



TECHNISCHE
UNIVERSITÄT
WIEN
Vienna University of Technology

DIPLOMARBEIT

highway to heaven

TELLS THE STORY OF A CITY ON A VERTICAL HIGHWAY TO SPACE THAT IS RAN
BY SPACETOURISM

AUSGEFÜHRT ZUM ZWECKE DER ERLANGUNG DES AKADEMISCHEN GRADES EINES
DIPLOM-INGENIEURS/DIPLOM-INGENIURIN UNTER DER LEITUNG
D. UNIV.-PROF. DIPL.-ING. WILLIAM ALSOP

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VON

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Abstract



This work is about a fictional future where humans have built a space elevator, a vessel traveling along a cable that spans into the space allowing practical travels to the orbit. The cable, being the „Highway to Heaven“ also supports some settlements. I concentrated on one of these, called Marina City. It is a city hanging at about a kilometer high above the ground. It serves as a base of entertainment industry in the cable.

The project explores some current concepts or themes in architectural discourse. The most obvious one is the concept of a vertical city. As the buildings we build get bigger very often ideas are taken from city planning discipline.

This is where designing a real vertical city becomes relevant in today's architecture scene. The project also touches on themes like Disney Architecture and Plug-In City. How to make a completely artificial environment habitable and pleasurable was answered by embracing the fake and using it as the main design language instead of trying to hide it away.

////////////////////////////////////

In dieser Arbeit gestalte ich das Szenario einer erfundenen Zukunft, in der die Menschen einen Weltraumlift gebaut haben. Der Weltraumlift, ein Fahrzeug, das entlang eines Kabels bis ins Weltall führt, ermöglicht praktische Reisen zwischen Erde und Orbit. Das Kabel, auch „Highway to Heaven“ genannt, trägt einige Siedlungen. Ich habe mich mit dem Projekt auf eine davon konzentriert: Marina City. Die Stadt „hängt“ einen Kilometer über Meeressniveau. Sie fungiert als eine Hochburg der Unterhaltungsindustrie auf dem Kabel. Das Projekt betrachtet einige aktuelle Konzepte oder Themen im architektonischen Diskurs. Das offensichtlichste davon ist das Konzept „Vertikale Stadt“. Mit den immer größer werdenden Gebäuden, die wir bauen, nutzen wir mehr und mehr Ideen des Städtebaus bei der Gestaltung/Umsetzung dieser Projekte. Eine vertikale Stadt zu gestalten, gewinnt somit an Bedeutung für die heutige Architekturszene. Das Projekt berührt auch einige andere Themen, wie Disney Architektur und Plug-In City. Die Frage, wie man eine komplett künstliche Umwelt bewohnbar macht und angenehm gestaltet, wird beantwortet, indem das Künstliche, statt es zu verstecken, angenommen wird und als Hauptgestaltungselement genutzt wird.

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The book begins with the summary of the research I have done, then moves on to the project. In the parts Project Xl, Project L, Project M and Project S the aspects of the project are shown from biggest to the smallest scale.



1

a tree is an open circuit



2

a city us a circuit allowing for circulation in all directions



3

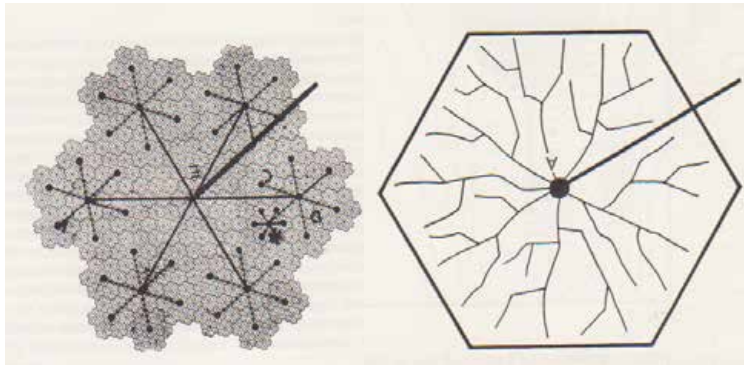
network of single city

studies

ekistics

Ekistics is the science of the human settlements. The old city was to be a model for the new, for the new city was still to be a place people feel home inside.

The book Ekistics by Constantinos A. Doxiadis has a number of ideas about the rules on how cities naturally form themselves.



4-5

system of a city network



6

city network in France

elements of the city image

Paths are the channels where users mostly move from A to B or stay and enjoy certain points.



7

Edges are where a dominant characteristic changes to another.



image of the city

8

Districts are sections of the city which have an certain character. It could be materials, shape of windows and usually is a combination of lots of these that creates it.



Image Of The City by Kevin Lynch was the key text on forming the city. It is a book where three cities Boston, New Jersey and Los Angeles are analysed and their inhabitants interviewed. The subject is how the users of these cities created their image or the map of the cities they live in, what they enjoy and don't enjoy in there and how they use them.

