

The City Coding Project:

An Investigation into Some Presumed Maxims for Residential Design in Hong Kong

by **Chit Kin Dickson Wong**

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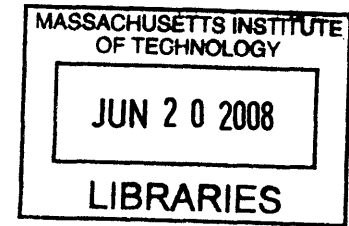
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Thesis Abstract

Formal expressions of architecture in a city are largely dictated by how the city is 'coded'. Therefore, tampering with the codes of a city – i.e. re-coding – is capable of making fundamental changes in building forms that would proliferate across the entire city.

Therefore, the City Coding Project consists of two primary components:

- Through the study of how residential developments in Hong Kong are 'coded', the first part of this thesis seeks to understand the underlying logic of the city's zoning regulations, programming conventions, construction practices and building codes in order to earn one degree of freedom that would alter the city's form fundamentally.
- Having that in mind, the second part of this thesis shows how, through creatively accepting, adding or tampering with the city's existing geometries, new formal potentials within the domain of existing practices could be unleashed and manifested as a new architectural typology.

These new formal potentials are particularly pertinent to residential design in Hong Kong because of its infamous reputation of being purely code-driven solutions to the problems of extreme density, mixed-use programming and construction optimization. The result of such solutions is a – formally as well as programmatically – highly monotonous urban landscape. The City Coding Project, in that regard, is conceived as a prototypical undertaking that demonstrates how one could wriggle free from – but not completely disregard - the city's seemingly unbreakable constraints upon residential design.

keywords: building codes, construction practices, mass production, mass customization, amenity programs

Thesis Supervisor: Yung Ho Chang

Title: Professor of Architecture, Department Head

for Cai Lao Shi, who taught me how to decipher
Cezanne's apples

Acknowledgement

I would like to thank my advisor, Yung Ho Chang, who encouraged me to explore uncharted waters beyond the existing architectural agenda, and perhaps more importantly, believed that I can achieve that more so than anyone else (including myself). I would also like to thank my reader, Nader Tehrani, whose acute insights made pivotal changes in the way I think about my design, and pushed me to embrace it wholeheartedly.

Special thanks to Ingeborg Rucker, my reader, who guided me through the labyrinth that I trapped myself in. Never in my 7-year long architectural education have I seen a professor so dedicated to a student's project. Thank you for being there for me, and believing that the project would be nothing short of spectacular even at times when it looked irredeemably sad and grim to me.

I would like to thank my family, for being supportive over the past 7 years; for understanding that an architectural education is annoyingly long and painful; and for understanding my need to live like a nomad from time to time for no apparent reason whatsoever.

At last my most sincere gratitude to my fellow students Chee, Leslie, Natsuki, Laura, Morgan and Matt, without whom my renderings would have looked sad and desolate, and my diagrams dull and silly. Thank you, Ricky, for making sure that my models were coming out on time, even in an unlikely event of a campus-wide power outage at MIT.

I thank you all.



fig. 1

“Each residential development forms a group of towers mounted on a podium in which a highly diverse range of communal activities takes place, from shopping to restaurants and sports club. These complexes are developed along a unique structure which is repetitive, complete, closed, hermetic autonomous and perfectly coded...each residential dwelling unit, or cell, on offer is more or less the same, but pretends to be different.”¹

1 Laurent Gutierrez and Valerie Portefaix, “*Life at Hyper Density*”, in Laurent Gutierrez, Ezio Manzini, Valerie Portefaix ed., HK Lab (Map Book Publishers, 2002), p 225

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Introduction

The Codes

In a city, it is a make-belief that a building's form is the result of a single architect's free will – it is rather the result of an architect's negotiation with and adaptation to the city's cultural and economical infrastructure, which in turn manifests itself in terms of building codes, construction practices and programmatic conventions. The operative mechanisms of these codes, practices and conventions, which are collectively referred to as 'the Codes' in the context of this thesis, offer clear directives that dictate how and what a building should be.

The 1916 Zoning Law in Manhattan is a prime example of how a set of embedded codes precedes and outweighs conscious architectural intentions: "... the process of sheer multiplication is allowed to proceed up to a certain height; then the building must step back from the plot line at a certain angle to admit light to the streets... after 1916, no structure in Manhattan could exceed the limitations of this spectral shape. To exploit maximum financial return on any given block, Manhattan's architects were forced to approximate it as closely as possible."¹

The effects of these constraints on architects vary to different degrees, depending on how restrictive they are on a given typology in a particular city. In Hong Kong, whose building codes and construction practices are necessitated by its hyper density, the Codes are often considered chafing constraints that burden the creative will of architects when it comes to residential design.

The local architects are of course, not complaining for no reasons – hyper-density, in the age of industrial mass production, implies repetition *ad infinitum* on the urban scale, which means that not only all window units on building A have to be identical, but also that the ones on building A have to be the same as the ones in the entire city. In that sense, the notion of residential design does not exist in Hong Kong – they are merely multiple variations of one single design.

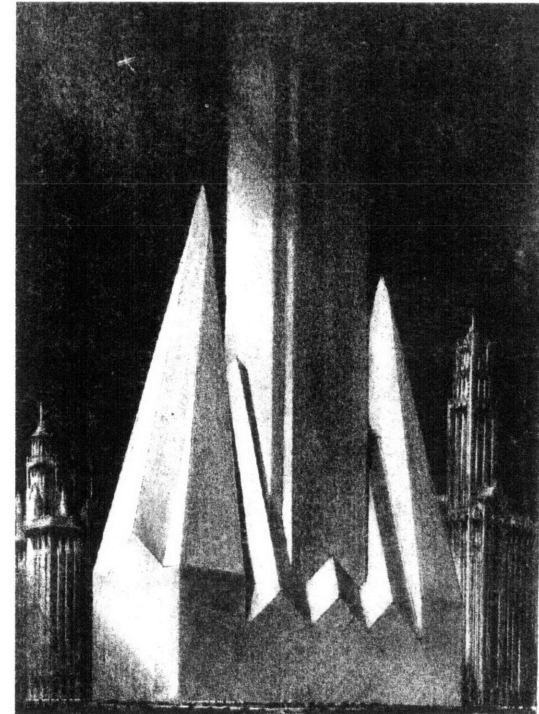


fig. 2

1 Rem Koolhaas, "Delirious New York" (The Monacelli Press, 1994)

Mie's Mischief as Re-Coding

That being said, the Codes are not always as recalcitrant as one would think they are – they are susceptible to changes that are necessitated by changes in the cultural and economical infrastructure of a city. More importantly, owing to the collective nature of the operative mechanisms of the Codes, fundamental changes would proliferate across the entire city once the lapse between the city's Codes and its socio-economical status is, in an almost mischievous way, identified and creatively *Re-Coded* by an architect.

In that sense, the pristine, somber Seagram Building is almost a Joycean mischief – in order to preserve the formal integrity of the tower, "...it only occupies 25 percent of the lot, it is erected without the setbacks mandated by the 1916 zoning law...The building's success leads New York to change the zoning law in the early 1960s to require the construction of plazas to provide open space, light, and air for the densely built-up commercial areas of the city"¹

Simple, elegant, Mie's *Re-coding* of New York's zoning law found that much yearned-for *one degree of freedom* that changed the face of Manhattan.

1 Andrew Dolkart, "the First US Zoning Law", the Architecture and Development of New York City <http://ci.columbia.edu/0240s/0242_2/0242_2_s7_1_text.html>



fig.3

Hong Kong: Coded and Re-coded

Similar instances of Coding and Re-Coding also occurred multiple times in Hong Kong as the city's form evolved over the past century. In 1974, a new set of Building Ordinances was established, in order to pave way for the introduction of the Ten Year Housing Program in 1976, whose heroic dimension (It first identified, quite relevantly, some 1,535,000 people who were "unsatisfactorily housed"¹ within the territory and set its target as meeting the housing needs of this population in a decade) requires a set of extremely precise, prescriptive and duplicable parameters that specify every single detail of residential design (from planning, construction to the size of a door knob) engendered thereby – It ought to be the Master Scheme, the Ultimate, Omniscient and Omnipresent Housing Design.

Ever since then, the city's streetscape has been rapidly shifting from being nostalgically chaotic to homogeneously systematic.



fig. 4

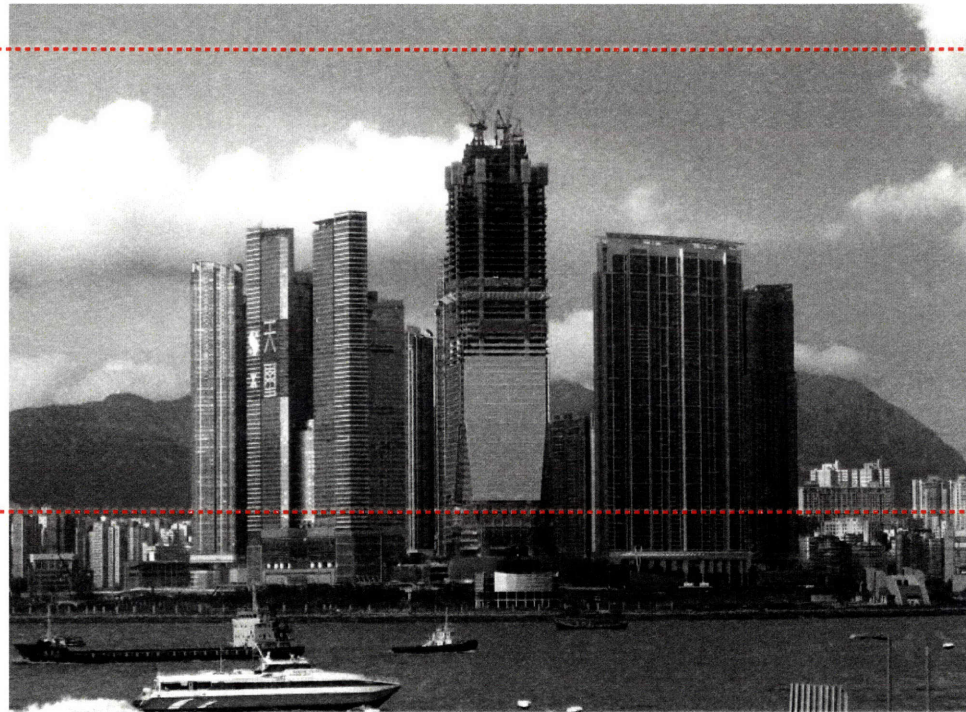


fig. 5

1 Manuel Castells, Lee Goh and Ri Yin-Wang Kwok, *The Shek Kip Mei Syndrome: Economic Development and Public Housing in Hong Kong and Singapore* (London, 1990), p.136

Recoding

height restriction after the airport was moved



Coding

height restriction before the airport was moved

fig. 6

Another famous instance of recoding in Hong Kong occurred on the Kowloon Peninsular, where the Kai Tak International Airport used to be located. When the airport was still in use, the strict height restriction in the area is reflected from the apparently less dense cityscape. As soon as the airport was relocated to Chek Lap Kok and the height restriction lifted, 80+ storey towers mushroomed in a matter of a few years.

The impetus for high density and factors that are external to architecture find their battleground on the skyline – as soon as one subsides the other immediately takes over. Traces of these battles are scattered all over the city, much like archeological artifacts.

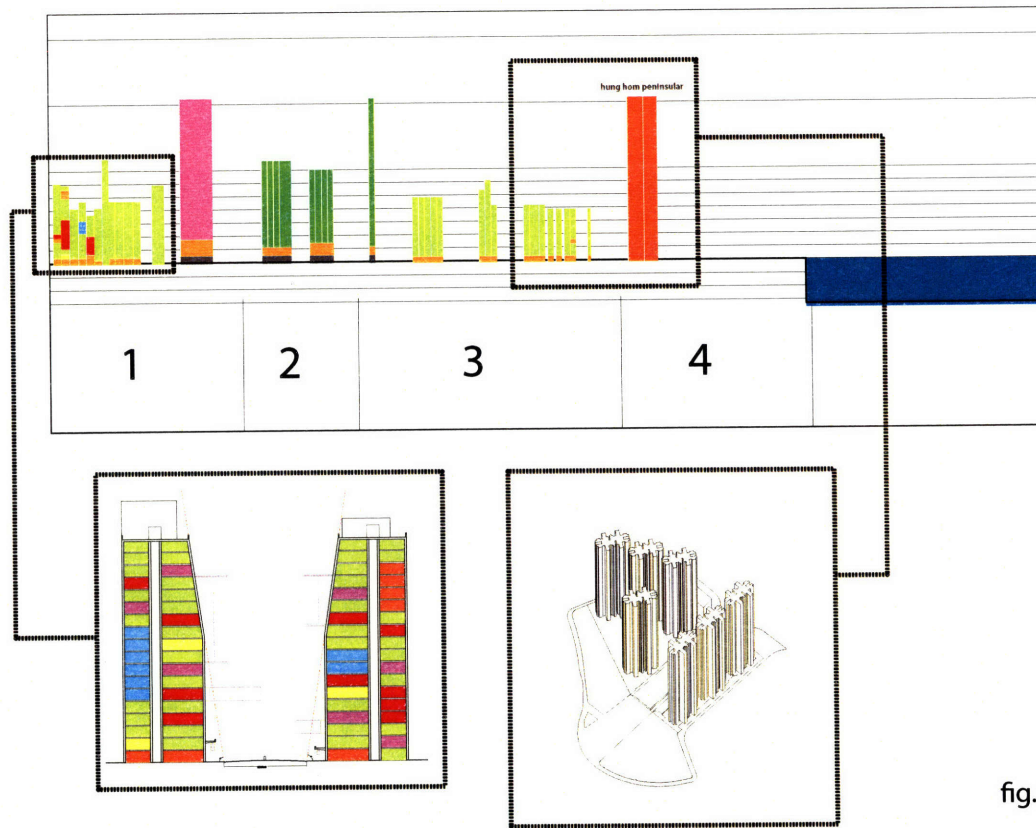
Why Bother?

Such examples of Re-coding are particularly pertinent to housing design in Hong Kong for a few reasons. On the first and most superficial level, re-coding serves as an entry point to rethink about the formal monotony of conventional residential design in Hong Kong.

The 1974 Building Ordinances, which introduced new regulations that encompass everything from fire escape regulations, daylighting requirements, planning requirements as well as construction procedures, are so prescriptive that given the construction technology that was available in Hong Kong at that time, would only lead to few building forms. Repetition ad infinitum is, if not the underlying rule of the game, the most obvious way to comply to the Codes. As a result, walls upon walls of public residential developments are found across the entire territory. Of course, given the urgent need for housing identified by the government in the 70s the Orwellian dimension of public housing schemes seemed inevitable. Putting formal monotony aside, these towers are supposed to be highly optimized – not only do they provide a sufficient amount of daylight for each apartment, but they provide it in such a way that sun light would fall at the right spot, even when multiple towers are packed on the same site. But as this housing typology continued to propagate across the city, even private housing estates are starting to adopt similar building and design techniques. The question then becomes, given that the spatial culture in Hong Kong has experienced such drastic changes because of the city's rapidly changing socio-economic status, is the same logic of 'optimization by repetition' still relevant? If not, what would be the catalyst for a fundamental mutation?



fig. 7



1. old urban center
1950s - 1980s
residential tenement
blocks appropriated
by alternative pro-
grams on different
levels. chaotic street-
scape.

2. Ho Man Tin
1950s-1980s
traditional center of
high-end residential
developments.

3. Hung Hom
1980s - mid 1990s
former whampoa ship-
yard. building height
limited by the old airport.
A large portion of the
area was developed into
whampoa gardens, a
large private residential
estate

4. New Reclamation
Area
1990s - present
residential blocks built
upon reclaimed land
in the late 1990s. sees
a shift into the single-
program tower para-
digm.

fig.8

But perhaps a more fundamental reason for re-coding housing in Hong Kong is programmatic diversity. Over the past 30 years Hong Kong has witnessed a gradual degradation in terms of programmatic diversity – from the multi-level scattering of different programs in old tenement blocks, to the hard-edged, Cartesian and homogeneous division of residential and commercial programs in new housing developments (with commercial activities concentrated on podium levels, and the rest is pure residential). The result of such division is the total dissipation of the city’s urban dynamics – the streets are totally usurped by large shopping facilities that are lifted above ground, and the pedestrians forced to confront a much larger and more impartial commercial establishment.

But arguing over whether streetscapes from the past should be re-enacted – Jane Jacob style – would be fruitless and unproductive. The status quo of housing development has been adopted for decades and is proved to be, to a certain extent, quite successful in terms of its efficiency. The question then becomes, would it be possible to re-code the current strategy in such a way that the former spatial norm (which, by the way, is still a prevalent urban motif in many parts of Hong Kong) be re-introduced into housing as it is?



