approx. 20 sqm
terrain:
R\$ 2333662
construction:
R\$ 3074630



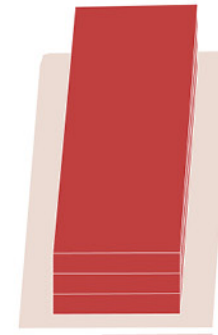
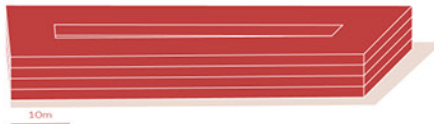
54 units
approx. 48 sqm
terrain:
R\$ 5553774
construction:
R\$ 10948621

140 units
approx. 41 sqm
terrain:
R\$ 9835610
construction:
R\$ 18336984



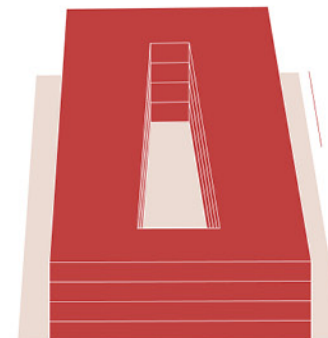
258 units
approx. 50 sqm
terrain:
R\$ 21178406
construction:
R\$ 49564449

124 units
approx. 36 sqm
terrain:
R\$ 7879036
construction:
R\$ 14277307



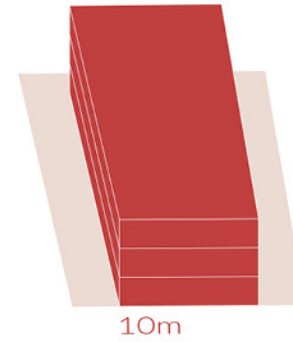
42 units
approx. 44 sqm
terrain:
R\$ 4525733
construction:
R\$ 6885649

64 units
approx. 41 sqm
terrain:
R\$ 4583973
construction:
R\$ 8984864



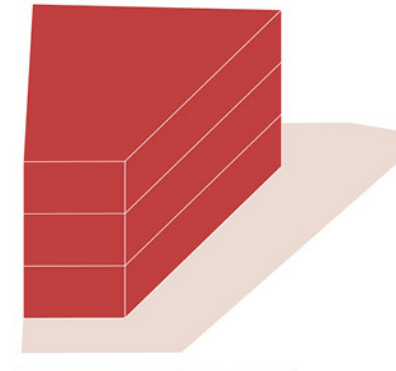
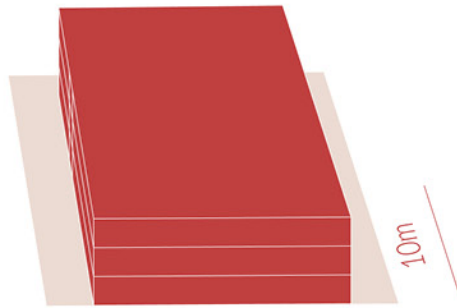
80 units
approx. 51 sqm
terrain:
R\$ 7204553
construction:
R\$ 13670922

33 units
approx. 45 sqm
terrain:
R\$ 3403201
construction:
R\$ 5048679



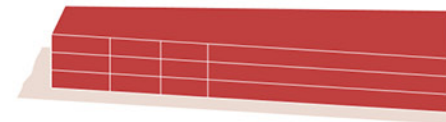
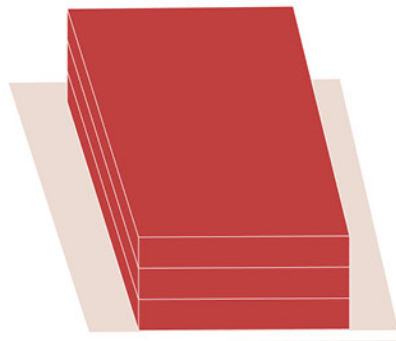
21 units
approx. 45 sqm
terrain:
R\$ 2392756
construction:
R\$ 3473493

33 units
approx. 47 sqm
terrain:
R\$ 3284105
construction:
R\$ 5672529



6 units
approx. 42 sqm
terrain:
R\$ 834844
construction:
R\$ 929259

42 units
approx. 31 sqm
terrain:
R\$ 2945348
construction:
R\$ 4564135



27 units
approx. 44 sqm
terrain:
R\$ 2877643
construction:
R\$ 4362981

Planning Area: 02

Block: 03

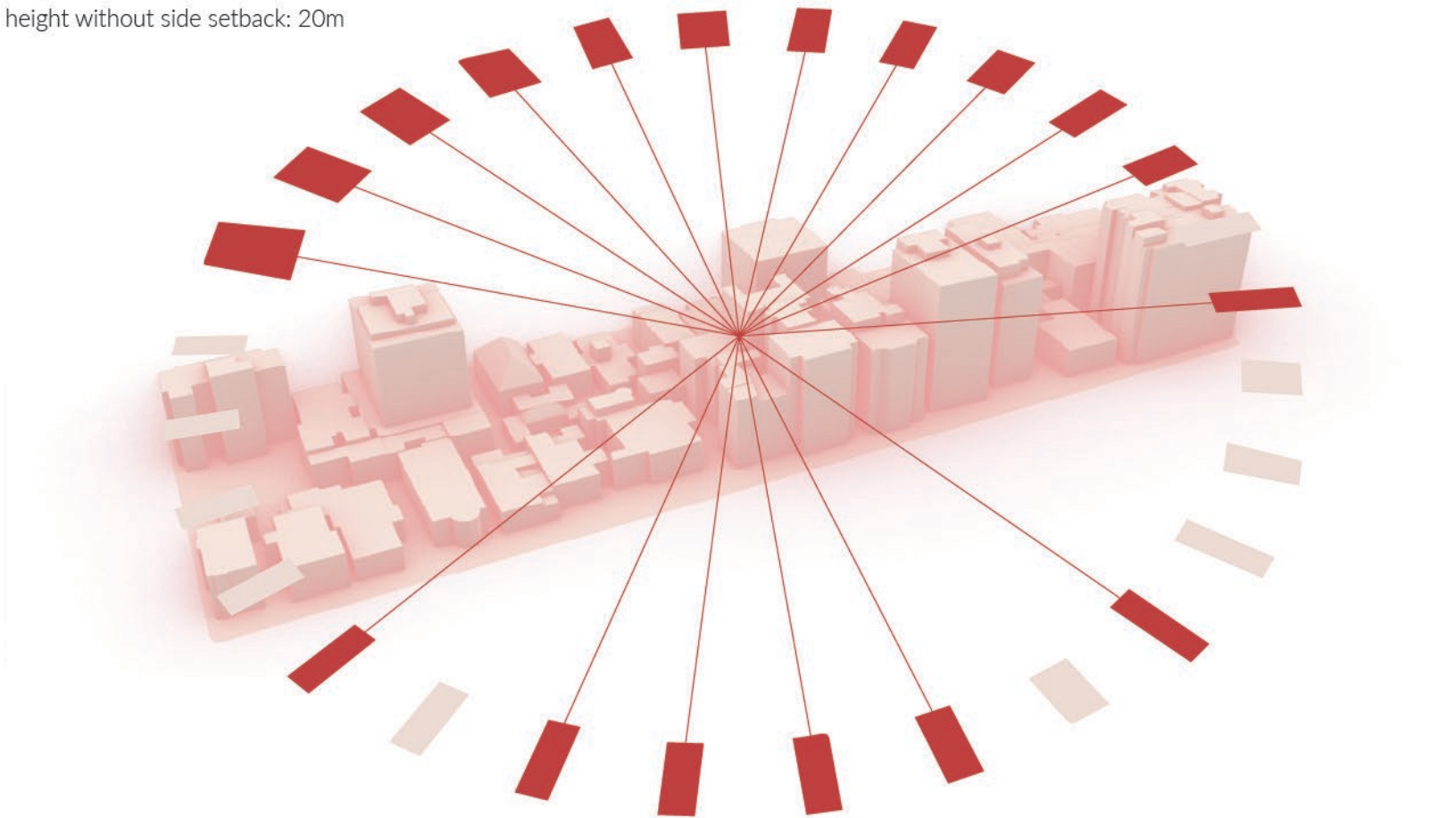
FAR: 3.5

BCR: 70%

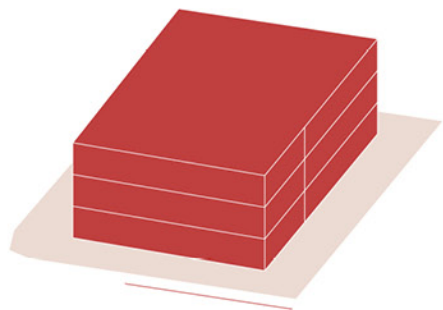
street setback: 3m

height with side setback: 29m

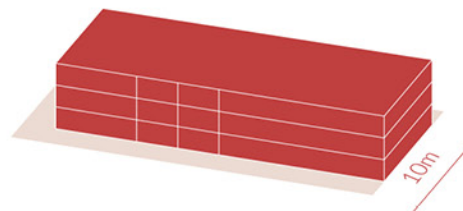
height without side setback: 20m



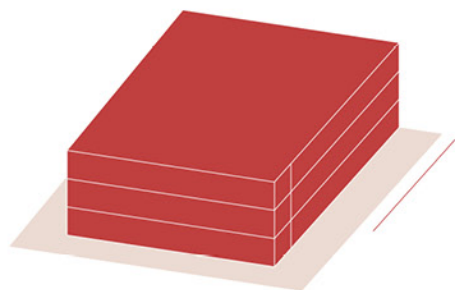
18 units
approx. 42 sqm
terrain:
R\$ 2620849
construction:
R\$ 2758921



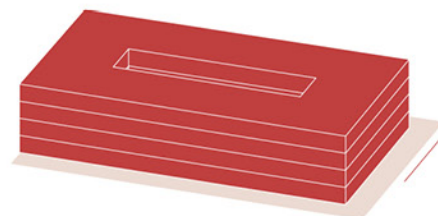
24 units
approx. 46 sqm
terrain:
R\$ 3185812
construction:
R\$ 4062626



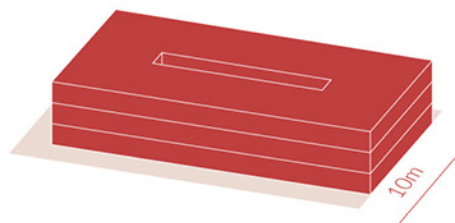
24 units
approx. 44 sqm
terrain:
R\$ 2946341
construction:
R\$ 3895993



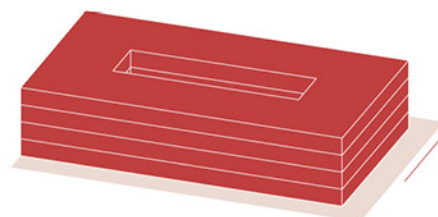
80 units
approx. 35 sqm
terrain:
R\$ 5865139
construction:
R\$ 9333191



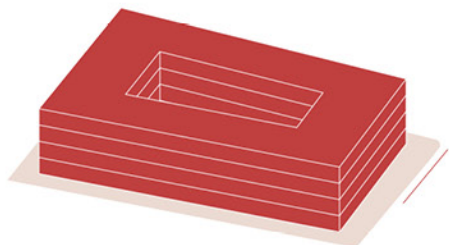
33 units
approx. 41 sqm
terrain:
R\$ 3922156
construction:
R\$ 5044703



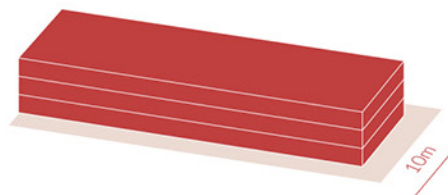
72 units
approx. 38 sqm
terrain:
R\$ 6007247
construction:
R\$ 9322817



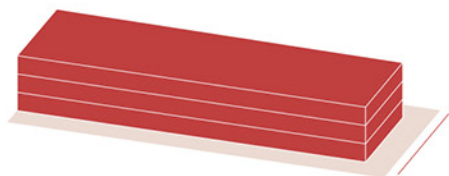
72 units
approx. 44 sqm
terrain:
R\$ 7832308
construction:
R\$ 13299199



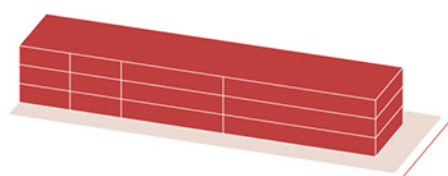
45 units
approx. 33 sqm
terrain:
R\$ 4092332
construction:
R\$ 5223649



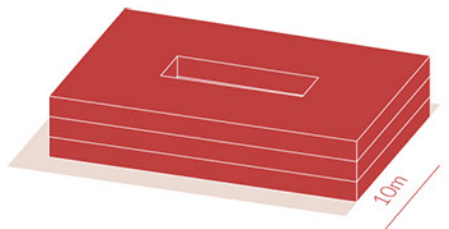
30 units
approx. 44 sqm
terrain:
R\$ 3828120
construction:
R\$ 4925116