9

Nodes are important focal points of a city. They are usually those places where transportation routes come together.

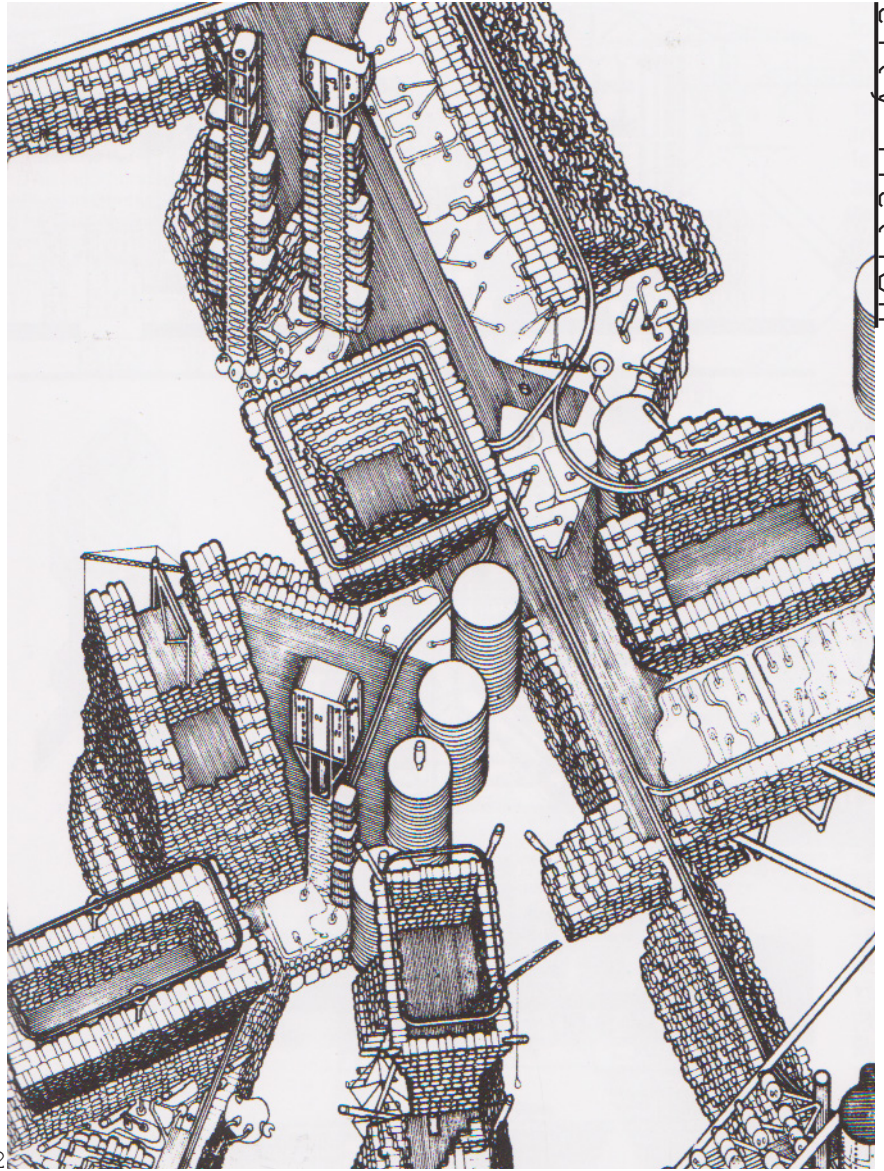


10

Landmarks are another type of point reference (like the nodes) but in this case the user does not enter within them, they are external. They are frequently used as clues of identity and even of structure and seem to be increasingly relied upon as a journey becomes more and more familiar. (1)



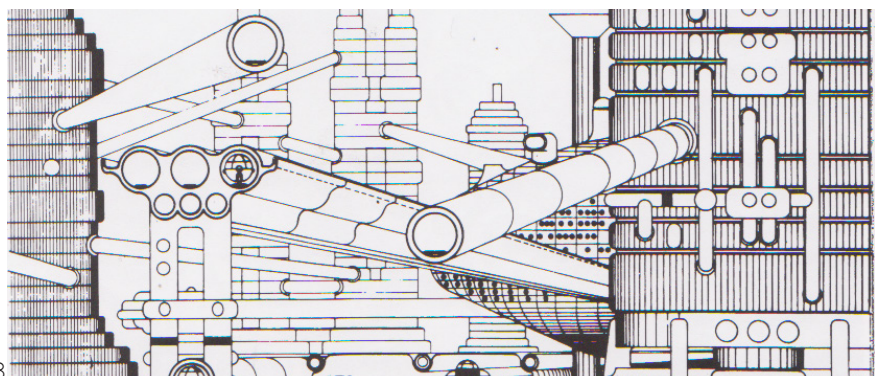
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12

In this famous axonometric drawing of the Plug In City the idea is that the moving parts in a city that makes the transportation possible like cars or trains are to be blended into the city. In Highway To Heaven I took the reversed approach. I've made the buildings fit into the cars.

