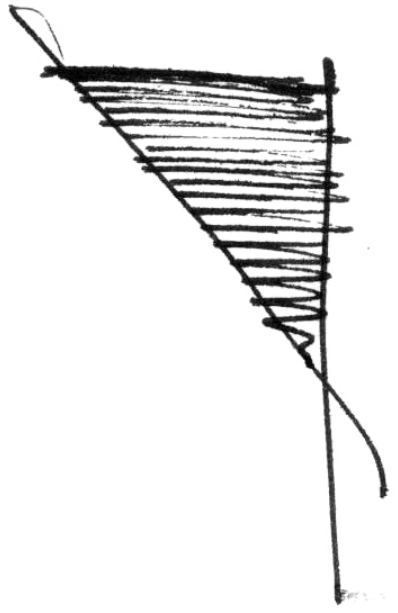

‚Living in the Wedge‘

a conceptual urban gap filler for Hong Kong‘s
unused slope formations

DIPLOMARBEIT

Zur Erlangung des akademsichen Grades eines
Diplom-Ingenieurs

Studienrichtung: Architektur

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INTRO

This Diploma thesis in Architecture is an investigation of ideas developed during an initial exchange period of study at the Chinese University of Hong Kong in 2011. Since then, these original thoughts have formed the basis of my research through the collaboration with colleagues and advisors between the Graz University of Technology and the Chinese University of Hong Kong.

Given the intensive development of land use, monumental land-reclamation programmes and shortage of suitable land available for development, new solutions for developing within the existing fabric of Hong Kong were sought.
Having recognised the redundant urban space defined by man-made cut slope formations in the landscape, a study began on the potential of exploiting the structure and topography of these landscapes for increasing the land available for development.
The quantity of such man-made sloped landscapes is vast, and therefore, with the potential to increase developable land in Hong Kong, was seen as a worthy pursuit by my academic advisors.

It is through a highly conceptual approach to this challenge, that the concept of an “Urban Gap Filler” was conceived. Developing the concept from complex urban analysis, reference to excursions and case studies throughout Mainland China and Hong Kong, the design of a Mega-structure was envisioned to occupy these obsolete urban spaces.
The development of a suitable structure to tackle the complex conditions of the site is resolved through a 3-dimensional structural grid that enables the development of the vertical slopes in a flexible manner.

Considering the Urban intervention as an ‘oversized construction kit’ the structure facilitates development that can adapt easily according to local conditions, neighbourhood analysis and urban requirements.

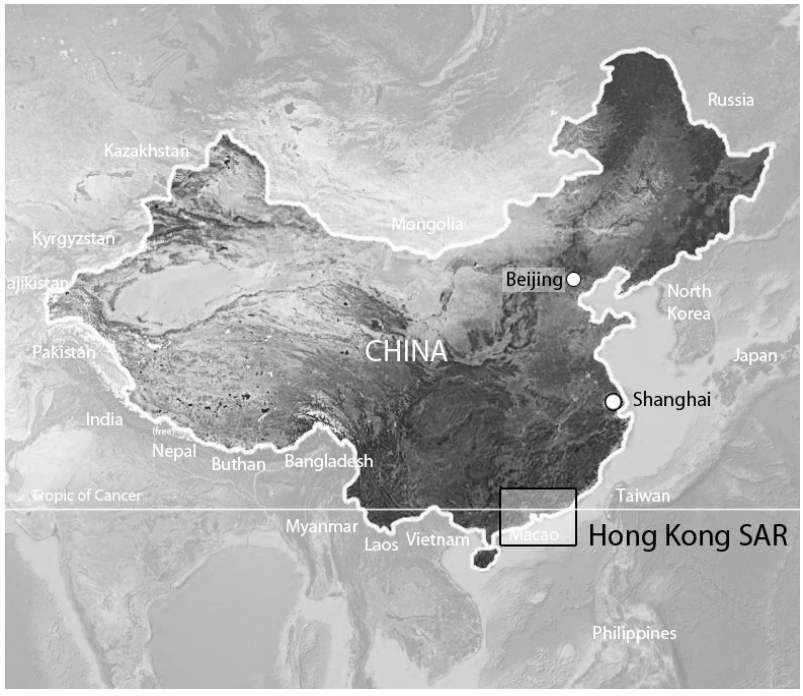
The 3-dimensional character of Hong Kong’s Urban Fabric is encouraged through crucial vertical and horizontal circulation that enables urban dwellers to permeate the structure at Ground floor level and access the rooftop level, providing unhindered access to otherwise unapproachable terrain.

The nature of the structure allows for the appropriation of space according to various parameters for development, urban conditions and lifestyle changes. It comprises the initial structure, inhabited by modular structural units that can combine together to form clusters of various heights, breadth and width.

The varying patterns for the arrangement of modules may either define, or be defined by the requirements for circulation and voids for ventilation throughout the structure.
It is considered that this form of development could be a suitable response to the typical development of monotonous, “copy and paste” approach to architectural typologies in Hong Kong. With the benefit of a unique topographical location, natural cooling and ventilation from the thermal mass of the site, the “Urban Gap Filler” should offer a distinct living environment in a City that has otherwise a scarce amount of land available for future development.

fig. 03 Map Hong Kong

HONG KONG



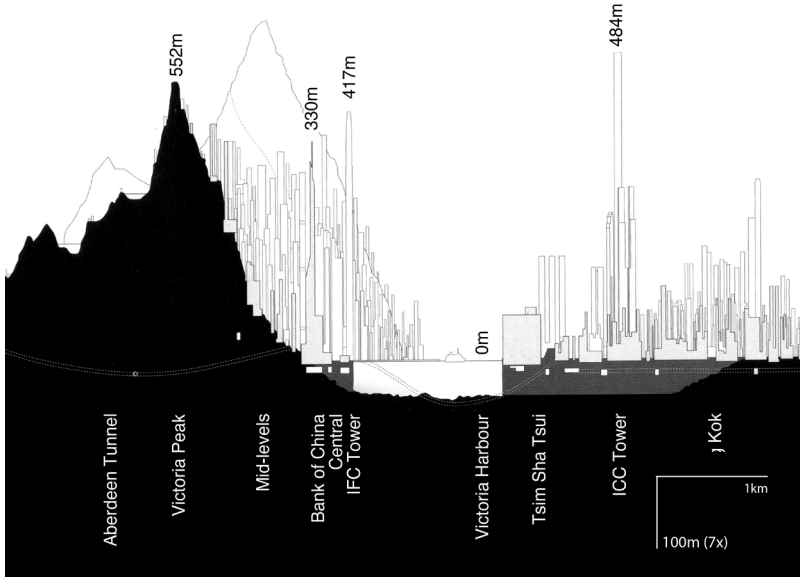


fig.04 Map China
fig.05 Hong Kong Altitute Profile

Geography

LOCATION

Located in the South China Sea the SAR (Special Administrative Region) Hong Kong comprises next to the New Territories in the North and the central Kowloon Peninsula, more than 260 islands. Among them Hong Kong Island and Lantau Island in the south eastern tip at the mouth of the Pearl River Delta.

Between the Kowloon Peninsula and Hong Kong Island lies Victoria harbour, one of the world's deepest natural maritime harbours and busiest container ports.

The area of Hong Kong covers 2755 square kilometers whereby only 1104 suqare kilometers is declared as land mass. 1651 square kilometers respectively nearly 60% consits of sea area. Merely 23.4% [1] of the land area is urbanised or built-up land. Nature reserves and Country parks hold nearly 40% of Hong Kong. [2]

TOPOGRAPHY

Hong Kong's topography clearly represents the mountainous characteristics of the southeast of China. The area hardly offers natural flatlands. The few narrow strips of flattened ground, especially on Hong Kong Island, have often been a main cause for the city's unique development.

More than 660 square kilometers of Hong Kong's land area consist of steep hillsides with an angle of more than 30° in 30% of the slopes.[3]

The altitude profile varies between 0m at it's lowest and 957 meters (Tai Mo Shan peak in the New Territories) at it's highest. With 552 meters Victoria Peak is the highest point on Hong Kong Island but only number 31 amongst Hong Kong's highest peaks.[4]

1 Hong Kong Extras (n.y.), Geography
2 cf. Hong Kong Government 2013, Hong Kong - the facts
3 cf. Koor, Natural Terrain Risk Management
4 wikipedia 2013, List of mountains

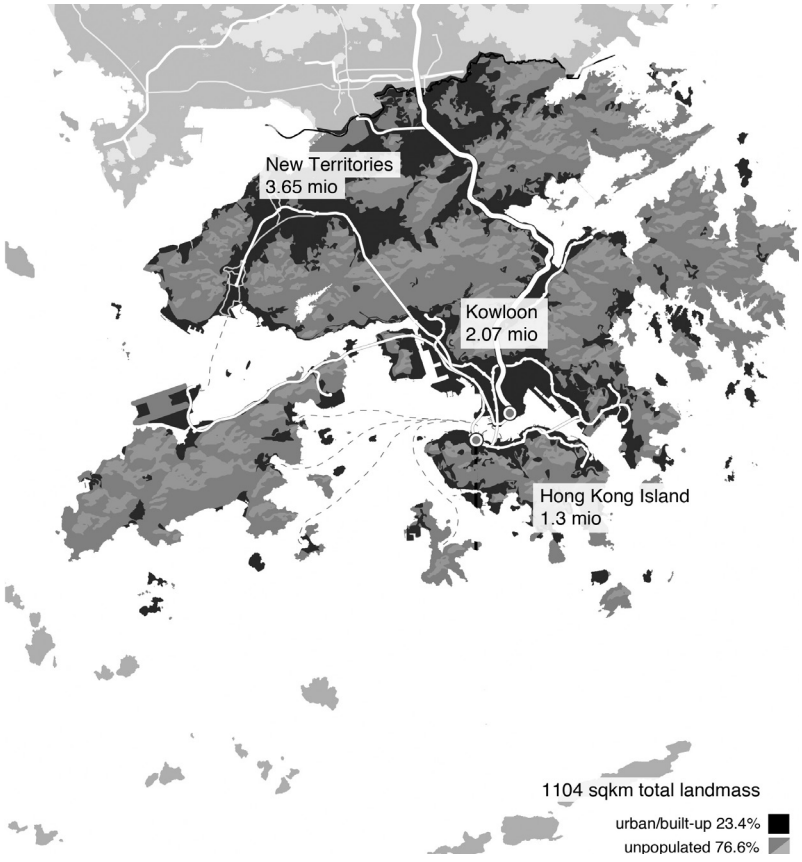


fig.06 Populatio Map Hong Kong
fig.07 Mong Kok

LANGUAGE

Official languages are Chinese (Cantonese 89.2% and Putonghua 0.9%, other Chinese dialects 5.5%[5]) and English, which is usually used, in governmental, legal, business and professional affairs.

DEMOGRAPHICS

After 1945 the colony remained as a major destination for refugees from neighbouring Mainland China, which, compared to Hong Kong's highly humane legislations, has not been too sensitive on the issue of political dissidents. On average approximately 100.000 people a year have immigrated for nearly 15 years to the city which has led to a population of nearly 3.2 million by the year 1961 .[6]

DENSITY

Hong Kong has developed into a high density- small footprint city with nearly 7.15 million residents on a developed land area of slightly more than 120km2, which is equivalent to 600 people per hectare on average. In some particular blocks such as Mong Kok and new towns in the New Territories, the density level is even higher than four times the average. Therefore Hong Kong holds a fixed position among the world leading cities in density rankings.[7]

Hong Kong Island	16,390 per sq km
Kowloon	43,290 per sq km
New Territories and Islands	3,810 per sq km[8]

POPULATION

In 2012 Hong Kong's population was about 7.15 million residents. The vast majority with 92% are Chinese residents. The other 8% are residual foreign nationals, who mostly originate from Indonesia (164 850), the Philippines (160 850) and the USA (28 290).[9]

6 cf. Barrie 2011, p. 8
7 cf. Barrie 2011, p.4 et seq.
8 cf. Hong Kong Extras (n.y.), Population Density
5,9 cf. Hong Kong Government 2013, Hong Kong - the facts

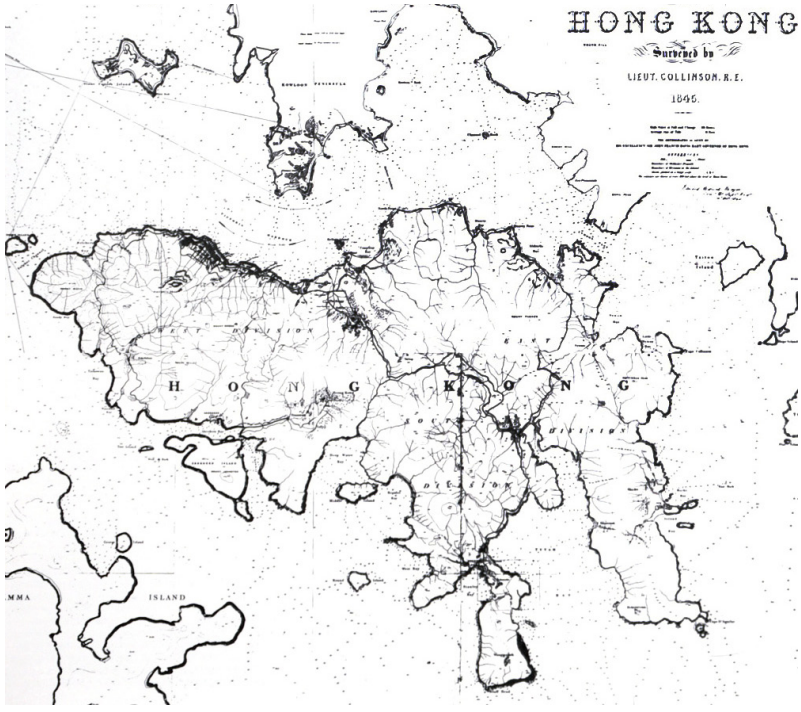


fig.08 Old Map Hong Kong 1845
fig 09. Wan Chai 1930

History

Within Hong Kong's greater region human activity can be traced back over 30.000 years due to archaeological findings such as stone tools and religious carvings found the on outlying islands. [10] The advantages of the sea, together with abundant vegetation due to subtropical climate have always been suitable factors for relatively good living conditions in that area.
Qin Shi Huang, China's first emperor, conquered the region in 214 BC and incorporated the territory into imperial China. With the military town Tuen Munto during the Tang Dynasty in 736, the subsequent territory became an important strategic basis for coastal defense.

At the time of the Mongol invasion in 1276, Hong Kong saw its first major population boom when Chinese refugees fled to the area because of disastrous living conditions such as wars and famines. Most of the new immigrants settled in, what is currently, the New Territories region in the north. Due to extremely steep and hardly cultivatable topographical conditions the people in Hong Kong had to focus on alternative businesses such as salt trading, pearl hunting and fishery. Some of the clans, which moved to this area, built walled settlements for protection against wild animals, rival clans and the threat of piracy, which increased according to the commercial relevance of 'Hong Kong' as an international trading port.

In the beginning of the 16th century the Portuguese were the first European visitors and trading partners with China. After military clashes between China and Portugal maritime activities and contact to foreigners were banned by the Haijin order, which lasted until 1685 under emperor Kangxi.

By the end of the 17th century, the region's commercial relationship with the British experienced a rapid upturn after the East India Company's first sea venture to south China, which later was demonstrated by the first trading post in Canton in 1711.[11] Beyond or eventually because of its primary function as the world-leading trading monopoly from the early 18th century to the mid-19th century the English East India Company gained so much economical power that it became involved in politics, adopted the position of an agent of British Imperialism in India and had a powerful influence in South China's future economic development.[12]

10 cf. The Institute of Archaeology (2006), Discovery of ancient quarry
11 wikipedia (2014), History of Hong Kong
12 Encyclopædia Britannica, (n.y.), East India Company

fig.10 Japanese Aircraft Carrier, Victoria Harbour 1941
fig.11 Des-Voeux Road

The company served as the world-biggest drug dealer between 1830 and 1840, which later resulted in a severe conflict between China and The British Empire.

In reponse to China's refusal 1839 to further on import opium which led to the first Opium War, Hong Kong Island was occupied by Sir Henry Pottinger on the 20th January 1841 and officially established a Crown colony as part of a cease-fire agreement.
China's economic 'glasnost' was the result of an harsh military intervention by the British Empire forcing China to readmit on drug traffic and colonial economic interests. By this time nearly 7500 people, mainly fisher man and Hakka charcoal burners lived primarily in coastal villages on an area of less than 80 sqkm.[13]

The dictation of the colonial laws and the economic oppression under British rule led to internal instability. In 1861 the Colony extended its territory with the acquisition of merely 9 km2 of the Kowloon Peninsula. The Taiping Rebellion, a civil war that started 1850, claimed more than 20 million lives and resulted in a further immigration wave which led to a total population of 125.500 by the year 1865.[14]

Due to a 99-year lasting lease of Hong Kong Island, Lantau Island and the New Territories obtained by the British in 1898 to a total territory of 1070 km2, Hong Kong has developed in a unique way. The free-port status along with strong economic advantages on one side and the British educations system on the other played an important role in Hong Kong's history.[15]

Despite the bubonic plague (50.000-100.000 deaths) in 1894 and an attack on Hong Kong in 1914 during WWI, in which 60.000 Chinese died, the population kept on growing rapidly from 530.000 in 1916 to 725.000 in 1925 and nearly 1.6 million by the year 1941.

Japan's Invasion in World War II on the 8th of December 1941 forced the British and Canadian defenses to surrender. The Chinese population suffered severe shortage on food and economic disadvantages which had a significant impact to the colony's growth. In 1945, when the United Kingdom resumed control of Hong Kong again the total population decreased from 1.6 million to only 650.000 in less than four years under Japanese occupation. [16]

13,16 cf. wikipedia (2014), History of Hong Kong
14 cf. Encyclopædia Britannica, (n.y.), Taiping Rebellion
15 cf. Barrie 2011, p. 2 et seq.

fig.12 View to North Point, 1984

The following years, after Japan pulled back in 1945, Hong Kong's population increased from 650.000 to 2.020.000 by the end of 1951 due to a vast immigration caused by ongoing disturbances and the Chinese Civil war (1927 to 1949), which ended with Mao Zedong's proclamation of the Republic of China on the 1st of October 1949.[17]

Since then, the city has grown between 500.000 and 1.000.000 people every five years until the mid-60s. With the immigrants whole companies shifted their main operations to Hong Kong in order to keep their businesses running under much better economical conditions considering the immediate accessibility to Western markets during the Cold War era.

In the 1950s, the industrialization with textile and other manufacturing productions experienced a steady upturn due to a growing availability of low-cost labour.

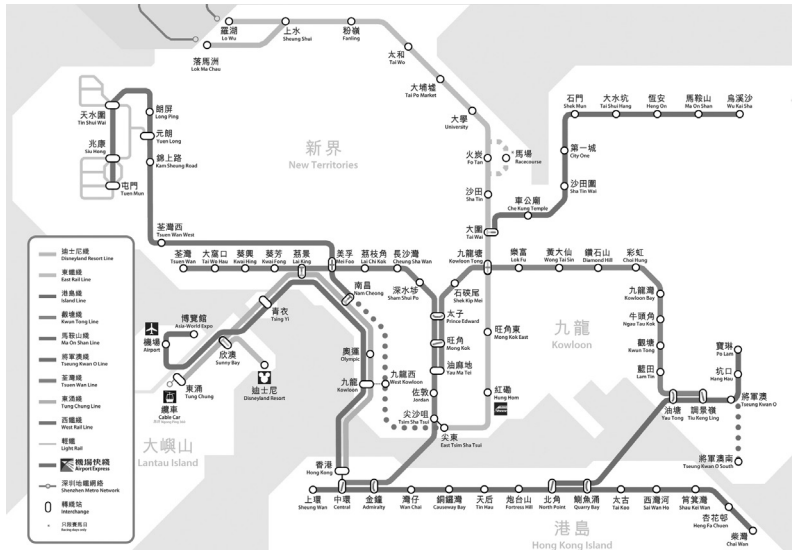
In 1980 when Shenzhen was established as a Special Administrative Region (SAR) by the PRC, trading in Hong Kong experienced an economic upturn. Producing goods gave way to investments and trading which in turn, had an impact on the housing situation.

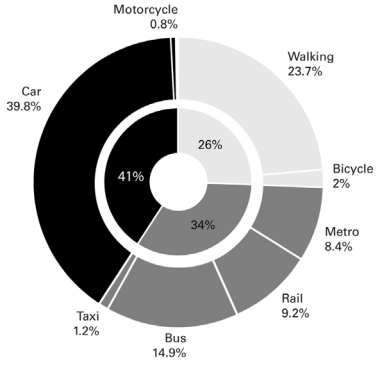
The former Colony continued to function as the main terminal for foreign investment from all over the globe. The manufacturing industry in southern China implicated the end of Hong Kong as a low cost production location but stepped up to a major financial center at the same time.

In 1984 a one country-two systems principle was negotiated, which further on allows a high degree of autonomy for the former colony of Hong Kong for another 50 years after the handover to China in 1997.

In the 2000's most of Hong Kong's residents found themselves getting along moderately well with the agreements with China.[18] Nevertheless the relatively high living standards and the attractive economic location are still driving forces for ongoing developments of all kind throughout the city, which has led to a number of extraordinary landmarks within Hong Kong's skyline.

17 cf. Barrie 2011, p. 2 et seq.
18 cf. wikipedia (2013), Hong Kong, Cold War Era





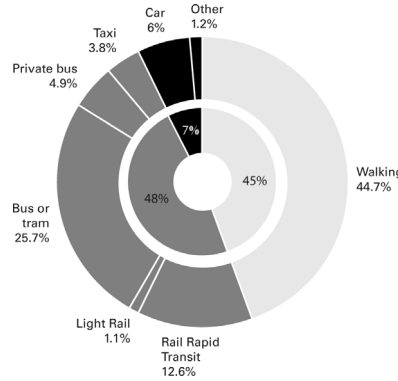


fig.13 Mini Buses
fig.14 Hong Kong MTR map
fig.15 Transportation London - Hong Kong

Characteristics

TRANSPORTATION

Compared to a number of other cities similar in size either in population or metropolitan area, Hong Kong provides an unusually flexible and highly sophisticated transportation system. Over 90% of nearly 11 million trips made every day are operated by public transportation such as the subway system (MTR), busses and ferries.[19]

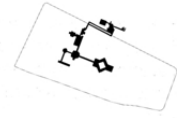
Low rates and an enormous grid of a variety of supplementary services, which are linked to each other, are highly effective. Due to a massive lack of parking space and difficult topographic conditions having a private car often does not pay off for the average resident. Judging from the fact that Hong Kong has a common density of 600 residents per hectare, public transport is an essential necessity within the city's infrastructure.

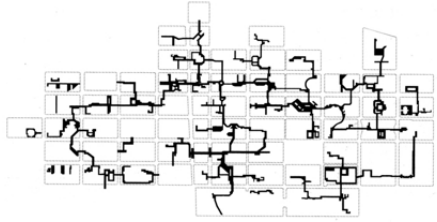
With a total of 575.000 vehicles and a road length of only 2.080km, respectively 282 vehicles for every street kilometer in 2008, Hong Kong clearly shows how a sustainable transportation system works on a daily basis.

Approximately half of Hong Kong's residents live within a radius of 500m to a mass transit station. More than 70% of its users walk to their starting stations - respectively continue by foot after arrival. Only 3% use some other public transportation after a train ride to eventually get to their final destinations.[20]

Another extraordinary public transportation system is the tram-way on Hong Kong Island, which exists since 1904 and connects Kennedy Town in the west and Shau Kei Wan in the eastern district. The slim bodied double deck trams serve 57 stops with an average interval of 255m on a track of 13km.[21]

19 cf. Zhou, Hong Kong Public Transportation
20 cf. Barrie 2011, p. 6
21 cf. Barrie 2011, p. 53 et seq.





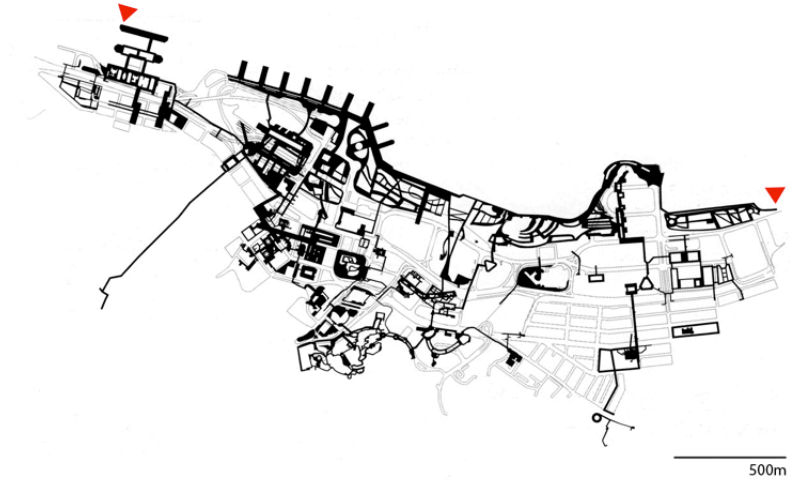


fig.16 Louvre Shopping Mall
fig.17 Calgary +15 Walkwaysystem
fig.18 Pedestrian network Hong Kong
fig.19 Mid-Levels Escalator

MULTIPLE GROUND

> *'Urbanism in Hong Kong is a result of top down planning and bottom up sollutions, a unique collaboration between pragmatic thinking and comprehensive masterpl anning, played out in three dimensional space. Footbridge networks throughout the city that grew piecemeal, built by different parties at different timest o severe different imme diate demands, eventually formed an extensive network an dbecame a prevailing development model fort he citie's lar ge scale urban projects.'* [22]

At first sight, despite the intercity highways, railways and main streets, the city appears relatively chaotic to a visitor. But after some time depending on a seemingly confusing network of walkways and bridges, Hong Kong turned out to be a well planned and highly functional place. Millions of people rely on public services day by day and end up always just where they need to be.

Hong Kong's public transport system does not end with vehicles like busses and trains. The city's multi-level pedestrian traffic network further includes a variety of public movement infrastructure services such as escalators, stairs, lifts, pedestrian bridges and walk-ways throughout all levels of the city. Complex walkway networks connect transportation hubs with shopping malls, piers or residential estates. It seems that established underground connection systems as we see in New York or London merge with Calgary's +15 walkways and eventually results in a sophisticated combination of appropriate connection elements according to specific demands in terms of pedestrian flow and topographical circumstances.

The high degree of three-dimensional connectivity often leads a misconceived perception of the physical ground level of the urban area. The street level primarily functions as a reference point for cultural life while gastronomic facilities such as bars, clubs and restaurants fill skyscrapers above ground all the way up to the top floors.[23]

22 Frampton et al. 2012, p. 06
23 cf. Frampton et al. 2012, p. 06 et seq.

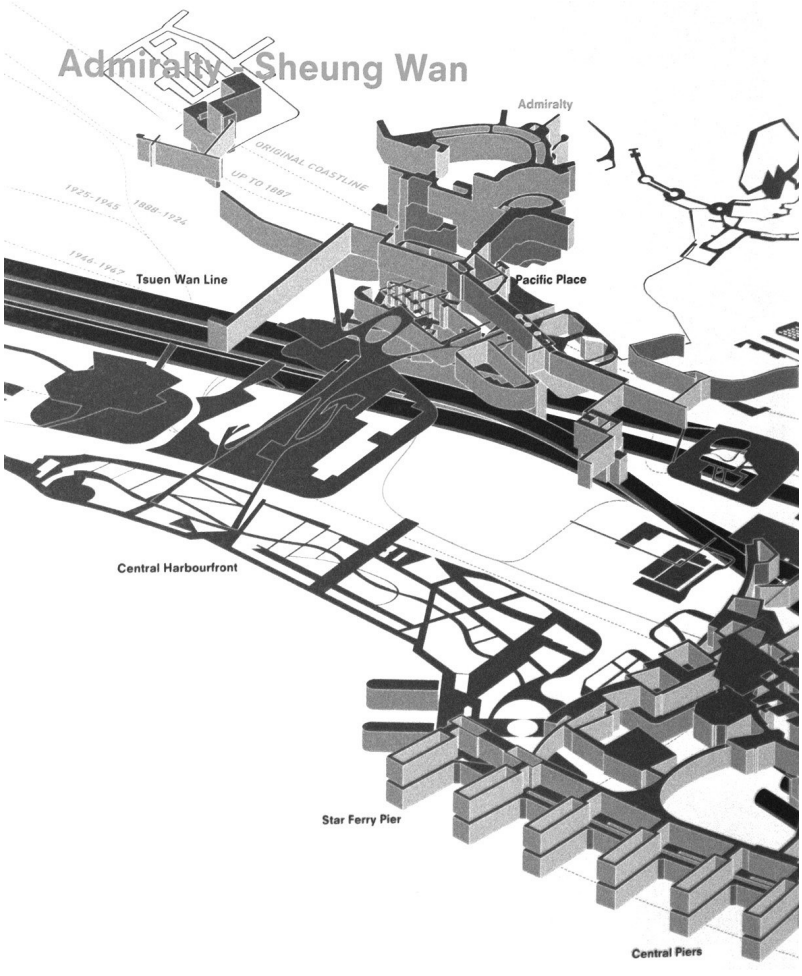


fig.20 Pedestrian Bridge
fig.21 Pedestrian network, Admiralty

An example representing the typical multiple ground concept is the Shun Tak Center Ferry Pier near Central Station.
A complex mix of different avtivities are combined in just one building. Next to the function as a main transportation hub connecting several ferries with tram, MTR, bus lanes, the public road network and helicopter ports, the podium area offers shopping malls, food courts and even horse betting offices.

Similar conditions are found within developments from the International Finance Center 2, Exchange Square and the Stock Exchange Building. Together with other public and semi-public structures a gigantic multi-level network claims a major area in Central. [24]

This continous network of elevated or underground pedestrian walkways allows to walk from the Shun Tak Center in the west through Central and Admiralty all the way to Wan Chai district without leaving it once. [25]

The 800 meter long Mid-Levels Escalator represents a further example of a continuous walkway system on Hong Kong Island. A series of 20 escalators and 3 moving walkways are built upwards on a steep hillside connecting Queen‘s Road Central and the 135 higher Conduit Road in Mid-Levels. The one-way ride takes about 20 minutes and, according to the rush hours, the system changes its moving direction to either downwards in the morning or upwards after work. [26]

Nevertheless high efficient multi-level circulation concepts alone can not compensate the lack of space within the city. During Hong Kongs development the government excavated massive hillsides respectively introduced gigantic land reclamation projects.

24 cf. Barrie 2011, p. 135 et seq.
25 cf. Frampton et al. 2012, p. 24
26 cf. Hong Kong Extras (n.y.), Central - Mid-Levels Escalators

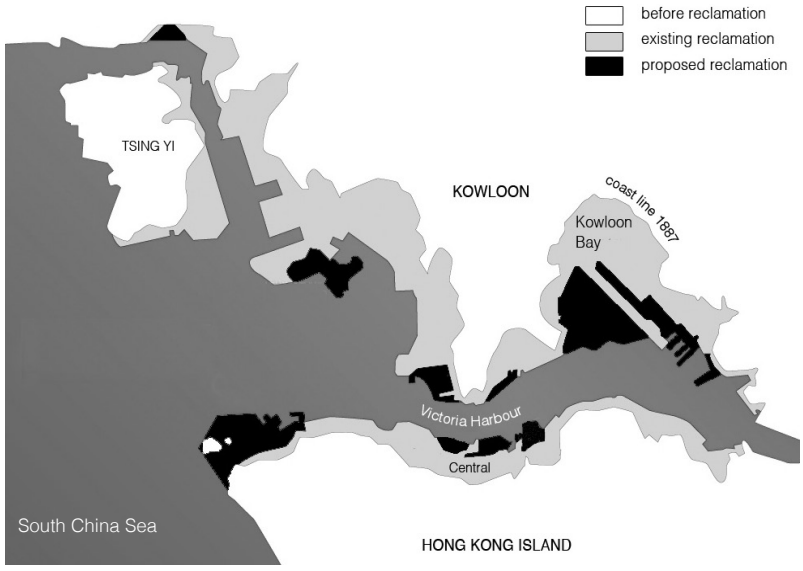


fig.22 Reclamation Map Hong Kong
fig.23 Reclamation, Victoria Harbour
fig.24 Chek Lap Kok Airport

Land Reclamation

> *'...In Hong Kong, a city built on steep and vast areas of landfill at incredible density, physical ground is equal parts elusive and irrelevant. What appears to be terra firma was likely water not so long ago...'* [27]

Not even 30% of Hong Kong's natural topography is considered to be sufficiently flat enough to accommodate urban construction. Therefore slightly more than a third of all developed land in Hong Kong has been reclaimed from the sea. Over the past decades the government has built an equivalent area of Hong Kong Island, which is highly suitable for urban developments of all kind. The island itself, measuring 6km across and about 12km from north to south, has been extended to approximately one fifth of its natural 70 sqkm. [28]

In particular, the area around Victoria Harbour represents many examples of the government's long-term reclamation policies.
In 1887 the shoreline of Hong Kong Island on Victoria Harbor was up to 200 meters away from the current promenade. For a better understanding on how much land was reclaimed since then, nowadays it would take about 20 minutes to walk from the original shoreline to the current waterfront. Today an immense number of shops, restaurants, bars and market booths define the district's ground level.

Another ambitious reclamation project is that of Hong Kong's Chek Lap Kok Airport covering 516.000 sqm. A formerly mountainous island was extended to four times of its original area, an equivalent of the Kowloon Peninsula. The 100 meter high peak was leveled to 7 meters above the sea. [29]

Due to high costs and the enormous impact on the environment, several organisations against further reclamation projects have been founded. Nevertheless, land reclamation programs seem to be an effective tool for the developing the city. The government has plans for upcoming land reclamation developments consisting of 585 hectares, specifically in the area around Victoria harbour. [30]

27 Frampton et al. 2012, p. 13
28 Barrie 2011, p. 40 et seq.
29 Foster and Partners (n.y.) Chek Lap Kok Airport
30 Harbour Protection 2013

EXCURSIONS

The following chapter is considered to be a selection of notional excursions on several issues, which to me seem worthwhile looking at for a better understanding of the Chinese context.

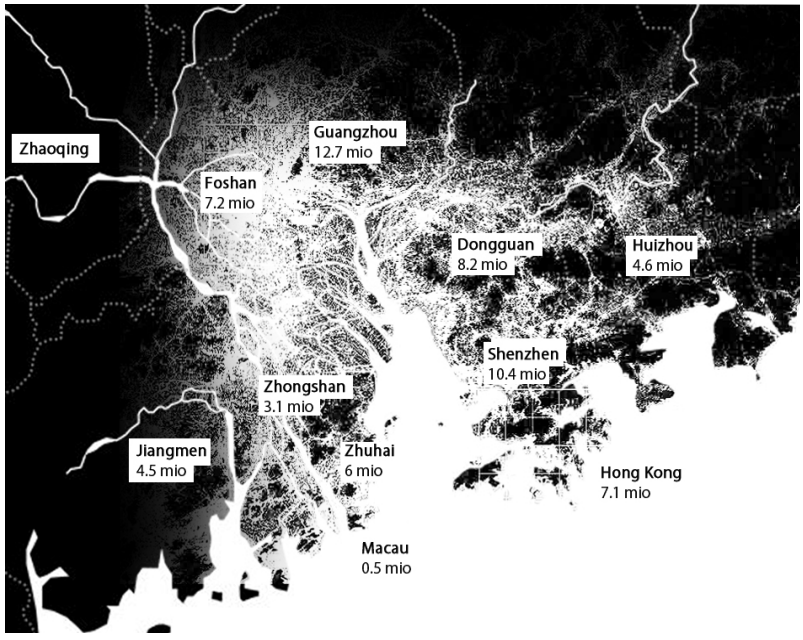


fig.25 PRD Map
fig. 26 Pearl River Delta Megacity

Context China

THE PEARL RIVER DELTA

'The idea ist o create a 'one-hour-living zone' encompassing all the nine cities in the Pearl River Delta.' Professor Zuo Zheng, Jinan University

The Pearl River Delta (PRD) is located in the Guangdong Province in southeast of Mainland China and is flanked by Hong Kong in the east and the former Portuguese colony Macao in the west. Because of its fortunate location and beneficial circumstances within the global economy the Pearl River Delta enjoys rapid growth. Free market oriented economic policies have led to highly profitable investment and businesses. As a result the PRD became Chinas driving economic powerhouse.

In 2008 the Chinese government released a Master Plan which involves a merging of the PRD's nine largest cities comprising Shenzhen, Dongguan, Huizhou in the east, Zhuhai, Zhongshan, Jiangmen in the west, Guangzhou, Foshan and Zhaoqing in the centre of a gigantic metropolitan region. Investments in 150 large-scale projects promise an enormous network of transportation, telecommunication, and water- and energy supply. As early as 2030, estimated 66 million people are supposed to live on an urban area of 54800sqkm.

Traveling between each of the nine cities within the metropolitan area should be achieved in less than an hour. 4000km of streets, tunnels, bridges and railways for high-speed trains on an area as large as Switzerland are considered to be a key factor. The relation between Hong Kong and the PRD region has developed considerably, which is evident by increasing border traffic. In 2013 an average of 560,000 people traveled in both directions between Hong Kong and Mainland China.

Upcoming infrastructural projects are already under construction, which will be shooting Hong Kong's residents directly into the PRD's 'one-hour living zone' by the year 2015. In roughly 45 minutes a 140km high-speed railway will travel from West Kowloon Station to Guangzhou. Beyond that, the 35.6km long 'Hong Kong-Zhuhai-Macau Bridge', the world's longest sea-crossing bridge tunnel, will open its tubes to connect Hong Kong with Macau or Zhuhai in only 30 min.[31,32]

31 cf. Lai 2013, The Pearl River Delta Megacity
32 cf. Moore/Foster 2011, China to create largest Megacity in the world

fig. 27 Shenzhen Street, 1979
fig.28 Shenzhen, 2013

SHENZHEN

'Shenzhen will be a pilot zone for a national comprehensive reform program and will be built into a national economic hub, State-level innovative city, model city with Chinese characteristics and international metropolis' [33]

Shenzhen is located between Mainland China and immediately north of Hong Kong and acts as a leading hub in terms of high-technology developments, financial services, foreign trading and shipping. The land, sea and air checkpoints have the largest flow of goods and people within the People's Republic of China. Via a tremendous infrastructure network the city is perfectly connected to most major counties and cities in Guangdong, Hong Kong, Macao and more than 20 provinces all over China. Due to massive upcoming infrastructure projects, Shenzhen will become a more important transport hub within the Pan-Pearl River Delta area.

