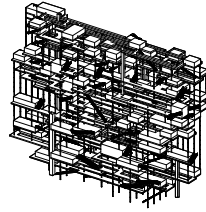


Source book

02.12.2010

Student Name Surname

Student Name Surname



Polku

An articulation with landscape and traffic

Students: Haipeng Wang, Tong sheng, Mengwei Wang

VERTICAL DENSITY

ARK-E3009 Design of Structures Studio
ARK-E5518 Digital Speculative Urbanism Studio

Teaching team:

Prof. Toni Kotnik, Prof. Pia Fricker, Prof. Carlos Bañón
Luka Piškorec, Kane Borg

A"DS Aalto University
Design of Structures

A!CM Aalto University
Computational Methodologies for
Landscape Architecture and Urbanism

SWT
SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

AIRLAB
architectural intelligence
research lab

Polku

Pasila will be the most accessible place in all of Finland in 2040. Furthermore, it is a key district for office construction in the coming years, as the central business district keeps expanding northwards. Thanks to new traffic development and robust new construction, Pasila is evolving into a real superhub. By 2040, Pasila will have more than 50,000 jobs and over 30,000 residents. 50 million passengers annually will pass by. Also, the volume of apartments and local services is increasing a great deal. "Pasila 2.0" accommodates work, living, and leisure. ¹

With the trend of denser and higher of the city, the effects of urbanization are starting to be seen in our current cities, yet the mentality of the design of our urban centers isn't changing enough. "The effects of vertical isolation are further exacerbated by its dependence on private capital and investment – hardly any tall building is generated through public funds. The results are cities that no longer imbue a quality of public space as the guiding principle of their urban fabric, but that are collections of increasingly isolated and self-referential objects." ² Public walking paths and landscapes are restricted to flat areas that do not grow upwards with the city.

This project is a proactive response to these vertical landscapes and aims to avoid segregation between urban, architecture, and landscape. We attempt a new typology for vertical landscape, program, and architecture. The concept carries on a beautiful Finnish word, *polku*, which means a walking route for the human and animals.

A new typology for vertical landscape and program

Typical skyscraper typology has very designed space and program. Each program has a designed position within the tower as well, with a vertical core only connected between different levels. In our proposal, vertical paths are flexible and allocate programs and landscape. The traffic core now is replaced by the different vertical path and integrate with the landscape, creating new possibilities of space arrangement. A new relationship among landscape, program, and architecture is developed by the different types of the path and stimulate unexpected space.

¹Central Pasila, 2017, City Planning Department

²Ole Scheeren, Space Formations (paper presented at the CTBUH 2014 Shanghai Conference Proceedings, Shanghai, 2014), 67-73

Parameter of the Polku

Traditional villages are often formed along roads or rivers, as a result of human activities in the natural formation of the network.³ There are many options for reaching the same destination. In a mature network, the destination is not the crucial factor to defined the path, but the purpose of the mobility and the efficiency of the path.

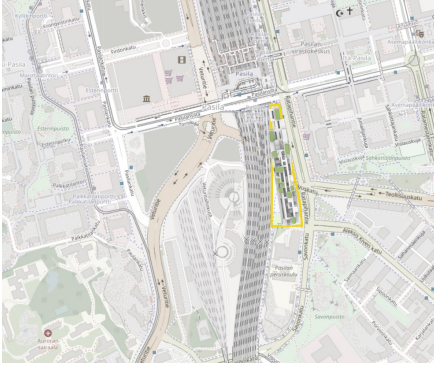
The vertical village is a transformation from the traditional villages. We extend the network path of the village from horizontal to vertical, aiming to provide different types for people to choose from.

Paths generate landscape and function. The landscape at the lower level is connected to the path at the upper level, which in turn generates a new functional layer.

The vertical path is also determined by the purpose and efficiency of the trip. The purpose of travel determines the number of paths to reach. Efficiency affects the length and slope of the path. We use environmental factors to optimize the control points of the generated path but are not the decisive factors. Environmental factors such as wind, light, and sight affect the density of the path and are reflected in the location of the landscape and program.

3. "Human Settlements: Types and Patterns". Geography Revision. Accessed on December 5, 2020.

Site



Traditional villages are often formed along roads or rivers, as a result of human activities in the natural formation of the network. Cities do not rely on a single major road, but develop into multiple urban roads, including motorized roads, bicycle roads, sidewalks, nature paths, and so on. There are many options for reaching the same destination.