A utopia may be unreal. But its values are something we can aspire to. A bit like holy saints.



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Archigram

Archigram, like Metabolists before them, was a group that widened what architecture and architects deal with. They mostly were interested in utopian projects where a certain problem of a city was tried to be solved or a certain addition to a city would make the place much more enjoyable. They were projects definitely grounded on reality but their importance lie not on their usage of interesting technology or their possiblensess. Since it is quite obvious to us that they are economically hard to realise. The real value of these projects lie in their aspirations. Their ideas on what are some problems, what kind of values can be added to life of users are to serve as a role model for architecture.



7

Space elevator was first thought of an Eiffel-like structure where an attached elevator takes you up to space.

Later it was reimagined by Yuri N Artsutanov as a cable hanging from a satellite.

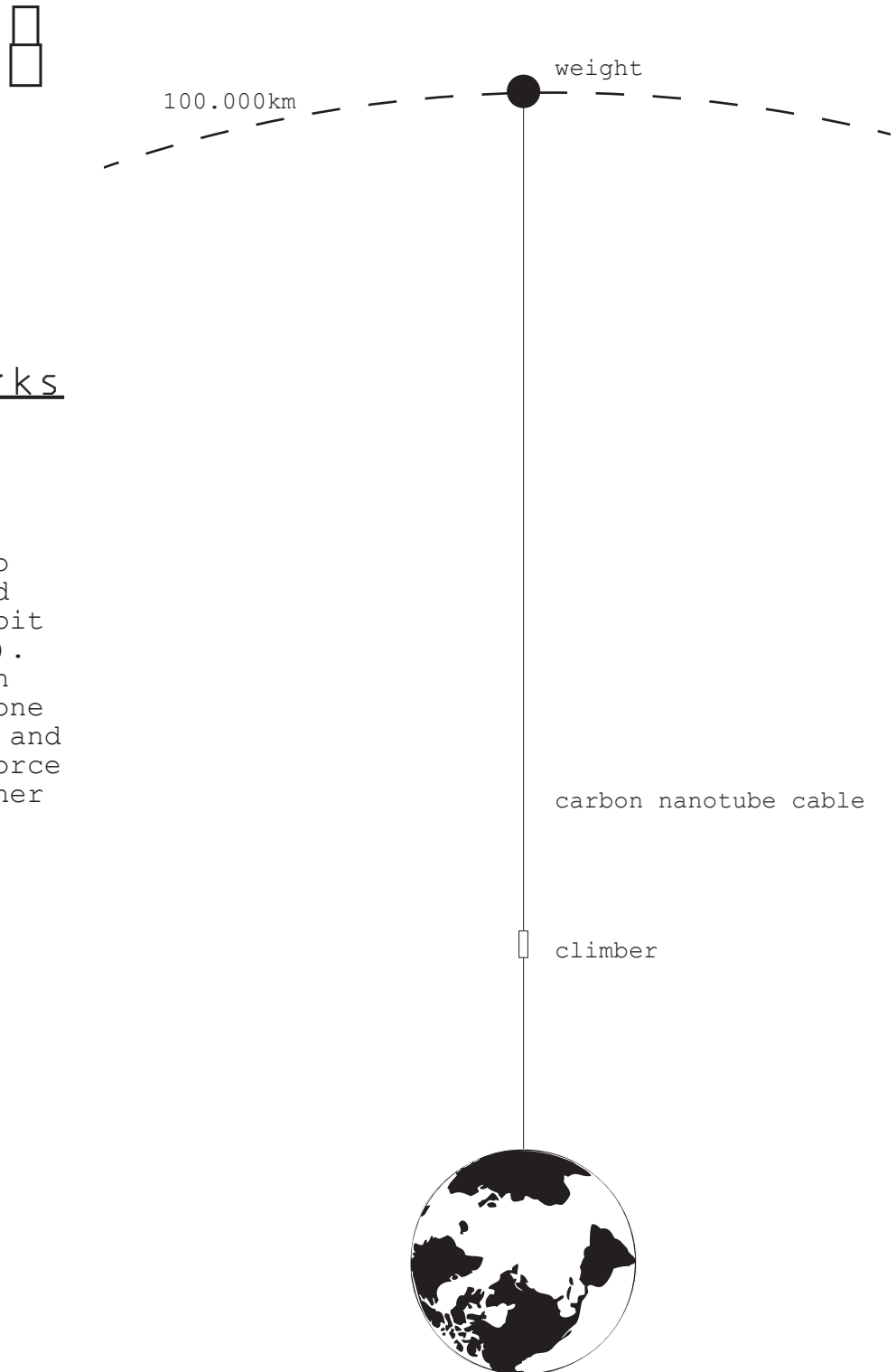
Four American scientists then discovered that the material required was stronger than any existing material.

That changed in the end of nineties when carbon nanotubes came into the game. High tensile strength of this material may make the concept of a space elevator feasible.

