social housing complex

in
sol
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social housing complex
in the favela of
Sol Nascente
in Brasília - Brazil

final thesis

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ABSTRACT

Sol Nascente Sector is a slum near Brasília, the capital city of Brazil, that has recently become an urban issue for its fast-rising population and lack of basic infrastructure, making it the biggest *favela* in Latin America.

For this reason, there is an urge for regulation and investments in urban infrastructure and social housing, due to the dwelling deficit present in Brasília and its metropolitan region.

Through its Agency for Social Housing and Urban Development (CODHAB), the Government of Brasília has recently started to promote Architecture Competitions as a way of bringing well-designed architecture to the poorest regions around the city.

This thesis is a response to an open call for an architectural competition launched in 2016 in order to build a social housing complex in Sector Sol Nascente, considering the historical context and the demographic situation of the region.

Keywords: Social Housing; Sol Nascente; Brasília; slum; architecture competition.

R I A S S U N T O

Sol Nascente è un quartiere povero vicino a Brasilia, capitale del Brasile, che negli ultimi anni è diventato una questione urbana molto discussa a causa della sua popolazione crescente e della mancanza di infrastrutture fondamentali, tanto da renderla la favela più grande di tutta l'America Latina. Per queste ragioni c'è una necessità urgente di regolamentazione e di investimenti in infrastrutture urbane e abitazioni sociali, per far fronte al deficit abitativo di Brasilia e della sua zona metropolitana.

Tramite l'Agenzia per l'Abitazione Sociale e per lo Sviluppo Urbano (CODHAB) il governo di Brasilia ha iniziato a promuovere dei concorsi di architettura con l'obiettivo di portare progetti di qualità alle regioni più povere della città.

Questa tesi è la risposta ad un bando di partecipazione per una competizione di architettura del 2016 per costruire un complesso di abitazione sociale nel Settore Sol Nascente, che considera il contesto storico e demografico e la situazione urbana fragile della regione.

Parole chiavi: Abitazione sociale; Sol Nascente; Brasília; favela; competizione di architettura

R E S UMO

Sol Nascente é um bairro pobre perto de Brasília, capital do Brasil, que recentemente se tornou um problema urbano devido à sua população crescente e à falta de infraestrutura urbana básica, se tornando a maior favela da América Latina.

Por estas razões existe uma necessidade urgente de regulamentação e de investimento em infraestrutura urbana e habitação social, pelo déficit habitacional existente em Brasília e na sua região metropolitana.

Através da Companhia Habitacional do Distrito Federal (CODHAB) o Governo de Brasília começou a promover concursos de arquitetura com o objetivo de levar arquitetura de qualidade às regiões mais pobres da cidade.

Esta tese è uma resposta ao edital de participação de um Concurso de Arquitetura de 2016 com o objetivo de construir um complexo de habitação social no Setor Habitacional Sol Nascente, considerando o contexto histórico e demográfico e a situação urbana frágil da região.

Palavras-chave: Habitação Social; Sol Nascente; Brasília; favela; concurso de arquitetura.

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Dwelling deficit and poor life conditions are well known characteristics of a *favela¹*. Near Brasília, the capital city of Brazil, two such urban settlements have recently drawn the attention of the authorities and the Brazilian Government due to their miserable conditions: Por do Sol and Sol Nascente Sectors.

In 2016, the Government of Distrito Federal, the administrative region in which is located Brasília, launched an open-call for an architecture competition purposing the construction of a social housing complex in Sol Nascente Sector, in order to produce quality housing for the lower classes of the *Brasiliense* population.

This thesis aims to conceive an architectural project following the guidelines of this architecture competition, considering the historic, geopolitical and demographical situation of Sector Sol Nascente, according to the *PDAD* – a census research realized by CODEPLAN² and financed by the Government of Distrito Federal.

Six social housing projects of different dimensions, scale and context will be taken as

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1   Portuguese word for Slum. UN-HABITAT defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following:
1. Durable housing of a permanent nature that protects against extreme climate conditions.
2. Sufficient living space which means not more than three people sharing the same room.
3. Easy access to safe water in sufficient amounts at an affordable price.
4. Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people.
5. Security of tenure that prevents forced evictions.
2   *Companhia de Planejamento do Distrito Federal*

case studies to be analysed following an epistemological approach by applying the complexity theory to the development of sustainable buildings, which considers its components based on the EU building directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 (dimensions, shape, floor number, access and circulation, structure, environmental control systems and water treatment), as well as the social, environmental and economic impacts and results of each of those project's characteristics, as a method to visualize and highlight the complexity of each case study. Also, a conceptual analysis will be added, from which key concepts of each case study will be taken into account in the formulation of the architecture project, which is the objective of this thesis.

Furthermore, the developed project will be submitted to the same analysis used with the case studies, in order to compare and attest its complexity and its social, environmental and economic impacts.

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THE THREE CAPITALS OF BRAZIL

Throughout its whole existence as a country, Brazil has had three different capital cities. Few years after the first Portuguese expeditions arrived in South America, Salvador, the first capital, was founded as a way to keep the economical production of the colony under control and remained as the government seat for around two hundred years.

In 1763, due to a progressive change in the economic exploitation of the Brazilian land, the capital was moved to Rio de Janeiro, the biggest city of the colony at that time, which was also closer to the gold mines recently discovered in the South East (BICALHO, p. 1).

In spite of the recent change of the location of the government, in the late 1800s there was already the will of moving the government to

image 02: The City of St. Salvador and its Harbour (John Harris, 1744) (from: http://www.bahia-turismo.com/salvador/seculo-18.htm)

the centre of the country for strategical reasons: being a coastal city, Rio de Janeiro was more vulnerable to maritime attacks from enemies, and, also, the Brazilian countryside was very poorly inhabited, which made it susceptible to invasions from the Spanish colonies in South America.

During the following centuries, the idea of transferring the capital to the countryside started growing on the crown's mind, through the propaganda made by a part of the nobility, until in 1852 the Senate proclaimed a law that provided the change of the capital to an area still to be chosen.

Later on, in 1892, time in which Brazil was already a Republic, the current President manifested his interest in transferring the capital, starting a mission that would involve many different professionals, expeditions and high investments from the country until finally, 65 years later, would culminate in the works for building the new city of Brasília.

THE CONSTRUCTION OF BRASÍLIA

Running for president in 1954, Juscelino Kubitschek successfully used the slogan *"50 anos em 5"*[1] as his main political promise to the Brazilian people, proposing the construction of the new capital and thus the development and urbanization of the centre of Brazil. Taking advantage of the prosperous economic situation of the country, the president started, in 1957, to effectively build the new centre of power of the Brazilian Government.

Through an open call for an architecture competition, the proposal of the Brazilian architect and urban planner Lucio Costa was chosen amongst 26 other proposals, for "having the spirit of the 20th century: it's new; it's free and open; it has discipline but it's not rigid"[2] and for being "the only plan for an administrative capital for Brazil"[3] (COSTA, 1991, p. 35.).

Being described by the jury as a brief project, that "omits everything that has no purpose"[4] (ibid., p. 35), and differently from the other projects presented to the competition, Costa stuck to designing only the masterplan, a plane-shaped city, which was clearly divided in

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1   50 years in 5.
2   *"Tem o espírito do século XX: é novo; é livre e aberto; é disciplinado sem ser rígido".*
3   *"O único plano para uma capital administrativa do Brasil".*
4   *"[…] omite tudo que é sem propósito".*

residential, commercial, civic and leisure zones. Also, any architecture drawing was included in the project.

For that matter, Oscar Niemeyer, who was head chief of the architecture department for the new capital and later would be known as one of the greatest Brazilian architects, joined the designing team, being responsible for designing most of Brasília's monuments, which included the government palaces, the parliament, the ecumenical cathedral, museums, the university, among others – all of those heavily influenced by the modernist thought of Le Corbusier.

In order to build the city, though, a huge amount of manpower was needed, and there was none around the capital – as it was located in a very lightly inhabited area. Thus, during the late 50s there was a massive flow of emigration towards Brasília from almost every part of the

country, partially financed by the government, but also spontaneously. As said Vasconcelos (1988, p. 55), he attraction Brasília evoked in the whole country, mainly in the decade of 1960, made thousands of families migrate to the lands of the new Brazilian capital seeking better life conditions.[5]

To the people who moved to Brasília in its early years, the President Juscelino Kubitschek gave the name *"Candango"*, a word in North Mbundu used by the African slaves to refer to the Portuguese colonizers, that had its meaning changed in the 20th century as a way not to call them workers and give them some prestige for building the new capital. (CANDANGO, n. d.)

This contingent of people arriving in Brasília needed a place to live. Consequently, small occupation cores started to appear around the construction sites, which very poorly sheltered the *Candangos*, who started organizing themselves to living in ephemeral houses built mainly in wood. Such occupation cores were indeed considered in the masterplan of Brasília, but not meant to exist contemporarily to the construction of the city. Instead, Brasília should first reach 500,000 inhabitants before the creation of the satellite cities (DISTRITO FEDERAL, 2009, p. 28).

image 04: building of the Brazilian Parliament. author: Marcel Gautherot. (from: https://ims.com.br/exposicao/marcel-gautherot-bresil-tradition-invention/)

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5   *"A atração que Brasília despertava em todo o País, principalmente na década de 60, fez migrar, para as terras da nova Capital brasileira, levas e mais levas de famílias, em busca de melhores condições de vida.*

According to Cavalcante (2009, p. 53), the zoning of the Corbusian urban model – in which Costas' design for Brasília was inspired – is based on the distribution of the working areas between the urban business centre, the civic centre and the industrial complexes, those last installed in garden cities, positioned as satellites to the main urban core. The residential areas distinguish themselves by the social classes that occupy them: the higher and medium classes occupy the areas closest to the business and civic centres, while the working classes settle farther away, along the industrial complexes.

Initially, the rising of those occupation cores in irregular areas around Brasília received a condescending treatment by the authorities, for sheltering a huge number of workers that were needed for quickly bringing Plano Piloto to light (DERNTL, 2018) and also conveniently keeping away the poorest from the city centre. According to Costa (1974, p. 26), "[…] as a consequence, those cores transformed themselves in real cities, so called satellite-cities, that took the place of the *Cidades-Satélites […]*"[6] foreseen in the original project for Brasília.

image 05: building of the dome of the Brazilian Parliament. author: Marcel Gautherot. (from: https://www.archdaily.com.br/br/01-81125/brasilia-em-construcao-por-marcel-gautherot)

image 06 (next page): construction site of the Federal Ministries, in the Esplanada dos Ministérios. (from: http://especiais.g1.globo.com/distrito-federal/2018/operarios-concretados-nos-predios-de-brasilia-mito-ou-verdade/data/construcao-de-brasilia-4_src.jpg)

6   *[…] Como consequência, os núcleos se transformaram em verdadeiras cidades, as chamadas cidades-satélites, que tomaram o lugar das Cidades-Satélites que deveriam ocorrer.*

CEILÂNDIA – THE COMMISSION FOR ERADICATION OF INVASIONS

One of those satellite-cities, called Vila IAPI, located around 15 km away from Brasília, was at the beginning promoted by the government as an option for the Candangos that did not see any dwelling solution other than invading. The given plots, though, should be "[…] gradually impaired, not conducing there any improvement and impeding any new invasion methods, so as to the people's own concern would bring them to move away, step by step, to the city or to the peripherical (structured) satellite-cities." (COSTA, apud DERNTL, 2018)[7].

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7   "[…] a área ocupada a título precário deverá ser gradualmente sangrada, não se fazendo ali benfeitoria alguma e impedindo-se qualquer modalidade de nova 'invasão', para que o próprio interesse leve a população a se transferir, pouco a pouco, para o corpo da cidade ou para os núcleo-satélites periféricos."

image 07: street spacing on Vila IAPI (1971). author: Aldo Paviani

The amount of people residing in Vila
IAPI rose rapidly, forming a real urban complex,
known as the biggest *favela* in the Federal Capi-
tal in that time. From this moment on, Vila IAPI
became a problem for the Government, that in
1969 conducted an evacuation plan for an area
even more distant from the city centre, the new
satellite city Ceilândia, whose name derives of
the acronym C.E.I., which stands for Invasion
Eradication Comission[8], and the suffix *lândia*,
the Portuguese word for land.

According to Oliveira (2007, p. 65),
"Vila IAPI presented appropriated character-
istics for social and community life. Its urban
design provided meetings and contact between
the dwellers. The disposition and spacing of the
shacks followed an egalitarian logic, the area was
generously provided with urban afforestation
and shading, even resembling the bucolic atmos-

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8   *Comissão de Erradicação de Invasões*

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phere of the modern garden cities. Besides, of course, the proximity to other satellite-cities, as well as the city center."[9]

In spite of all those qualities, the Government of Distrito Federal chose to keep on with the removal of Vila IAPI claiming the proximity of the city to nearby streams, and the risk of pollution of the Paranoá Lake and its hydrographic basin.

In 1971 the Commission for Eradication of Invasions – CEI – then took action rapidly, by choosing a region immediately outside the Paranoá Basin, in the former farm of Guariroba, northern of Taguatinga, an already established Satellite-City of Brasília (ADMINISTRAÇÃO REGIONAL DE CEILÂNDIA, n. d.), in order to reallocate the people of the former Vila IAPI. Through the mediation of community leaders, such as schools, churches and other institutions assisted by social services, the Government started to promote the future city to the dwellers, promising a new settlement with water, light and sewerage systems. Getting there, though, the residents found only "the screws marking [the plots of] 25 x 10 m²" (OLIVEIRA, p. 69), with no further infrastructure, finding themselves

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9   "A Vila IAPI apresentava características apropriadas para uma vida social comunitária. O seu traçado proporcionava aos moradores o encontro e o contato. A disposição e espaçamento dos barracos seguiam uma lógica igualitária, a área era generosa em arborização e sombreamento, apresentando certa bucolidade das cidades-jardins modernas. [...] Além, é claro, da localização próxima, em contato viário direto com o Núcleo Bandeirante, o Guará, Candangolândia e com o Plano Piloto"

Later on, the own Government recognized that this policy of eradication had a very negative effect on the dwellers, either socially, environmentally or spatially. "The 'invasions' made sense for the local families. Leaving a local where one has lived for many years is tough, but the idea of having their own land was stronger. […] To wake up in a place where there were no trees, to raise a shack where there was neither a faucet nor a cistern; to relate to the new unknown neighbours; those were really super-human activities." [10] (GDF, 1986, pp. 9-11).

[10]   *"As 'invasões' tinham sentido para as famílias faveladas. Deixar um local onde viveu por vários anos foi difícil, mas a ideia do lote próprio falou mais alto". [...] Amanhecer em um local onde não existia uma única árvore, erguer um barraco onde não havia uma única torneira d'água e nem cisterna; relacionar-se com vizinhos até certo ponto estranhos, realmente eram atitudes sobre-humanas."

Even though there were many problems for the population submitted to it, the CEI program continued to remove the dwellers of the invasions and install them in the new city of Ceilândia during the decade of 1970. Between 1970 and 1976, around "118,453 dwellers of invasions in Plano Piloto were eradicated" (GOUVÊA apud OLIVEIRA, p. 72) and reallocated in Ceilândia.

In 1975, the decree law #2,943 of the Government of Distrito Federal created the Administration of Ceilândia, bounded to the Administration of Taguatinga. On October 25th, 1989, the law #11,921 gave Ceilândia the status of its own administrative region, called RA-IX[11]. (ADMINISTRAÇÃO REGIONAL DE CEILÂNDIA, n. d.)

image 11: City Centre of Ceilândia in 1970. (from: http://www.cronologiadourbanismo.ufba.br/apresentacao.php?idVerbete=1625)

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11   *Região Administrativa IX – Ceilândia.*

THE EMERGENCE OF SECTOR SOL NASCENTE

Along the years, even after the burst of growth after the construction of Brasília and the reallocation of the invasions spread over the Region of Distrito Federal to the city of Ceilândia, the habitational deficit did not cease to exist. During the 1990's, due to a high demand for housing for the poorest, some properties meant to be used as farms located southeast of the Administrative Region of Ceilândia started to get fractioned by its landowners and sold to people in need. (ROCHA, 2014, pp. 32-33)

In the 2000's, a number of horse cart-drivers[12] that wandered around the city of Ceilândia decided to team up and buy one of those properties, divided it and created themselves one condominium, participating in the process of land grabbing. (ibid, p. 34). After perceiving the rentability of this act, those wagoners kept on buying and dividing the properties in smaller plots in order to sell them to the poorest and started creating what later would be called Sector Sol Nascente – having its borders expanding over environmental protection areas, rough reliefs and urban and rural zones of different interests[13] (CODEPLAN, 2013). Those areas were originally meant to be green belts around

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12   So called "*carroceiros*", people who drive horse-powered vehicles to work by gathering garbage or transport goods, usually in the poor suburban regions of big cities.
13   *Zonas Urbanas de Dinamização e Zonas Rurais de Uso Diversificado*

image 13: dwellers from Sector Sol Nascente and their home. (from: ibid)

the Administrative Region of Ceilândia, functioning as regional supply areas for horticultural goods (SEDUMA: ZEEDF, 2007, p. 14).

In 2008, the Government of Distrito Federal has recognized Sector Sol Nascente and included it in its Regimentation Area for Social Interest[14], through the District law #785 of November 14th, 2008. Immediately after that the urban zoning and design for Sector Sol Nascente was published by the State Secretary for Management of Territory and Habitation[15], in which the limits of the city were well described taking account the environmental protection areas around the occupation.

Nowadays there are many conflicting information about the dwelling population of Sector Sol Nascente. The census research conducted by the Brazilian Institute for Geography and Statistics – IBGE[16] in 2010 says there were around 56,483 inhabitants. On the other hand, the research conducted by CODEPLAN as asked by the Government of Distrito Federal shows a number of 78,912 inhabitants (CODEPLAN, 2013). Still, as said by the Secretary for Public Safety of Distrito Federal in 2014, there could be as many as 130,000 inhabitants in Sector Sol Nascente, being possibly the most populous *favela* of Latin America. (ROCHA, 2014, p. 34)

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14   *Área de Regulamentação e Interesse Social (ARIS).*
15   *Secretaria de Estado de Gestão do Território e Habitação*
16   *Instituto Brasileiro de Geografia e Estatística*

Given the irregular occupation of Sector Sol Nascente, the Government of Distrito Federal began a process of inspection through the responsible autarchy, AGEFIS[17], that started to give notice to the dwellers and threatened to bulldoze the irregular shacks. However, populist politicians took advantage of that situation, by intervening and stopping the Government's actions, as an attempt to collect votes for their future re-elections. (ROCHA, 2014, pp. 35-36).

Between all the problems that the dwellers of Sector Sol Nascente face, there are the lack of water and electricity supply – that come to the most houses through illegal connections to the public network, usually located

image 14: people with defficiencies find several difficulties in moving around Sector Sol Nascente (from: https://www.metropoles.com/distrito-federal/sol-nascente-uma-comunidade-ainda-longe-de-ser-vitrine-no-df)

_____

17   *Agência de Fiscalização do Distrito Federal*

far away from the housing unities –, the lack of sewerage and waste services, present in only 25% of the plots (CODEPLAN, 2013), and the very high indexes of criminality, present in the Administrative Region of Ceilândia for decades and expanded to the area occupied by Sector Sol Nascente. Over the walls around the city it's possible to notice the presence of criminal factions, that started acting on the drug market, robbery and homicides, and most recently specialized themselves in land grabbing, by understanding that it is a more rentable crime, and its penalty is sensibly milder than that for traffic (MARIZ, 2018).

As a direct consequence of this fact, Sector Sol Nascente keeps expanding even though the limits of the city have been defined by the Government of Distrito Federal in 2008, lacking infrastructure and quality of life for its inhabitants, perpetuating the *favela* condition in which Sector Sol Nascente is still found.

image 15: dwellers walking over unpaved streets in Sector Sol Nascente. (from: ibid)

SOCIAL DIAGNOSIS

41 to 60 sqm
39,79%

91 to 150 sqm
12,97%

occupied residences
according to built area

< 40 sqm
15,95%

61 to 91 sqm
30,21%

> 151 sqm
1,08%

artesian well
1,41%

occupied residences
according water supply

public network
98,58%

two
47,19%

occupied residences
according to bedroom
number

one
21,51%

three
31,30%

septic tank
51,46%

occupied residences
according to sewerage

public network
6,10%

cesspool
42,44%

thrown away improperly
13,58%

occupied residences
according to waste
services

public waste collection
55,85%

other destinations
30,37%

rented
15,22%

occupied residences
according to property
conditions

owned in non regular plots
79,94%

lent
4,83%

Through the analysis of the document *PDAD – Pesquisa Distrital por Análise de Domicílios*, a research realized by the Government of Distrito Federal, it is possible to understand the demographic situation of the Housing Sectors Pôr do Sol and Sol Nascente, being the last one the area in which this thesis will be developed.

The information provided by this census was divided in several categories, from which five were taken into account for realizing this social diagnosis, considering the consulted household's building characteristics, disponibility of urban infrastructure, ethnicity, education, labor and income. Furthermore, the collected information was converted into graphics that materialize the social situation of the selected area.

HOUSING CHARACTERISTICS

Considering that the whole housing sector was spontaneously constructed by the dwellers without permission of the government, none of the properties belong truly to the people. Almost 80% of the homeowners have a deed of sale for their plot, while 15% rent their houses and 5% occupy ceded households.

Mostly, the built houses are medium-sized - around 70% of tham range from 41 to 91 sqm. There are really few houses that present more that 151 or less than 20 sqm. Also the major part of the houses has two bedrooms, followed by those with three, and a smaller quantity has only one bedroom.

population according to frequency of use of parks and gardens

never
87,32%

sometimes
3,07%

frequently
1,39%

seldom
8,22%

population according to age

7~9
6,16%

15~18
9,06%

25~39
27,67%

60 or more
4,80%

0~6
12,33%

10~14
11,38%

19~24
8,93%

40~59
19,67%
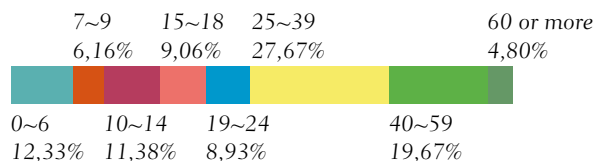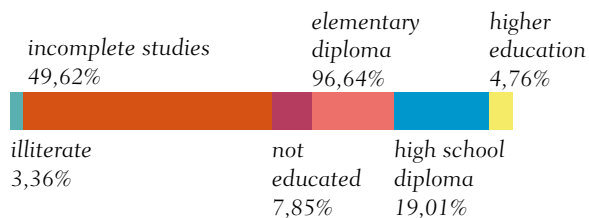
population according to education

incomplete studies
49,62%

elementary diploma
96,64%

higher education
4,76%

illiterate
3,36%

not educated
7,85%

high school diploma
19,01%
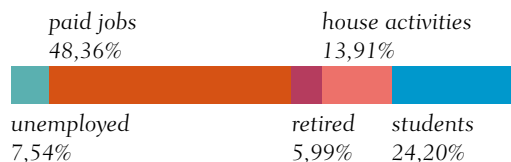
population according to labor activities

paid jobs
48,36%

house activities
13,91%

unemployed
7,54%

retired
5,99%

students
24,20%

population according to ethnicity

afro-brazilian
5,04%

white-brazilian
34,03%

pardo-brazilian (mixed ethnic)
60,93%
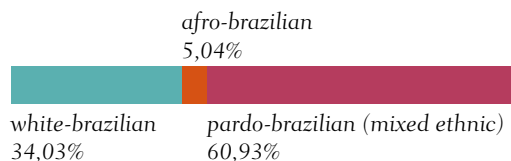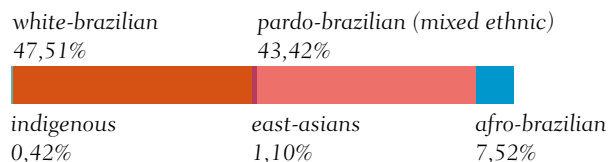
brazilian population according to ethnicity

white-brazilian
47,51%

pardo-brazilian (mixed ethnic)
43,42%

indigenous
0,42%

east-asians
1,10%

afro-brazilian
7,52%

HOUSING INFRASTRUCTURE

Most of the households have access to the public network of water supply, though there are still around 300 unities that obtain water from artesian wells or other precarious forms.

Only 6% of the households in Sol Nascente Sector have access to the public network of sewerage. 51% of the houses use septic tanks and 42% use cesspools as their sewerage system. There is also a small but concerning number of houses that leave their sewerage on the street.

According to the research's graphics it's clear that Sol Nascente Sector lacks basic urban infrastructure. Only 9% of the houses are connected to asphalted streets, while 6% of them have sidewalks, and 7% have curbs. Also the allarming rate of 3% of the houses have access to the rainwater network. 91% of the houses have street illumination around.

Regarding the public areas, almost none of the households benefit from quality public spaces in its surroundings. Only 5% of the people declare that there are wooded streets around their homes, while less than 1% of them claims that there are gardens, parks, environmental protection areas, rivers, bike paths or cultural centers whatsoever.

URBAN POPULATION

The population of Por do Sol and Sol

not present
8,72%

present
91,28%

occupied residences according to public illumination

not present
94,49%

present
5,51%
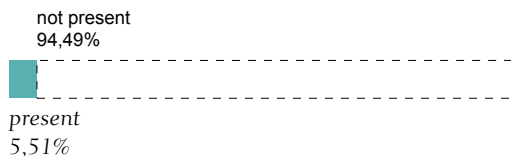
occupied residences according to sidewalks

not present
93,48%

present
6,52%

occupied residences according to curbs

not present
90,72%

present
9,28%

occupied residences according to asphalt

not present
96,64%

present
3,36%

occupied residences according to rainwater network

PPI
Sol Nascente
R$ 468,82%

PPI
Distrito Federal
R$ 1.489,57

PPI
Plano Piloto
(City Center)
R$ 4.451,87

per capita income

MINIMUM WAGE (2013)
R$ 678,00

between 1 and 2
minimum wages
32,18%

more than
5 minimum wages
9,08%
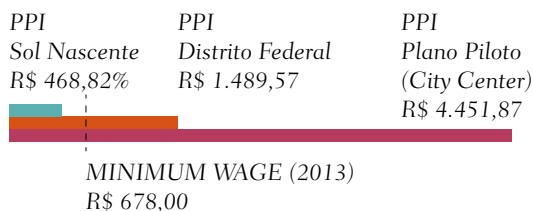
occupied households according to salary range

up to 1
minimum wage
9,98%

between 2 and 5
minimum wages
42,03%

Nascente sectors is rather young. 67% of the dwellers are in the said working-class ages, between 15 and 64 years. The low percentage of people in the third-age (60 years or more) evidences the rather short lifespan of the citizens, if compared to other regions of Distrito Federal.

The greatest part of the population Is self-declared as Pardo-Brazilian (60%), followed by White-Brazilians (34,03), Afro-Brazilians (5,04) with a small parcel of East-Asians (0,32%). There were no people who self declared indigenous.

EDUCATION

The absolute majority of the student population of Sectors Por do Sol and Sol Nascente goes to school or university in their own Administrative Region, RA IX – Ceilândia. A much smaller amount of students goes to school in RA III – Taguatinga, the adjacent Administrative Region. The other 3,41% of the students are divided in many other Administrative Regions, being the most significant RA I – Brasília.

LABOR AND INCOME

Comparing the per capita income of Sectors Por do Sol and Sol Nascente with the whole Distrito Federal, one observes that the income of the whole region is more than three times higher. Considering the per capita income of Plano Piloto, which comprehends the cen-

tral areas of Brasília, the area with the highest commercial and services facilities, this value is almost ten times higher.

The working population from Sectors Por do Sol and Sol Nascente is concentrated in the western part of Distrito Federal. 41% of the people work in their own Administrative Region, RA IX – Ceilândia. Right after, around 20% of the people have to travel everyday to RA I – Brasília; around 10% work in RA III – Taguatinga, and the other 30% are evenly distributed in the other Administrative Regions.

The majority of the households in sectors Por do Sol and Sol Nascente has a salary range that goes from two to five times the minimum wage (42%), followed close by households with a salary range from one to two minimum wages. Higher incomes, starting from five times the minimum wage represent only 9,08% of the households.

Even tough the majority of the population in Sectors Por do Sol e Sol Nascente lives with very low monthly incomes, only about 20% of the population is aided by social benefits provided by the government.

CONCLUSION

Housing Sectors Por do Sol and Sol Nascente are two of the poorest neighbourhoods from Brasília. According to the analysis by the Government of Brasília, there are some critical indicators of poverty and poor health conditions

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that should be concerned.

Urban infrastructure is a serious issue for the dwellers of Sectors Por do Sol and Sol Nascente. Water supply and electricity services are almost fulfilled by the general public network. On the other hand, more than one third of the households use cesspools, which is a latent risk to public health. Around 10% of the houses don't have public illumination, while more than 90% don't have asphalted streets, sidewalks nor curbs in their surroundings.