Different types of path around Pasila



Streetscape



Distance: ● ● ○ ○ ○
 Width: ● ● ● ● ●
 Efficiency: ● ● ● ● ●



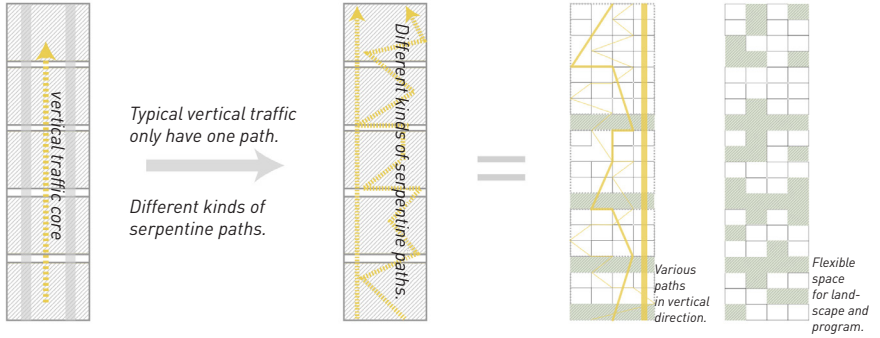
Distance: ● ● ● ○ ○
 Width: ● ● ● ○ ○
 Efficiency: ● ● ● ○ ○



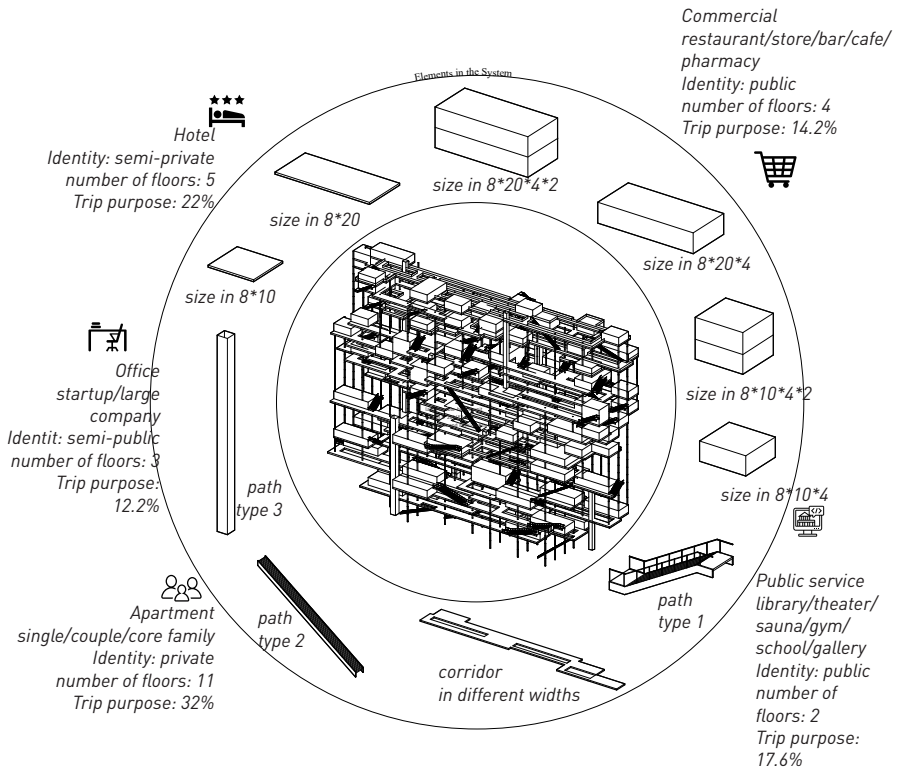
Distance: ● ● ● ● ●
 Width: ● ○ ○ ○ ○
 Efficiency: ● ● ○ ○ ○

In a mature network, the destination is not the crucial factor to defined the path, but the purpose of the mobility and the efficiency of the path.

Concept principle



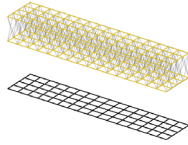
Elements



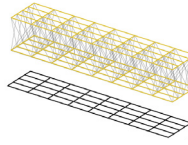
Framework generation and optimization



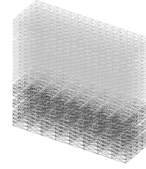
Digital lines connect vertical direction.