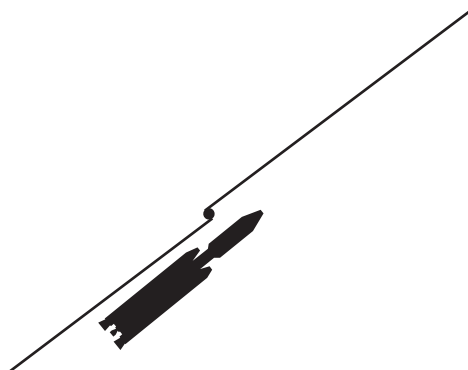
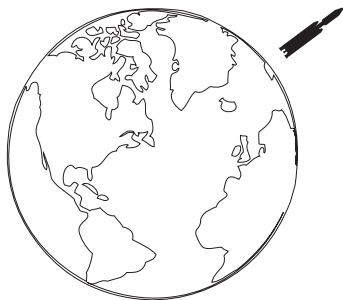


how space elevator works

The basic concept is to string a cable from the Earth's surface to an altitude beyond geosynchronous orbit (35800km altitude).
(2) The gravity on earth pulls from one side of the cable and the centrifugal force pulls from the other side.



space elevator
deployment

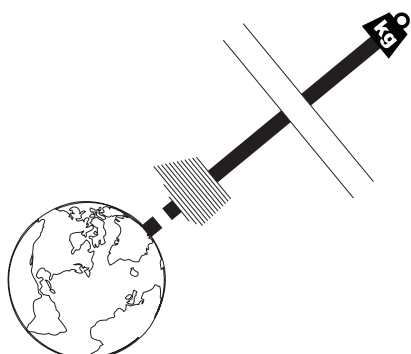
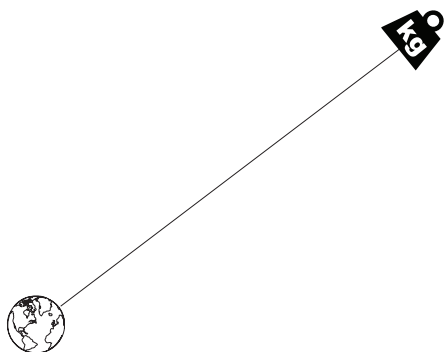


Selecting the largest (US) launch vehicle available, a Titan IV=Centaur, it is possible to place a 5500 kg payload into geosynchronous orbit. With the Titan IV=Centaur launch envelope of 5500 kg we can deploy a nanotube ribbon that is 1.5 m by 5 cm at Earth and tapering to 1.5 m by 11.5 cm at geosynchronous with a total length of 117000 km and a total mass of 5000 kg. This cable has the capability of supporting a 132 kg climber. (3)

Deployment of the initial cable will entail placing a spacecraft carrying a spooled cable in geosynchronous orbit.

The cable will be on two spindles such that each end can be deployed separately, one end downward toward Earth (pulled by gravity) and the second upward (pulled by outward centrifugal acceleration). (4)

When the cable reaches earth it will then be anchored. The spacecraft will then move away from Earth to the other end of the cable to act as the counterweight. An elevator can then be operational at the cable.