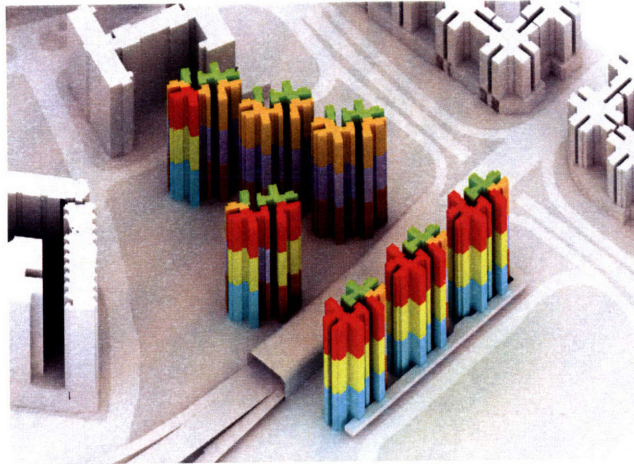


fig. 9a: private housing pricing

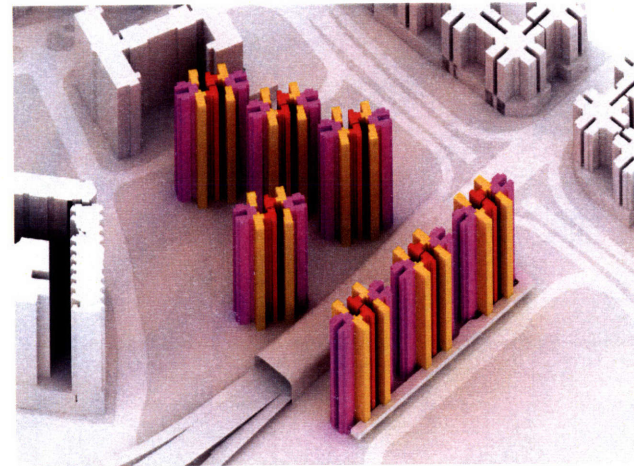


fig. 9b: public housing pricing

Furthermore, When the same mode of development is employed on both public and private sector housing, does the same means of optimization - which centers on the notion of isolating developments into gated communities for different income classes - still make sense economically?

typical pricing scheme for home ownership scheme :

The flats in a PSPS estate are sold at a 40-60% discount price, and their prices are discriminated only in terms of their size and nothing else - a south-facing, 800 sq. ft. flat on the 28th floor bears the same price tag as a mass grave-facing, 800 sq ft. flat on the 1st floor. The problem is solved by resorting to bureaucracy in its purest form - lottery.

typical pricing scheme for private housing :

private housing developments, on the contrary, have an established system of price discrimination.

De-Coding

Before Re-Coding, it is necessary to understand the mechanism of housing design in Hong Kong – how every nut and bolt is orchestrated to generate a housing development as the way it is now. Of course there are thousands of factors that contribute, directly and indirectly, to the evolution of housing development in the city. But for the sake of argument this analysis – i.e. De-Coding – will focus on four major areas that directly affect the tectonics of the housing towers.

1. zoning conventions
2. program
3. construction
4. building codes regarding daylighting and façade design

1. Zoning conventions
2. Programs
3. Construction
4. Building codes - Daylighting

analysis: how town planning in hong kong becomes as uncanny as the way it is

building (planning regulations cap. 123F 1984 Ed.

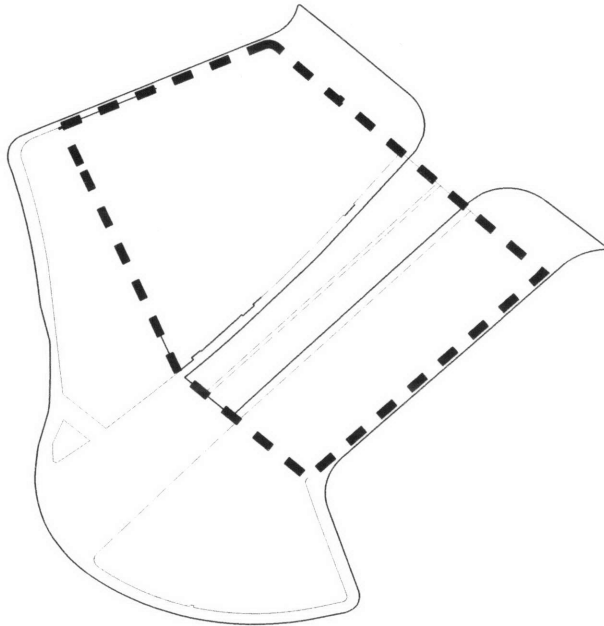


fig.10

Step 1:

Take the site boundary. Site Area = 27760 sq. m

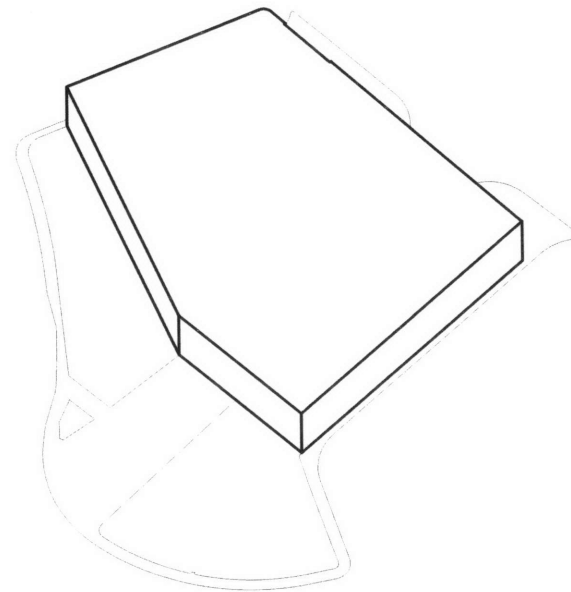


fig.11

Step 2:

According to the Planning Guide of Hong Kong, the site falls under Residential Class C in the Metroplan Area.

That means the plot ratio of the site = 10.

$GFA = 10 \times 27760 = 277600 \text{ sq. m}$

The minimum floor-to-ceiling height in Hong Kong is 2.75, taking structure and mechanical services into account, height/floor = 3.0

1

analysis: how town planning in hong kong becomes as uncanny as the way it is

building (planning regulations cap. 123F 1984 Ed.

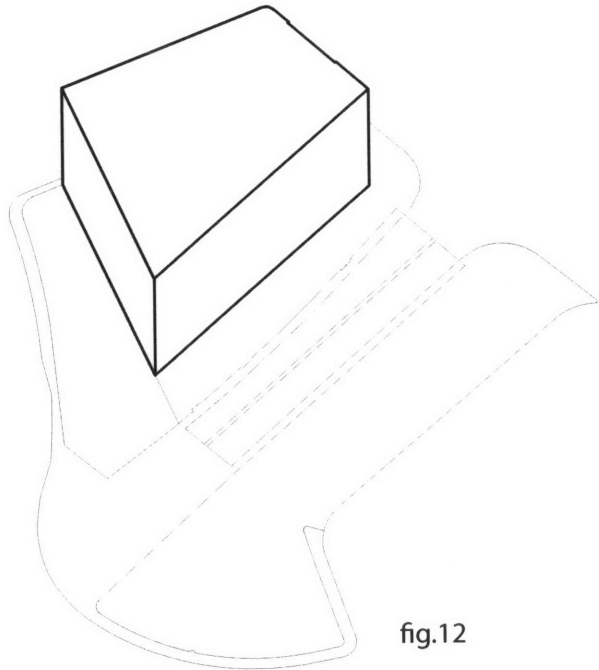


fig.12

Step 3:

The Planning Guide also specifies that for the same site the site coverage is 40% of the Site Area.
Site Coverage = $27760 \times 0.4 = 11100$ sq. m

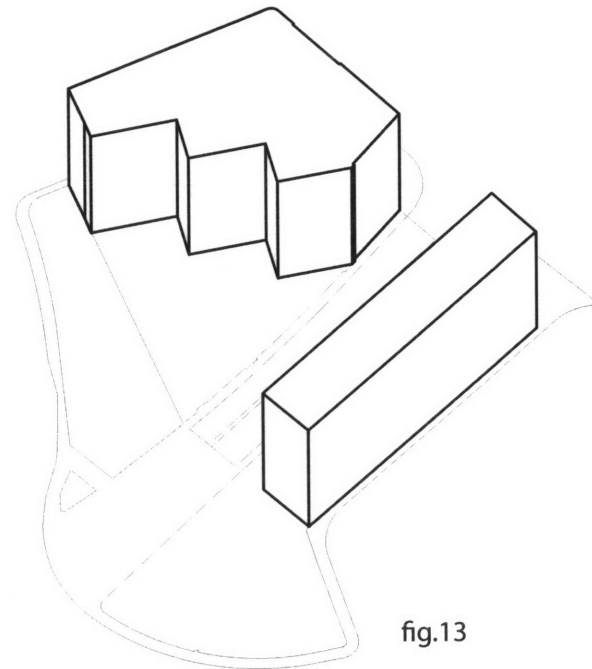


fig.13

Step 4:

The orientation of the blocks has to be re-arranged to maximize sea view and south-facing apartments.

1

1 Hong Kong, *Building (Planning) Ordinance* in Bilingual Laws Information System, cap 123F, ed. 1984 < <http://www.legislation.gov.hk/eng/home.htm> >

analysis: how town planning in hong kong becomes as uncanny as the way it is

building (planning regulations cap. 123F 1984 Ed.

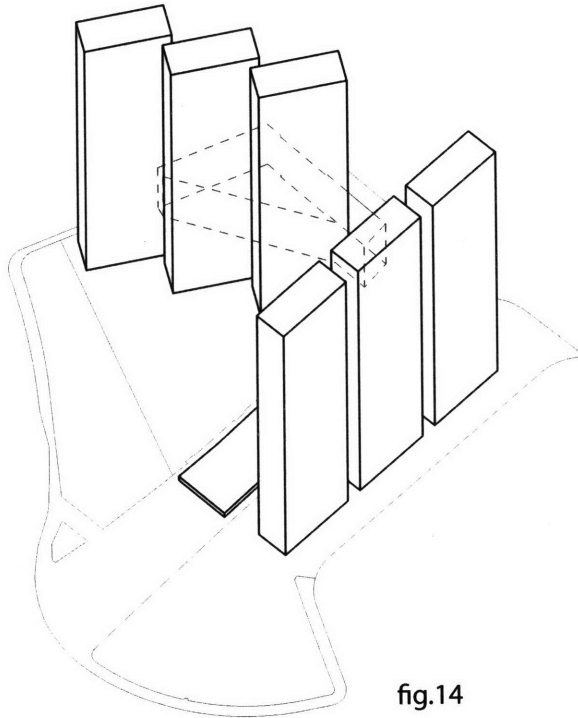


fig.14

Step 5:

The blocks are then further divided into 6 apartment blocks and a commercial podium.

1

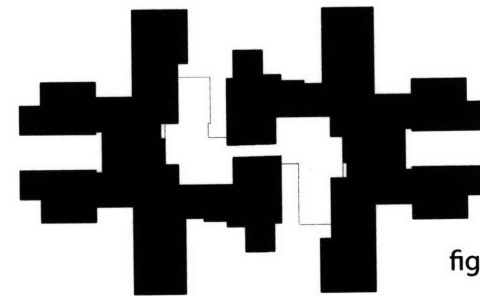
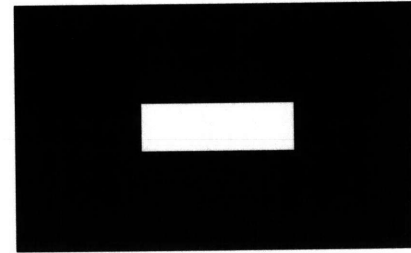


fig.15

Step 6:

According to the Building Ordinance, four more conditions govern the outline of the apartment blocks:

1 Hong Kong, *Building (Planning) Ordinance* in Bilingual Laws Information System, cap 123F, ed. 1984 < <http://www.legislation.gov.hk/eng/home.htm>>

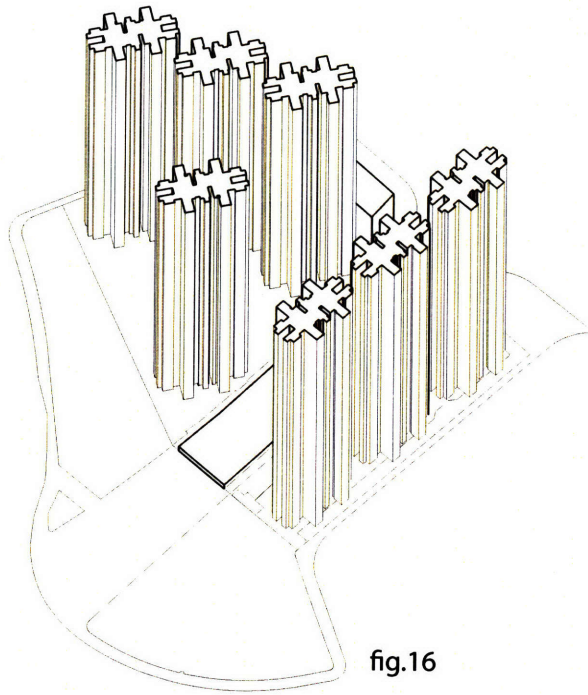


fig.16

Step 7:

The most common strategy to meet these conditions is to carve volumes out from a rectangular block. After the operation the GFA of the six blocks would be considerably reduced. Therefore, in order to make up for the loss in GFA an extra apartment block abutting the streets is placed.

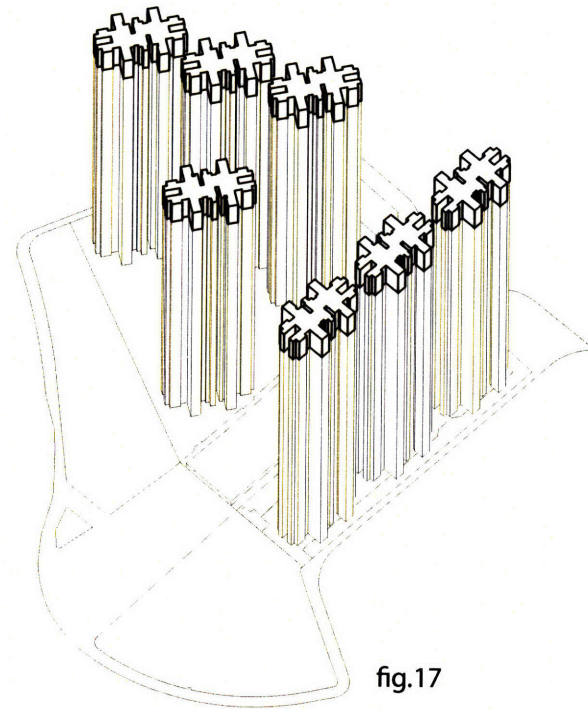


fig.17

Step 8:

According to the 2001 Energy and Environment in Building Provision, if the apartment blocks comply with certain 'green' criteria (such as wider internal corridors, sky gardens, public spaces within the building etc.), the developers are allowed to build an extra 8% of the total site area.

1 Hong Kong, *Building (Planning) Ordinance* in Bilingual Laws Information System, cap 123F, ed. 1984 < <http://www.legislation.gov.hk/eng/home.htm> >

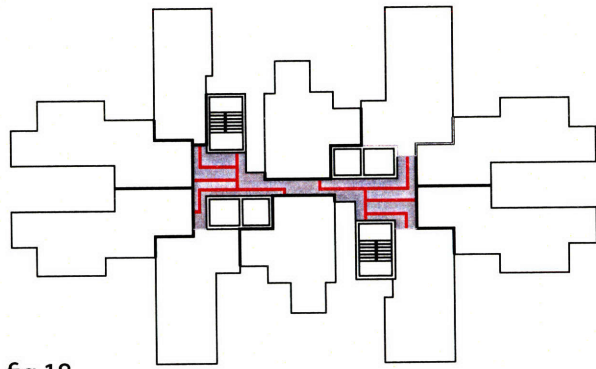


fig.18

Building (Planning) Regulations 41C, paragraph (2)
 Every building or basement to which this regulation applies shall be provided with at least such number of firefighting and rescue stairways as will ensure that no part of the building (including any basement in the building) or basement is more than 60m from such a stairway.