The history of the former hilly, fishing village, now one of the PRDs nine major cities, exemplifies clearly how fast urban development can take place. In 1980 Shenzhen became an important trading post in China's first special economic zone just on the other side of the border to Hong Kong. The SEZ (Special Economic Zone) benefits from a far more liberal framework for economic and trading policies than in the rest of the country. As a corner stone for China's reform and opening-up policy, these circumstances have led to an enormous economic boost. From a small border town of 30.000 people in 1979, Shenzhen has grown into a modern metropolis with nearly 10.5 million permanent residents within only 32 years (14 million including commuting area). With a total of 1992 square kilometers, the city is now the second largest urban area after Guangzhou with a population of 12.7 million.

Due to the economic influences, a liberal lifestyle, especially compared to Mainland China, and the strong multi cultural impact, Hong Kong will probably hold a special position within the PRDs region. Considering the vast growth of the Pearl River Delta's population within next 15 years finding new space for housing and infrastructure will definitely become essential all over the Delta area. [34]

33 Shenzhen Government Online (n.y.), Development Goal
34 cf. Shenzen Government Online (n.y.) Overview

EXAMPLES OF TRADITIONAL CHINESE HOUSING

fig. 29 Tulou settlement in Fujian Province

fig.30 Inner Yard, Sunken Court-Cave Dwelling

TRADITIONAL CHINESE HOUSING

Studying Hong Kong's housing history and its resident's contemporary housing habits made me curious of how and in what way their ancestors inhabited the territory. A short theoretical excursion into traditional Chinese housing illustrates some completely different forms of dwellings all over China which have been well established models for many centuries and partly still are. Nevertheless, it also gives a slight impression of how dramatically the lifestyle of millions of Chinese has changed over the past few decades and even within a single generation.

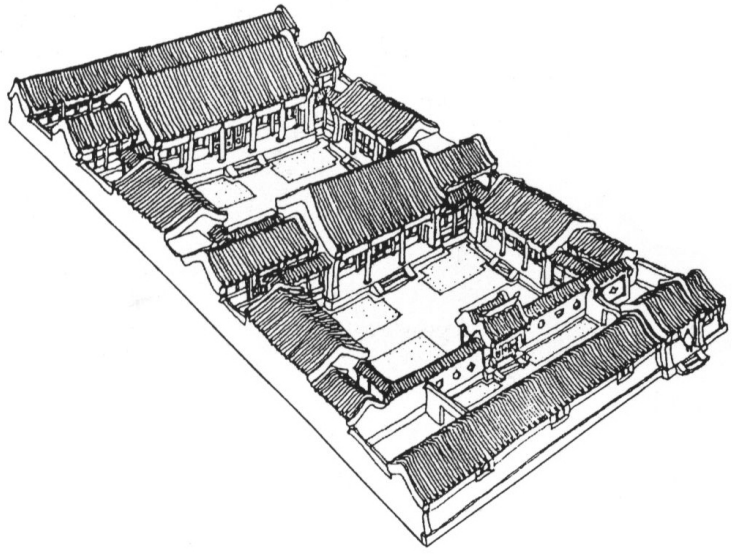
Traditional Housing in China has primarily evolved from family structures and working habits in rural areas. A multi-generation living, based on sharing and caring principles, has always been and still is of high importance,especially for a social development and understanding.

The majority of Chinese still live the way of their ancestors, in large family structures under one roof. Because of ongoing mass migration to the cities traditional living decreases all over the country. The young move away from their villages and leave the elderly behind. As a result, in booming cities like Shanghai, Peking and especially Hong Kong, historical buildings have been demolished in order to make way for new developments.

A further devastating impact on tradition happened under the Cultural Revolution between 1966 and 1976 in which China's population was forced to abandon traditional values. Mao's strict course resulted in the nationwide destruction of religious buildings such as temples, shrines and other built heritage. Besides that, thousands of scholars, priests and intellects were executed systematically.[35]

Despite all ongoing or past negative influences on traditional values, countless built heritage still exists and functions throughout China. The following examples should give an insight into traditional housing in China, which still is an important parameter in the Chinese way of life.

35 cf. Blaser 2006, p. 21 et seq.



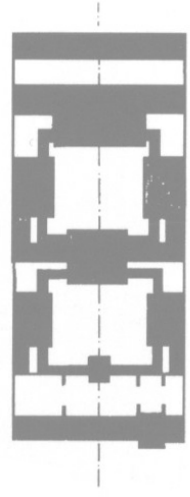


fig.31 Siheyuan Courtyard House
fig.32 Siheyuan floorplan pattern

CHINESE COURTYARD HOUSE

Walled structures have always been a part of Chinese culture. Such structures were usually self managed units with social hierarchies in which tradition had been passed on to following generations. The defensive design primarily conveys a feeling of protection and represents a strong solidarity of its residents. In spite of a clear trend towards a small family structure in the cities, the traditional social company within the clans, families and neighbourhoods found it's way into China's modern urban life-style.

The most common traditional housing form in China is that of the courtyard house. The characteristic of the introvert living-style can be found in a variety of different types of courtyard housing all over the country. Depending on the type, one or several courtyards are aligned on a central north-south axis and form the center of the building.

The arrangement of the rooms and yards follow a clear hierarchy according to the yinyang and further principles referring to the Confucius philosophy. The main access and often the only entrance due to security reasons is usually located in the south.

The boundary in the form of the outer walls, the courtyard house itself indicates a prototypical form of walled settlements which primarily can be found in the south-eastern parts of China. Prior to World War II, about 23 walled villages existed within the boundaries of the Hong Kong Colony. [36]

Similar to a Court Yard development the later projects structural grid contains functions and the installation layer concentrated around an inner space. This on the hand achieves a maximum of clearance to its center.

36 cf. Bettles 2002, p.120 et seq.

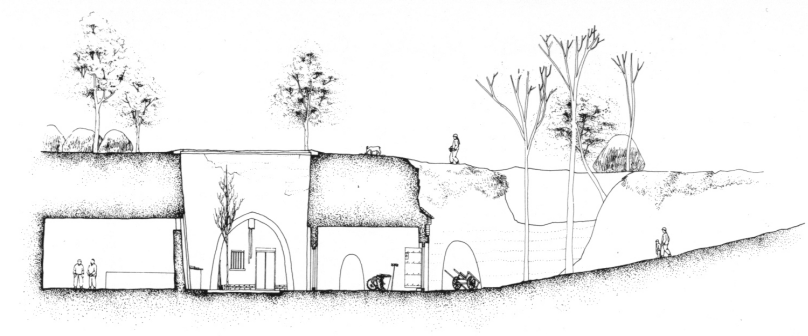


fig.33 Section through Sunken Court-Cave Dwelling
fig.34 Sunken Cave Court Settlement

SUNKEN CAVE COURT DWELLING

A special and very original form of the courtyard house is that of a Sunken-Court Cave Dwelling.

Considering the fact that more than a third of the world's population continues to live in structures made of clay, loess or other earth materials it seems natural that today's most populated country with nearly 1,34 billion[37] has a tradition in earthen houses. This 6000 year old example of Chinese traditional housing survives even today with an assumed 40.000 occupants throughout China.

The Sunken-Court Cave dwellings, which are typical for the loess belt region along the Yellow River can be described as cave-containing bodies dug into the easily workable soil. Another advantage of the interplay between the built structure and the natural surroundings can be found in simple structural physics, which result from a traditional energy-consciousness based on natural insulation against heat and cold.

Inside the cave constructions, the temperature is cooler in summer and warmer in winter by almost 10°C. A well-considered arrangement of rooms around a central 20-30m2 courtyard, which lies 6 meters under the surface, gives the residents a feeling of safety by providing a healthy climate. [38]

Some of the Sunken Court Cave dwelling's characteristics such as enclosed yards or 'dug in' living space can be also found within the project and use basically the same advantages as their traditional models in terms of privacy or natural structural physics.

37 cf. U.S.Census Bureau 2013, Countries and Area Ranked by Population
38 cf. Blaser 2006, p.118 et seq.

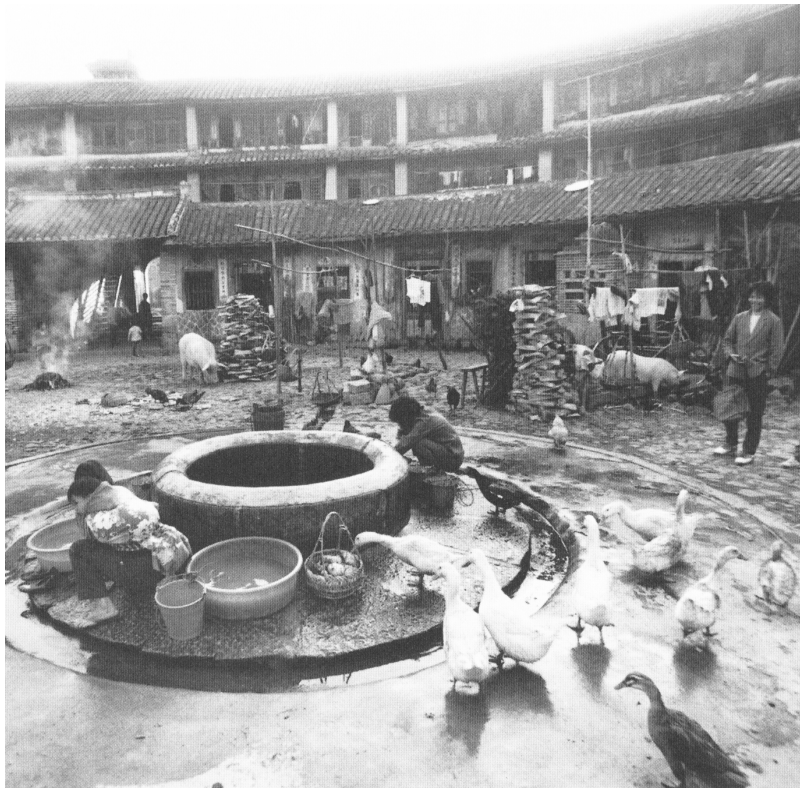


fig.35 inner yard, tulou
fig.36 urban tulou

TULOU

Rather than the typical Chinese courtyard house, which was a less conventional development in Guangdong area, the southern parts of China are better known for walled villages or enclosed settlements such as that of a Tulou. [39]

The development of these structures can be traced back to the 7th century under the Tang Dynasty. Tulous, usually inhabited by the Hakka or Keija people, were built as a defensive structure and gradually developed into community buildings for residential purpose but always with a clear defensive intention. A conceivable reason for this kind of settlement can be found with the threat of piracy and rebel troops along the northern boundary of the Gunagdong province.
The massive outer walls, which often measure several meters in thickness are designed to withstand any attack. Only one door leads into the building and the inner yard, which comprises an arrangement of storage rooms for goods, food and life stock, a well and temples.

Tulou buildings have between three and five storey's and could accommodate up to 800 people. Today there are more than 20.000[40] partly inhabited preserved buildings throughout China. Structures such as the Tulou were designed to accommodate large clans or families and often provided common facilities for their residents in their center.

With the Urban Tulou, the Shenzhen based Urbanus Architects refer to this traditional development. Advantages in terms of natural ventilation and the boundary to the stressful and loud environment, represent a well functioning typology within a modern urban context.[41]

Despite the trend of standardised living units in modern metropolitan areas favouring small family and single households related people still tend to live in close proximity to each other. According to that, the project allows to merge neighboring modules for larger communities or families. Similar as in the traditional model, single modules of the project are designated for common facilities.

39 cf. Barrie, S. 2011, p.24-25
40 cf. Cultural Afairs Bureau
41 cf. Urbanus Architecture & Design, Urban Tulou


洋
中國
酒
滙
總

EXAMPLES OF HONG KONG HOUSING

fig.37 Hong Kong Housing

Housing in Hong Kong

In contrast to traditional Chinese housing, Hong Kong' housing situation developed differently than in Mainland China. Unique typologies have evolved over decades due to its extraordinary historical and political influences.

After their arrival in Hong Kong, many immigrants found themselves in poor housing situations. The city life within the colony was often completely different from what the new residents were used to before.
Due to a massive slum fire in Sham Shui Po area in 1953, which claimed thousands of shanties and left 53.000 people homeless, the Colonial government consequently came up with new housing policies such as resettlement estates and marked the beginning of the public housing estate programme.[42] In April 1973 the Housing Authority was established to develop and implement affordable housing for lower-income residents. Nowadays approximately 30% of the Hong Kongers now live in public rental units, partly under precarious housing situations.

During my semester abroad at the CUHK, I was able to visit different places all over the city. Among them was an estate in the Chai Wan neighbourhood where eight people used to live in only two separate rooms on slightly more than 32sqm. A family and some other sub-tenants had to switch their beds according to their work shifts to afford the rent of the apartment.

Hong Kong's lifestyle is and always has been defined by small-scale living and the utilisation of even to the last available square meter. Therefore, most apartments do not have additional storage or work-space like attics or basements to store utilities such as sports equipment, tools and other objects which are not used on a daily basis. The necessity of space utilisation can be seen in almost every sphere, especially in terms of privacy and public.

In Hong Kong the urban development primary focused on highly efficient multi-storey living machines on the smallest area possible, which has led to the fact the approximately 42% (approx. 3 mio) of the population now lives in apartments higher than the 14th floor (35 m +).[43,44]

42 cf. nes. 2013, Public Housing in Hong Kong
43 cf. Crerar 2013, No place for claustrophobics
44 cf. Housing Department 2012, Housing Austhority

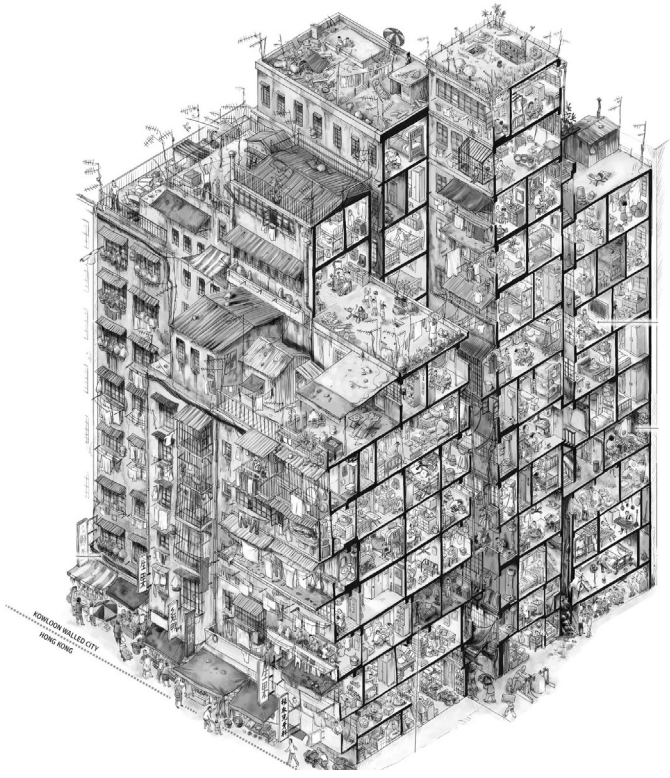


fig.38 ‚City of Darkness', Section Sketch
fig.39 Walled City, Outer Facade

KOWLOON WALLED CITY

Hak Nam, or better known as the 'City of Darkness' was a 40 meter high city cluster where up to 33000 people lived on only 0,027km2. This plot ratio made Kowloon Walled City the worlds densest settlement before it was demolished between 1984 and 1994.
Originally a former Chinese military base, which had been built on land leased by the British Empire on the Kowloon side, the area transformed into a refuge for drug addicts, criminals and political refugees.

In a smaller scale the Kowloon Walled City suffered and benefited from the same developments as the rest of Hong Kong. The conditions in terms of water and energy supply got worse after massive immigration waves caused by World War II and Mao's takeover 1949 in China.
Neglected by the government, the area still had the status of a diplomatic black-hole which seemed to be a perfect breeding ground for illegal wheeling's and dealings. Controlled by triads officially until 1974 the uncontrolled growth of dwellings of all kind took its course.

Hong Kong's economic boom in the 1970s also pushed the buildings within Walled City to a height of 14 stories according to the flight path safety limit of the neighboring Kai Tak Airport. The chaotic conglomeration of often improvised apartments and shack-like dwellings on rooftops was not planned by any official engineers, however, it still functioned well for more than 50 years. Due to the mutual support of the cluster, building by building had to be removed.
Over the years, the majority had a peaceful life and the severe lack of common public support such as educational and medical facilities was compensated by sustained neighborhood relations. After the demolition, resettled residents mourned the social structures they had in their former homes. [45,46,47]

> *‚The bad thing about the demolition is we went our seperate ways. It was impossibel for the government to rebuild a village and to put all the people together. The thing that I've missed the most? It's still the relationship with my neigbors. Nothing was more special than that. My neighbors were nice - it was easier for us to sit down and chat in the past. Today, it is difficult'* [48]

45 cf. Carney 2013, Kowloon Walled City: Life in the City of Darkness
46 cf. Girad, Lambod 1993
47 cf. Barrie 2011, p. 26 et seq.
48 Kin-Fun 2014

fig.40 Cage People
fig.41 Cage Dwellings

CAGE DWELLING

While Hong Kong hosts around 40 billionaires, nearly 1.3 million people of its 7.21 million residents[49] live below the poverty line. Social inequality and ongoing migration primarily from Mainland China still facilitate a controversial housing market in which estimated 100.000 people do not seem to have another chance than living in cage homes or rooftop shacks.[50] If at all available, insufficient sanitary or cooking facilities which often are located in the same room, lead to physical and emotional stress.

Due to the massive lack of space, apartments are divided into even smaller cells bordered by bars and wire constructions. Simple plastic foils or wooden panels provide relative privacy. Subdivisions by mezzanine floors and partitions in the early shop houses are probably the origin of the so called ‚cage dwellings'.[51]

Especially the poorest suffer from the extremely bad housing conditions. Hundreds of landlords exploit these circumstances by charging an average of 150 € a month for often not more than only 2 sqm of 'living space'. Sometimes up to 20 residents can be found in single rooms of 30 sqm which clearly exceeds the average domestic household size of 2.9 people. [52]

The majority of people who live in tiny cage dwellings are impoverished, elderly, illegal immigrants or people incapable of work, who otherwise would have to live on the streets of Hong Kong. [53]

49,52 cf. Census and Statics Department 2014
50 cf. Feeding Hong Kong 2013
51 cf. Barrie 2011, p.37
53 cf. Gayle 2012, Cage dogs of Hong Kong

fig.42 Chang Apartment
fig.43-45 Different Rooms

TRANSFORMATION

The Chinese Architect Gary Chang can be seen as a pioneer in the field of highly efficient transformation design in Hong Kong. With the ‚Domestic Transformer', a 32 sqm apartment located in downtown Hong Kong which can be transformed into 24 different designs, Chang took the idea of minimal housing to a new level.

His design approaches are primarily based on a smart system of moving elements and the focus on maximum functions in minimal space.[54] If needed the room can be used as kitchen during lunch time and transformed into a home cinema or bedroom right after cooking.
Chang's concern basically tends to an intelligent and highly efficient utilisation of area and space which further on increases the quality of living in small dwellings.

He therefore returns to the principle of cell structures, which on one side, focuses on social independent individuals - urban nomads - and at the same time stands for highly functional minimal space. By doing so, Chang refers implicitly to structural approaches which have been planned throughout the metabolist movement of the 1960's. [55]

54 cf. Jordana 2010
55 cf. Vielhauer 2013

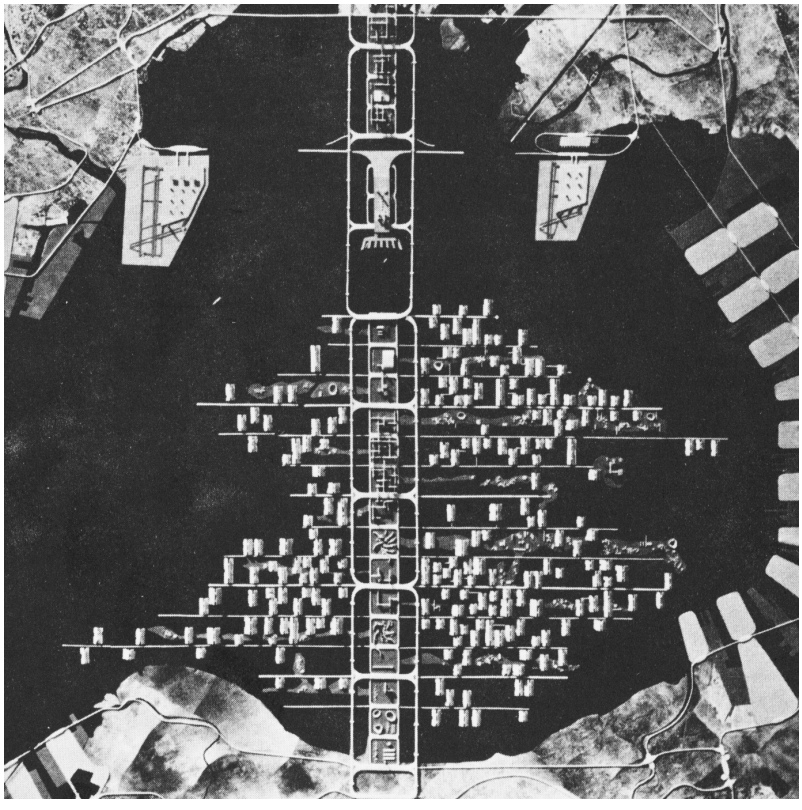


fig.46 Nagakin Capsule Tower, 1972
fig.47 Tokyo Bay, 1960

Megastructures

In the 1950's, architects all over the globe began to experiment with new and thoroughly bizarre designs which has led to new movements in architecture and urban planning.

As a response to often chaotic reconstruction efforts after World War II, new ways of urban developments have been applied. The focus was set on a mixture of functionalism and infrastructure which has led to a new understanding of urbanism. As a consequence, Mega Structures were built with vast growing populations and have been considered as cities on the edge of urban areas. Some of these settlements functioned relatively well whilst others went and still go through ghettoisation.

Japan's Metabolists, a group of young architects that have been strong advocates of a new architectural excitement, brought their ideas to the edge of the conceivable. Regardless whether on land, by sea or in the air mega constructions with several sqkm in size comprising infrastructure and food supply have been common approaches.

The young ambitious architects and visionaries around Kenzo Tange, based their strategies on natural biochemical metabolisms which basically describes structural transformation processes within cells according to their environmental conditions.

What started with relatively small-scale projects based on temporary applications such as Expo-Pavilions turned later into gigantic structural concepts (Tokyo bay). However, most of these utopian ideas were driven by ironic and poetic approaches and never left the state of a gedankenexperiment. [57]

57 cf. Koolhaas 1994, 19-22,57

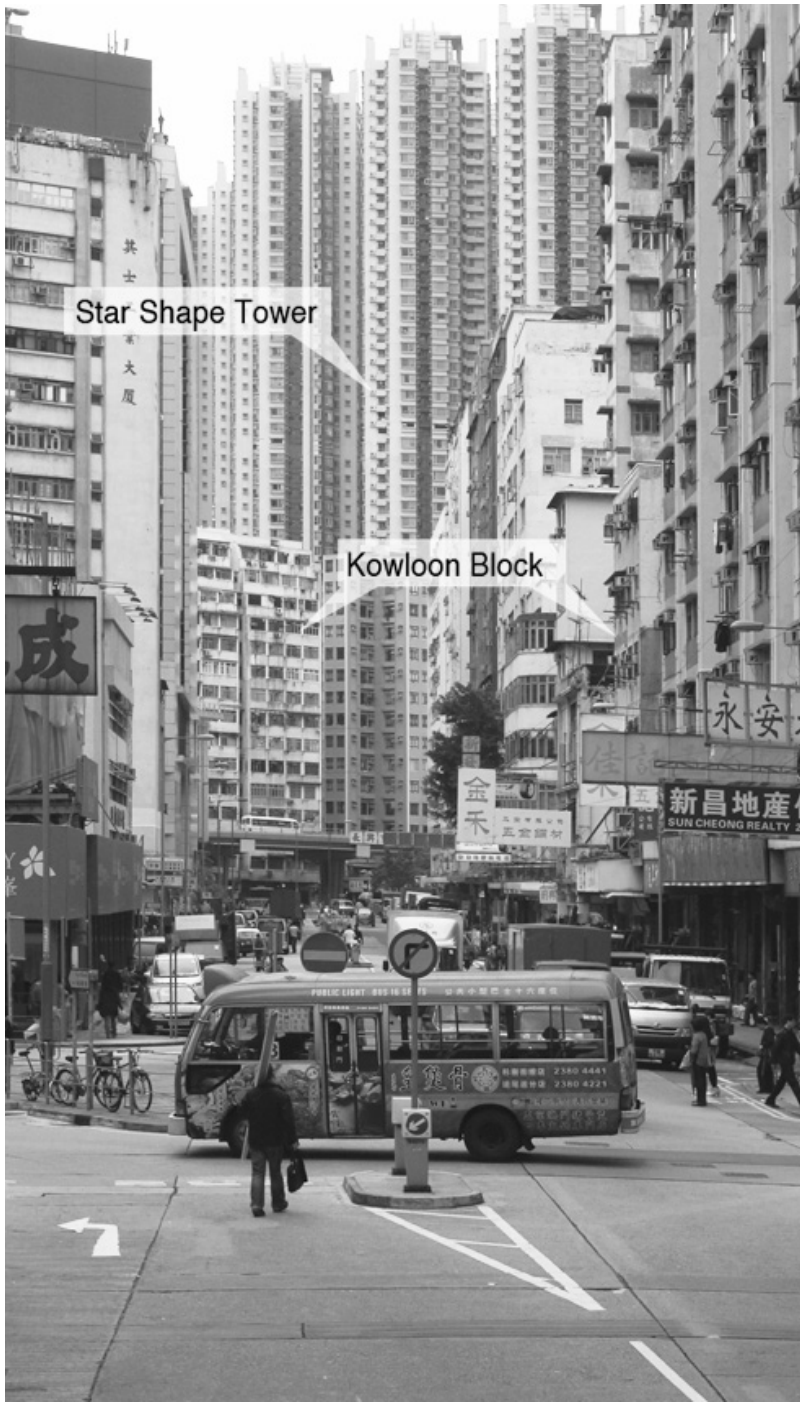


fig.48 Kowloon

Hong Kong Typologies

> *'In Hong Kong conditions are literally extreme: the topogra phy, the climate as well as the economic and political cir cumstances.'* [58]

Threatening, sight blocking building walls, hundreds of meter high pencil shaped towers with footprints of not more than a single unit with worn down facades showing a seemingly chaotic arrangement of dripping air conditioning units, are the physical appearance of a highly efficient way to accommodate millions of people on the smallest ground possible.

Due to natural and historical influences, Hong Kong's housing situation still has to go through a steady developing progress to keep up with its social and economic changes. Built architecture resembles a radical and expressive transcription of an extremely high level of density whereby design primarily results as a direct consequence of functional and technical constrains.
The straight-foreword and thoroughly pragmatic appearance of the buildings simply reflects a rational and highly efficient „handwriting", which to an average understanding of design often seems everything else than attractive.

Within often tight, economical conditions, architecture is strictly reduced to optimisation of materials and spatial usage. At this very point it basically seems like a reckless experiment which tries to find the lowest possible tolerability in terms of spatial living quality.
Despite Hong Kong's relatively young history its unique development created a variety of certain building typologies, whereby every single example has been developed according to the city's demands by the time of its construction.[59]

For a better understanding of how Hong Kong has dealt with its housing issues in the last century, six of the most important typologies should give a short insight in the city's unique architectural development.

58 Christ/Gantenbein 2012, p.5
59 cf. Christ/Gantenbein 2012, p.4 et seq.

fig.49 Different Shophouses
fig.50 Austin, Kowloon

HONG KONG SHOP HOUSE

Since the last decades of the 19th century shop houses have been Hong Kong's dominant building form until the mid 1950s and served as an effective urban typology for a rapid extension of the city.

The origin of the Shop House can be found on Hong Kong Island, built on steep, relatively narrow and deep plots and usually reaches two to three storey's in height. The facades often have colonnades or balconies, which provide shade to the pedestrian walkways underneath whereby some have been enclosed to create additional room. For lighting and ventilation reasons facilities such as kitchen or lavatories are situated in the rear. These structures were usually built to accommodate one family. Because of housing shortage it was not uncommon that several families lived in subdivided rooms under on roof. Depending on the decade Hong Kong shop houses vary in form and design due to constant adaptations of building regulations and safety standards.[60]
The principle of a two-storey shop-house is revisited and applied on modules within the 'podium-area' of the project. Double height units allow a variety of different shops and other commercial facilities.

KOWLOON BLOCK

The early ‚Kowloon Blocks' are modifications of Tong Lau Apartment houses which again have developed from the shop house.
The typology of these structures provides better lighting and ventilation conditions and has basically shaped the Kowloon Peninsula until now. With the invention of scissors stairs and the implementation of the elevator in the early 60's block developments quickly adapted to new technological possibilities to react on the shortage of housing units.[61,62]

GALLERY BUILDING

The inaction of the government in the matter of housing problems after World War II led to the formation of a large ghetto on a hillside in Sham Shui Po area, which burned to the ground on Christmas Eve in 1953 and left nearly 53.000 people, mostly refugees and migrants, homeless.

60 cf. Barrie 2011, p.31-36,47
61 cf. Barrie 2011, p.137
62 cf. Christ/Gantenbein 2012, p. 97-112

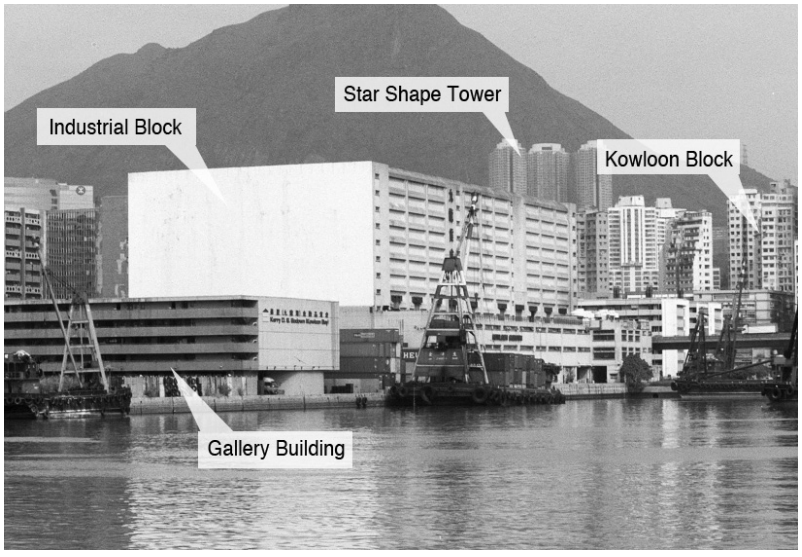


fig.51 Building at Waterfront
fig.52 Tai Kok Tsui

As an immediate response to the bad living conditions and serious safety hazards the government planned the ‚Mark I' a H-formed gallery building which was able to accommodate 35.000 people by a average surface of 2.23 sqm per person. Shared bathrooms, kitchen facilities and schools on roof terraces satisfied basic necessities of the residents. Inspired by its previous residential models, a variety of Flattened Factories developed in the years of economic upturn. [63]

INDUSTRIAL BLOCK

Mao's Bamboo Curtain policy was an important contribution to a booming manufacturing industry in Hong Kong. So called ‚Industrial Blocks' or ‚Stacked Factories' with up to 30 storey's with single floor areas of up to 1000 sqm were built throughout Hong Kong, often in close proximity to harbour fronts.
The open, supporting constructions of these buildings offered individual space for thousands of cheap labour in all kind of industrial activities whereby some required customised waste water or supply systems. Therefore numerous chimneys and supply pipelines on the outer facade are a further significant characteristic of an industrial block. With the announcement of the Shenzhen Special Economic Zone in 1979, the demand for Industrial Blocks has decreased dramatically which led to a mass emigration of Hong Kong and Shanghai based companies into the SSEZ for even cheaper labour force. [64]

SLAB COMPOSITION

Slab compositions are often used by the Hong Kong Housing Authority and can be seen as highly efficient housing machines, offering accommodation for 15.000 and more residents. The efficiency of such developments is based on an interplay of elevators, which usually stop every three floors, and well planned pedestrian traffic routes leading directly to public transportation hubs.
The estates are often built on steep ground whereby single slab buildings are linked together and arranged according to the surrounding topography. Common facilities on the ground-floor such as schools, parks and playgrounds generate a lively environment.[65]

63 cf. Christ/Gantenbein 2012, p.70-75
64 cf. Christ/Gantenbein 2012, p.40,77-93
65 cf. Christ/Gantenbein 2012, p.119

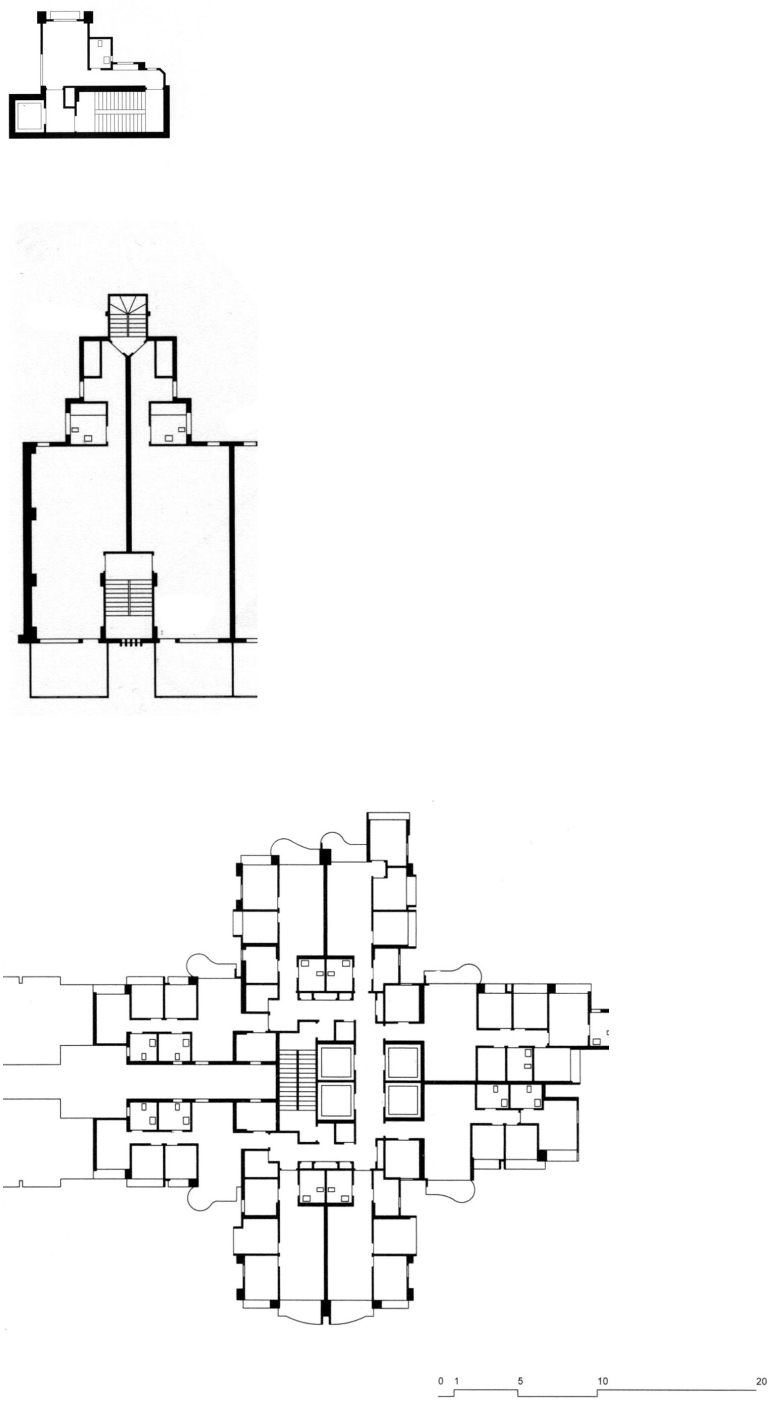


fig.53-56 Hong KongTypologies

PENCIL TOWER

One of Hong Kong‘s most famous and unique typologies is that of a Pencil Tower. This building type was an immediate architectural response after the 1984 announcement of Hong Kong‘s ‚hand-over‘ to China for the year 1997. To avoid high financial risks and often complicated negotiations with multiple land owners, investors started to focus on a development of narrow single plots.
Economic pressure and severe shortage of land manifested itself into slender living towers with often not more than a single unit on each floor where infrastructure claimed more than 50% of its usable floor space. [66]

STAR SHAPE TOWER

Star Shape Towers make up the majority of Hong Kong‘s highrise buildings. Usually a multi-storey podium complex providing common facilities or even multifunctional public facilities such as shopping malls, infrastructure hubs or sport centers, serve as a buffer between housing units and the busy street levels.
Within the last decades dozens of bizarre floor plan patterns have evolved according to building regulations, view and access corridors. In some examples up to 18 apartments share a central access element with lift lobby and stair case. [67]

Especially in the New Territories, where shortage of developable land seems at least less severe, entire settlements of evolved versions of Star Shape Buildings sprung up in recent years.