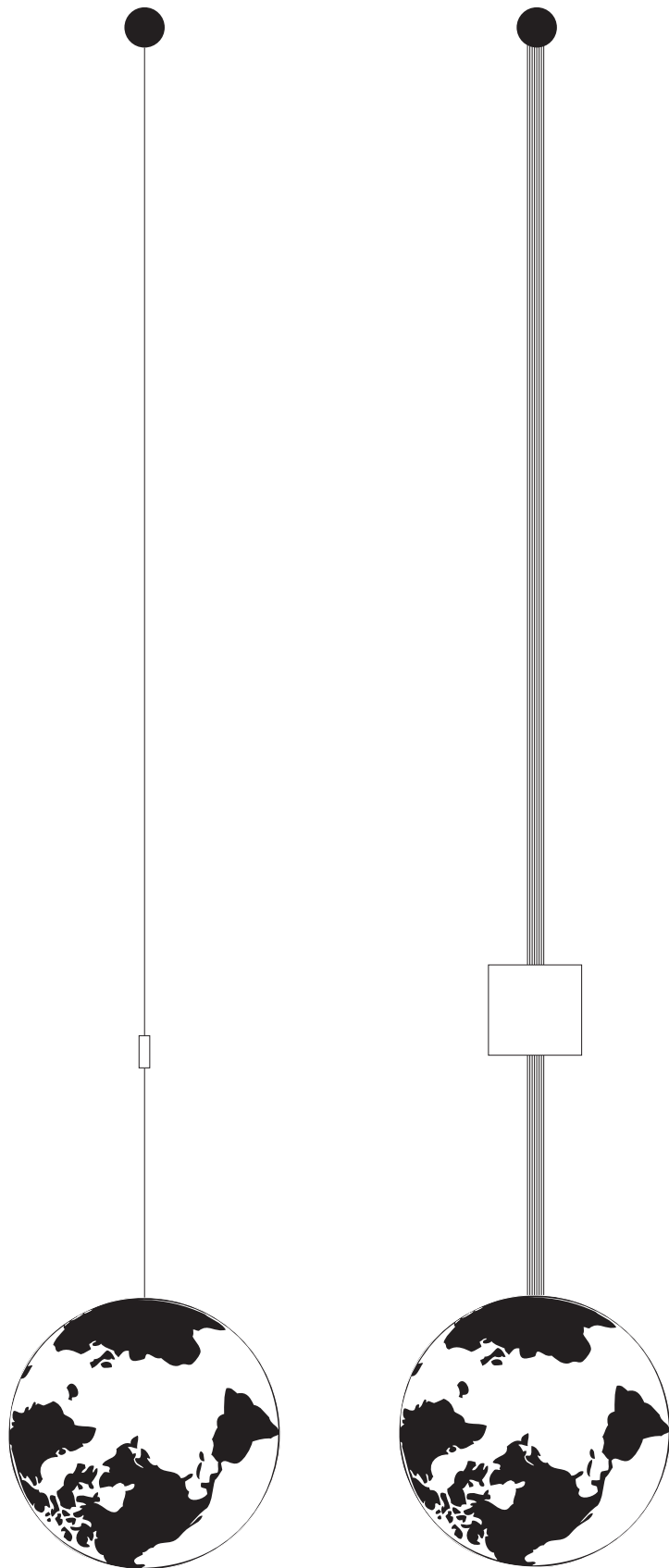
3 Bradley C. Edwards, Design And Deployment Of A Space Elevator, Los Alamos National Laboratory, Los Alamos, 2000
4 Bradley C. Edwards, Design And Deployment Of A Space Elevator, Los Alamos National Laboratory, Los Alamos, 2000

space elevator
settlements



Using the same length as in the initially deployed cable, the counterweight to cable mass split is 212kg for the counterweight and 316 kg for the cable.

(5) Additional cables of comparable capacity could be produced every 232 days using this first cable. In 3.5 years the capacity of any individual 20.000 kg cable could be built up to 1.000.000 kg (6) and in additional 10 years to 40 billion kg. Which would support a 100.000 people city. The dimensions of such cable would be the same with the thickness 11 meters to 4 meters tapering to 11 meters to 9 meters. After 250 climbers (40 months) have been sent up the cable with incrementally increasing cable payloads, the cable would be capable of supporting a 20,000 kg climber (13,000 kg payloads) in route to Earth orbit or any space location within the orbit of Saturn every 5 days (7).



5 Bradley C. Edwards, Design And Deployment Of A Space Elevator, Los Alamos National Laboratory, Los Alamos, 2000
6 Bradley C. Edwards, Design And Deployment Of A Space Elevator, Los Alamos National Laboratory, Los Alamos, 2000
7 Bradley C. Edwards, Design And Deployment Of A Space Elevator, Los Alamos National Laboratory, Los Alamos, 2000