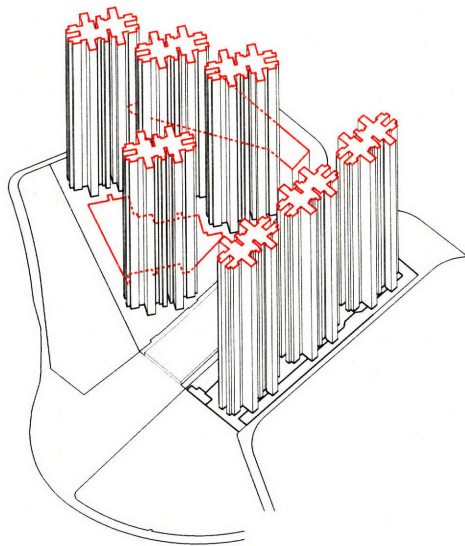


fig.19

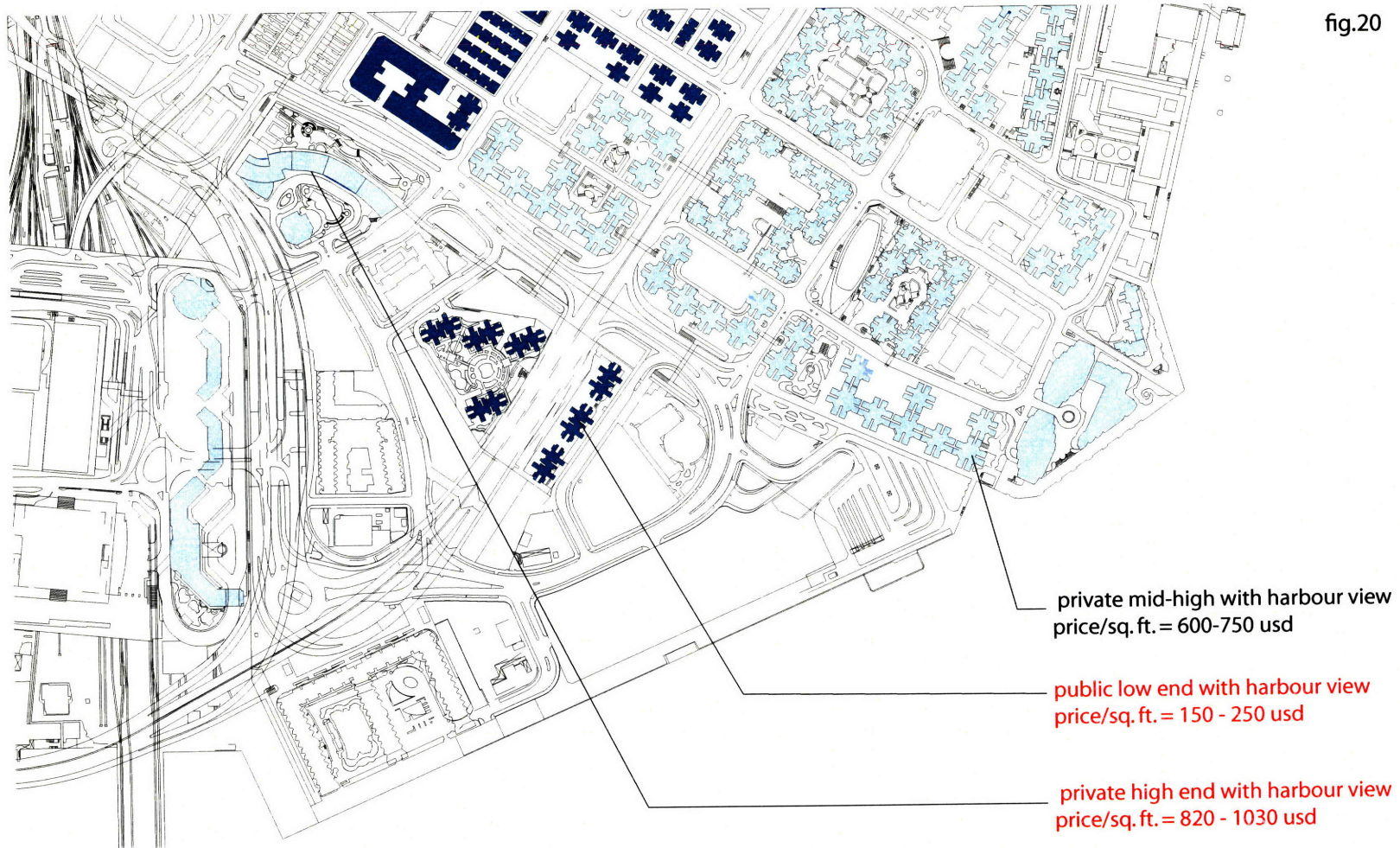
Building (Planning) Regulations 25, paragraph (1a)
 Every domestic building on a class A or B site or on a class C site shall have within the site an open space at the rear, or partly at the rear and partly at the side, at a level of not less than 150mm below the floor of the lowermost storey in accordance with the Second Schedule

which in this case is 25%

1 Hong Kong, *Building (Planning) Ordinance* in Bilingual Laws Information System, cap 123F, ed. 1984 < <http://www.legislation.gov.hk/eng/home.htm>>

1. Zoning conventions
2. Programs
3. Construction
4. Building codes - Daylighting

fig.20



Gated communities, as a means of separating income classes from another, is a norm in Hong Kong. That being said, they are often juxtaposed with each other in the same area

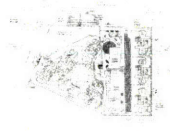
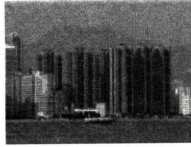
hung hom peninsula



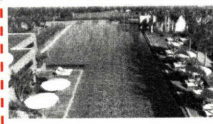
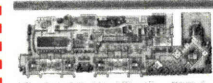
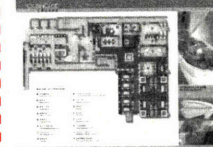
harbour place
(reincarnation of hung
hom peninsula)



i own



nothing



i am a member

nothing



cost of apt/ sq ft
250-400 usd

cost of apt/ sq ft
670-920 usd

fig.21

In Hong Kong, high-end developments and low-end developments are architecturally identical. The only difference between the two lies in the type of amenities (not) provided in the development. In order to create price discrimination and market the apartments to different clienteles, there is an impetus to incorporate different amenity programs into residential developments

As soon as private housing estates adopt the construction techniques and efficiency of public housing production, the architecture itself becomes highly irrelevant. To create the necessary price discrimination for different clienteles, the focus is shifted to the (non) provision of exclusive amenity services.

For the purpose of this thesis three types of amenity programs that are usually associated with housing developments are identified:

1. public amenities
2. community and daily necessities (usually associated with low-end middle class developments)
3. consumer (usually associated with high-end middle class developments)

public amenity programs

fig.22

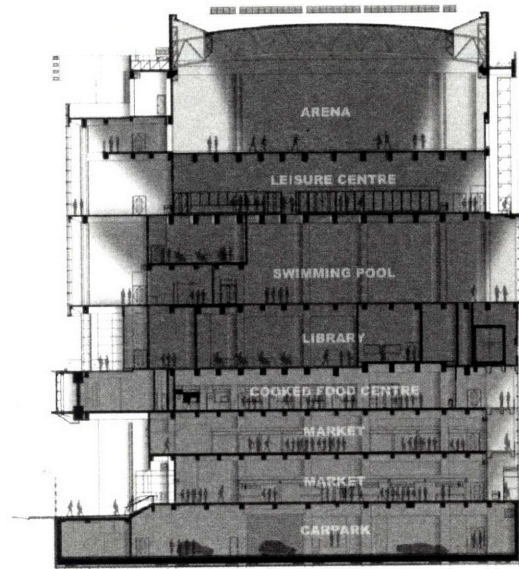


fig.23

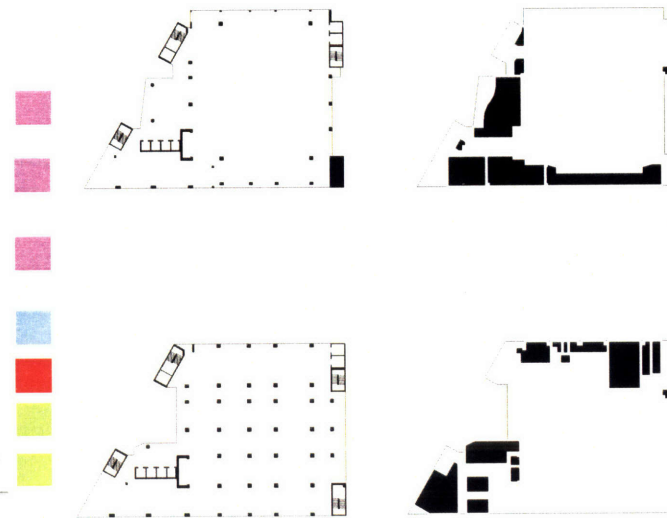


fig.24



fig.25

public public cultural markets public recreational public catering

Public municipal services buildings, where public amenity programs are provided in a skyscraper, are characterized by a central open space where the general public can occupy, and small service rooms on the periphery.

community and daily necessities: collective provision



fig.26

It is not uncommon that, within a low-end housing estate, a centralized low-end shopping mall is being provided. Instead of selling high-end products these shopping malls provide daily necessities for the residents. The most commonly found commercial units are grocery stalls, stationery shops, apothecaries and fresh goods markets.

amenity programs for high-end housing developments

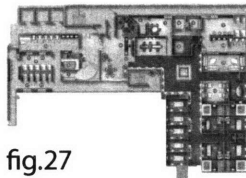


fig.27

Clubhouse Lower Level

'her paradise' (ladies' club) jacuzzi, therapy rooms, changing rooms, relaxation, rooms, juice bar, sauna room, nail beauty room

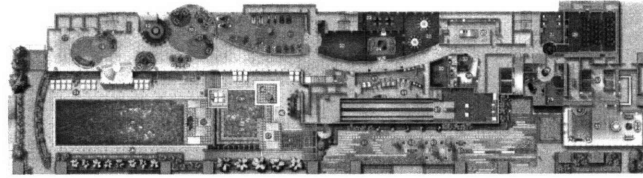
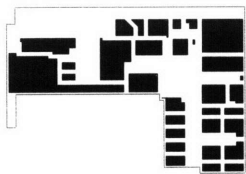
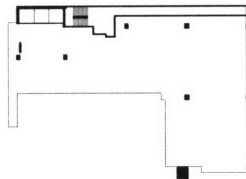


fig.28

Clubhouse Podium Level

'fitness nation': gym, dance practice room. 'gala club' (translation: food related facilities): learning kitchen, dining hall, lounge. 'av spectacle': grand theatre music centre. 'happy zone' (translation: miscellaneous entertainment): karaoke rooms, glow bowling (?) centre. 'aqua world': sun deck, fountain, jacuzzi, foot massage zone, pool lounge, kid's pool, juice bar.

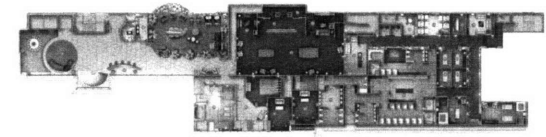
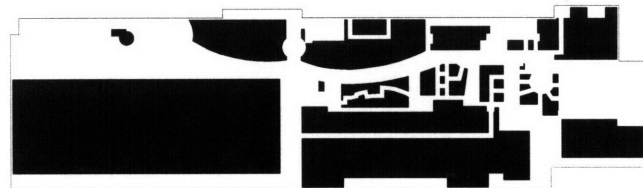
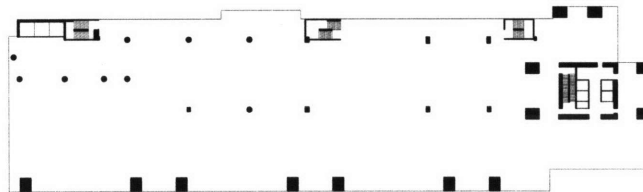


fig.29

Clubhouse Upper Level

'his kingdom': wine corner, bar, cigar room, snooker area, juice bar, foot massage room, training room, tanning room, recreation room, steam room, sauna room, jacuzzi, changing room, massage room, VIP treatment room. 'kids' wonderland': kids' play area, e-station (computer room)



The podium space is chopped up into small rooms to provide extra privacy – just to be coherent with the theme that this is an 'exclusive palace' for the user.

public, community and consumer

public amenities

- public recreation**
 public sports hall
 public swimming pool
- commercial**
 public market
 low-end shopping
- cultural**
 public library
 lecture rooms
- public catering**
 cooked food center

community and daily necessities

- miscellaneous retail**
 convenient stores
 video stores
 stationery stores
 low-end boutiques
- community services**
 community centers
 daycare
 elderly home
 elderly daycare
 community hall
 district admin. office
- education**
 tutoring school
- general recreations**
 playground
 chess garden
 public event space
- health care**
 clinics
 chinese pharmacy
 massage parlor

consumer

- commercial**
 high-end restaurants and bar
 private kitchens
- department stores
 furniture stores
 supermarket
- consumer recreations**
 spa and sauna
 gym
 cinema
 cinema repertoire
 karaoke
 skating rink
 private club
- 'consumer' education**
 berlitz
 music schools
 art schools

Multilevelism as a spatial norm in Hong Kong:

Multilevelism in Hong Kong partakes of two forms:

1. the chaotic
2. the homogeneous

Chaotic multi-levelism did not intend to be chaotic when it emerged in the late 60s and early 70s. It was, in fact, an attempt to end an even more chaotic urban past – squalid, 3-storey tall tenement blocks were rapidly replaced by the then brand-new reinforced concrete skyscrapers. By the time the new set of Building Ordinance was introduced in 1973 new RC blocks have already mushroomed across Hong Kong and Kowloon. The speed of construction at that point was almost parallel to the rate of GDP increase of the city – a heroic What characterizes chaotic multi-levelism is the scattering of diverse programs on different floors, regardless of the construction logic of a tower. The only way these programs manifest their existence is by the signage that protrudes out from the façade of these blocks. Hence the chaotic streetscape along, for example, Nathan Road, where the old urban center is located.

Homogeneous multi-levelism, on the other hand, does intend to be homogeneous through and through. After the 1966 riot in Hong Kong the government and the general public became paranoid about social disorder. The obsession to re-introduce social order is translated into the provision of housing.

“... the inadequacy and scarcity of housing and all that this implies, and the harsh situation that results from it, is one of the major and most constant sources of friction and unhappiness between the government and the population. It offends alike our humanity, our civic pride and our political good sense.”¹

The government identified some 1,535,000 people who were “unsatisfactorily housed”² within the territory. Then it sets its target as meeting the housing needs of this population in a decade. With this paranoia as a backdrop, ‘Existenz Minimum’ becomes a given and speed, the priority. Homogeneity, in this context, is speed.

1 Manuel Castells, Lee Goh and Ri Yin-Wang Kwok, *The Shek Kip Mei Syndrome: Economic Development and Public Housing in Hong Kong and Singapore* (London, 1990), p.136

2 Castells, Goh and Kwok, *The Shek Kip Mei Syndrome: Economic Development and Public Housing in Hong Kong and Singapore*, p.25

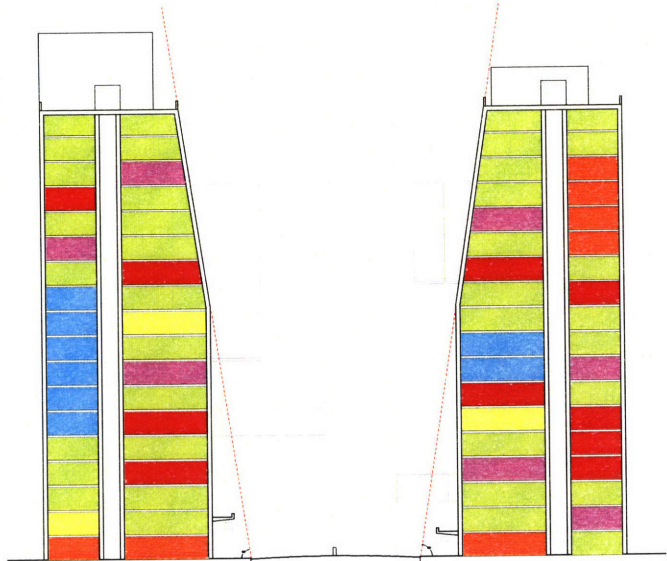
case 1: Multi-Levelism on Building Scale



fig.30

central
median annual household income = 39600 usd (switzerland = 34000 usd)

- private kitchen
- commerce club
- hair salon
- HKU Alum Office
- organic cafe
- kfc
- convenient store



programmatic section through nathan road

fig.32



fig.31

mongkok
median annual household income = 26250 usd

- one of the most famous massage parlors in Hong Kong according to this sign, this building has:
1. clinics
 2. plastic surgery clinics
 3. dentists
 4. hair salon
 5. beauty parlor
 6. tutorial school and
 7. something dodgy

case 2: Multi-Levelism on Geographical Scale

central escalator



fig.33

semi-vertical street with programs along its way, and nodal points for other pedestrians to join

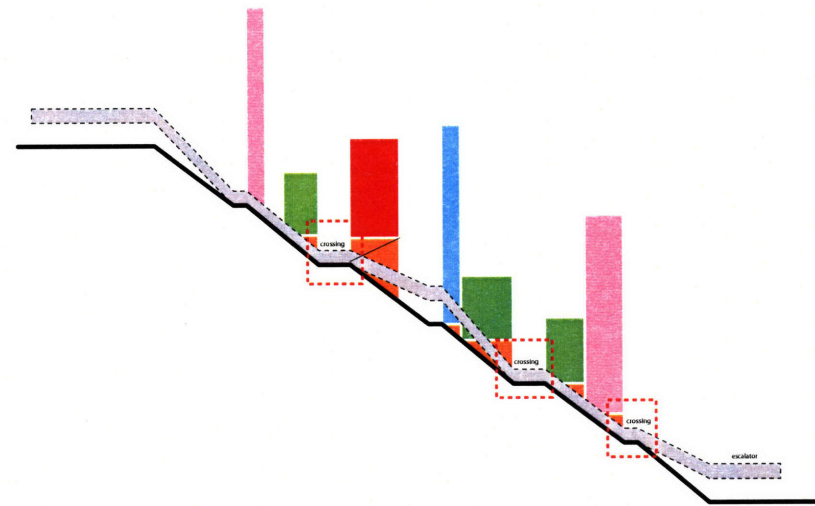


fig.34

1. Zoning conventions
2. Programs
3. Construction
4. Building codes - Daylighting

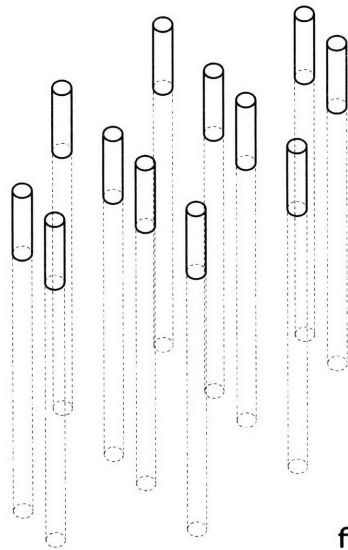


fig.35

Step 1:
Caisson piles with $R = 2.5$ to 3.0 m (or mini composite piles with $R = 0.8$ to 1.2 m) are first driven into the ground until it reaches the bedrock or, in this case (because the existing blocks were built on reclaimed land), the depth specified by the Building Code.

Depending on the programs on the ground/podium floors, the top 5m of the piles would be exposed and clad into columns in lobbies.