‚Hong Kong‘s building types share certain characteristics resulting from design operations which aim for high efficiency in planning , land use, and construction such as: extrusion and stacking of similar floor plaes, pairing or tripling of building volumes to share vertical access elements, and use of prefabricated modules to reduce construction time.‘ [68]

66 cf. Christ/Gantenbein 2012, p.42 et seq.
67 cf. Christ/Gantenbein 2012, p.45,130-135
68 Christ/Gantenbein 2012, p.44-45

HONG KONG SLOPES

fig.57 stabilisation measures on man made slope next to infrastructure

fig.58a typical cut-slope formation next to infrastructure

fig.58b typical cut-slope formation next to estate

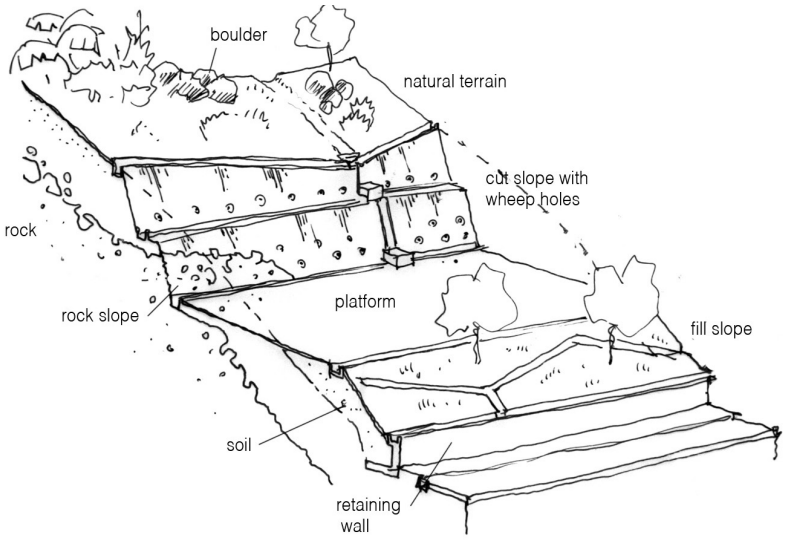
MAN MADE SLOPES

According to Hong Kong's mainly hilly topography, flat and therefore far easier developable land is more than just rare. Nevertheless the very high degree of urban development did not shrink from building on reclaimed land or far up the hillsides. The mountainous terrain requires appropriate measures to guarantee a safe environment for any build structure and especially its users.
As a result, a large number of man-made slopes are formed on hillsides in close proximity to infrastructure and buildings throughout the city. About 60.000 sizeable man-made slopes are registered in Hong Kong whereby two thirds belong to the government. The some 20.000 remaining slopes are owned privately. These numbers clearly show a notable potential for slope developments of all kind. [69,70]
Even for the dead, space seems to be limited. For Hong Kong's government columbaria and stacked cemeteries are highly welcome instruments to develop steep hillsides which otherwise seem to be unusable. [71]

SLOPE CONDITIONS

Unlike natural slopes, where hillsides usually erode to a stable angle, accompanied with a relatively balanced vegetation cover, rock structure and soil type, so-called man-made slopes are modified by human activities which create steep cut slopes in order to primarily accomplish platforms for buildings and benches for roads. These massive interventions change the geometry of slopes and usually affect the natural equilibrium negatively.
Despite technologically stabilisation measurements and maintenance work, weak controls and the lack of proper engineering standards has caused a number of severe landslides in the last century which claimed some 470 lives since the year 1947.

69 cf. Hong Kong Building Department 2013, Slope Safety
70 cf. Hong Kong Land Department
71 cf. Barrie 2011, p. 143



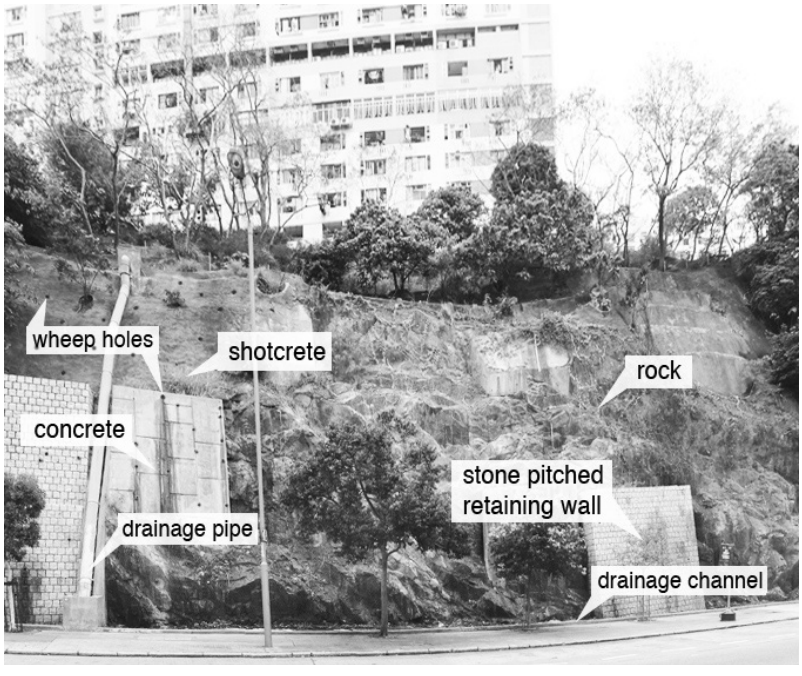


fig.59 Slope Shema
fig.60 slope stabilization measurements

In response to these issues a number of established engineering works are required to stabilize the slopes and prevent landslides:

Slope Support Measures:

Slope support such as rock bolting, soil nailing and retaining walls are common stabilisation measures for a better cohesion of slope surface

Surface Protection Measures:

Shotcreting and stone pitching is primarily used for surface protection and is crucial for the slope's appearance.

Drainage Measures:

Drainage such as weepholes, ranking drains and different forms of channels protect the slope from further erosion and eventually landslides.

There has been and still is a risk of landslides due to insufficient precautions and harsh climate conditions. According to the government a number of programmes such as the Landslip Preventive and Mitigation Programme (LPMit, since 2010) pursue an enhancement of man-made slopes such as upgrading old slopes and among others. involve them as a part in new projects. [72,73]

However, this overall development only favours the integration of man-made slopes in future developments throughout Hong Kong. Beyond the issue of stabilisation measures, physical matters such as urban heat island effect due to direct solar radiation on the bare shotcrete or stone surfaces are not to be underestimated.

Several hours of sunlight every day absorbed by massive rock and stone slopes, additionally enhance the urban heat island effect. This on the other side increases the temperature and therefore requires higher heat mitigation for affected estates or structures. Bringing urban overheating to a minimum does not only cool down affected areas it also reduces cooling energy. As a welcomed result, emissions and money are saved which leads to a win-win situation for residents and city authorities.

72 cf. CEDD 2012
73 cf. Hong Kong Land Department 2011, Technical Guidelines on Landscpae Treatment for Slopes


PLANNING
SITE

ANALYSIS

fig.61 topview Shau Kei Wan

fig.62 Hong Kong Map, Location Shau Kei wan
fig.63 Tai Tam Reservoir

The Planning Site

For a realistic application of the concept a planning site with most of the relevant conditions had to be found. With almost no flat developable space left, Hong Kong Island just seemed to be the right place for an appropriate site and environment for a testing-scenario.

An almost continuous cut-slope strip, dividing Shau Kei Wan's developed areas from the natural hillsides, offers ideal slope conditions. Along the steep transition zone next to the Yiu Tung Estate in the south of Shau Kei Wan, a lengthened cut-slope-formation with varying heights and depths has been chosen for further development. The following analysis gives a brief inside on Shau Kei Wan's historical development and its context in the city.

Shau Kei Wan

LOCATION AND TOPOGRAPHY

Shau Kei Wan is part of the Eastern District which lies in the northeast of Hong Kong Island, south of the Kowloon Peninsula. The district measures about 1.900 hectares and counts a population of nearly 590.000 residents, making it one of the most populated districts within the city. [74]

The former old fisher village Shau Kei Wan occupies a small strip between the narrow eastern end of Victoria Harbour and the foot of Mount Parker, which with 532 meters is the second highest peak on the Island but only the 40th highest within Hong Kong. [75]

Claiming a fifth of Hong Kong Island or 1315 hectares, the Tai Tam Country Park stretches from the southwest end of Shau Kei Wan to the south of the island. With the Tai Tam Water Reservoir in the middle, the natural wooded hinterlands offer a number of hiking opportunities and seem to be an ideal and recreational destination in contrast to densely developed areas. Via the Hong Pak Country Trail, which is in close proximity to the planning site, the Tai Tam Country Park could be easily accessed directly from the projects roof top levels.

74 cf. Home Affairs Department 2013, Eastern District
75 cf. wikipedia 2013, list of mountains

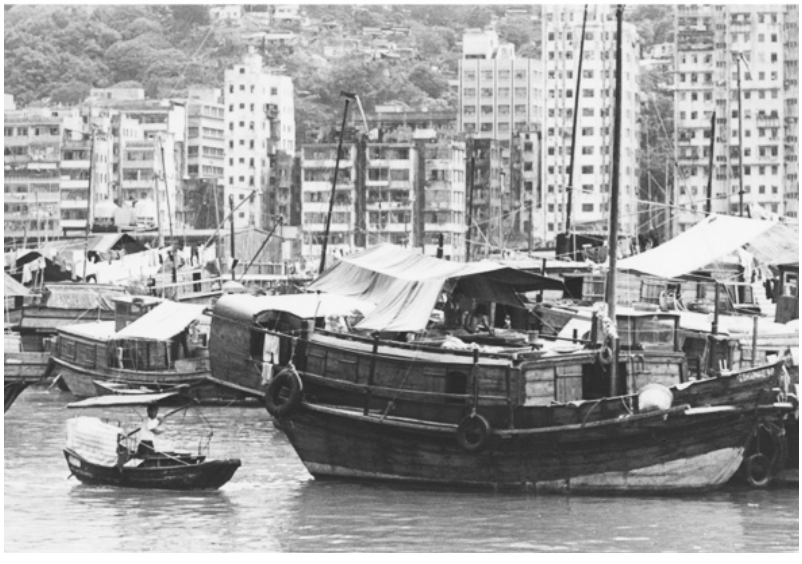


fig.64 top view, schau kei wan 1960s
fig.65 Shau Kei Wan, 1979

HISTORY

During the Sung Dynasty merchants traveling between Fujian Province and Guangzhou often went ashore for fresh water.
The early settlements were built by Hakka people who came from Guangdong province to Chai Wan and Shau Kei Wan where they erected the first villages.

The original name of Shau Kei Wan was „Starving People's Bay", which became a natural typhoon shelter for fishing boats due to its advantageous topographic conditions. After the arrival of the British, the small village was renamed due to the appearance of its bay into „Shau Kei Wan", which in Cantonese means bamboo basket.
Several thousand boat dwellers, who used to live on compact clusters of floating houses, and the fishing culture gave the district its character which still can be seen in a number of seafood restaurants and fish markets all over the place.

Due to the economic upturn in the 1960s the extensive land reclamation programme led to a new coastline over the years and the old Shau Kei Wan turned into a new industrial district with modern residential areas and public facilities. On the other hand, this development reduced the population of traditional boat dwellers from 130.000 in 1961 to about 5.000 by the year 2001. Although most of the former coastal shacks were not removed until the 1980s. [76,77,78]

NEIGHBORHOOD

As for the rest of Hong Kong, Westeners or imigrants other than Chinese tend to live in the financial district around Central, Wan Chai or Tsim Sha Tsui area on the Kowloon Peninsula. The outskirts of the city are in general less frequented by tourism or foreigners. Therefore the majority of the population in such areas are residents of Chinese background.
Like in most of Hong Kong's older parts, Shau Kei Wan also shows a representative profile of the city's historical development in terms of building typologies and utilisation of space such as land reclamations. Some of the early shipyards were located up to 800 meters inland on a narrow strip of land next to Nam On Street just about 250 away from Yiu Hing Road.

76 cf. Chan 2013, The keeper of Shau Kei wan's maritime past
77 cf. hkmemory, the perished fishing village
78 cf. Home Affairs Department 2013, Eastern District


Kowloon
Peninsula
Kwun Tong
Public Pier
Victoria Harbour
Sam Ka Tsuen
Ferry Pier
Sai Wan Ho
Ferry Pier
Shau Kei Wan
Typhoon Shelter
Lei Yue Mun
Sai Wan Ho
Station
Sai Wan
Shau Kei Wan
Station
Tramway
Island Line MTR
Island Eastern Corridor
planning
site
Shau Kei Wan
Chai Wan
Wan Chai Road
Mount Parker 532m
200m

In some parts of Shau Kei Wan the former shoreline can still be recognised based on old factory buildings which at the time of their construction have been built in close proximity to the harbour front for a better access to maritime traffic.
Nowadays, a well functioning infrastructure exists on the reclaimed land just around the project site. s.a. fig. google make over

Despite the relatively long distance to Central, Shau Kei Wan offers a lot to see for tourists. On a special temple tour, visitors can discover some built heritage such as the Shing Wong- or the Tin Hau Temple, which have been built almost 100 years ago.
With 6 primary and 10 secondary schools, public facilities such as sport fields, playgrounds and a number of markets and shopping opportunities, Shau Kei Wan provides a relatively high living standard.

A network of pedestrian walkways connects the Yiu Tung Estates, Tung Chun Court and Tung Shing Court with the street level of Yiu Hing Road next to the Shau Kei Wan Plaza which is more than 20 meter lower than the foot of the slope. The close proximity to public transportation is an essential criteria for a site‘s quality.

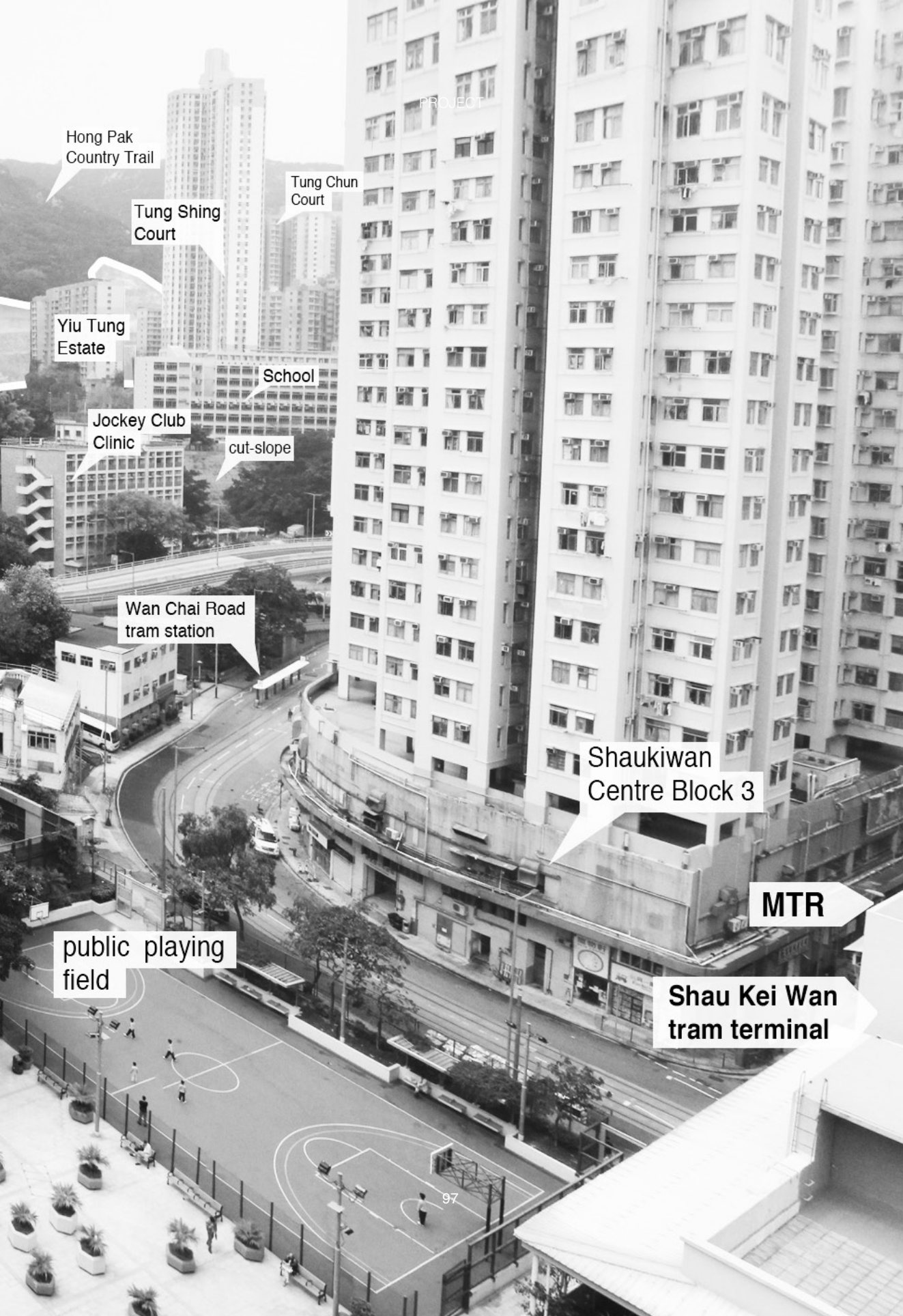
TRANSPORTATION

Historically, Transportation in Shau Kei Wan was rather inconvenient due to bad transportation systems and the relatively long distance to other population centers such as Central or Wan Chai.
The major connection between Shau Kei Wan and the rest of Hong Kong Island was King‘s Road. In 1904 the tram service between Northpoint and Shau Kei Wan was established, which later became insufficient as more and more people migrated to this area after World War II. Public buses and ferry services began to serve Shau Kei Wan. The final relief for the traffic issue came with the construction of the MTR and the Island Eastern Corridor.

The following transportation systems can be reached easily within walking distance from the project site.

fig.66 Transportation Shau Kei Wan

fig.67 Shau Kei Wan Neighborhood


PROJECT
Hong Pak Country Trail
Tung Chun Court
Tung Shing Court
Yiu Tung Estate
School
Jockey Club Clinic
cut-slope
Wan Chai Road tram station
Shaukiwan Centre Block 3
MTR
public playing field
Shau Kei Wan tram terminal


Ferry to
Kwun Tong
Ferry to Sam
Ka Tsuen
Shau Kei Wan
Typhoon Shelter
Holy Cross
Path
ISLAND LINE MTR
Hoi Foo
Street
Nam Hong
Street
400 m radius
to MTR
Aldrich Bay
Market
D1
B2
D2
B3
Shau Kei Wan
MTR Station
B1
A1
A3
A2
C
Bus
Terminal
Tram
Terminal
Shing Wong
Temple
Galaxy
Placa
Smiling
Placa
foot bridge
Yiu Tung
Shopping
Center
foot bridge
foot bridge
Tung Chun
Court
Tramway
Chai Wan
Road
Yiu Tung
Estate
Tung Shing
Court
Jockey Club
Clinic
Yiu Hing Road
hiking trail
planning site
(cut-slope formation)
100m

MTR:
approx. 400m from MTR station Exit A to project site.
The Island Line, which is by far the fastest transportation system in Hong Kong, connects Shau Kei Wan to the rest of the city. It takes 18 minutes to travel to Central and nearly 26 minutes to Mongkok.
Together with the Bus Terminal and the Tram Terminal, only a few minutes walk away, the MTR station becomes a highly effective interchange hub.

Tram:
approx. 300m from Tramway Terminal to project site.
The Tramway system is the oldest public transportation service on Hong Kong Island and still connects Shau Kei Wan Terminal in the east with Kennedy Town in the west. (s.a. transportation and circulation). Due to extremely low prices and low speed this system is still preferred by many residents and tourists.

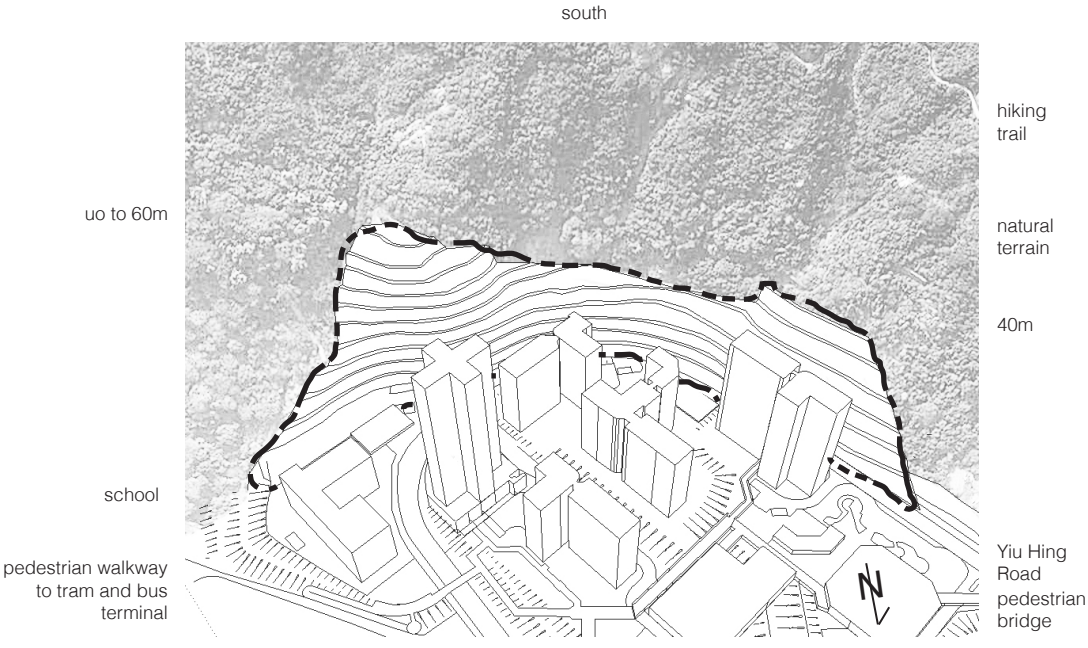
Bus lines:
approx. 350m from Bus Terminal to project site.
Over 20 bus lines stopping all over Shau Kei Wan connect Shau Kei Wan to other districts. Bus A12 directly serves Chek Lap Kok Airport.

Mini-buses:
Several green mini-buses, with a terminus at Po Man Street in Shau Kei Wan even stop along the Yiu Hing Road immediately in front of the project. Passengers can also use red mini-buses, which serve Chai Wan, Wan Chai, Causeway Bay and destinations in the south of the island such as Shek O.

Maritime Traffic:
Several Boat and Ferry services still serve different destinations such as Tung Lung Island and the Kwun Tong Public Pier on Kowloon site.

Private Transportation/Taxi:
With the Yiu Hing Road, the planning site has a direct connection to the public road network. This facilitates easy access with private transportation such as the taxi service, which operates effectively throughout the city. The 4 kilometers to the Eastern Harbour Crossing Tunnel in Quarry Bay can be reached by car or taxi in approximately 4 minutes. The Chai Wan Road leading east connects Shau Kei Wan with the neighboring Chai Wan.

fig.68 existing infrastructure near site



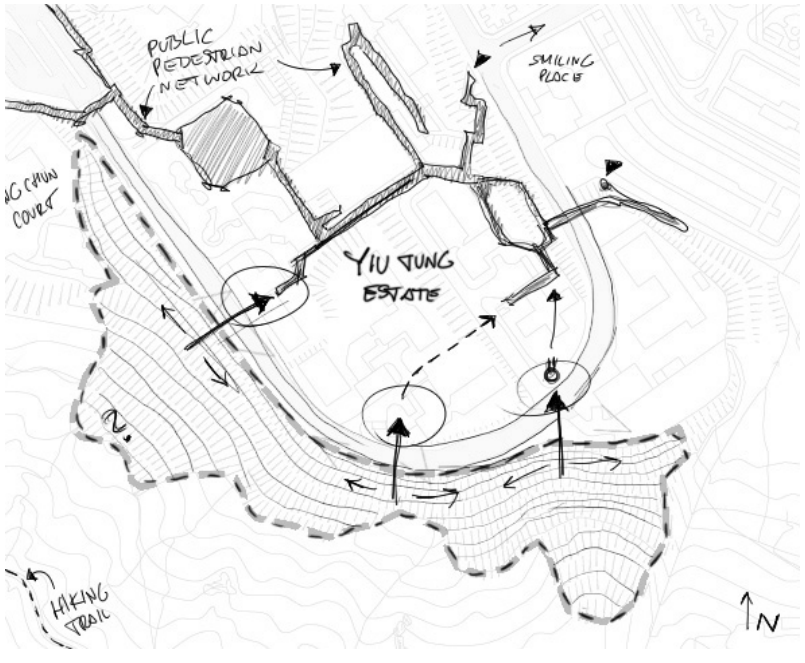


fig.69 Slope Formation
fig.70 Slope Formation, Top View, access to city

The Slope

Located along the southern turn of Yiu Hing Road the approximately 450m long and up to 60 meter high cut-slope formation offers a variety of different shapes and surfaces mainly facing seawards to Victoria Harbour in the north of Shau Kei Wan.

The Yiu Hing Road measures approximately 6 meters in width and is flanked by a 5 meter wide pedestrian sidewalk on both sides. The buildings of the Yiu Tung Estate are just opposite of the slope formation. Several trees on the sidewalk provide shade for pedestrians. The transition zone between the Estate and the natural hillside only consists of a road, sidewalks and a man-made cut-slope formation, which is a typical sight throughout the edge of Hong Kong‘s developed areas.

The slope is divided-up into ten steps, whereby each consists of an average of one meter wide maintenance walkway for inspection, and averaging slightly more than six meter high vertical. The depth of the setbacks vary from only a few decimeters to several meters. However, the longest distance between the street level and the natural hillside measures slightly more than 60 meters at the top of the project.

The surfaces of the vertical „walls“ are basically a result of different common surface protection measurements and have an angle range between 30° and 90°.
The majority is covered by partly overgrown shotcrete with wheepholes followed by stone pitched retaining walls and plain concrete. Nevertheless some of the surface is roughly hewn rock.

Drainage channels and concrete drainpipes are located mainly on the edges of the slope. Traces of efflorescence indicate spontaneous cascades throughout the surface. Handrails and maintenance ladders, which connect the horizontal inspection walkways, are a contrast to the rough appearance of the dark mineral surface.
An additional main drainage channel runs along the Yiu Tung road at the bottom of the cut-slope formation.


紀念
梁
志
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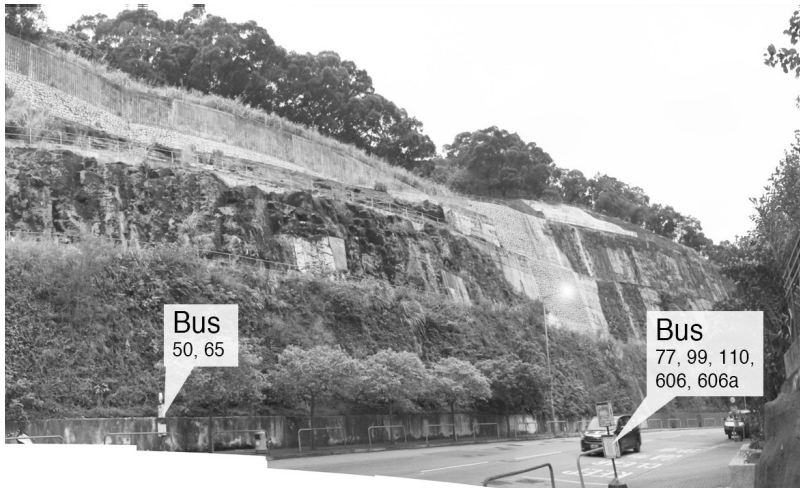
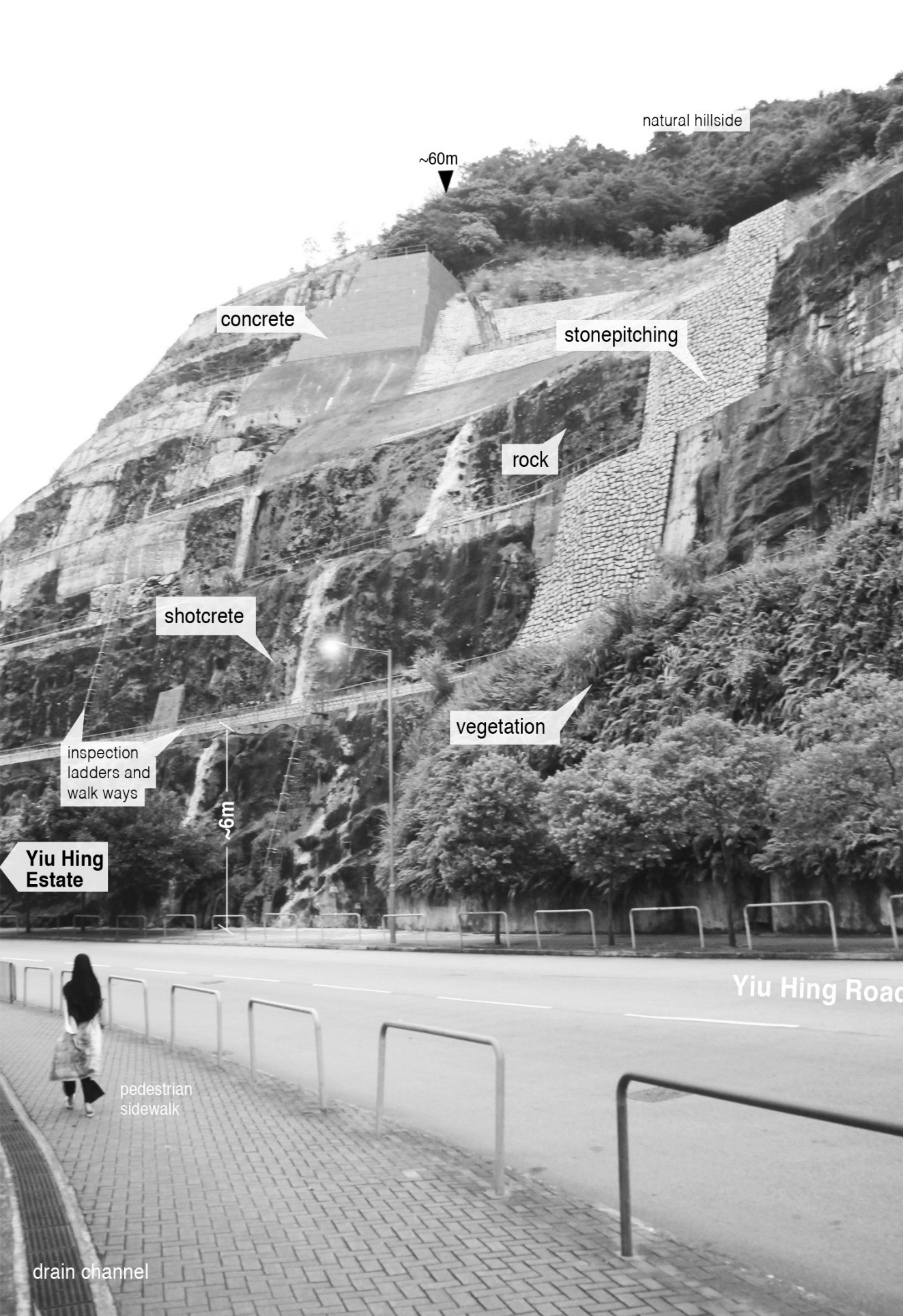
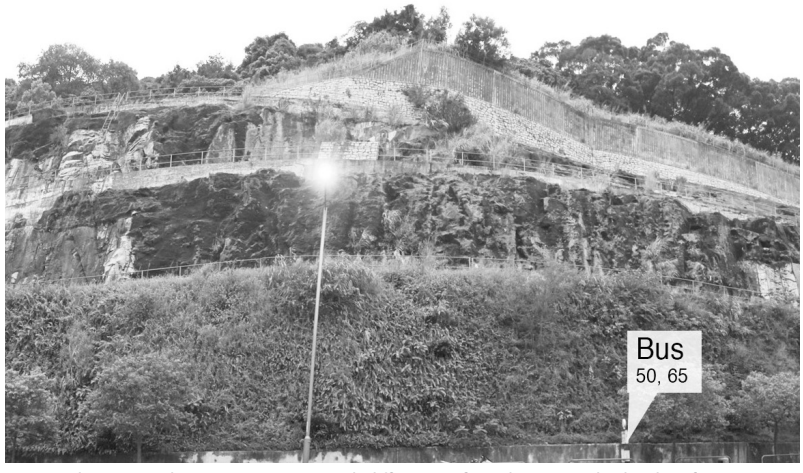


fig.71 slope formation
fig.72 Hiking Trail
fig.73 Bus Stops, Yiu Hing Road
fig.74 Sidewalk, Yiu Hing Road


natural hillside
~60m
concrete
stonepitching
rock
shotcrete
vegetation
inspection ladders and walk ways
~6m
Yiu Hing Estate
Yiu Hing Road
pedestrian sidewalk
drain channel

side walk with trees for shading, wheep holes and inspection ladder on shotcrete 'wall'



view on slope to northwest, up to 5 steps with different surfaces, bus top on both sides of Yiu Hing Road

fig.75 Yiu Hing Road
fig.76 Inspection Ladder, Shocrete Wall
fig.77 Middle Section, Yiu Hing Road

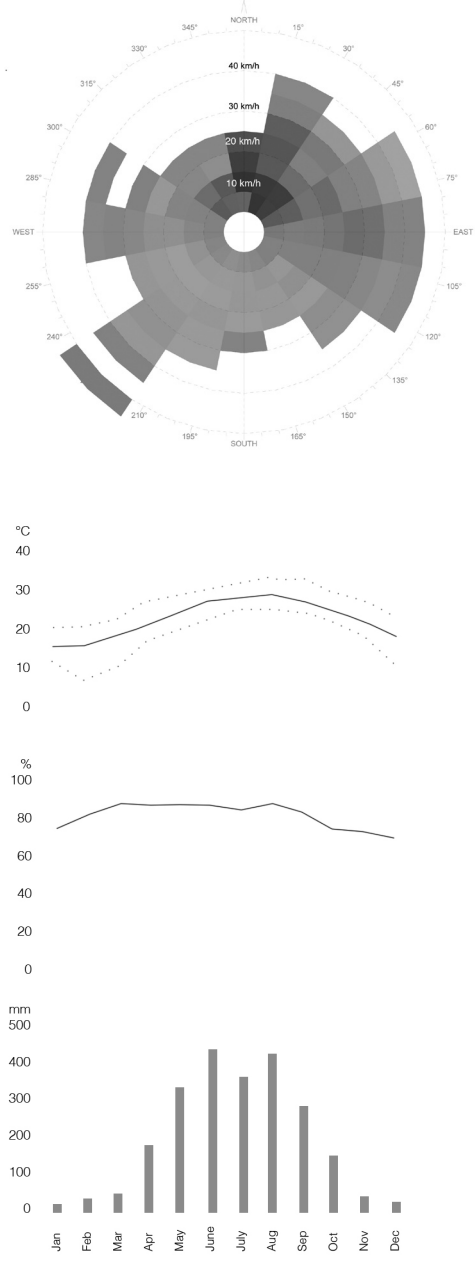


fig.79 Wind Diagram
fig.80 Climate Diagram
-monthly average temperature
-humidity monthly average
-precipitation monthly average

The Climate

The Climate in Hong Kong is typically subtropical and humid and can be divided into four seasons.
Spring-time is the most humid time of the year with humidity levels over 80 per cent.
Parallel to a rise in temperature, rainfall increases sharply in April. Weather in spring tends to be unstable. Cloud cover, rainfall, windy and sunny periods can change within short intervals.

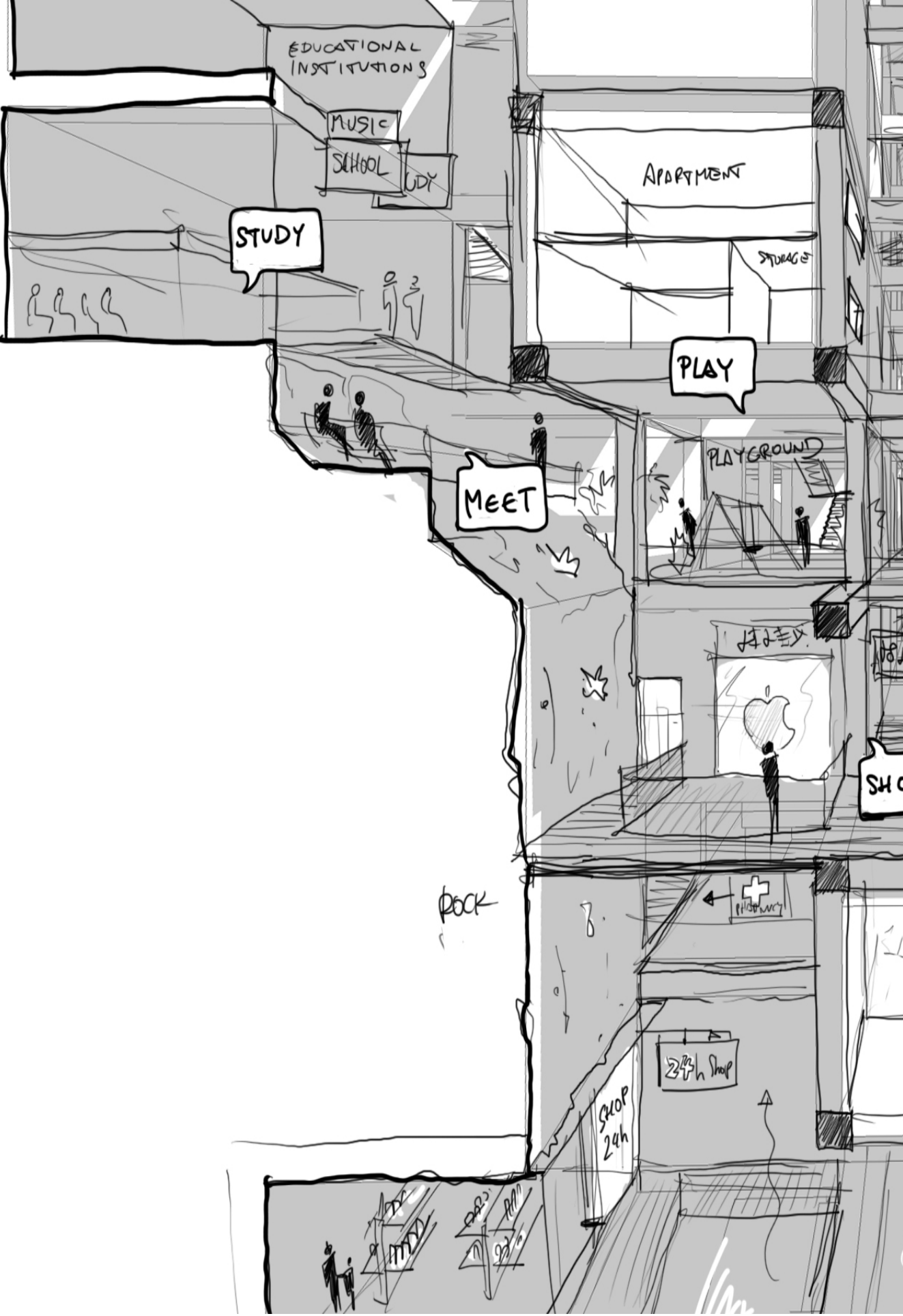
In the summer season, the weather is usually hot and humid. Temperatures exceeding 30°C cohere with high humidity are quite common during day time.
Long–lasting sunny and dry periods, especially in July and August cause typhoons which hit the city frequently. Average minimum temperatures of around 26°C in nighttime are not uncommon.