Size: 8*20
Height: 4
commercial, office,
public service

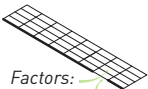
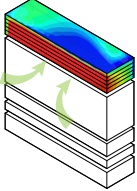


Size: 8*10
Height: 4
hotel, apartment



Wind analysis

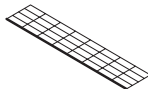
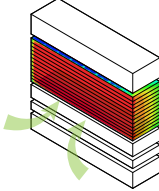
Commercial



Factors:

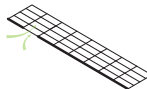
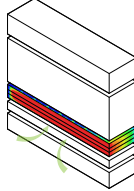
wind speed 2.6
wind height 16
area of the windward side
640
coefficient 1

Public service



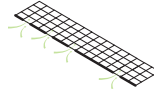
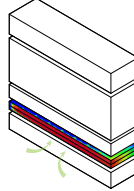
wind speed 3.2
wind height 32
area of the windward side
320
coefficient 0

Office



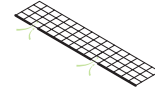
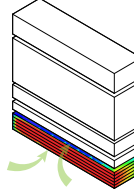
wind speed 3.7
wind height 48
area of the windward side
480
coefficient 1

Apartment

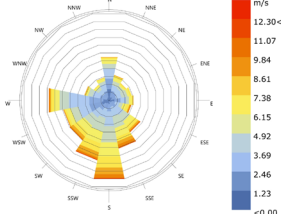
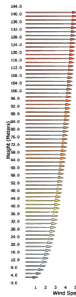


wind speed 4.4
wind height 80
area of the windward side
1760
coefficient 4

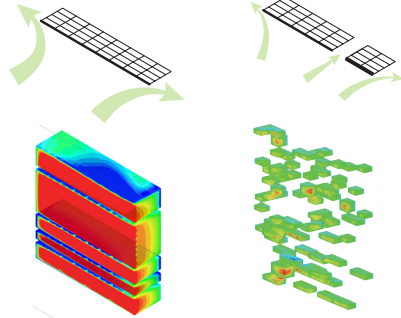
Hotel



wind speed 4.0
wind height 112
area of the windward side
800
coefficient 2



Wind-Rose
HELSINKI, FIN
1 JAN 1:00 - 31 DEC 24:00
Hourly Data: Wind Speed (m/s)
Calm for 1.20% of the time = 105 hours.
Each closed polyline shows frequency of 1.3%. = 112 hours.

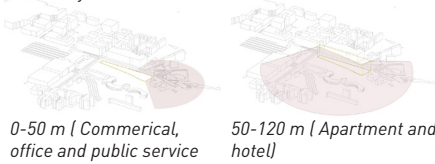


The influence of wind is relevant to the direction, area of the windward side, velocity, and the height of the wind. Every block can be regarded as a whole when considering the wind influence. Each block removes appropriate number of columns to balance the influence of wind to the whole system.

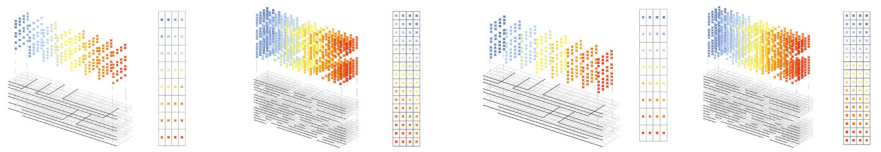
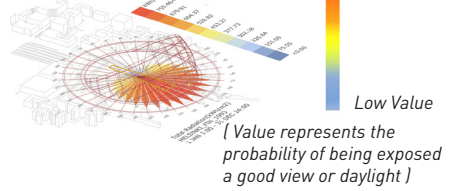
Points distribution

The distribution of points affects path generation and function density. The environmental factors of the site, such as sunlight and view, are different due to orientation, which we define as value. Depending on demand, different functions have different preferences for light and sight, which result in uneven distribution of points density.