The lack of good quality public spaces might explain their own low frequency of use reported by the dwellers of the Sector. At the same time people say they don't usually go to parks, gardens, theatres and cinemas, it's also known that practically none of the households is located near any of those facilities.

case stu- dies

P E D R E G U L H O

The social housing complex Prefeito Mendes de Moraes, also known as Pedregulho, was designed by Brazilian architect Affonso Eduardo Reidy, in 1947, in order to shelter workers of the government of the state of Rio de Janeiro, in Brazil, under great influence from Le Corbusier's aesthetics and principles, such as functional concerns strictly related to formal solutions, controlling of lighting and ventilation and ease of circulation; but also influenced by Oscar Niemeyer's work and language used in his works in Belo Horizonte, such as the resumption of arches and vaults, curved lines and wavy design.

In the masterplan, each one of the buildings is strongly characterized by its own form: the parallelepiped ones, are the residential blocks; the trapezoidal buildings are destined as public equipment, such as schools, laundry and stores; the vaults are the sporting courts. The intention of keeping the great view of the city of Rio de Janeiro to every apartment makes the architect design a long, wavy building over pilotis, that follows the curves of the terrain and avoids the natural slope by using footbridges and becomes the key-building of the whole complex.

image 16: main access to the building on the third floor over pilotis: view over the landscape is preserved and public. (from: http://www.hiddenarchitecture.net/2018/02/pedregulho-housing-development.html)

CONCEPTUAL ANALYSIS

Retrieving the concept of neighbour-hood unit, firstly written by Clarence Perry and well exploited in Brazil by Lucio Costa in the *Superquadras* of Brasília, Reidy puts together many urban facilities designed exclusively for the dwellers of the complex, such as small stores, laundries, sports courts and a school, thus all of those are in walking distance for every inhabitant of *Pedregulho*.

By precisely following the contour lines of the terrain, the main building shows great respect for the environment around the project. Also, the very low density, being built only about 17% of the plot area, fills this housing complex with green areas, making it possible for the dwellers to live in an open place inside a very dense city.

INNOVATION AND SUSTAINABILITY ANALYSIS
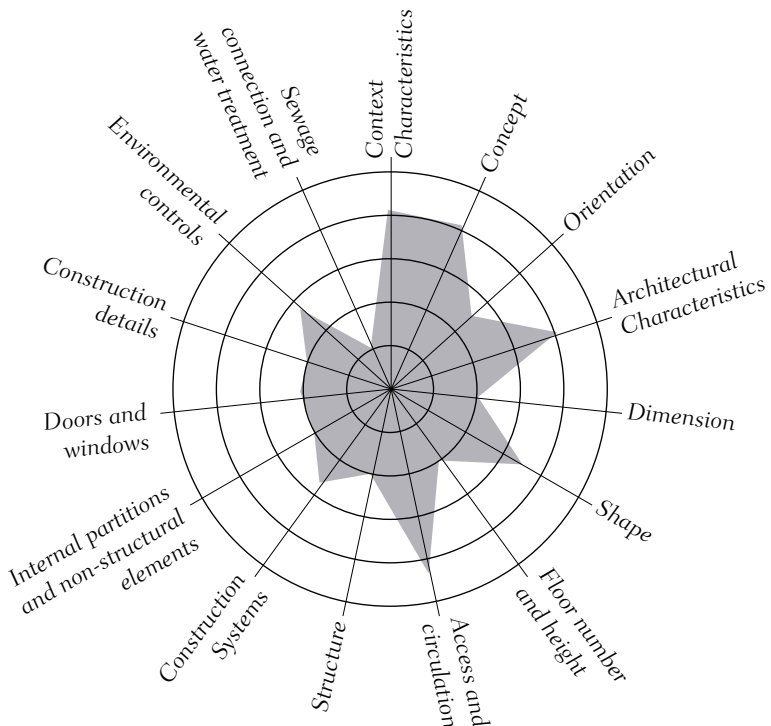
innovation

By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic abo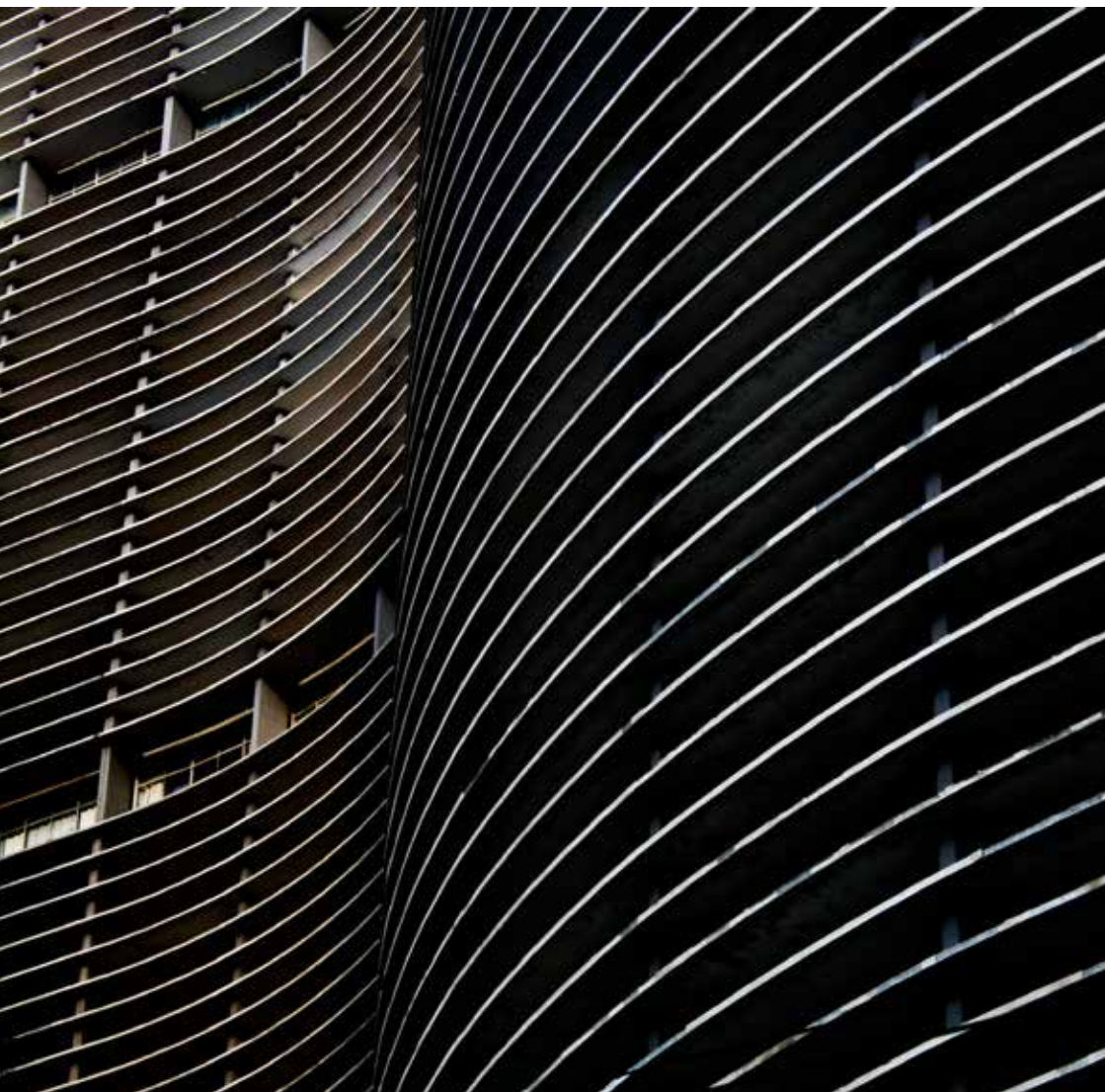ve – in which one perceives which are the most important innovation aspects of *Conjunto Habitacional Prefeito Mendes de Morais, Pedregulho.*

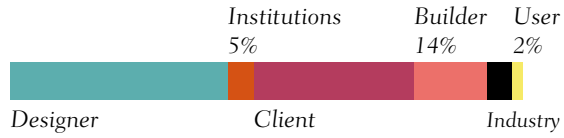Context characteristics, concept, architectural characteristics, shape and access and circulation are the categories with the highest degree on innovation, considering the reunion of many different facilities for the dwellers and the respectful project implementation regarding the urban context.

Other categories, such as environmental control systems and especially sewage connection and water treatment have a low degree of innovation, since those aspects can be considered standard, not so innovative for the whole project.

d e c i s i o n - m a k e r

Builder
21%

Institutions
13%

Designer
41%

Industry
13%

Client
13%

The main responsible for making the decisions for the building are the designer (42%), the client (32%) and builder (14%). In the beginning of the works, the designer (Architect Oscar Niemeyer) and the builder (Architect

Carlos Lemos) could be considered the same entity; passing the years, after having financial problems and consequently serious delays, Oscar Niemeyer had to move away from São Paulo and could not follow the works anymore, thus leaving the decision-making to the builder.

PAVIMENTO INTERMEDIÁRIO
INTERMEDIATE FLOOR

5° E 7° PAVIMENTO
5TH AND 7TH FLOOR

4° E 6° PAVIMENTO
4TH AND 6TH FLOOR

1° E 2° PAVIMENTO
1ST AND 2ND FLOOR

PAVIMENTO TÉRREO
GROUND FLOOR

0   15   30

Environmental
23%

Economic
11%

Social
67%

Analysing the sustainable approach of the Building Characteristics, one can perceive that the social aspect of the project has the biggest role (67%), being a social housing complex. Also the environmental aspects are rather considerable (23%), followed by the economic (11%).

image 19: internal circulation (from: ibid)

COPAN BUILDING

Built as a gift to the 400th birthday of the city of São Paulo, the Copan Building is one of the most important and emblematic buildings from Brazil. The architect's intention, oriented by demands of the client, was to create a building containing many diverse uses in the lower floors, such as stores, restaurants and a cinema, as well as about 30 floors of apartments of many different typologies.

Thought also as an important icon for the city, the architect purposed a curved building, with s-shaped plans, which puts Copan away from all of the buildings in its surroundings, making it possible to breath in the very centre of the city. The building is still today the greatest structure in reinforced concrete in the country, composed by six blocks with a total of 1160 apartments with varying dimensions, comporting around five thousand inhabitants, of different social classes.

image 20: aerial view from Copan Building (from: https://www.flickr.com/photos/89142790@N00/3193461022) author Sergio Tanaka

image 21 (next page): main façade from Copan Building (from: ibid) author Sergio Tanaka

CONCEPTUAL   ANALYSIS

Diversifying the typologies in *kitchen-ettes*, one, two and three-bedroom apartments makes it possible for families of different configurations and social situations to cohabit in the same housing complex. To design a building so diverse in the centre of São Paulo, the biggest city of Brazil, is an action that popularizes the plot, giving opportunities not only to the richest, but also to lower classes to live in the noble centre.

The geometric configuration of Edifício Copan creates a strong identity for the project, which later became an urban mark for the city, a sign of individuality for the citizens.

image 22: typical floor [from 13th to 32nd pavement. no scale (from: http://www. vitruvius.com.br/re-vistas/read/arquitex-tos/13.151/4630)
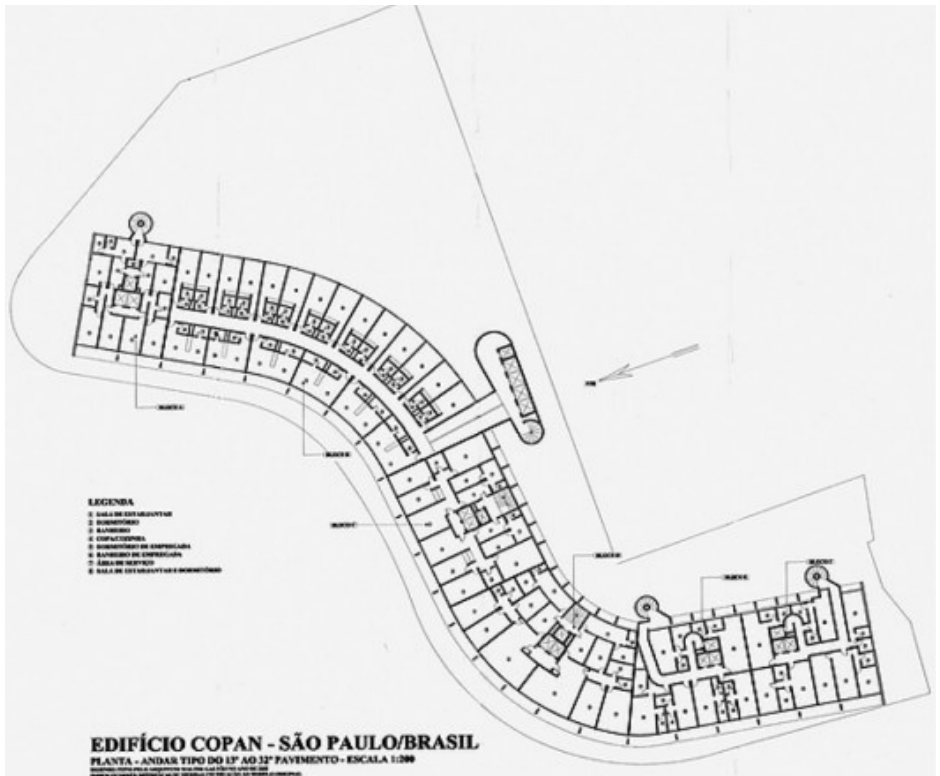
EDIFÍCIO COPAN - SÃO PAULO/BRASIL
PLANTA - ANDAR TIPO DO 13º AO 32º PAVIMENTO - ESCALA 1:200
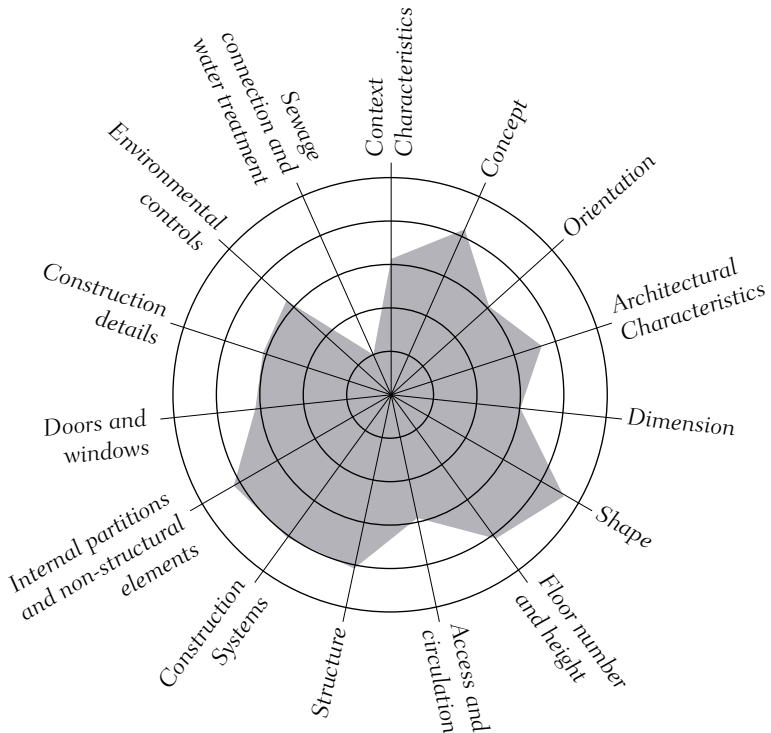
i n n o v a t i o n

By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic above – in which one perceives which are the most important innovation aspects of *Edifício Copan*.

Concept, architectural characteristics, shape and structure are the categories with the highest degree on innovation, considering the

boldness of designing the biggest building in reinforced concrete in Brazil with its very unique shape in the middle of the 20th century.

Other categories, such as environmental control systems and especially sewage connection and water treatment have a low degree of innovation, since those aspects can be considered standard, not so innovative for the whole project.

decision-maker

Institutions
5%

Builder
14%

User
2%

Designer

Client

Industry

The main responsible for making the decisions for the building are the designer (42%), the client (32%) and builder (14%). In the beginning of the works, the designer (Architect Oscar Niemeyer) and the builder (Architect Carlos Lemos) could be considered the same entity; passing the years, after having financial problems and consequently serious delays, Oscar Niemeyer had to move away from São Paulo and could not follow the works anymore, thus leaving the decision-making to the builder.

sustainability

Environmental
26%

Social
31%

Economic
43%

image 23: main façade (https://i.pinimg.com/originals/ac/dd/9b/acdd9be1b4869a1d-e573d8b86f881f5a.jpg)

Analysing the sustainable approach of the Building Characteristics, we can perceive that the economical aspect of the project has the biggest role (43%), due to its original character: a building designed to fulfil real estate needs. Right after there are the social aspects (31%) and environmental aspects (26%).

QUINTA MONROY

Working along the Chilean government, the studio Elemental had to create a social housing project for resettling 100 families in a 500 square meter plot. The government chose not to displace the families, even if the price of the land costed more than three times the standard for social housing works.

Having a limited budget, the architects could only build unities of 30 sqm – which according to their understanding wasn't enough for the families to live with quality. The way they found for solving this issue was creating not the biggest houses but building a housing system that could make up for the needs of the family in the first moment, and then could be upgraded by the dwellers, according to their needs.

In order to allow the expansion of the unities, the architects designed a three-storey building, in which the ground floor is one unity, and the second and the third floor are the second unity, a duplex. This way, both of those have the possibility of being expanded by the owners. Also, the kitchens and bathrooms are dimensioned for the final stage of the houses, already expanded, with 70 sqm, instead of 30 sqm.

image 24: main view (from: https://arcspace.com/wp-content/uploads/Crop-Up/-/media/918127/Quinta_Monroy_Update_Image%2001.jpg)

image 25 (next page): main view of housing complex after post occupation alterations (from: http://www.mfa.fi/files/mfa/tiedotemateriaalit/GA-AA-Iquique8.jpg)

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C O N C E P T U A L   A N A L Y S I S

One of this project's main concept is the replicability. The simplicity of the geometry makes it possible to implant it in various locations, considering the different conditions of terrain. Being a social housing complex, it is important to focus not on the exclusivity of the work, but in the ease of reproduction and cost-effectiveness.

The liberty of personalization by the users is also a strong attribute of the project, as the dwellers have the possibility of auto construction, by printing their own personality on the houses along time and having the opportunity of taking care of the public spaces around the houses.

MONEY   NO MONEY

80 m²   40 m²

80 m²   40 m² + 40m²
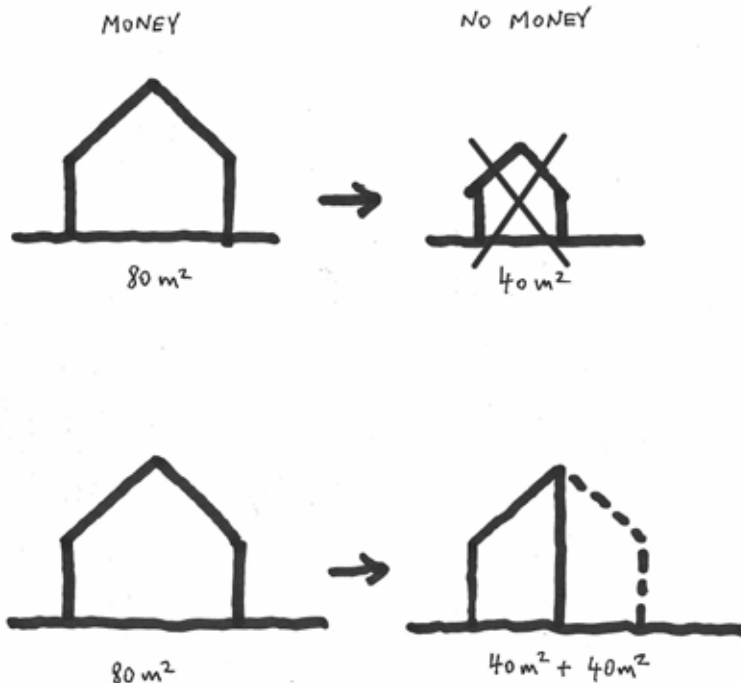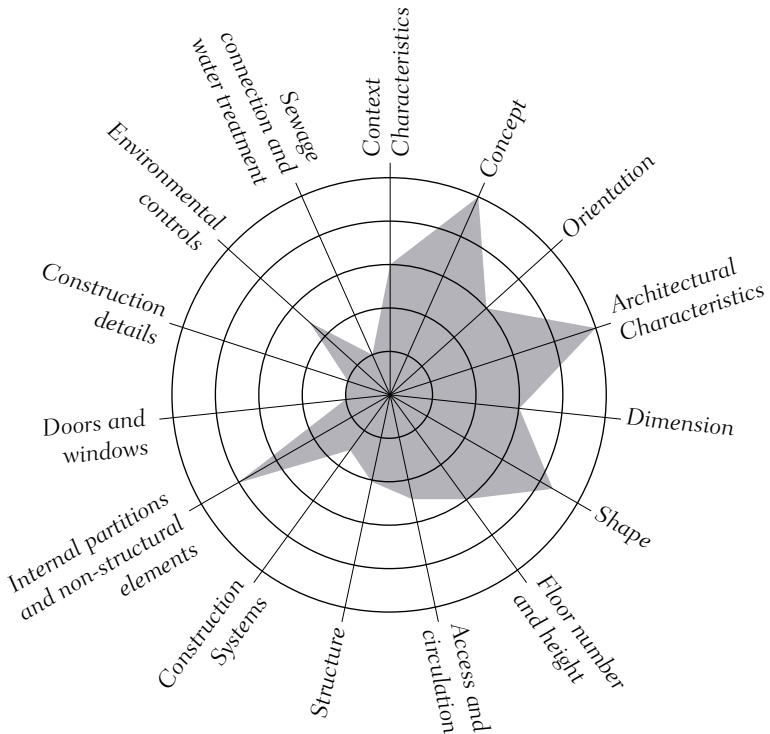
i n n o v a t i o n

By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic above – in which one perceives which are the most important innovation aspects of *Quinta Monroy*.
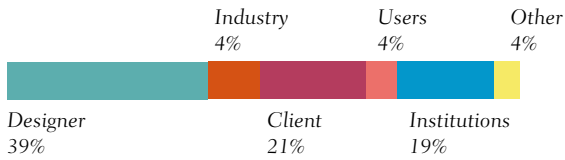
Concept and architectural characteristics are the highest degree on innovation, consid-

ering ELEMENTAL's proposal of cuilding only half of the housing unity and preparing it for the future expansions, provided by the owners.

Being a rather simple project, geometrically speaking, floor number and height, as well as access and circulation present lower levels of innovation, followed by environmental control and sewage connection and water treatment.

d e c i s i o n - m a k i n g

	Other 4%	Institutions 13%	User 6%

Designer 52%	Builder 17%	Client 8%
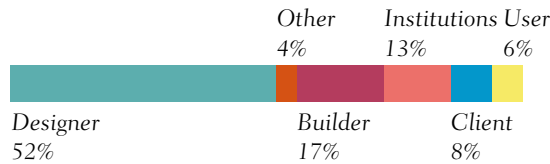
The main responsible for making the decisions for the building are the designer (52%) and the builder (17%). Also, the users have a rather important role in the late phases of designing, as half of the units are to be built by the owners of the houses.
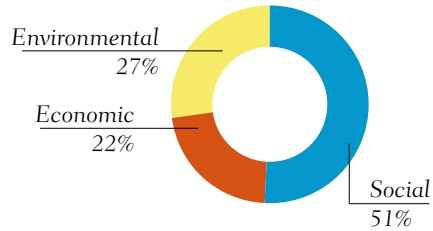
Environmental
27%

Economic
22%

Social
51%

Analysing the sustainable approach of the Building Characteristics, one perceives that indeed the social aspect of *Quinta Monroy* is the strongest between all three (51%), followed by the environmental aspects (27%) and then economic (22%), as a consequence of the financial concessions made in order to achieve the social goals.

VILLA VERDE

Following the same concept applied in *Quinta Monroy*, in 2009, ELEMENTAL was asked by the company Arauco for designing a supporting housing plan for their workers in Constituición, Chile.

Differently of ELEMENTAL's first big project for social housing, this time the designers could develop a new and competitive typology, again not by creating the cheapest possible housing, but by applying the concept of incremental building and prioritizing the finishing of the most complex elements, such as bathrooms and kitchens, this time with higher standards, leaving for the dwellers the option to enlarge their own houses along time, according to their own needs.

The plan intends to create around 9.000 housing unities in about thirty different cities, which comprehends villages from 10.000 and 20.000 inhabitants. In such places, good quality social housing projects will have great impact, by changing part of the city's urban tissue and also offering good urban planning solutions.

image 28: overview (from: https://src.lafargeholcim-foundation.org/img/737eb1fc-cf58-4c7c-9ce7-66811fe25758/AllLAsi-CL-prog14-04aa.JPG)

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CONCEPTUAL ANALYSIS

As well as *Quinta Monroy* and other works by Alejandro Aravena, *Villa Verde* presents a very strong social character, along to the economic concern of building the best possible house with a very limited budget. The architect keeps the idea of building a small housing and giving the future home owners the possibility of expanding it according to their needs.

INNOVATION AND SUSTAINABILITY ANALYSIS
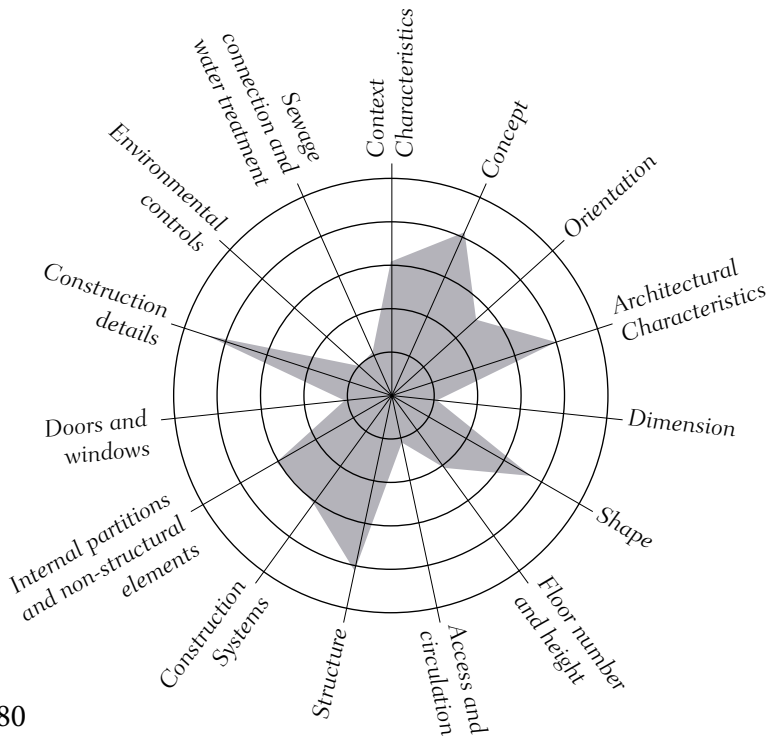
innovation

By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic above – in which one perceives which are the most important innovation aspects of *Villa Verde*.

Construction details, concept, architectural characteristics, shape and structure are the categories with the highest degree on innovation, considering the reunion of many different facilities for the dwellers and the respectful project implementation regarding the urban context.

Other categories, such as environmental control systems and doors and windows have a low degree of innovation, since those aspects can be considered standard, not so innovative for the whole project.

image 29: dweller's reunion in the public space (from: http://www.disenoarquitectura.cl/wp-content/uploads/2018/07/disenoarquitectura.cl-elemental-alejandro-aravena-villa-verde-foto-5.jpg)

decision-making

Industry
4%

Users
4%

Other
4%

Designer
39%

Client
21%

Institutions
19%

      The main responsible for making the decisions for the building are the designer (39%) and the client (21%). Also, the institutions have a rather important role in the designing process (19%), considering the financing politics and their interests.

s u s t a i n a b i l i t y
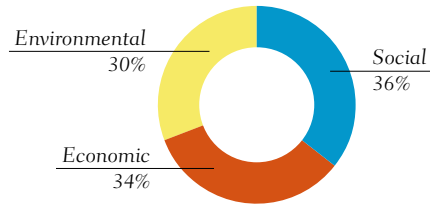
Environmental
30%

Social
36%

Economic
34%

image 30: overview (from: http://www.disenoarquitectura.cl/wp-content/uploads/2018/07/disenoarquitectura.cl-elemental-alejandro-aravena-villa-verde-foto-1.jpg)

Analysing the sustainable approach of the Building Characteristics, one perceives a very balanced score between the three sustainable aspects of *Villa Verde*, being the social one the most prominent (36%), followed closely by the economic (34%) and the environmental (31%).

CASAS DAS SETE CIDADES

image 31: overview (from: https://i.pin-img.com/originals/76/e9/80/76e980541b41f6a8153551c319e1dbb9.jpg)

image 32 (next page): overview (from: https://img.archilovers.com/projects/f24072b4-9bd1-4b69-9586-3b99f4a27cd1.jpg) author: João Morgado

      Asked to build a small neighbourhood of houses in Sete Cidades, in the island of Azores in Portugal, architects Eduardo Souto de Moura and Adriano Pimenta aimed to optimize the cost benefit ratio of the buildings. The rationality of the internal spaces tries to guarantee the exercise of the familiar activities inside. All the houses are built in two floors, utilizing also the attic area for the bedrooms, and present an external furnace built in concrete, as the traditional architecture of the north of the island.