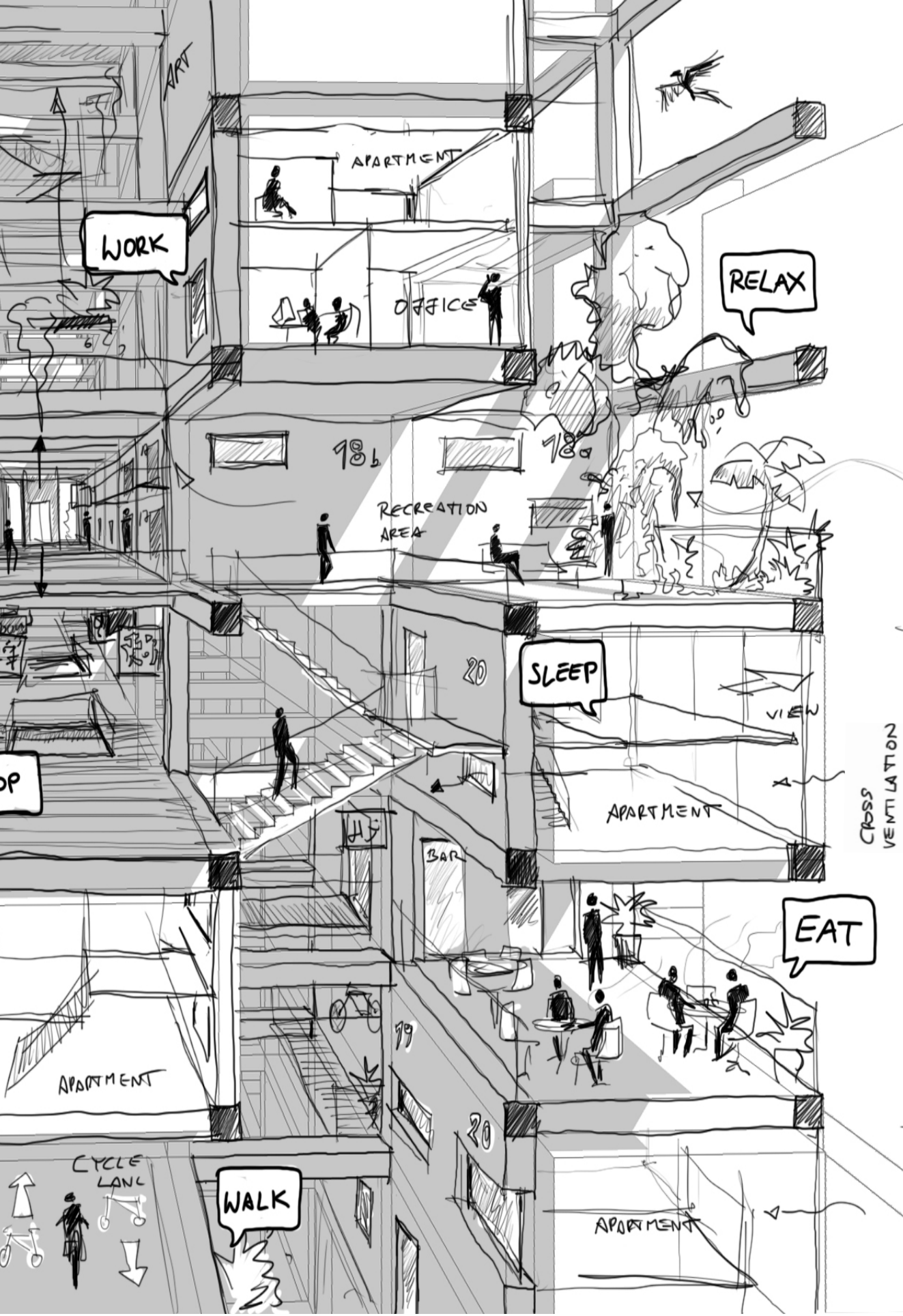
The autumn is dominated by high temperatures and decreasing humidity. Sunny periods, especially in October with a strong perceivable drop in rainfall make the autumn the most pleasant season for Hong Kong's residents and visitors.

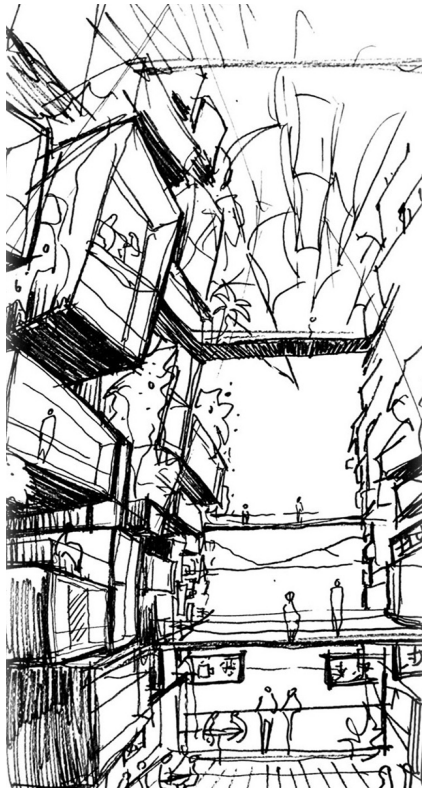
Starting sunny in November, winter becomes steadily cloudier and colder until January.
Despite Hong Kong's coastal location just below the Tropic of Cancer, low temperatures around 0°C, especially in the North Territories, are likely to occur within the first months of the year. Nevertheless warm airstreams frequently bring temperature between 20 and 28°C in wintertime. [79]

79 cf. Hong Kong Observatory 2012, Climate of Hong Kong

THE CONCEPT


EDUCATIONAL INSTITUTIONS
MUSIC SCHOOL
STUDY
APARTMENT
STORAGE
PLAY
PLAYGROUND
MEET
ROCK
24h Shop
SHOP 24h


ART
APARTMENT
WORK
OFFICE
RELAX
18b
18a
RECREATION AREA
20
SLEEP
VIEW
APARTMENT
CROSS VENTILATION
BAR
EAT
19
APARTMENT
20
CYCLE LANE
WALK
APARTMENT



The Origin

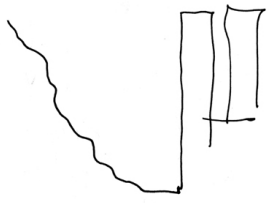
The driving force behind my concept simply is the necessity for new developable space throughout the city of Hong Kong. In a first approach on this issue during research work for a master studio at the Chinese University of Hong Kong in 2011, I discovered the ‚vertical' as a potential planning site. At the final presentation this idea apparently was well received and accepted as a possible solution, which has led to a surprisingly positive success in form of a studio award within my semester.

On an early exploratory hike on Hong Kong Island, I encountered dozens of different slope formations in the Eastern District, especially around Chai Wan. Rather than focusing on the potential of already existing and accessible slopes I turned to steep cliff formations directly at the waterfront. The master studio with the title ‚Living on the edge' exemplifies housing at an unusual site. The sketch on the left shows the initial concept of stacked housing units above a public layer with a view to the sea side.

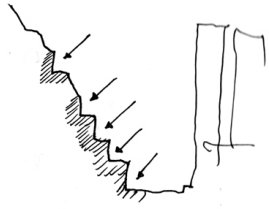
Almost one and a half years later I decided to visit the city again and to make another attempt for a Hong Kong related project in the form of my final Diploma thesis.

After some conversations with former lecturers, I started to set my focus on man-made cut slope formations. By doing so I actually recognised how many slopes exist all over the city. In the beginning the concept developed unattached to any concrete planning site. On an excursion in March 2013 to the Ming Wah Dai Estate I eventually decided to choose a slope formation at the southwestern edge of Shau Kei Wan.

1



2



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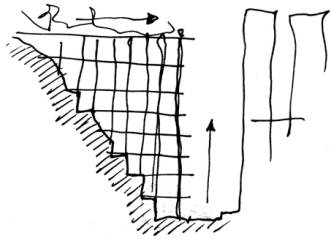

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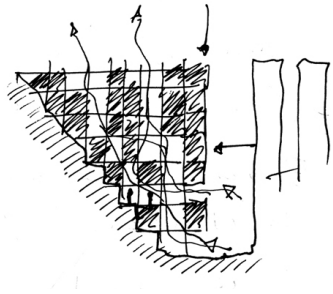


concept sketch, development of a cut slope formation

The Strategy

The strategy is relatively simple. Elements with different functions cover a yet unused ‚vertical' slope, usually located on the edge of the urban areas between buildings, infrastructure and the natural terrain. According to different shapes, angles and dimensions of slopes, a highly flexible modular system is considered to be an appropriate approach.

On a random cut-slope formation, ideally next to an already existing infrastructure, a 3-dimensional grid is applied directly on the steps of the slope.
The resulting structure reaches from the street level up to the highest point of the cut slope-formation and becomes a gap-filler which can be seen as an ideal element in the often very short transition zone between nature and city.

Vertical access running through structure, allows a direct connection between the street and the roof top area, which merges with the nature towards the hillside.

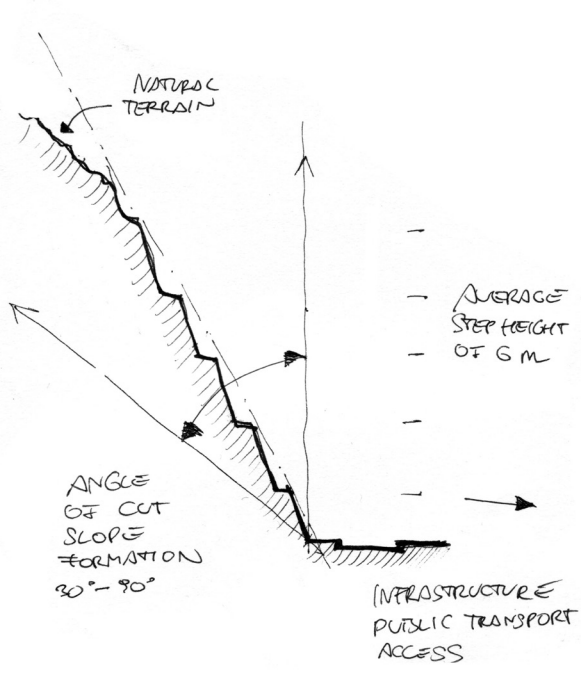
1. Selection of appropriate cut-slope formation in close proximity to existing infrastructure

2. Preparation of cut-slope formation, foundation and excavation of the slope, according to arrangement pattern

3. Application of 3-dimensional grid structure, connection between roof top area and natural hillside/terrain

4. Insertion of modules with different functions responding to neigh bourhood analysis. Position of modules according to arrange ment pattern

The project is now defined by three zones. The roof top, a perforated and planted surface, which reduces direct solar radiation and weathering. The facade to the city, which provides voids for views, natural lighting and ventilation. The slope, inside the structure, integrated in the arrangement of the modules, providing a unique atmosphere and a pleasant micro climate due to the rock's thermal cooling effect.


NATURAL TERRAIN
AVERAGE STEP HEIGHT OF 6 M
ANGLE OF CUT SLOPE FORMATION 30°– 90°
INFRASTRUCTURE PUBLIC TRANSPORT ACCESS

The Parameters

Potential planning sites usually vary in appearance and location and therefore require an appropriate approach for any new project. Nevertheless individual developments can be implemented as independent structures responding to its immediate surroundings.

Assumed that a slope does not undercut the minimum dimension of about 6,6 meter in depth and height (equal to axial dimension), basically every formation can be considered as a potential site for further application of the concept.

The slope angles usually vary somewhere between 30° and 80°. Even though completely vertical surfaces can be developed as well.

An already existing infrastructure, respectively access to public transport in close proximity to the area, is advantageous.

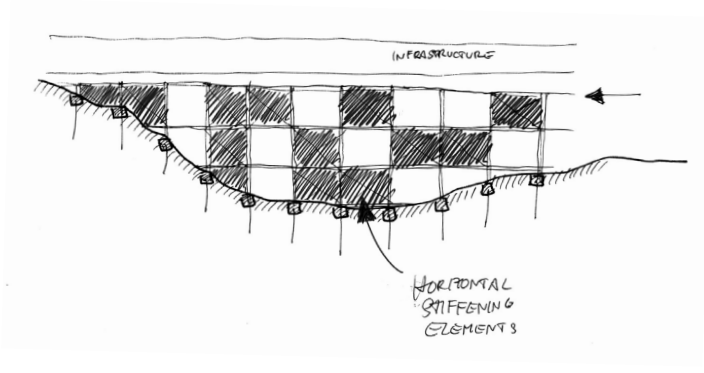
Based on the modular system, the combination of functions of the ‚cubes' can theoretically meet the demands of the neighbourhood and further increase the living quality within the area or district.

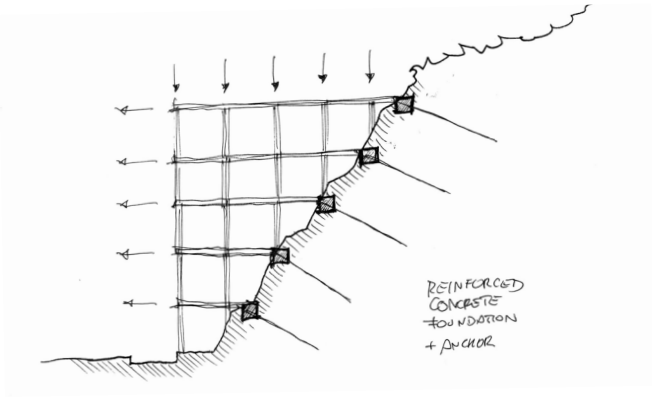
According to developers requirements, a project might consist of only ‚office and shop' cubes, only ‚residential cubes' or a mix of different functions.

The transition into a natural hillside on the edge on top of a slope further integrates the project on the location.

THE STRUCTURE

structure, consits of beam and column elements


INFRASTRUCTURE
HORIZONTAL
STIFFENING
ELEMENTS


REINFORCED
CONCRETE
FOUNDATION
+ ANCHOR

THE FOUNDATION

The project sites offers some advantageous basic conditions in terms of structural engineering. Unlike common developments, where main constructions such as load carrying cores need to be erected, the slope developments benefit from natural given conditions.

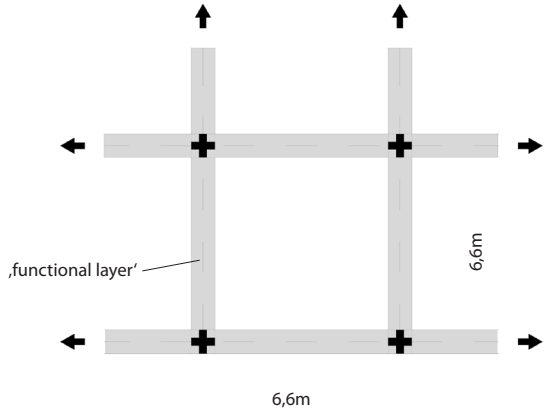
Underneath a thin layer of soil, which is mostly covered by surface protection measurements, the slope usually consists of massive rock. This advantage serves as an ideal foundation for an anchoring of the horizontal structural elements.

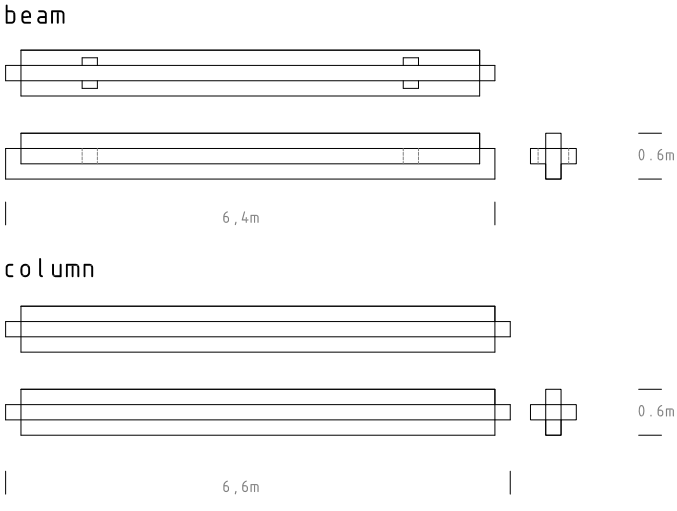
The fixating of the beams in reinforced concrete foundations all over the cut-slope prevents the structure from horizontal forces off and towards the slope.

Vertical forces are transported by the column elements which are aligned vertically on top of each other. A connection system aligns these elements vertically, joining the prefabricated column elements with the beam elements

A sufficient sequence of stiffening elements such as the ceilings and additional diagonal tensile cables within the voids, generate a slab effect and reinforce the horizontal layer of the structure.

As a result this construction concept does not require additional vertical stiffening. Nevertheless the wall elements of the modules act as panels within the vertical layers.


‚functional layer'
6,6m
6,6m


beam
0.6m
6,4m
column
0.6m
6,6m

THE GRID

Axial Dimension: 6,6m

Due to an ideal overall dimension according to a variety of material properties such as range and load transfers, average step dimensions of cut-slope formations, and convenient subdivision in terms of floor heights, the axial dimensions measure 6,6 meters overall.

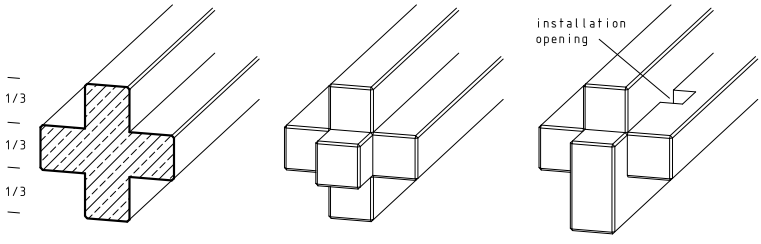
The excavation of single modules within the intersecting area of grid and slope achieves an extension of the grid into the slopes body.

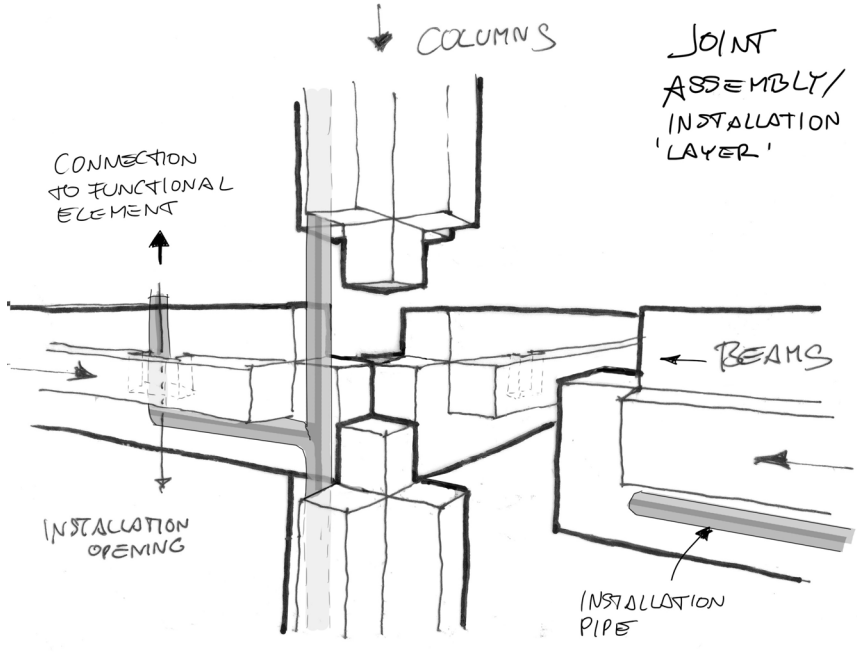
BEAMS AND COLUMNS

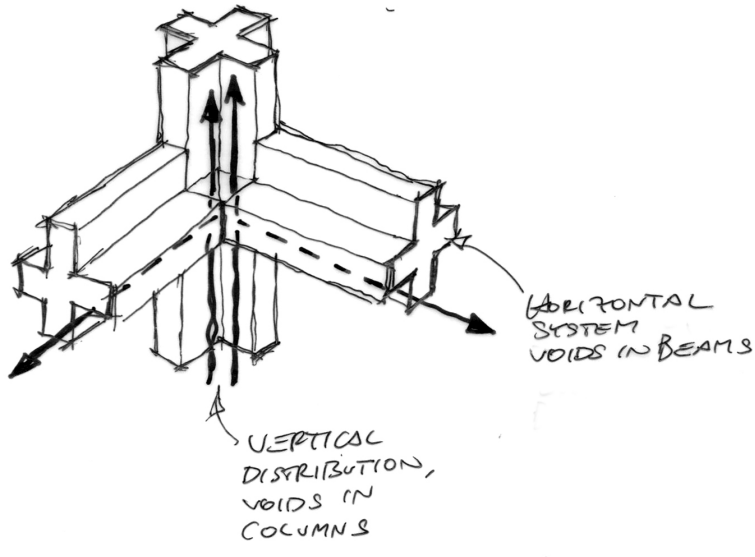
The construction primarily consists of prefabricated reinforced concrete column and beam elements with a profile of an isosceles cross, measuring 0,6 x0,6m.

Next to the construction, the structure itself further functions as a 0,6m wide vertical as well as horizontal ‚function-layer', containing installation, wall-, window- and ceiling-elements, and storage space.

By shifting all inconvenient necessities completely into the 0,6 meter wide space of the structure, a maximum of individual floorplan variations can be achieved on a floor area of 6x6 meter in each floor of a module.



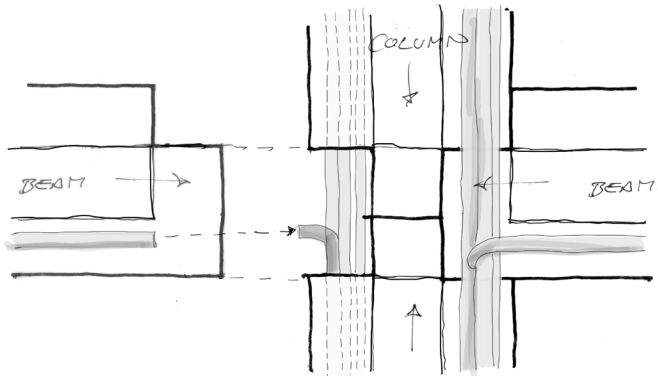

COLUMNS
JOINT ASSEMBLY/ INSTALLATION 'LAYER'
CONNECTION TO FUNCTIONAL ELEMENT
BEAMS
INSTALLATION OPENING
INSTALLATION PIPE


HORIZONTAL SYSTEM VOIDS IN BEAMS
VERTICAL DISTRIBUTION, VOIDS IN COLUMNS

THE JOINT

A simple assembly of the columns and beams in the joints allow the integration of installation pipes throughout the structure. Because of setbacks at the lateral, horizontal support surfaces of 20cm at the beams ends, four 20x20cm openings lead vertically along each columns edges.

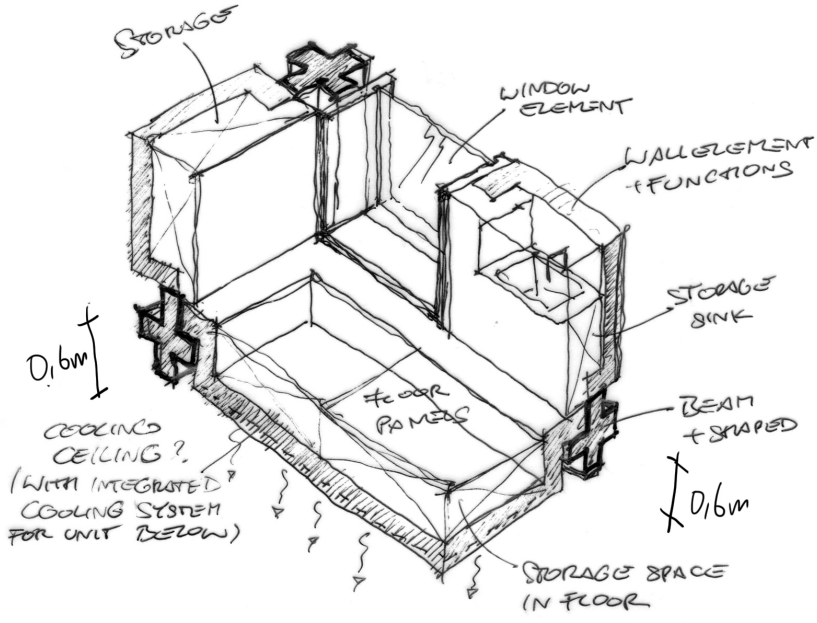
The same principle is also used for the horizontal elements. Due to the proximity to the columns, supply- and waste water pipes run through designated 10x20cm installation openings on both sides of the beam before they turn horizontal and connect to the vertical main collecting pipes

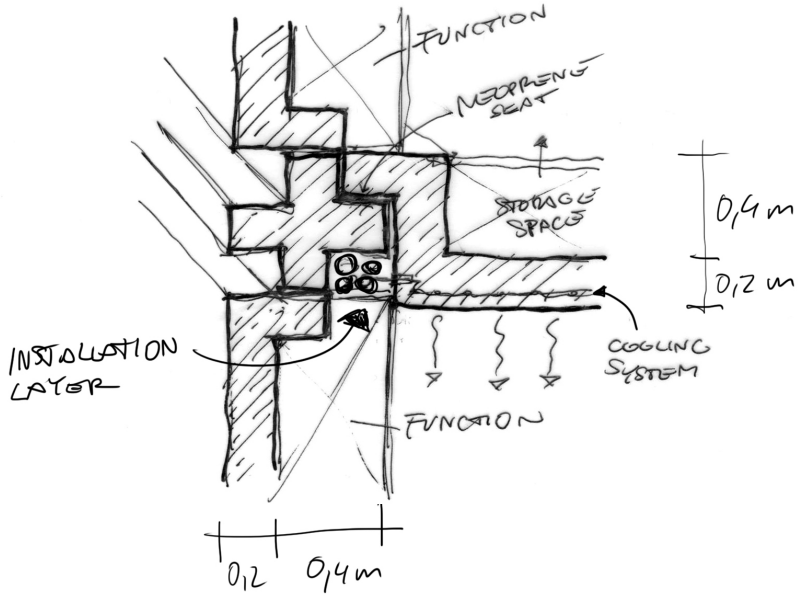


FUNCTIONAL LAYER

The functional layer, which basically overlaps with the vertical and horizontal structural elements, carries on the idea of a neutral structure for individual usage. Different functions in the form of kitchen or bathroom equipment, work tables or simple storage space, is shifted to the 0.6 meter wide functional layer.

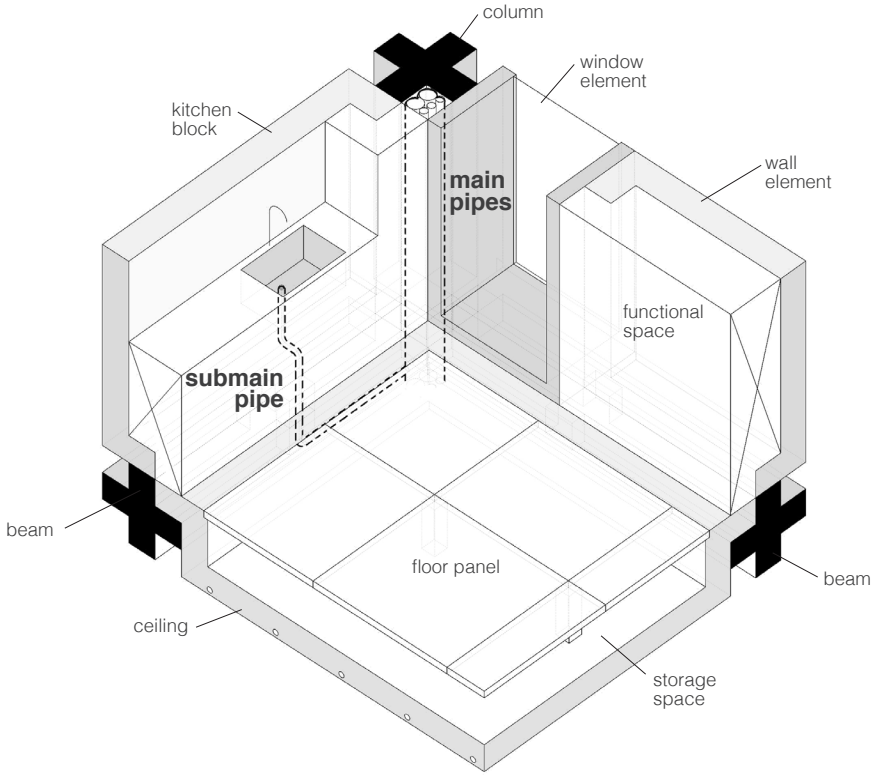
Even installation and supply pipes, which run throughout the structure, are moved to the recesses on each edge of the columns and beams. No additional installation layers such as shafts are required. For each unit four vertical 20x20 cm installation shafts are available.

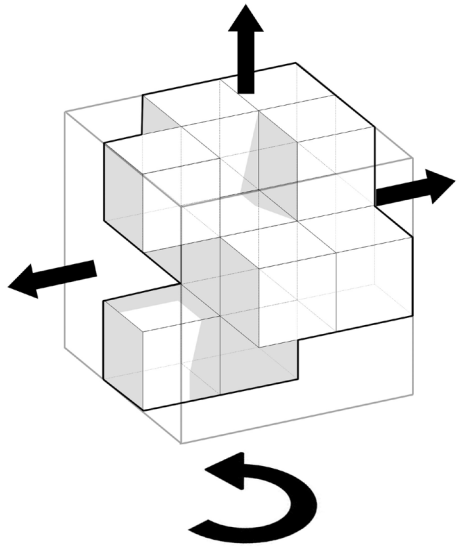

STORAGE
WINDOW ELEMENT
WALL ELEMENT + FUNCTIONS
STORAGE SINK
0,16m
FLOOR PANELS
BEAM + SHAPED
COOLING CEILING ? (WITH INTEGRATED COOLING SYSTEM FOR UNIT BELOW)
0,16m
STORAGE SPACE IN FLOOR

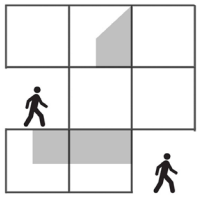

FUNCTION
NEOPRENE SEAT
STORAGE SPACE
0,4 m
0,12 m
INSTALLATION LAYER
COOLING SYSTEM
FUNCTION
0,12
0,4m

STORAGE AND FUNCTIONAL SPACE

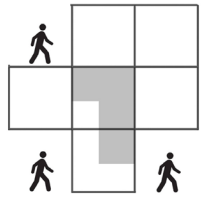
The vertical wall-elements consist primary of 20cm thick concrete coffers. This leaves the remaining 40cm for functional space. Kitchen appliances and bathroom equipment such as wash-basins or washing machines, not exceeding 40cm in depth, are integrated in a variety of different 1 to 3 meter long wall elements.
Bigger space containing elements such as beds, kitchen tables or storage boxes can be simply relocated into the floor space. The functional opportunities are almost unlimited and might reach from Jacuzzis to temporary wine cellars or indoor gardens.
The possible storage space in each floor of a ceiling element is about 12,5 cubic meters, a 6 meter long wall element offers nearly 6,5 cubic meter of space. The combined volume of ceiling- and vertical-elements (by 50% wall-element), within one unit make up to 25 cubic meter of functional storage space.



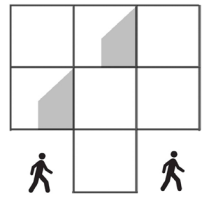




top



front



side

ARRANGEMENT

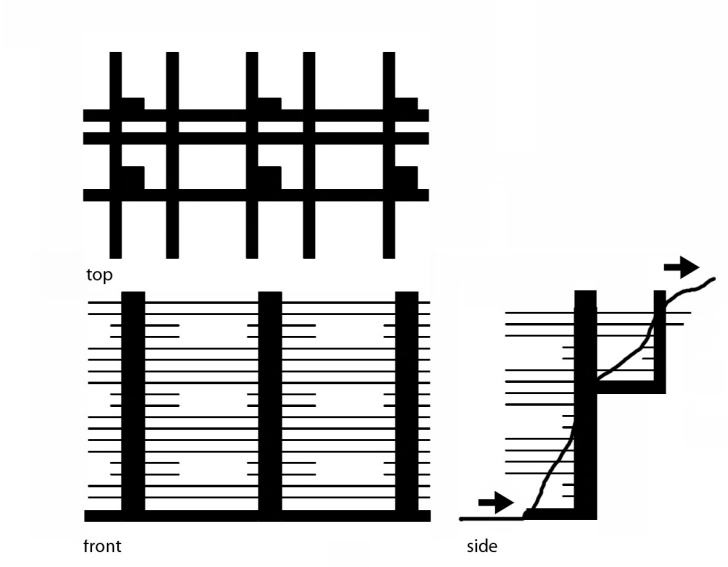
There are potentially dozens of different ways to organise and arrange the modules according to a variety of important parameters.
During the work for this concept, a couple of different arrangements have been tested. To achieve the goal of providing sufficient void space for circulation and natural lighting and ventilation, I tried several approaches, starting from the basic tetris-pattern to ‚Rubik's Cube' with systematic break-throughs.

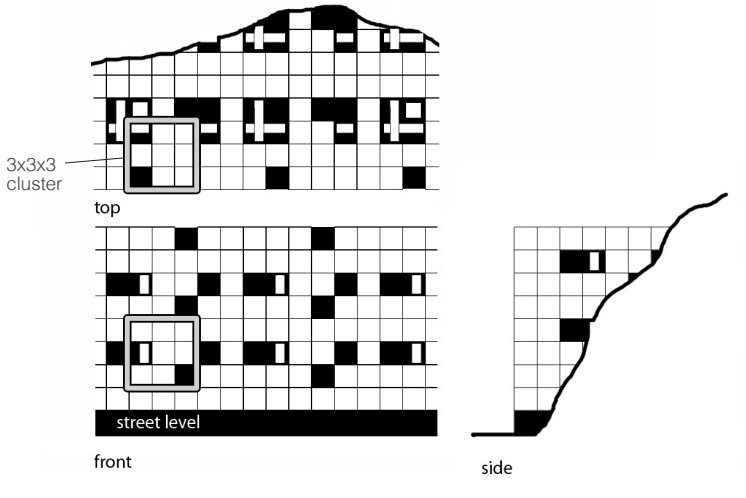
The most efficient approach possible for an arrangement, might be that of a coded algorithm which parameters force a minimum of two facades facing a void which needs to be open to the top or to the ground to achieve an appropriate natural ventilation and lighting scenario.

In the current state of the project, a 3x3x3-cluster, similar to the ‚Rubik's Cube' whereby each element of the cluster conforms to a 6x6x6 meter module, was used to create an appropriate initial arrangement. According to infrastructure, ventilation and lighting parameters 15 elements of 27 remain void space. Therefore the arrangement of the whole project is primarily based on the extension of turned or shifted versions of the initial 3x3x3-cluster.

As a result, continuous openings throughout the project allow a connection of vertical and horizontal circulation layers.