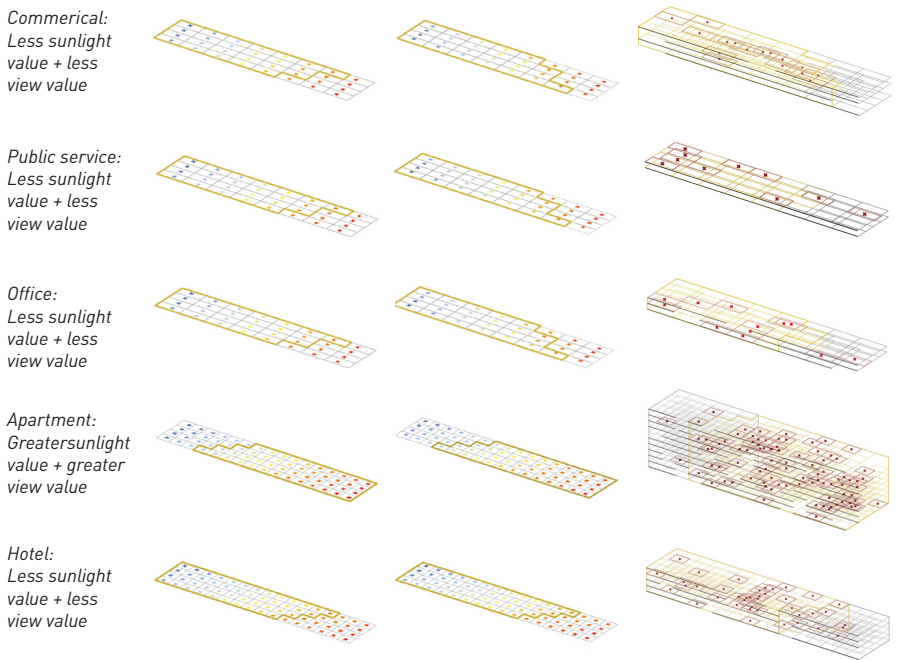
View analysis



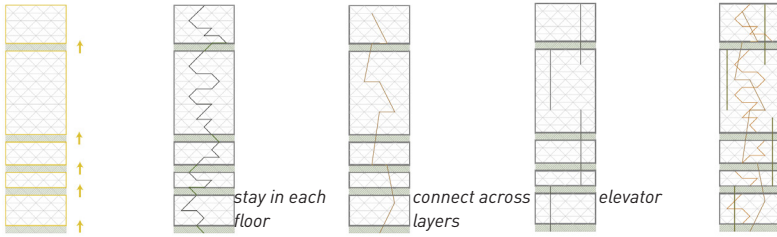
Solar analysis (Annual radiation value)



Solar preference View preference Total selected range and density distribution

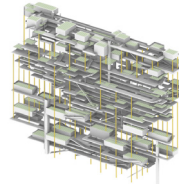
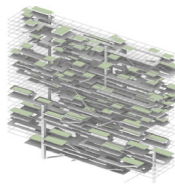
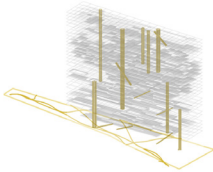
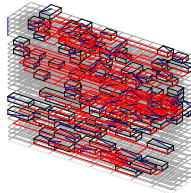
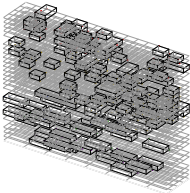
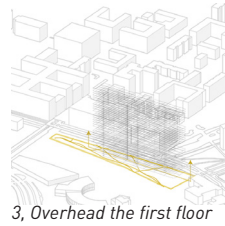
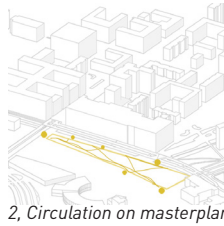


Different types of path in the framework



Put a landscape cluster between each block

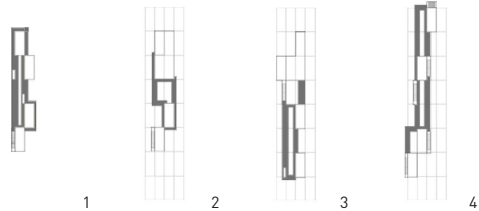
<i>type1 (Enjoyment)</i>	<i>type2 (purposed)</i>	<i>type2 (Efficient)</i>
Distance: ● ● ●	Distance: ● ● ○	Distance: ● ○ ○
Efficiency: ● ○ ○	Efficiency: ● ● ○	Efficiency: ● ● ●