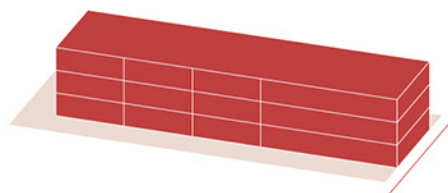
21 units
approx. 44 sqm
terrain:
R\$ 3029697
construction:
R\$ 3377201



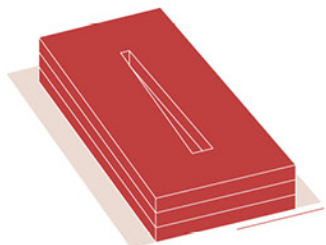
48 units
approx. 42 sqm
terrain:
R\$ 4607599
construction:
R\$ 7527078



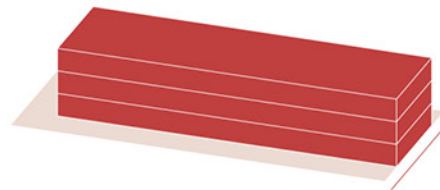
15 units
approx. 47 sqm
terrain:
R\$ 2419387
construction:
R\$ 2620736



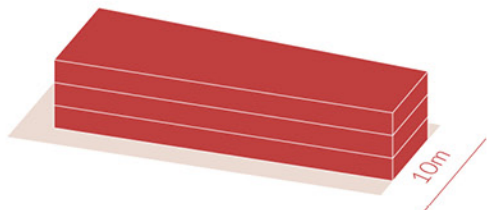
60 units
approx. 27 sqm
terrain:
R\$ 4621070
construction:
R\$ 6054909



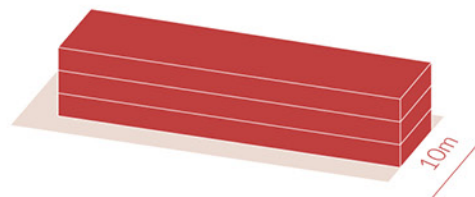
18 units
approx. 44 sqm
terrain:
R\$ 2566752
construction:
R\$ 2898331



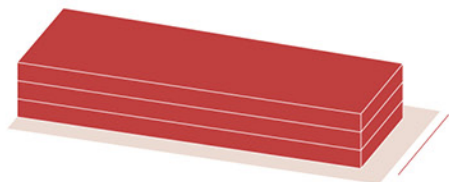
18 units
approx. 49 sqm
terrain:
R\$ 2763961
construction:
R\$ 3234832



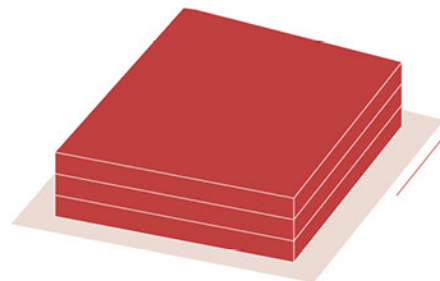
15 units
approx. 47 sqm
terrain:
R\$ 2405836
construction:
R\$ 2590209



33 units
approx. 47 sqm
terrain:
R\$ 4201829
construction:
R\$ 5667432



48 units
approx. 44 sqm
terrain:
R\$ 5651411
construction:
R\$ 8250753



AP3



All images from Google StreetView

Planning Area: 03

Block: 01

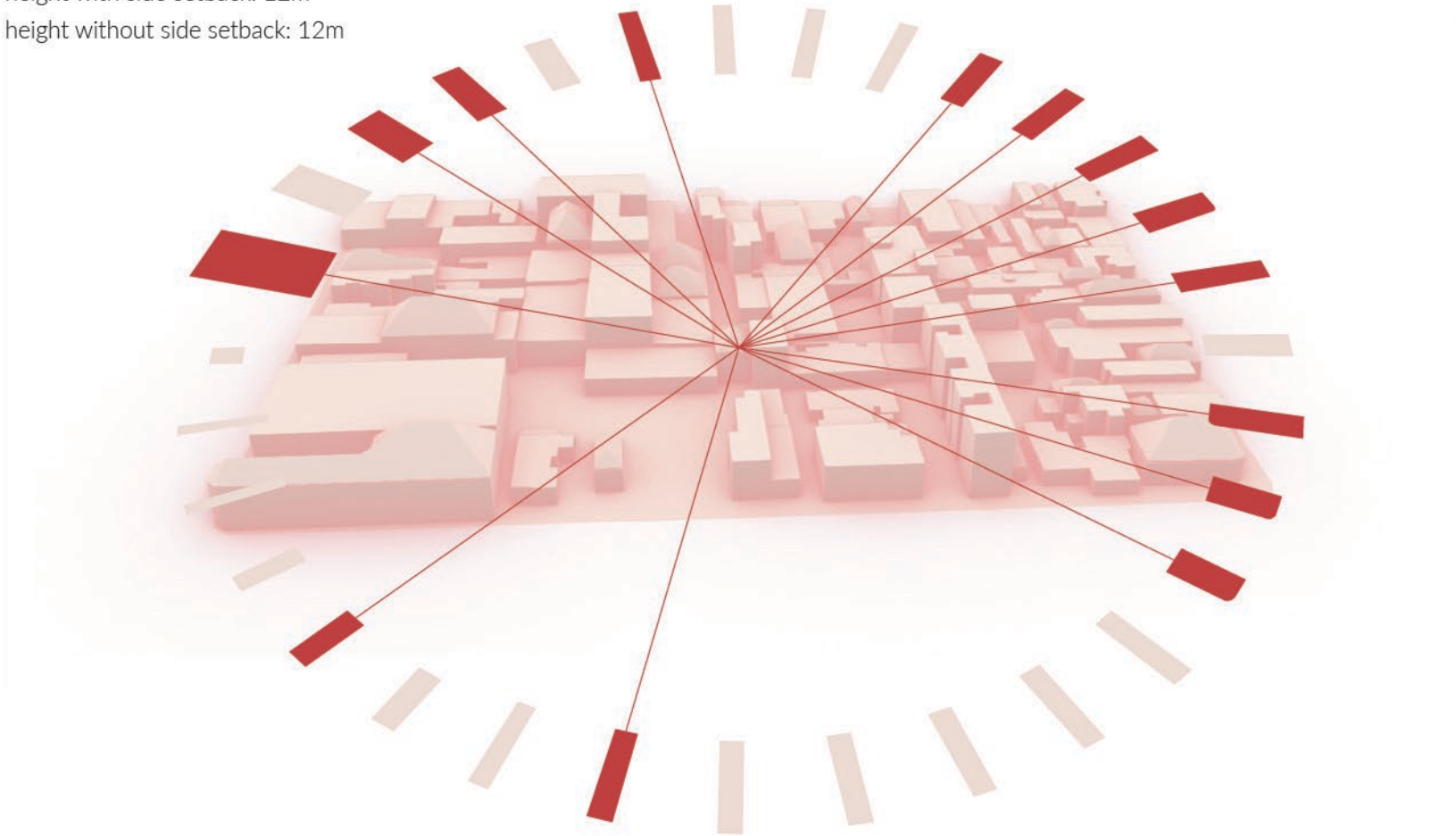
FAR: 2.1

BCR: 70%

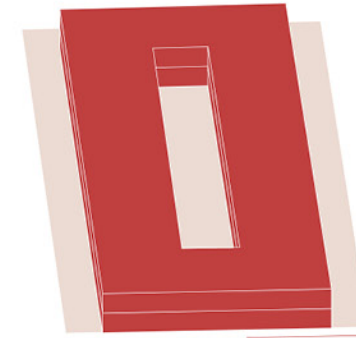
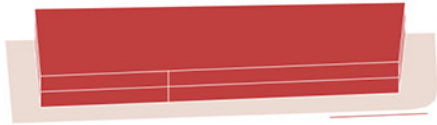
street setback: 3m

height with side setback: 12m

height without side setback: 12m

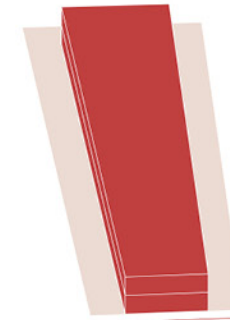
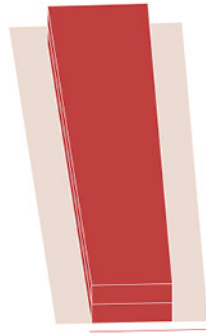


22 units
approx. 44 sqm
terrain:
R\$ 79731
construction:
R\$ 3593016



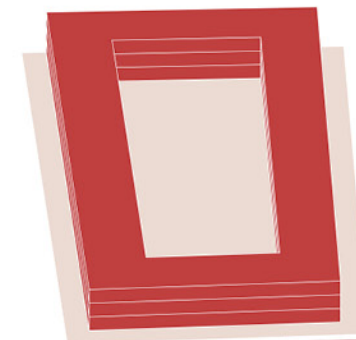
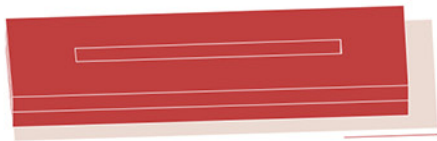
40 units
approx. 36 sqm
terrain:
R\$ 137463
construction:
R\$ 5312107

16 units
approx. 45 sqm
terrain:
R\$ 76897
construction:
R\$ 2657006



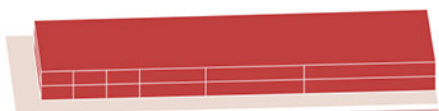
18 units
approx. 43 sqm
terrain:
R\$ 79977
construction:
R\$ 2854337

40 units
approx. 32 sqm
terrain:
R\$ 116292
construction:
R\$ 4684995

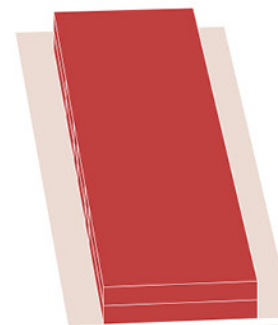


99 units
approx. 35 sqm
terrain:
R\$ 277352
construction:
R\$ 12656424

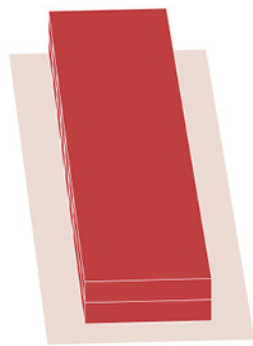
24 units
approx. 44 sqm
terrain:
R\$ 94530
construction:
R\$ 3864362



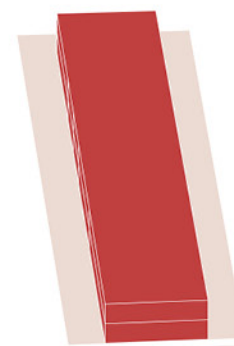
26 units
approx. 46 sqm
terrain:
R\$ 104327
construction:
R\$ 4387387



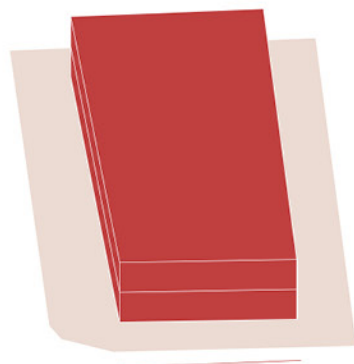
18 units
approx. 43 sqm
terrain:
R\$ 75837
construction:
R\$ 2827605



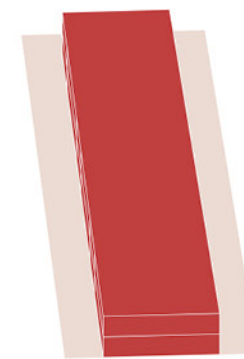
18 units
approx. 44 sqm
terrain:
R\$ 80617
construction:
R\$ 2897116



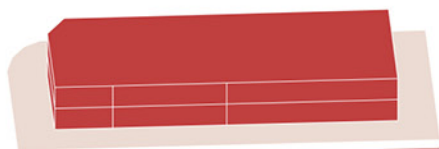
12 units
approx. 44 sqm
terrain:
R\$ 59625
construction:
R\$ 1956041