      With a total area of around 13.000 sqm, the plot is located in a transitional area between consolidated housing areas and empty spaces. The juxtaposition of the houses in the urban tissue happens in an alternated way, in order not to block the view of the plot to the lagoon in the region.

CONCEPTUAL ANALYSIS

Aiming to reduce to the most the expenses of building, the architect tries to design the lightest project possible, by rationalizing the internal spaces and utilizing the most the utile area of the houses built. The repetition of the architectonic objects makes it possible to fabricate the parts in series and the simplification of the worksites, thus saving lots of money in the construction.

Geometrically similar to the vernacular architecture, the built houses can merge into the landscape, while introducing contemporary materials.

image 33: transversal section (from: https://www.archdaily.com.br/br/765406/loteamento-e-casas-das-sete-cidades-eduardo-souto-de-moura-plus-adriano-pimenta/552c8936e58ece2cf-d00018a#)
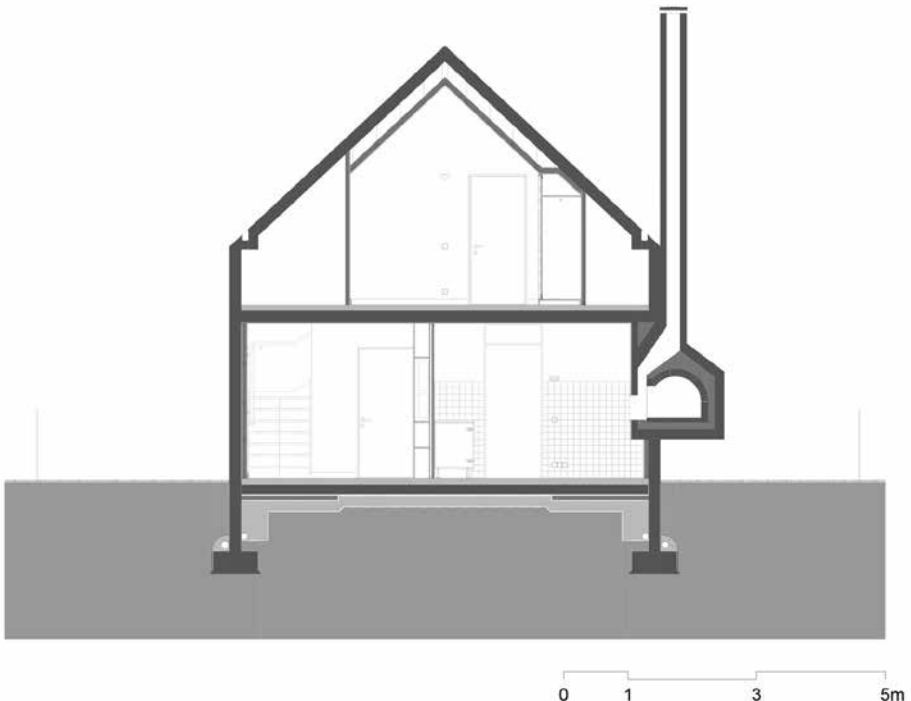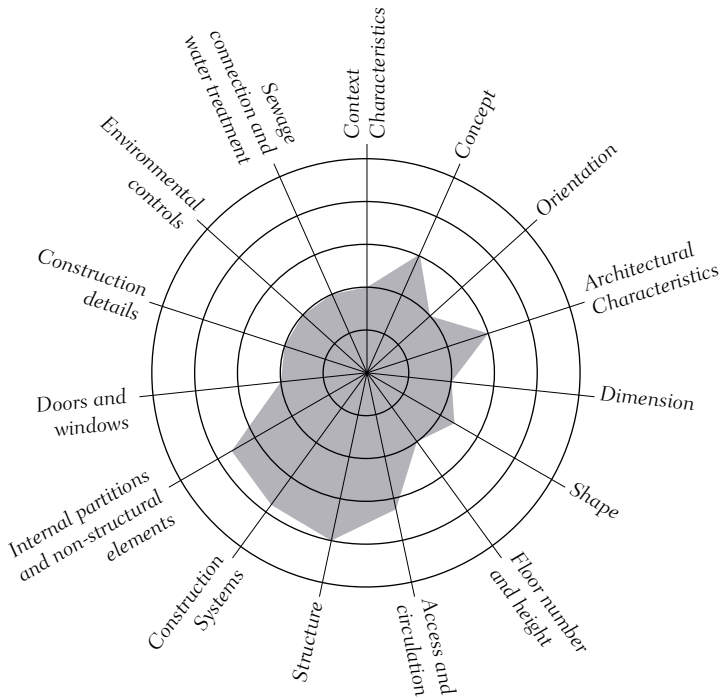
i n n o v a t i o n

By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic above – in which one perceives which are the most important innovation aspects of Loteamento e Casas das Sete Cidades.

None of the attributes has reached a classification higher than Architectural (3 out of 5), proving the project not to be radically innovative. Structure and internal partition are the characteristics said to be more innovative, considering the envelope built in cast-in-situ concrete and the facilities of changing the internal partitions in the future, while construction details, doors and windows and environmental control have not reached any level of innovation due to the use of already well-known technologies.

d e c i s i o n - m a k e r

Users
8%

Industry
4%

Designer
48%

Builder
25%
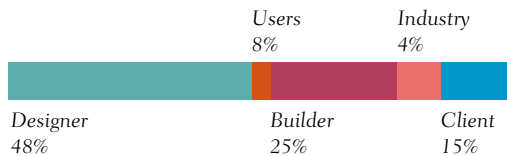
Client
15%

The main responsible for making the decisions for the building are the designer (48%) and the builder (25%), considering the liberty given to the architects. The client (15%) are the third in line, followed by the industry (8%) and the users (4%).
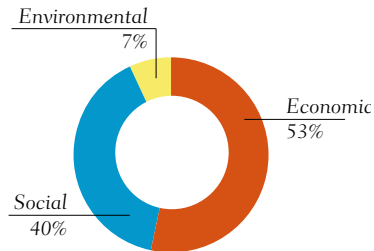
Environmental
7%

Economic
53%

Social
40%

Analysing the sustainable approach of the Building Characteristics, one perceives that indeed the economic aspect of *Casas das Sete Cidades* is the strongest between all three (54%), considered the economic oriented design and the cost-controlled process, followed by the social aspects (40%) and then environmental (7%).

CASA VILA MATILDE

location: São Paulo, SP, Brazil
architect: Terra e Tuma
type: unifamiliar dwelling
year: 2015

When asked about the possibility of designing a new house for an old lady who for decades lived alone in a condemned house, with structural and noxious problems, in a suburban neighbourhood in São Paulo, the architects faced two exits for the problem: the first and most obvious would be selling the property and moving to an apartment, to which the owner resisted. The second option was to design and build a home that the owner could afford with the savings of her lifetime, that were not much.

The house, to be erected in the existent plot, after bulldozing the old one and taking care of the adjacent constructions, should be designed in a plot of 120 sqm and 4,8 meters wide. The architects used raw materials, such as cement structural blocks for the walls, eliminating the necessity of using cast-in-situ concrete for the columns and finishing on the walls. By creating a void in the geometry, a courtyard opens to the living room and the kitchen, bringing light and ventilation into the building. In the second floor, in the back of the plot, there is a bedroom, while the in the front of the building there is a small garden, in an area that later could be closed, if there is the need of enlarging the house.

image 35: dining room and circulation
author: Pedro Kok
(from: https://images. adsttc.com/media/ images/5641/6364/ e58e/ce0d/8300/0063/ large_jpg/0188.TerraETuma.CasaVilaMatilde-PKOK1318. jpg?1447125850)

93

CONCEPTUAL ANALYSIS

As the architects understand the financial needs of the client, they design an extremely rationalized house, by choosing materials that exempt other investments, such as the structural concrete blocks, that work as the structure for the house, making it even possible to expand the house in the future, and can be used without applying any finish on the inside or the outside of the house.

The use of modular components, such as doors, windows, stairs and railings, drops the costs of construction, as there is no need of custom-made work: the architecture adapts itself to the market availability.

image 36: dining room and circulation author: Pedro Kok (from: ibid)
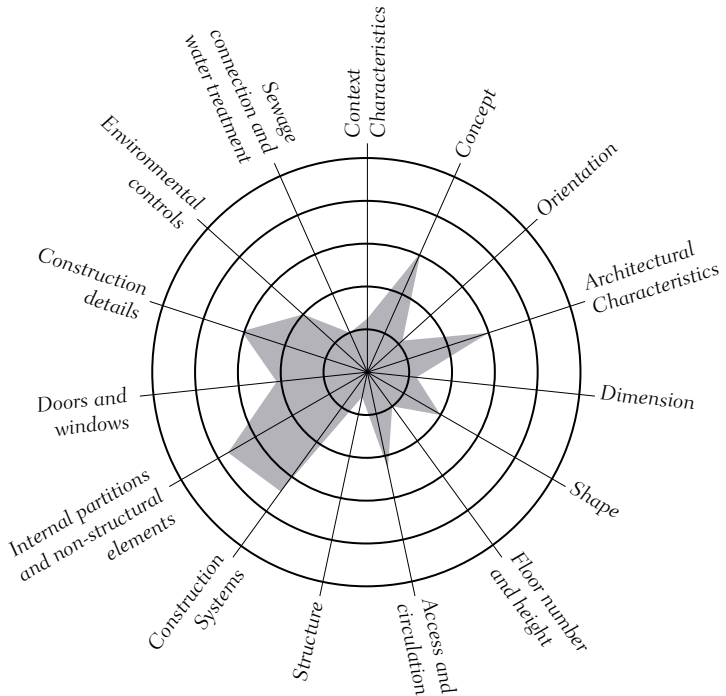
By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic above – in which one perceives which are the most important innovation aspects of *Casa Vila Matilde*.

Construction systems and internal partition and non-structural elements happen to be the categories with the highest degree on inno-

95

vation, considering the use of structural concrete blocks for building up the house and exempting the use of cast-in-situ concrete or any finishing for the walls.

Other categories, such as environmental control systems and especially sewage connection and water treatment have a low degree of innovation, since those aspects can be considered standard, not so innovative for the whole project.

d e c i s i o n - m a k e r

Client
20%

Users
13%

Designer
53%

Builder
15%
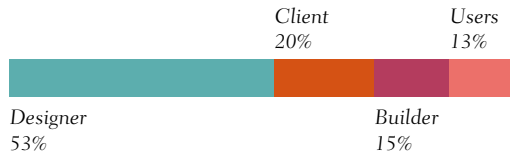
The main responsible for making the decisions for this project is the designer (53%), who had the liberty of choosing materials, shape, structure, architectural elements and systems. The client had some decisions, such as the plot, size and contents of the house (20%), followed by the builder (15%) and the users (13%).

s u s t a i n a b i l i t y

Environmental
16%

Economic
66%
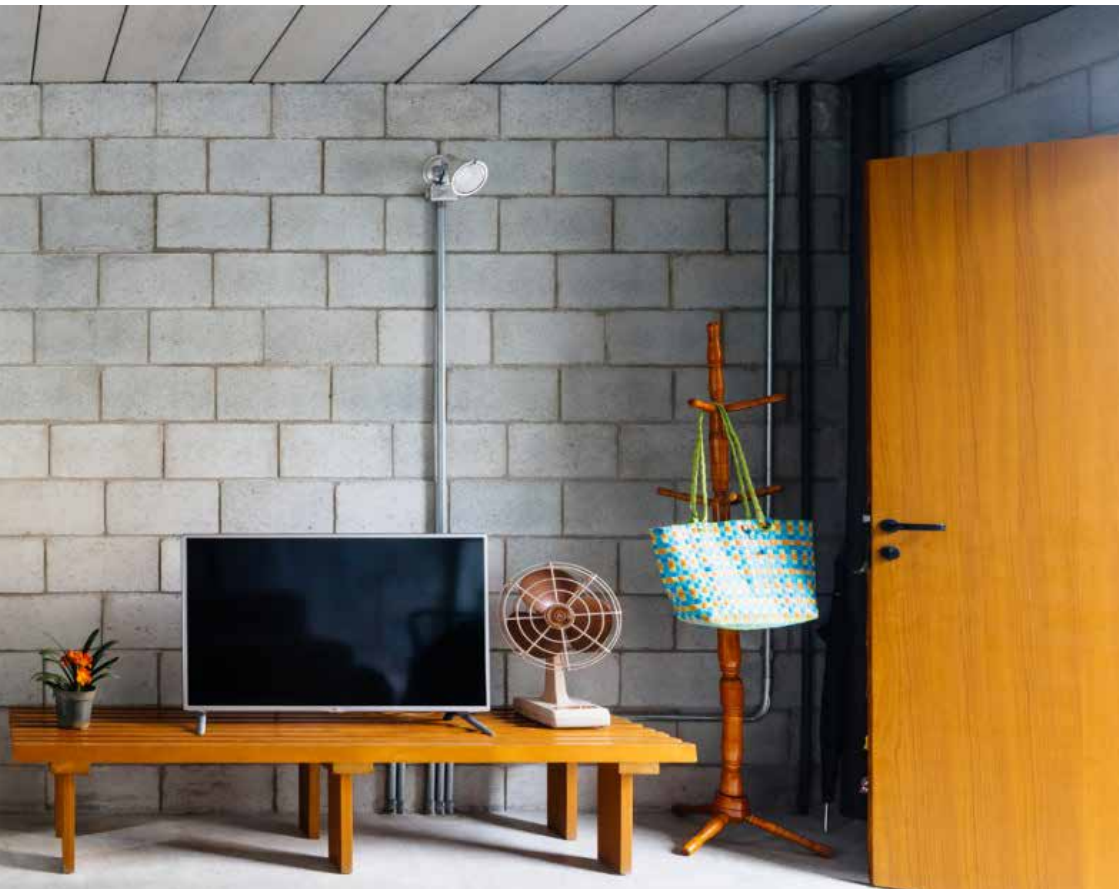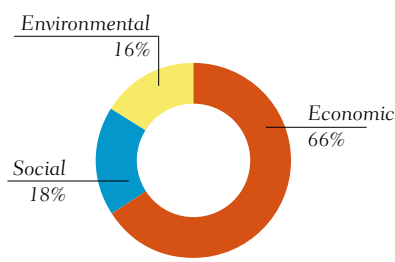
Social
18%

Considering that this project is not a so-cial housing, thus not intended to be mass-built or replicated, but is a house built for one single person in a cost-controlled regime, the most important aspect of its sustainable approach is the economic one. (66%), followed by almost a tie between the social one (18%) and environmental one (16%).

ar-
chi-
tec-
ture

COMPETITION AND PROGRAM

In 2016, the Government of Distrito Federal along with the Company for Housing Development of Distrito Federal (CODHAB), in order to fulfil the dwelling deficit of the region, launched an architecture competition for designing Housing Buildings for 14 plots in Sector Sol Nascente. (CODHAB, 2016).

The design must follow the current legislation, including urbanistic guidelines, building regulations and accessibility, thermal, acoustic and lighting standards.

The competition states that the architect must design one building to be repeated in the 14 floors, and the urbanization of the area in between the constructions. The buildings should present maximum four floors (ground floor + three floors), vertical circulation only by stairs and two- or three-bedrooms apartments, with one parking space each. (*ibidem*, 2016). The table below specifies the minimum areas, dimensions and opening sizes for each kind of room in the units.

image 38: Cover for the Architecture Competition
(from: http://www. codhab.df.gov.br/concursos)

Room	Min. area (sqm)	Min. dimension (m)	Min. opening (m)
Living room	9,00	2,5	0,80
Bedroom 01	7,50	2,4	0,80
Bedroom 02	7,50	2,4	0,70
Bedroom 03	7,50	2,4	0,70
Kitchen	3,75	1,8	0,80
Laundry	3,00	1,8	0,80
Bathroom	Ø 1,10	1,5	0,80

CONCURSO PÚBLICO NACIONAL DE PROJETOS DE ARQUITETURA E COMPLEMENTARES

UNIDADES HABITACIONAIS COLETIVAS

SOL NASCENTE _QUADRA 700

INS -CRI ÇÕES **19** AGO

CODHAB Companhia de Desenvolvimento Habitacional do Distrito Federal

HABITA BRASÍLIA

Secretaria de Gestão do Território e Habitação

GOVERNO DE BRASÍLIA

Environmental, economic, social and cultural sustainability must be considered, being appreciated the use of new technologies that make the building more efficient, especially regarding natural lighting, ventilation and passive conditioning. The architectural solutions must aim economy and constructive rapidness, given the urgent condition of the area. (*ibidem*, 2016)

Furthermore, some changes in the program of the competition were made by the author, considering the focus and development of this thesis: there will be two-, three- and four-bedrooms apartments and one-bedroom studios (those with no parking spaces inside the plot); one small commercial space will be foreseen in the ground floor of each building, meant to host low-impact stores, such as bakeries, drug stores, grocery stores etc.. Also, the vertical circulation by elevators will be designed independently of the structure of the building, thus its actual construction being facultative. Those changes cause no negative impact on the general propose of the competition.Building Area

C L I M A T E

According to the Köppen-Geiger climate classification, the region of Distrito Federal, located in the top of the Brazilian Highlands, has a tropical savanna climate, classified *Aw* (ALVARES et. al, p. 718). Its annual average temperature is 21,0 °C. The coldest month is July, with the average low temperature of 13.7 °C, and

the warmest month is September, with the average high of 28,4 °C.

The Brazilian Association for Standardization[1] defines guidelines for the ecological design of buildings, according to their climatic classification. For the region of Distrito Federal, its recommended to design medium-sized windows for ventilation, that should be shaded during the daytime. The external envelope should be heavy, and the roofing should be light and isolated from the other constructive structures.

During the winter, the direct solar heating is enough for keeping the interiors warm enough, if combined to the heavy external envelope with high volumetric heat capacity. During summer, the recommended strategy for thermal conditioning is selective ventilation, when the internal temperature is higher than the external. Otherwise, it's also recommended the use of cooling systems by evaporation.

1   *Associação Brasileira de Normas Técnicas*

CONCEPTUAL APPROACH

Through the analysis of the six selected case studies, six main concepts were chosen as guidelines for the architectural proposal for this thesis.

DIVERSITY OF TYPES

In his *Dictionnaire Historique de l'Architecture*, Quatremére de Quincy explains a type for architecture as "an object, after which one can conceive works that may have no resemblance to each other"[2] (QUINCY, apud ROSSI, 1966, p. 31), definition that years later is developed by Aldo Rossi (1966, p. 33), who says that the type is "the very own idea of architecture; that that is the closest to its essence."[3]

An architectural complex that presents only one type in its composition can present many different objects. Even though, it is interesting that there is a diversity of types when it comes to designing for the people. Concerning dwelling, the diversity of types may enable the cohabitation of an infinity of familiar configuration in only one project: people who live alone, families with two, three or more members, new

---

2   "[…] un oggetto, secondo il quale ognuno può concepire delle opere, che no si rassomiglieranno punto fra loro"
3   "[…] l'idea stessa dell'architettura; ciò che sta più vicino alla sua essenza."

familiar structures and new ways of living that not necessarily follow the concept of the traditional family with father, mother and sons. This possibility enriches the dwelling experience and the quality of the project.

UNIDAD HABITACIONAL PORTALES

image 39: List of different typologies of apartments in a social housing project in Santiago, Chile.
(from: https://www. plataformaarquitectura.cl/cl/02-84819/ clasicos-de-arquitectura-unidad-vecinal-portales-b-v-c-h/villa_portales_-_tipologias_2#)

IDENTITY

In order to define the concept of identity, Juhani Pallasmaa introduces firstly the concept of home as being "an individualized dwelling, […], an expression of personality and family and their very unique patterns of life.", while the house, under the notion of architecture, "is the container, the shell for home." (PALLASMAA, 2013, p. 16), also criticizing the *modus-operandi* of today's architects, that care about building houses instead of homes.

Still according to Pallasmaa, a "home is a projection and basis of identity, not only of an individual by also of the family". Homes are spaces marked as our own personal territory, by adding objects or configurations which mean something for the user, such as photos, decorations, but also by organizing the sheets in a certain way or laying clothes messily on a chair.

The role of the architect when designing houses is not to pretend that is possible to build up a home for a family – or more than one – by himself, but to understand and create a very personalized house when working with one client, or to make it possible for the future dwellers to print their own personality over their future houses – thus transforming those in their homes.

image 40: Quinta Monroy after post occupational interventions made by the dwellers, who printed their own identity on their homes. (from: https://arcspace. com/wp-content/ uploads/CropUp/-/ media/918127/Quinta_Monroy_Update_ Image%2001.jpg)

M O D U L A R I T Y

Oxford Dictionaries defines Module as "each of a set of standardized parts or independent units that can be used to construct a more complex structure, such as an item of furniture or a building." (OXFORD DICTIONARIES, 2018).

To consider modularity as a key-concept when designing architecture is to think the project in a way that its geometry, dimensions and constructive elements have either a smallest common multiple, or all the same fitting systems, in a way that the construction becomes simpler, more efficient.

A modular house could, for instance, have all its measures as multiples of 0,5 metre – walls, doors, windows. Thus, one saves on material, by avoiding losses and unnecessary cuts, and it speeds up the building process.

image 41: Hospital Sarah Kubitschek in Brasília, built in pre-cast concrete in a modular system. (from: https://www.artstreetecture.com/streetview/ post/551-hospital-sarah-kubitschek-brasilia-joao-filgueiras-lima)

N E I G H B O U R H O O D

First defined in the early 1900s by Clarence Perry, the Neighbourhood Unit is an urban planning model thought for the rapidly growing metropolitan areas of industrialized cities. It was largely adopted by the urban planners of the 20th century, being also one of the main concepts used in the planning of Brasília, by Lucio Costa, in 1957. The guidelines and core principles of the Neighbourhood Unit as purposed by Perry (1929, p. 489) are:

"1. Size – A residential unit development should provide housing for that population for which one elementary school is ordinarily required, its actual area depending upon population density.

2. Boundaries – The unit should be bounded on all sides by arterial streets, sufficiently wide to facilitate its by-passing by all through traffic.

3. Open Spaces – A system of small parks and recreation spaces, planned to meet the needs of the particular neighbourhood, should be provided.

4. Institution Sites – Sites for the school and other institutions having service spheres coinciding with the limits of the unit should be suitably grouped about a central point or common area.

5. Local Shops – One or more shopping districts, adequate for the population to be served, should be laid out in the circumference of the unit, preferably at traffic junctions and ad-

jacent to similar districts of adjoining neighbourhoods.

6. Internal Street System – The unit should be provided with a special street system, each highway being proportioned to its probable traffic load, and the street net as a whole being designed to facilitate circulation within the unit and to discourage its use by through traffic."

Following the guidelines proposed by Perry, especially those concerning the open spaces and local shops, and aligning it with an spatial organization such as the one proposed by Alejandro Aravena in his design for Quinta Monroy in Chile (DELAQUA, 2012), one can achieve the creation of public spaces to which the dwellers can relate closely, developing a sense of property and responsibility for the public space.

image 42: site plan of ELEMENTAL's Quinta Monroy in Chile showing the position of the plots in order to create small neighbourhood cores that would create a sense of belonging and property over the public area(from: https://www.area-arch.it/en/quinta-monroy-housing/)

0   10   30

R E P L I C A B I L I T Y

Opposingly to the concept of type proposed by Quatremére de Quincy and revised by Aldo Rossi, there is the concept of model, which is "[…] an object that should be replicated precisely as it is."[4] (QUATREMÉRE DE QUINCY, apud ROSSI, 2011, p. 31). When designing dwellings for social purposes, other than cost-effectiveness and welfare of the dwellers, one must consider that the apprehension of the project must be simple, of low complexity, in order to make it possible to the dwellers to intervene on it if needed.

One of the principles of the works of

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4   *"Il modello, inteso secondo la esecuzione pratica dell'arte, è un oggetto che si deve ripetere tal quale è."*

the Pritzker laureate Alejandro Aravena when designing social housing is to facilitate the comprehension and reproduction of his work by providing open access to its drawings, as a way to encourage the future dwellers to also interact with their houses. As stated by the architect, hopefully that is a way of "ruling out one more excuse for why markets and governments don't move in this direction to tackle the challenge of massive rapid urbanization." (ELEMENTAL, apud STOTT, 2016).

RESPECT FOR THE CONTEXT

Simitch and Warke (2014) state that there is no architecture in isolation: it is always situated in a context. What can always change, though, is its relationship to that context, being either "platonic, symbolic, casual, symbiotic, detrimental" (p. 49) and the way the architect interpretates it, choosing to sustain a friendly dialogue, or opting to build his architecture in a more aggressive way.

The architectural decisions of Affonso Eduardo Reidy in the Pedregulho complex, in Rio de Janeiro, for instance, show the architect's respect and care for the context: the biggest building of the complex is moulded accordingly to the declivity of the terrain, following the fluidity and the curves of the mountain where it is built. Besides, the building is divided in two parts, vertically, by the ground floor built on pilotis, that not only preserves the quality of the view from the landscape, but also creates a platform with a scenic overlook for the city of Rio de Janeiro open for the users of the building.

image 44: bird view from Pedregulho Complex in Rio de Janeiro. The building's form follows the topografy of the plot. (from: http://www.hiddenarchitecture.net/2018/02/pedregulho-housing-development.html)

"O" Sector

Ceilandia

Sol Nascente
Sector

Project Plot
zoom on next page

Por do Sol
Sector

0   1   2   4 km

Vicente Pires

Brasília
(30 km)

Taguatinga

Aguas Claras

Samambaia

environmental protection area
watercourse
Sol Nascente Sector polygonal
plot polygonal

SITUATION MAP

1

2

3

4

5

6

7

8

9

10

11

12

13

14

0   50   100   200 m

plot	x dimension	y dimension	area
1	42,52 m	35,31 m	1.522,94 sqm
2	47,00 m	35,69 m	1.668,34 sqm
3	47,00 m	36,06 m	1.686,07 sqm
4	47,00 m	36,06 m	1.686,07 sqm
5	47,00 m	35,69 m	1.668,34 sqm
6	45,82 m	34,97 m	1.580,37 sqm
7	46,76 m	46,76 m	1.699,51 sqm
8	46,76 m	46,76 m	1.699,51 sqm
9	46,76 m	46,76 m	1.699,51 sqm
10	46,76 m	46,76 m	1.699,51 sqm
11	44,20 m	37,01 m	1.643,55 sqm
12	49,30 m	47,96 m	1.833,87 sqm
13	44,21 m	47,96 m	1.737,73 sqm
14	44,21 m	44,20 m	1.643,55 sqm

zoom on next page

N
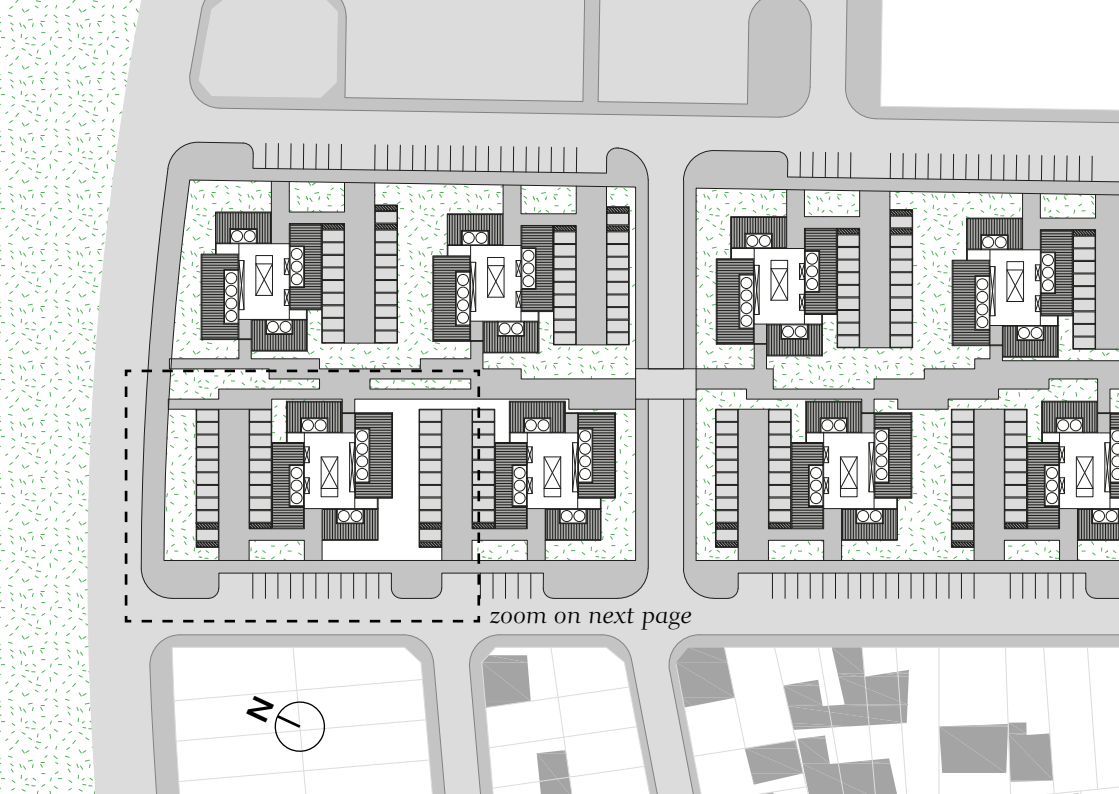
THE PROPOSAL

As required by the competition's rules, one building was designed in order to be replied 14 times over the availiable plots.