Width of each path

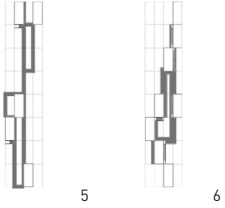
1. Commical

Unit of each floor: 4



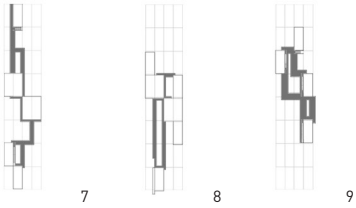
2. Public service

Unit of each floor: 6



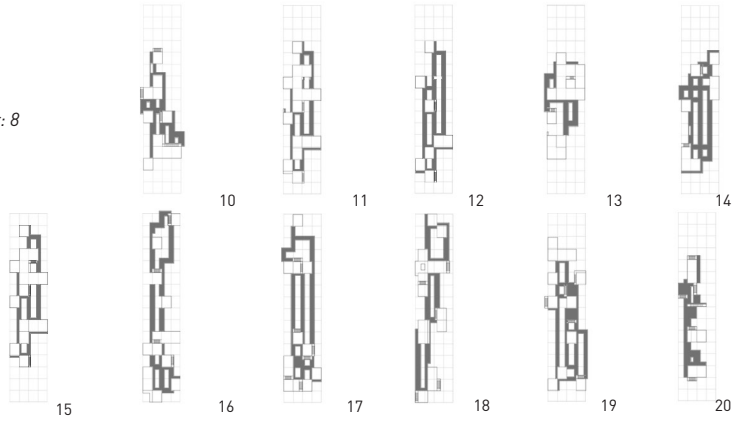
3. Office

Unit of each floor: 4



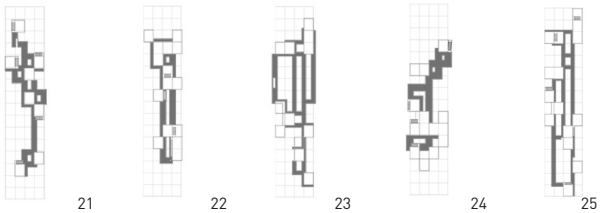
4. Apartment

Unit of each floor: 8



4. Hotel

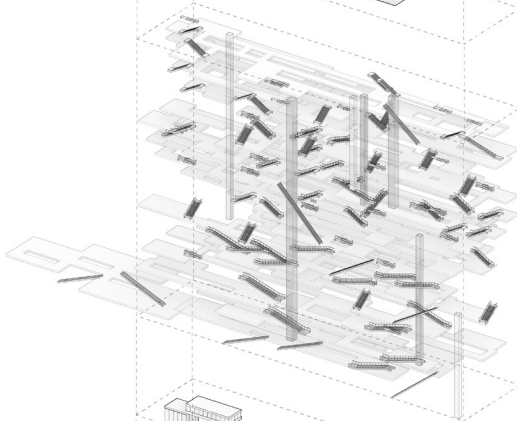
Unit of each floor: 8



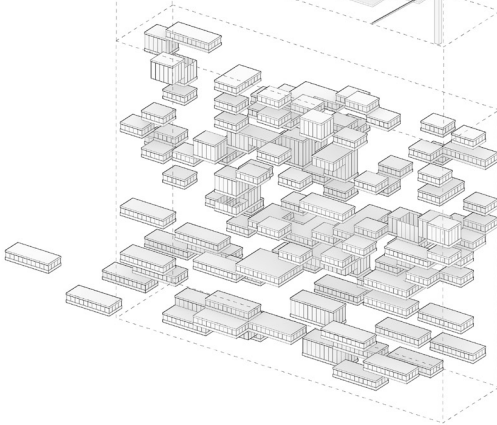
roofs working as landscape space



Three types of path



Density changes



By extracting three elements of the system, the interactions between the factors can present complexity in order. The vertical village consists of different paths with separate efficiencies, enjoyments and distances. Along the paths, units in two sizes and landscapes generate and integrate successfully into the system. The complexity of the system promises the adaptive range of the space and inclusiveness to the users.

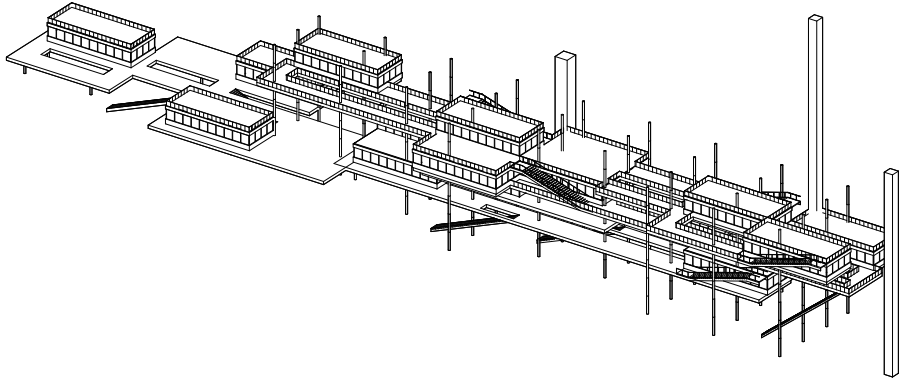
Commercial

restaurant/store/bar/cafe/pharmacy

Identity: public

number of floors: 4

*size in 8*20*



Large-size units, low density. Open space and different ceiling heights.