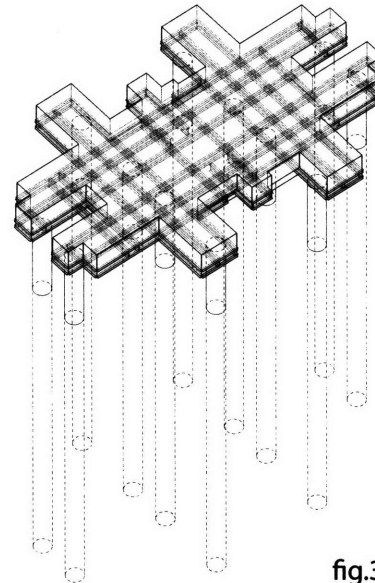


fig.36

Step 2:
On top of the piles a falseworks platform is first built, on top of which a 2.5 m deep composite transfer plate is constructed. The transfer plate transfers all the loads from above to the piles

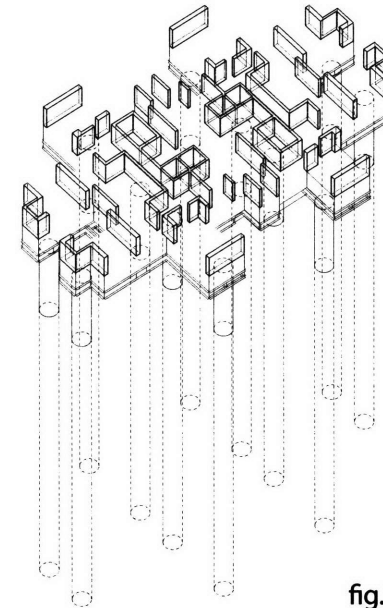


fig.37

Step 3:
Shear walls and cores that are tailored to the outline of the plan derived from the planning ordinance. The architectural implication of this is enormous. Call it the manifesto of Hong Kong – the out and out renunciation of the Modernist's Open Plan. As much as they have been regarded as 'Ville Radieuse's look-alikes', they are designed to prescribe interior spaces, not to liberate them.

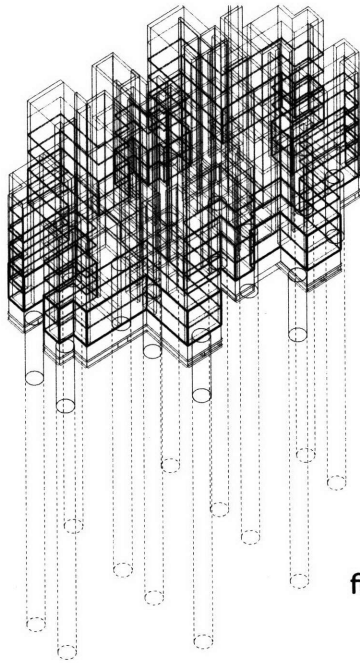


fig.38

Step 4:
Wall panels and floor slabs are constructed as the slip-forms for curing the RC shear walls and cores go up floor by floor.

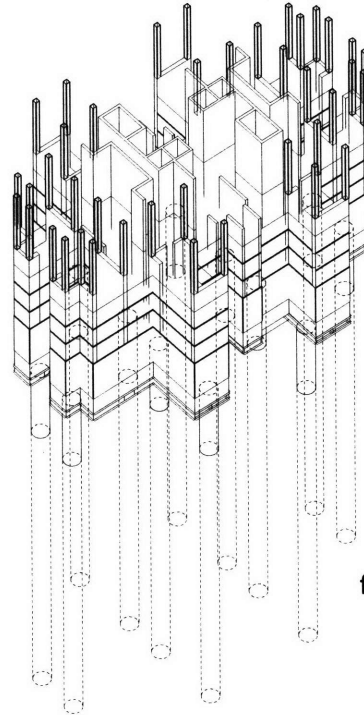


fig.39

Step 5:
If alternative programs have to be introduced **WITHIN** the tower (such as sports club, commercial facilities etc.), transfer columns have to be introduced in order to free up space for a completely different set of spatial logic.

Hong Kong's rejection of the Open Plan contradicts itself at this point: Given that the provision of a wide range of services has become even more important than the ownership of the apartment, the shear walls become more of a nuisance than convenience.

Therefore, in Hong Kong, alternative facilities = negotiation of different spatial logics.

Jump forms:

Perhaps one of the most obvious feature of the highly mechanized construction industry in Hong Kong is the use of jump forms:

“Fully mechanised public housing construction in Hong Kong in the late 1990’s involves the following features:

- i. the use of a climbing formwork system (sometimes referred to as self-climbing or self-lifting) to construct the central core walls,
- ii. precast facades and steel panel formwork (or alternatively climbing formwork) to construct the residential wings,
- iii. aluminium system soffit formwork to construct the floor slabs.

The central core is typically constructed ahead of the residential wings by using a climbing formwork system. The wings then “spiral” around the central core.

Once the climbing formwork is in position, the formwork panels are closed and the next concrete wall is poured. The cycle continues, which is normally four days. Faster times have been achieved. However, the limiting factor to faster times is usually the construction of the floor slabs, which are done as a separate process.”¹

When architects discovered the ‘stick-and-slab’ system in the early 20th century they were overjoyed. But it did not take them long to discover that structural stability is only one limitation among many others before their design can actually scrape the sky. Jump form overcomes a hurdle that is particularly pertinent to Hong Kong – speed. In-situ and mechanized construction processes are orchestrated so perfectly that it takes only 3-5 days to build a floor (concrete Grade C45 takes 12 hours to cure under normal conditions. So much of the time is invested in placing reinforcement in the slabs and shear walls). The moral of the story is clear: cheapness (hence efficiency) is the ultimate Cartesian crutch to all residential design (and some may argue that there is only ONE residential design in Hong Kong). After a round of almost unconscious process of problem solving the uncanny high-density tower appears. It is all cold, hard math – the obsession in cheapness leads to an insane degree of repetition. This is the Paranoid-Critical Method at its best.

1 Production Office of the Department of Civil Engineering at City University, *Traditional Construction Methods*, 2000, 23 May 2008, <<http://www.cityu.edu.hk/CIVCAL/production/traditional/>>

multi-levelism: construction connotation

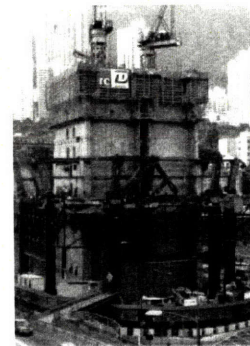
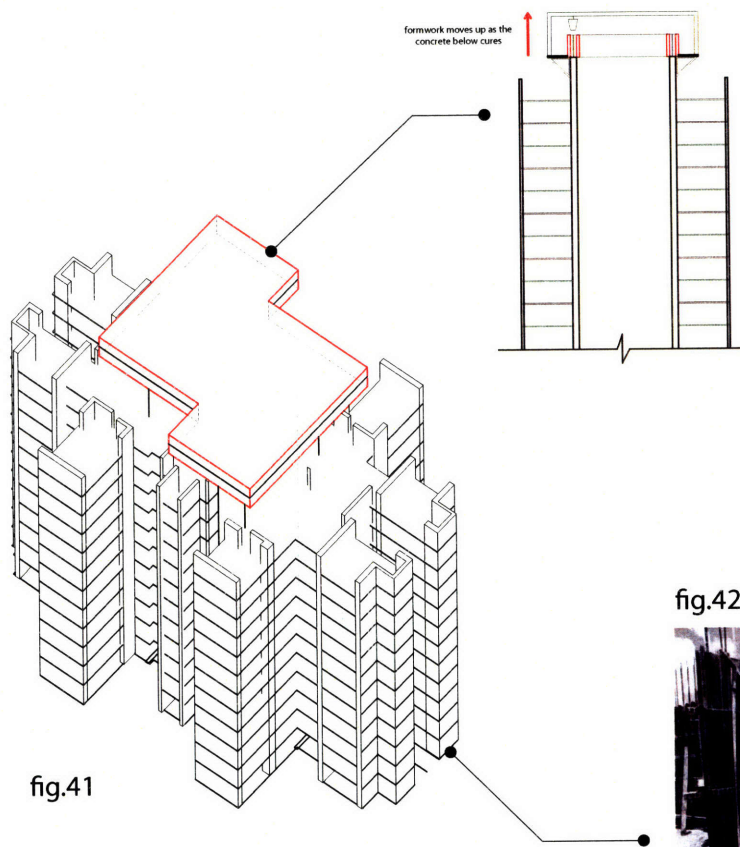


fig.40

fig.42



fig.43

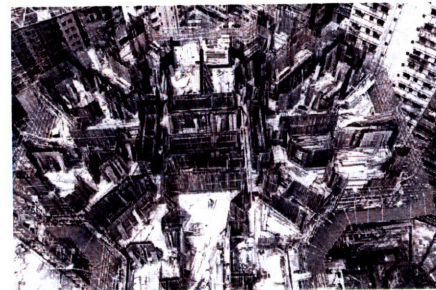


fig.41

Other constraints:

1. Shear walls cannot go sideways. straight up. (staggering sideways = more structure = costly = no)
2. Cores have to go straight (plumbing and mechanical services)
3. Bathrooms and kitchens have to align (otherwise plumbing services would be impossible)

RC: in-situ vs. prefab:

shear walls: in-situ

core: automated in-situ

external wall panels + windows: prefab

1. Zoning conventions
2. Programs
3. Construction
4. Building codes - Daylighting

Regulations Regarding Daylighting

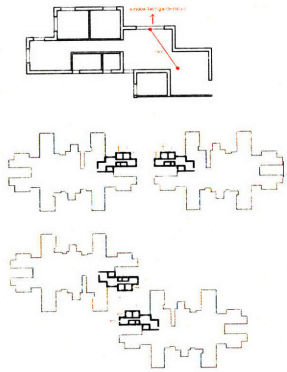


fig.44

Building (Planning) Regulations 32, paragraph (1)
No part of any room used for habitation shall be more than 9m, measured within the room, from a prescribed window which faces directly into the external air

1

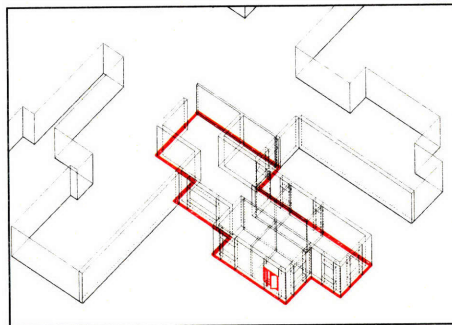
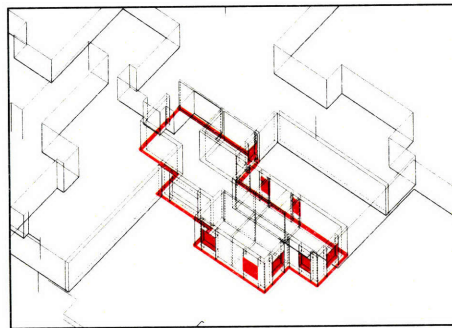


fig.45

■ windows

Building (Planning) Regulations 30
Every room used for habitation or for the purposes of an office or as a kitchen shall be provided with natural lighting and ventilation.

Such natural lighting and ventilation shall be provided by means of one or more windows which shall be –

- a) so constructed that
 - i) the aggregate superficial area of glass in the window or windows is not less than one-tenth of the area of the floor of the room; and
 - ii) the windows ca, to an extent at least equal in the aggregate to one-sixteenth of the area of the floor of the room, be opened in such manner that the top of the opening of each window is at least 2m above the level of the floor

Regulations Regarding Daylighting

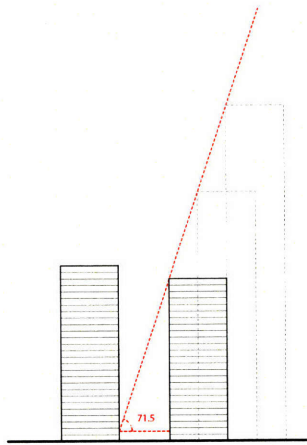


fig.46

in order to prevent the building from protruding above the plane the usual practice is to push the building back or to reduce the height.

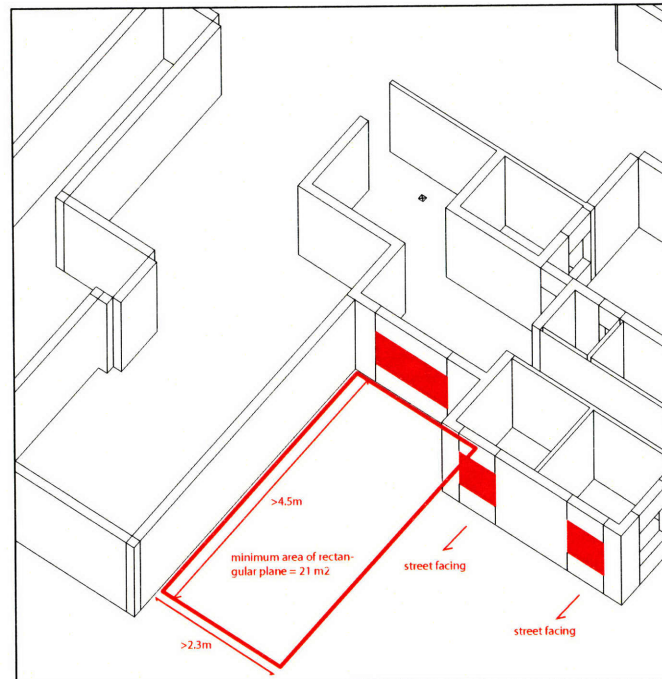


fig.47

The rectangular horizontal plane shall be such that –

- A) it has an area of not less than 21m²; and
- B) the minimum length of the base is not less than 2.3m; and
- C) the minimum length of the sides at right angles to the base, between the wall in which the window is sited and any other wall or building opposite thereto within the boundary of the site on which the building is erected, is not less than 4.5m; or
- D) where the window opens ton to an area bounded on the side opposite to the window by a boundary of the site on which the building is erected, the minimum length of the sides at right angles to the base, between the wall in which the window is sited and such boundary, is not less than 2.3m

1

1 Hong Kong, *Building (Planning) Ordinance* in Bilingual Laws Information System, cap 123F, ed. 1984 < <http://www.legislation.gov.hk/eng/home.htm>>

Re-Coding

Conclusions from De-Coding:

- The one degree of freedom does not lie in the residential part of a housing development – the Codes have imposed such strict rules on them that they can hardly be altered formally.
- The amenity programs, however, provide an entry point for re-coding. From our analysis it is clear that they can be accommodated in almost any building forms, be they vertical skyscrapers or horizontal podium plinths. The daylighting requirements for these programs are also less restrictive – although still require daylight, these programs are not confined by the provision of windows facing external air.
- From that point of view, the only constraints we are left with for amenity programs are zoning conventions and construction practices.
- While the first one can be tweaked by policy changes, the second one, however, requires a more sophisticated re-interpretation of the current construction practices

testing the rules

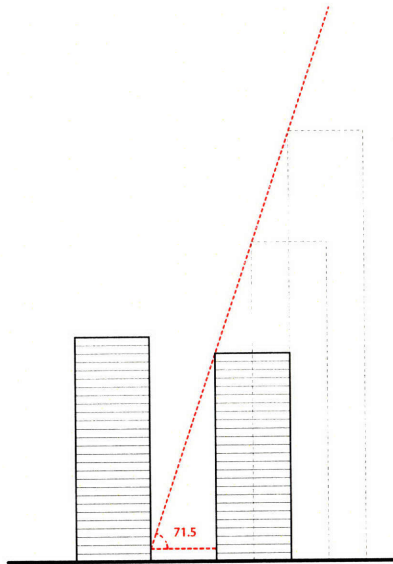


fig.47a

What everyone does: in order to prevent the building from protruding above the plane the usual practice is to push the building back or to reduce the height. This clause, therefore, is Hong Kong's response to the 'setback law' in NYC

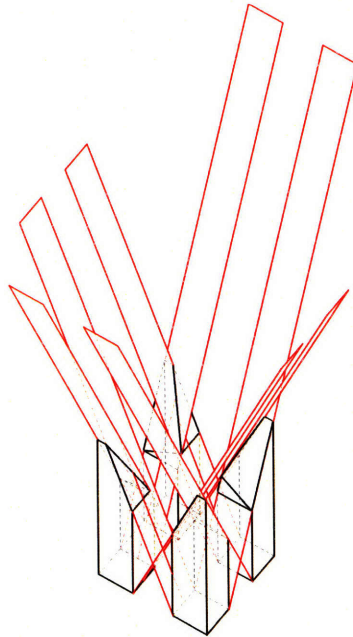


fig.47b

What no one wants to do: just put the buildings really close to each other and allow them to start shaving off each other.