A wind vane form was proposed, which favours cross-ventilation: the module-building is composed by four four-storeys parallelepipedic volumes, disposed radially around their center, an open garden surrounded by the vertical circulation of the building, the staircase and the volume that contains the elevator; in the second, third and fourth floors, the slabs over which the dwellers walk to get to their apartments have openings over the spots in which there are green areas in the groundfloor and present no vertical
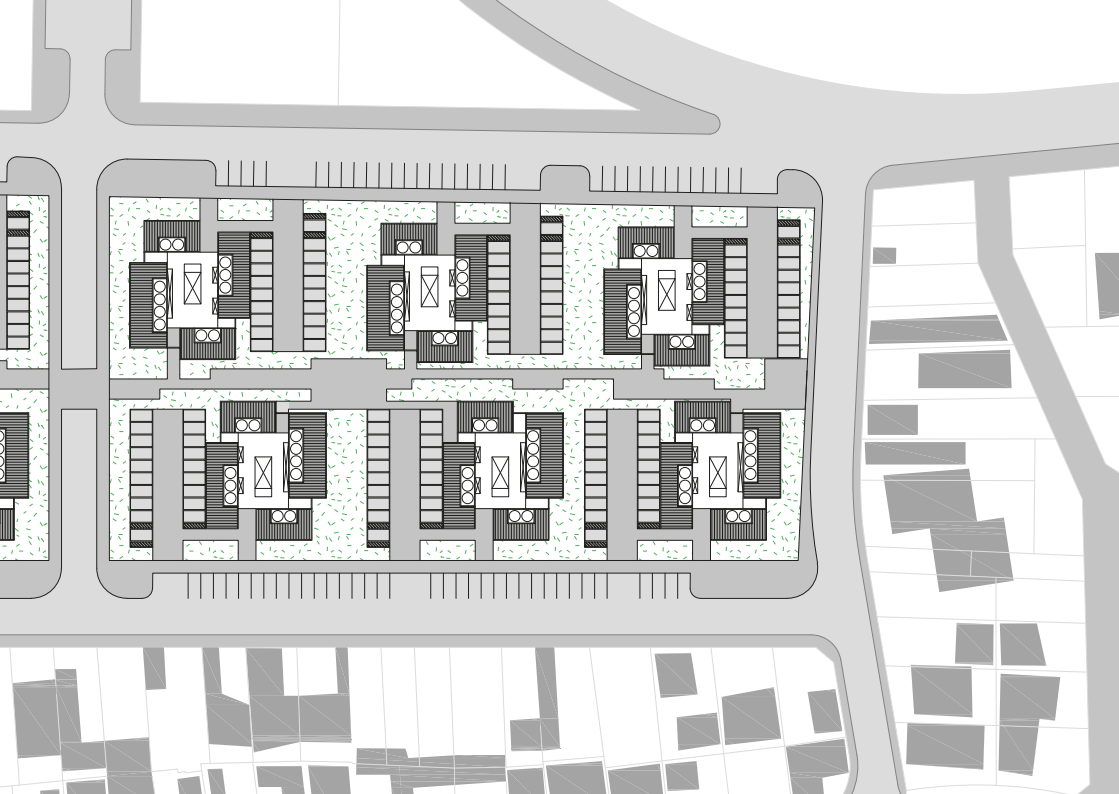
site plan
scale 1:1500

closure whatsoever - thus bringing in air circulation to the buildings.

Each building has 6 apartments per floor - except for the ground floor, that has 4 apartments, one small store and one multi purpose room for the condominium. The total amount of housing unities per building is 22, being 4 one-bedroom studios, 6 2-bedroom, 8 3-bedroom and 4 four-bedroom aparments. Only the studios do not have parking spots granted inside the building plot.

vehicle access

pedestrian main access

pedestrian back access

N
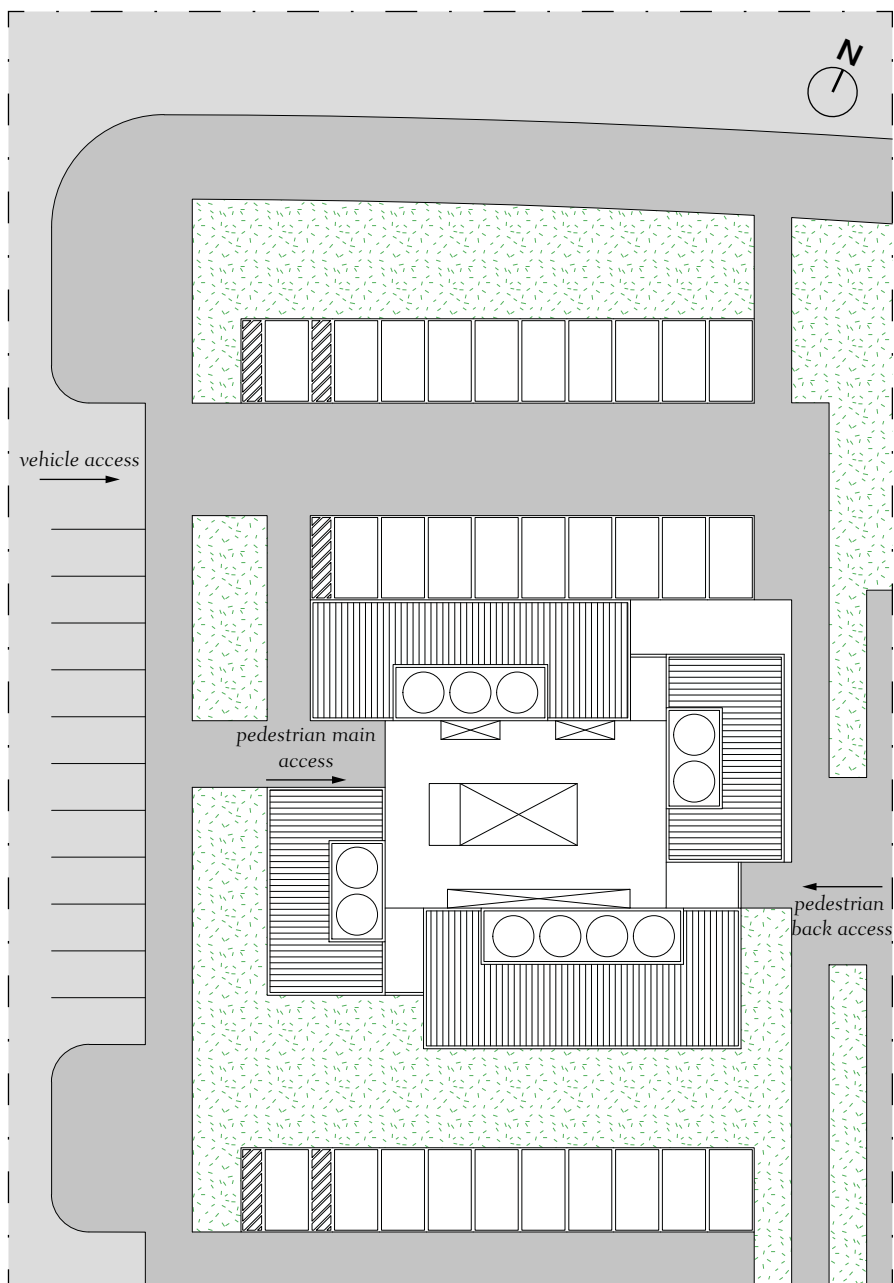
site plan zoom
scale 1:350

1 bedroom apartment

2 bedroom apartment

4 bedroom apartment

3 bedroom apartment

local store

condominial room

exploded axonometry
no scale

groundfloor plan
scale 1:250

1 - circulation
2 - garden
3 - multi purpose condominial room
4 - commercial space

5 - 1 bedroom apartment [41,60 sqm]
6 - 2 bedroom apartment [52,90 sqm]
7 - 3 bedroom apartment [65,88 sqm]
8 - 4 bedroom apartment [78,33 sqm]

0 1 2   5   10

first and third floor plan
scale 1:250

1 - circulation
2 - garden
3 - multi purpose condominial room
4 - commercial space

5 - 1 bedroom apartment [41,60 sqm]
6 - 2 bedroom apartment [52,90 sqm]
7 - 3 bedroom apartment [65,88 sqm]
8 - 4 bedroom apartment [78,33 sqm]

0 1 2   5   10

125

second floor plan
scale 1:250

1 - circulation
2 - garden
3 - multi purpose condominial room
4 - commercial space

5 - 1 bedroom apartment [41,60 sqm]
6 - 2 bedroom apartment [52,90 sqm]
7 - 3 bedroom apartment [65,88 sqm]
8 - 4 bedroom apartment [78,33 sqm]

126

0 1 2   5   10

longitudinal section
scale 1:250
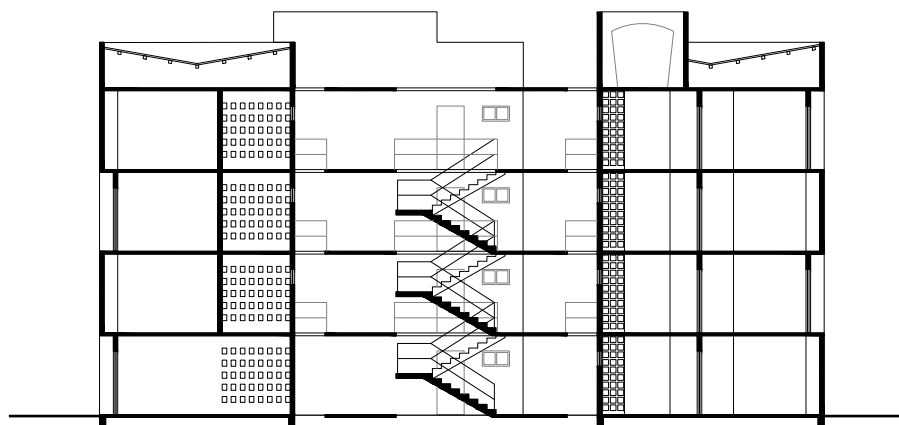
transversal section
scale 1:250
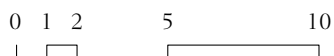
0 1 2   5   10

façade a
scale 1:250

façade b
scale 1:250

0 1 2   5   10

128
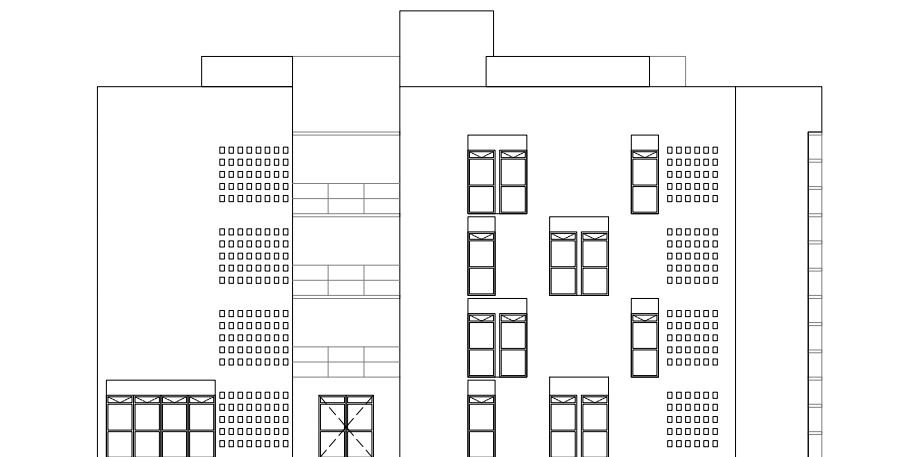
façade d
scale 1:250

façade d
scale 1:250

0   1 2   5   10

one-bedroom apartment

Designed for a single person or a couple with no kids, this apartment is composed by one bedroom, one bathroom and an open concept kitchen, connected to the dining and living room, as well as to the laundry room, reaching an area of *46,60 sqm*.

The main façade faces either north-east or south-west (in the last case, the façades are shaded by an extra pair of horizontal *brises-soleil*.) In the lateral façade there is a wall of *cobogós*, that permanently ventilates the apartment.

With only one unity per pavement, there are four one-bedroom apartments for each building, making it 56 unities for the whole housing complex.

1-bedroom apartment (type a)
ground floor and second floor
scale 1:75

0　　　　1　　　　2　　　　3

1-bedroom apartment (type b)
first and third floor
scale 1:75

0   1   2   3
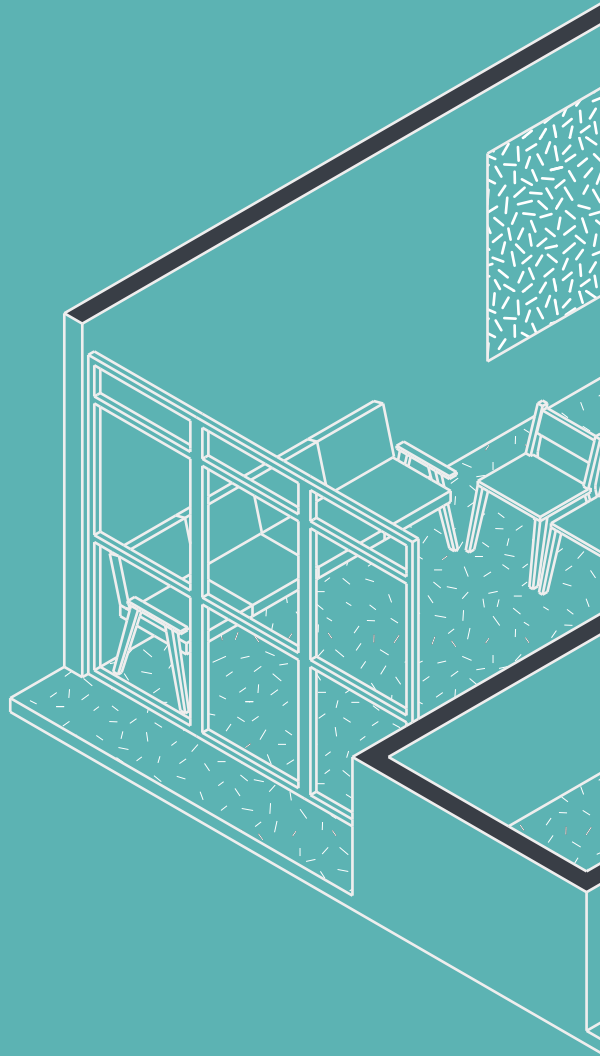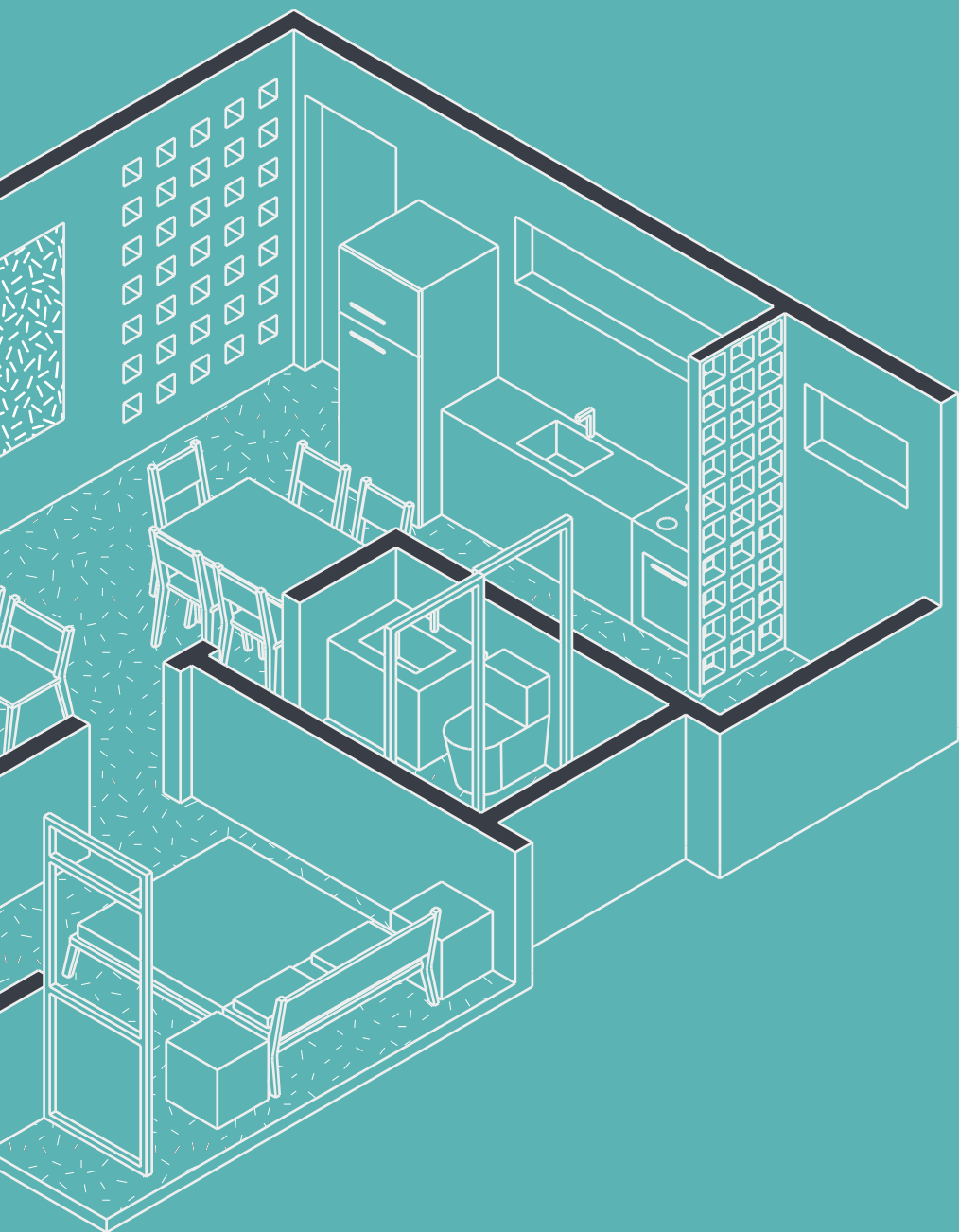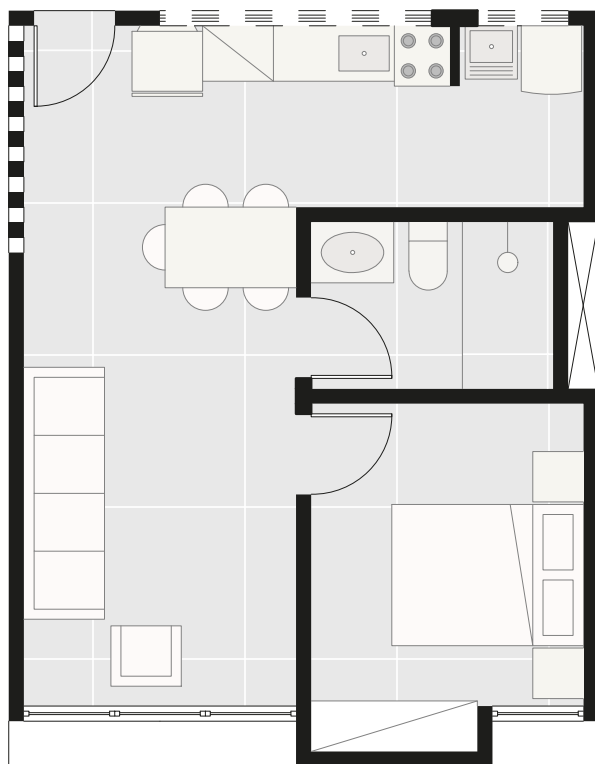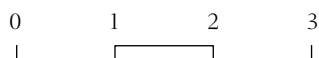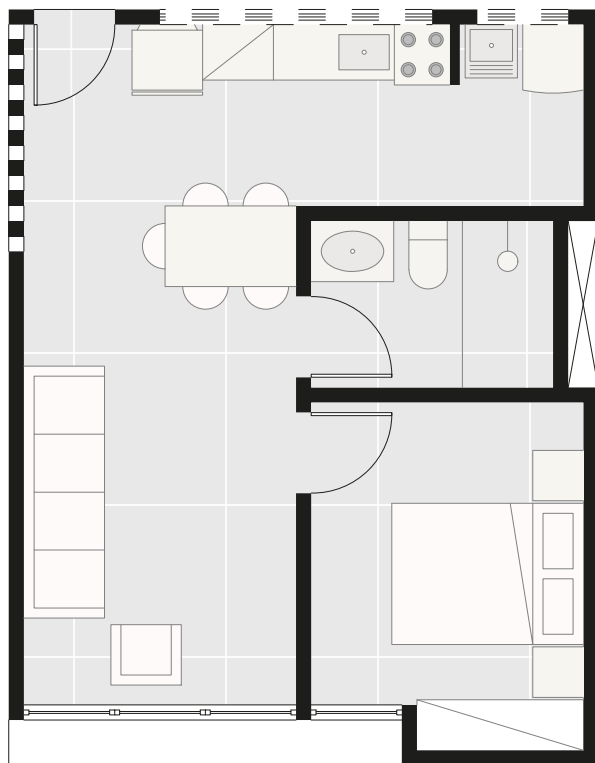
1-bedroom apartment (type a)
scale 1:75

1-bedroom apartment (type b)
first and third floor
scale 1:75

det 01 - corner block binding
see on page 174

0.00
2.85
2.85
5.40
5.40
5.70

det 01

0.00

.90

det 03 - cobogó
see on page 175

det 02 - "T" block
binding
see on page 174

1.95

det 01

.90

det 02

3.75

page 02

.90

7.05

2.70

.90

det 01

det 01

7.35

1-bedroom apartment (type a)
first layer of cement blocks
scale 1:75

☑ *14x14 cm cement block*
▭ *14x29 cm cement block*
⊠ *14x44 cm cement block*

det 01 - corner block binding
see on page 174

0.00

2.85

2.85

5.40

5.40

5.70

det 01

0.00

det 03 - cobogó
see on page 175

det 02 - "T" block
binding
see on page 174

1.95

det 01

3.75

det 02

page 02

7.05

det 01

det 01

7.35
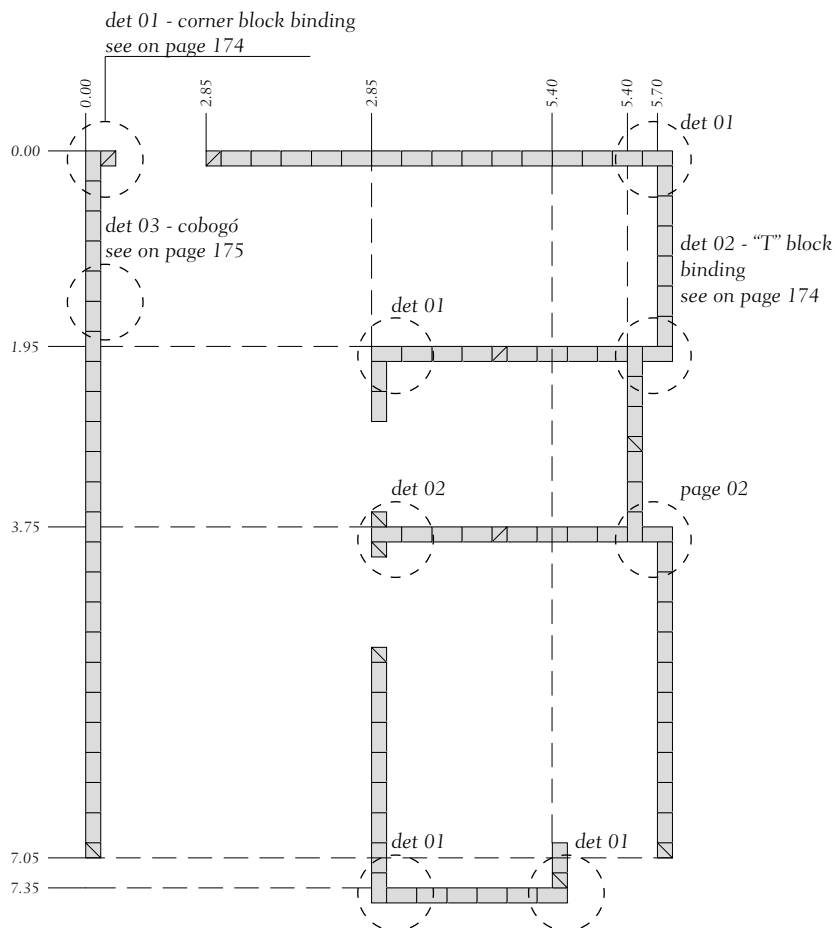
1-bedroom apartment (type a)
second layer of cement blocks
scale 1:75

⬚ 14x14 cm cement block
▭ 14x29 cm cement block
⬚ 14x44 cm cement block

1 bedroom apartment (type a)
oriented north-west
sun shading - no scale
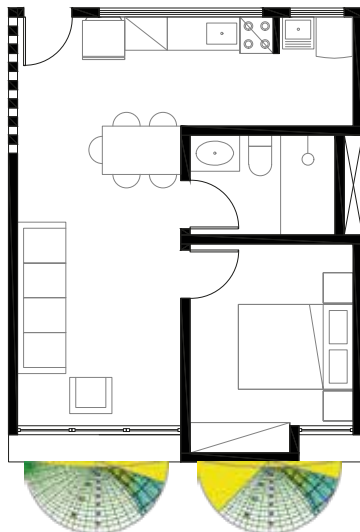
1 bedroom apartment (type a)
oriented south-east
sun shading - no scale

1 bedroom apartment (type a)
oriented north-west
sun shading - no scale

1 bedroom apartment (type a)
oriented south-east
sun shading - no scale

139
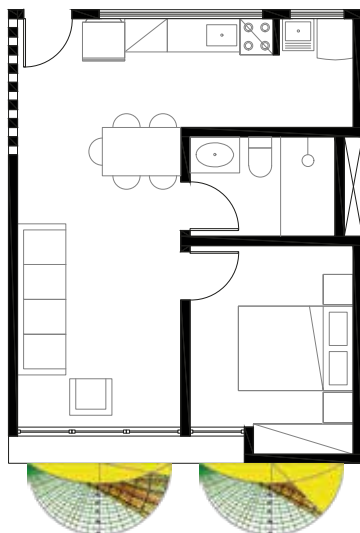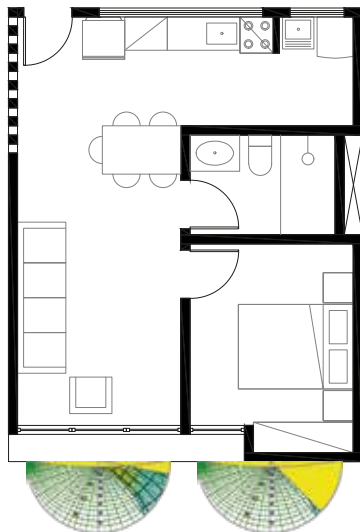
TWO-
BEDROOM
APARTMENT

This apartment has one bathroom and an open concept kitchen, dining and living room, as well as the laundry room, reaching an area of 52,92 *sqm*, being fully adaptable for people with disabilities.

The main façade faces either north-east or south-west (in the last case, the façades are shaded by an extra pair of horizontal *brises-soleil*). In the lateral façade there is a wall of *cobogós*, that permanently ventilates the apartment.

With two unities per pavement, except for the ground floor, there are six two-bedroom apartments for each building, making it 84 unities for the whole housing complex.