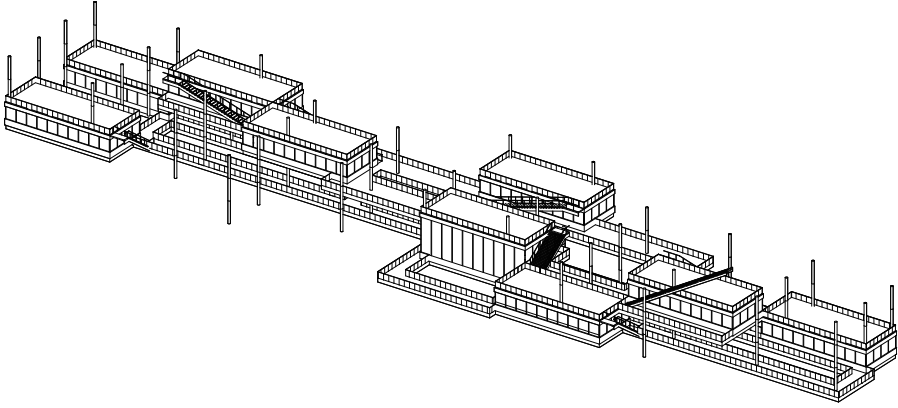
Public service

library/theater/sauna/gym/school/gallery

Identity: public

number of floors: 2

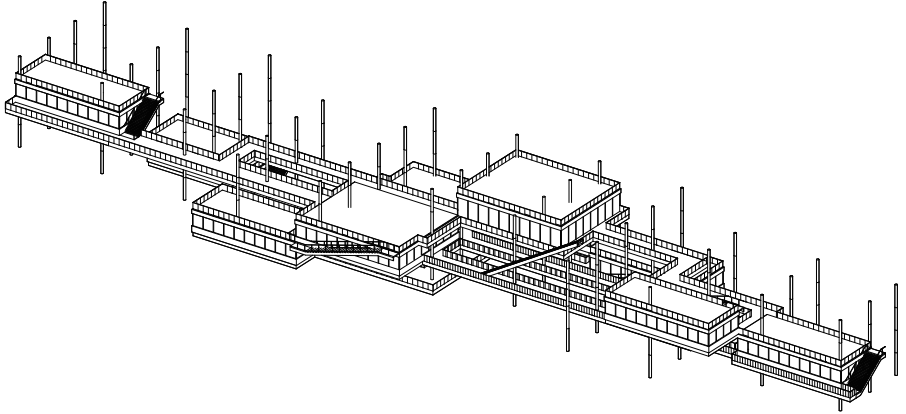
*size in 8*20*



Large-size units, low density. Open landscape space and different ceiling heights.

Office

*startup/large company
identit: semi-public
number of floors: 3
size in 8*20*



Large-size units, high density. Less open landscape space and different ceiling heights.