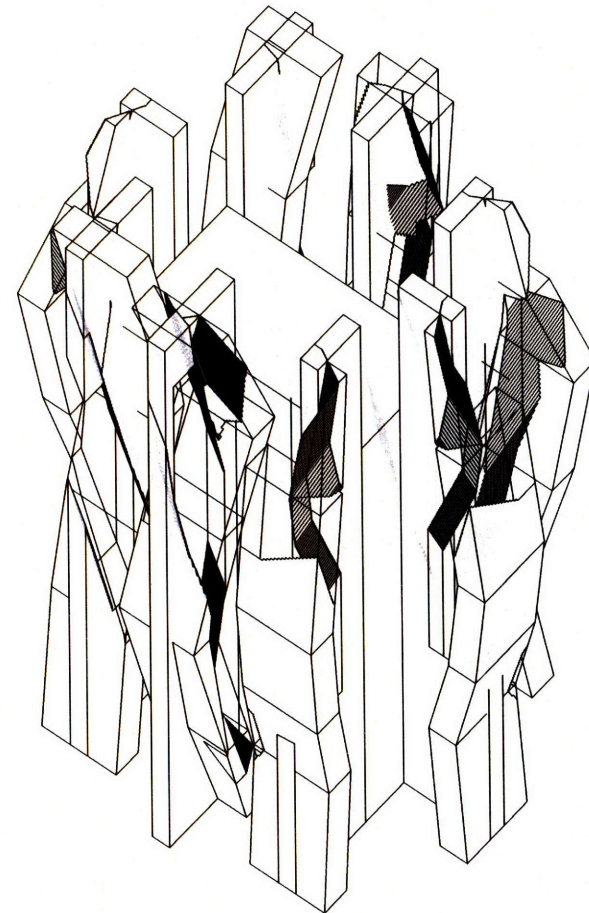


fig.47c

testing the rules

fig.48

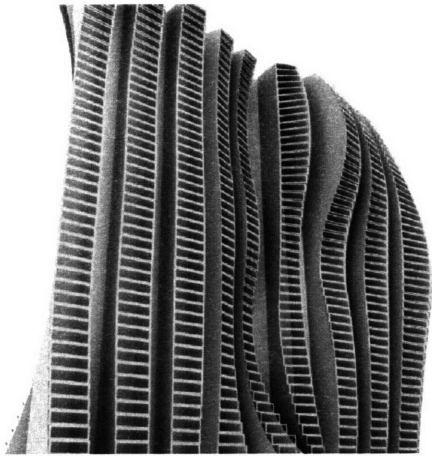
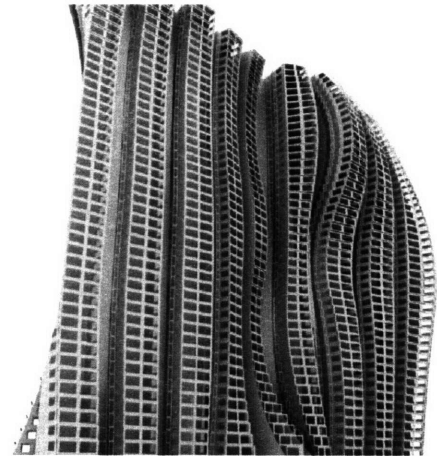


fig.49



fig.50



facade tests

re-inventing the wheel:

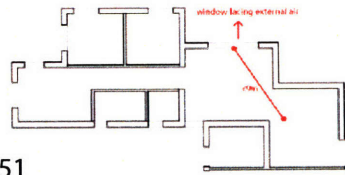


fig.51

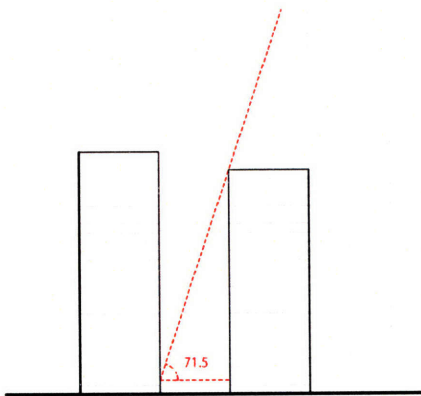
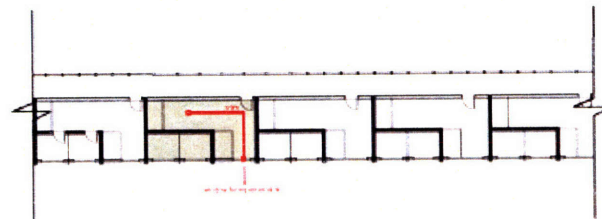
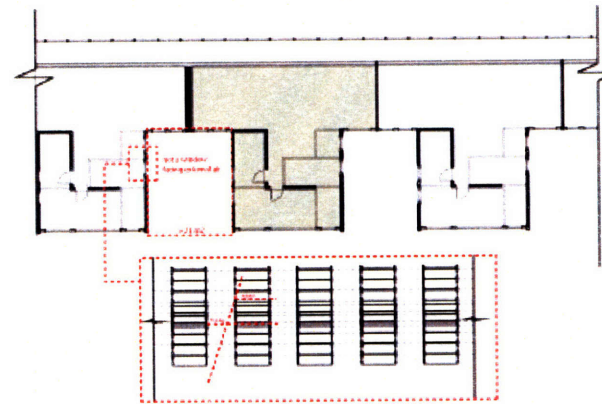


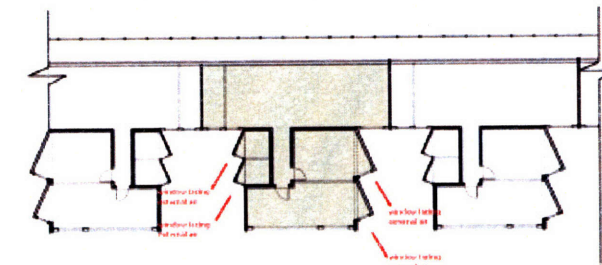
fig.52



a straight facade violates the 9m rule immediately because bedrooms and bathrooms are taking up all the window space. it is inevitable that some corners of the apartment are more than 9m away from a window facing external air.



so protrusions on plan are created in order to increase the surface area of each apartment. better now, but still violates the 71.5 deg rule.



'ears', or bay windows oriented towards the outside are then placed in order to follow the rule.

fig.53

and how recoding does not help much with housing unit design

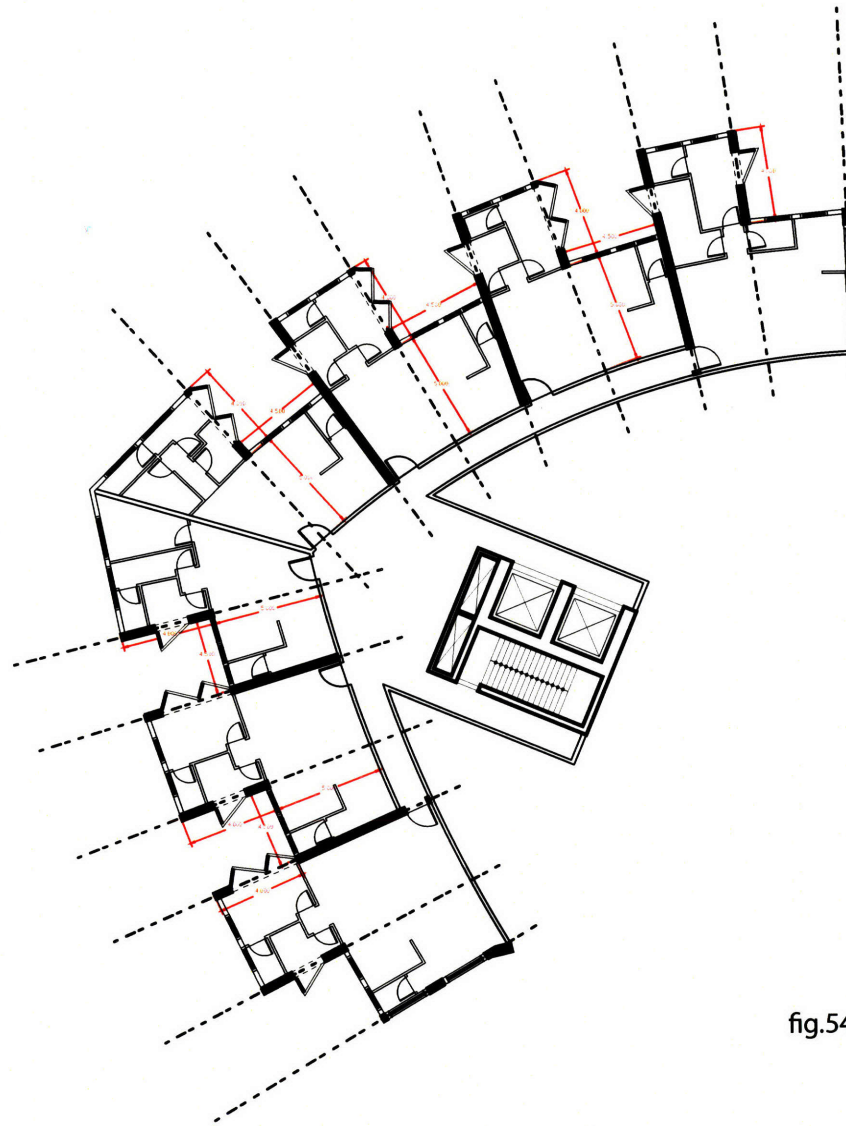
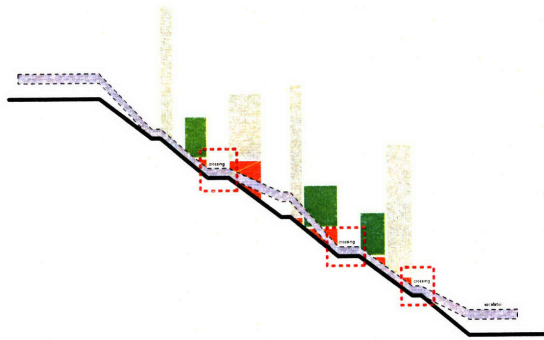
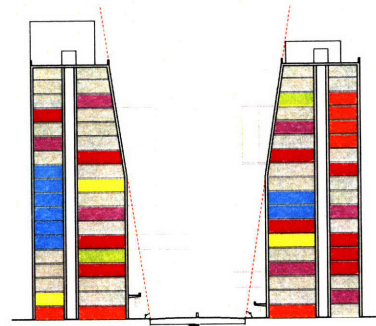


fig.54

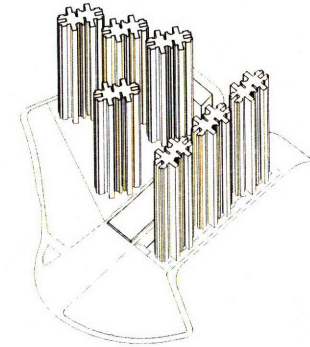
turning a street into an architectural inquiry



multilevelism on geographical scale



multilevelism on building scale



boring status quo

fig.55

The re-introduction of amenity programs into residential towers is, at the end of the day, an organizational problem that is based on observations on the existing spatial norm of the city – yes, we know that multi-level scattering is a norm and yes, we know about the central escalator as an example of multi-levelism on a geographical scale. But what does it mean when we say we want these two observations to be applied on the status quo?

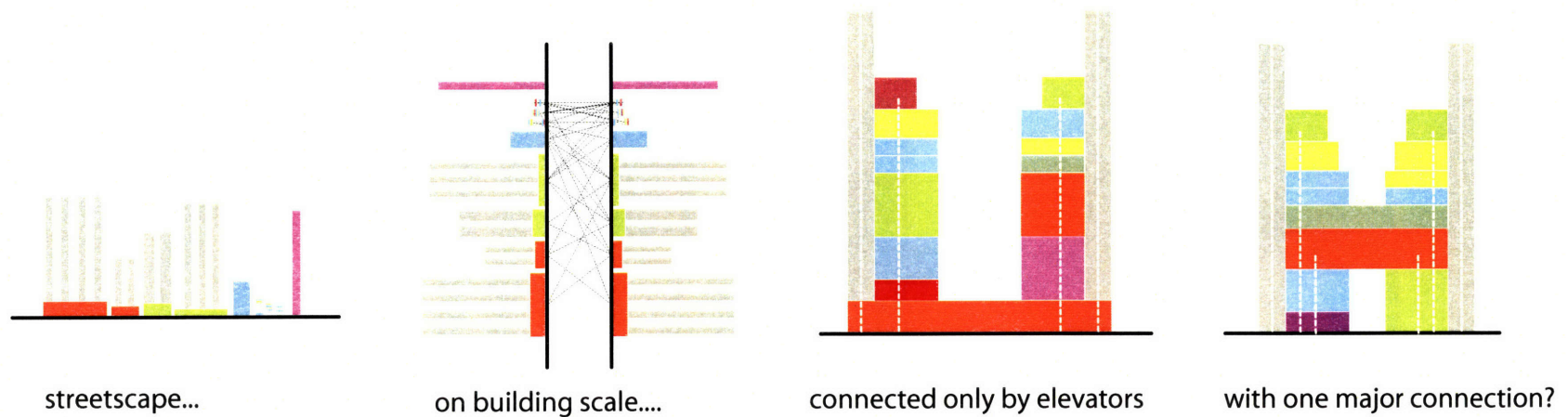


fig.56

Here we are looking for clues for programmatic organization:

Re-introduction of amenity programs in a tower, so it seems, implies a vertical street condition that share similar organizational logic as a horizontal street. Here's a conceptual leap: If we take an elevation of a typical street in Hong Kong (post 1974, in order to take the status quo into account), rotate it and duplicate it, we might start reducing the street scale to the building scale – and consequently an urban problem to an architectural problem. Note that the second diagram strangely makes sense – residential programs are located on the periphery in order to gain more daylight.

The rest becomes a problem of programmatic organization. Before getting into that, a few parti options have been tested.

Design options

fig.57

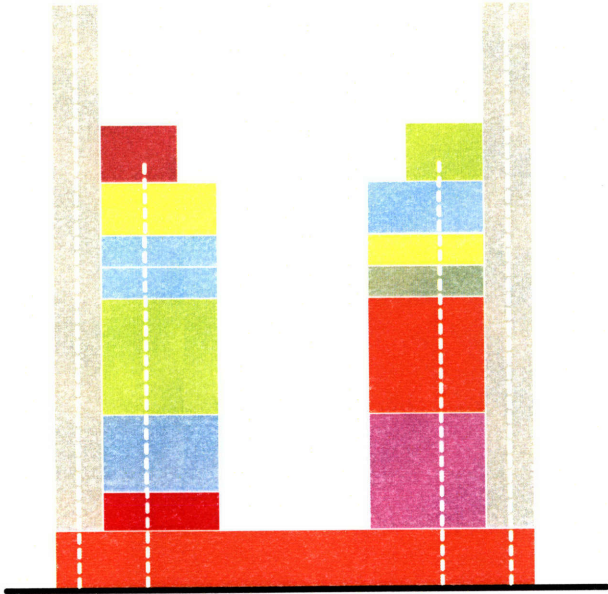
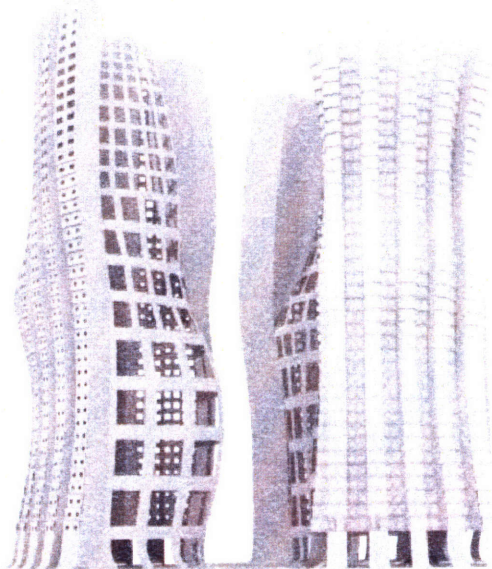


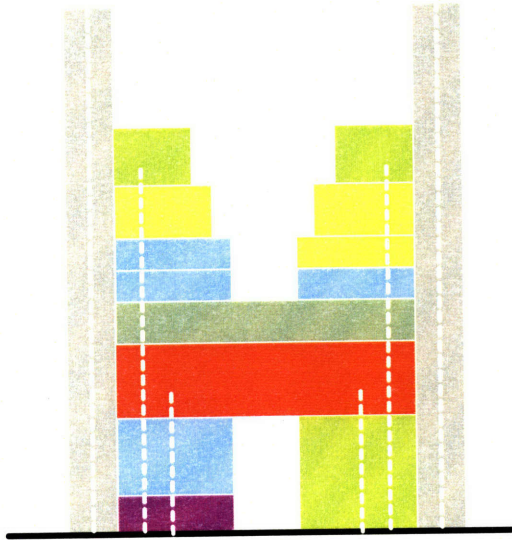
fig.58



seperate towers, with a plinth connecting them all on ground level?

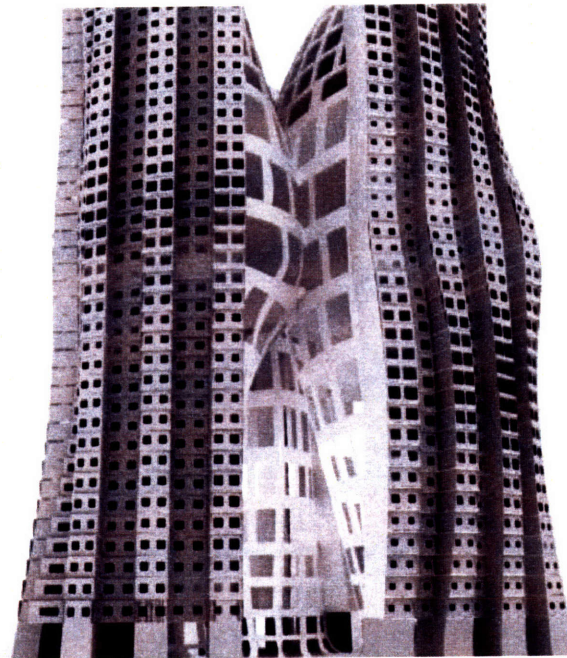
Design options

fig.59



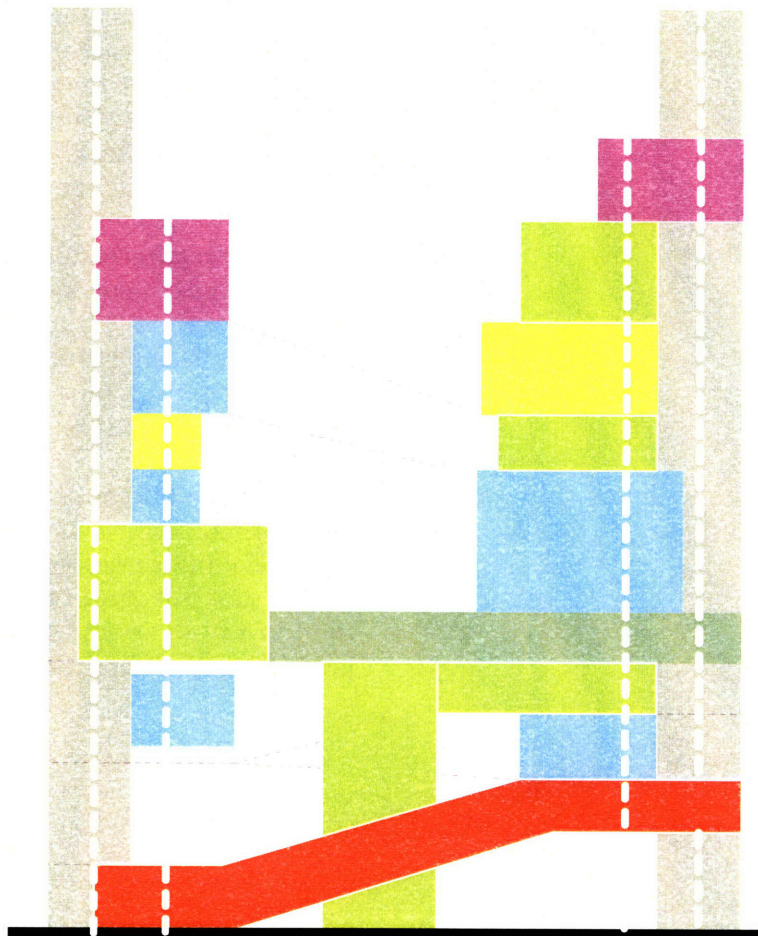
pumping people up to connection level?