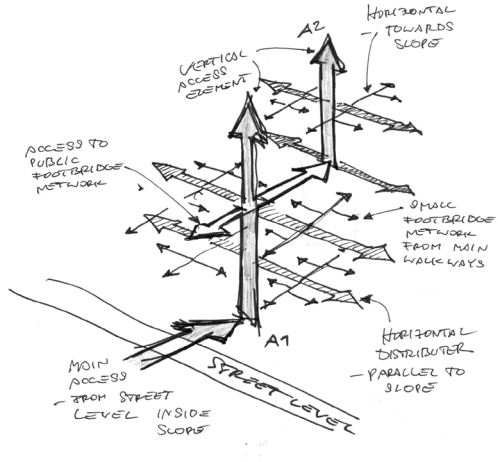
In denser zones within the structure, a connection of two or more modules on the same floor achieves better lighting and ventilation conditions. With other words, a unit which only has two facades facing a void, can be combined with another unit to increase quality in terms of space, views and lighting.


top
front
side


3x3x3
cluster
top
street level
front
side

CIRCULATION AND ACCESS

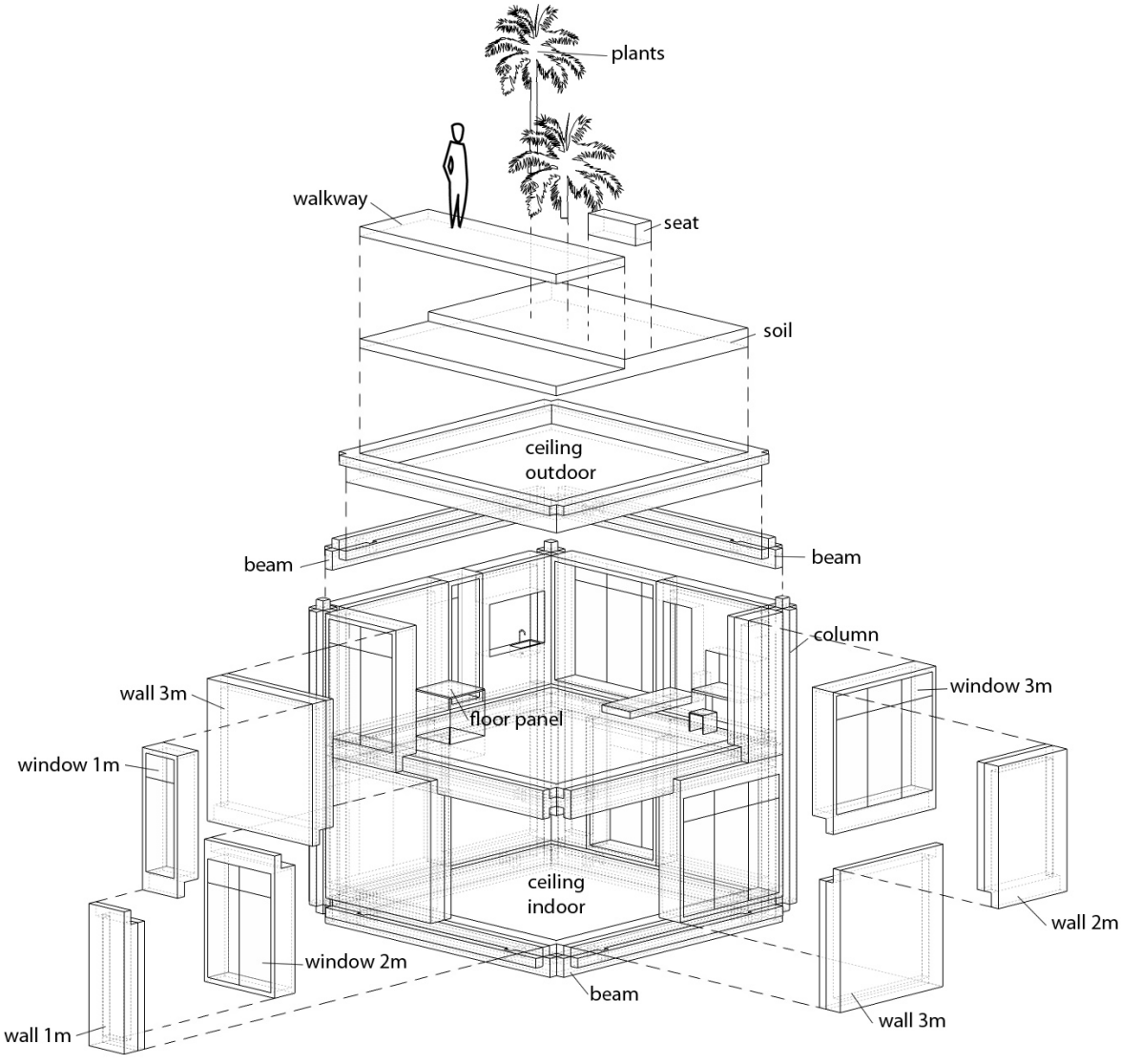
As shown in the analysis (s.a. p.90, fig.70), the interconnected pedestrian network of covered walkways and footbridges leading through Yiu Tung Estate, create an ideal connection to the city
Extension bridges over the Yiu Hing Road into the Yiu Tung Estate and the Tung Shing Court link the project with the city on a pedestrian level.



Vertical access elements consist of a pair of infrastructural modules whereby elevator modules, each providing three elevators, and staircase modules are combined.
The vertical access modules reach from the street level to the roof-top and serve every single floor. This allows a continuous connection from busy street levels to green rooftop landscapes and a specific guidance of the pedestrian flow within the structure.

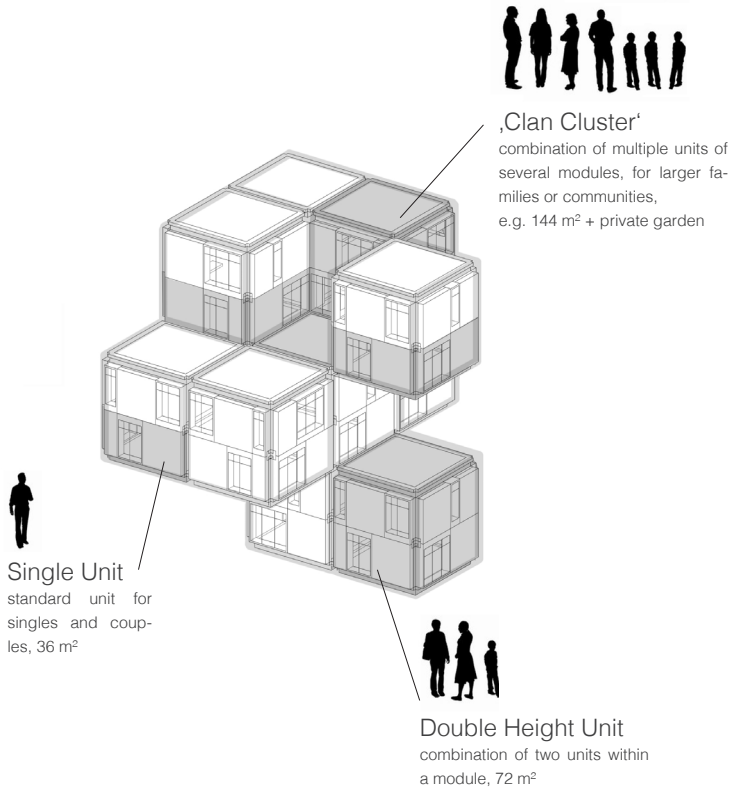
With a setback of 3 modules, vertical access elements are usually located along the horizontal main ‚streets' which run through the structure parallel to the slopes on each floor. The longest distance between a residential module and the next vertical access element should not be longer than a maximum of 4 modules.

Starting from the main ‚streets', smaller individual foot-bridges measuring 1 to 2 meter in width link the modules to the walkway network.
The individual bridge system can also be used as extended balconies.



assembly of module, exploded diagram

THE MODULE



different combinations of living units

DEFINITION

The module basically describes the 6x6x6 meter cubic space enclosed by four columns on each vertical edge and horizontally between 8 beams (4 at both ends). A 0.6m thick ceiling element divides a module exactly half way in height into two units whereby each unit usually functions as an independent apartment. The rooms have a floor area of 6x6 meter/36 square meters and measure 2.7 meters in height.

ASSEMBLY

The assembly of the enclosed modules is a relatively simple process. Prefabricated elements are used according to the orientation and the desired floorplan layouts. Void-facing facades naturally have more operable window elements for ventilation, light and view purpose.

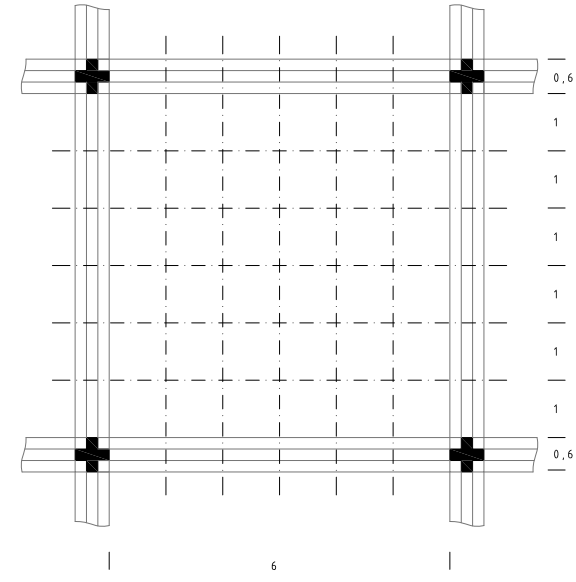
The vertical and horizontal elements are positioned within the ‚functional layer' and divide the indoor space from the outside. This strategy allows maximum clearance inside a unit.

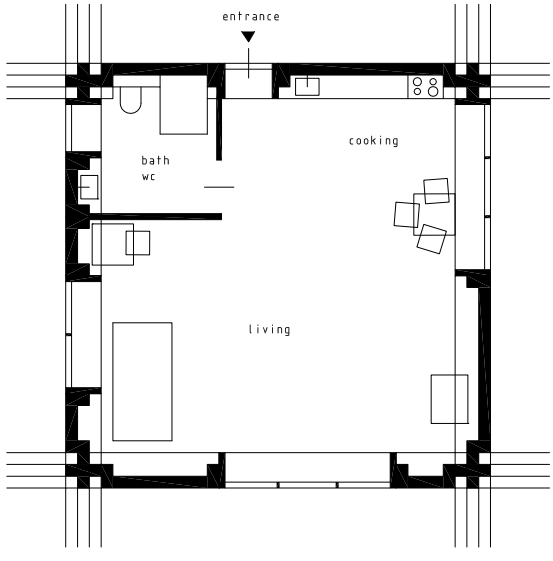
The assembly basically works as an oversized construction kit, which uses standardized components for a relatively fast building process.

ADAPTION AND VARIABILITY

The combination of two units within a module or several units within more modules is possible according to the function and the lifestyle of its users. This variability allows a unit/module to grow with the demand of its owners and adapts due to individual changes in their lives.

Singles or couples might prefer the standard 36 m^2 unit whereas families with one or more children tend to acquire the unit above, below or next to their starting unit to increase living area. According to tradition, even so called ‚Clan Clusters' where larger families or communities might decide to reside under one roof, are possible scenarios within the concept.





floor plan layout according to grid pattern above

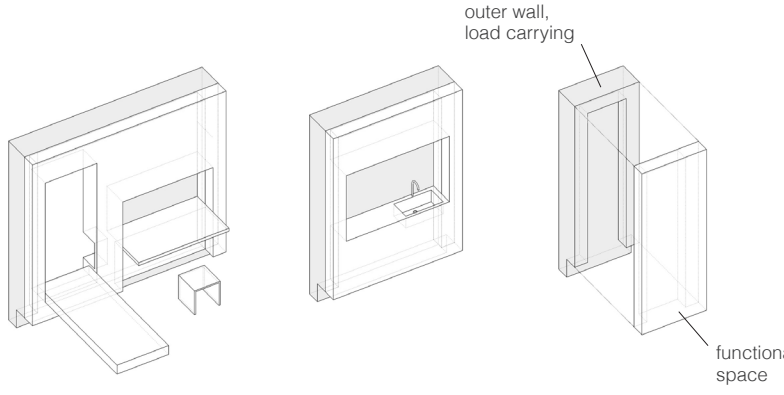
GRID DIMENSIONS MODULE

The 6x6 meter clearance within a modules floorplan is subdivided into 36 fields, each measuring 1 sqm in size.
A subset into 1,2, or 3m segments, refers to well established dimensions in terms of clearances and comfortable measures. Therefore, the dimensions of the prefabricated elements of the component catalogue are based on this simple grid pattern.

According to the subdivision of the floorplan, dividing walls, stair openings, wall- and window-elements are positioned along the grid‘s axes.

Component Catalogue

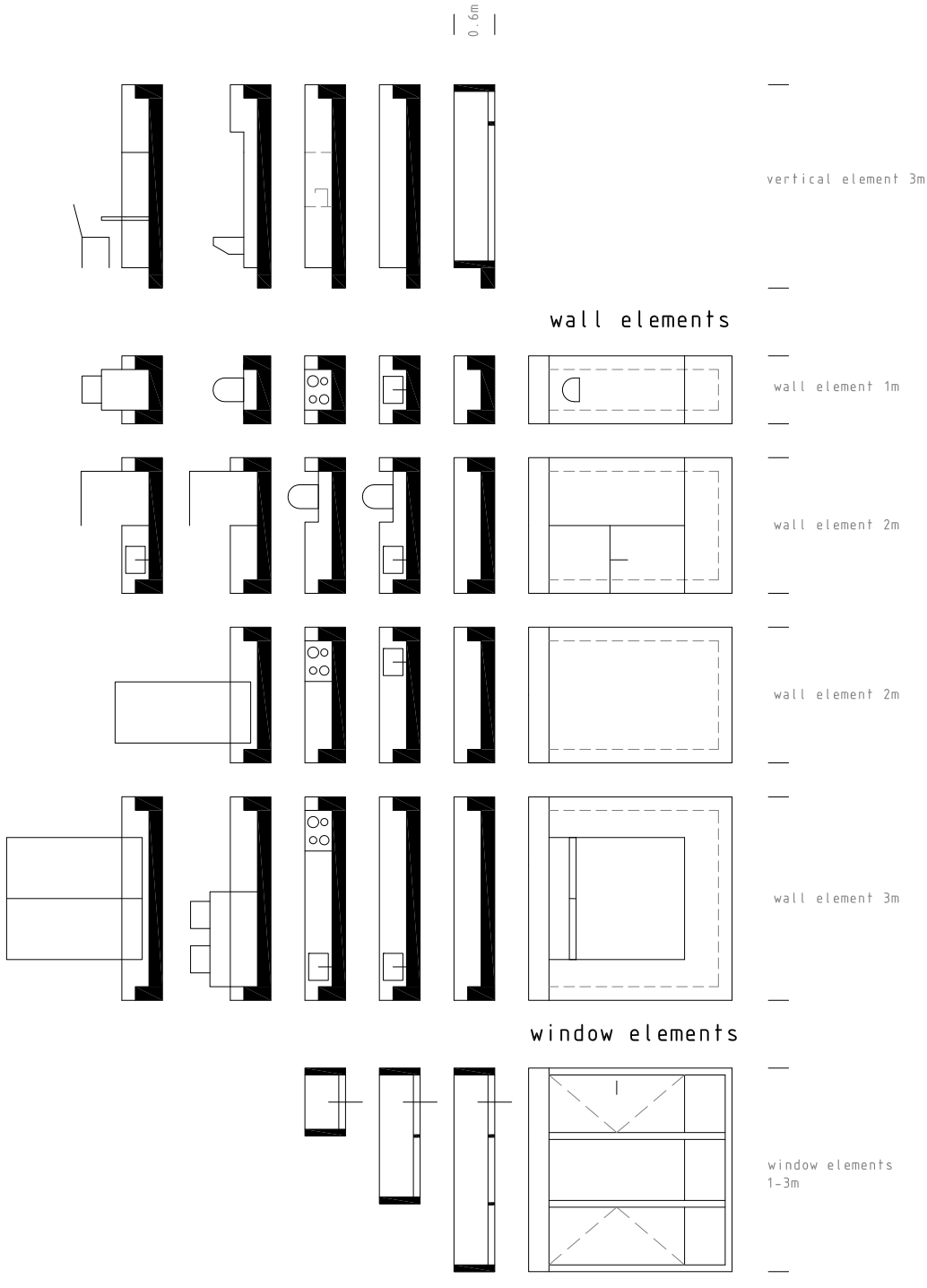
The components can be divided into vertical and horizontal elements, which basically consist of one third load-carrying structure and two thirds individual, functional space.



Wall Elements with different functions

examples of vertical elements

upper floor



M 1:100

WALL ELEMENTS

Wall elements consist of two parts. First, an outer, reinforced concrete and load bearing shell, which takes a third of the ‚functional layers' 60cm. And second, the functional space on the inside, 40cm in depth. The wall element acts as an additional structural element, reinforcing the structure.

The functions on the inside vary according to its range of application and are offered in certain blocks. Following examples show possible main function-blocks.

Kitchen block:
kitchenware such as ovens and dishwashers, cooking plates, fume hoods, sinks, folded up tables and chairs, storage

bathroom block/toilet block:
WC-shell and cisterns, wash-basin, foldable shower cabins, mirror, hair-dryer, hand-dryer, storage

sleeping block:
folded bed, bedside table, clothing storage

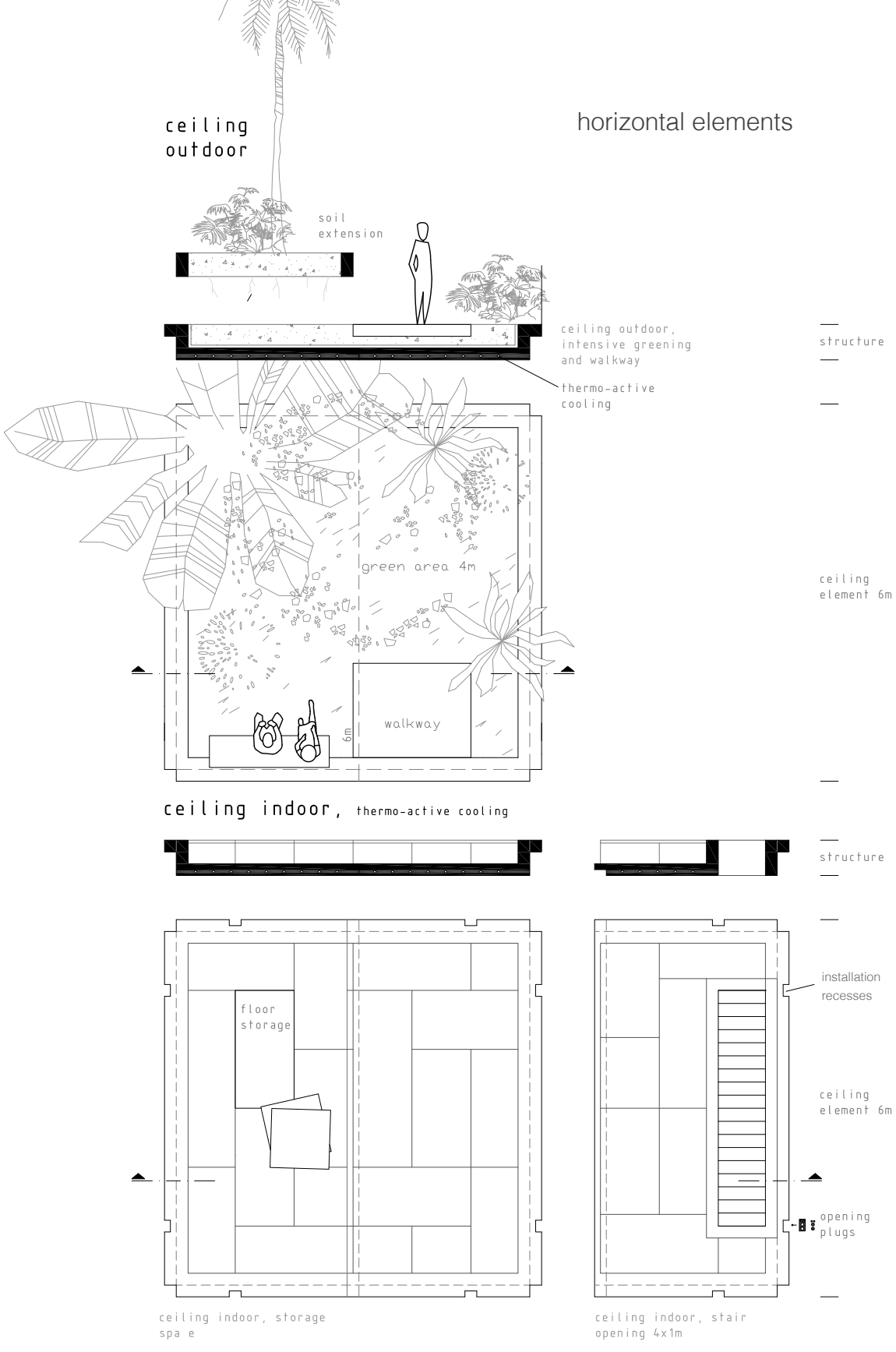
work block:
extendable table, foldable chair, home library, info station/screens

entertaining block: info station/screens incl. game console, HIFI

WINDOW ELEMENTS

The translucent or transparent elements allow natural lighting and ventilation into the interior of the modules. According to a favoured floorplan arrangement, window elements measure 3m in height and 1, 2 or 3m in width. The subdivided parts of the elements are available in fixed or operable versions. A slideable window in the upper zone, allows individual ventilation.
If a view is not wanted, translucent coatings for toilets and bathrooms are possible.

horizontal elements



M 1:100

CEILING ELEMENTS

Next to the important horizontal stiffening function for the structure, each ceiling element offers either up to 12,5 cubic meter of possible storage space or green surfaces, depending on its position within the module.

Top ceiling elements usually act as green roofs. Root blocking drainage layers divide soil from the concrete body. Additional basins for soil extensions on the top allow even larger vegetation. Solid walkway elements are simply inserted into the soil layer.

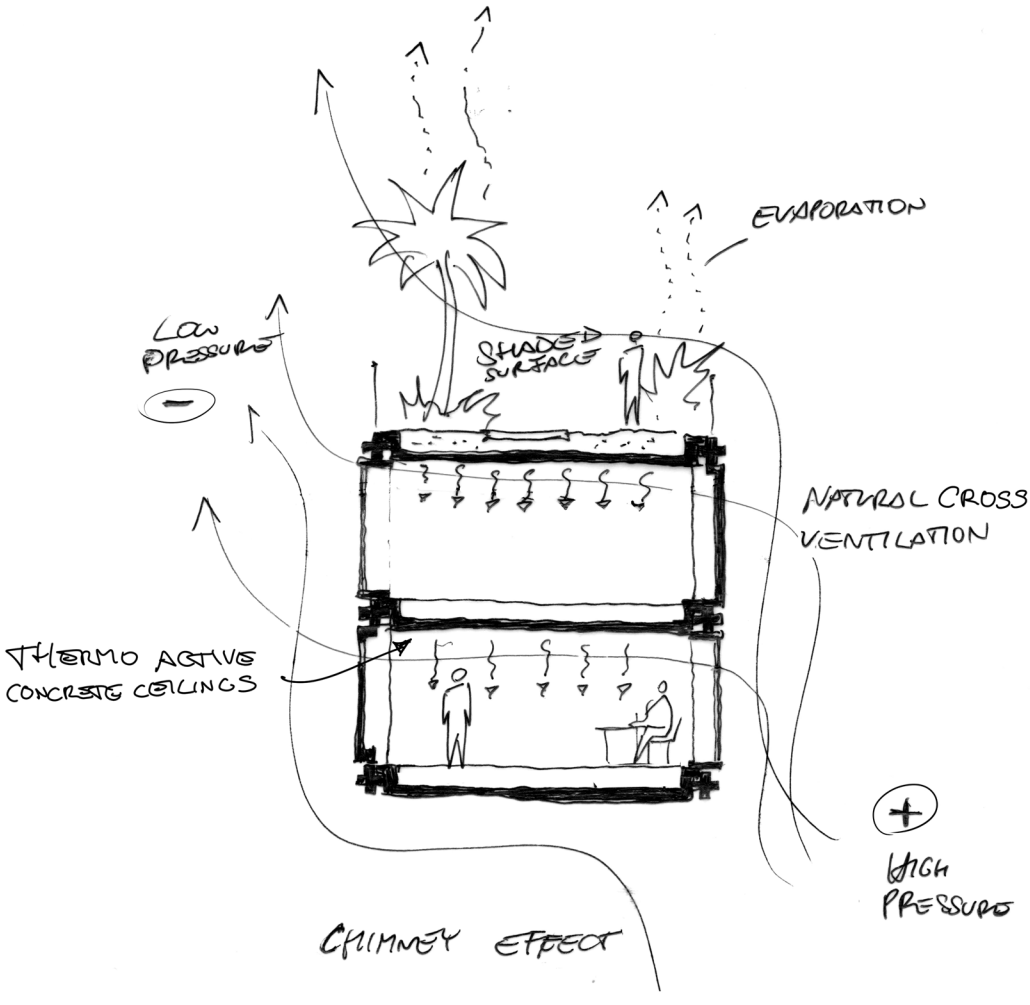
Ceiling elements which function as indoor floors usually offer storage space. Removeable floor panels, according to the 1m floorplan-grid, are put on a supporting raster. This storage space can be seen as a compensation for non existing basements or attics.
Following examples show some possible functions within the floor storage space:

Storage for sport equipment, tools, clothing, tables, chairs, beds with sheets, blankets, tatami mats and other sitting opportunities.

Besides the advantageous storage function, ceiling elements facing the inside of the units, are equipped with a concrete core cooling system.

For an easier assembly within the structure, the ceiling elements are divided in two halves. A special stair-element is used to combine several floors for double height units or ‚clan clusters'.

Recesses near each corner of the contact surfaces, match with the installation openings in the beams below and allow the conduction of installation pipes.


EVAPORATION
LOW PRESSURE
SHADED SURFACE
NATURAL CROSS VENTILATION
THERMO ACTIVE CONCRETE CEILINGS
HIGH PRESSURE
CHIMNEY EFFECT

Cooling

The project can be seen as perforated blanket which primary covers unfavourable surfaces and turns them into a natural cooling unit. Temperature will be stored in the surface and regulates the micro climate within the structure naturally.
During the hot summer, direct sunlight heats up the cut-slope formation which further on leads to an additional heating. The mainly dark plain surfaces absorbe the solar radiation. Heat gets stored inside the slope during daytime and eventually radiates during nightime. This small-scale scenario of urban heat island effects is a common issue all over the city and can be avoided by the application of the concept.

Shading

According to the arangement, continous voids throughout the development allow air and light to penetrate the whole structure. The primary overgrown roof top area acts not only as an extension of the green layer of the natural terrain on the hillsides, it also works as an shading element for the structure below.

Evaporation

The evapuration, caused by a variety of vegetation growing on the top soil-filled ceiling elements and recreational garden or park areas inside, additionally cools down the structure and contributes to a chimney effect.

Natural Cross Ventilation

Individual slide- or tiltable openings in the upper section of the window-elements benefit from the rising air flowand allow an additional natural cross ventilation within the modules. However, this cooling methode requires optimal orientation of the modules facades.

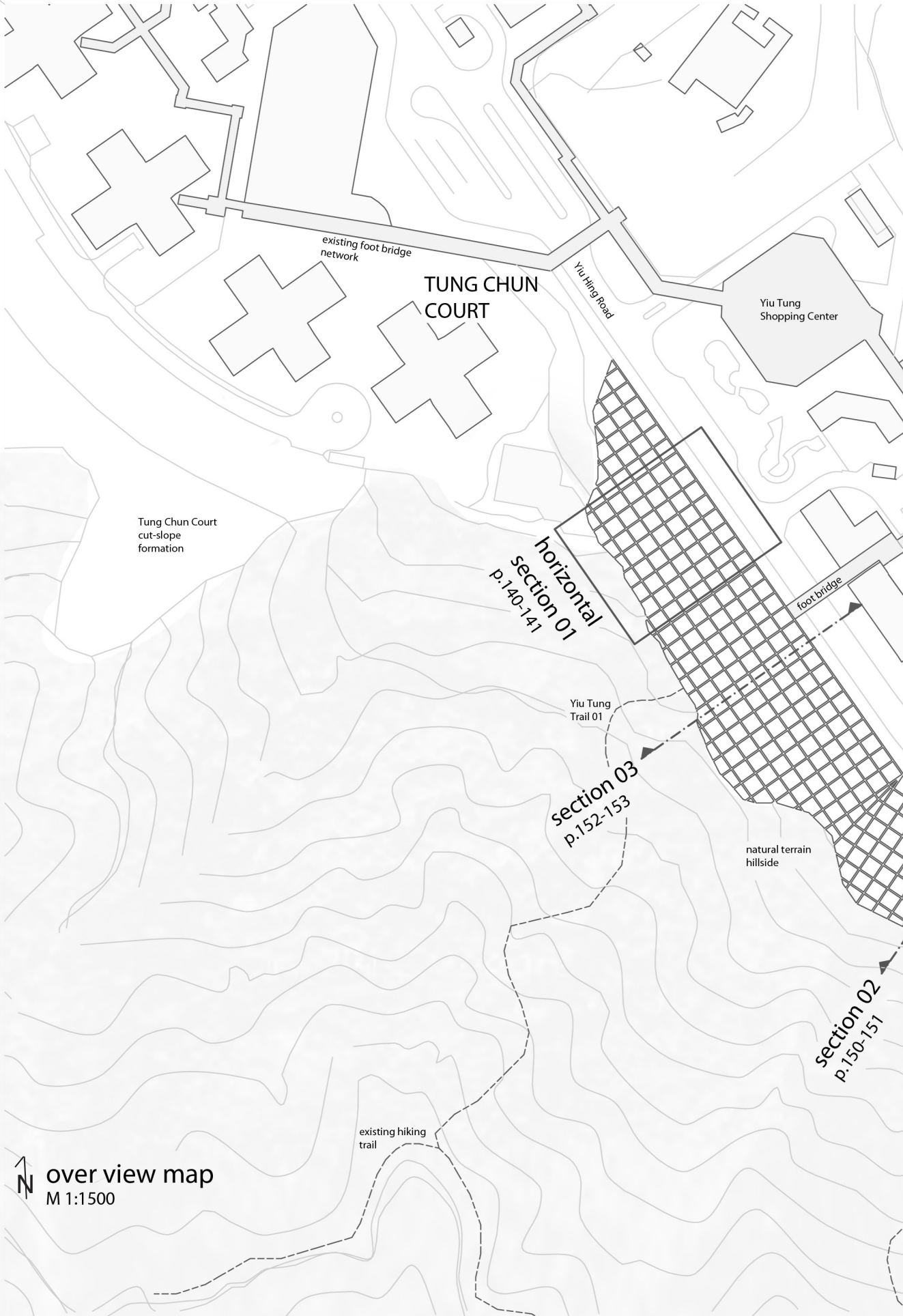
Thermoactive Elements

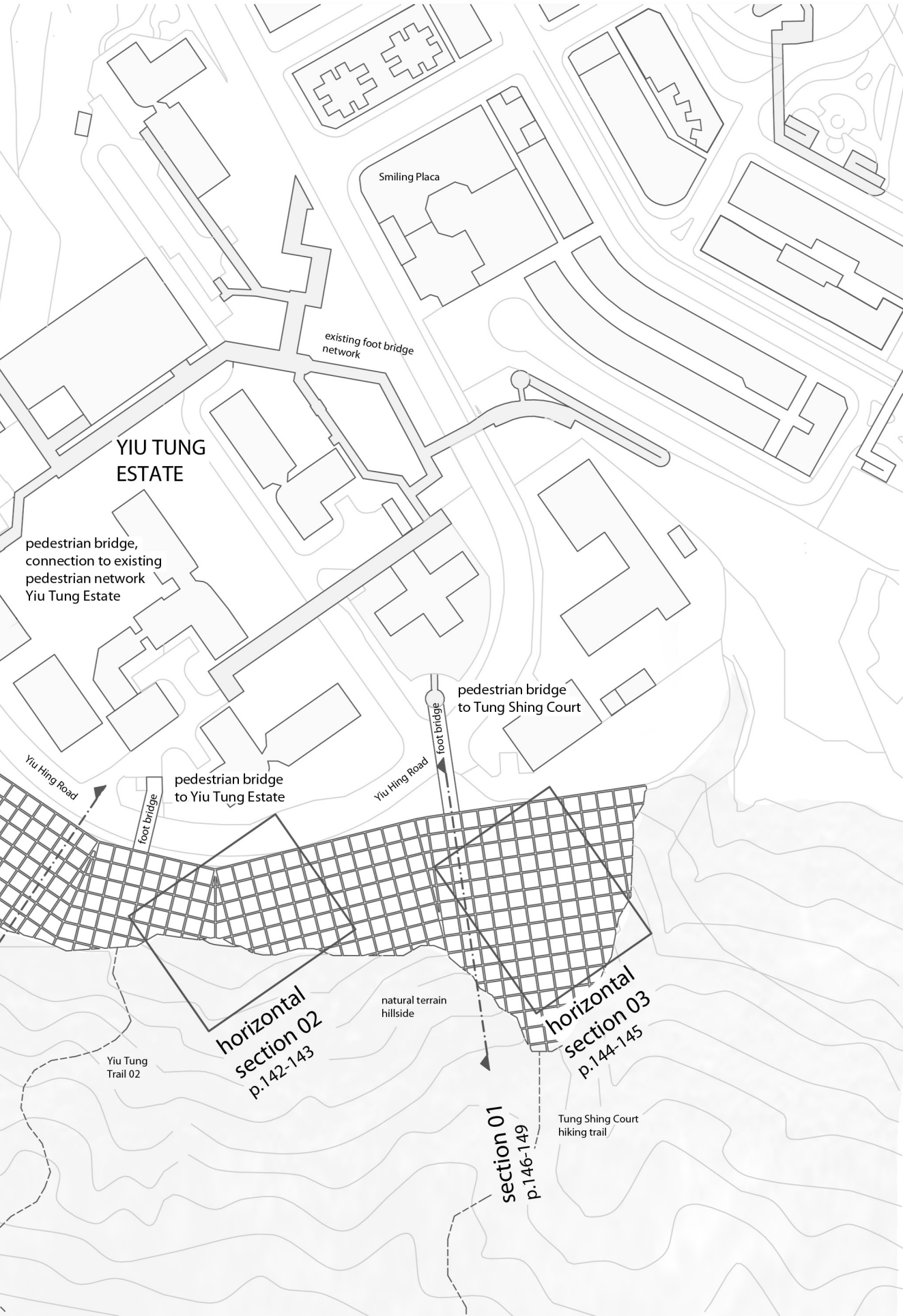
Due to its efficiency a concerete core cooling system inside the ceiling elements might be worth striving for to achieve optimal room climates in combination with the above-mentioned cooling methodes. The nearby running installation pipes offer simple connection facilities to the ceiling elements.