18 units
approx. 46 sqm
terrain:
R\$ 83454
construction:
R\$ 3073866



12 units
approx. 46 sqm
terrain:
R\$ 59156
construction:
R\$ 2022499



14 units
approx. 48 sqm
terrain:
R\$ 74285
construction:
R\$ 2489012



Planning Area: 03

Block: 02

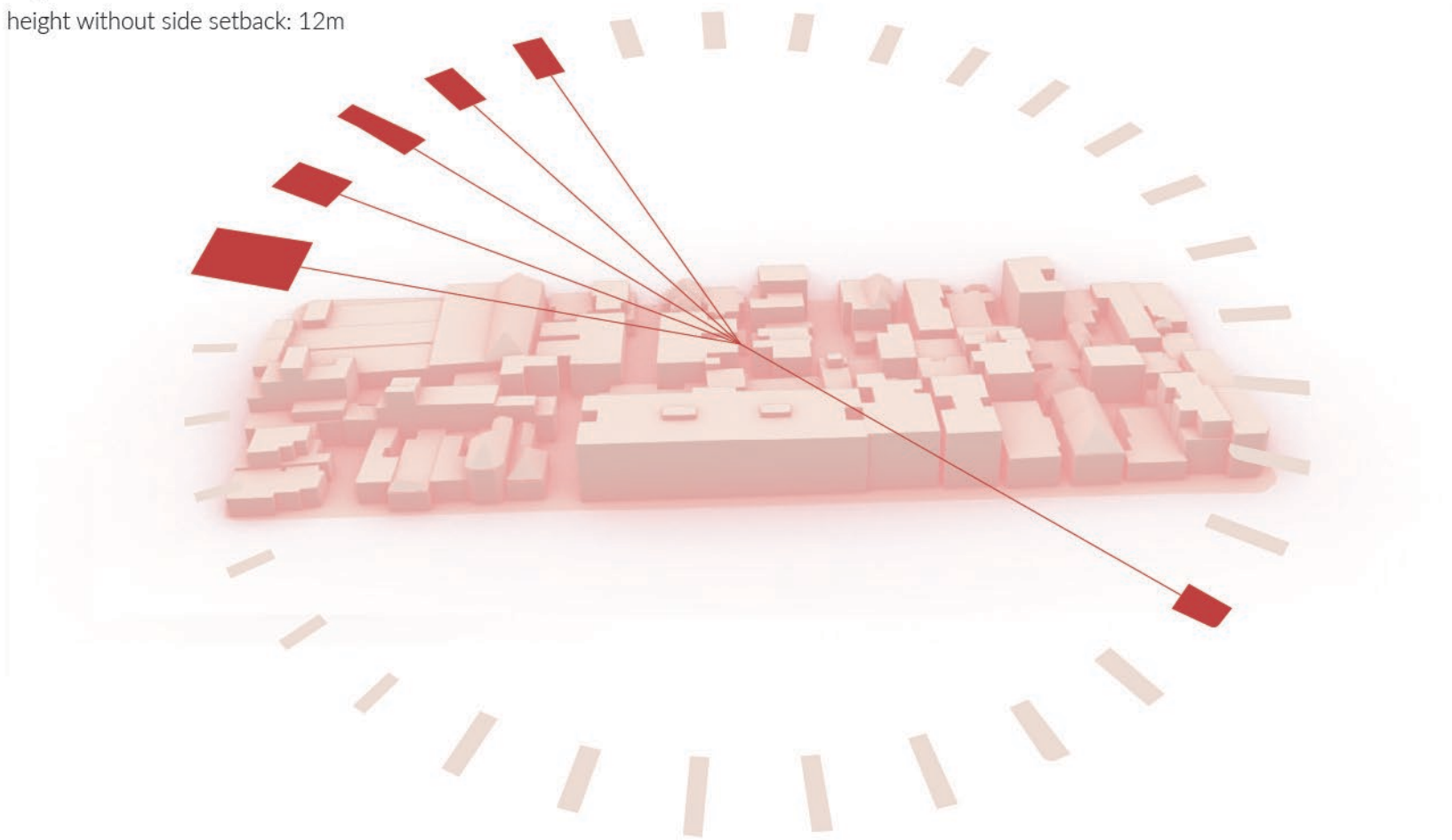
FAR: 2.1

BCR: 70%

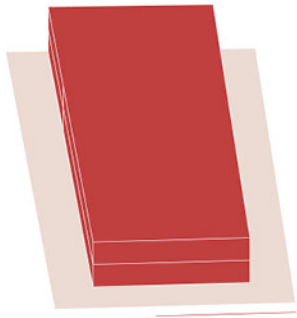
street setback: 3m

height with side setback: 12m

height without side setback: 12m



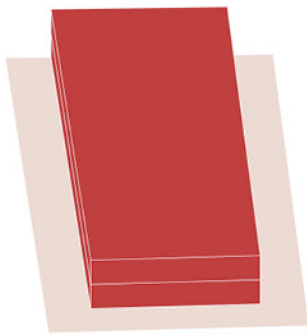
18 units
approx. 43 sqm
terrain:
R\$ 71662
construction:
R\$ 2852609



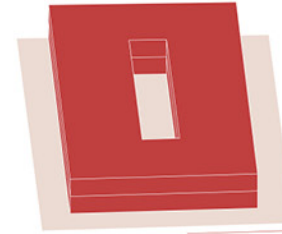
20 units
approx. 44 sqm
terrain:
R\$ 86219
construction:
R\$ 3217639



16 units
approx. 47 sqm
terrain:
R\$ 70391
construction:
R\$ 2791867



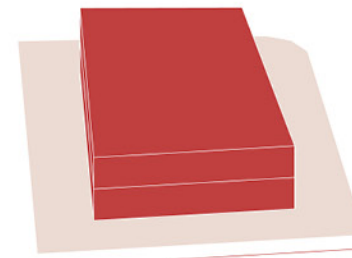
38 units
approx. 26 sqm
terrain:
R\$ 93305
construction:
R\$ 3701164



84 units
approx. 33 sqm
terrain:
R\$ 218631
construction:
R\$ 10332488



6 units
approx. 45 sqm
terrain:
R\$ 36509
construction:
R\$ 1002733



Planning Area: 03

Block: 03

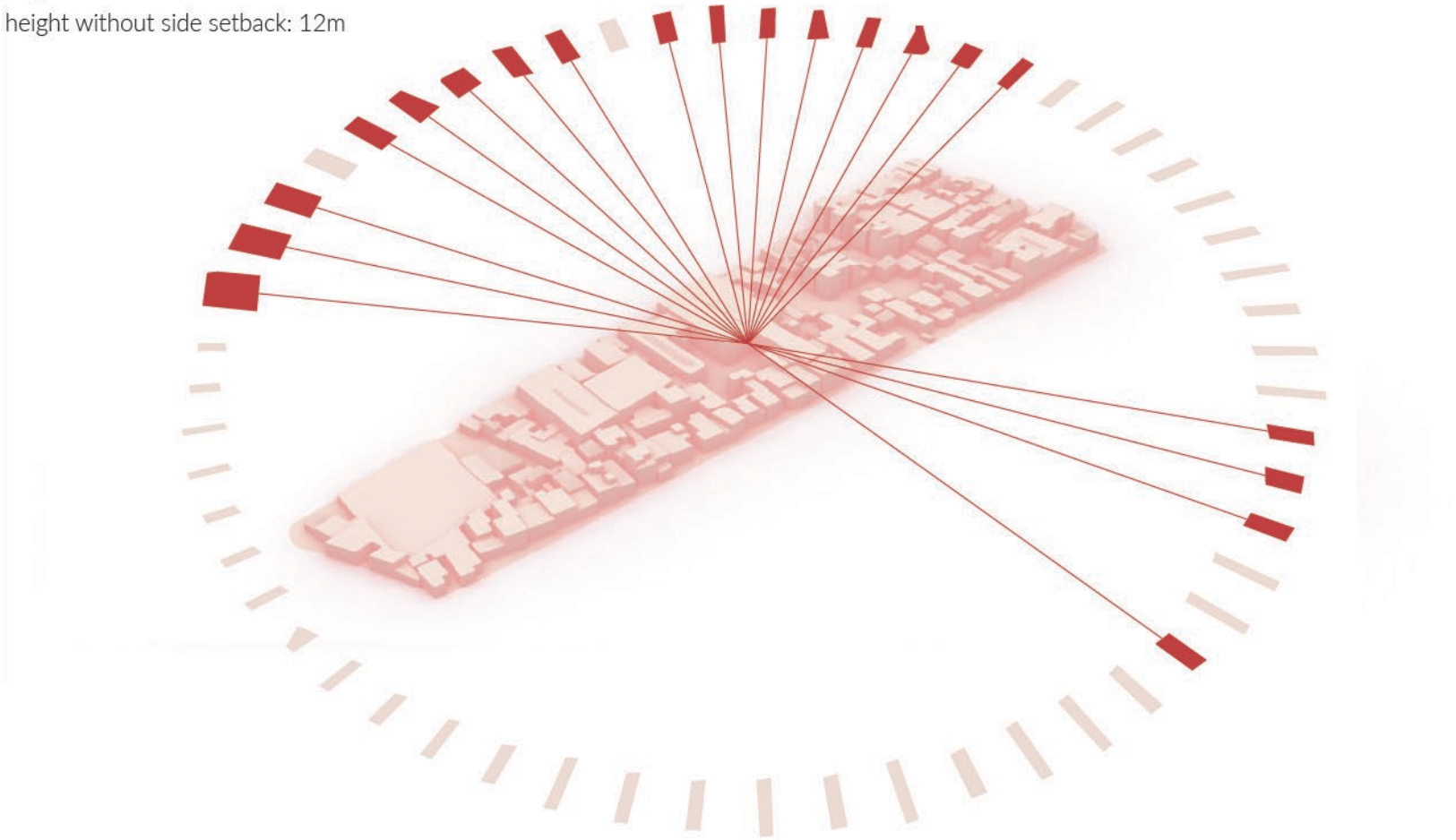
FAR: 2.1

BCR: 70%

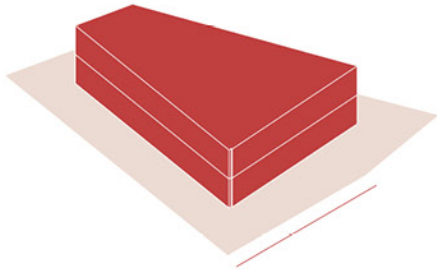
street setback: 3m

height with side setback: 12m

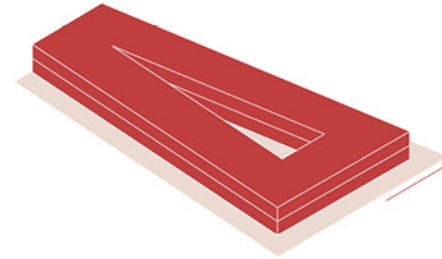
height without side setback: 12m



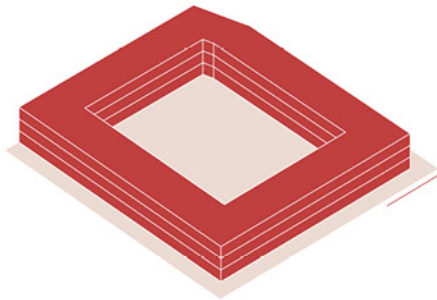
12 units
approx. 37 sqm
terrain:
R\$ 41560
construction:
R\$ 812868



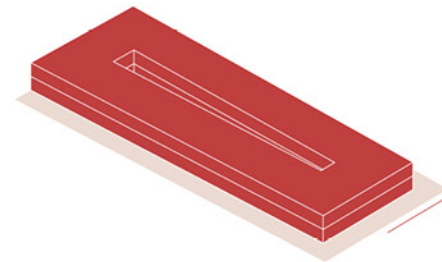
38 units
approx. 37 sqm
terrain:
R\$ 171713
construction:
R\$ 5154811



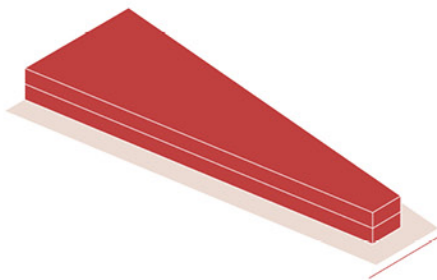
78 units
approx. 39 sqm
terrain:
R\$ 320990
construction:
R\$ 11178544



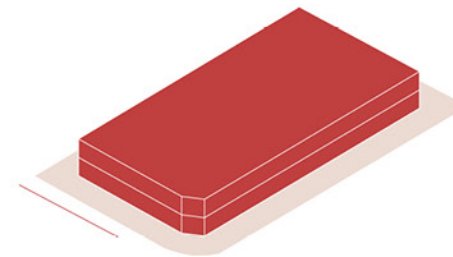
36 units
approx. 41 sqm
terrain:
R\$ 173108
construction:
R\$ 5397119



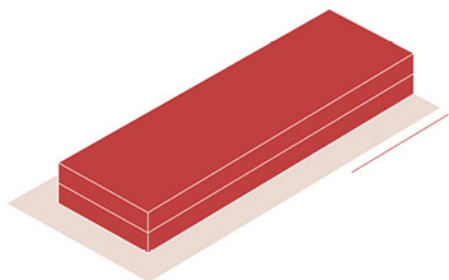
22 units
approx. 43 sqm
terrain:
R\$ 113047
construction:
R\$ 3503744



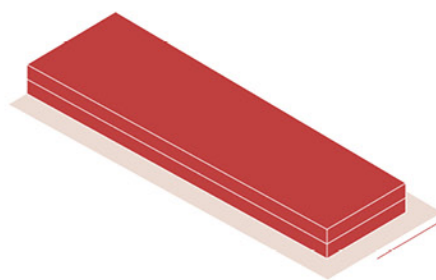
16 units
approx. 57 sqm
terrain:
R\$ 109273
construction:
R\$ 3251634