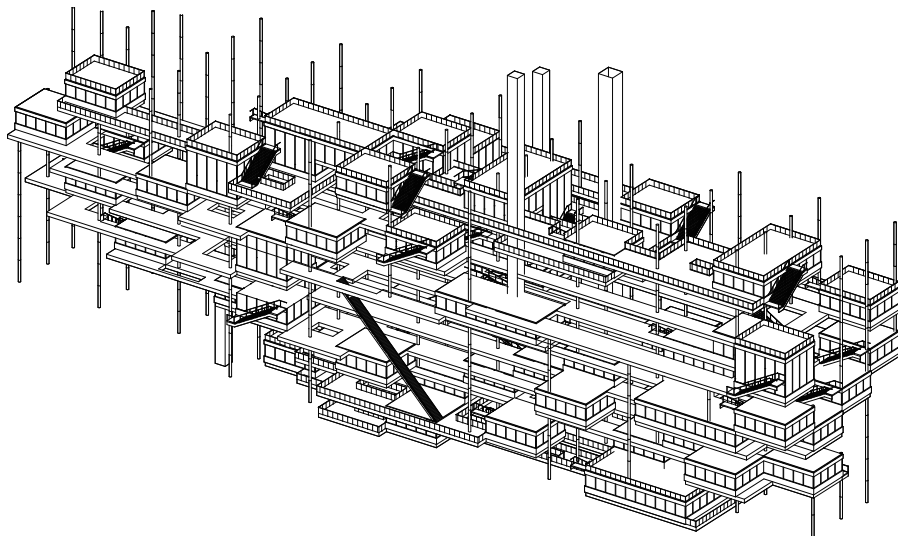
Apartment

single/couple/core family

Identity: private

number of floors: 11

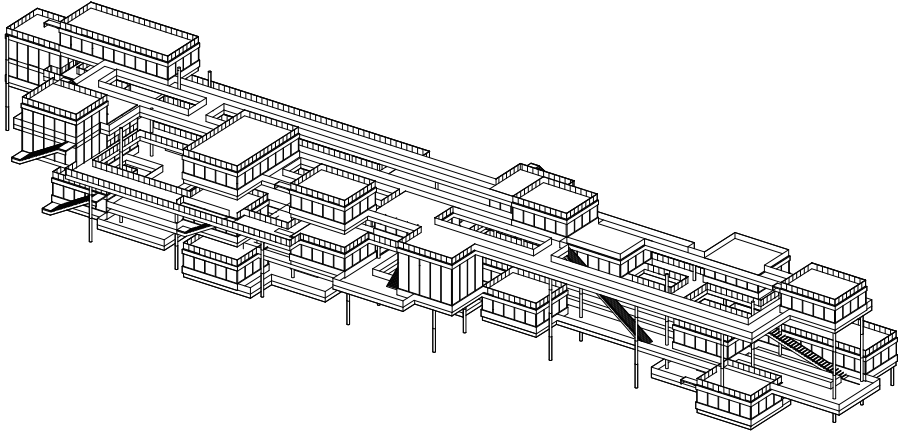
*size in 8*10*



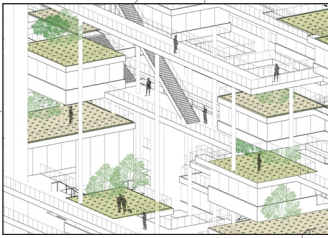
Small-size units, high density. Less open space and private landscape space.

Hotel

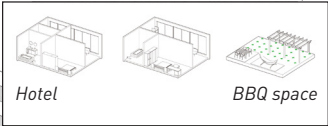
*Identity: semi-private
number of floors: 5
size in 8*10*



Small-size units, low density. open landscapespace and different ceiling heights.

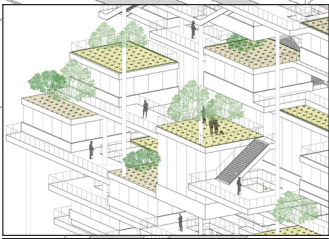


Small but low-density space, suitable for hotels; produces different ceiling heights. And there is a private landscape and open landscape space at the same time, but it ensures that the line of sight is blocked.



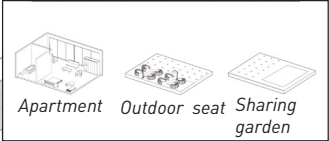
Hotel

BBQ space



The small size unit makes the landscape more private, but it also creates a line of sight connection.

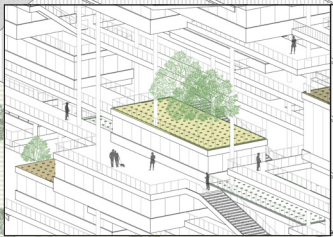
Suitable for apartment.



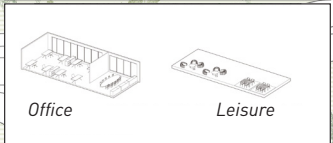
Apartment

Outdoor seat

Sharing garden

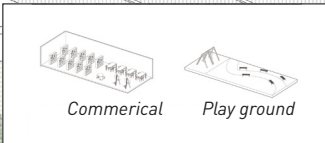


Large-size units are suitable for commerce, public services and offices. Due to the low density of points, a more open landscape space and empty space are created.