PLAN DRAWINGS

fig.78 Layout Plan, Eastern District


p.138/139

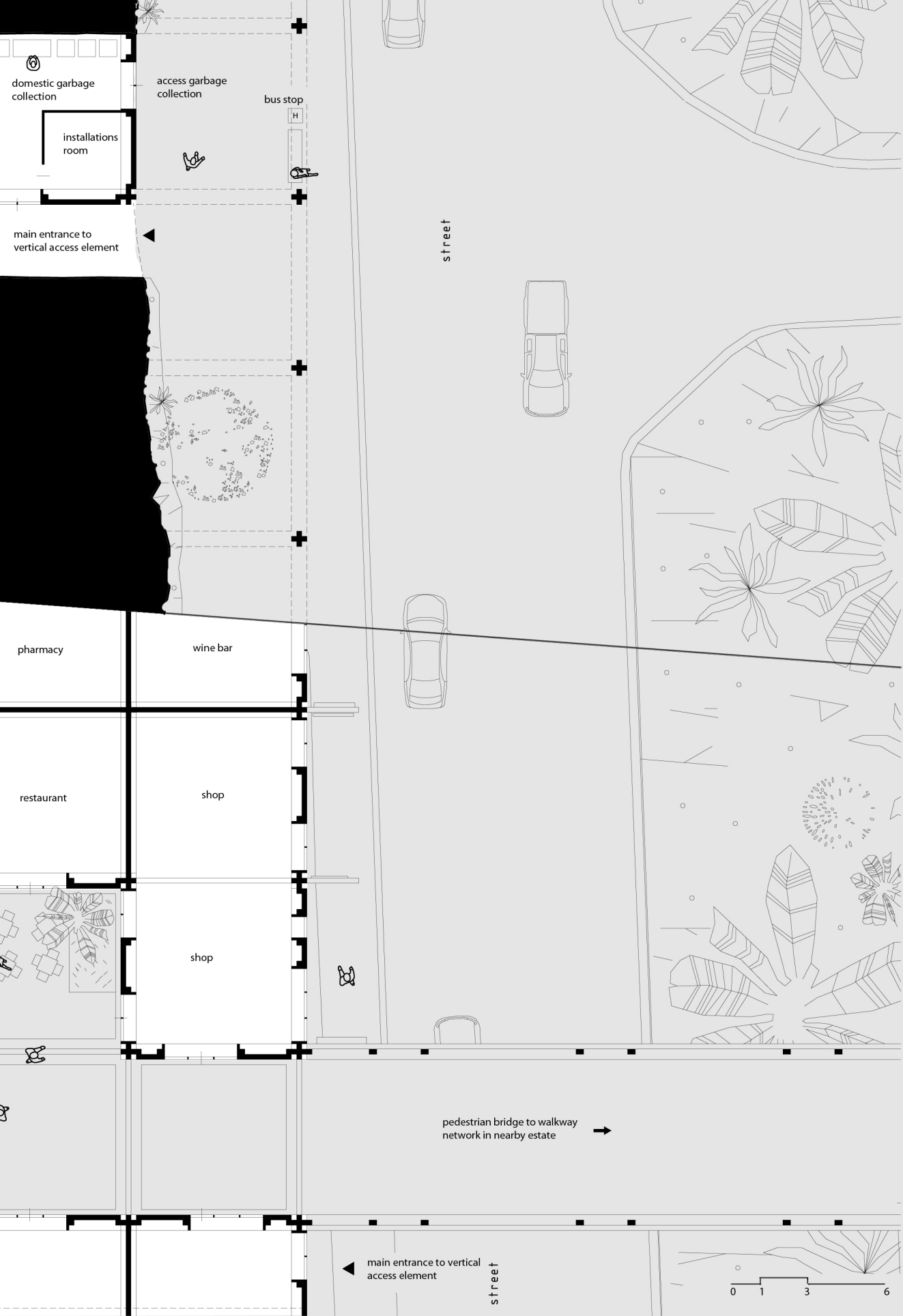

existing foot bridge network
TUNG CHUN COURT
Yiu Hing Road
Yiu Tung Shopping Center
Tung Chun Court cut-slope formation
horizontal section 01 p.140-141
foot bridge
Yiu Tung Trail 01
section 03 p.152-153
natural terrain hillside
section 02 p.150-151
existing hiking trail
N
over view map
M 1:1500


Smiling Placa
existing foot bridge network
YIU TUNG ESTATE
pedestrian bridge, connection to existing pedestrian network Yiu Tung Estate
pedestrian bridge to Tung Shing Court
foot bridge
Yiu Hing Road
pedestrian bridge to Yiu Tung Estate
foot bridge
Yiu Hing Road
horizontal section 02 p.142-143
natural terrain hillside
horizontal section 03 p.144-145
Yiu Tung Trail 02
section 01 p.146-149
Tung Shing Court hiking trail

horizontal section 01

street level/F5

M 1:200

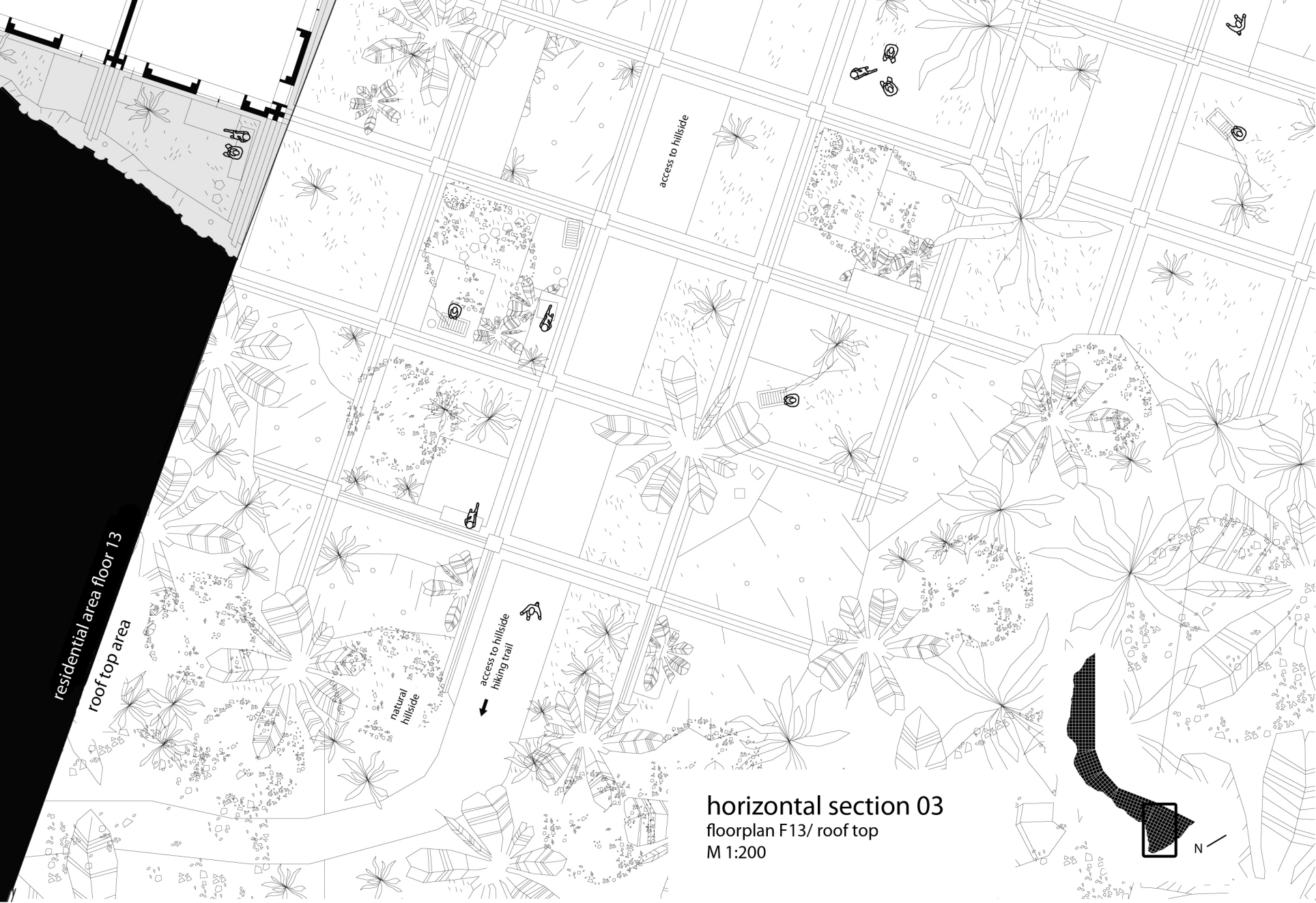

domestic garbage collection
access garbage collection
bus stop
H
installations room
main entrance to vertical access element
street
pharmacy
wine bar
restaurant
shop
shop
pedestrian bridge to walkway network in nearby estate
main entrance to vertical access element
street
0
1
3
6

horizontal section 02

floorplan F5/F13

M 1:200

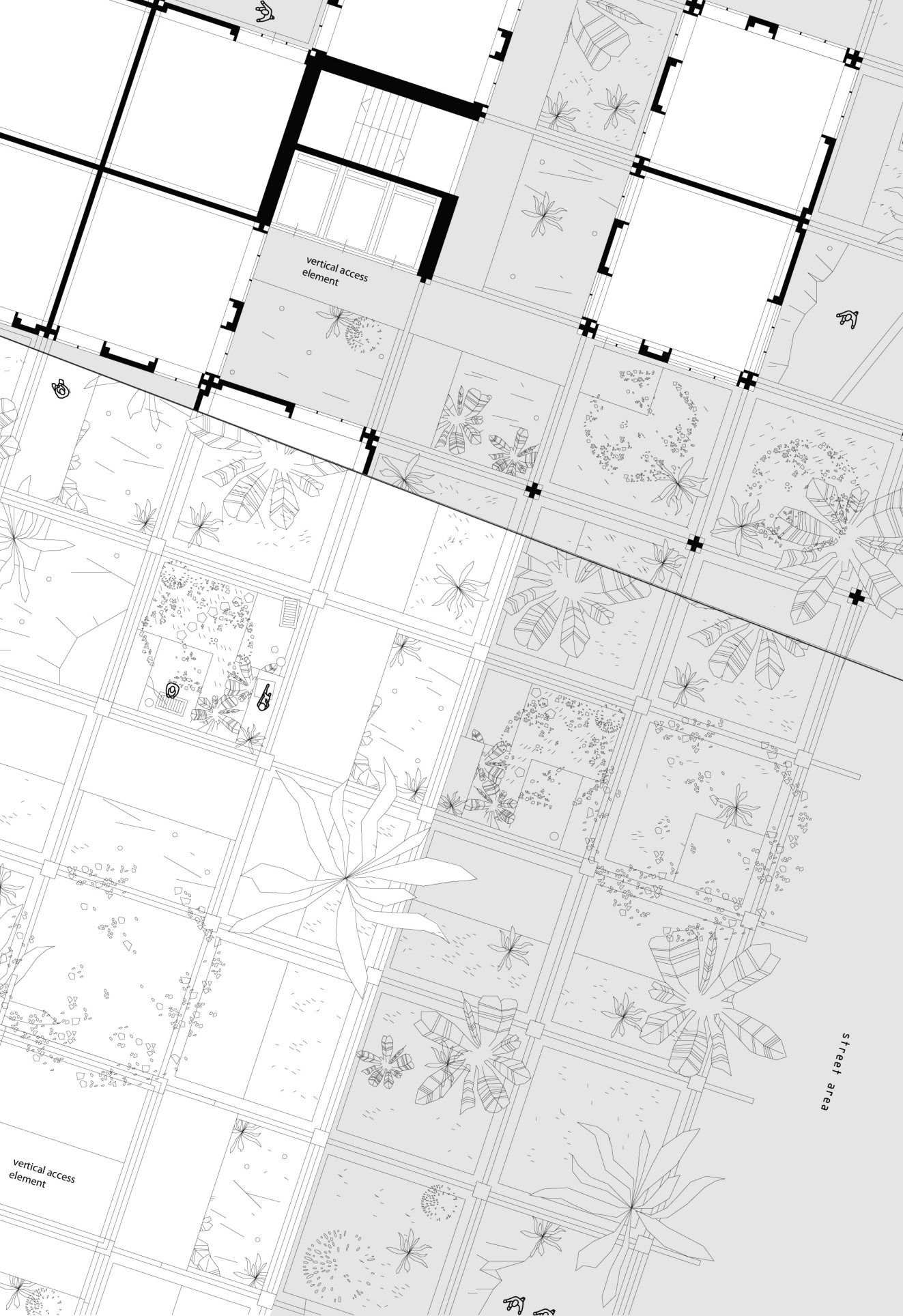

special column
special beam
street level
BBQ area
vertical access element
access elevator street level
0 1 3 6



horizontal section 03

floorplan F13/ roof top

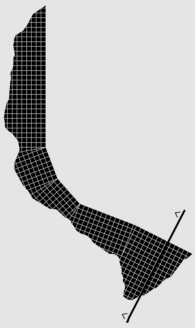
M 1:200

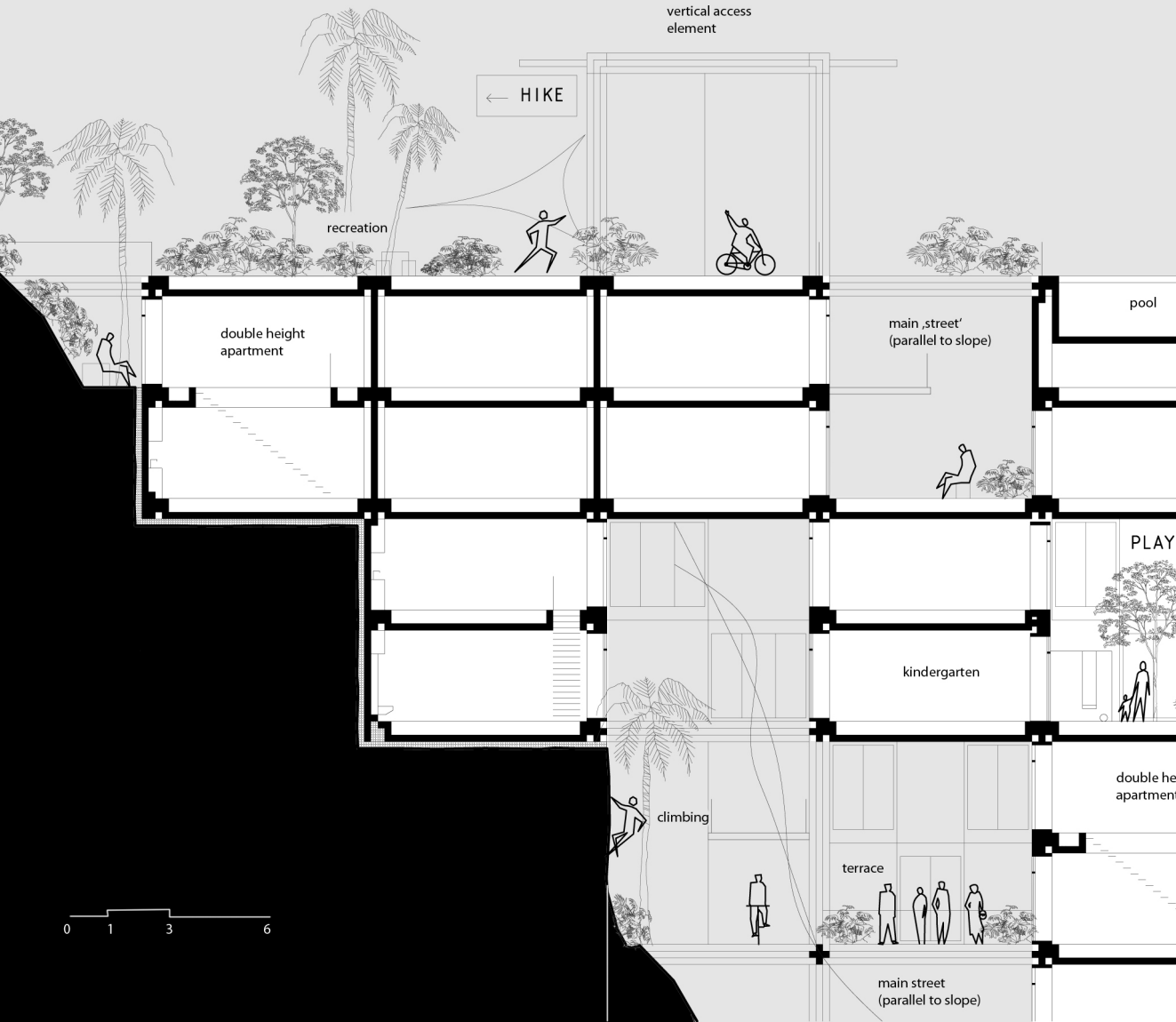

vertical access element
vertical access element
street area

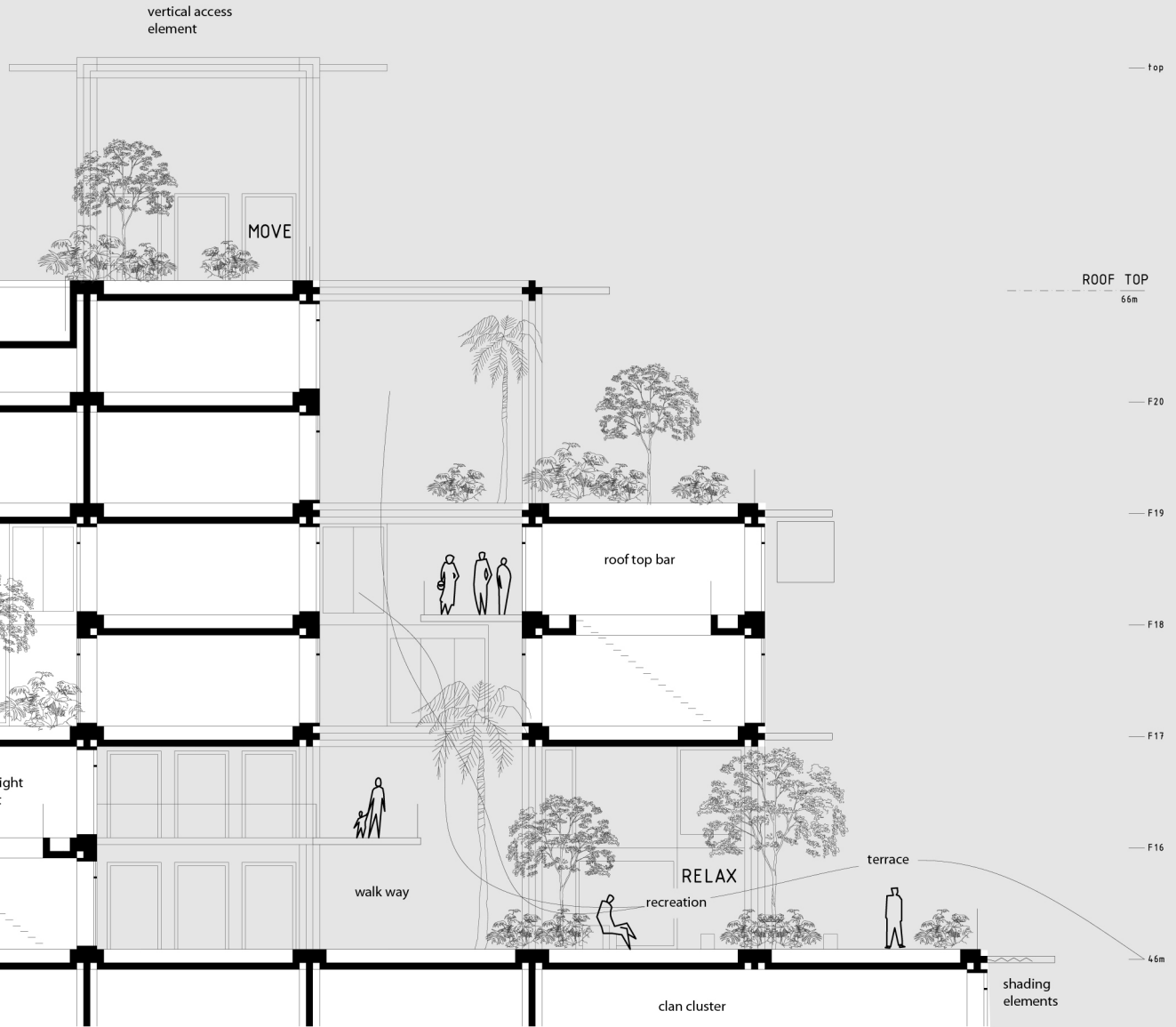
section 01_a

roof top/ residential area

M 1:200



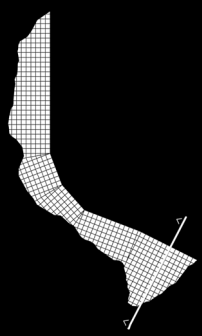


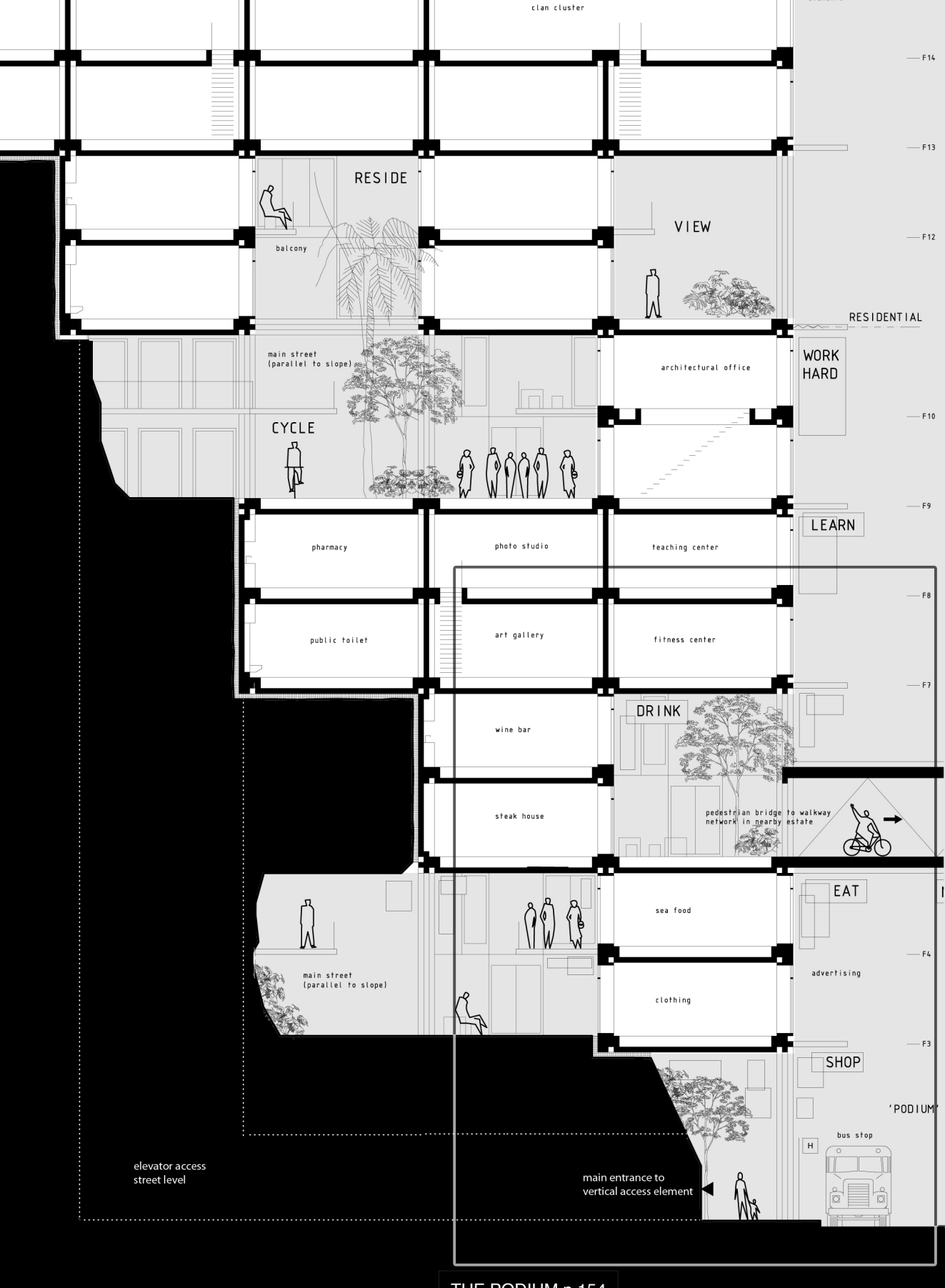

vertical access element
MOVE
top
ROOF TOP
66m
F20
F19
roof top bar
F18
F17
F16
RELAX
terrace
walk way
recreation
46m
shading elements
clan cluster

section 01_b

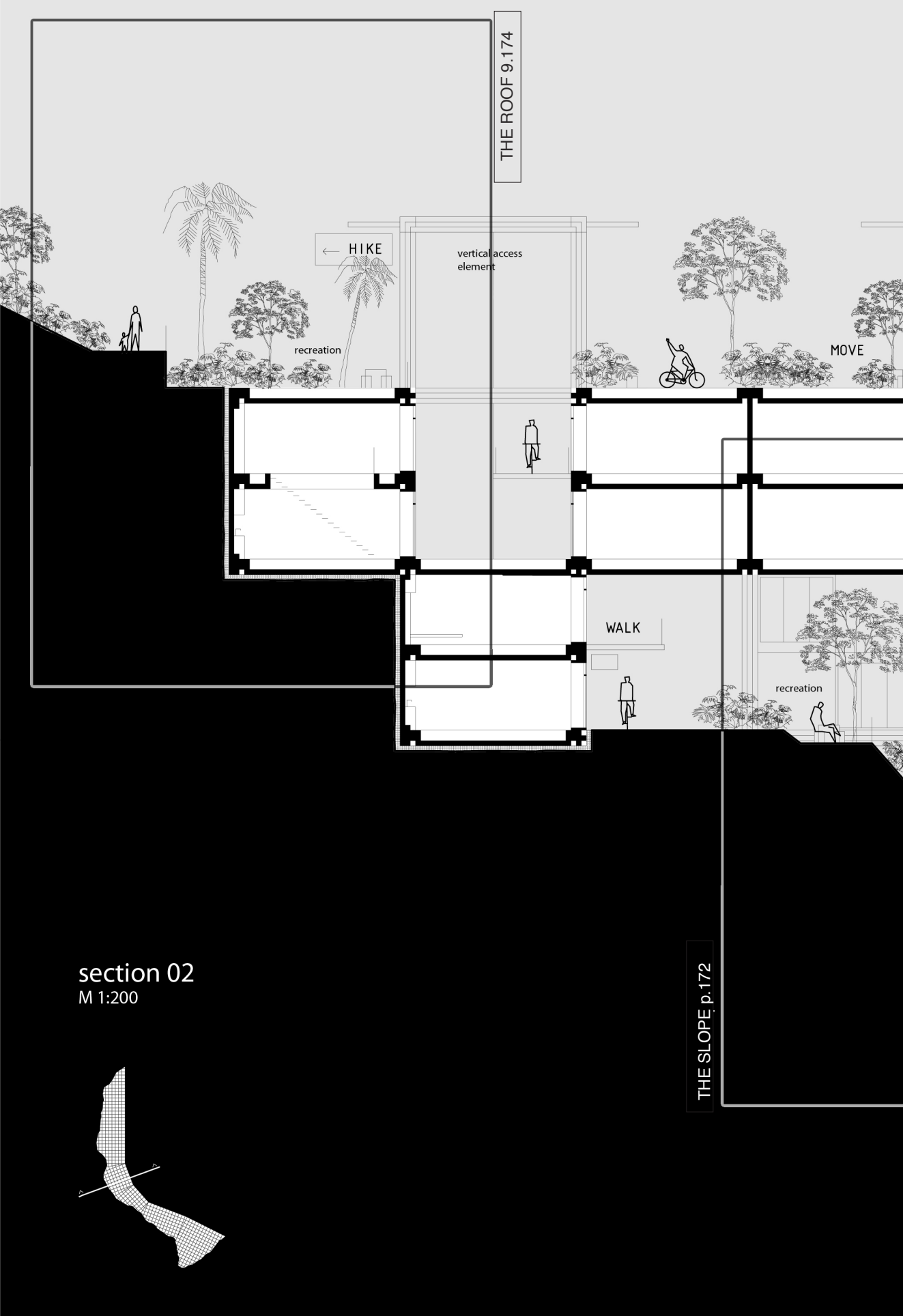
residential area/podium/street level

M 1:200

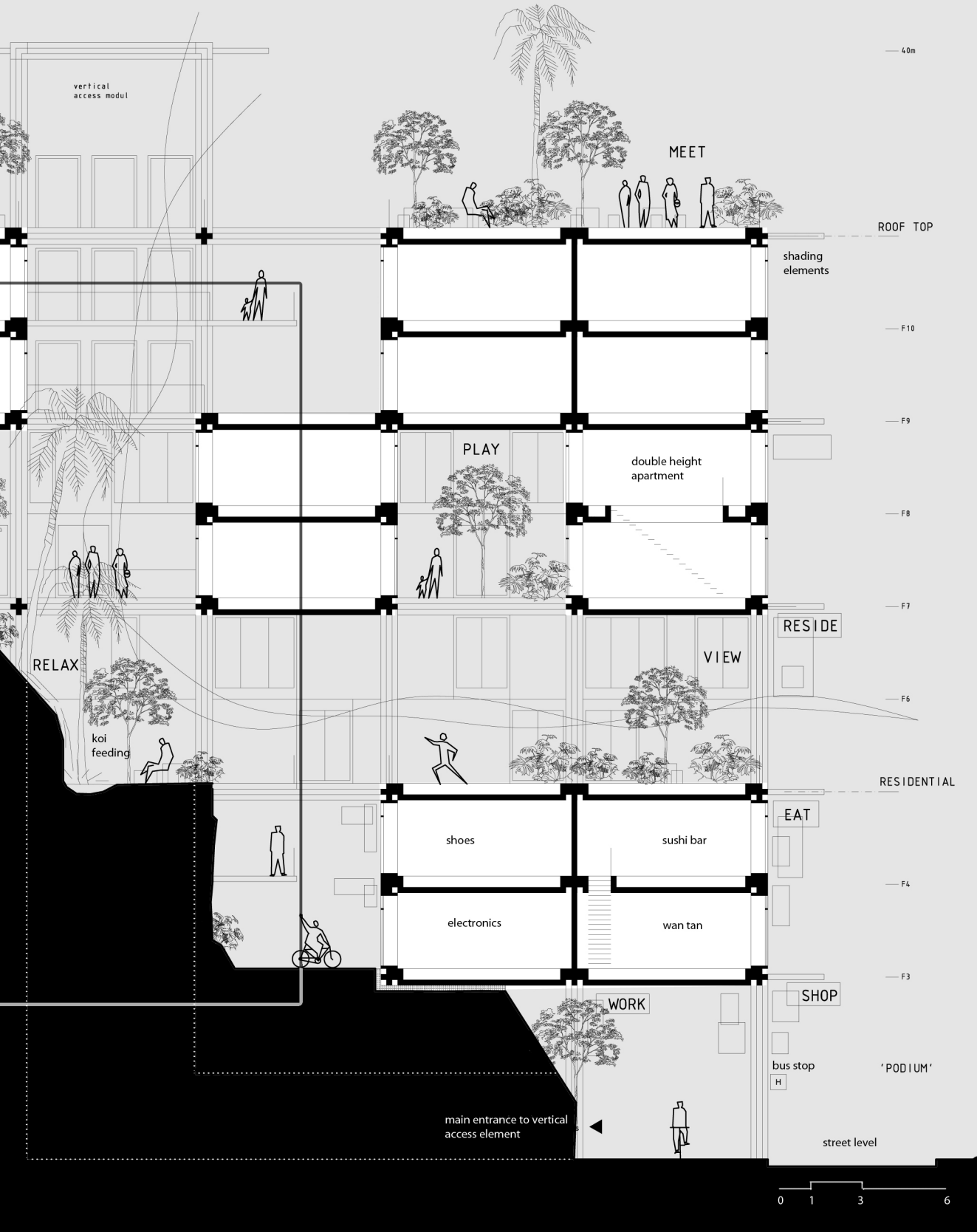


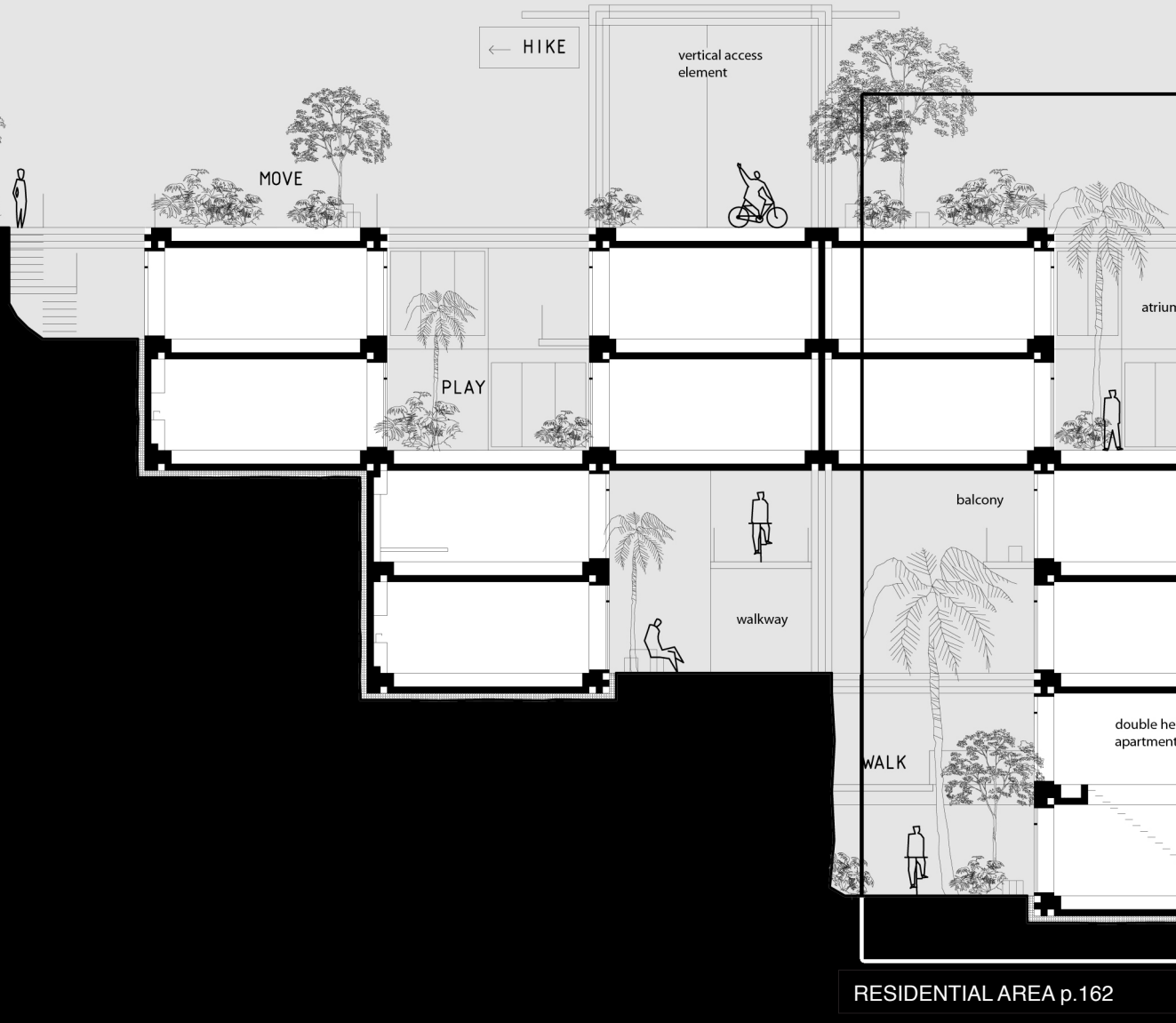


THE PODIUM p.154



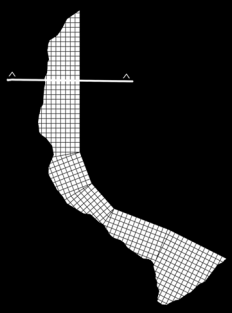
section 02
M 1:200

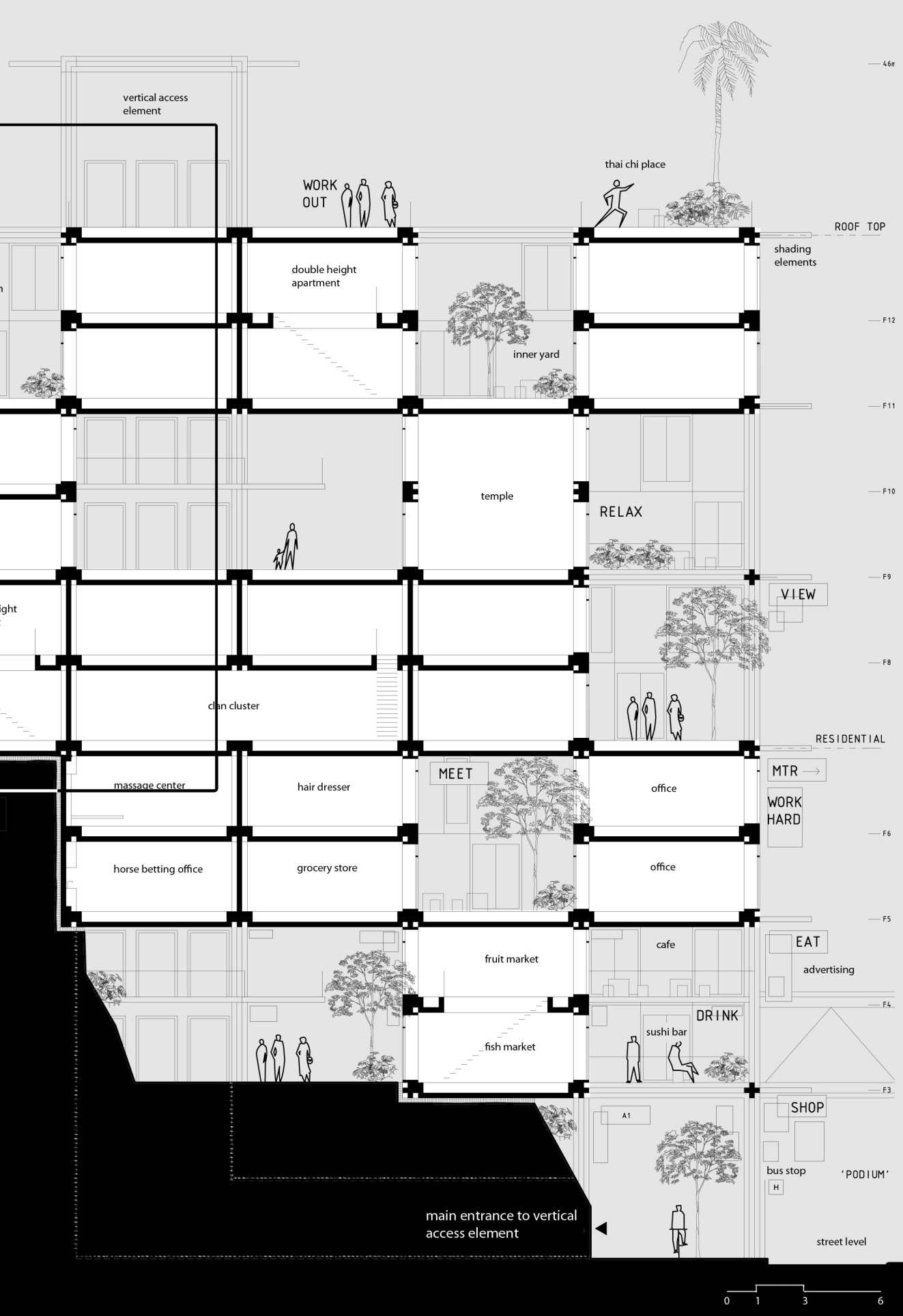

vertical
access modul
MEET
40m
ROOF TOP
shading
elements
F10
F9
PLAY
double height
apartment
F8
F7
RESIDE
VIEW
RELAX
F6
koi
feeding
RESIDENTIAL
EAT
shoes
sushi bar
F4
electronics
wan tan
F3
SHOP
WORK
bus stop
H
'PODIUM'
main entrance to vertical
access element
street level
0
1
3
6

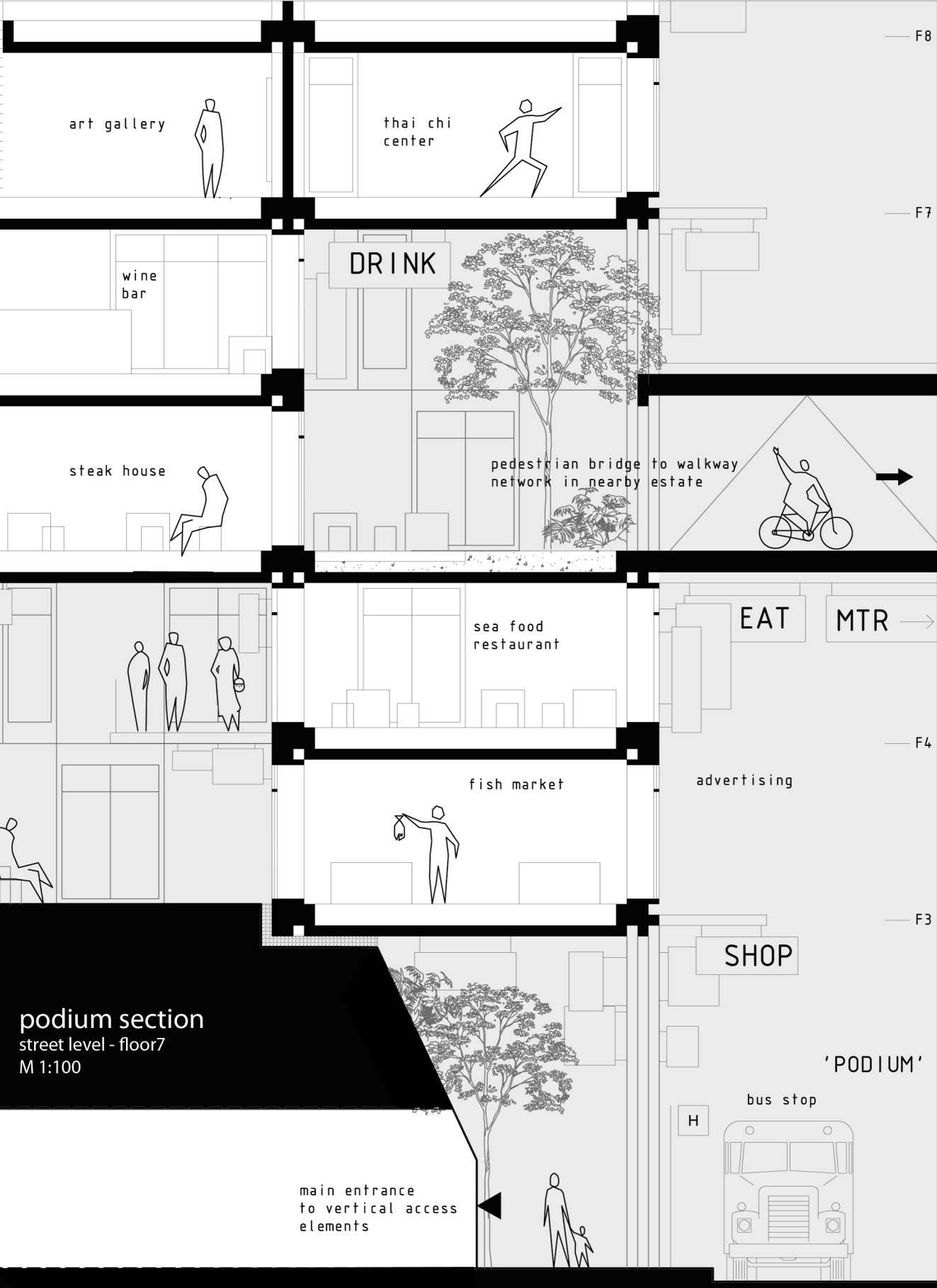


section 03

M 1:200




vertical access element
WORK OUT
thai chi place
ROOF TOP
shading elements
46m
double height apartment
F12
inner yard
F11
temple
RELAX
F10
F9
VIEW
F8
clan cluster
RESIDENTIAL
massage center
hair dresser
MEET
office
MTR
WORK HARD
F6
horse betting office
grocery store
office
F5
cafe
EAT
fruit market
advertising
F4
DRINK
sushi bar
fish market
F3
A1
SHOP
bus stop
H
'PODIUM'
main entrance to vertical access element
street level
0
1
3
6



podium section

street level - floor7

M 1:100

‚PODIUM' AREA

The ‚Podium Area' refers to the Podium Towers, which are common developments all over Hong Kong. This typology usually consist of Star Shape Towers built on top of an interconnected multiple storey high base, often comprising a rich mix of different functions such as shopping malls and other public or common facilities.