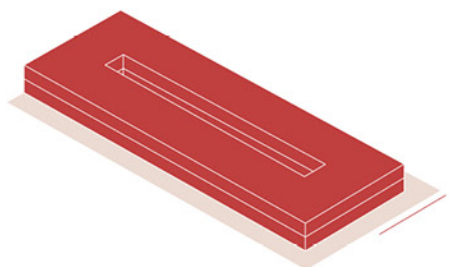
14 units
approx. 47 sqm
terrain:
R\$ 82684
construction:
R\$ 2424467



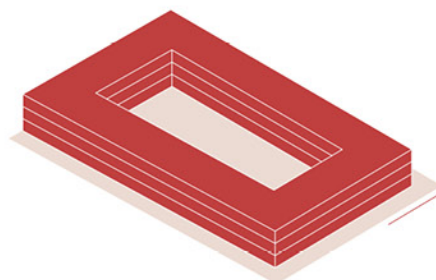
30 units
approx. 46 sqm
terrain:
R\$ 149705
construction:
R\$ 5075971



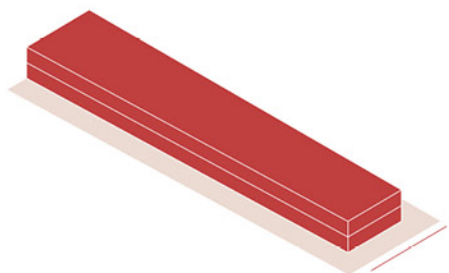
40 units
approx. 36 sqm
terrain:
R\$ 175283
construction:
R\$ 5372455



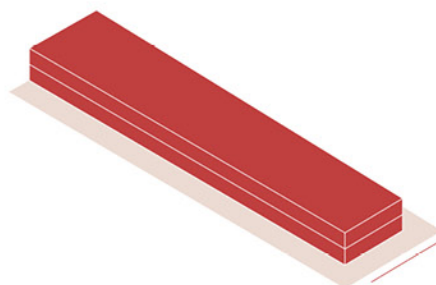
57 units
approx. 47 sqm
terrain:
R\$ 256155
construction:
R\$ 9898550



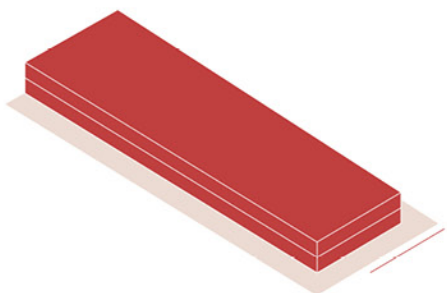
20 units
approx. 44 sqm
terrain:
R\$ 112217
construction:
R\$ 3276690



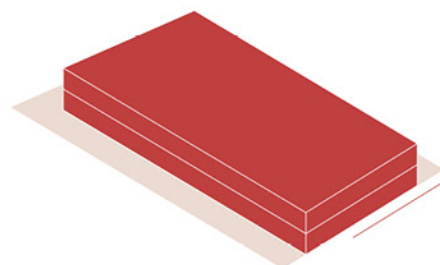
20 units
approx. 45 sqm
terrain:
R\$ 113515
construction:
R\$ 3346948



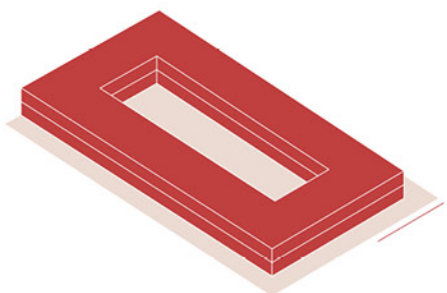
30 units
approx. 44 sqm
terrain:
R\$ 145565
construction:
R\$ 4900038



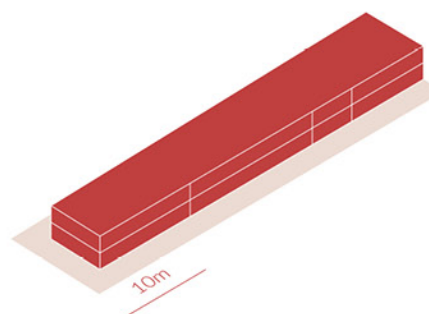
16 units
approx. 46 sqm
terrain:
R\$ 84153
construction:
R\$ 2617245



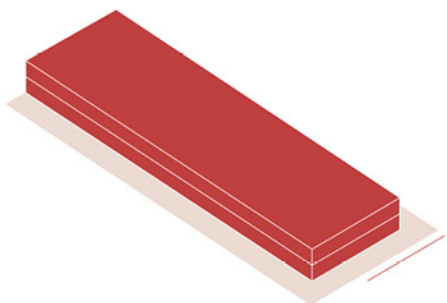
34 units
approx. 47 sqm
terrain:
R\$ 217196
construction:
R\$ 5949964



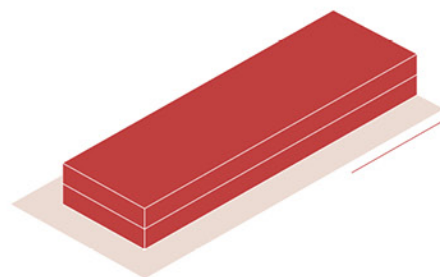
16 units
approx. 48 sqm
terrain:
R\$ 102367
construction:
R\$ 2814532



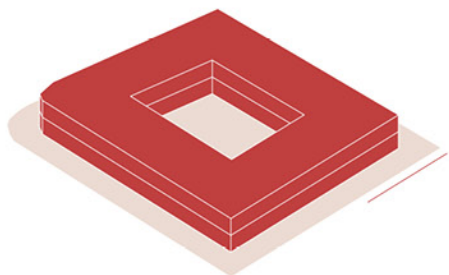
28 units
approx. 45 sqm
terrain:
R\$ 140401
construction:
R\$ 4662149



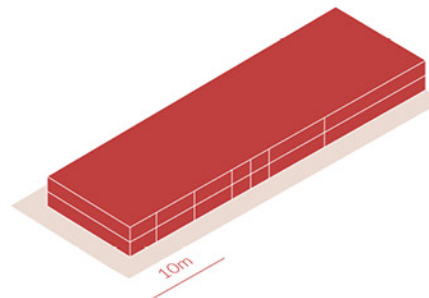
14 units
approx. 43 sqm
terrain:
R\$ 78261
construction:
R\$ 2245268



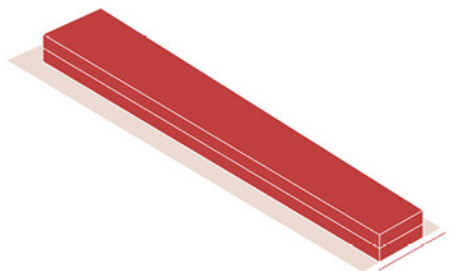
24 units
approx. 46 sqm
terrain:
R\$ 152076
construction:
R\$ 4032248



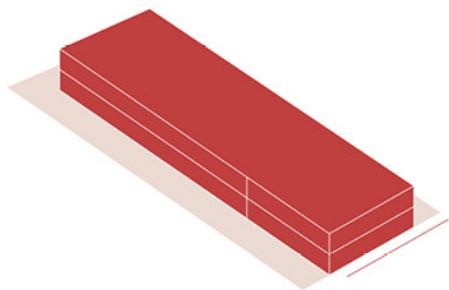
32 units
approx. 44 sqm
terrain:
R\$ 151490
construction:
R\$ 5166729



22 units
approx. 47 sqm
terrain:
R\$ 133468
construction:
R\$ 3795309



14 units
approx. 47 sqm
terrain:
R\$ 84227
construction:
R\$ 2439292



AP4



All images from Google StreetView

Planning Area: 04

Block: 01

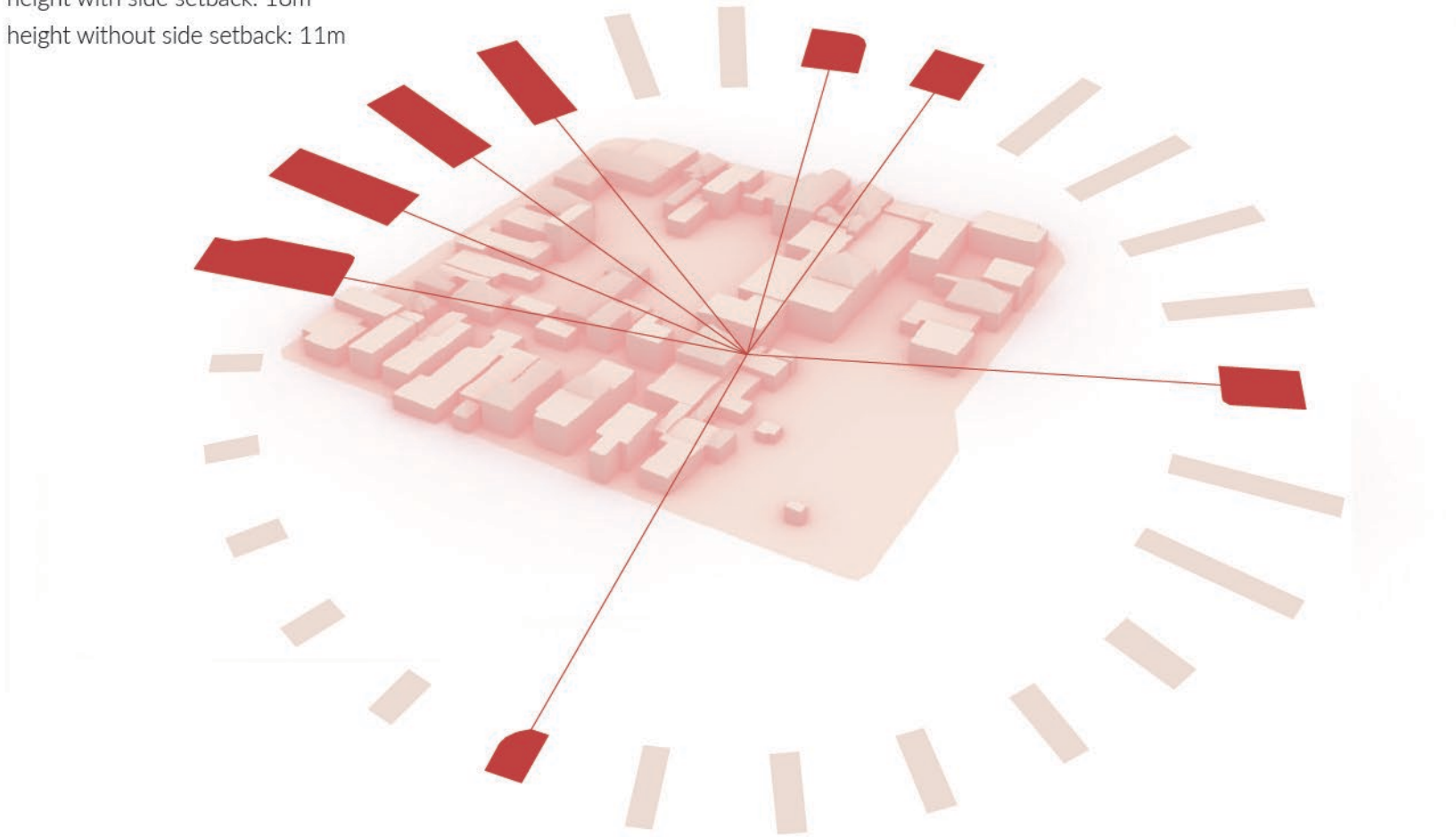
FAR: 2.5

BCR: 70%

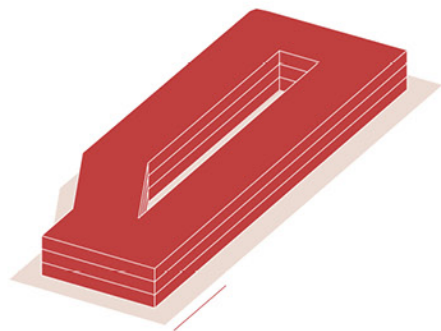
street setback: 3m

height with side setback: 18m

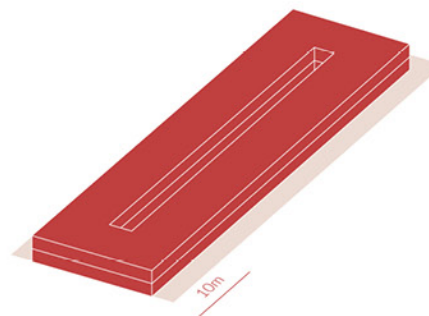
height without side setback: 11m



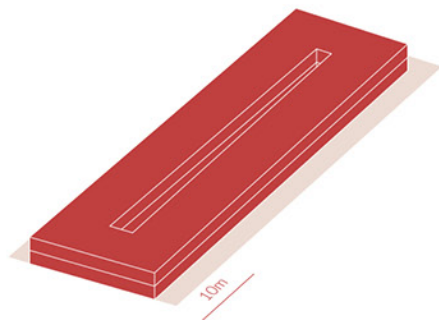
63 units
approx. 49 sqm
terrain:
R\$ 551468
construction:
R\$ 9243219