2-bedroom apartment (type a)
ground floor and second floor
scale 1:75

0   1   2   3

2-bedroom apartment (type b)
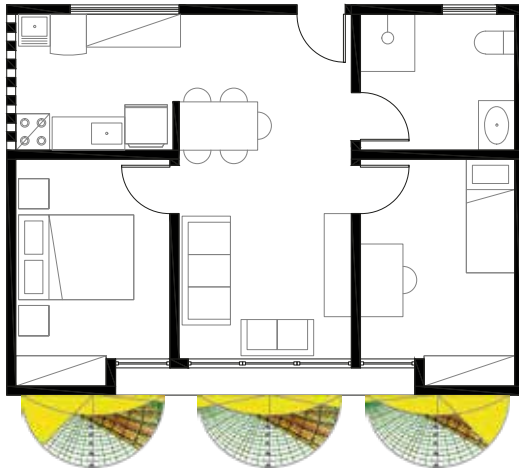*ground floor and second floor*
scale 1:75

| 0 | 1 | 2 | 3 |

143
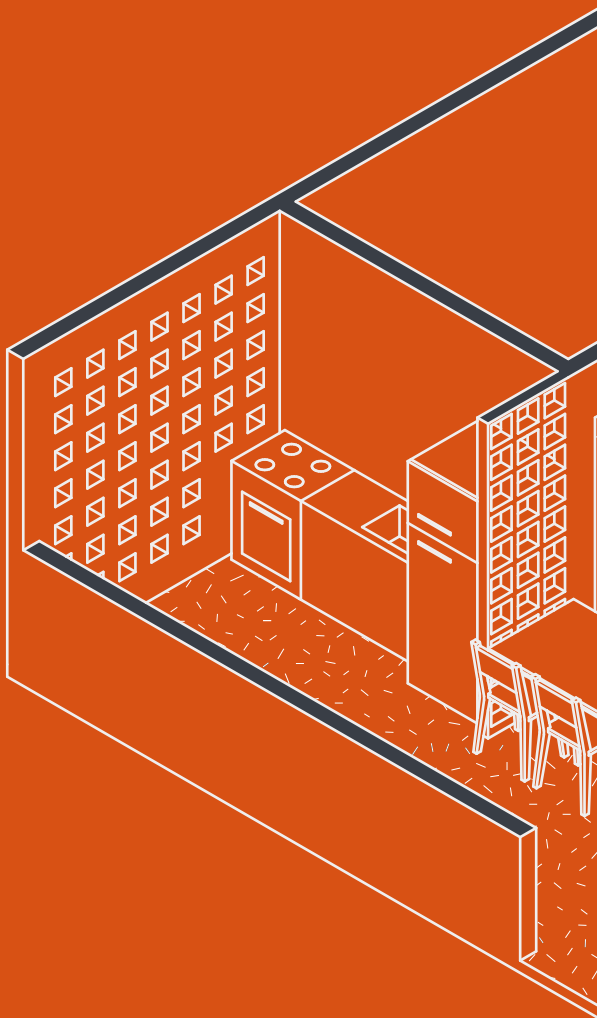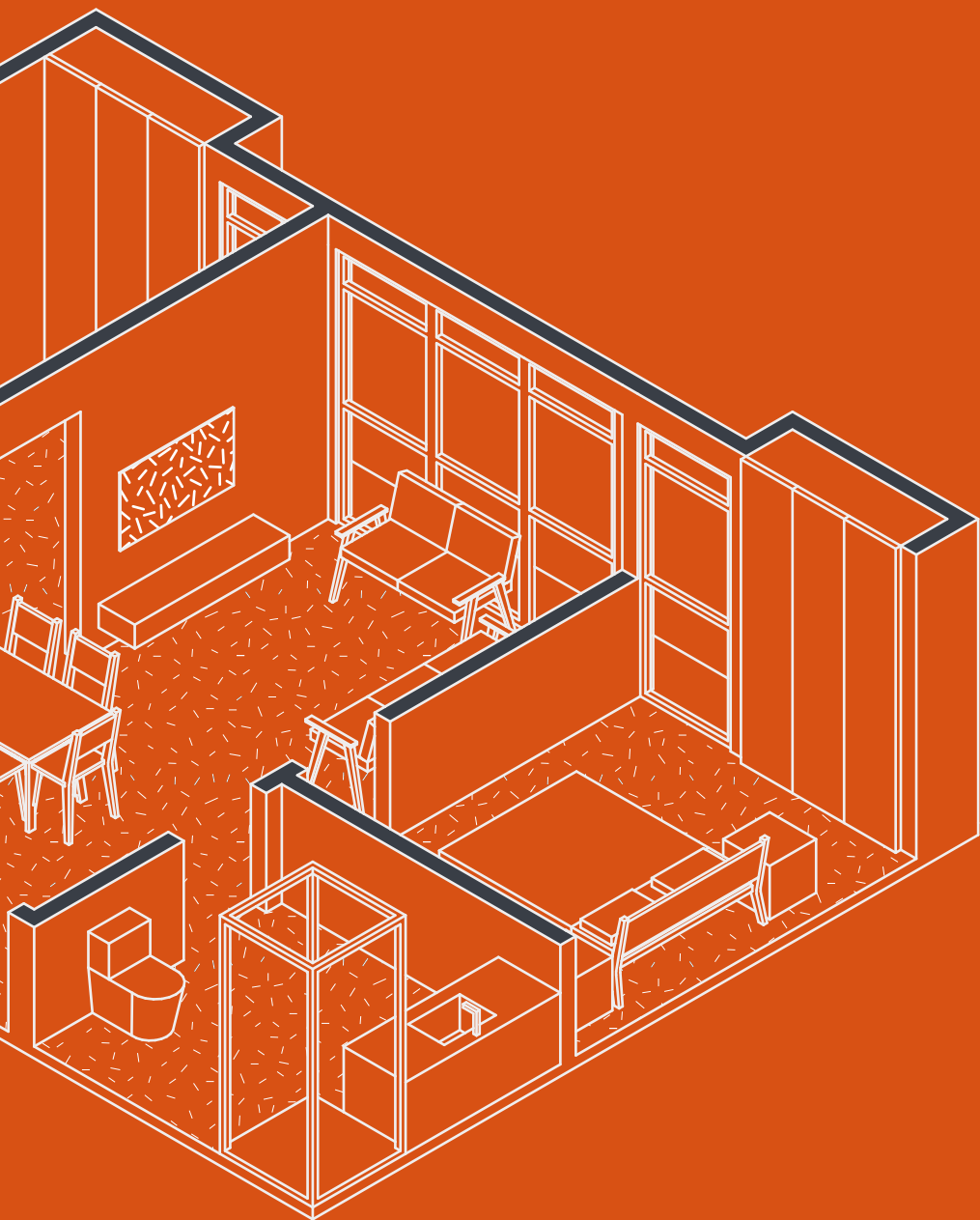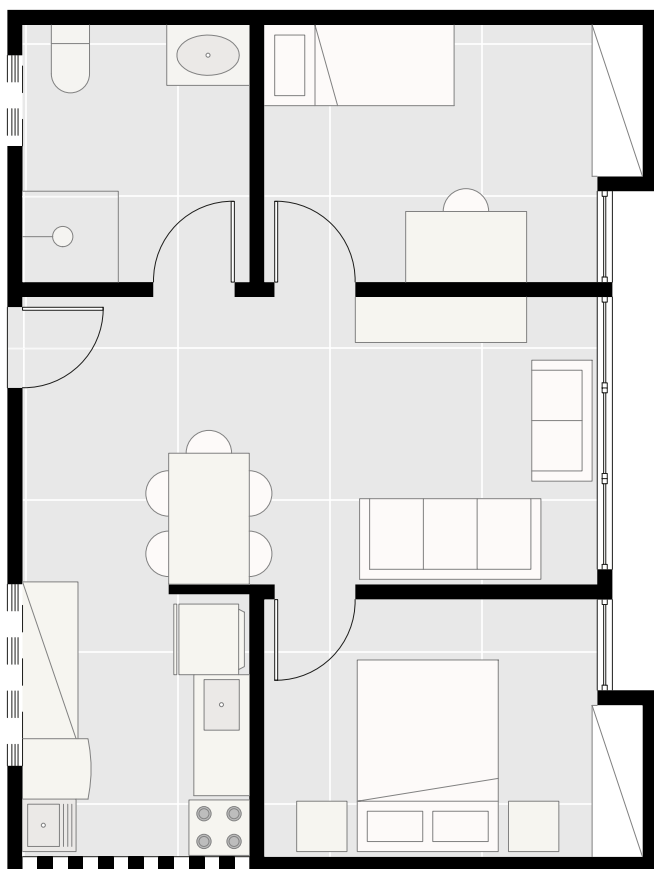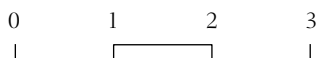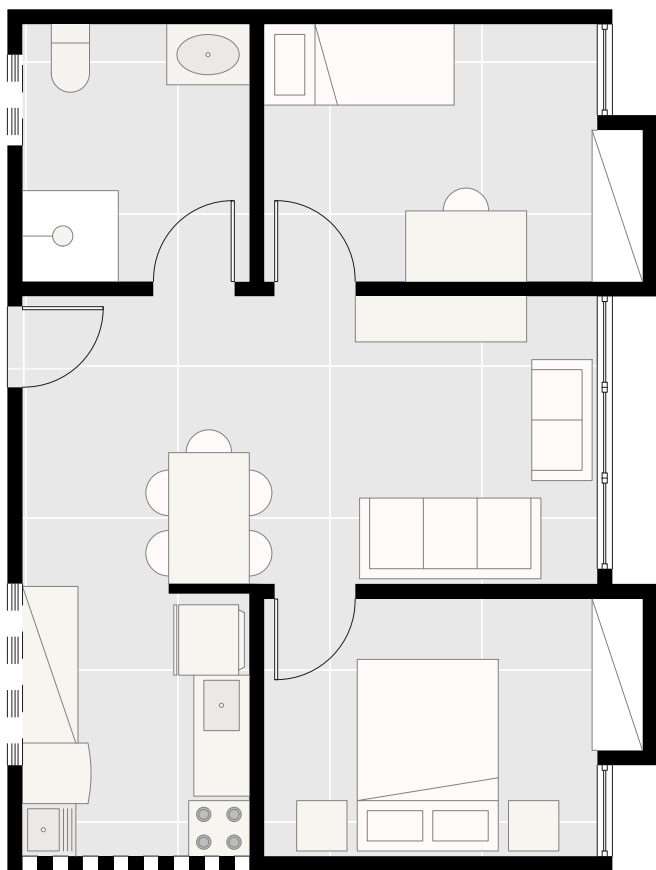
2-bedroom apartment (type a)
ground floor and second floor
scale 1:75

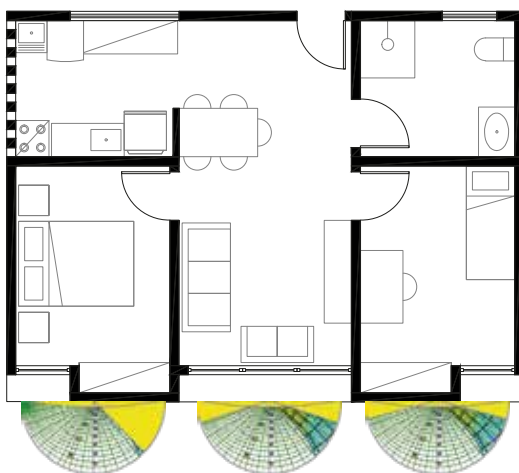*2-bedroom apartment (type a)*
under 15 cm grid
scale 1:75
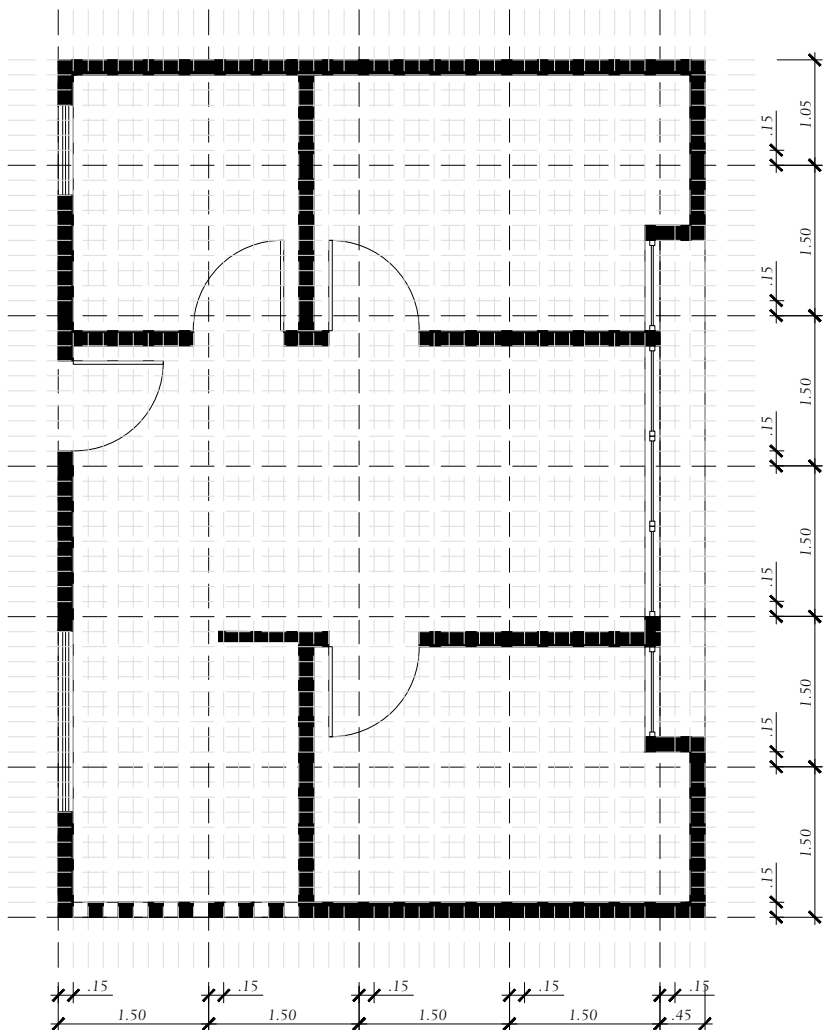
det 01 - corner block binding
see on page 174

det 02

det 02 - "T" block binding
see on page 174

det 01

det 03 - cobogó
see on page 175

2-bedroom apartment (type a)
first layer of cement blocks
scale 1:75

☑ *14x14 cm cement block*
▱ *14x29 cm cement block*
⊠ *14x44 cm cement block*

det 01 - corner block binding
see on page 174

det 02

det 01

det 02 - "T" block binding
see on page 174

det 02

det 01

det 01

det 03 - cobogó
see on page 175

det 02

det 01

2-bedroom apartment (type a)
first layer of cement blocks
scale 1:75

◩ 14x14 cm cement block
▭ 14x29 cm cement block
⊠ 14x44 cm cement block

147

2 bedroom apartment (type a)
oriented north-west
sun shading - no scale

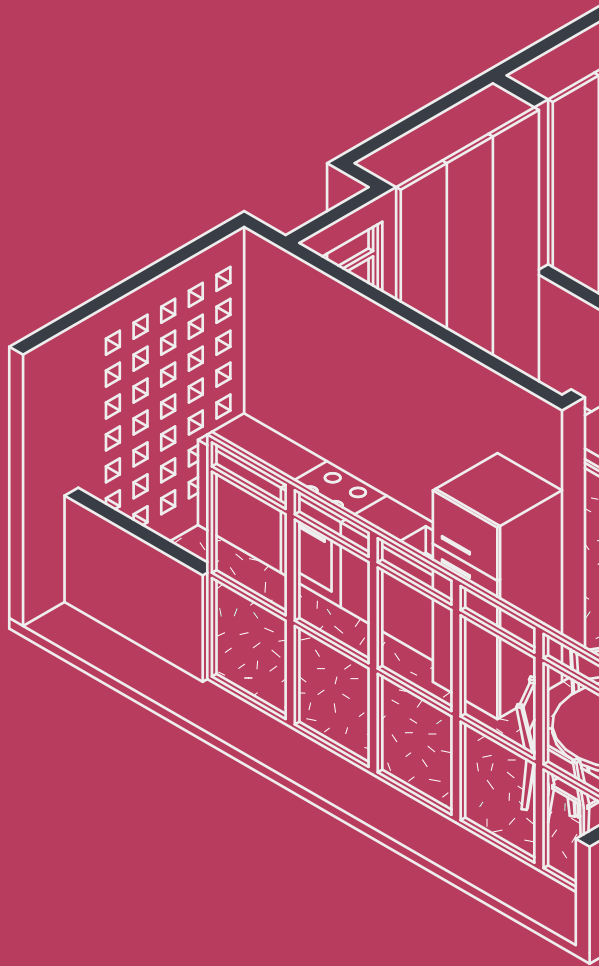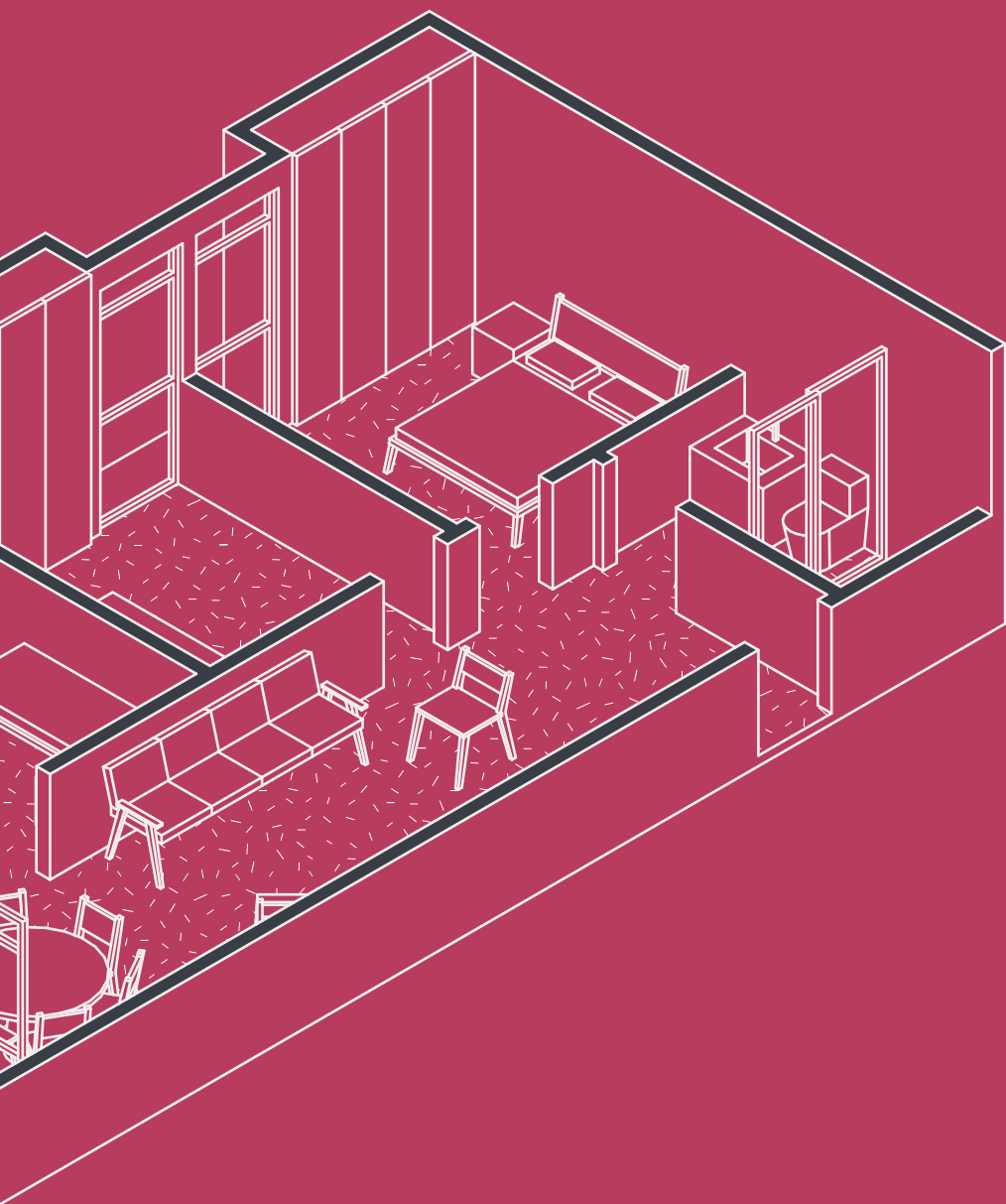*2 bedroom apartment (type a)*
oriented south-east
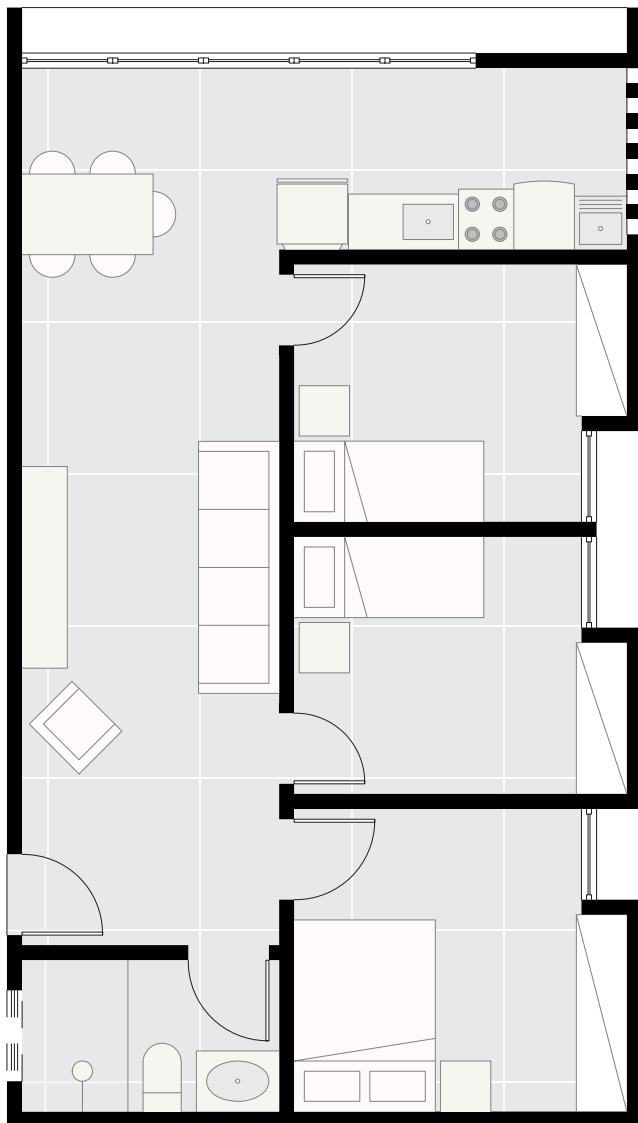*sun shading - no scale*

2 bedroom apartment (type b)
oriented north-west
sun shading - no scale

2 bedroom apartment (type b)
oriented south-east
sun shading - no scale

149
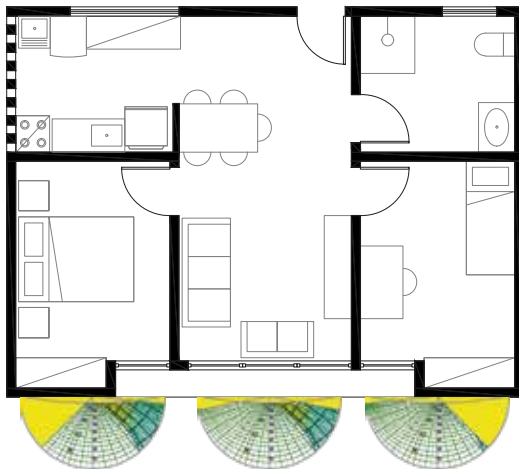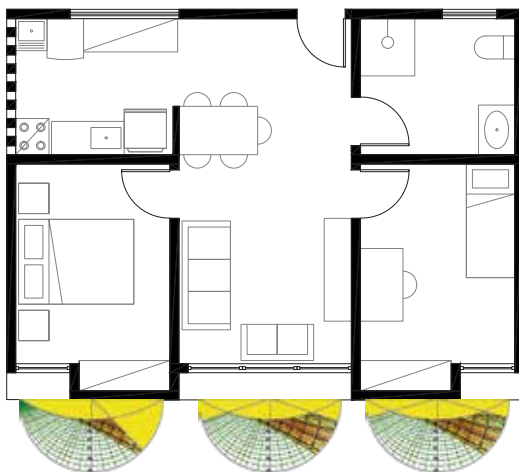
three-bedroom apartment

Designed for a medium family or dwellers that need three different bedrooms, this apartment presents one bathroom and an open concept kitchen, connected to the dining and living room, as well as to the laundry room, reaching an area of 65,88 *sqm*.