The Accessibility of this area within the concept usually happens by the main access at the street level or direct pedestrian connections such as walkways or sky bridges from nearby estates.

Beyond the role of a flexible ‚urban-equalizer' due to a broad variety of different functions within the modules and units, the ‚Podium Area' also works as a soothing buffer zone dividing the usually loud and stressful street level from the calmer ‚Residential Area' above.

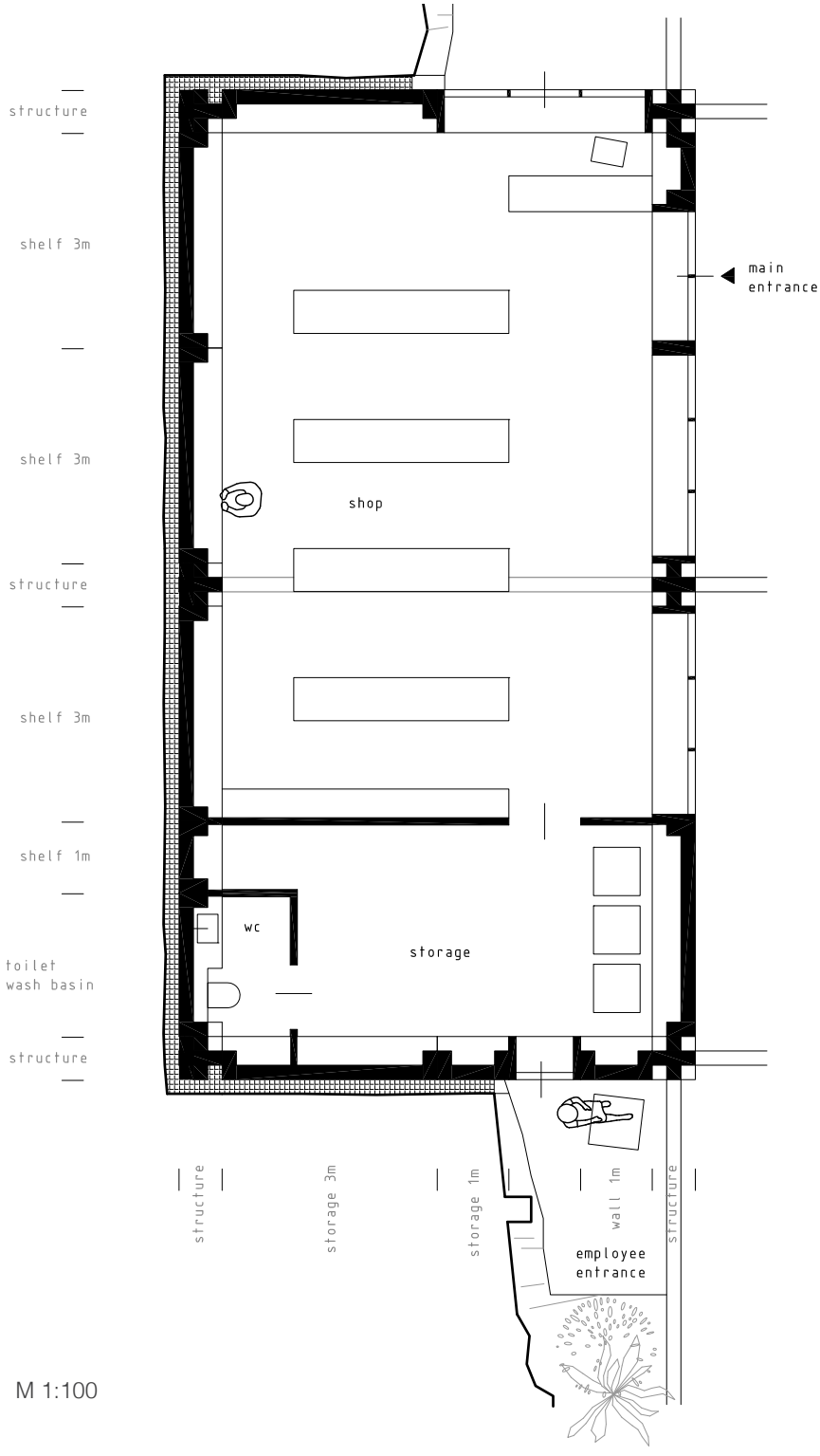
Similar to its built models all over the city, the ‚Podium Area' within the project offers a variety of different facilities. This selection however varies according to neighbourhood analysis.
If for instance, the demand for educational institution is urgent within a certain area, modules might be combined to teaching-centres or similar facilities.

The functions within the ‚Podium Areas' modules and units might be as diverse as the different districts in which the concept could be applied.
A usual setup probably starts with the busiest and loudest functions such as restaurants, bars, clubs or markets within the first floors above street level and turns into art galleries, grocery stores or gyms on top. Offices or similar facilities tend to be an ideal transition to the next zone, the ‚Residential Area'.

The following examples of floorplans give a brief inside to possible layouts according to their functions of units within the ‚Podium Area'.

grocery shop

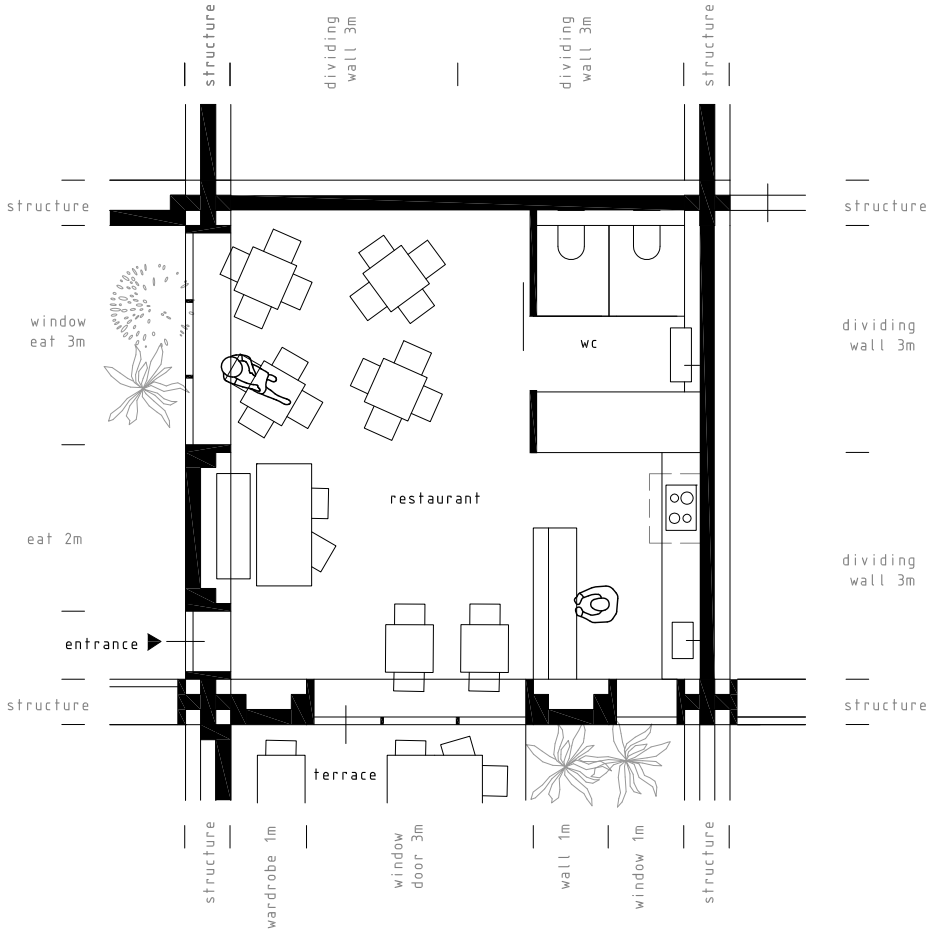
2 modules combined



M 1:100

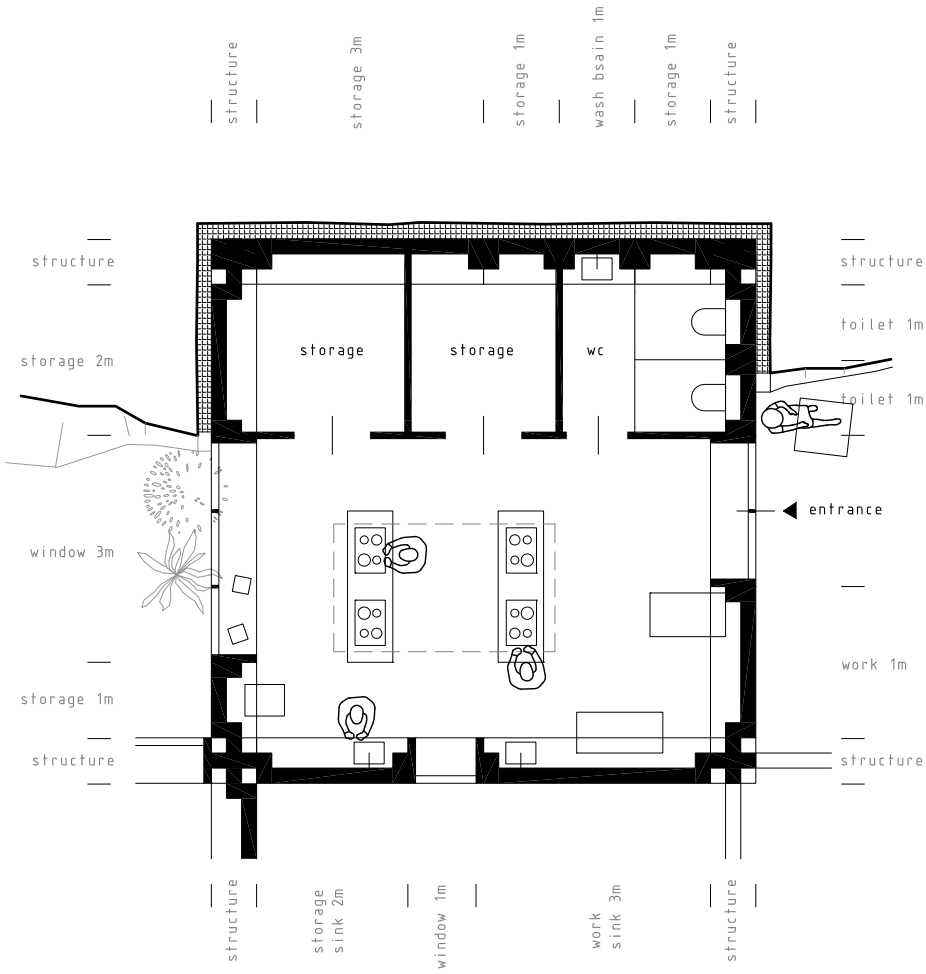
restaurant unit

lower floor, podium area



food service unit

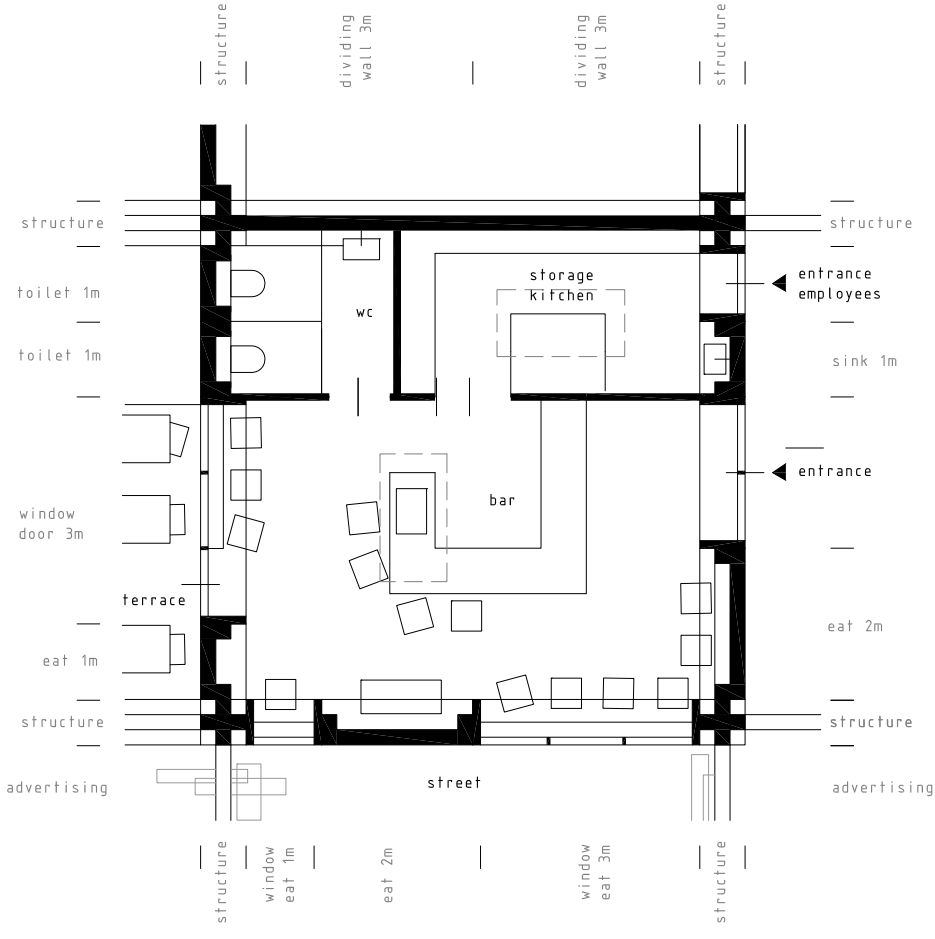
common kitchen, delivery



M 1:100

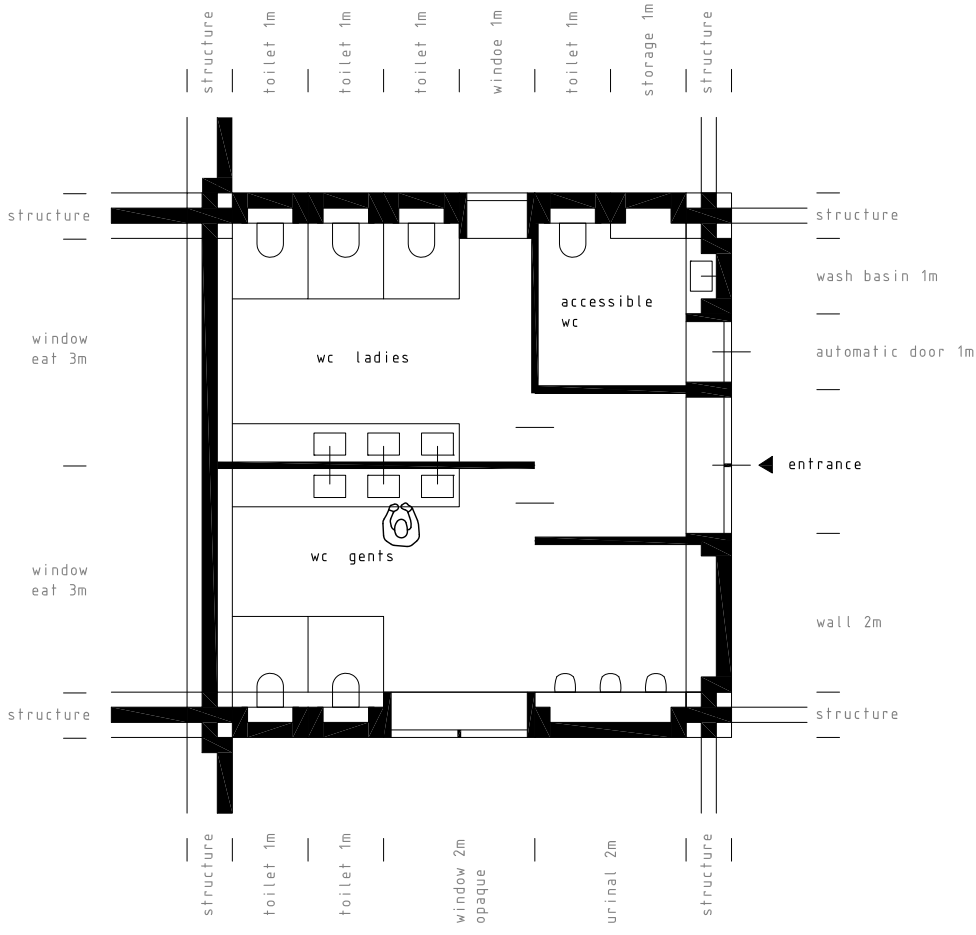
sushi bar unit

upper floor, podium area



public toilet unit

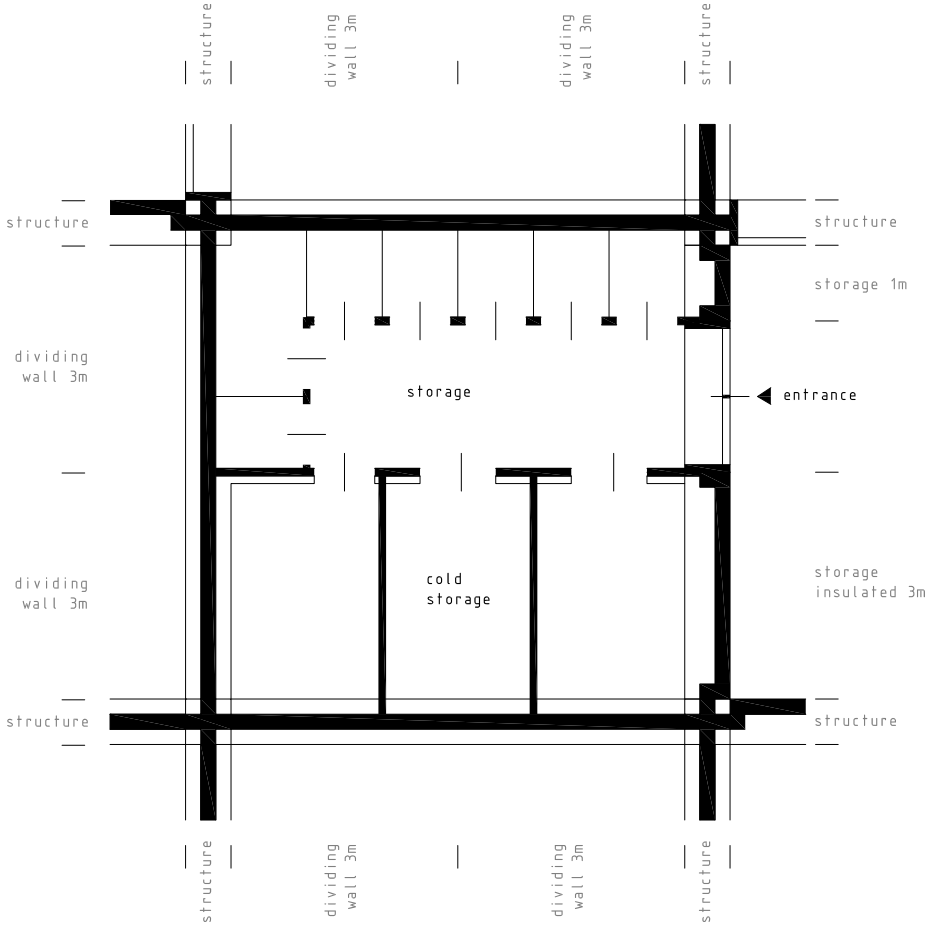
podium area

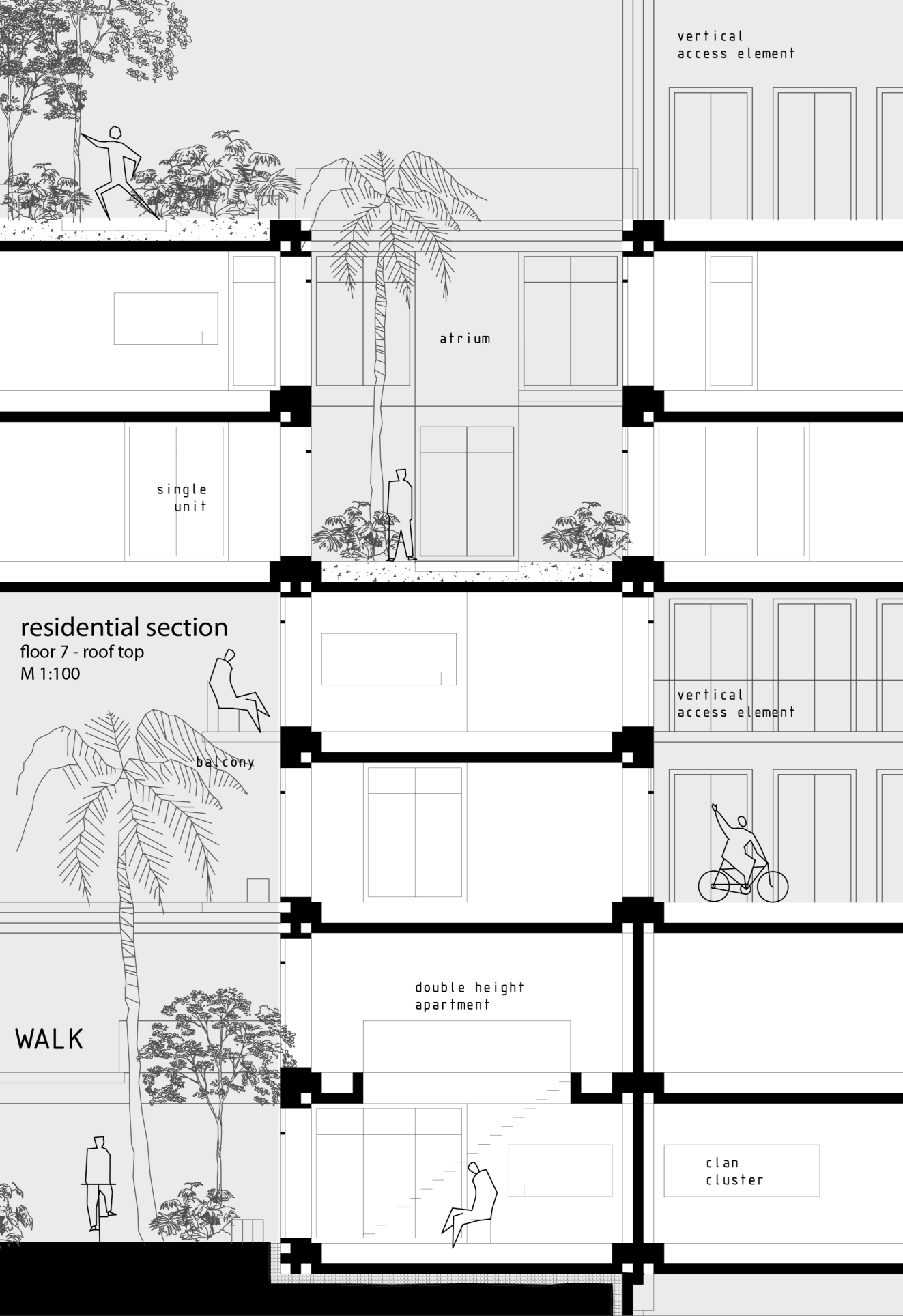


M 1:100

common storage unit

podium are, for restaurants, offices, etc.




vertical
access element
atrium
single
unit
residential section
floor 7 - roof top
M 1:100
vertical
access element
balcony
double height
apartment
WALK
clan
cluster

RESIDENTIAL AREA

The ‚Residential Area' basically satisfies the actual demand for new living space within the project. This zone is considered to be a calmer and more private environment, even though the access to this area is subject to restrictions for non-residents.

As mentioned in the modules-chapter before, the units can be combined, respectively grow or shrink according to their users current lifestyles. This variability however, requires advantageous changes within the immediate neighbourhood.

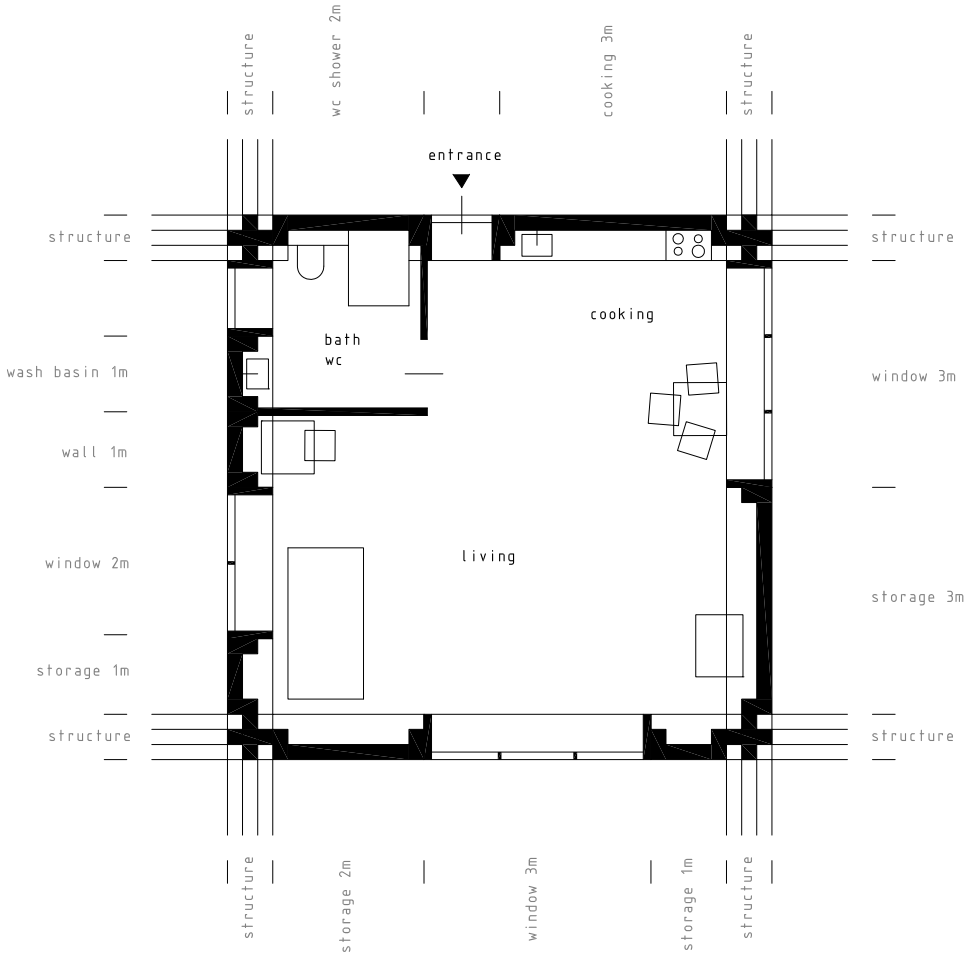
Despite the non-residential functions in the ‚Podium Area', common facilities reserved for the projects residents, such as kindergartens, day nurseries or playgrounds, are located within the ‚Residential Area' to encourage communal structures among the neighbours.
Functions such as common storage modules or home offices are planned to fill out unfavourable locations in terms of lighting which might occur in the intersected area of slope and grid.

Next to the circulation, the voids are basically filled with recreational functions such as parks, inner yards, atriums or common BBQ areas and work-out areas.

The ‚Residential Area' appears more like a conglomeration of single or multiple living units with access to green areas in form of yards and gardens, than the dreary stacking of standardized floorplans as we see it in nearby estates.

The following examples of floorplans should give a brief insight on possible layouts within the units of the ‚Residential Area'.