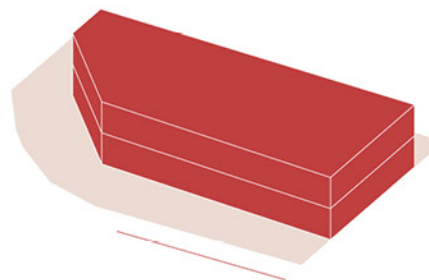
68 units
approx. 28 sqm
terrain:
R\$ 483019
construction:
R\$ 8075565



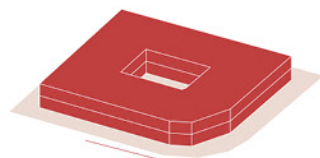
38 units
approx. 48 sqm
terrain:
R\$ 466861
construction:
R\$ 7701519



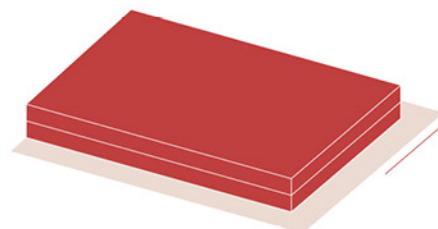
6 units
approx. 48 sqm
terrain:
R\$ 94008
construction:
R\$ 1072857



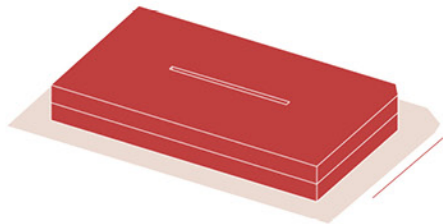
24 units
approx. 43 sqm
terrain:
R\$ 282365
construction:
R\$ 4309240



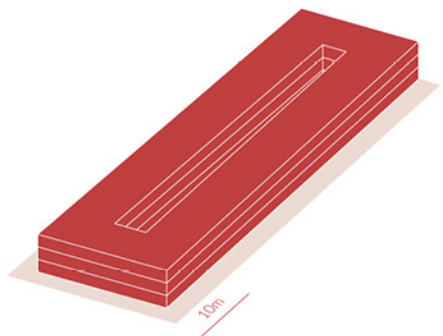
28 units
approx. 44 sqm
terrain:
R\$ 271653
construction:
R\$ 4526657



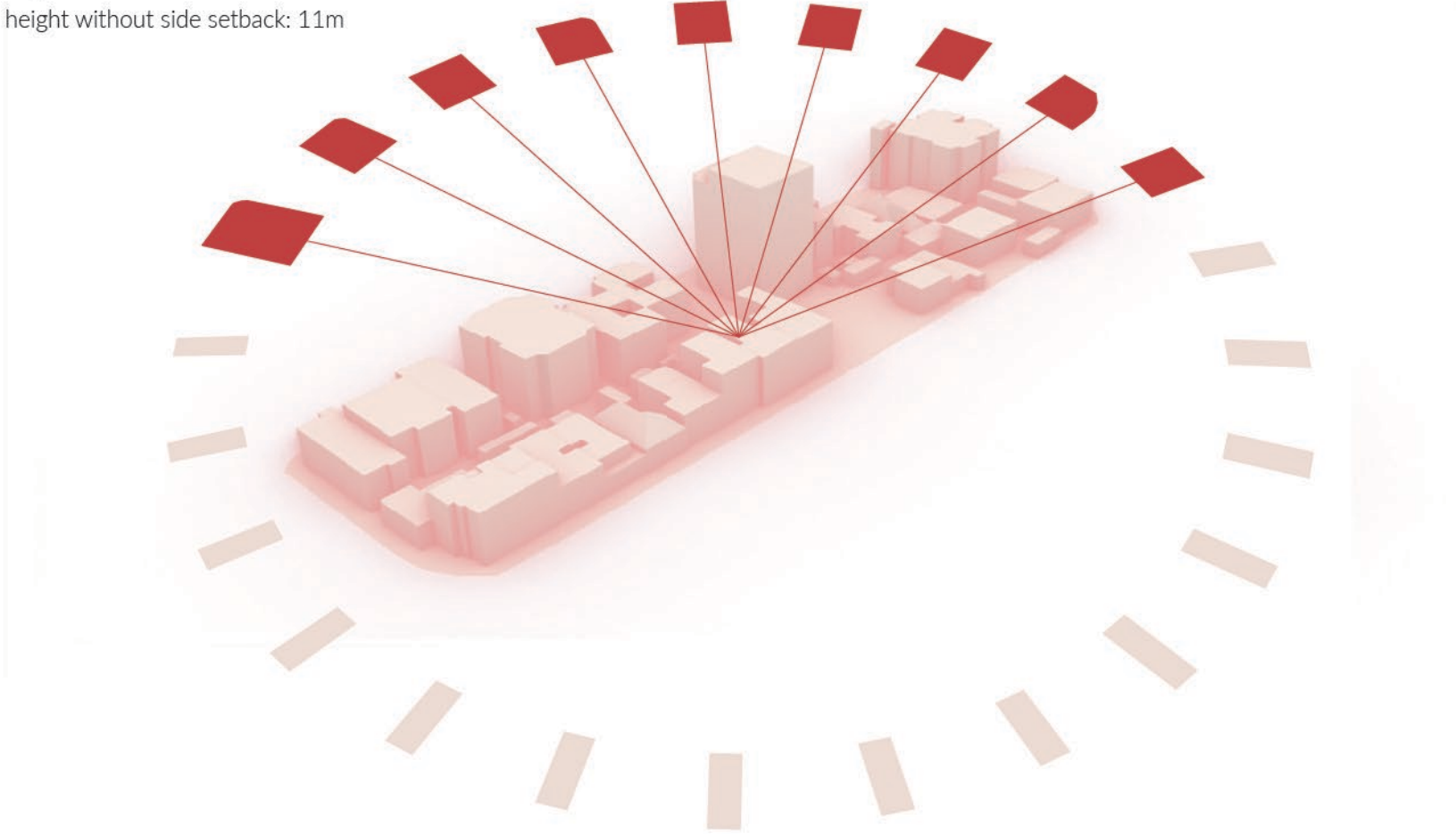
24 units
approx. 39 sqm
terrain:
R\$ 241236
construction:
R\$ 3461451



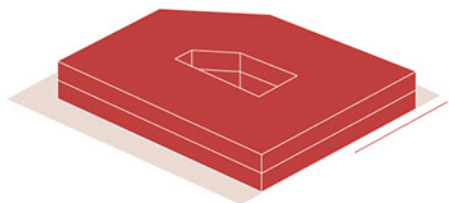
108 units
approx. 28 sqm
terrain:
R\$ 524228
construction:
R\$ 8917577



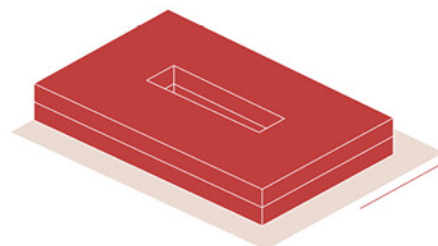
Planning Area: 04
Block: 02
FAR: 2.5
BCR: 70%
street setback: 3m
height with side setback: 18m
height without side setback: 11m



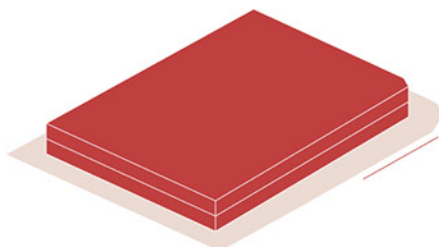
22 units
approx. 34 sqm
terrain:
R\$ 198088
construction:
R\$ 3075846



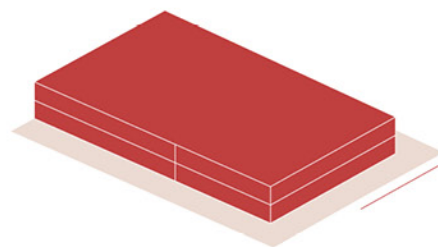
24 units
approx. 35 sqm
terrain:
R\$ 221805
construction:
R\$ 3478760



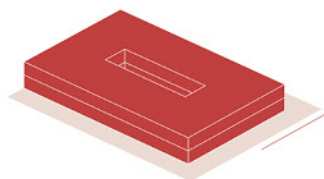
40 units
approx. 38 sqm
terrain:
R\$ 356707
construction:
R\$ 5604441



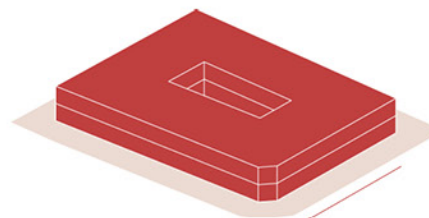
20 units
approx. 46 sqm
terrain:
R\$ 214765
construction:
R\$ 3375541



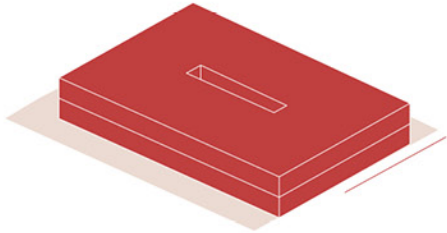
24 units
approx. 36 sqm
terrain:
R\$ 222611
construction:
R\$ 3493738



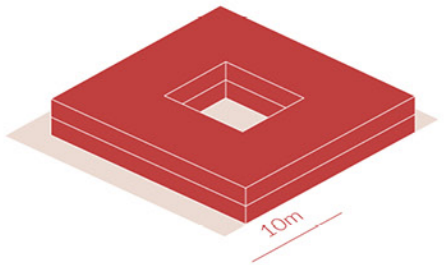
22 units
approx. 38 sqm
terrain:
R\$ 237846
construction:
R\$ 3422706



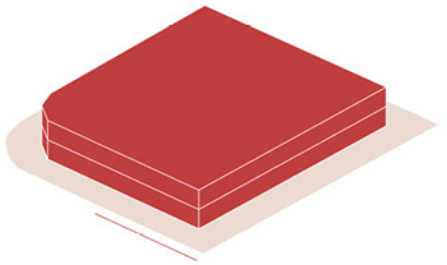
16 units
approx. 43 sqm
terrain:
R\$ 176919
construction:
R\$ 2665564



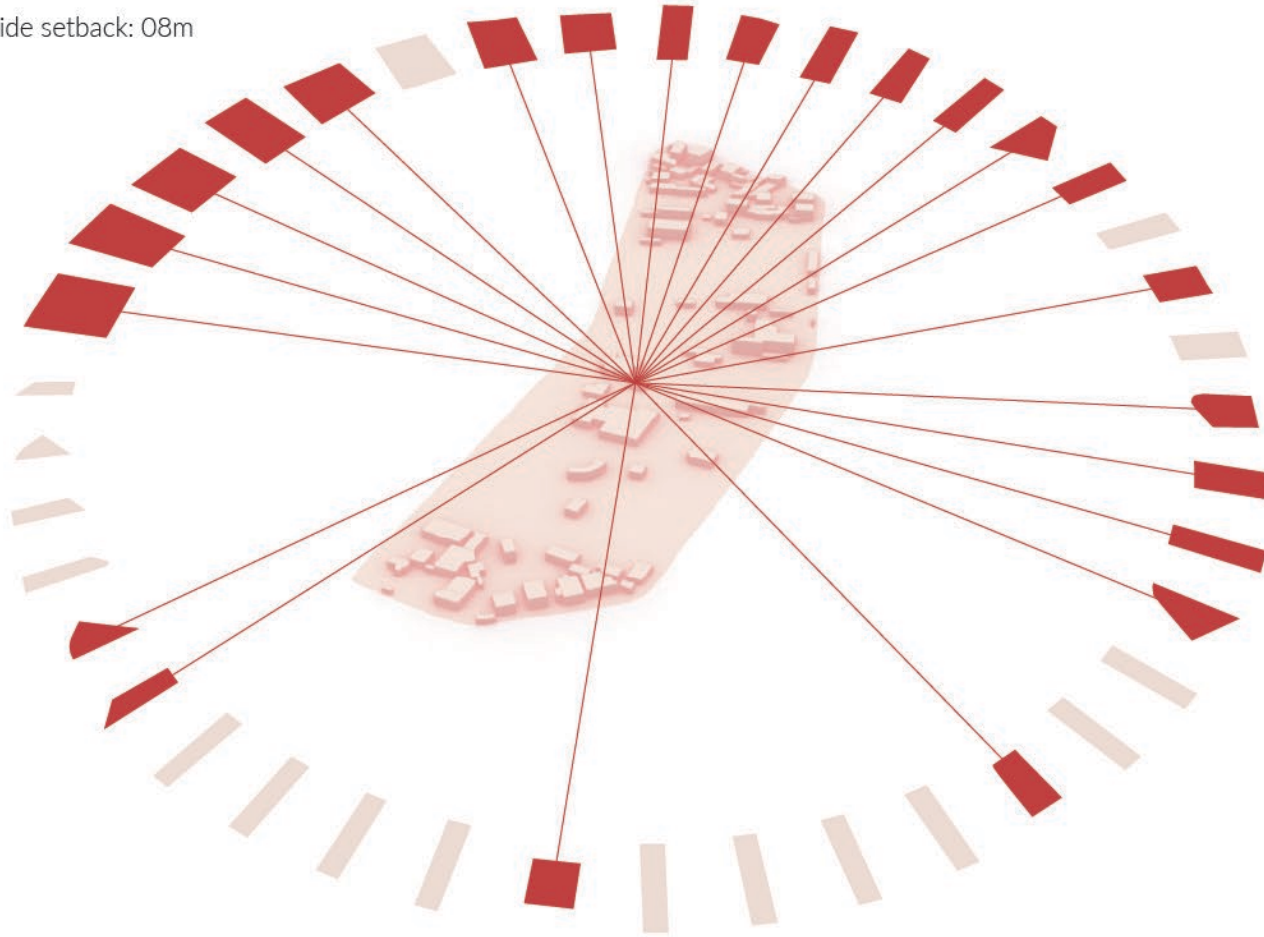
24 units
approx. 37 sqm
terrain:
R\$ 231247
construction:
R\$ 3841982