The main façade faces either south-east or north-west (in the last case, the façades are shaded by an extra row of horizontal *brises-soleil*). There is also wall of *cobogós*, that permanently ventilates the apartment
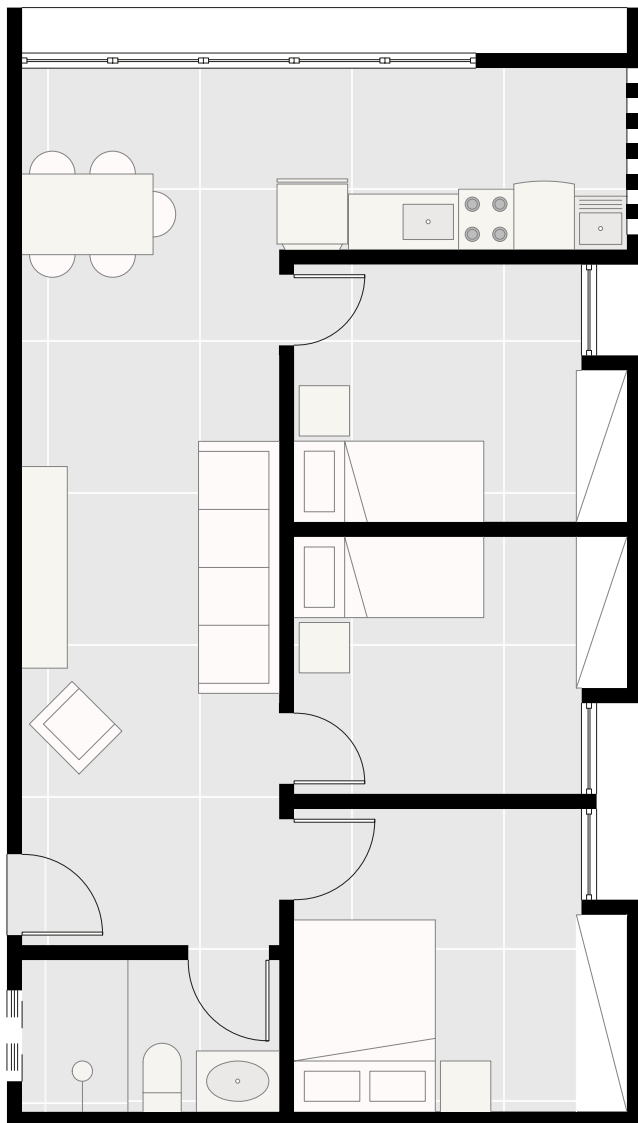
With two unities per pavement, there eight apartments for each building, making it 112 unities for the whole housing complex.
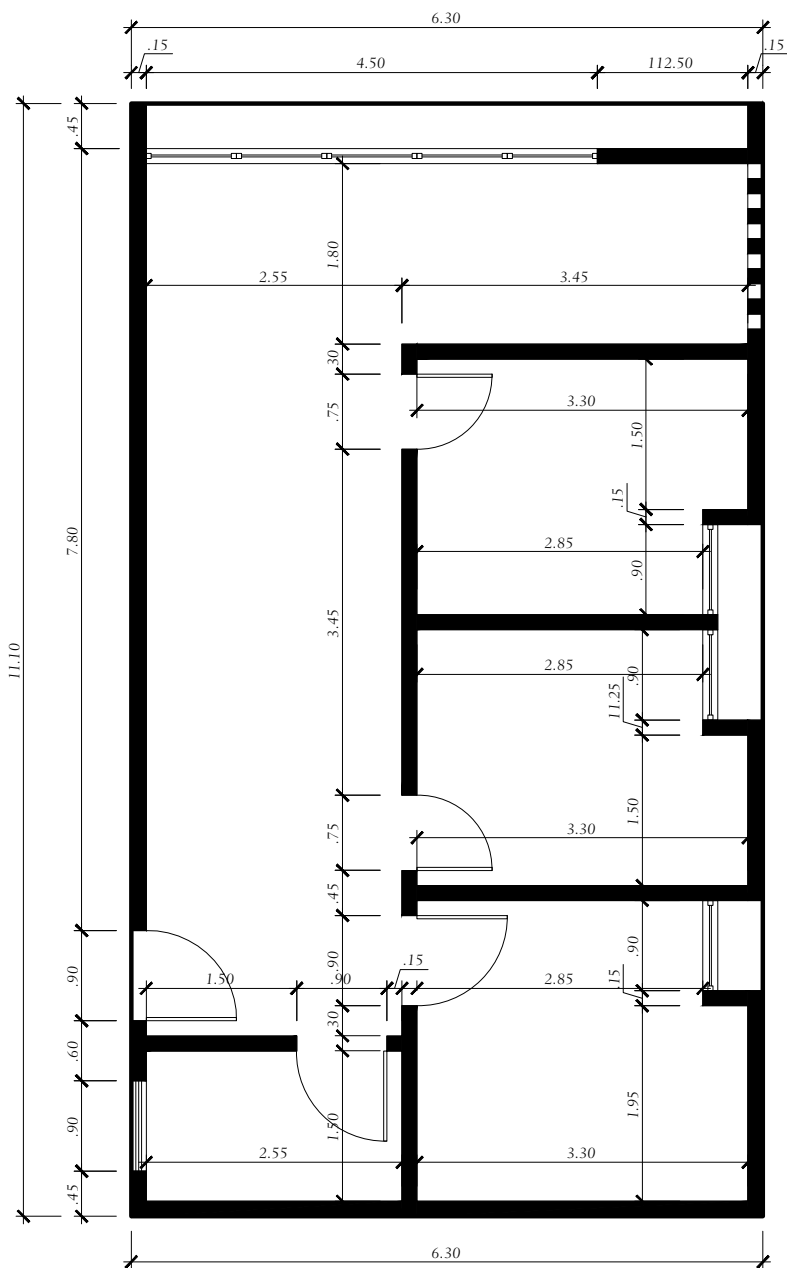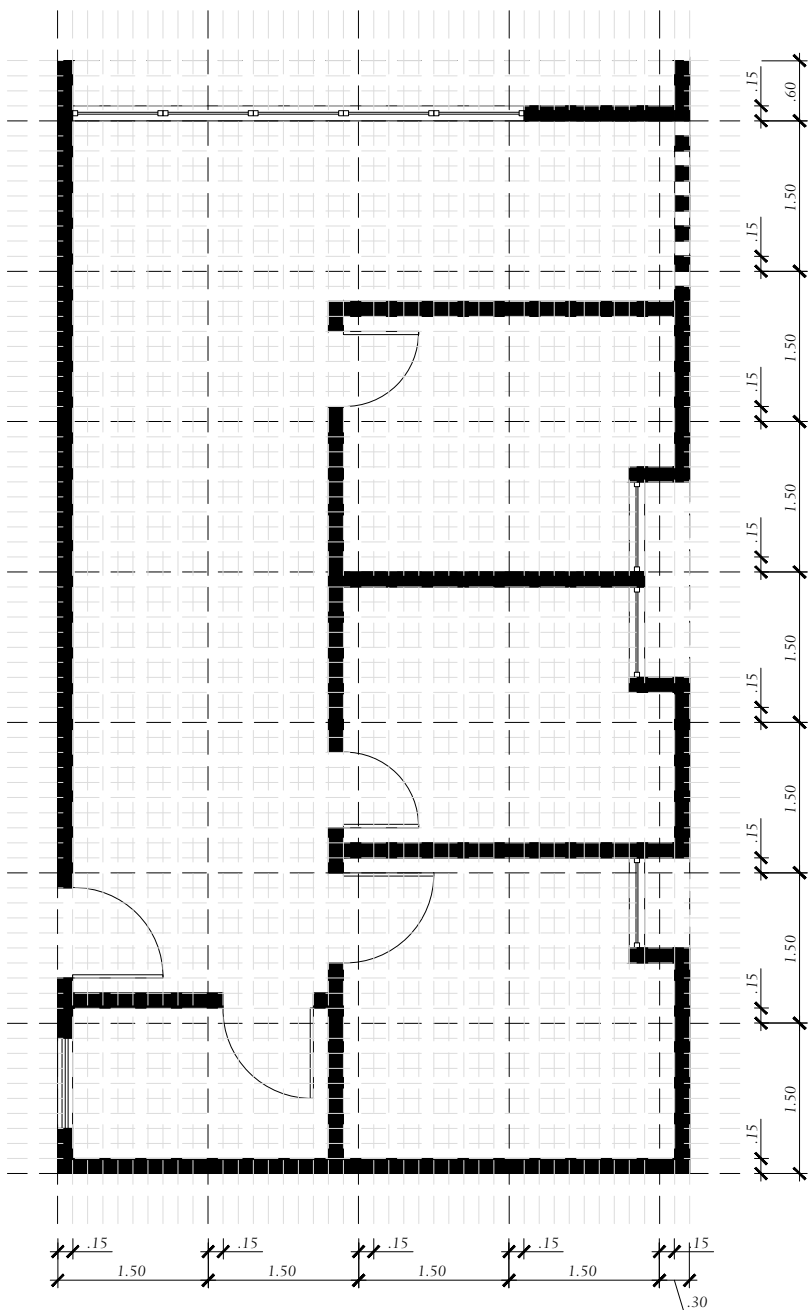
3-bedroom apartment (type a)
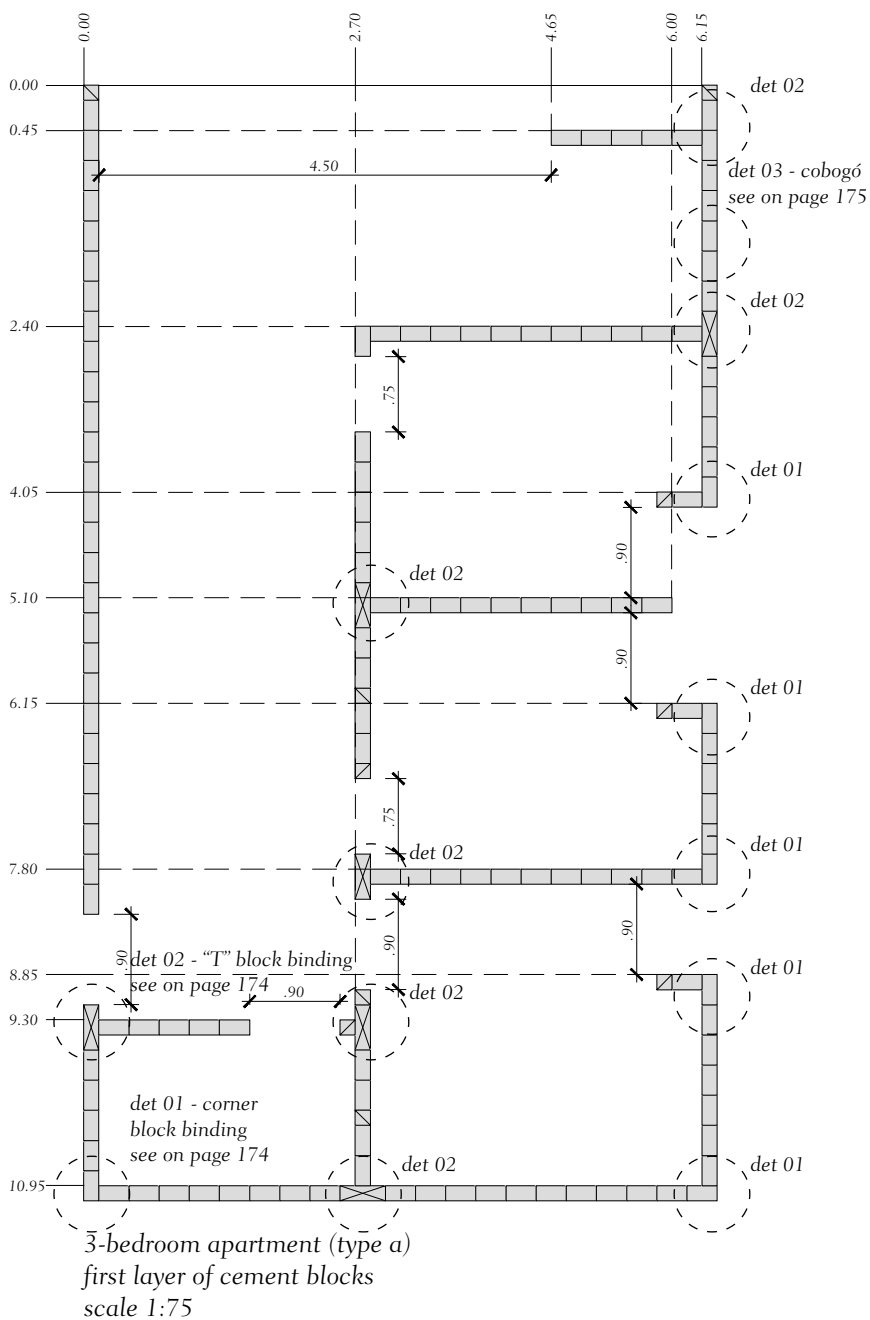*ground floor and second floor*
scale 1:75

3-bedroom apartment (type b)
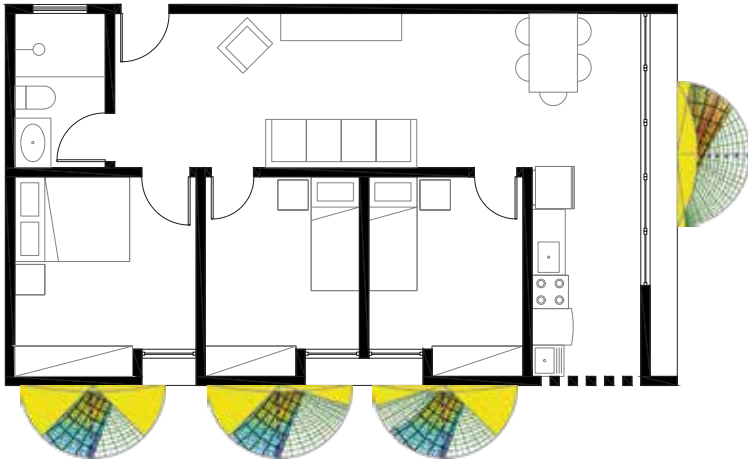*ground floor and second floor*
scale 1:75

3-bedroom apartment (type a)
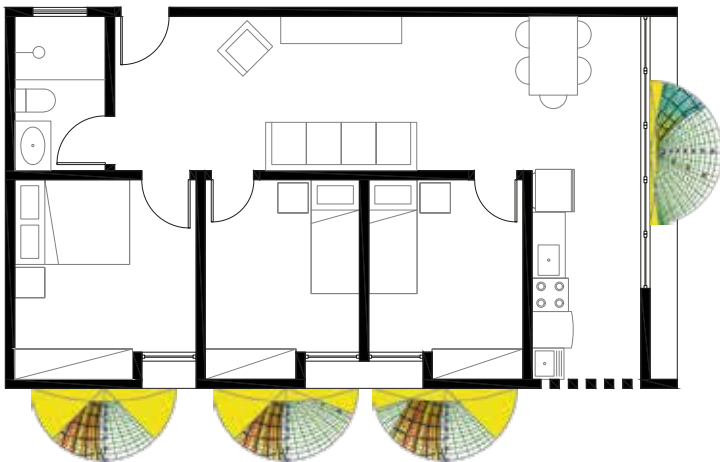*ground floor and second floor*
scale 1:75

154

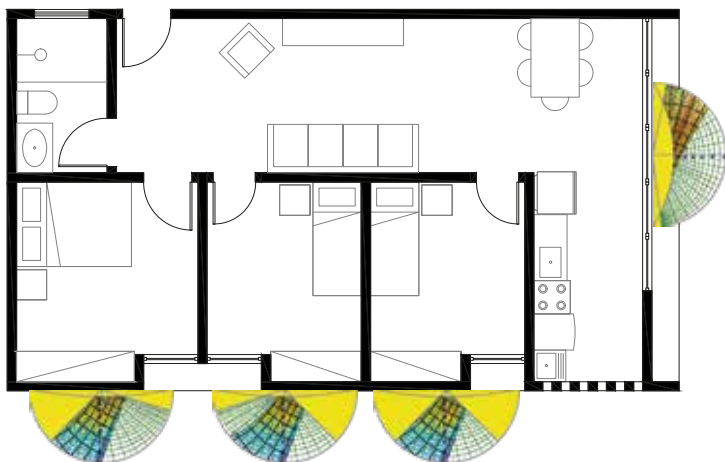*3-bedroom apartment (type a)*
under 15 cm grid
scale 1:75

155

det 02

det 03 - cobogó
see on page 175

det 02

det 01

det 02

det 01

det 01

det 02

det 01

det 02 - "T" block binding
see on page 174

det 02

det 01

det 01

det 01 - corner
block binding
see on page 174

det 02

0.00   2.70   4.65   6.00 6.15

0.00
0.45
4.50
2.40
.75
4.05
.90
5.10
.90
6.15
.75
7.80
.90   .90
8.85
.90   .90
9.30
10.95

3-bedroom apartment (type a)
first layer of cement blocks
scale 1:75

14x14 cm cement block
14x29 cm cement block
14x44 cm cement block

156

3-bedroom apartment (type a)
second layer of cement blocks
scale 1:75

- ▱ 14x14 cm cement block
- ▭ 14x29 cm cement block
- ▨ 14x44 cm cement block

Labels within figure: det 02, det 03 - cobogó see on page 175, det 01, det 02 - "T" block binding see on page 174, det 01 - corner block binding see on page 174

Dimensions: 0.00, 2.70, 4.65, 6.00, 6.15, 0.00, 0.45, 4.50, 2.40, .75, 4.05, .90, 5.10, .90, 6.15, .75, 7.80, .90, .90, .40, 8.85, .90, 9.30, 10.95
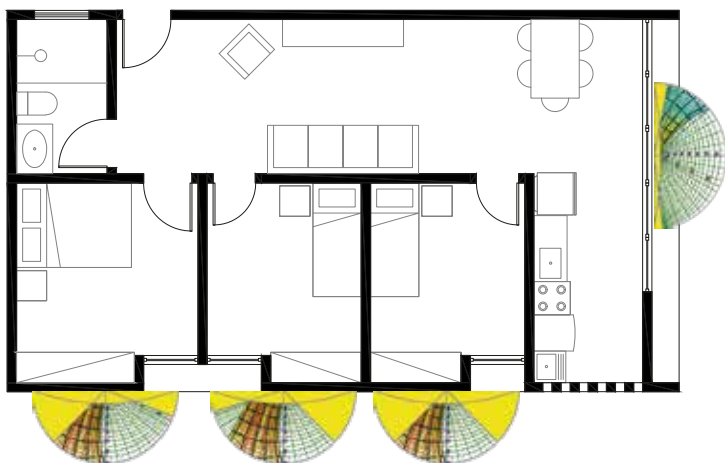
157

3 bedroom apartment (type a)
oriented north-east
sun shading - no scale

3 bedroom apartment (type a)
oriented north-east
sun shading - no scale

3 bedroom apartment (type b)
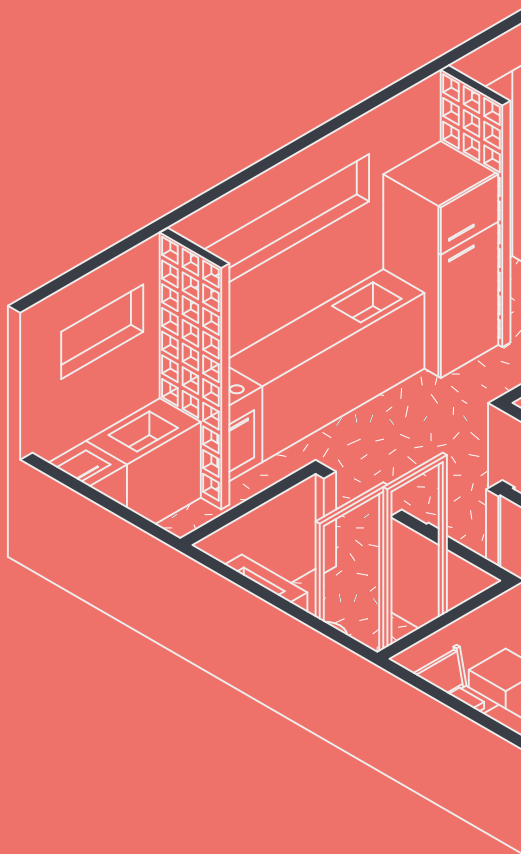*oriented north-east*
sun shading - no scale

3 bedroom apartment (type b)
*oriented north-east*
*sun shading - no scale*

four-bedroom apartment

Designed for a large family or dwellers that need four different bedrooms, this apartment presents two bathrooms and an open concept kitchen and laundry, connected to the dining and living room, reaching an area of 78,33 *sqm*.

The main façade faces either north-east or south-west (in the last case, the façades are shaded by an extra pair of horizontal *brises-soleil*). The lateral façade follows the same shading system as the three-bedroom apartments.
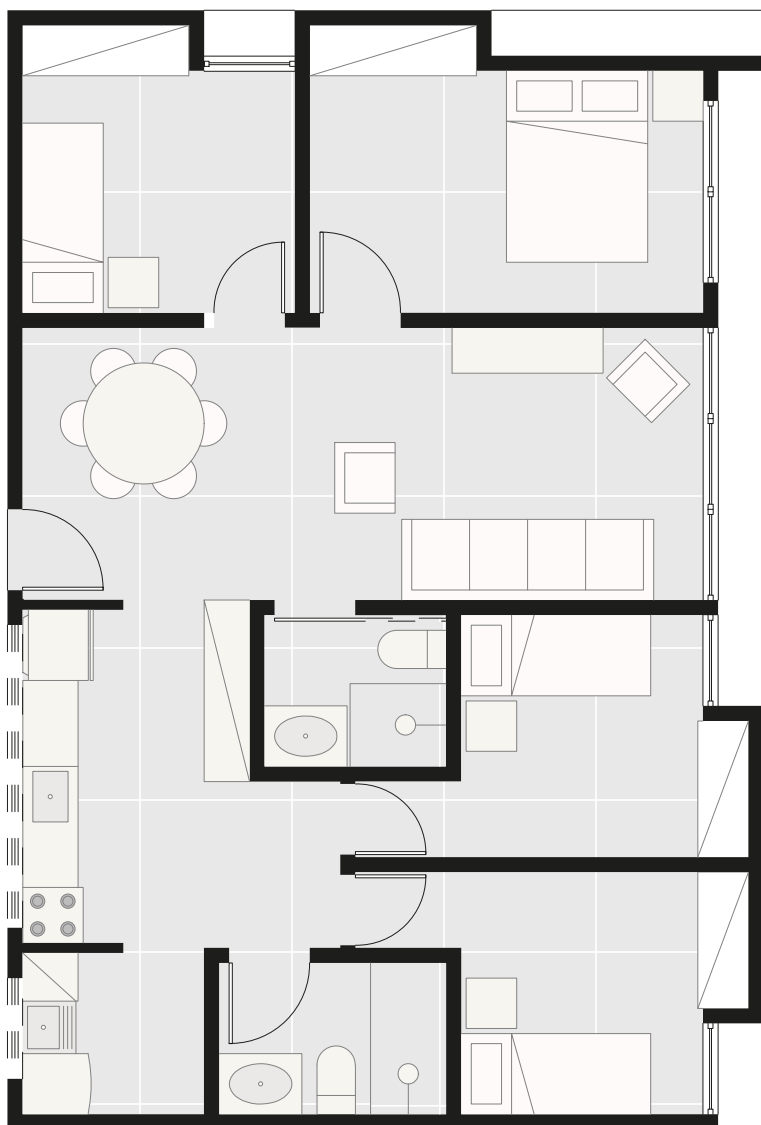
With one unity per pavement, there are four apartments for each building, making it 56 unities for the whole housing complex.
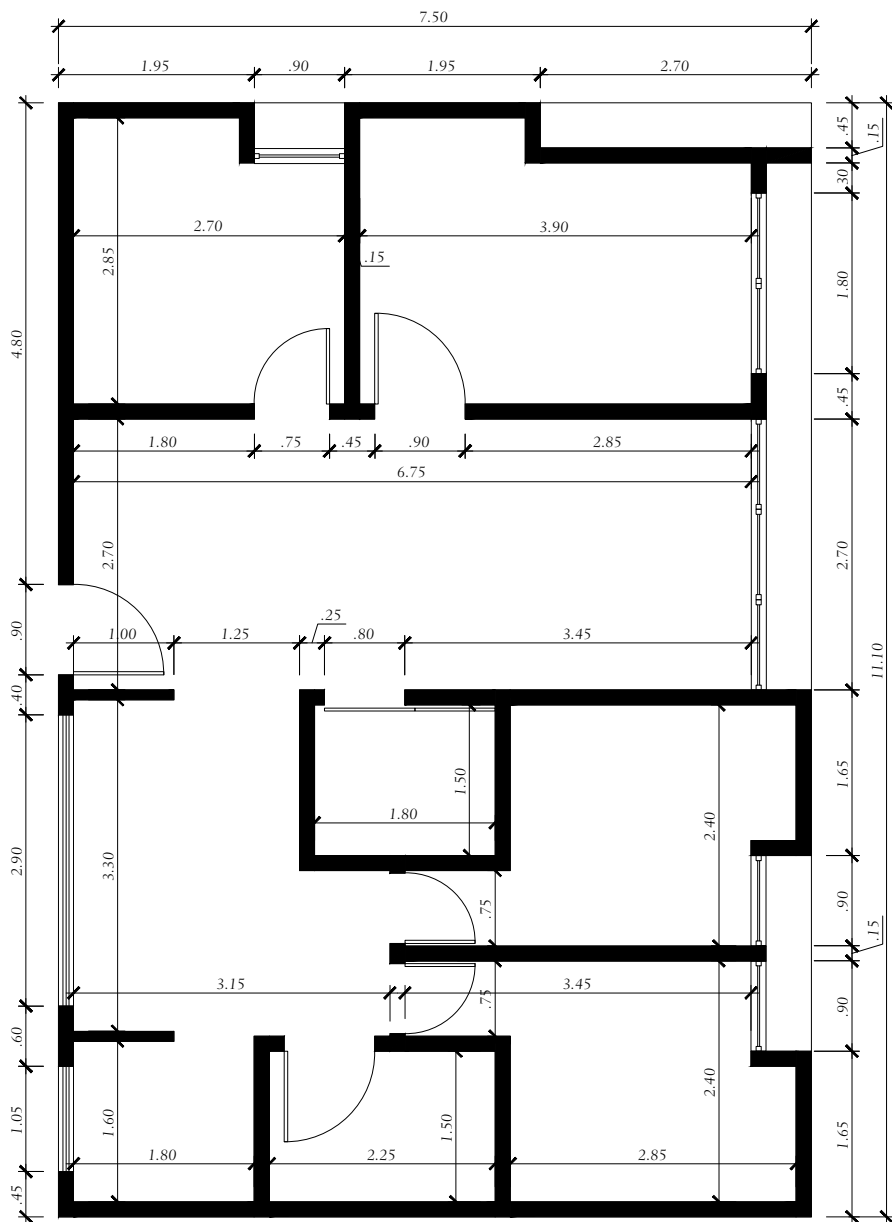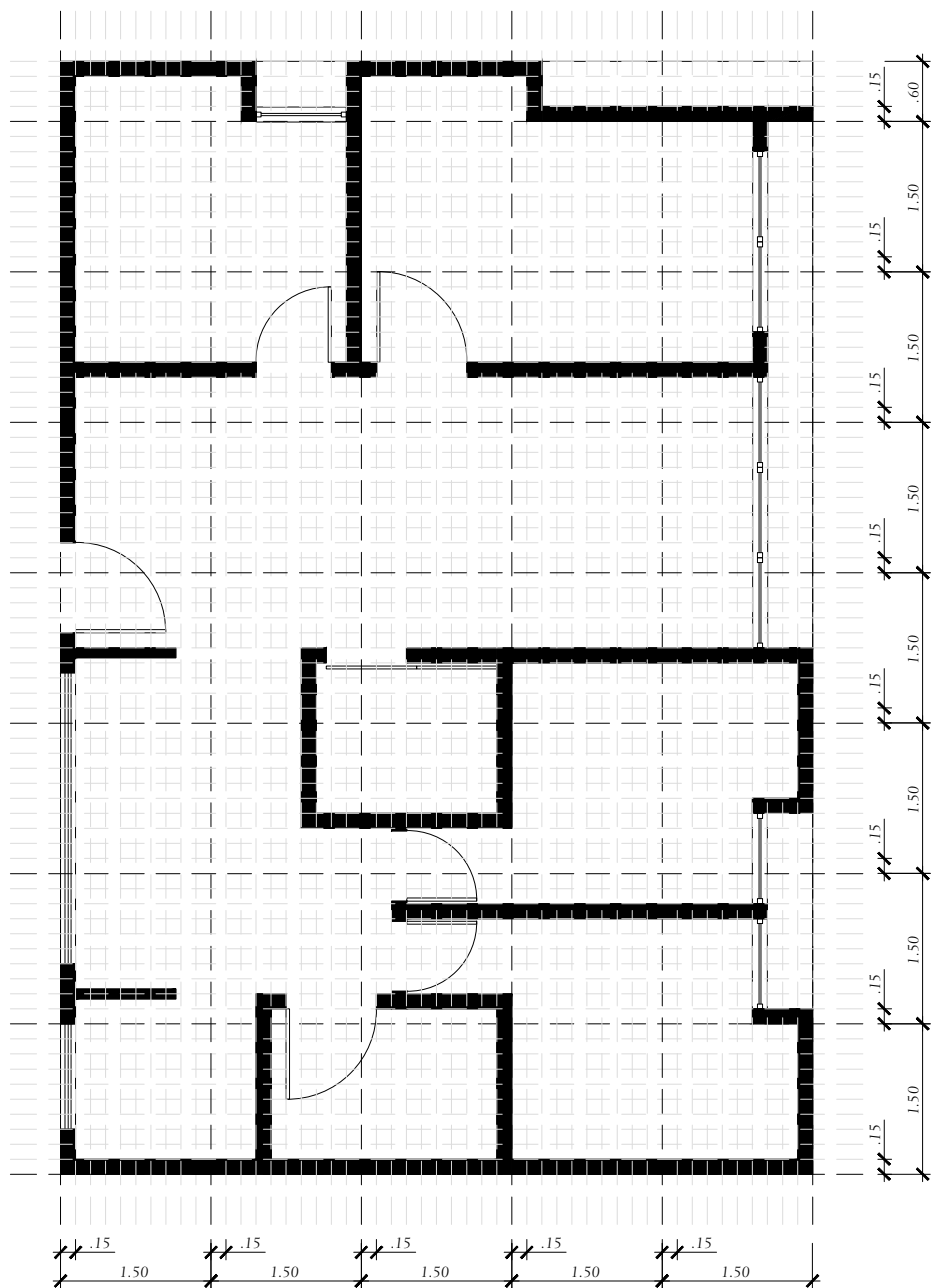
4-bedroom apartment (type a)
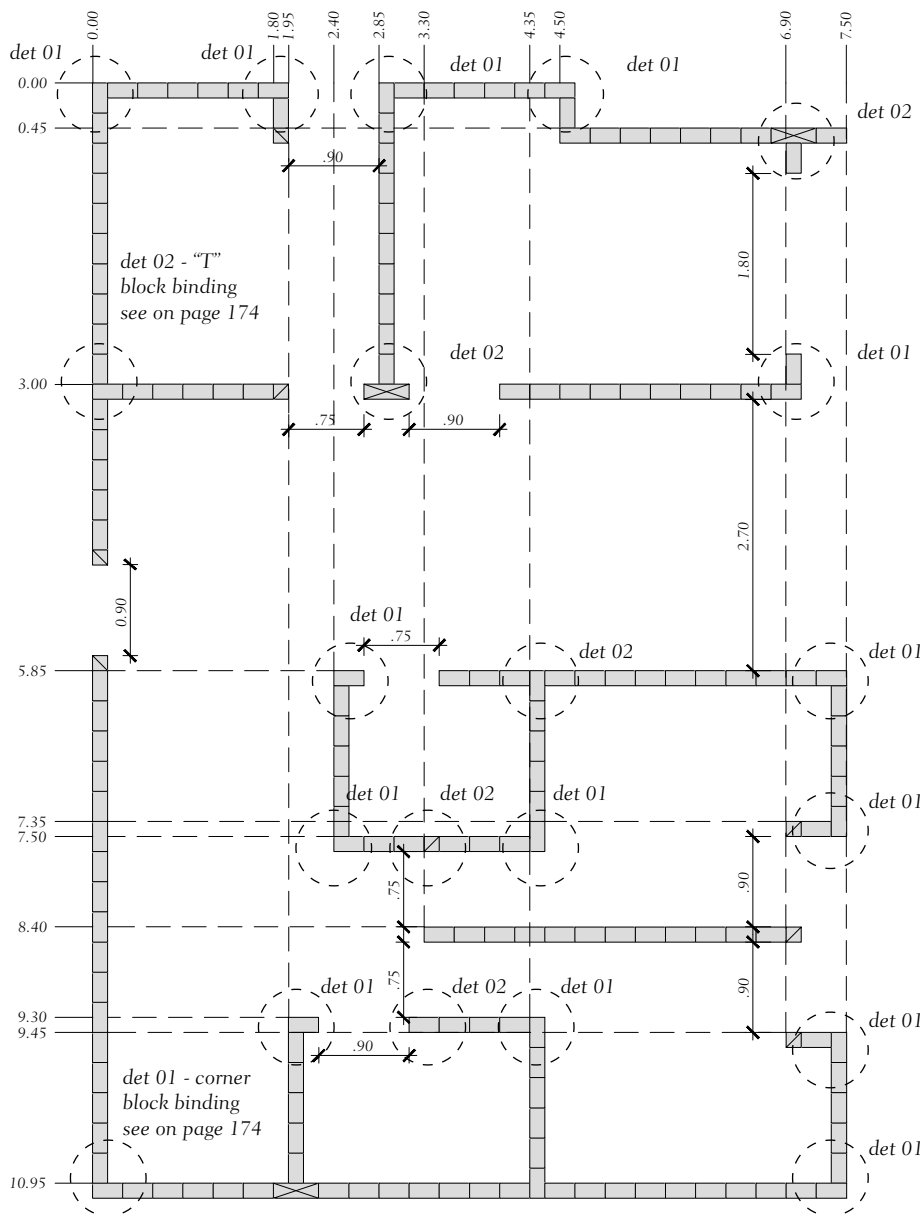*ground floor and second floor*
scale 1:75