A flyer for Cyberpunk Space Elevator

11

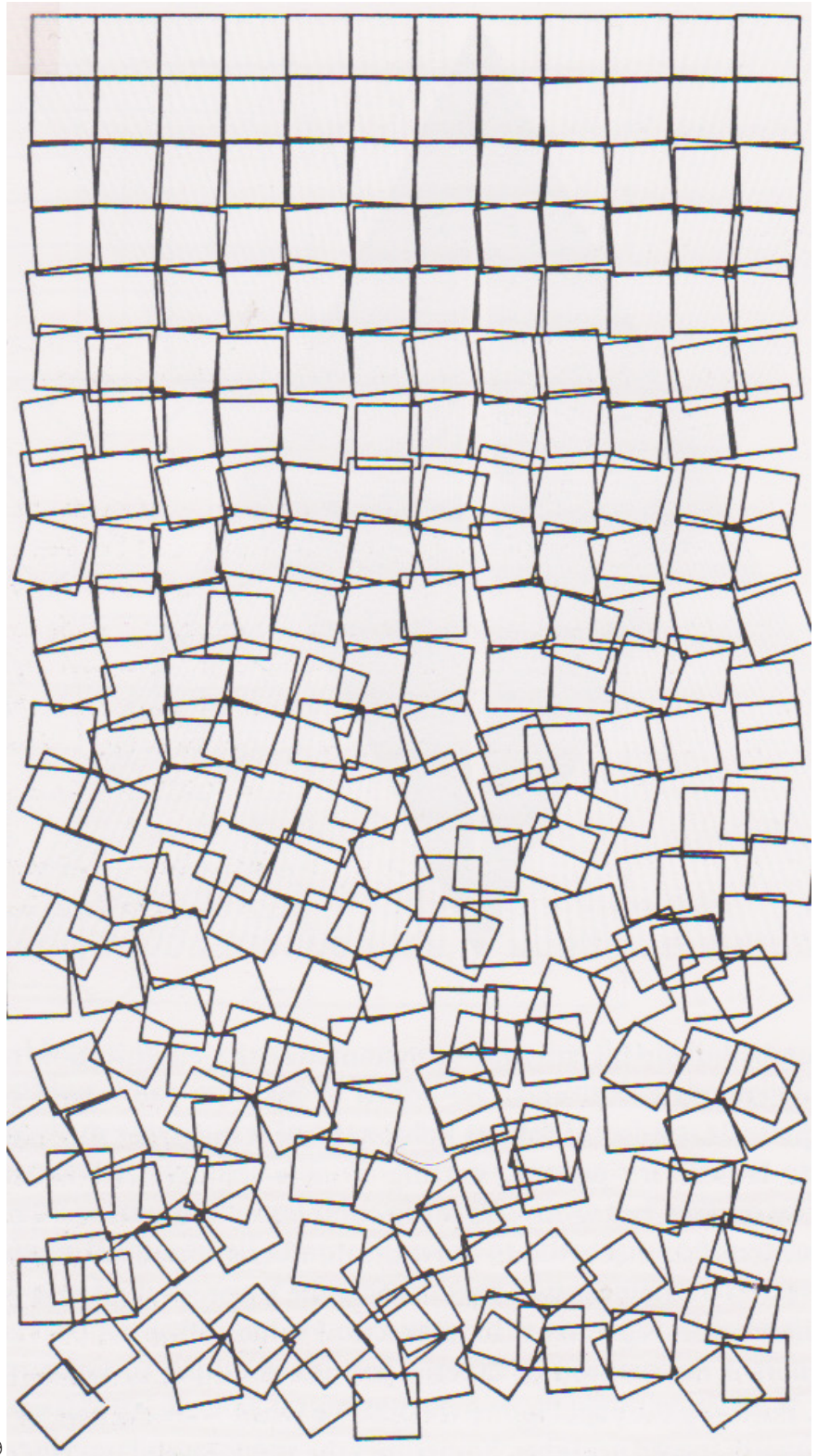
space travel
space elevator

Currently, the cost of launching payloads to LEO is about \$25.000 per kilogram using the Space Shuttle and 10.000 per kilogram using expendable launch vehicles (ELVs). With the space elevator the cost of putting a kilo to the orbit may reduced to \$300 (8), which means an average person would be able to go to space for \$20.000 just after its completion. Later the price will probably sink as the elevator becomes more efficient and the cable is able to support more weight.

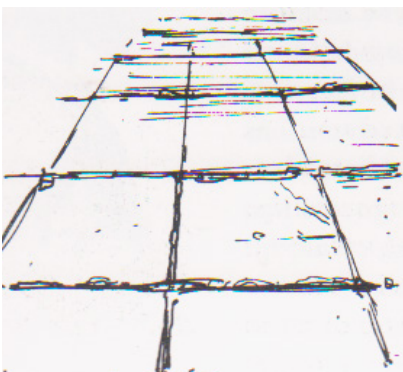
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Aesthetics
ernst gombrich

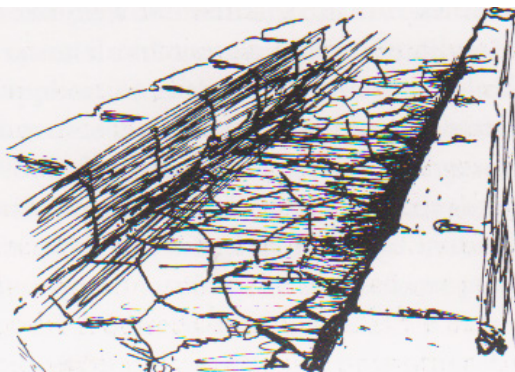
In his book *The Sense Of Order*, Ernst Gombrich tells us about the aesthetics of the regular pavement pattern (down left) and the crazy pavement pattern (down middle, down right). One leaves the perceptive process without enough work to do and one presents so much variety that we can never grasp it. So the answer should be somewhere in between. (right) (9)