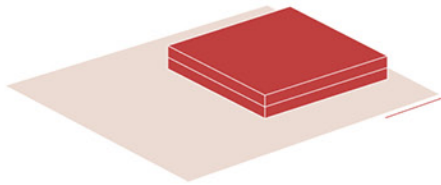
26 units
approx. 35 sqm
terrain:
R\$ 229791
construction:
R\$ 3350059



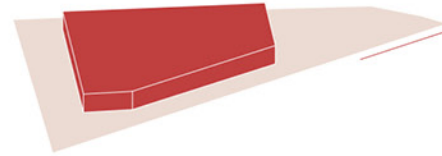
Planning Area: 04
Block: 03
FAR: 0.6
BCR: 40%
street setback: 3m
height with side setback: 21m
height without side setback: 08m



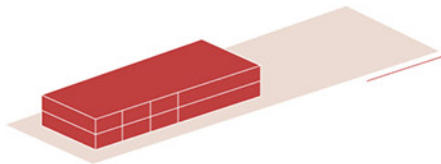
4 units
approx. 40 sqm
terrain:
R\$ 213225
construction:
R\$ 3717105



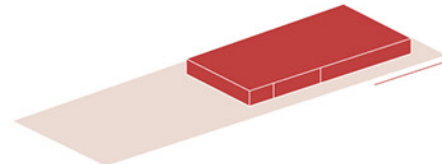
11 units
approx. 31 sqm
terrain:
R\$ 344662
construction:
R\$ 1227290



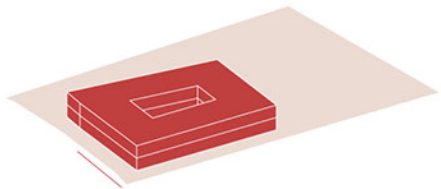
12 units
approx. 43 sqm
terrain:
R\$ 375302
construction:
R\$ 1898451



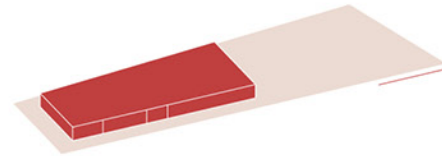
7 units
approx. 45 sqm
terrain:
R\$ 411649
construction:
R\$ 1174102



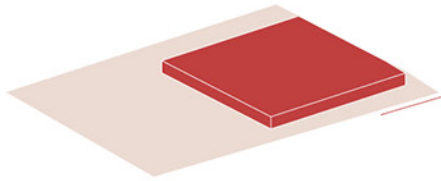
24 units
approx. 37 sqm
terrain:
R\$ 867567
construction:
R\$ 3316300



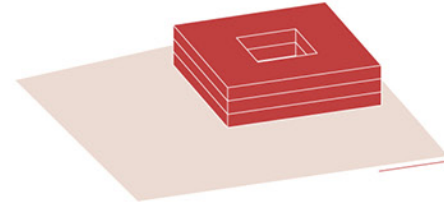
9 units
approx. 44 sqm
terrain:
R\$ 515004
construction:
R\$ 1445502



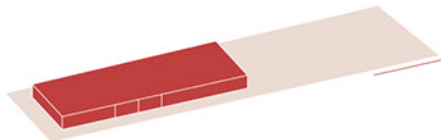
12 units
approx. 59 sqm
terrain:
R\$ 902752
construction:
R\$ 4039401



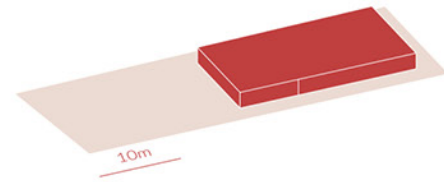
36 units
approx. 37 sqm
terrain:
R\$ 963059
construction:
R\$ 4868865



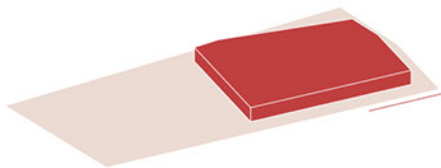
8 units
approx. 46 sqm
terrain:
R\$ 488119
construction:
R\$ 1363844



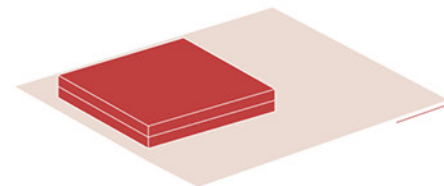
7 units
approx. 47 sqm
terrain:
R\$ 412919
construction:
R\$ 1225808



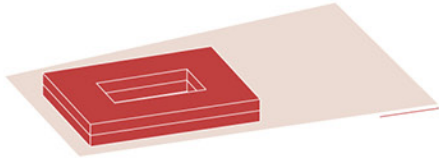
11 units
approx. 44 sqm
terrain:
R\$ 595420
construction:
R\$ 3093671



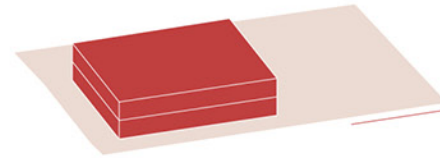
24 units
approx. 55 sqm
terrain:
R\$ 1128576
construction:
R\$ 5821647



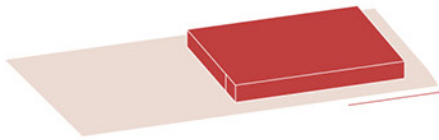
24 units
approx. 45 sqm
terrain:
R\$ 1054959
construction:
R\$ 4020611



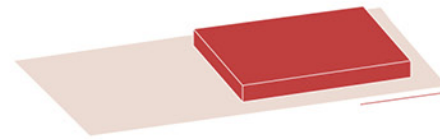
12 units
approx. 43 sqm
terrain:
R\$ 403315
construction:
R\$ 1898536



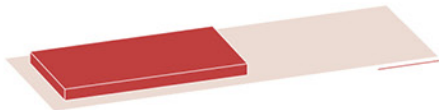
7 units
approx. 43 sqm
terrain:
R\$ 378965
construction:
R\$ 1109276



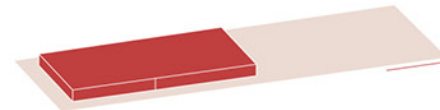
10 units
approx. 32 sqm
terrain:
R\$ 402117
construction:
R\$ 1133339



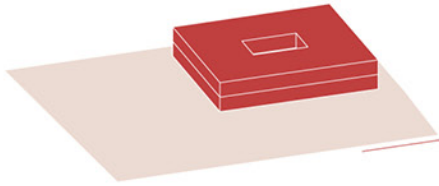
10 units
approx. 50 sqm
terrain:
R\$ 605514
construction:
R\$ 1704789



11 units
approx. 43 sqm
terrain:
R\$ 589825
construction:
R\$ 1747307

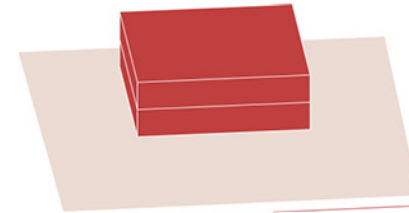
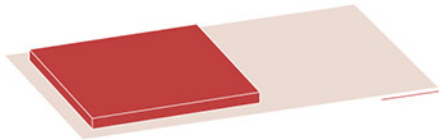


24 units
approx. 30 sqm
terrain:
R\$ 706602
construction:
R\$ 2656856



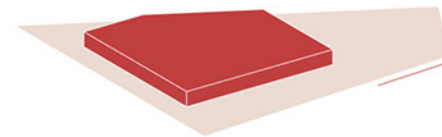
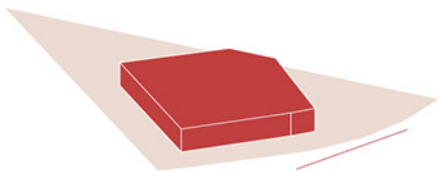
8 units
approx. 45 sqm
terrain:
R\$ 290000
construction:
R\$ 1340843

12 units
approx. 78 sqm
terrain:
R\$ 1011194
construction:
R\$ 4876890



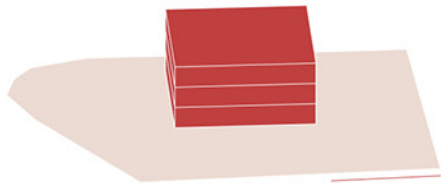
6 units
approx. 46 sqm
terrain:
R\$ 277618
construction:
R\$ 1029384