162
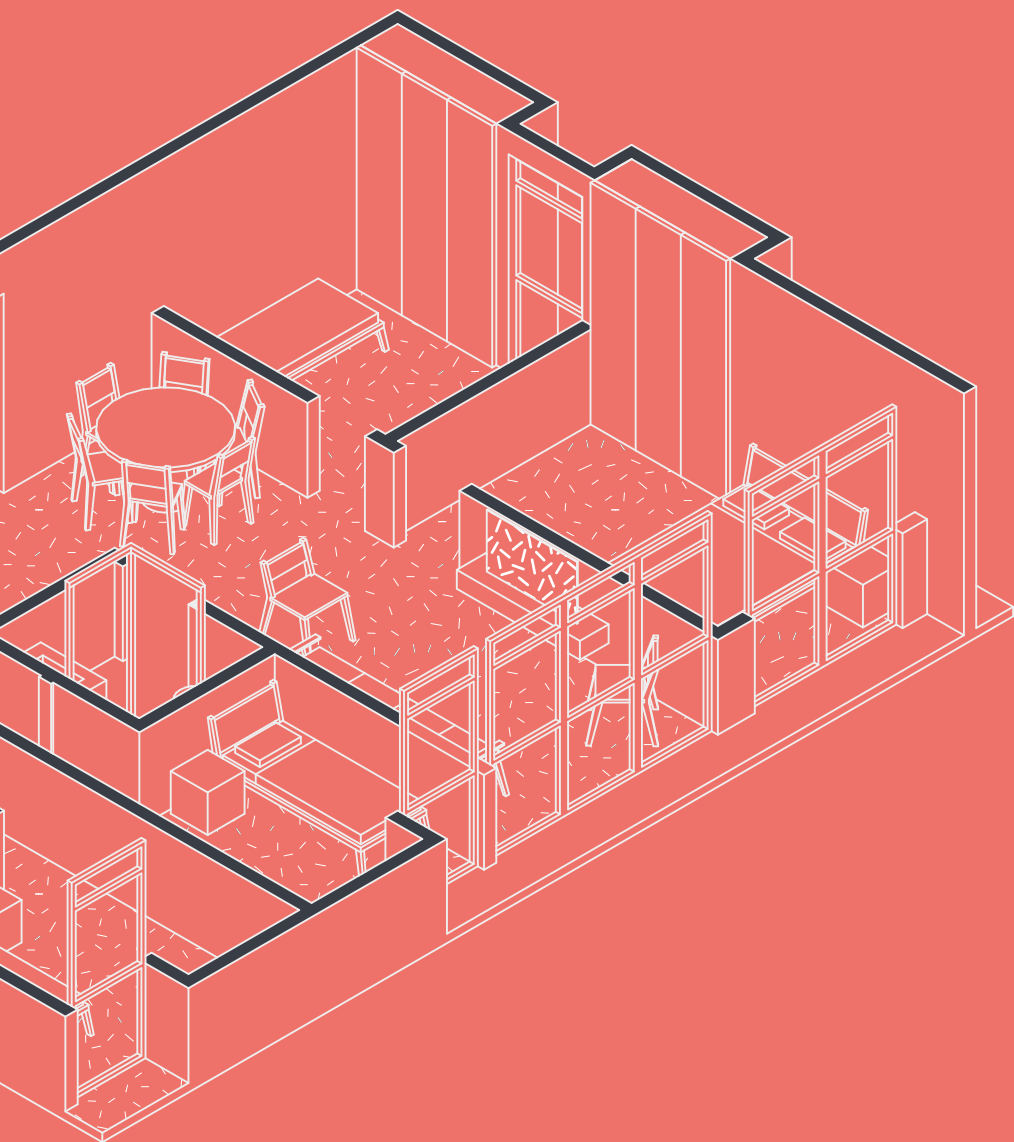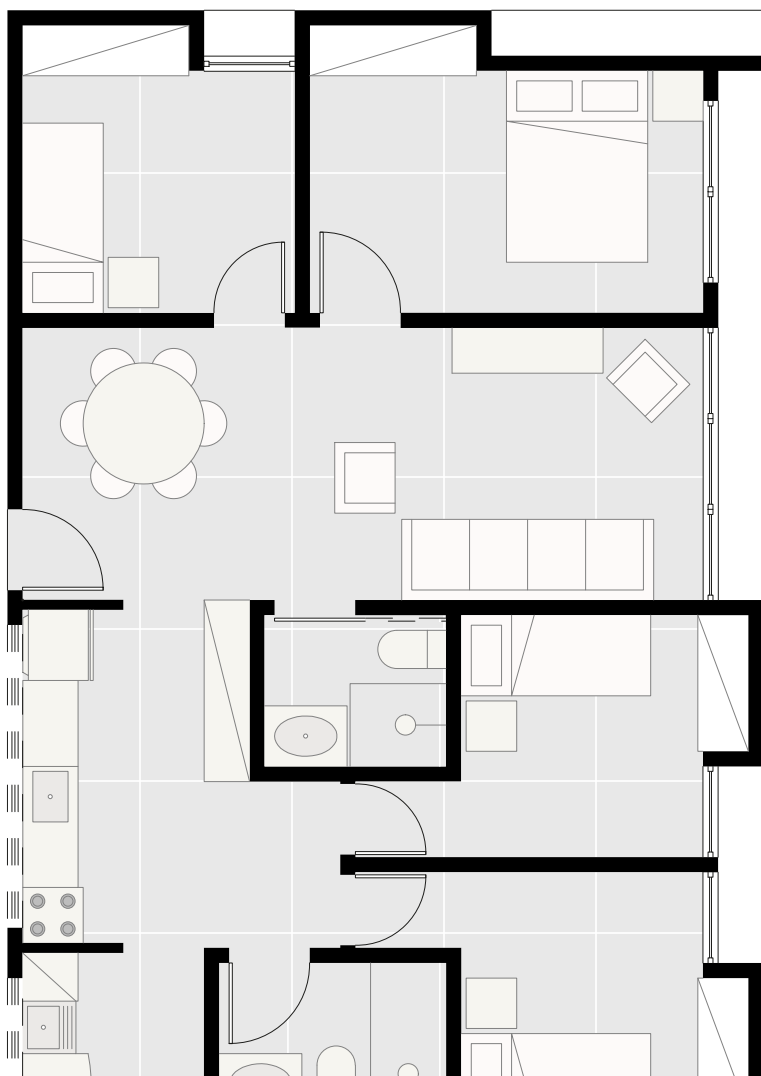
4-bedroom apartment (type b)
ground floor and second floor
scale 1:75

4-bedroom apartment (type a)
164   *scale 1:75*

4-bedroom apartment (type a)
under 15 cm grid
scale 1:75

165

det 01
det 01
det 01
det 01
det 02

*det 02 - "T"
block binding
see on page 174*

det 02

det 01

det 01

det 02

det 01

det 01
det 02
det 01
det 01

det 01
det 02
det 01
det 01

*det 01 - corner
block binding
see on page 174*

det 01

*4-bedroom apartment (type a)
first layer of cement blocks
scale 1:75*

⬛ *14x14 cm cement block*

⬜ *14x29 cm cement block*

⬛ *14x44 cm cement block*

166

det 01   0.00   1.80   1.95   2.40   2.85   3.30   4.35   4.50   6.90   7.50

det 01   det 01   det 01   det 02

0.00

0.45

.90

det 02 - "T"
block binding
see on page 174

3.00

det 02

1.80

det 01

.75   .90

2.70

0.90

det 01
.75

det 02   det 01

5.85

det 01   det 02   det 01   det 01

7.35
7.50

.75

.90

8.40

.90

.75

det 01   det 02   det 01   det 01

9.30
9.45

.90

det 01 - corner
block binding
see on page 174

det 01

10.95

4-bedroom apartment (type a)
first layer of cement blocks
scale 1:75

▨ *14x14 cm cement block*
▢ *14x29 cm cement block*
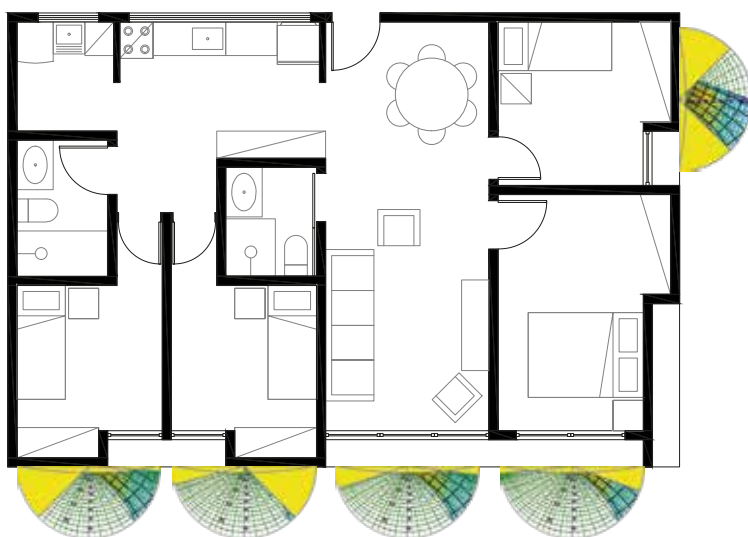⊠ *14x44 cm cement block*

167

4 bedroom apartment (type a)
oriented north west
sun shading - no scale

4 bedroom apartment (type a)
oriented south-east
sun shading - no scale

4 bedroom apartment (type b)
*oriented north west*
sun shading - no scale

4 bedroom apartment (type b)
oriented south-east
*sun shading - no scale*

169
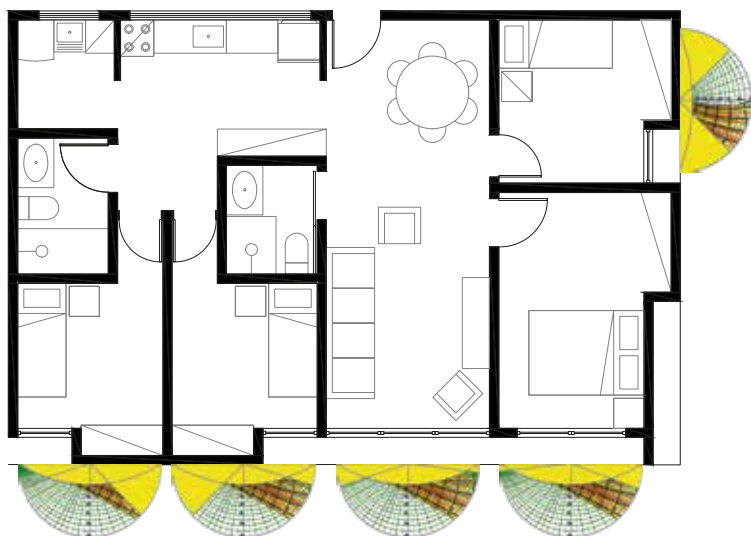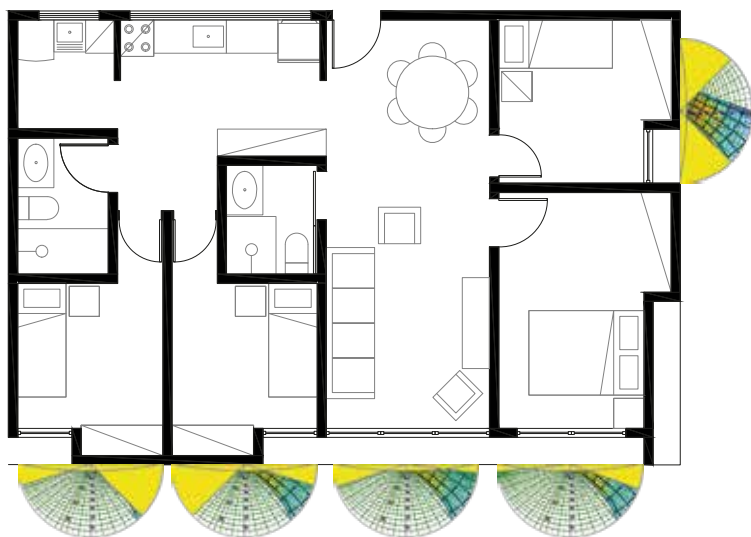
SOLAR STUDIES

Considering the environmental performance of the building, as well as the welfare of the dwellers and the geographical position of the project, it is extremely important to consider the solar incidence over the transparent parts of the façades. In order to ensure this, solar studies were conducted in order to analyse every window in every possible position, according to the different positions of the same project in the 14 different plots.

All the habitational unities were designed considered the high solar incidence of Brasília. Thus, all the windows were set back 45 centimetres from the façade, in order to create

sun-path
with temperature
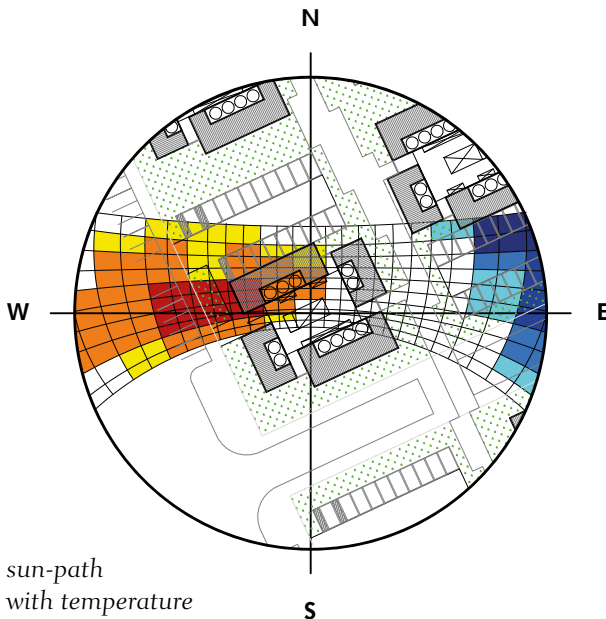
vertical and horizontal obstructions with the own geometry of the building. However, those obstructions were proven not enough for the worse façade orientations.

Every apartment that has its main façades oriented towards south-east and north-east receive the best illumination possible - only during the morning. Thus, those apartments do not need any further shading systems. On the other hand, those turned to south-west and north-west receive the afternoon sun, which is too hot and must be avoided at all costs. In order to fully protect the interiors of those unities, one set of brises-soleil was added for each window facing north-east, and two sets were added for each window facing south-west.
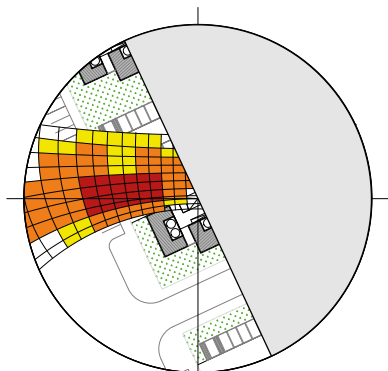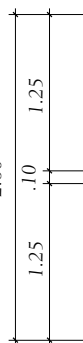

sun-path

south-east façade
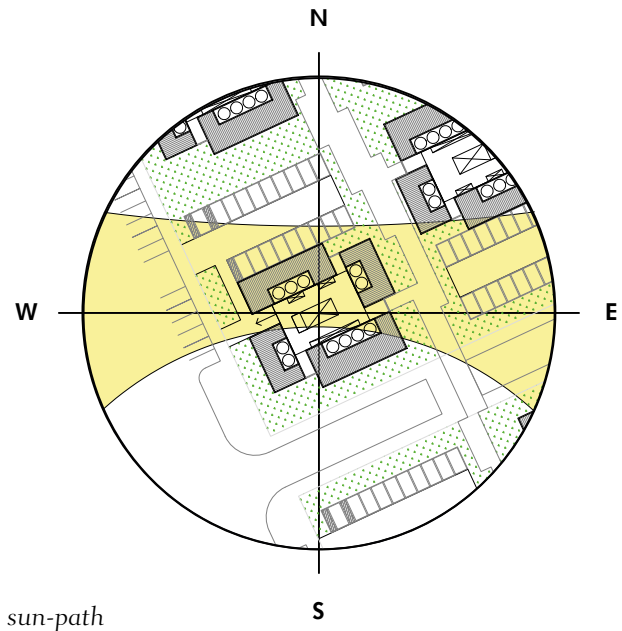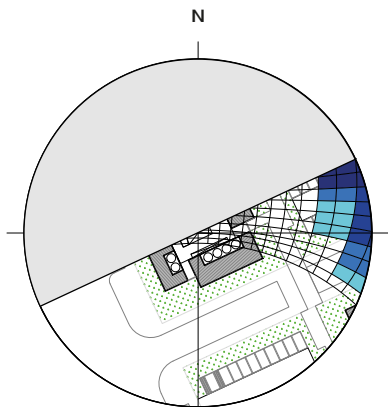
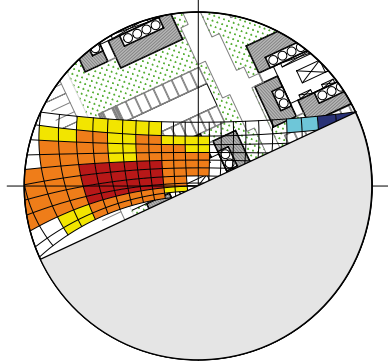south-west façade
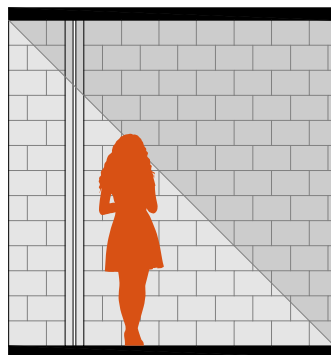
north-west façade

south-east / north-east façades
no shading

south-west façade
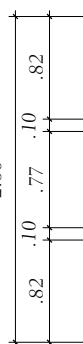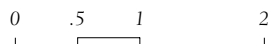one extra brises-soleil

north-west façade
two extra brises-soleil

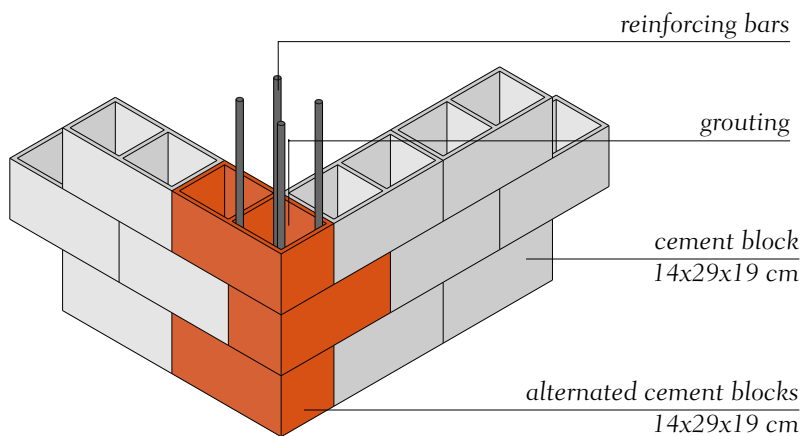0   .5   1   2

C O N S T R U C T I V E   S Y S T E M

Considering the requeriments of the architecture competition, the conditions of access to construction materials as well as the cost-benefit relationship, even though there is a certain loss on the flexibility for future changes in the internal layouts of the housing unities, the chosen material for building the apartment blocks are the CMU - Concrete Masonry Units.

When building with CMU, there is no need of designing the structure separately - the own masonry sustains the building. Thus, it is not necessary to use neither cast *in-situ* concrete, nor its molds, making the construction work simpler and cheaper.

Still, considering that in order to keep the physical performance of each CMU it is not posible to break them as normal clay bricks, the dimensions of the architectural design must follow a modulation based on the size of the CMU family. In the case of this thesis, the chosen CMU family was the Family 29 - in which the basic block has 29x14x19 cm -, which follows a 15 centimetre grid.

Where two or more structural masonry walls meet, the CMU must alternate themselves one over the other, and the structure must be reinforced by stacking reinforcement bars vertically in the blocks' voids, and then grouting them together.

reinforcing bars

grouting

cement block
14x29x19 cm

alternated cement blocks
14x29x19 cm

det 01
corner block binding

reinforcing bars

grouting

cement block
14x44x19 cm

cement block
14x29x19 cm

det 02
"T" block binding

174
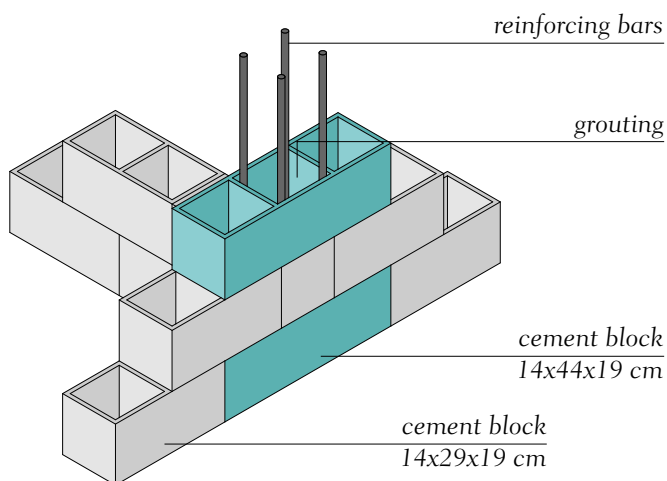
C O B O G Ó

Hollow brick, in ceramic or cement, used for construction of perforated walls, in order to enhance the internal illumination and ventilation (COBOGÓ, n. d.). It was first created by Coimbra, Boeckmann and Góis, three brazilian engineers in Recife, in 1930, and became a symbol for brazilian modern architecture.

The housing unities in this project present cobogós as an alternative for allowing the cross ventilation, and that are build by simply installing the blocks turned 90° to outside, aided by reinforced mordar and reinforced bards and grouting in each row after and before the voids.

reinforcing bars

grouting

cement block
14x14x19 cm

reinforcement
for mortar

ventilation voids

cement block
14x14x19 cm
rotated 90°

cement block
14x29x19 cm

det 03
cobogó
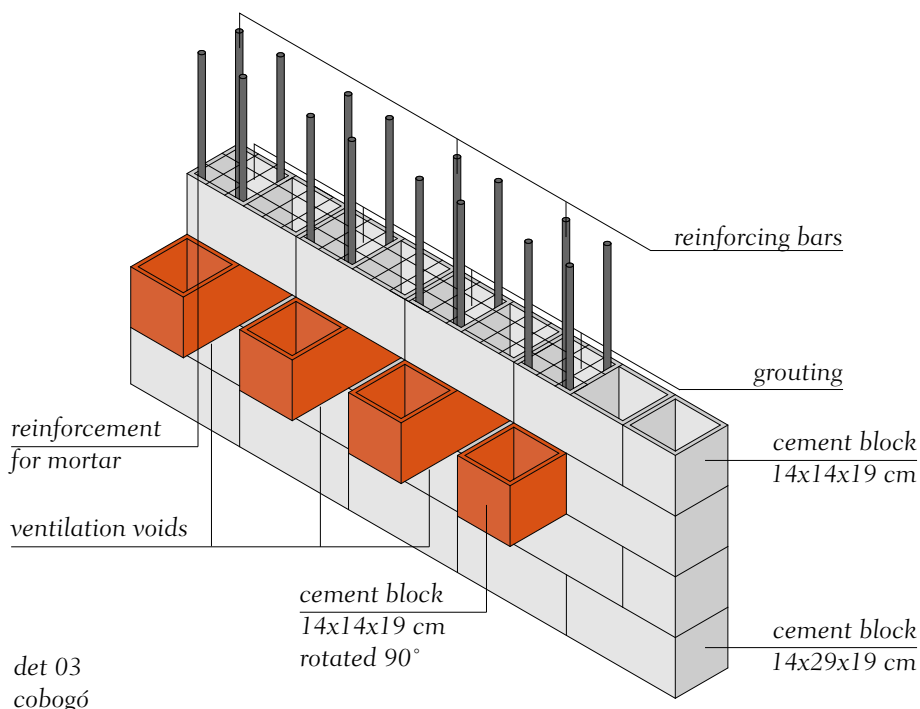
COLOUR - SCHEME

According to Kohlsdorf (2015), in order to make it easy for people to locate themselves in the urban tissue, "matter the information diversity of the façade characteristics, as those build more or less complexes sets."[1] Between those characteristics, one can cite their size (width and height), openings, materials, textures and colours.

Since this project repeats itself fourteen times, one beside the other, the simplest characteristic to change was the colour. Thus, it was decided to select seven different colours, and paint two buildings with each of those.

In Portuguese, Sol Nascente means literally rising sun. Based on that, a colour palette based on the sunrise was proposed, starting on a serene blue and passing through orange, coral, pink, beige, yellow and light blue.

Due to the constructive system, there is no need to apply paint over the finished surface. Thus, the paint shall be applied only over the window's setbacks on the façades, remaining only a visual remark for the passants.