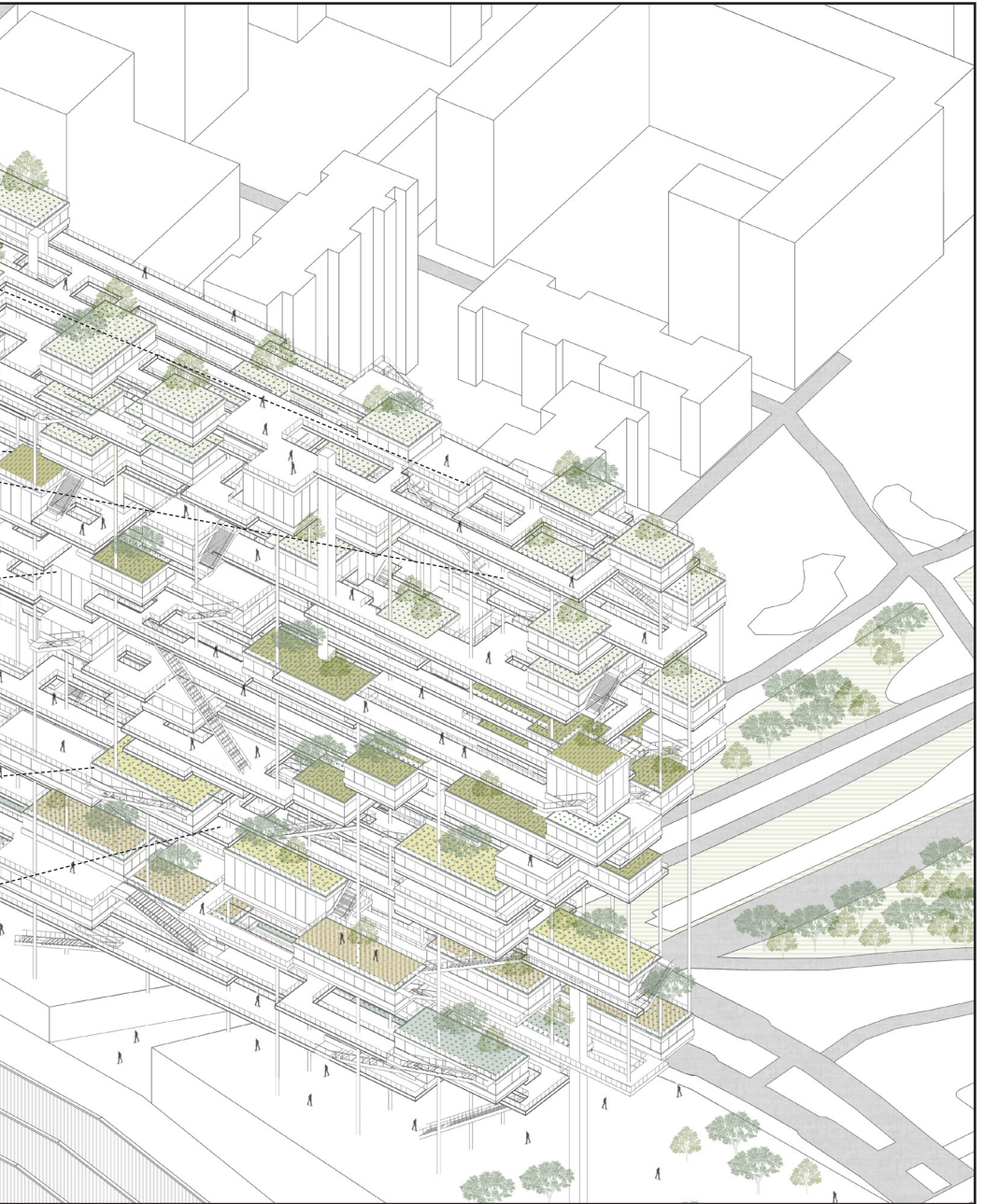
Office

Leisure



Commercial

Play ground



Bibliography and references

Ole Scheeren, 2014, Space Formations, paper presented at the CTBUH 2014 Shanghai Conference Proceedings, Shanghai, 2014, 67-73.

Central Pasila, 2013, City Planning Department, Helsinki plans 2013:1

“Human Settlements: Types and Patterns”. Geography Revision. Accessed on December 5, 2020. Available at: <https://geography-revision.co.uk/gcse/urbanisation/human-settlements-types-and-patterns/>. [Accessed 10.12.2020].

Salla Jokela, 2017. Nordic City Challenge is developing Pasila area in Helsinki. Available at: <https://www.helsinki.fi/en/news/sustainability-news/nordic-city-challenge-is-developing-pasila-area-in-helsinki> [Accessed 10.12.2020].

Jean-Paul Rodrigue , 2020 , The Geography of Transport Systems, New York: Routledge. ISBN 978-0-367-36463-2.

Data resource:

Trip purpose percentage from: Jean-Paul Rodrigue (2020), New York: Routledge, Chapter 4 – Transport, Energy and Environment. ISBN 978-0-367-36463-2. Available at: https://transportgeography.org/?page_id=144 [Accessed 10.12.2020].

Function percentage from: Helsinki's present state and development 2019, Online, ISBN 978-952-331-628-7 Available at: <https://tilajakehitys.hel.fi/summary> [Accessed 10.12.2020].

Function percentage from: Helsinki facts and figures 2019, City of Helsinki, Available at: <https://www.hel.fi/helsinki/en/administration/information/statistics/> [Accessed 10.12.2020].