4 units
approx. 40 sqm
terrain:
R\$ 213225
construction:
R\$ 579296



11 units
approx. 39 sqm
terrain:
R\$ 485925
construction:
R\$ 1416971

12 units
approx. 42 sqm
terrain:
R\$ 388148
construction:
R\$ 1854987



AP5



All images from Google StreetView

Planning Area: 05

Block: 01

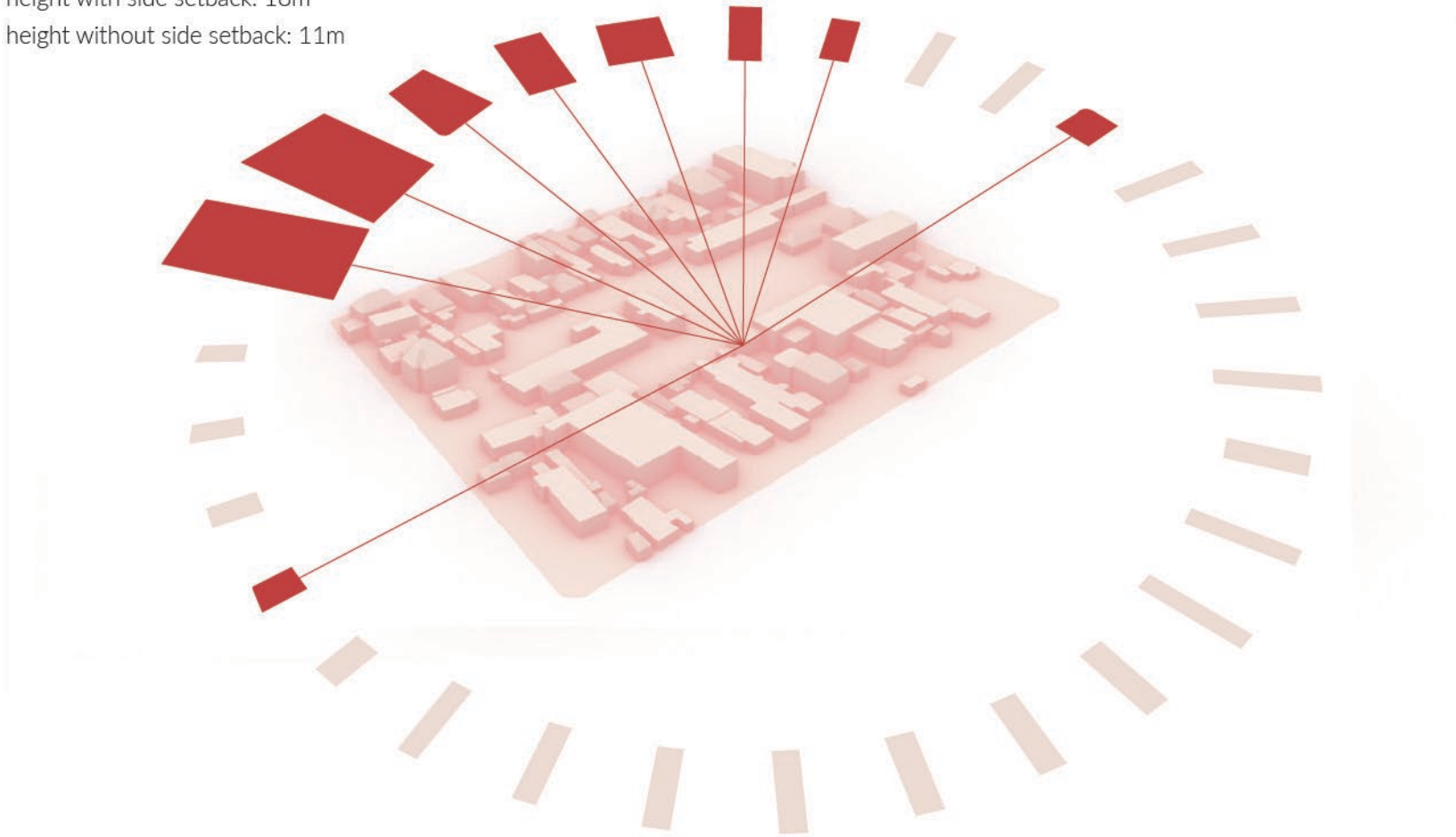
FAR: 2.5

BCR: 70%

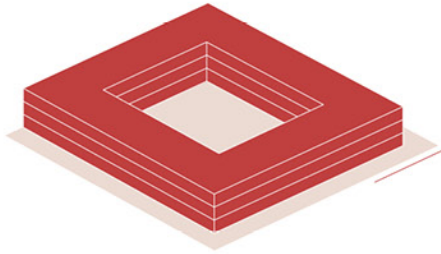
street setback: 3m

height with side setback: 18m

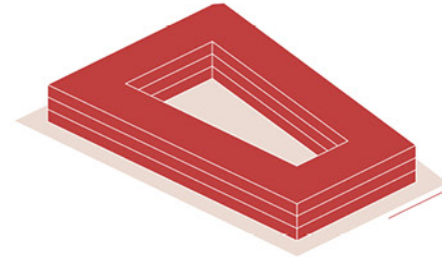
height without side setback: 11m



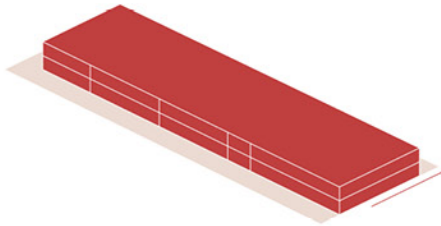
60 units
approx. 36 sqm
terrain:
R\$ 198304
construction:
R\$ 8095399



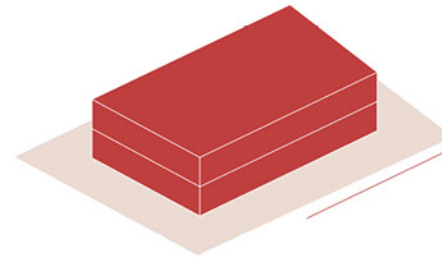
57 units
approx. 42 sqm
terrain:
R\$ 233221
construction:
R\$ 8798805



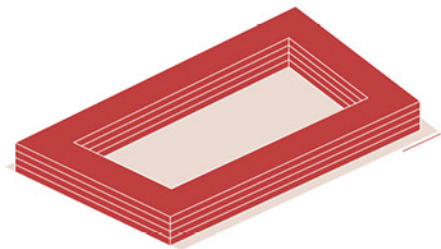
26 units
approx. 47 sqm
terrain:
R\$ 132096
construction:
R\$ 4482944



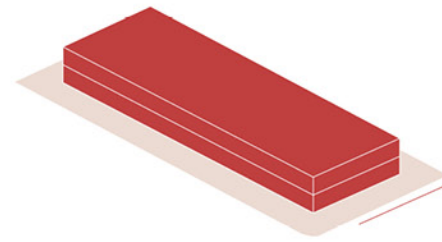
6 units
approx. 41 sqm
terrain:
R\$ 41830
construction:
R\$ 907448



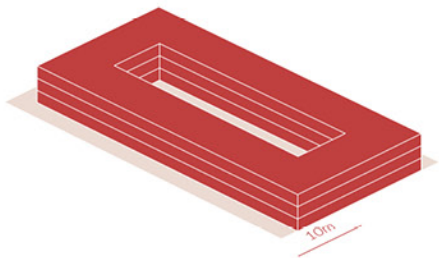
184 units
approx. 44 sqm
terrain:
R\$ 637266
construction:
R\$ 29073971



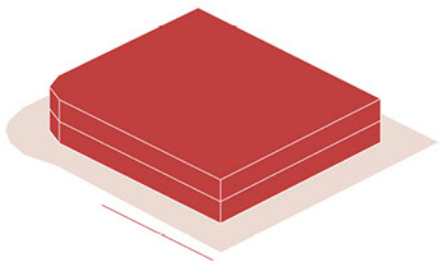
16 units
approx. 43 sqm
terrain:
R\$ 89531
construction:
R\$ 2520595



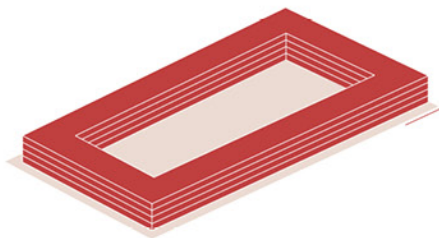
54 units
approx. 44 sqm
terrain:
R\$ 201463
construction:
R\$ 7982162



14 units
approx. 46 sqm
terrain:
R\$ 78064
construction:
R\$ 2360144



168 units
approx. 50 sqm
terrain:
R\$ 674092
construction:
R\$ 30600939



Planning Area: 05

Block: 02

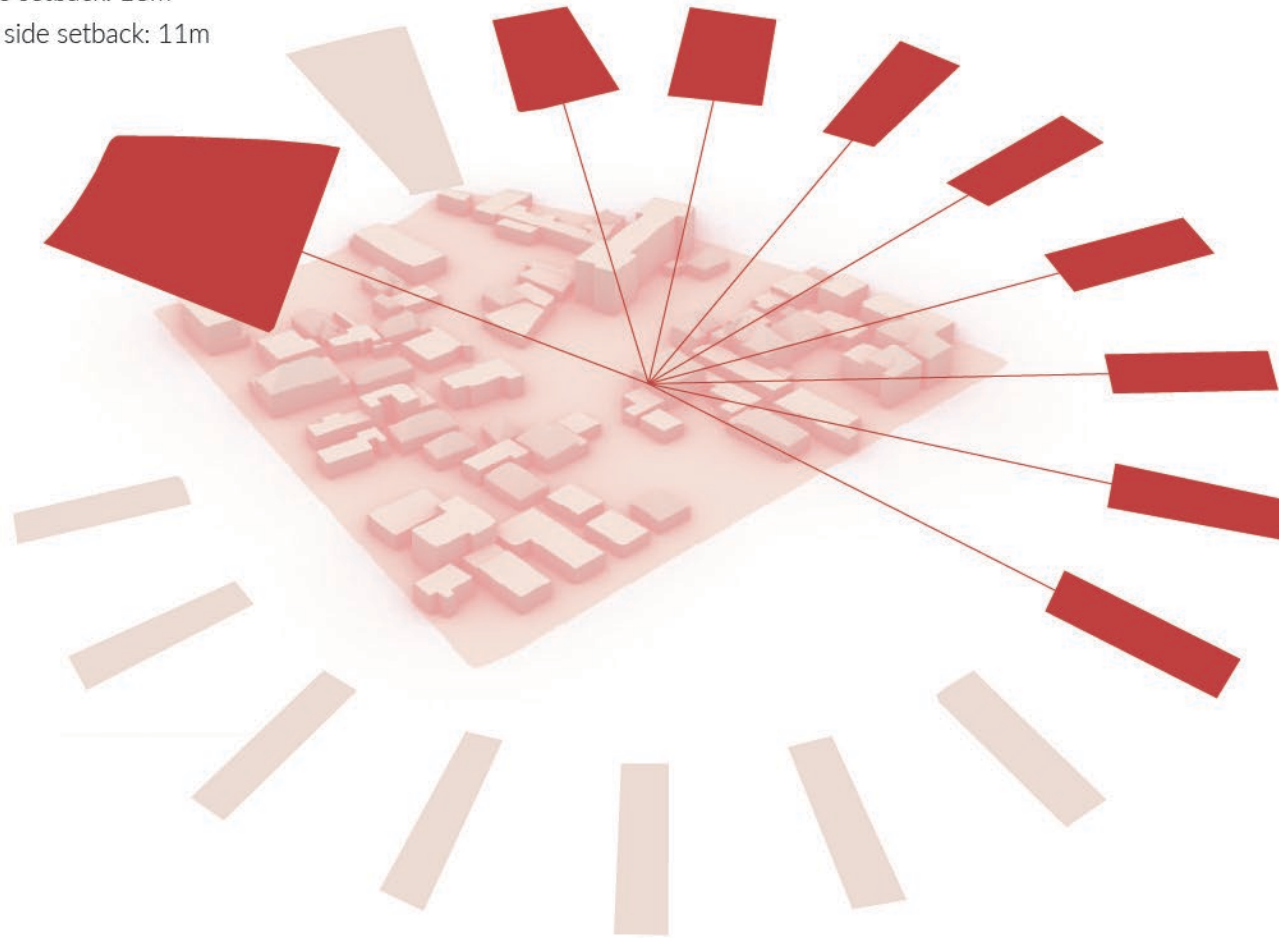
FAR: 2.5

BCR: 70%

street setback: 3m

height with side setback: 18m

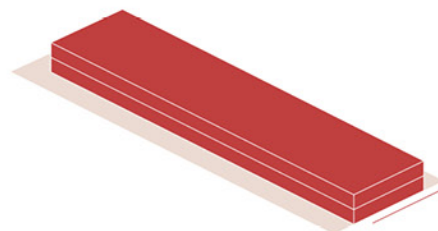
height without side setback: 11m



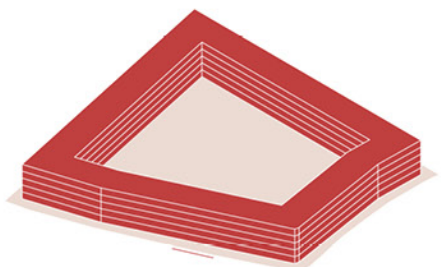
38 units
approx. 42 sqm
terrain:
R\$ 166021
construction:
R\$ 5917838



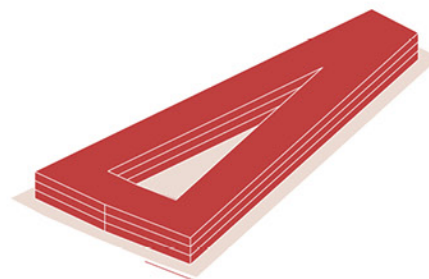
22 units
approx. 45 sqm
terrain:
R\$ 114051
construction:
R\$ 3629894



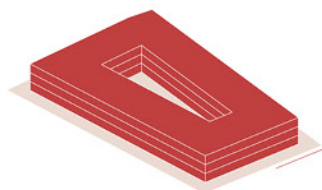
280 units
approx. 40 sqm
terrain:
R\$ 811063
construction:
R\$ 36310320



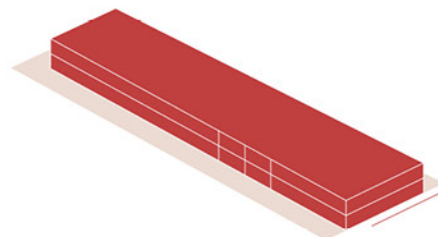
120 units
approx. 40 sqm
terrain:
R\$ 380134
construction:
R\$ 14954658



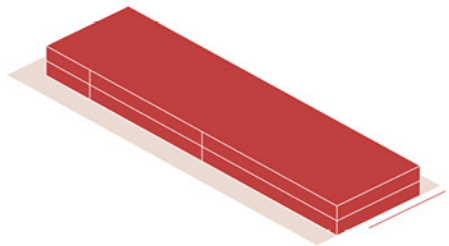
63 units
approx. 47 sqm
terrain:
R\$ 232451
construction:
R\$ 8852089



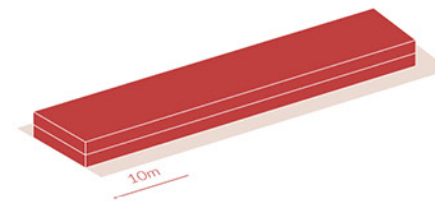
22 units
approx. 45 sqm
terrain:
R\$ 113931
construction:
R\$ 3634818



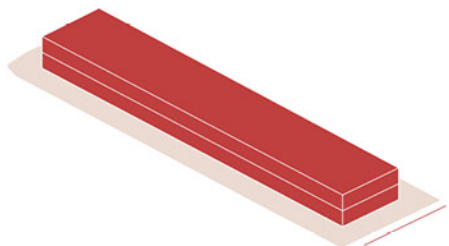
26 units
approx. 45 sqm
terrain:
R\$ 128246
construction:
R\$ 4323554