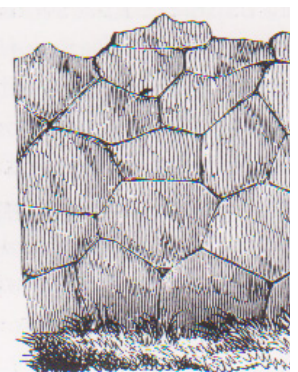
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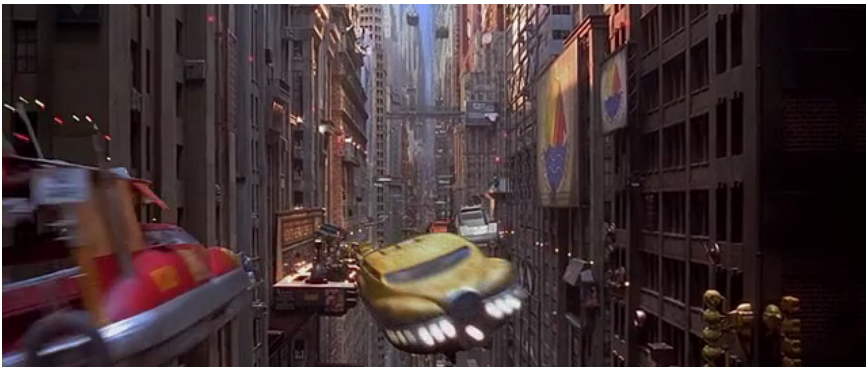
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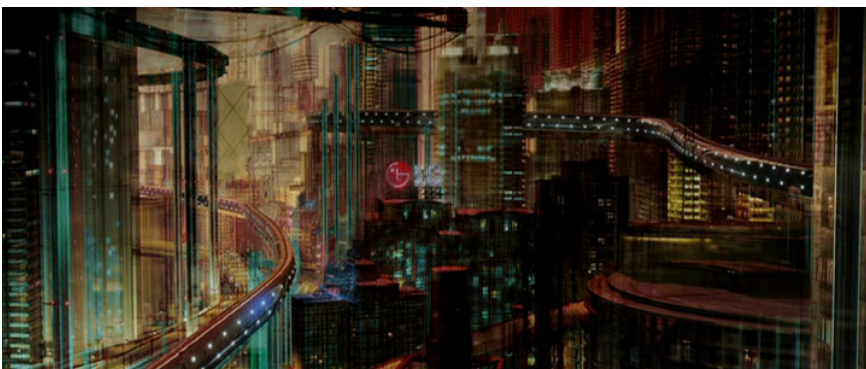
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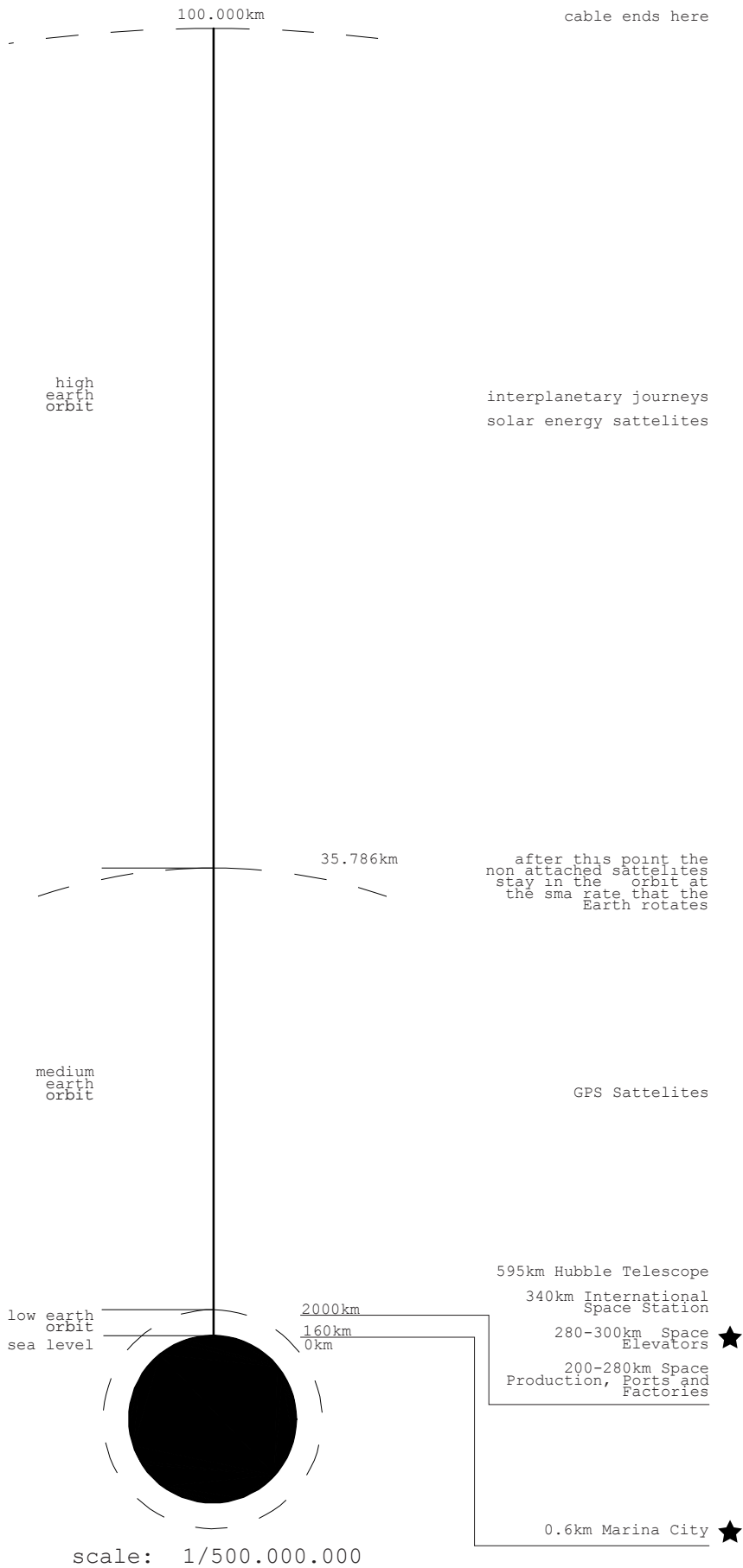
aesthetics
sci fi