fig.60



sketch parti diagram

fig.61



secret/ private programs located at the top

having programs eating into residential

having a public hub where things happen

linkages as program - a vertical street at your doorstep

site plan

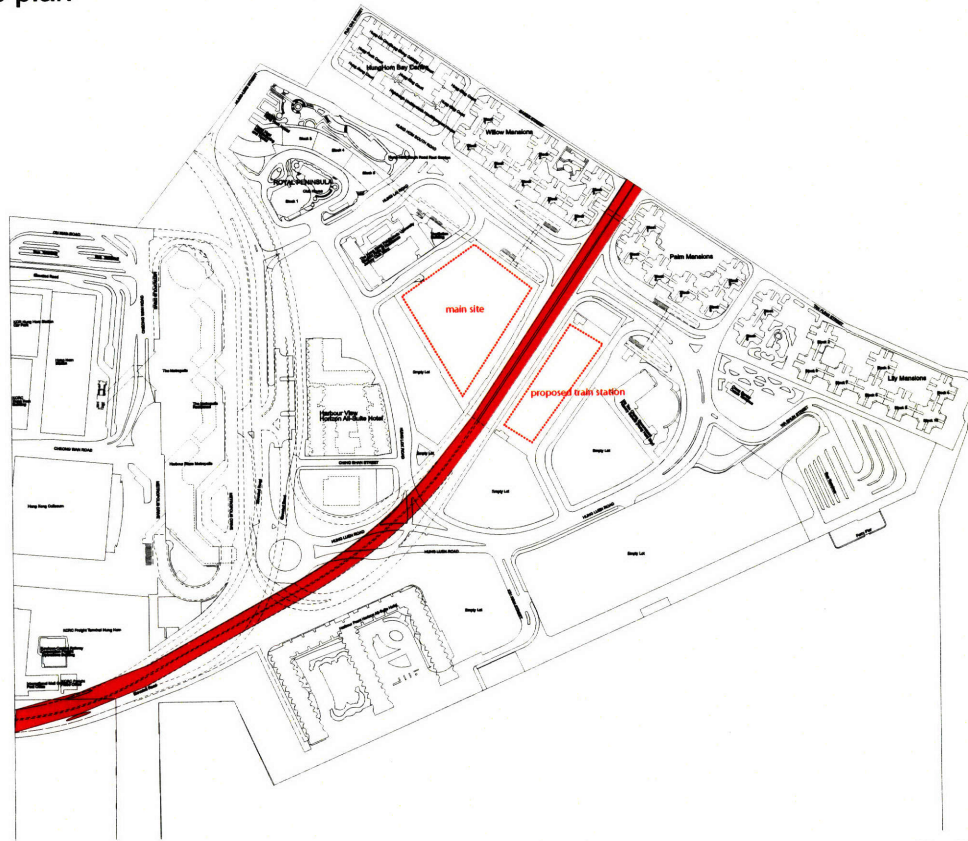


fig.62

Site:

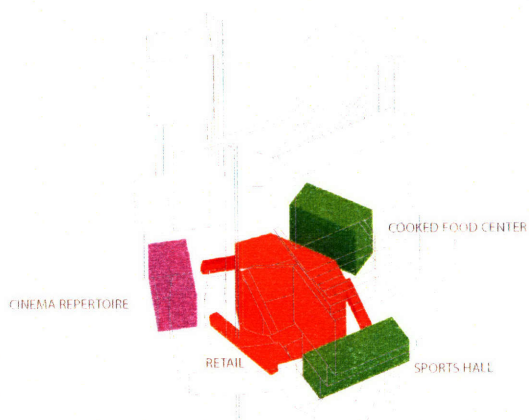
The entire site is bound by three major traffic arteries of the area: Hung Hom South Road (to the north), Hung Hom Road (east) and Hung Lok Road (west). Immediately adjacent to the site are two educational institutions: the HK Polytechnic University Student Hostel and the Ma Tau Chung Government School.

Due to the prototypical nature of this project the site conditions are largely irrelevant – it could be any tabula rasa site designated for residential development in Hong Kong. For the sake of argument two decisions are made here:

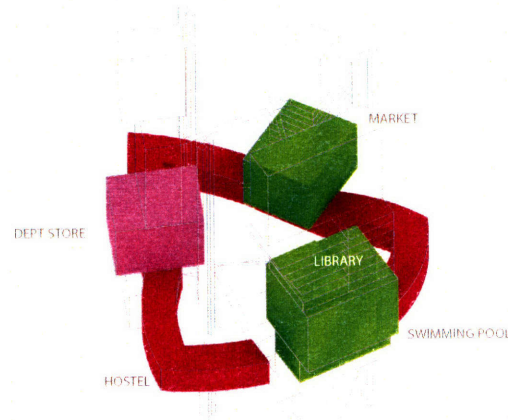
- only the larger portion of the site is manipulated
- the smaller site is reserved for a train station, such that visitors from other districts may also enjoy the amenity programs provided on the main site.

Programmatic Organization

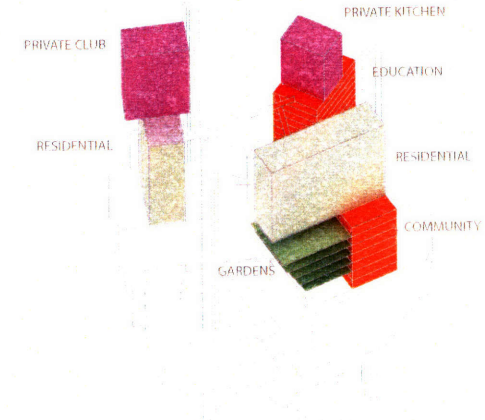
fig.63



The busiest commercial programs from the three types of amenity programs are located on the lower floors



the commercial programs are then followed by a few 'destination public programs' such as hostels, sports hall and swimming pool, before the program strand proceeds to large anchor programs such as library, department stores and markets



located at the top are the more secluded programs. Some of them, such as community service centers, kindergartens and elderly homes, are open to public during office hours. Some others, such as private kitchens and private clubs, are exclusive to members.

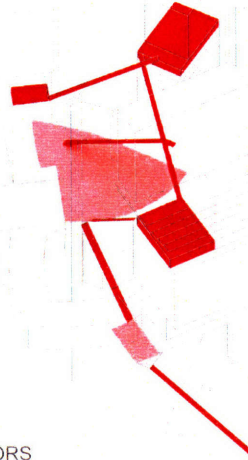
Programmatic Organization

fig.64



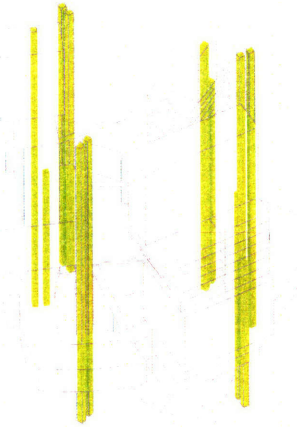
RAMPS

public programs at the bottom can be connected by a ramp - vertical street condition



ESCALATORS

escalators may selectively connect the less public programs directly to street level through distribution floors

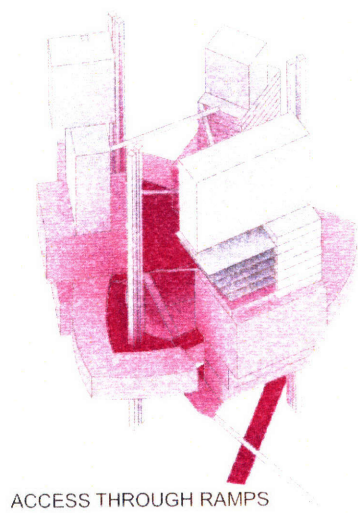


ELEVATORS

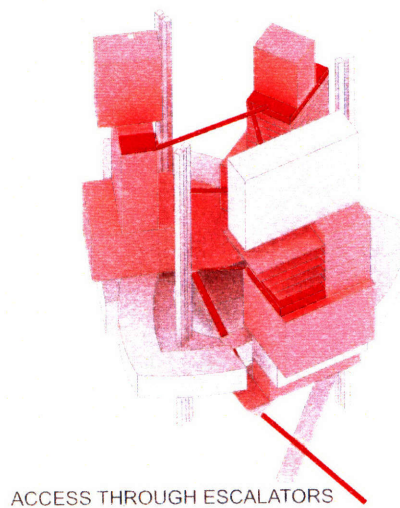
elevators provide direct access to all programs, including residential

Programmatic Organization

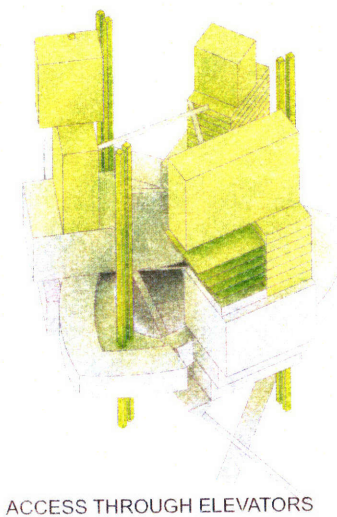
fig.65



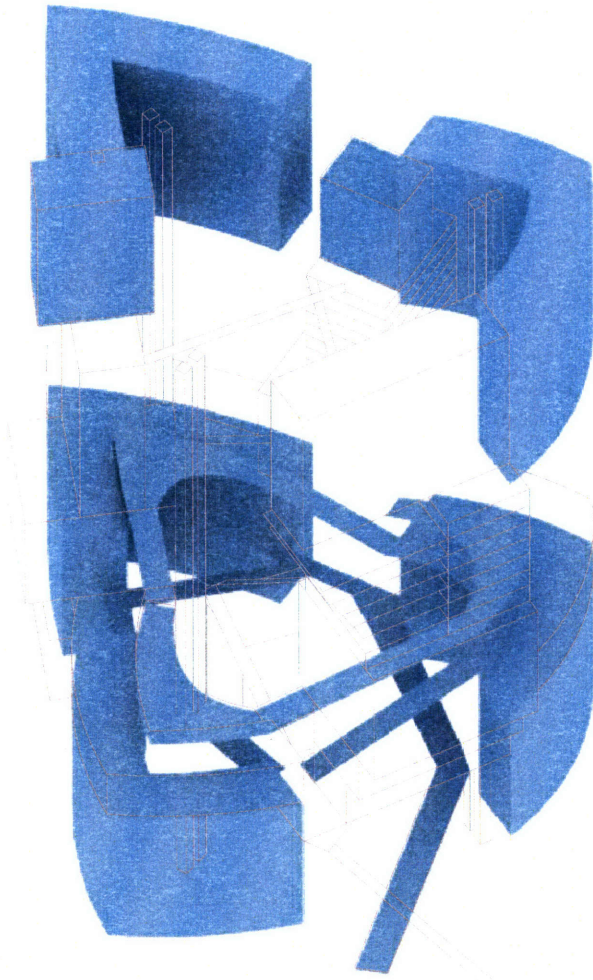
public programs connected by ramp



programs connected by escalators



programs connected by elevators



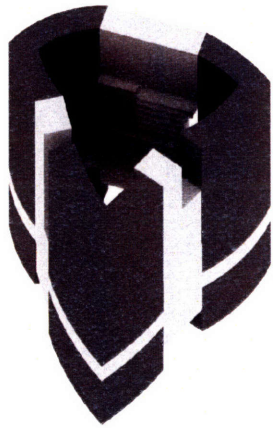
ACCESS THROUGH RESIDENTIAL

fig.65

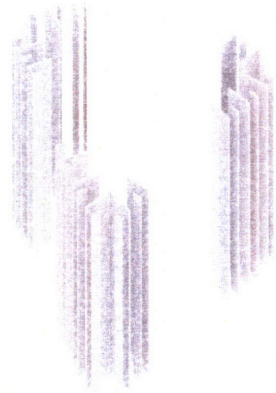
When programs are connected as such two types of residential communities are created- although both capitalize on their adjacency to amenity programs, the upper section enjoys a 'backyard' condition – a private restaurant right next to one's door. The lower section, on the other hand, is confronted with a 'street condition' – a vertical street right at one's doorstep.

fig.66

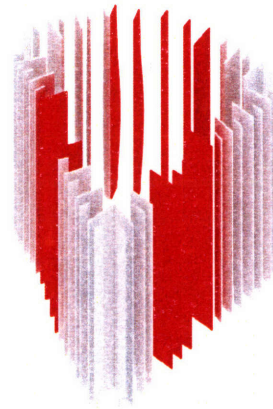
recoding > program > construction



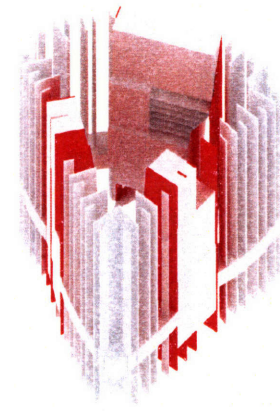
programmed parti



allocate shear walls for the residential blocks as they should be

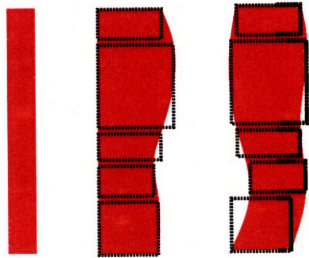


allow extra shear walls to propagate through the amenity programs



try sticking the programs in

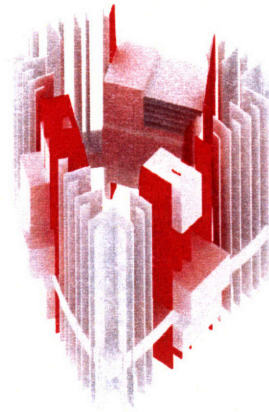
fig.67



Since shear walls may stagger on one plane in two directions, one may start 'bending' the shear walls according to the relative sizes of the amenity programs



So the staggered shear walls are introduced

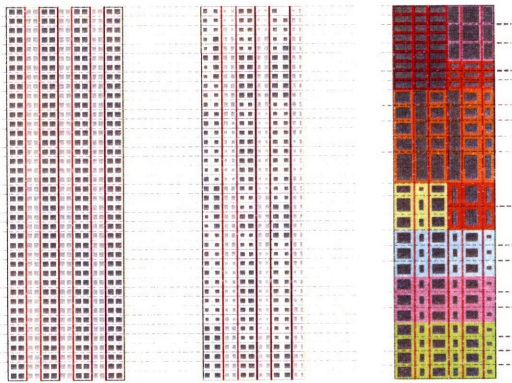


try sticking in the programs again



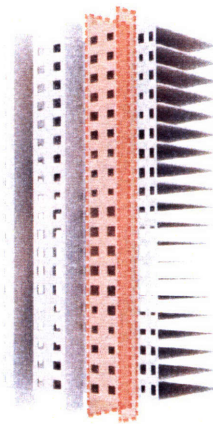
wrap the programs and the residential blocks with an envelope

recoding > program > construction > facade
fig.68

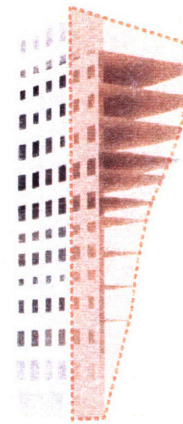


with residential facade there isn't really much one can do about - daylighting constraints set up by the code has pretty much fixed facades as the way they are now. mass production techniques (in the name of efficient housing provision) is a norm in hk.