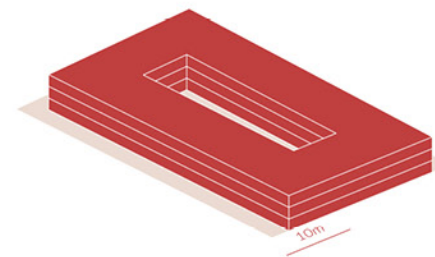
22 units
approx. 43 sqm
terrain:
R\$ 112886
construction:
R\$ 3488264



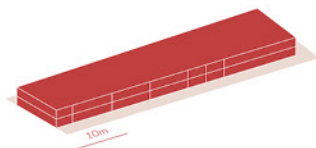
16 units
approx. 44 sqm
terrain:
R\$ 98327
construction:
R\$ 2618066



81 units
approx. 37 sqm
terrain:
R\$ 222421
construction:
R\$ 9017437



26 units
approx. 46 sqm
terrain:
R\$ 132524
construction:
R\$ 4370338



Planning Area: 05

Block: 03

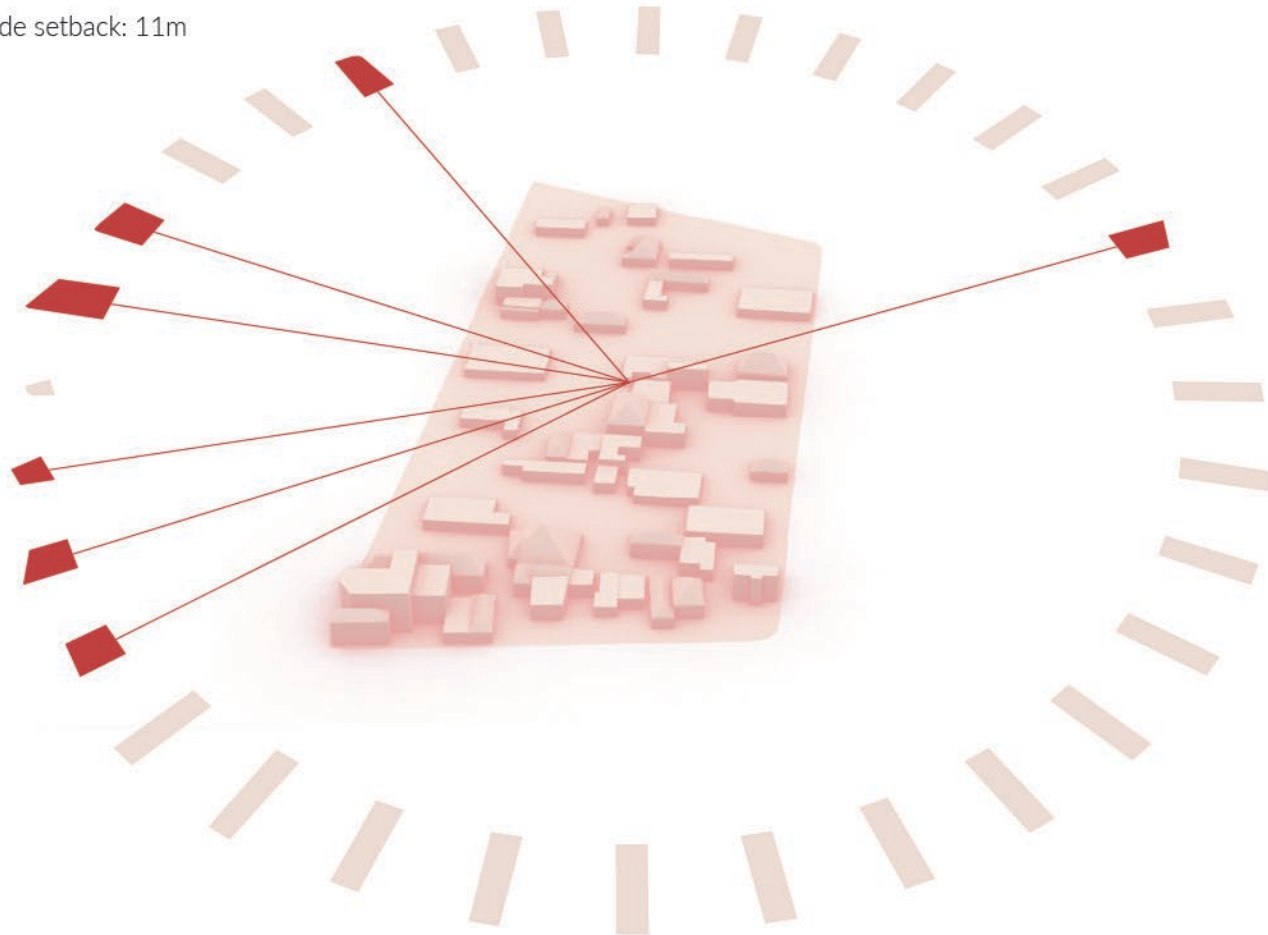
FAR: 1.5

BCR: 70%

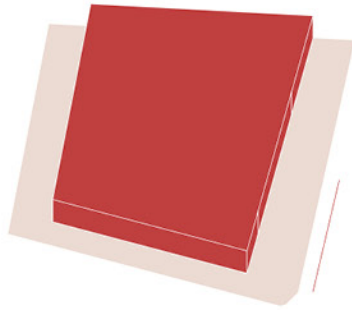
street setback: 3m

height with side setback: 18m

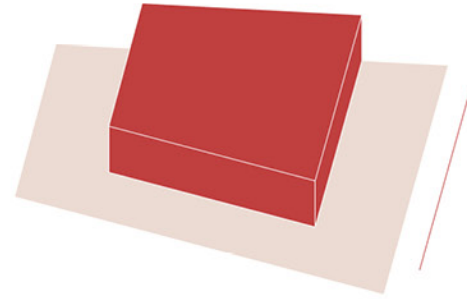
height without side setback: 11m



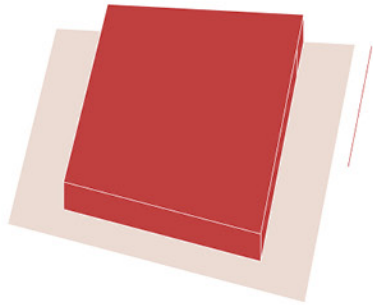
11 units
approx. 43 sqm
terrain:
R\$ 277871
construction:
R\$ 1754504



2 units
approx. 39 sqm
terrain:
R\$ 67457
construction:
R\$ 285043



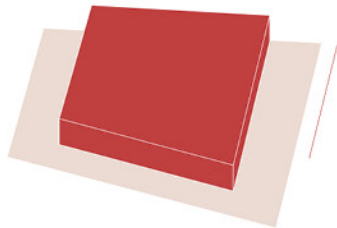
6 units
approx. 46 sqm
terrain:
R\$ 175969
construction:
R\$ 1013688



7 units
approx. 43 sqm
terrain:
R\$ 209993
construction:
R\$ 1115397



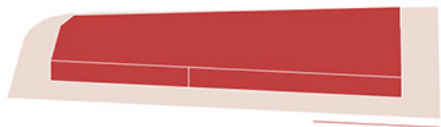
7 units
approx. 26 sqm
terrain:
R\$ 125770
construction:
R\$ 679537



4 units
approx. 49 sqm
terrain:
R\$ 128488
construction:
R\$ 723002



6 units
approx. 42 sqm
terrain:
R\$ 191363
construction:
R\$ 925606



SEEDLING

This chapter will be an evaluation of the new CPBU delineation, using the catalog of parcels to calculate potential new units and evaluate how construction costs would compare to the costs of Minha Casa Minha Vida (MCMV) developments.

The methodology to calculate the potential units within each AP was the following: the number of vacant houses⁶⁸ and abandoned establishments⁶⁹ was collected. The vacant houses value was multiplied by the percent of buildings within the ap with less than three floors⁷⁰ and then reduced to 10%. This was made to account for vacant apartments in buildings and seasonal migration, since the data collected doesn't specifically attribute if the homes are abandoned.

The information for abandoned establishments was fully considered since the criteria for abandonment is detailed.

These values were summed and multiplied by the percent of buildings within the delimited CPBU area versus the total of buildings within the AP.

That total was then multiplied by the ratio of usable parcels and finally by the average amount of units per parcel by AP.

The equation for the total of units per AP:

$$((VC \times BB \times 10\%) + AE) \times BC \times UU \times AU$$

VC= vacant houses

BB= percent of buildings below 10m versus the total amount of buildings within the AP

AE= abandoned establishments

BC= percent of buildings within CPBU areas versus the total amount of buildings within the AP

UU= ratio of usable parcels within each AP (considering the catalog of parcels)

AU= average amount of units that could be built in a parcel within each AP (considering the catalog of parcels)

⁶⁸ Souza.

⁶⁹ Souza.

⁷⁰ "Data Rio."

Using this calculation method, the number of units that could be produced by AP was the following:

AP1 – 5,496 units

AP2 – 66,279 units

AP3 – 41,899 units

AP4 – 7,204 units

AP5 – 12,353 units

That would total 133,231 units when the estimated housing deficit for Rio in 2019 was 220,000⁷¹ units.

From 2006 to 2016, 114,399⁷² units were built in the state of Rio de Janeiro through the Minha Casa Minha Vida program.

One of the imprecisions in this calculation is the unavailability of information on the parcels; a larger sample could radically change the ratio of usable parcels, for instance; and the inference of the number of abandoned houses, since the information available is on unoccupied dwellings. The value for the average amount of units is based on the volumes within the catalog of parcels. It doesn't consider the particularities that would

⁷¹ "Rio Recebe 75 Mil Unidades Habitacionais Na Última Década, Pouco Menos de Um Terço Do Déficit de 220 Mil - Jornal O Globo."

be accounted for in a specific design, which would significantly alter the number of units.

There are also a lot of setbacks when it comes to the current state of the parcels and their commercial values; lots in AP2, for instance, tend to be larger, having a higher percentage of usable parcels and average units, but the availability of terrains in that area is scarce, given the price. AP1 and AP3 have many preserved buildings that are not accounted, and could possibly not be redeveloped.

Even with these imprecisions, the study shows infilling, or redeveloping, with the use of CPBU is a relevant tool to implement social housing.

To calculate the price of the units, I had help from professor Luiz Henrique Costa Oscar from the Civil Engineering School at UFRJ.

The base for the cost calculation was the CUB⁷³ for social housing, which is the average construction cost per sqm in each state of Brazil. To make results more precise, the value for the structure was taken out of that

⁷² Moreira, "'MINHA CASA, MINHA VIDA' EM NÚMEROS:"

⁷³ "CUB/M² | CBIC."

average, and a new average was made with eighteen of the volumetric models from the catalog of parcels.

The new value also considers costs for the design and supplementary projects, for the developer, construction companies and costs for sale and managing operations.

Those costs are not contemplated within the CUB, but since they are costs within MCMV developments, they were also averaged for eighteen volumes and added to the sqm cost. The final price per sqm was R\$:3,690.

Without the value of the terrains, elevator, and other indirect costs, constructing within the urban areas of Rio de Janeiro is less expensive than most wage limits⁷⁴ of the Minha Casa Minha Vida program.

Units below 26sqm are feasible within the lowest limit financed by the program, which is approximately R\$:96,000⁷⁵. The recommended for Social Housing with two bedrooms is between 40sqm and 50sqm.

Using an insterscalar methodology proved to be very useful. The use of the three-dimensional volumes was essential to understand the limitations of the blocks

within the current urban morphology and the building capacity, estimate the costs, and think about implementation strategies. Other observations are related to the results by AP and to how strict these volumes become with the number of legal constraints.

More strategies have to be considered to render this operation viable for lower incomes, and to allow for urban diversity. These could include having private partnerships and social rents. Brazilian laws don't currently allow mixed-financed and mixed-use developments to occupy the same volume in social housing, which could be defied.

Mixing multiple incomes could not only be beneficial for the neighborhoods⁷⁶ and morphologically, but it could finance other building possibilities. One pair of elevators with eight stops, for instance, costs about R\$195,000⁷⁷, a sum that could easily be embedded in commercial units or market price units. That same login could be applied for social rents versus market price rents being mixed as an enterprise.

⁷⁴ "Programa Minha Casa, Minha Vida (MCMV)."

⁷⁵ Redação, "Quais são as faixas do Minha Casa Minha Vida em 2020?"

⁷⁶ Talen, *Design for Diversity*.

⁷⁷ "CUB/M² | CBIC."

It's also important to have in mind that many Brazilians are not even capable of affording the lowest categories of the MCMV program, so splitting costs with the private initiative could be a way to make those units viable.

I should also highlight that there are other resources from the Federal Government that are supposed to be directly used to subsidize social housing in each of the Brazilian states. In the case of Rio it is estimated that in 2019 only 10% of that money was employed for that purpose⁷⁸.

Regardless of how revolutionary the legislation, nothing will happen if there is no political will to apply it and if the citizens don't have the knowledge about it. I hope that this work is a clear example of the potential CPBU has to leverage social housing in Rio de Janeiro.

⁷⁸ Redator, "A política habitacional no Rio de Janeiro e o desmonte do Fundo Estadual de Habitação de Interesse Social."

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