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1 *"Importa à topocepção da área considerada a diversidade informativa das características de fachadas, conforme construam conjuntos mais ou menos complexos."*

177
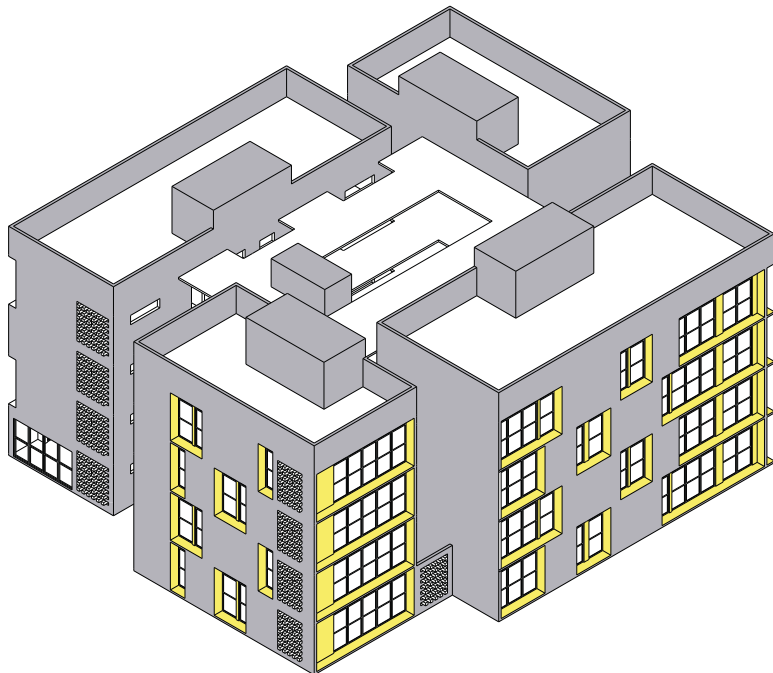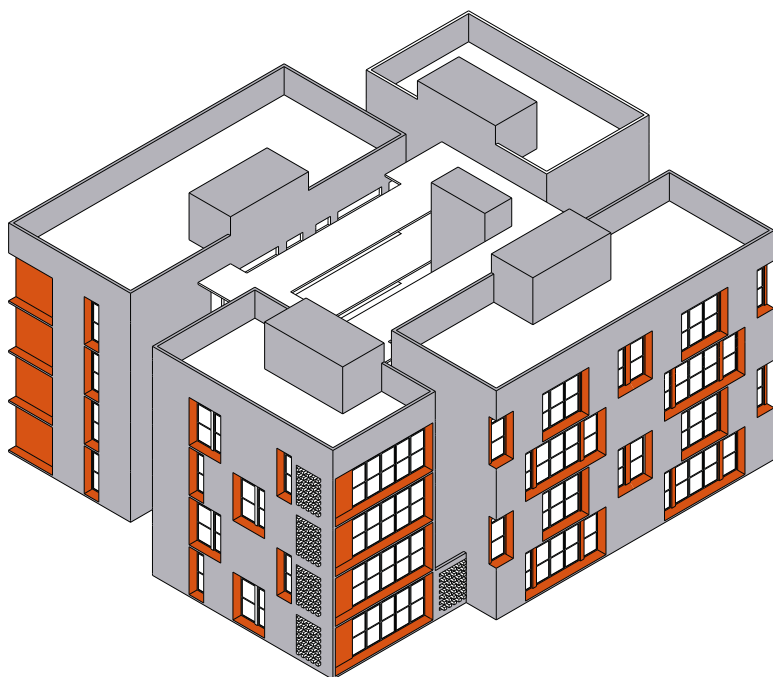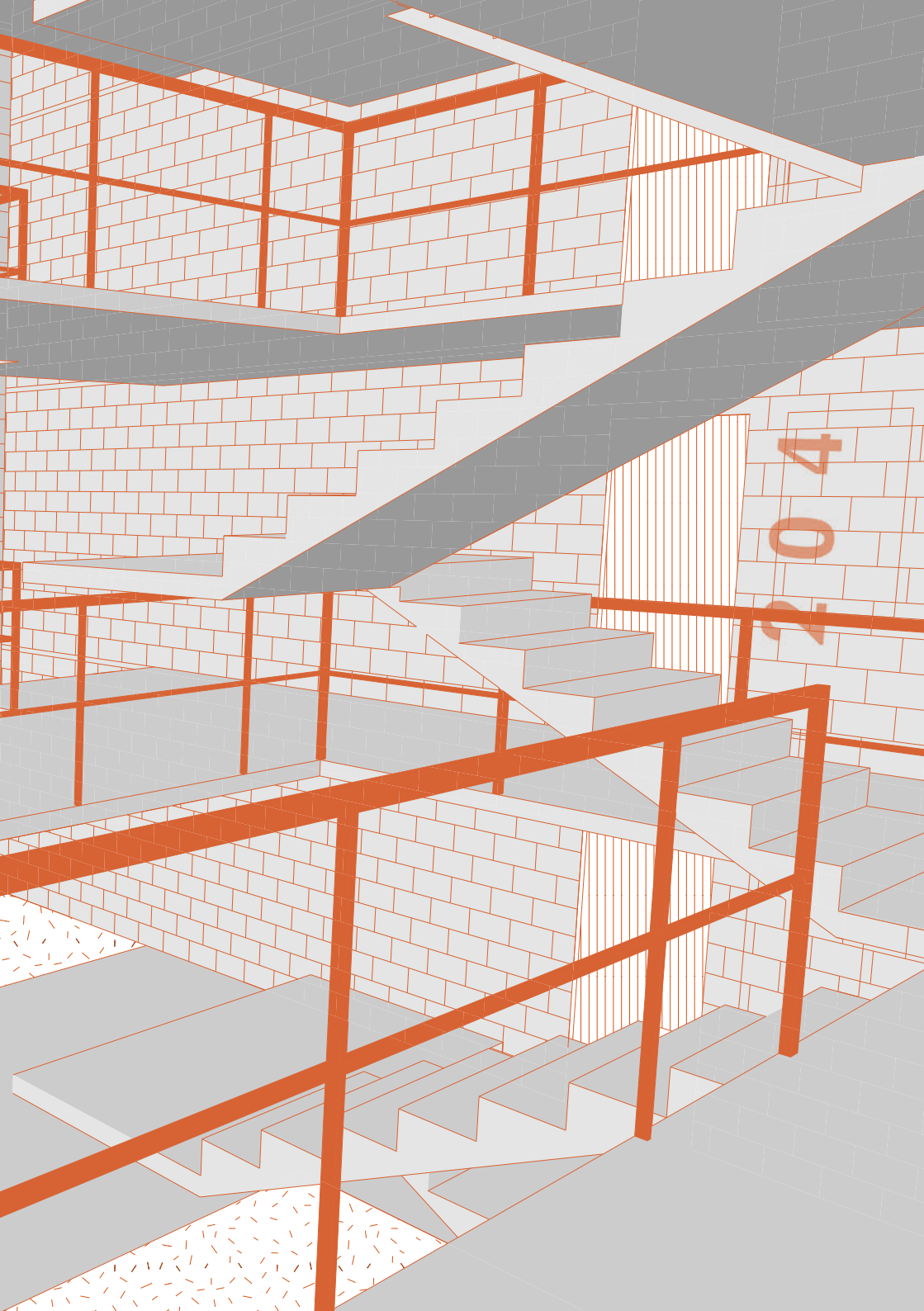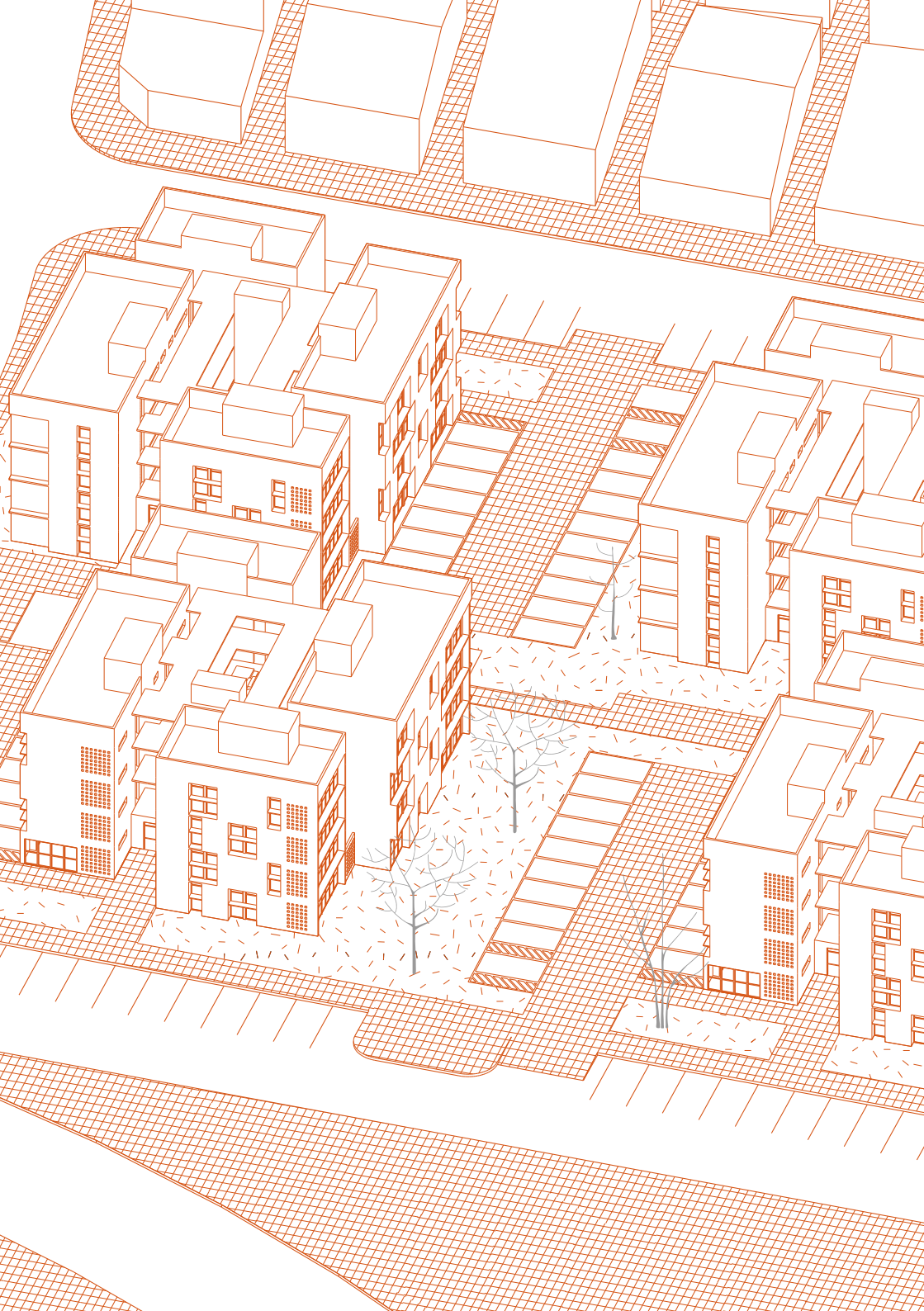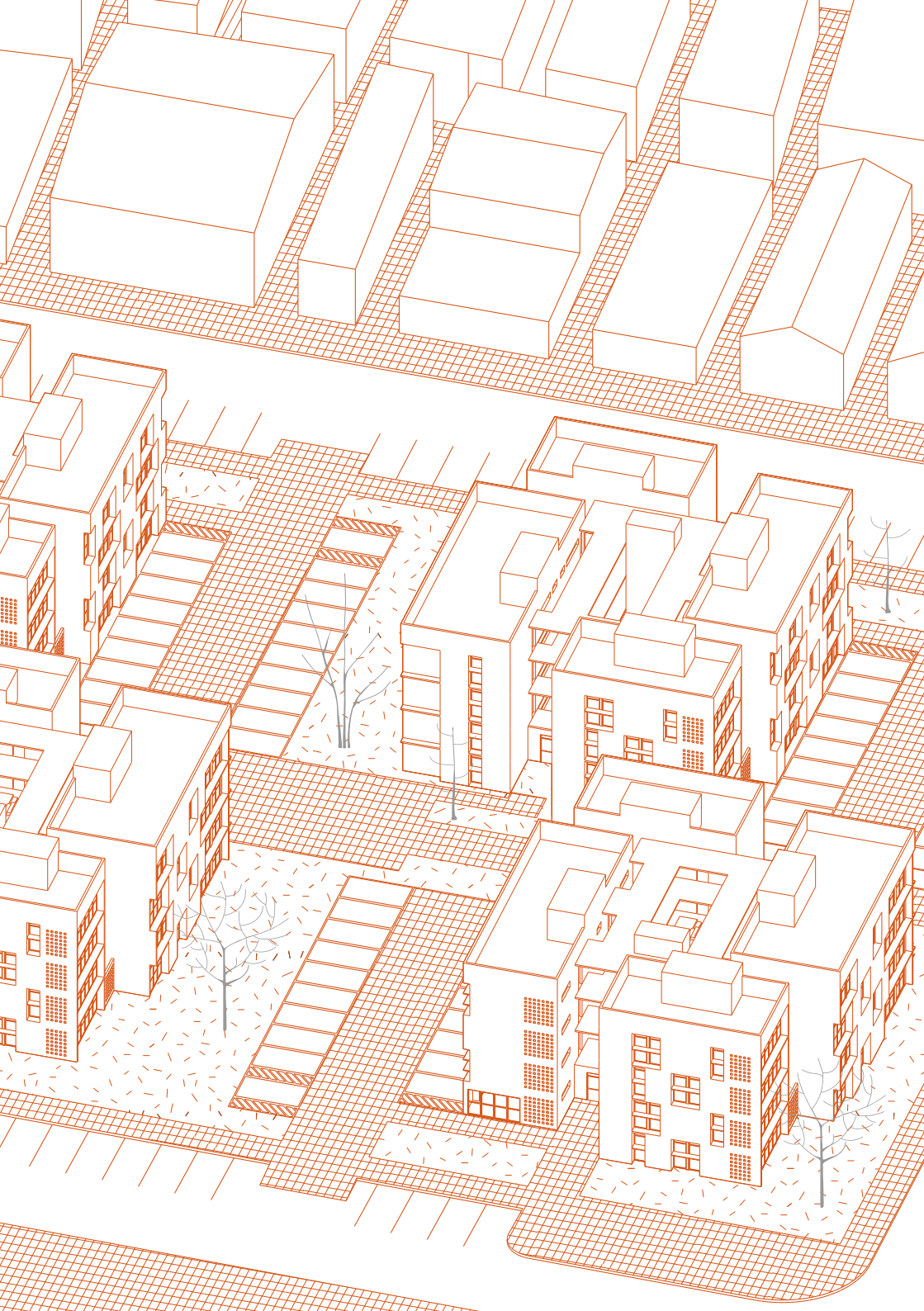
dis-
cus-
sion

SOCIAL ECONOMICAL ENVIRONMENTAL ANALYSIS

innovation
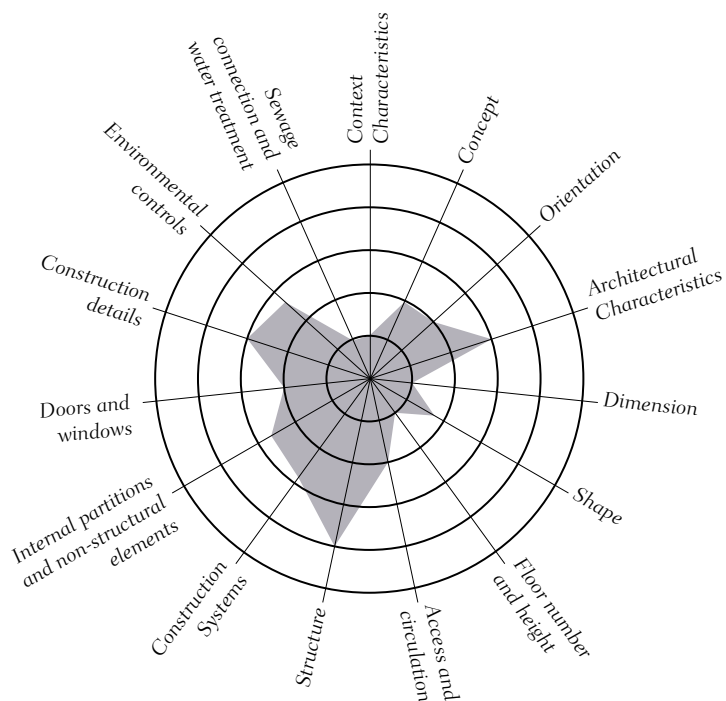
By analysing the building characteristics considering the degree of innovation of each category (from 0-4/irrelevant to radical), one generates the graphic above – in which one perceives which are the most important innovation aspects of this thesis' project.

Taking account of the objectives of the architecture competition, it was less important

to reach a high level of innovation than to reach a high level of economic and social sustainability.

Architectural characteristics, structure and construction systems are the categories with the highest degree on innovation, considering especially the modularity and lack of need of a separate structural project, and how those choices were taken as the basis for every architectural decision.

Other categories, for instance sewage connection and water treatment, have reached a rather low level of innovation for not being considered in the project. Floor number and height and context characteristics are also in lower levels because of the simplicity of these parameters.

d e c i s i o n - m a k e r

Builder
4%

Industry
13%

Designer
52%

Institutions
20%
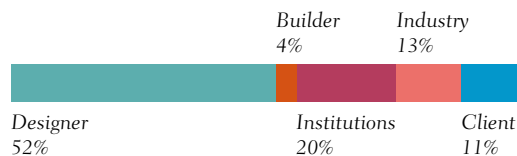
Client
11%

The main responsible for making the decisions for the building are the designer (52%), the institutions (20%) and the industry (13%). The Government of Distrito Federal represents the institutions but also the client, since the initiative of publishing the notice for the competition was theirs. The industry has some power on decision-making due to the availability of products in the region.
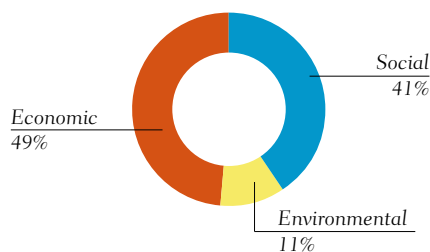
Economic
49%

Social
41%

Environmental
11%

Analysing the sustainable approach of the Building Characteristics, one can perceive that the economic aspect of the project has the biggest role (49%), followed closely by the social aspects (41%), being a social housing complex. Due to the strong social and economic approach of ths project, the environmental sphere remains with only 11% of the total.

CONCEPTUAL ANALYSIS
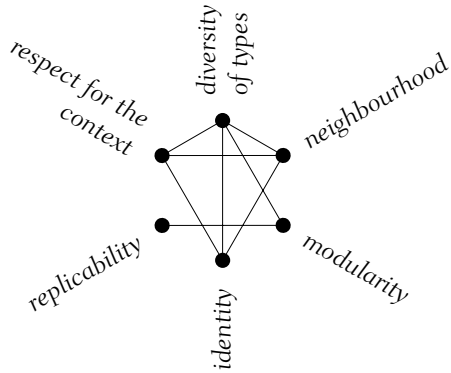
The starting point of the conception of this architecture project was based on six key-concepts, chosen after each selected case-study, namely respect for the context, for Reidy's Pedrgulho, diversity of types, for Niemeyer's Copan, neighbourhood, for ELEMENTAL's Quinta Monroy, modularity for Terra e Tuma's Casa Vila Matilde, identity for ELEMENTAL's Villa Verde and replicability for Souto de Moura's Casas das Sete Cidades. For each of those concepts, several of architectural choices were made.

In order to keep the respect to the context, the setbacks were set 5 meters away from the limits of every plot - in order to keep the permeability of the streets and the voids and spaces.

The insertion of four types of apartments and still one small store and the multi-purpose condominium room in the ground floor assures the diversity of types. Having one bedroom studios and two, three and four bed-

room apartments in a housing complex makes it possible to house many kinds of different families - not only one type of family needs access to social housing.

The positioning of the blocks, the long linear garden in-between the buildings, as well as the position of one small store per building create the feeling of neighbourhood - the dwellers can relate to smaller public spaces around their own blocks, developing a sense of property that will make them want to take care of the space as if it was theirs.

Considering the cement masonry units constructive system, the whole project must be fitted into a grid of 15x15cm - so there are no losses of bricks. Taking advantage of that, also the windows and doors were all designed to fit this grid: the doors have either 75cm or 90cm, and the windows are all based on a 90cm module.

The usage of colours in the façades of each building is an attempt not only to create different layers of information in order to facilitate the localization of the passers-by. Having a colour assigned to one's own building gives the users the sensation of identity inside the repetition.

As asked in the competition and assumed in this project, only one building was developed to be replicated in the 14 existent plots – and possibly in another location with similar dimensions, if needed, as said by Alejandro Aravena.

C O N C L U S I ON

To design a Social Housing Complex in a sensible urban context following also the requirements of a governmental architecture context is a complex challenge. The welfare of the occupants of the housing unities is the first thing to be studied, but also the impact on the neighbourhood, that lacks basic infrastructure.

Taking account of the socioeconomic data provided by the latest census, as well as referring to canonical architecture projects of affordable housing, this project aims to create good quality housing for the lowest-income population, that does not lack in quality and comfort, and is still economically viable. The diversity of typologies was a key concept, in order to cover the most possible combinations of family types, as well as the intention of building small habitation cores that would awake a sense of community in the future dwellers.

By following those concepts along with the use of constructive systems that are known to reduce the costs of construction, as well as understanding the needs of the families that might later enjoy this project, it is possible to create good quality architecture even in a limited budget in difficult conditions. Nowadays Social Housing must not be a synonym for poor design.

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image 01 (next page): sky view from the Sol Nascente Sector (from: https://temas.folha.uol.com.br/reef/reportagens-e-analises/com-mesada-de-r-13-bi-da-uniao-brasilia-e-ilha-da-fantasia.shtml)

image 02: The City of St. Salvador and its Harbour (John Harris, 1744) (from: http://www.bahia-turismo.com/salvador/seculo-18.htm)

image 03: Candangos standing over the slab of the Brazilian Parliament. author: Marcel Gautherot. (from: https://ims.com.br/exposicao/marcel-gautherot-bresil-tradition-invention/)

image 04: building of the Brazilian Parliament. author: Marcel Gautherot. (from: https://ims.com.br/exposicao/marcel-gautherot-bresil-tradition-invention/)

image 05: building of the dome of the Brazilian Parliament. author: Marcel Gautherot. (from: https://www.archdaily.com.br/br/01-81125/brasilia-em-construcao-por-marcel-gautherot)

image 06 (next page): construction site of the Federal Ministries, in the Esplanada dos Ministérios. (from: http://especiais.g1.globo.com/distrito-federal/2018/operarios-concretados-nos-predios-de-brasilia-mito-ou-verdade/data/construcao-de-brasilia-4_src.jpg)

image 07: street spacing on Vila IAPI (1971). author: Aldo Paviani

image 08: commercial activities and everyday life on Vila IAPI (1970). author: Aldo Paviani

image 09: wooden shacks in Ceilândia in 1971. (from: https://omensageiro77.wordpress.com/2015/02/14/casa-de-madeira-no-sudeste-ja-foi-bem-comum/)

image 10 (next page): informal settlement Vila Amaury, one of the Satellite-Cities removed to Ceilândia. In the back there are the Brazilian Parliament and the Palace of the Presidence. (from: ibid)

image 11: City Centre of Ceilândia in 1970.(from: http://www.cronologiadourbanismo.ufba.br/apresentacao.php?idVerbete=1625)

image 12: aerial view from Sector Sol Nascente. author: Jorge William. (from: https://ogimg.infoglobo.com.br/in/22882454-182-a00/FT1086A/ 652/x76741561_BRASILBrasiliaBSBPA 14-05-2018PAEspecial-para-a-Revista-Epoca-sobre-a-comu.jpg.pagespeed.ic.q3-YonSy2n.jpg)

image 13: dwellers from Sector Sol Nascente and their home.(from: ibid)

image 14: people with defficiencies find several difficulties in moving around Sector Sol Nascente (from: https://www.metropoles.com/distrito-federal/sol-nascente-uma-comunidade-ainda-longe-de-ser-vitrine-no-df)

image 15: dwellers walking over unpaved streets in Sector Sol Nascente. (from: ibid)

image 16: main access to the building on the third floor over pilotis: view over the landscape is preserved and public. (from: http://www.hiddenarchitecture.net/2018/02/pedregulho-housing-development.html)

image 17: main façade (from: ibid)

image 18: floor plans (from: ibid)

image 19: internal circulation (from: ibid)

image 20: aerial view from Copan Building (from: https://www.flickr.com/photos/89142790@N00/3193461022) author Sergio Tanaka

image 21 (next page): main façade from Copan Building (from: ibid) author Sergio Tanaka

image 22: typical floor [from 13th to 32nd pavement. no scale (from: http://www.vitruvius.com.br/revistas/read/arquitex-

tos/13.151/4630)

image 23: detail from the building's brise-soleil (from: https://arteforadomuseu.com.br/wp-content/uploads /2013/05/20110406-_MG_6777.jpg)

image 23: main façade (https://i.pinimg.com/originals/ac/dd/9b/acdd9be1b4869a1d-e573d8b86f881f5a.jpg)

image 24: main view (from: https://arcspace.com/wp-content/uploads/CropUp/-/media/918127/Quinta_Monroy_Update_Image%2001.jpg)

image 25 (next page): main view of housing complex after post occupation alterations (from: http://www.mfa.fi/files/mfa/tiedote-materiaalit/GA-AA-Iquique8.jpg)

image 26: ELEMENTAL's sketch (from: https://arcspace.com/wp-content/uploads/CropUp/-/media/918204/Quinta_Monroy_Update_Image%2002.jpg)

image 27: internal street after post occupation alterations (from: https://arcspace.com/wp-content/uploads/CropUp/-/media/918138/Quinta_Monroy_Update_Image%2003.jpg)

image 28: overview (from: https://src.lafargeholcim-foundation.org/img/737eb-1fc-cf58-4c7c-9ce7-66811fe25758/A11LAsi-

CL-prog14-04aa.JPG)

image 29: dweller's reunion in the public space (from: http://www.disenoarquitectura.cl/wp-content/uploads/2018/07/disenoarquitectura.cl-elemental-alejandro-aravena-villa-verde-foto-5.jpg)

image 30: overview (from: http://www.disenoarquitectura.cl/wp-content/uploads/2018/07/disenoarquitectura.cl-elemental-alejandro-aravena-villa-verde-foto-1.jpg)

image 31: overview (from: https://i.pinimg.com/originals/76/e9/80/76e980541b41f6a8153551c 319e1dbb9.jpg)

image 32 (next page): overview (from: https://img.archilovers.com/projects/f24072b4-9bd1-4b69-9586-3b99f4a27cd1.jpg)   author: João Morgado

image 33: transversal section (from: https://www.archdaily.com.br/br/765406/loteamento-e-casas-das-sete-cidades-eduardo-souto-de-moura-plus-adriano-pimenta/552c8936e58ece2cfd00018a#)

image 34: detail from one unitie's attic (from: https://img.archilovers.com/projects/f24072b4-9bd1-4b69-9586-3b99f4a27cd1.jpg) author: João Morgado

image 35: dining room and circulation

author: Pedro Kok (from: https://images.adsttc.com/media/images/5641/6364/e58e/ce0d/8300/0063/large_jpg/0188.TerraETuma.CasaVila-Matilde-PKOK1318.jpg?1447125850)

image 36: dining room and circulation author: Pedro Kok (from: ibid)

image 37: living room author: Pedro Kok (from: ibid)

image 38: Cover for the Architecture Competition (from: http://www.codhab.df.gov.br/concursos)

image 39: List of different typologies of apartments in a social housing project in Santiago, Chile. (from: https://www.plataformaarquitectura.cl/cl/02-84819/clasicos-de-arquitectura-unidad-vecinal-portales-b-v-c-h/villa_portales_-_tipologias_2#)

image 40: Quinta Monroy after post occupational interventions made by the dwellers, who printed their own identity on their homes. (from: https://arcspace.com/wp-content/uploads/CropUp/-/media/918127/Quinta_Monroy_Update_Image%2001.jpg)
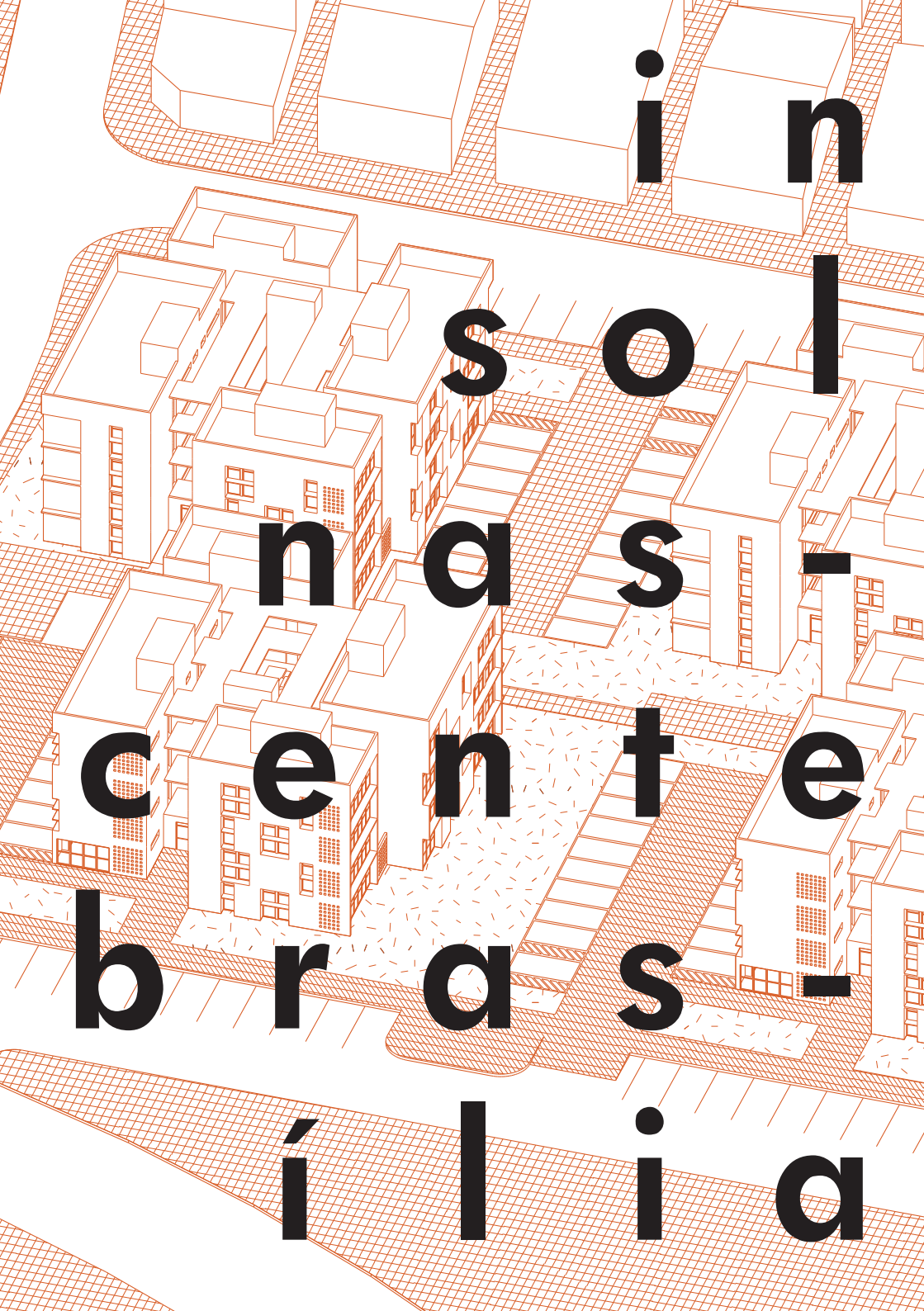
image 41: Hospital Sarah Kubitschek in Brasília, built in pre-cast concrete in a modular system. (from: https://www.artstreetecture.com/streetview/post/551-hospital-sarah-kubitschek-brasilia-joao-filgueiras-lima)

image 42: site plan of ELEMENTAL's Quinta Monroy in Chile showing the position of the plots in order to create small neighbourhood cores that would create a sense of belonging and property over the public area(from: https://www.area-arch.it/en/quinta-monroy-housing/)

image 43: bird view perspective of ELE-MENTAL's social housing complex in Monterrey, Mexico, and it's principles of replicability. (from: https://images.adsttc.com/media/images/5008/9c0a/28ba/0d50/da00/12fe/large_jpg/stringio.jpg?1414055836)

image 44: bird view from Pedregulho Complex in Rio de Janeiro. The building's form follows the topografy of the plot. (from: http://www.hiddenarchitecture.net/2018/02/pedregul-ho-housing-development.html)

social housing complex

insol
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