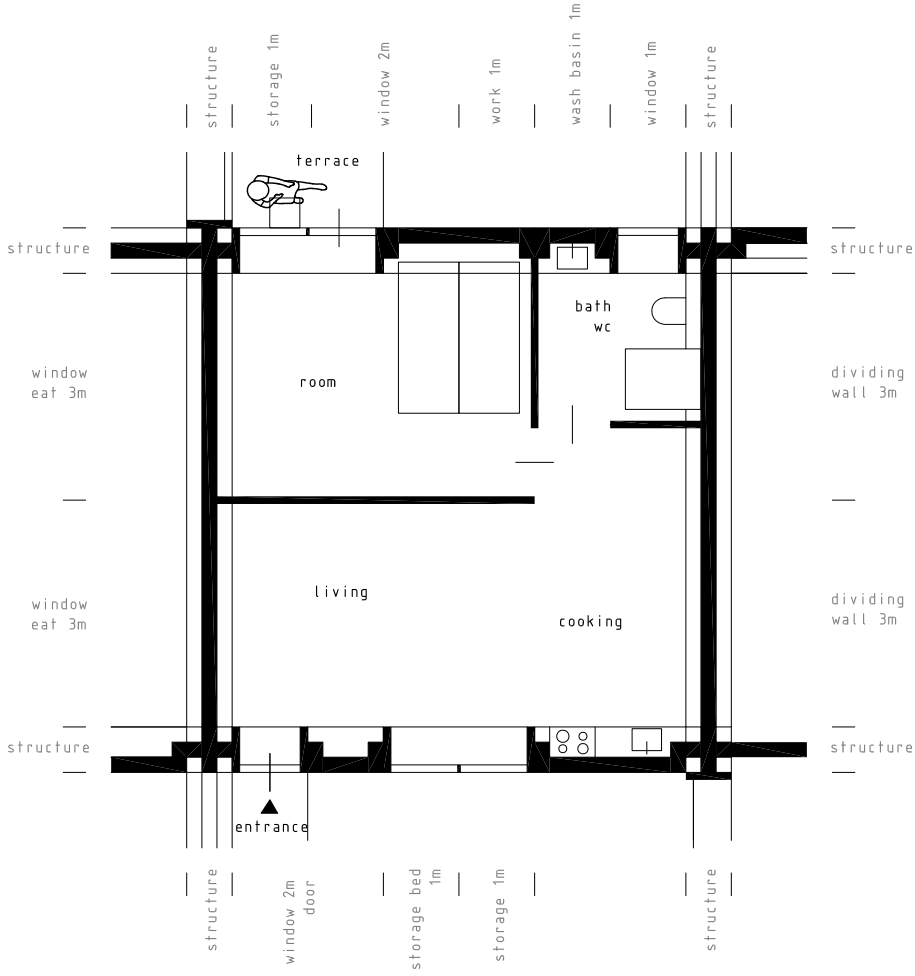
single unit
upper floor



M 1:100

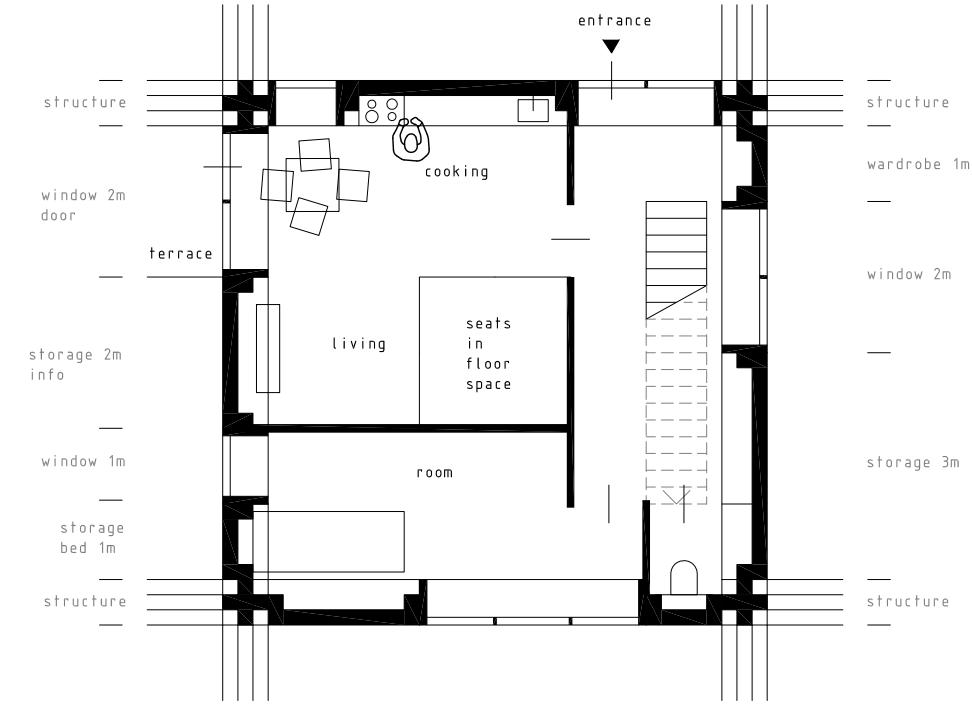
double module

lower floor

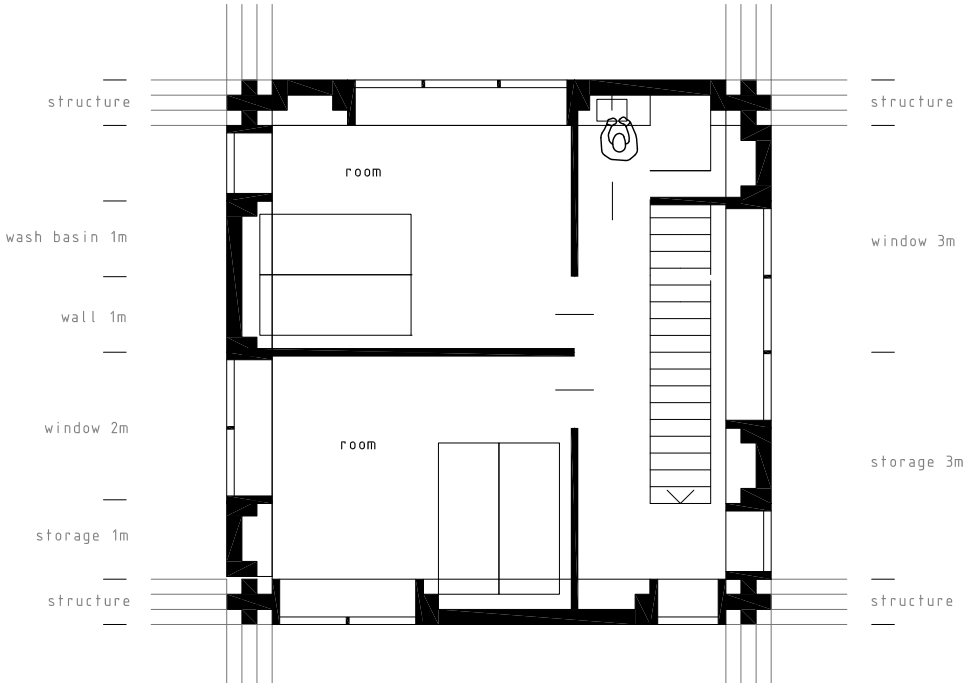


double height unit

floor plans



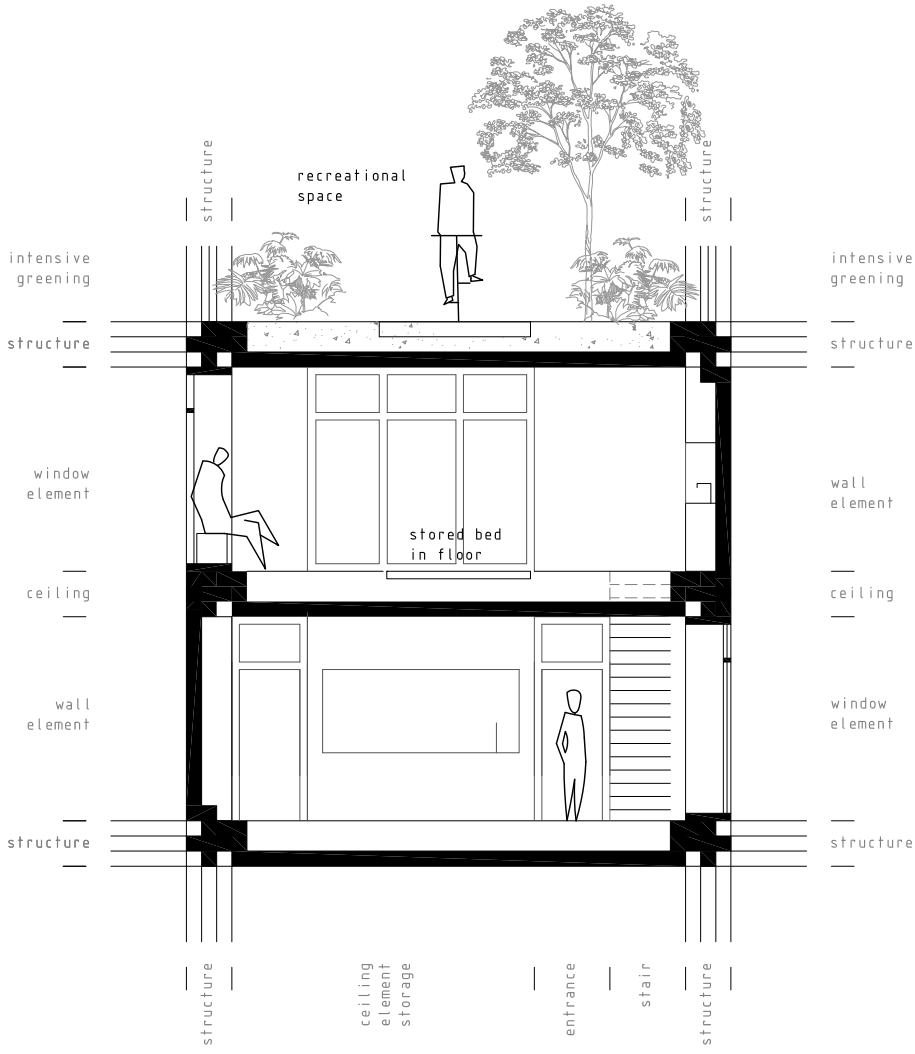
lower floor



upper floor

duoble height unit

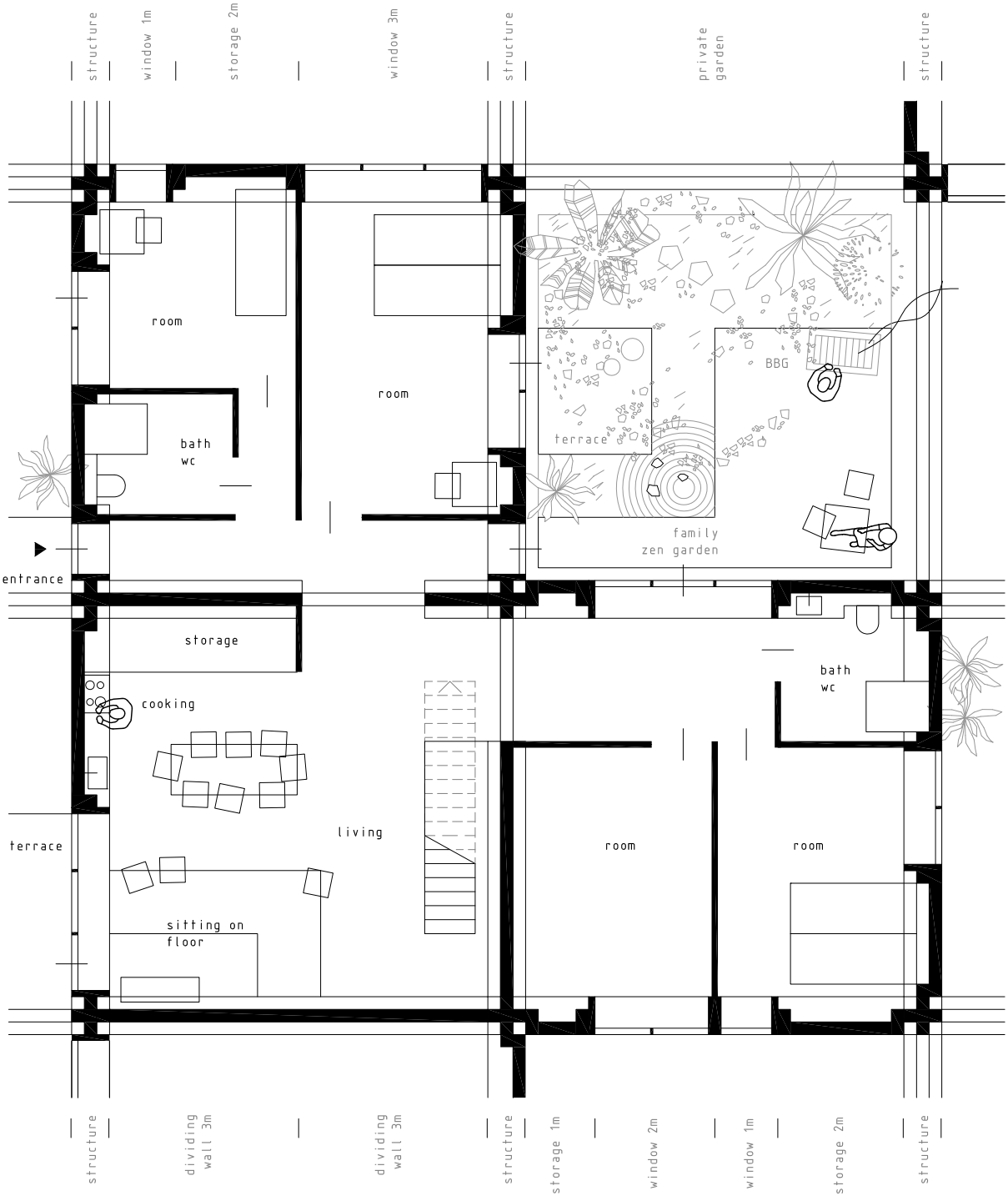
section



M 1:100

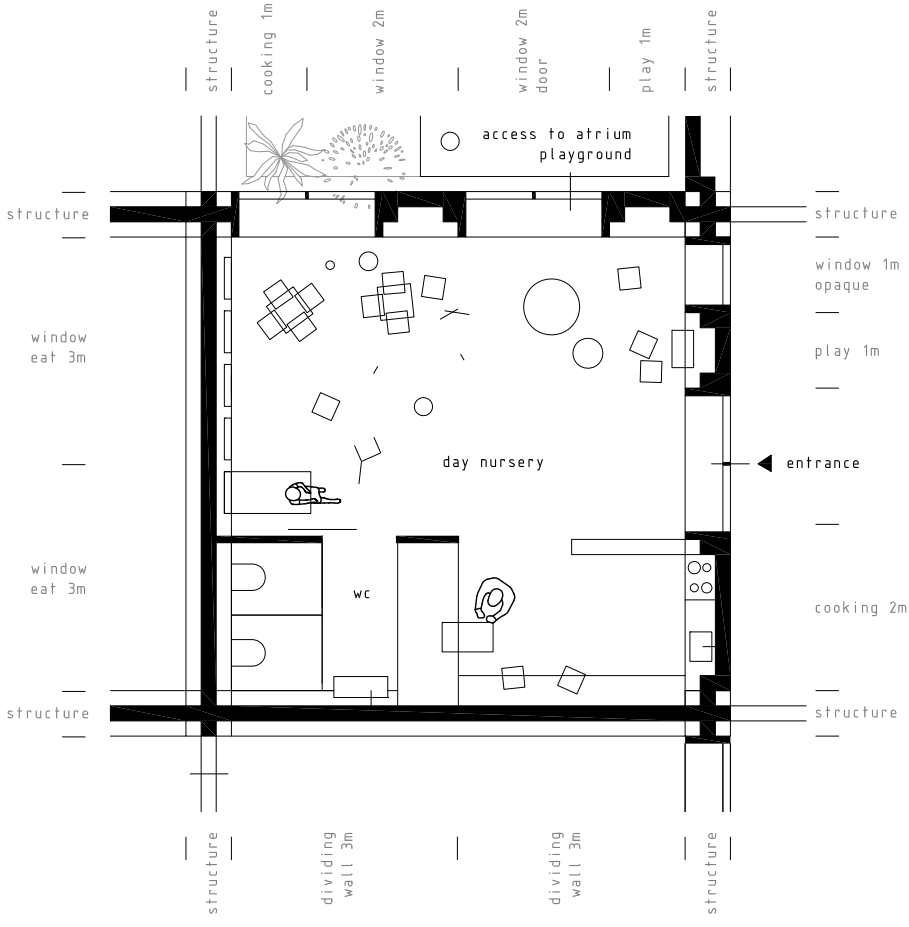
‚Clan Cluster‘
lower floor

M 1:100


structure
window 1m
storage 2m
window 3m
structure
private garden
structure
room
room
bath wc
entrance
storage
cooking
living
terrace
sitting on floor
BBG
terrace
family zen garden
bath wc
room
room
structure
dividing wall 3m
dividing wall 3m
structure
storage 1m
window 2m
window 1m
storage 2m
structure

nursery

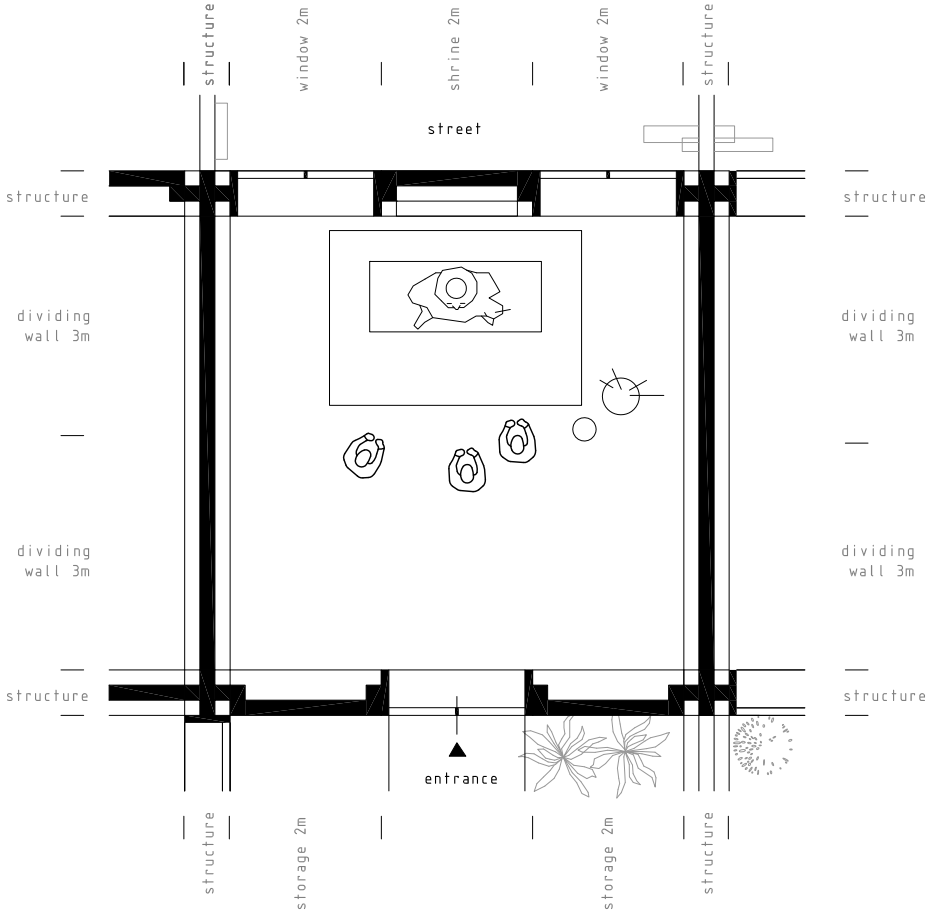
lower floor, residential area

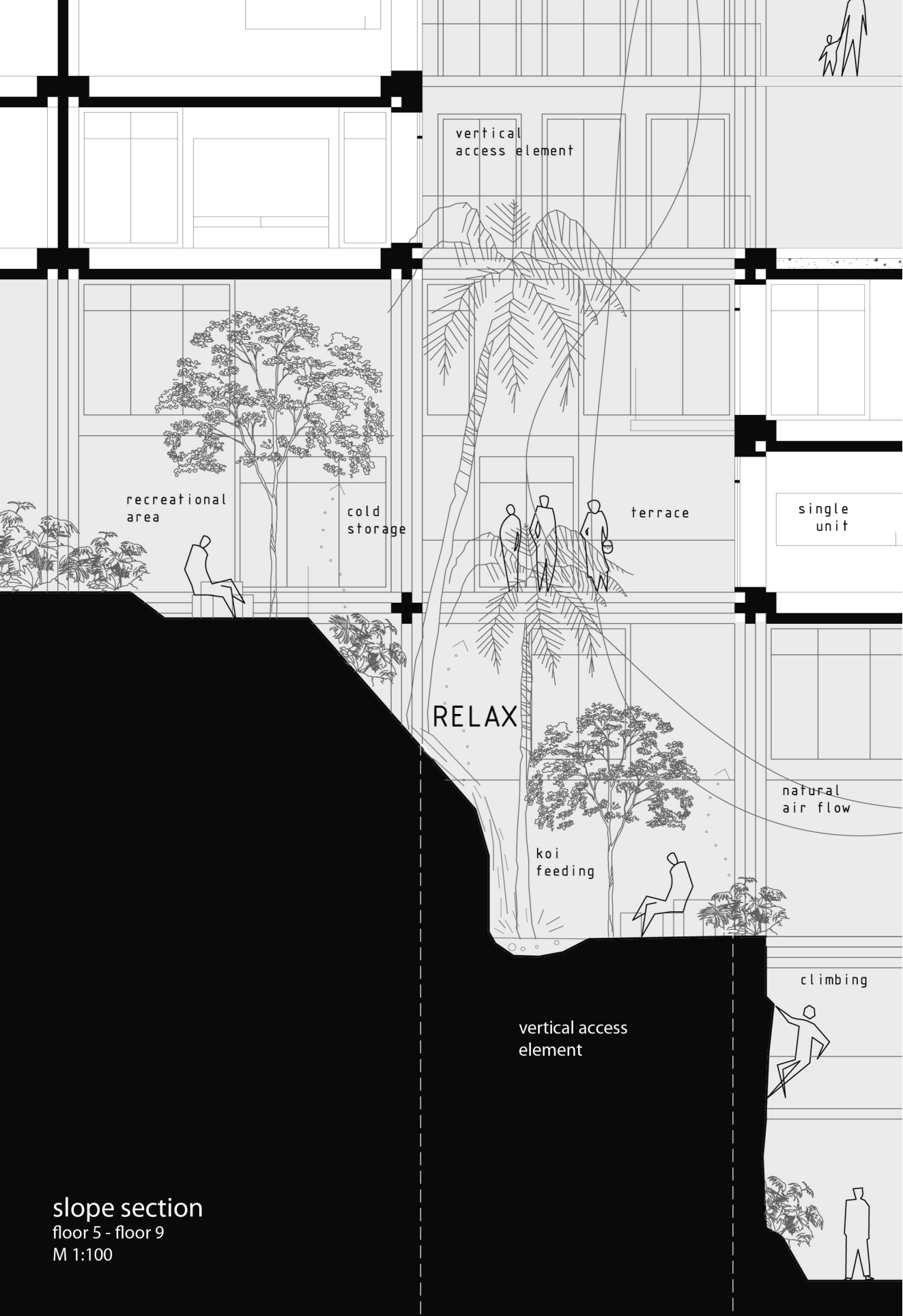


M 1:100

temple / shrine

lower floor.residential area





slope section

floor 5 - floor 9

M 1:100

THE SLOPE

Next to the physical advantages of the slope which leads to a comfortable micro climate, the constant appearance of the cut-slopes surface throughout the structure offers an impressive scenery.

In places where voids directly encounter the slope, recreational areas might gain additional qualities. Due to a constantly recurring sequence of horizontal and vertical voids in the form of light wells and infrastructure, an attenuated penetration of sunlight and rainfall brings a natural environment deep into the project.

Terraces, walkways and recreational spaces often lead directly along into the untouched slope. The different surfaces of the slopes provide different appearances in colour, shape, and stabilisation measurements.

Despite the application of the concept, the function of wheepholes and drainage systems stays unaffected. During rainy periods, cascades along the slope find their way, right beside public and private units, through the structure before eventually entering main channels at the foot of the slope.

The rainwater could be further used to supply water basins within the recreational areas directly next to the slopes which, next to an additional cooling function due evaporation, might be used as a habitat for fish or other aquatic creatures such as turtles.

Additional to that, drilled out planting recesses all over the rock surface, allow larger plants to be rooted.

With further activities such as climbing, a revitalisation of the blank surfaces increases the quality within this unique living environment by turning actual inactive areas into special active-areas. A combination with playgrounds would turn an unused vertical into an exciting space for residents and visitors.

roof top section

floor 8 - roof top

M 1:100

THE ROOF TOP AND RECREATIONAL AREAS

ROOF TOP AREA

As the calmer counterpart to the ‚Podium Area' the ‚Roof Top Area' offers a variety of different outdoor activities. This layer acts, next as a shading blanket, as a transition zone, which from the top, appears like a park-like landscape with an immediate end towards the city.

An interconnected network of top ceiling elements filled with soil together with additional soil basins, allows intensive greening. As a result, a continuous walkway system through a sky garden in combination with the vertical access elements, connects the natural terrain on the top edge of the cut-slope formation with the urban street level at the ground floor.
The elevator and staircase elements jut out a modules height on the roof top area.

The roof top offers views and chill out areas, BBQ places and sport opportunities such as Thai Chi-, work-out- or Ping Pong-areas.
Because of these qualities, a quiet oasis at the city's edge invites even residents from denser urban places to relax before they eventually go on hiking trails. These trails are directly connected to the public walkways system on the top of the concept.

RECREATIONAL AREA

Top-ceiling-elements throughout the structure act as public and semi-public recreational spaces. These areas are ideal meeting points or, on the other side, quiet havens on each floor, offering a variety of different out-door activities such as playgrounds, sport areas or simply park-like recreational zones.

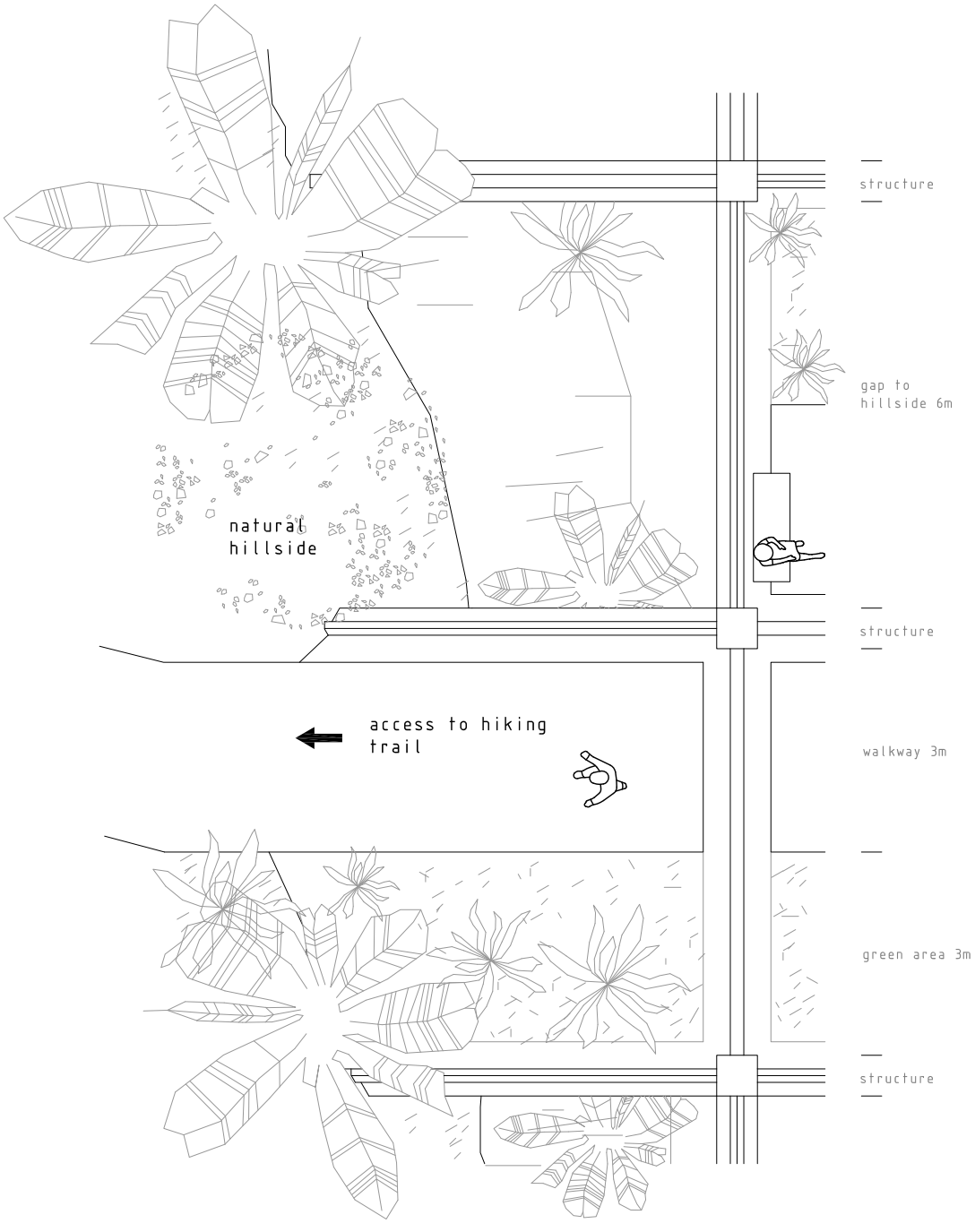
Next to the public areas on top of the building, atrium-like enclosed voids, function as semi-public inner yards with terraces and balconies for the bordering units.
Additional to the recreational function within the structure‘s voids, the residents should be able to organise common garden for planting and harvesting own vegetables, especially in the residential zones.
This conscious interaction with the slope and the vegetation within this special environment, underlines the high living quality of this concept.

Due to Hong Kongs abundant vegetation, the structure literally grows together with the natural terrain on top of the slope.

The following examples of plans give a brief inside on how the roof top area could be utilized and highlight the qualities within the concept.

connection to natural terrain

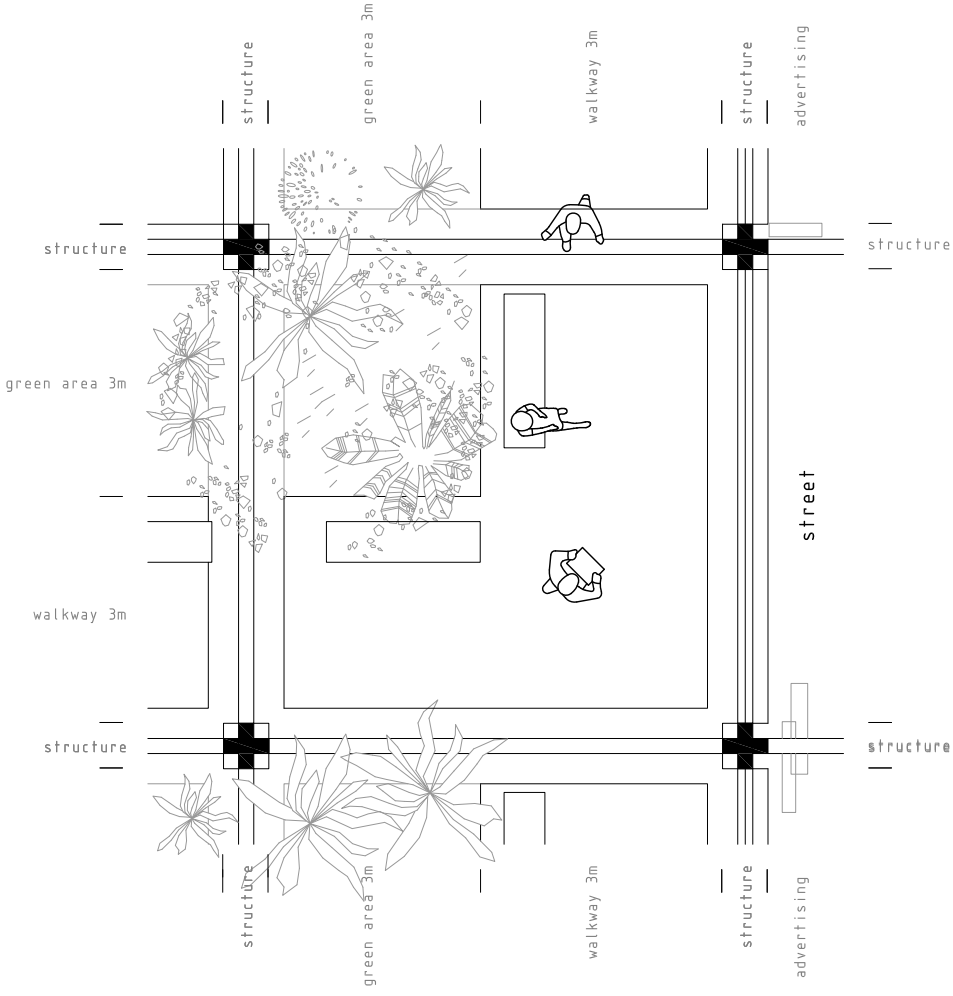
roof top area



M 1:100

main walkway

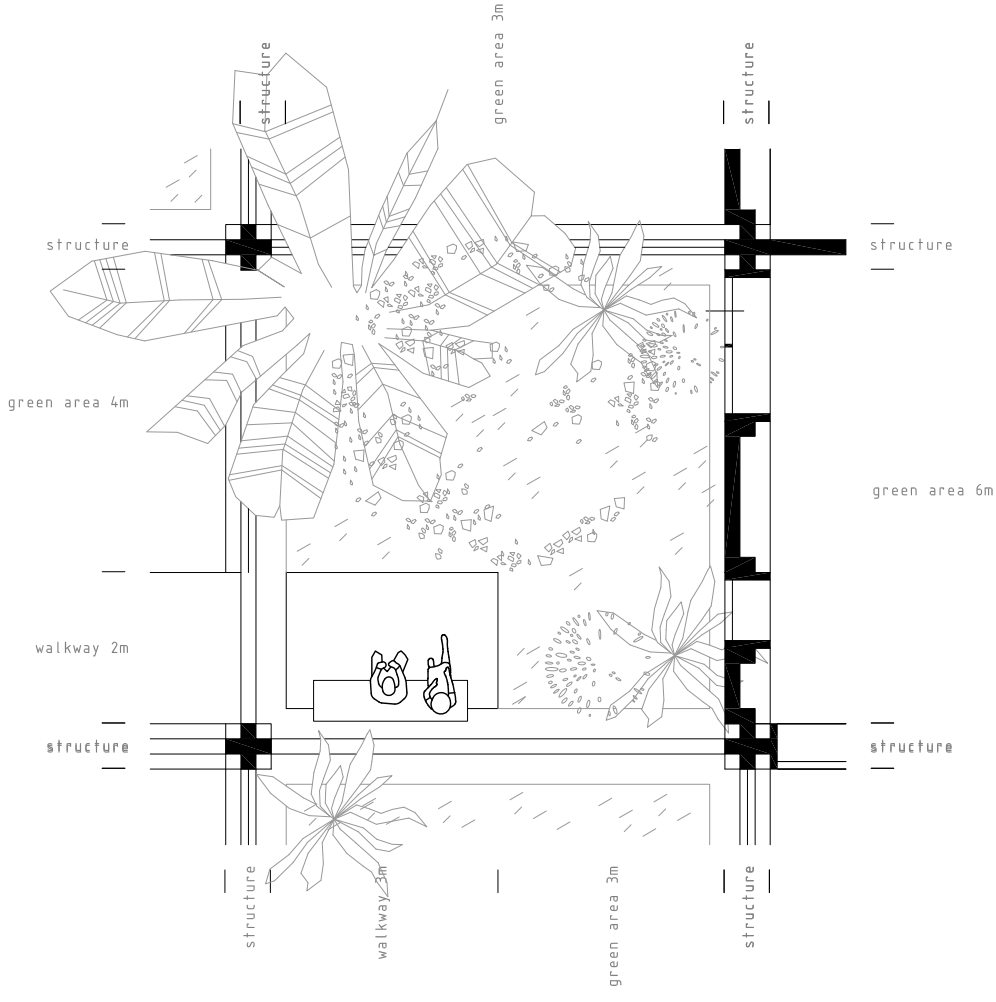
throughout the structure



M 1:100

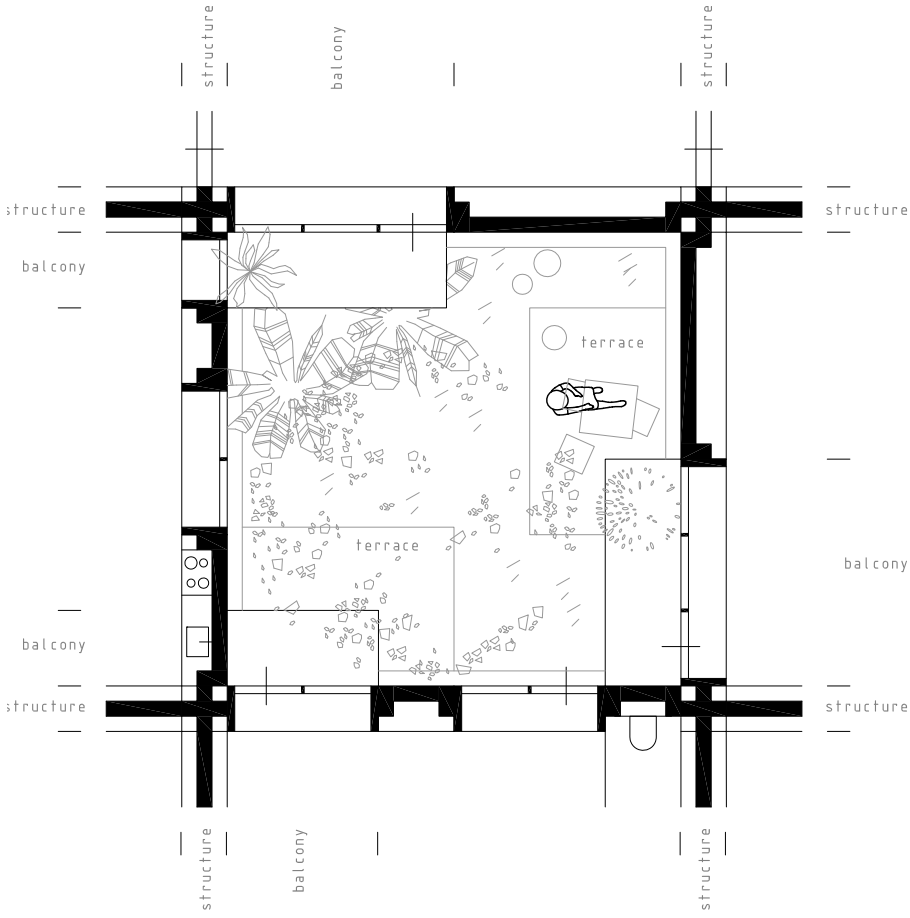
recreational area

throughout the structure



atrium

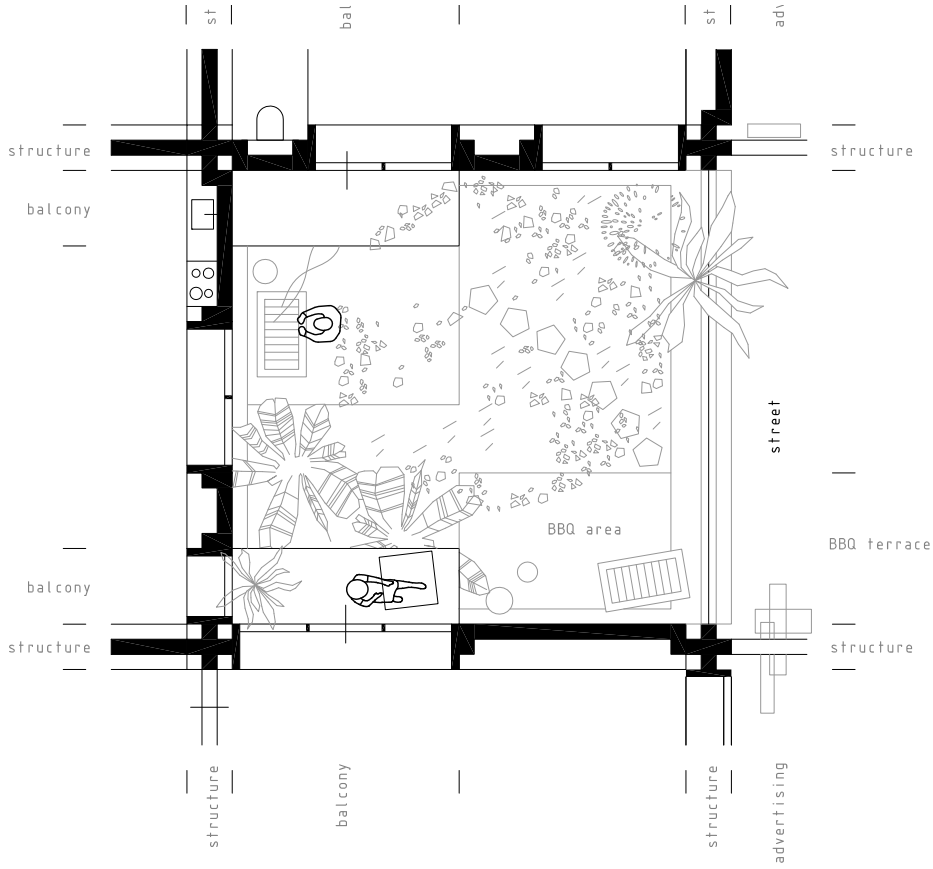
upper floor, residential area



M 1:100

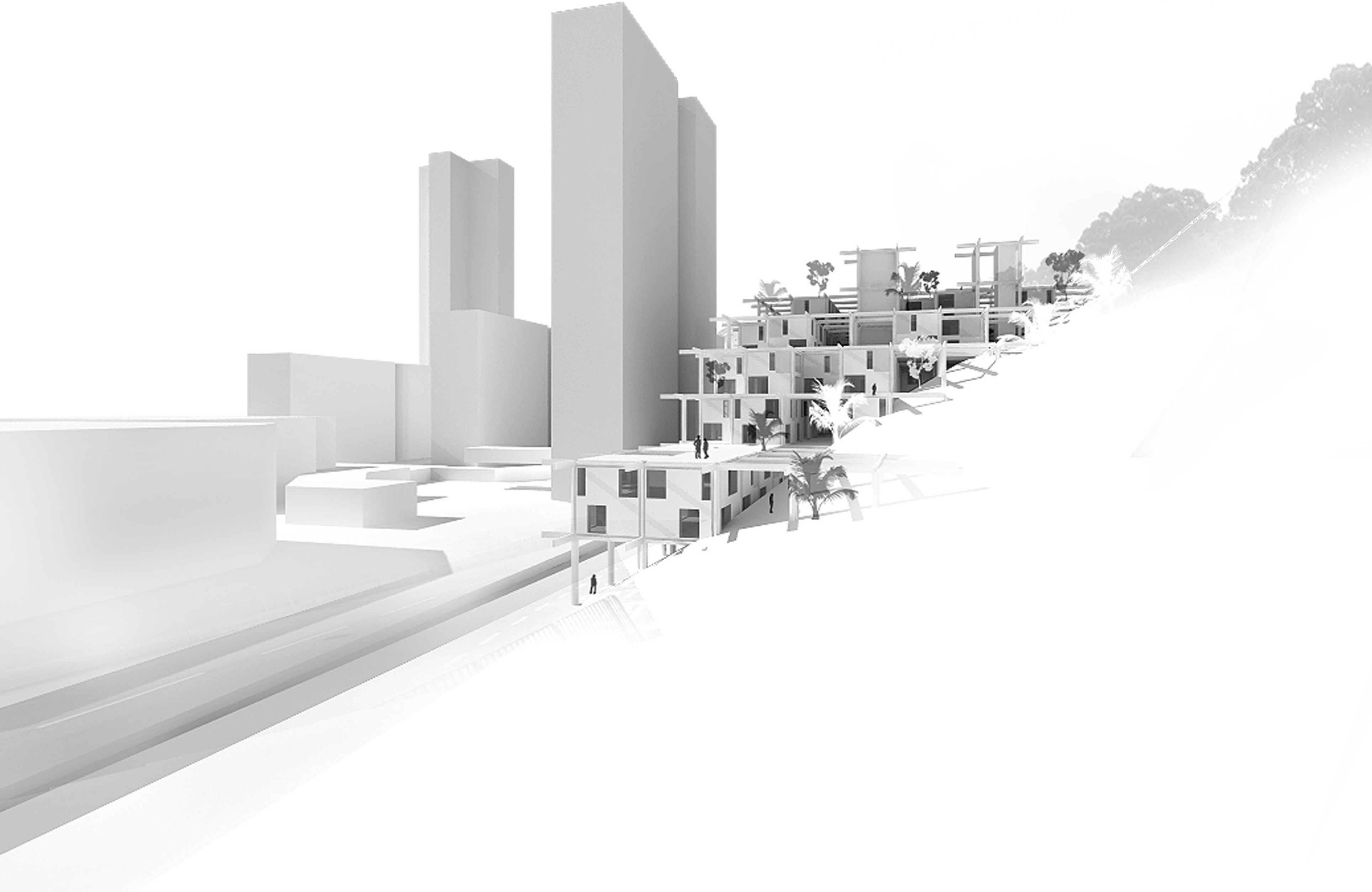
BBQ terrace

upper floor, throughout the structure



VISUALIZATIONS

Terraced beginning of structure with connection to existing pedestrian network



terraced beginning of the structure

‚podium area' - vertical access element

residential units above‚podium area‘

single unit - residential area

bar unit - residential area

common faciliy module - ‚buddhist temple'

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Flo

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Ivan

Jin

Leng

Patrick

Simon

Tini

Family

Friends

and Mr. Wong

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