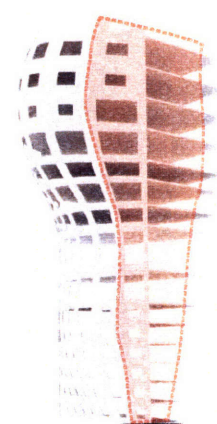
but when it comes to amenity programs within a residential development, daylighting and mass production constraints are lifted immediately. with the same construction system, now geared towards accomodating amenity programs, we are getting some pleasant surprises here.



straight facade for residential blocks, supported by straight shear walls

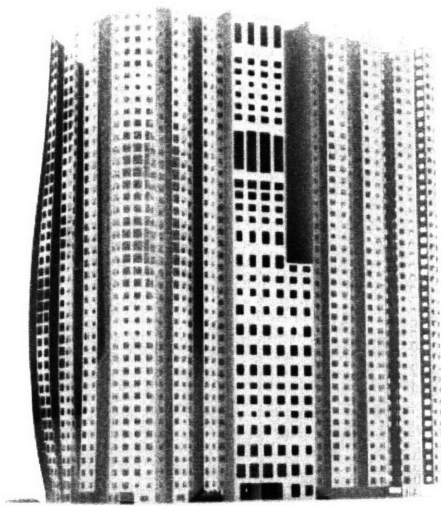


option: flat external facade,

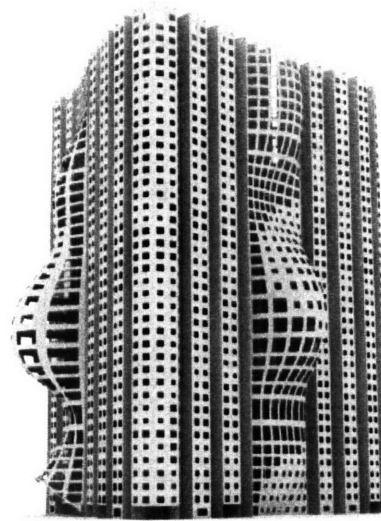


option: use the external facade to accomodate amenity programs

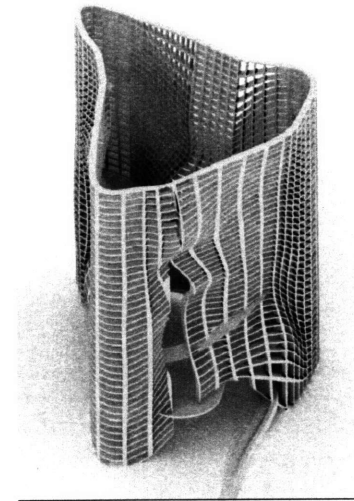
fig.69



one could either try to keep the external facade straight



or use the facade to accommodate different program sizes



by the same token the internal facade could be altered in similar ways. a grid like surface (still RC construction) is introduced in order to increase the level of privacy for the residential blocks



fig.70

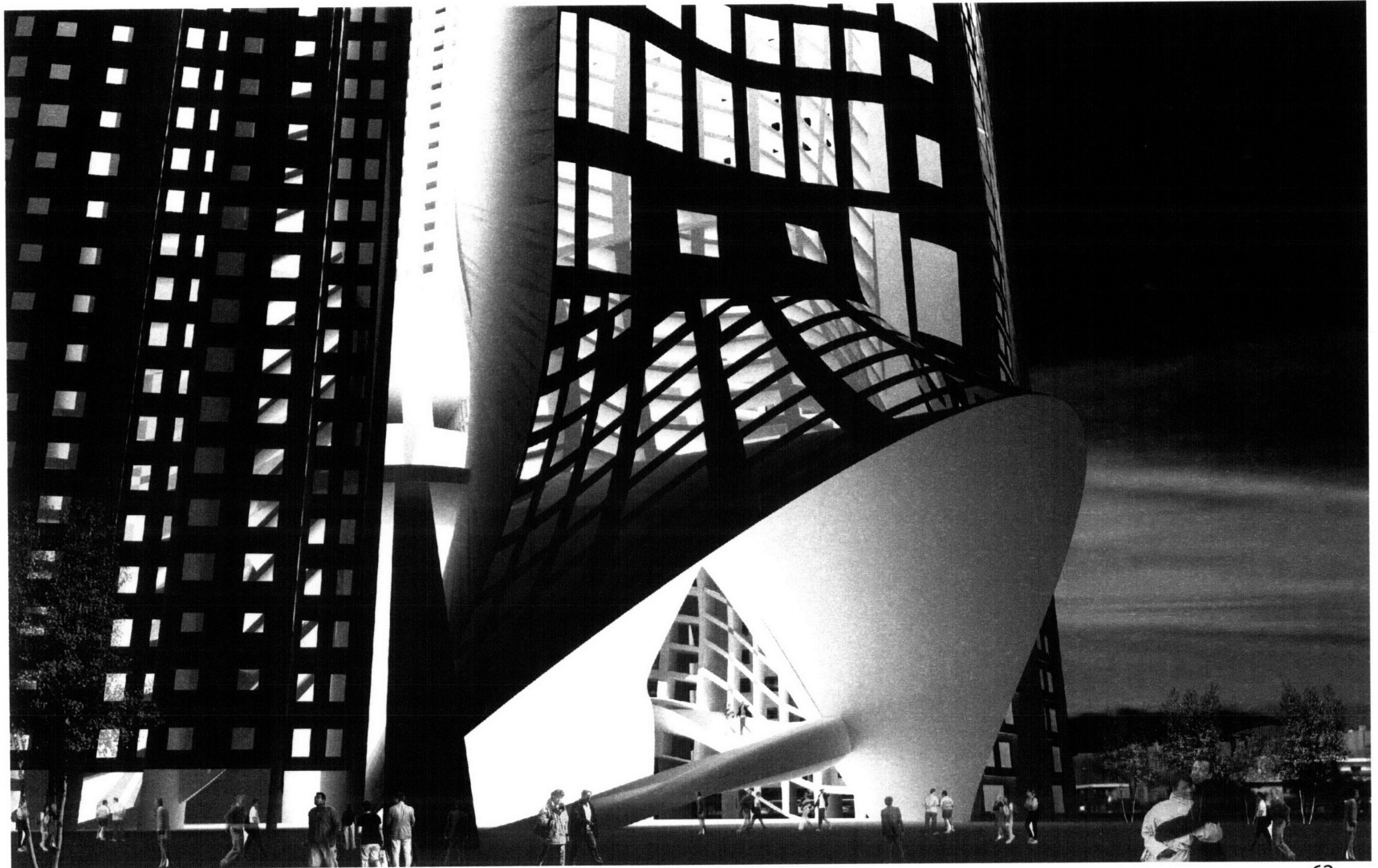


fig.71

recoding > program > construction > facade > circulations

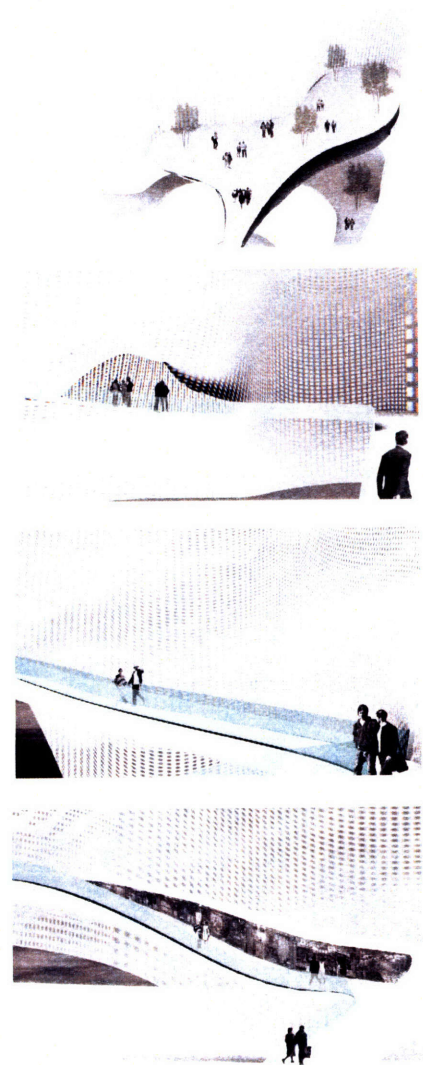
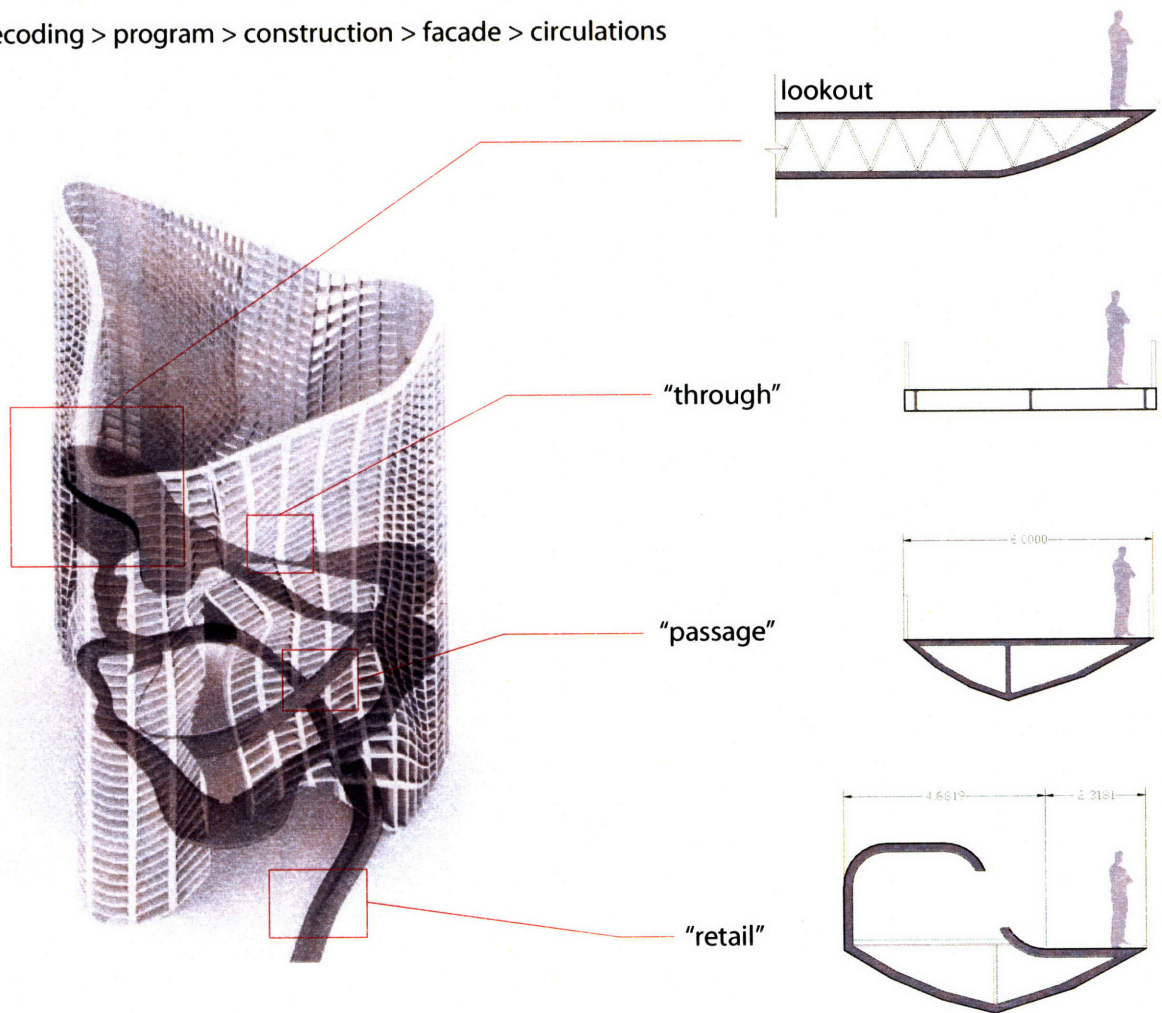


fig.72



fig.73

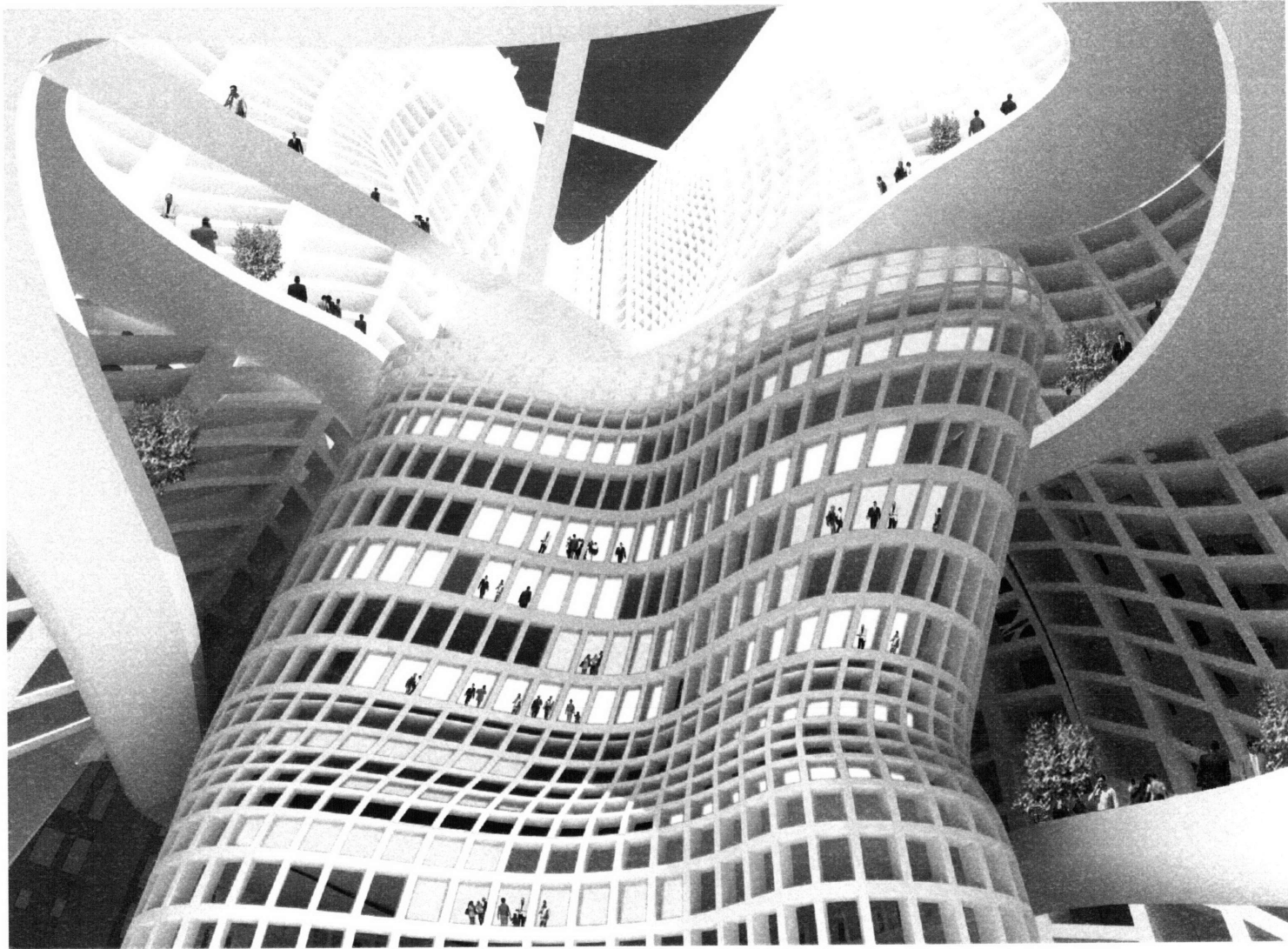
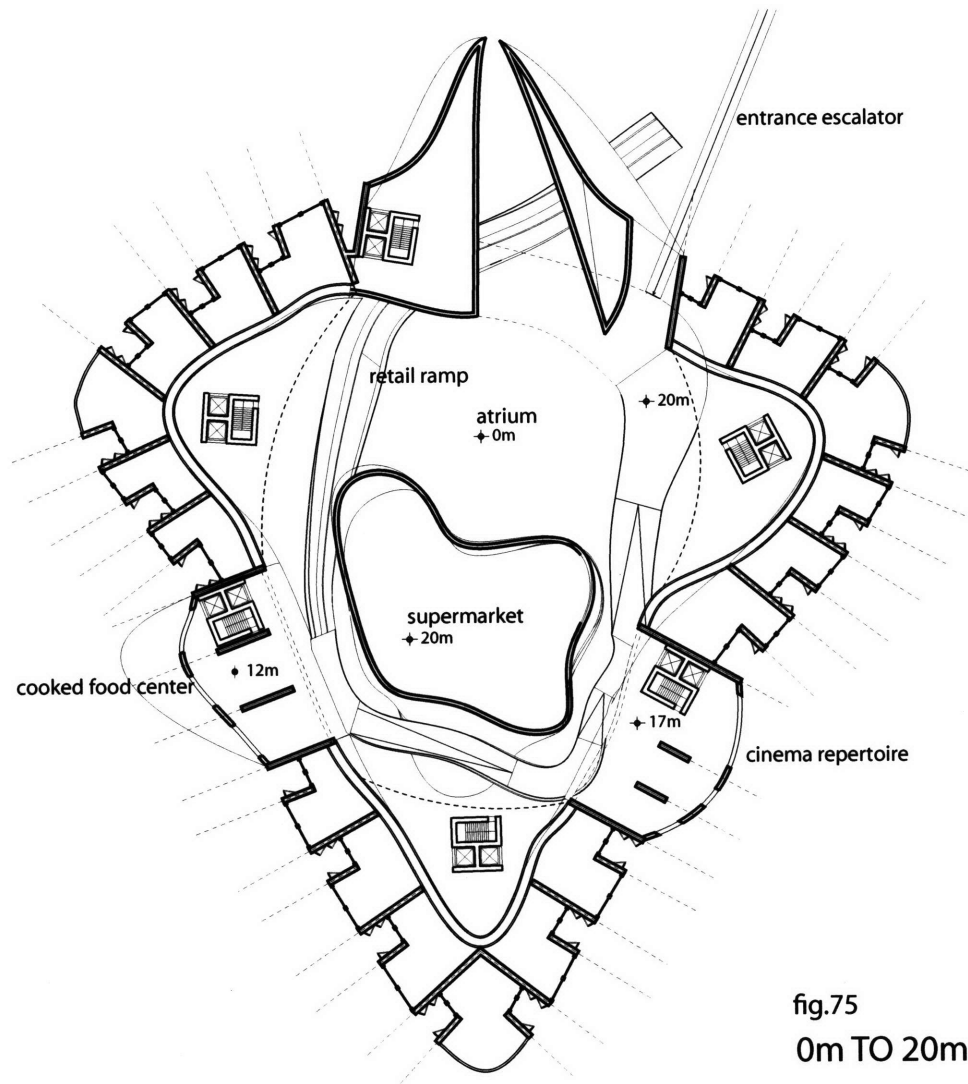


fig.74



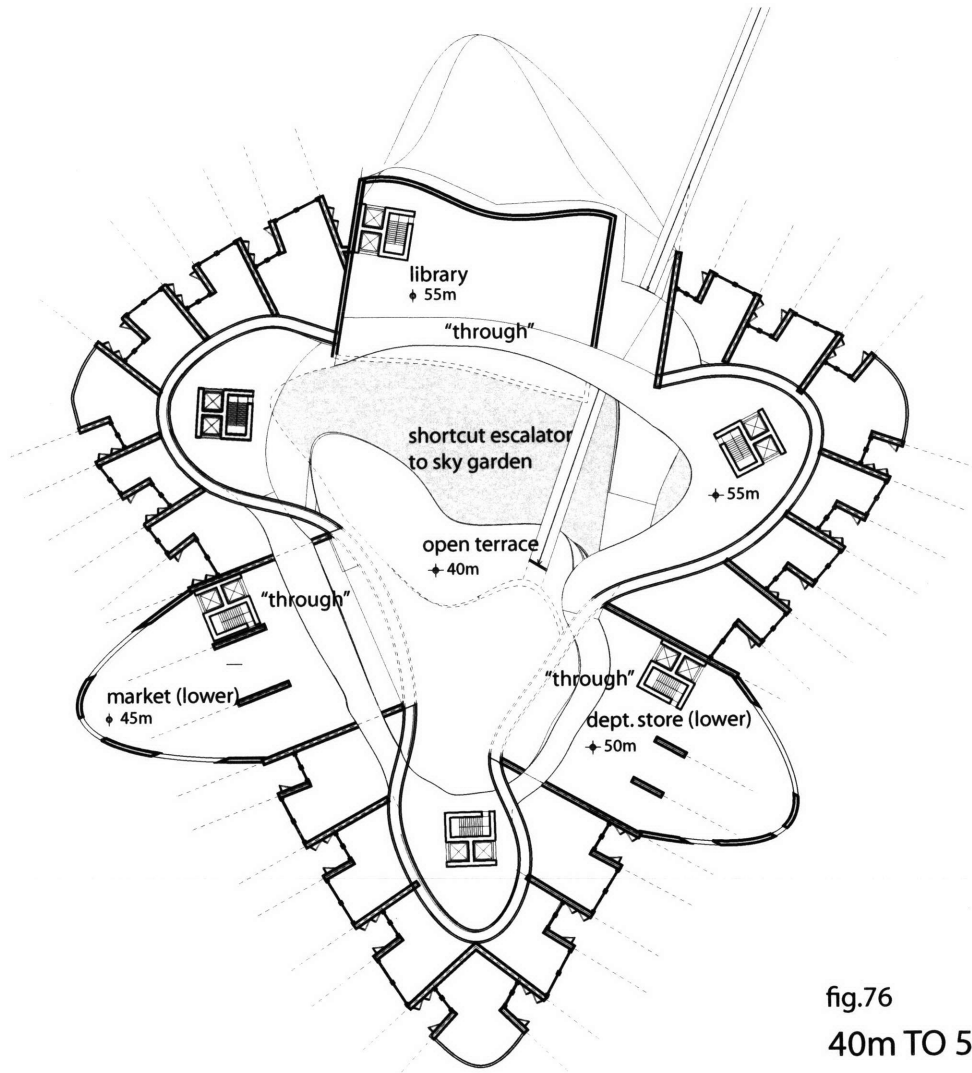


fig.76
40m TO 55m

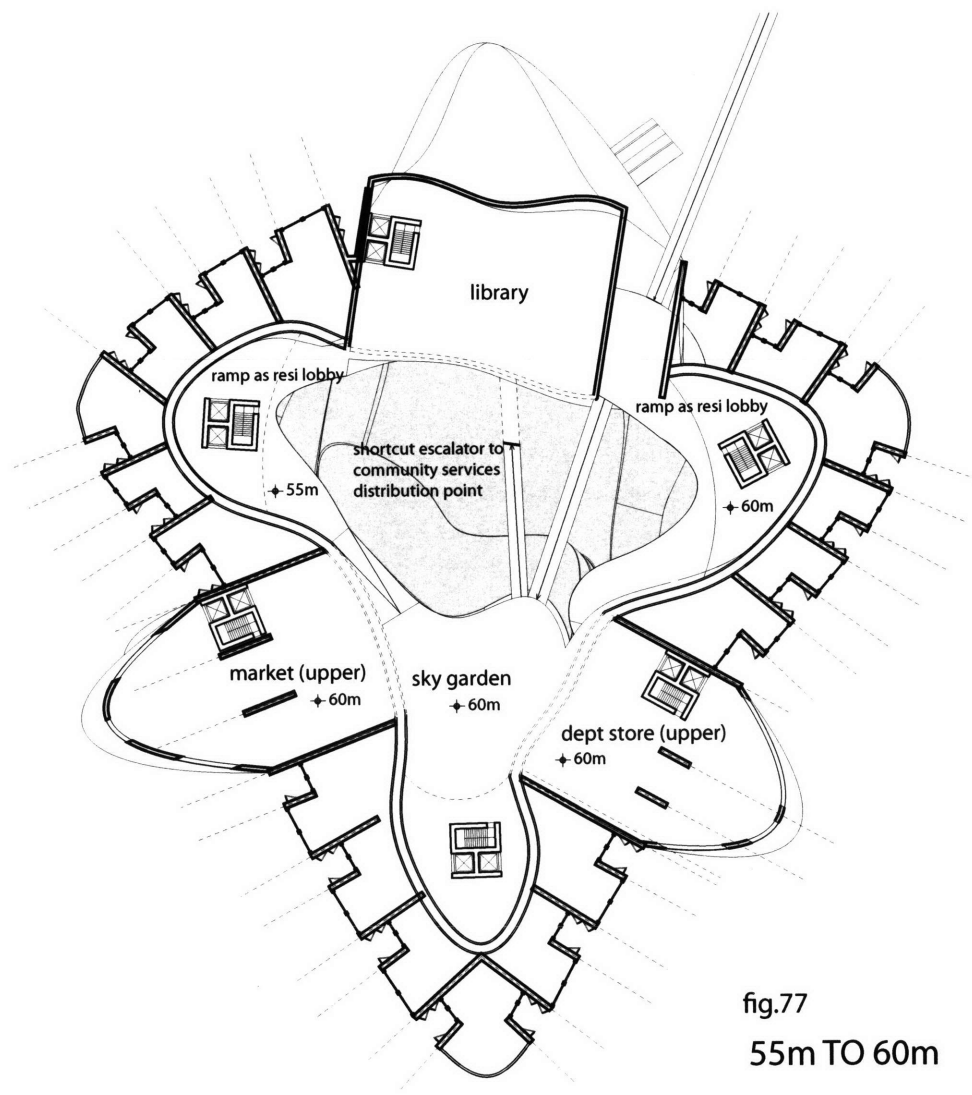


fig.77
55m TO 60m

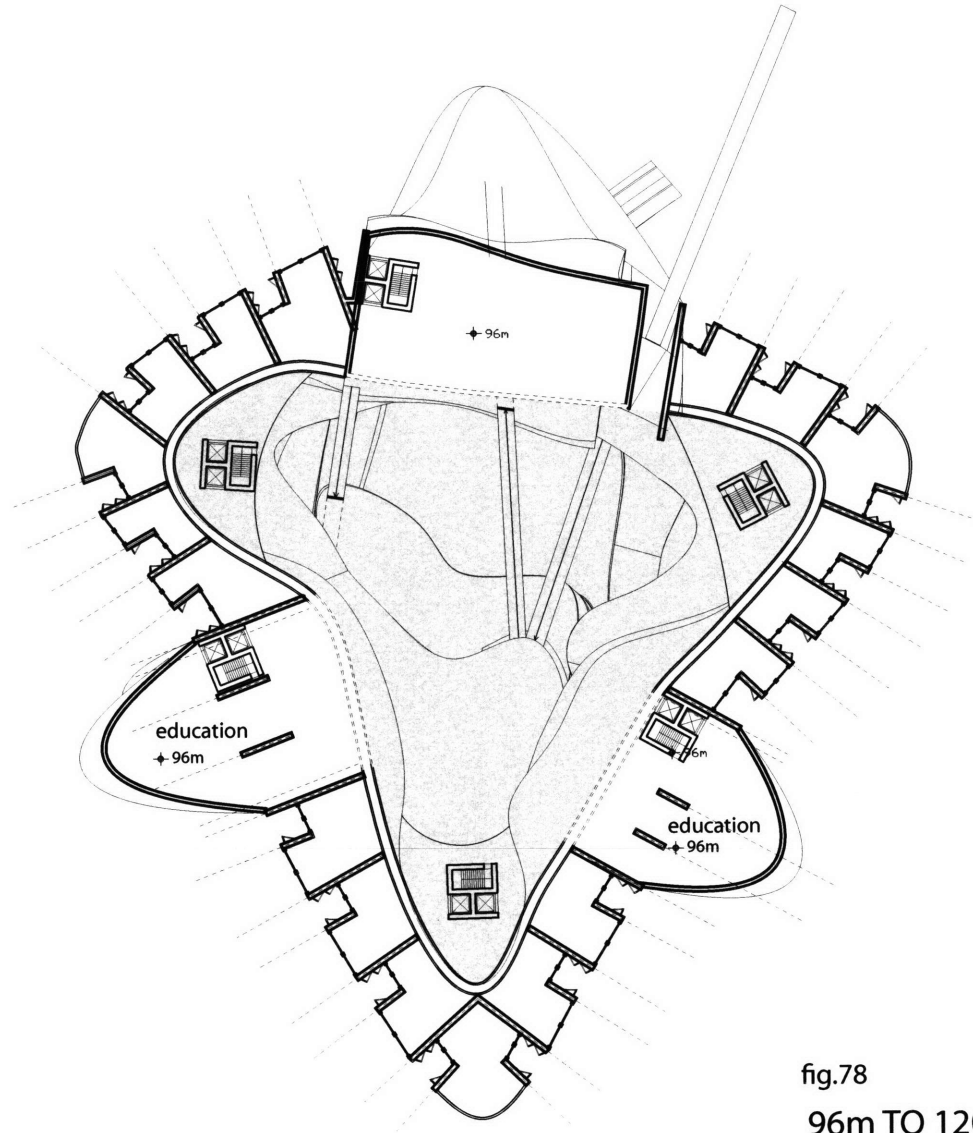


fig.78
96m TO 120m

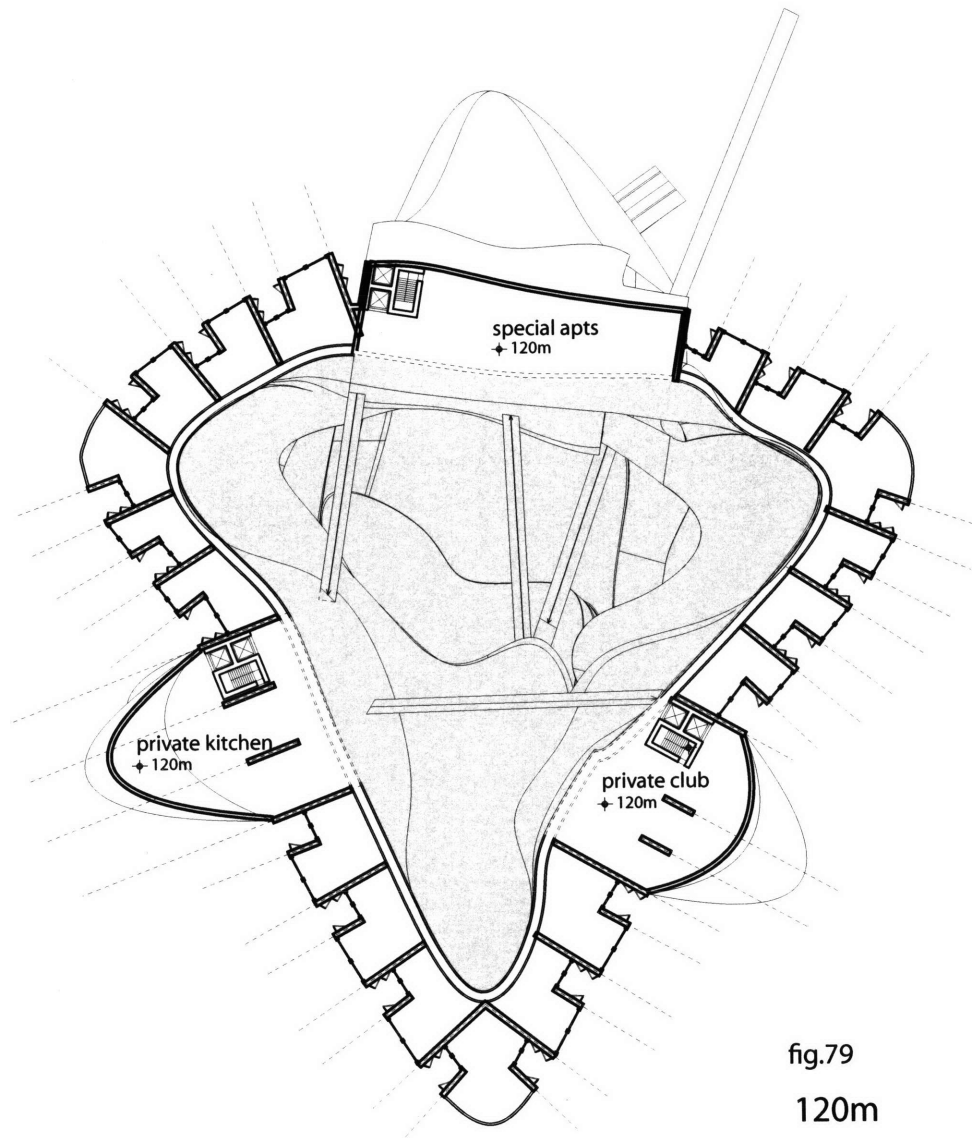
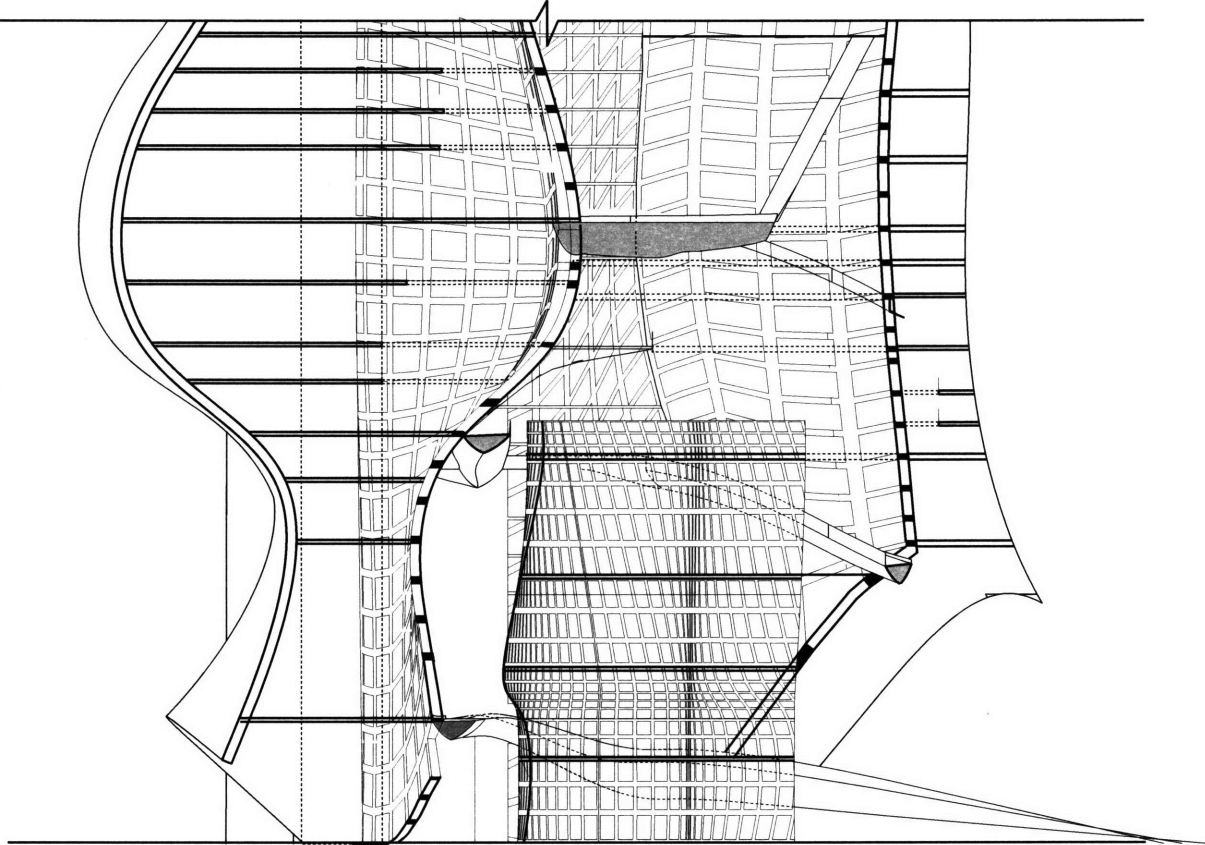


fig.79

120m



PARTIAL SECTION (0m to 60m) 1:150

fig.80

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fig. 2: Woolworth rendering by Hugh Ferriss, from Avery Architectural Library, Columbia University

fig. 3: Seagram Building, from Eikongraphia <<http://www.eikongraphia.com/?p=111>>

fig. 5: Hung Hom Peninsula, from Guang Ying Ji Shi <<http://www.littlelittle.org/blog/?p=82>>

fig. 6: A view of The Union Square buildings in summer 2007 from Wikipedia < http://en.wikipedia.org/wiki/Image:UnionSquareview_20070829.jpg>

fig. 7: HK Tin Shui Wai South , from Wikipedia < http://commons.wikimedia.org/wiki/Image:Tin_Shui_Wai_South_20070901.jpg>

fig. 26: Shatin at Night, Hong Kong, by Frank K. Petit < http://www.doe-mbi.ucla.edu/~pettit/pix/pcd0592/shatin_nitelites.92-11.htm>

fig. 27 to 29: floor plans of clubhouse in Grand Waterfront, from Henderson Group Properties <http://www.hld.com/property/localsales/kowloon/grandwaterfront/c_plan_en.html>

fig. 33, 40 to 42: Slip forms, from Production Office, Civil Engineering Department, City University <<http://www.cityu.edu.hk/CIVCAL/production/traditional/>>

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