In the movies from up to down Artificial Intelligence, Ghost In The Shell, The Fifth Element, Star Wars III Revenge Of The Sith and 2046 the cities of the future are presented with a good variety of saturated colors, rich environments, monumentality and overgrownness lots of neon and other lights, objects such as cranks, pipes machines, screens, cables...

moon at 363.295km

project XL

14



location

The cable of the elevator reaches approximately one third of the way to the moon. The regions of it are used for different purposes but most of the action plays in the first 1000km above sea level.

The longest journey a touristic space elevator would make is from Marina City to the beginnings of Lower Earth Orbit and takes about 8 hours with a speed of 36km/h.

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location

The project would be best located at Singapore, a rich country thanks to its ports would get one more port into the space.

Singapore also is a very small country looking for some extra space in coming 15 years for its estimate of 1.5 million population increase. Surely they would benefit from new settlements.

In our version of the future another reason they build it is a series of floods that hit Singapore which raises panic about possible end times. Hence they build a city in the sky.

Attractors

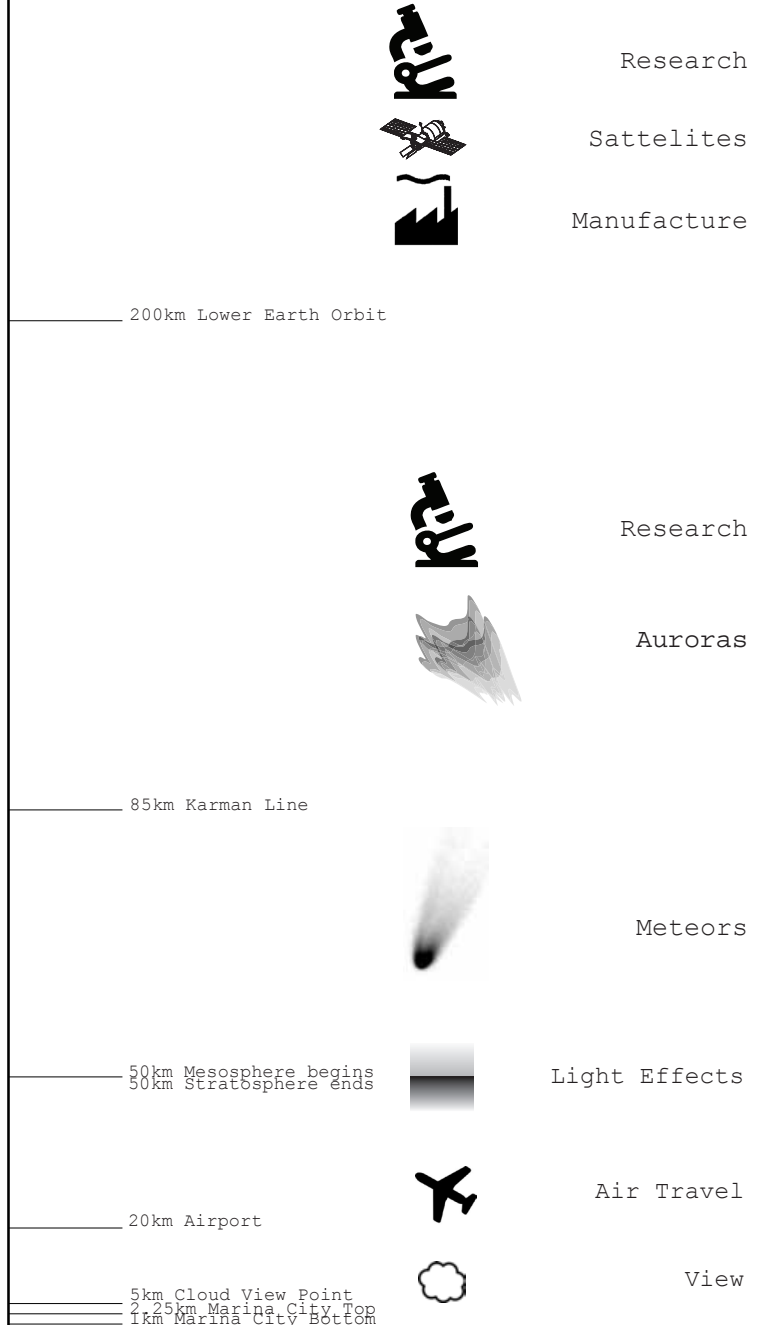
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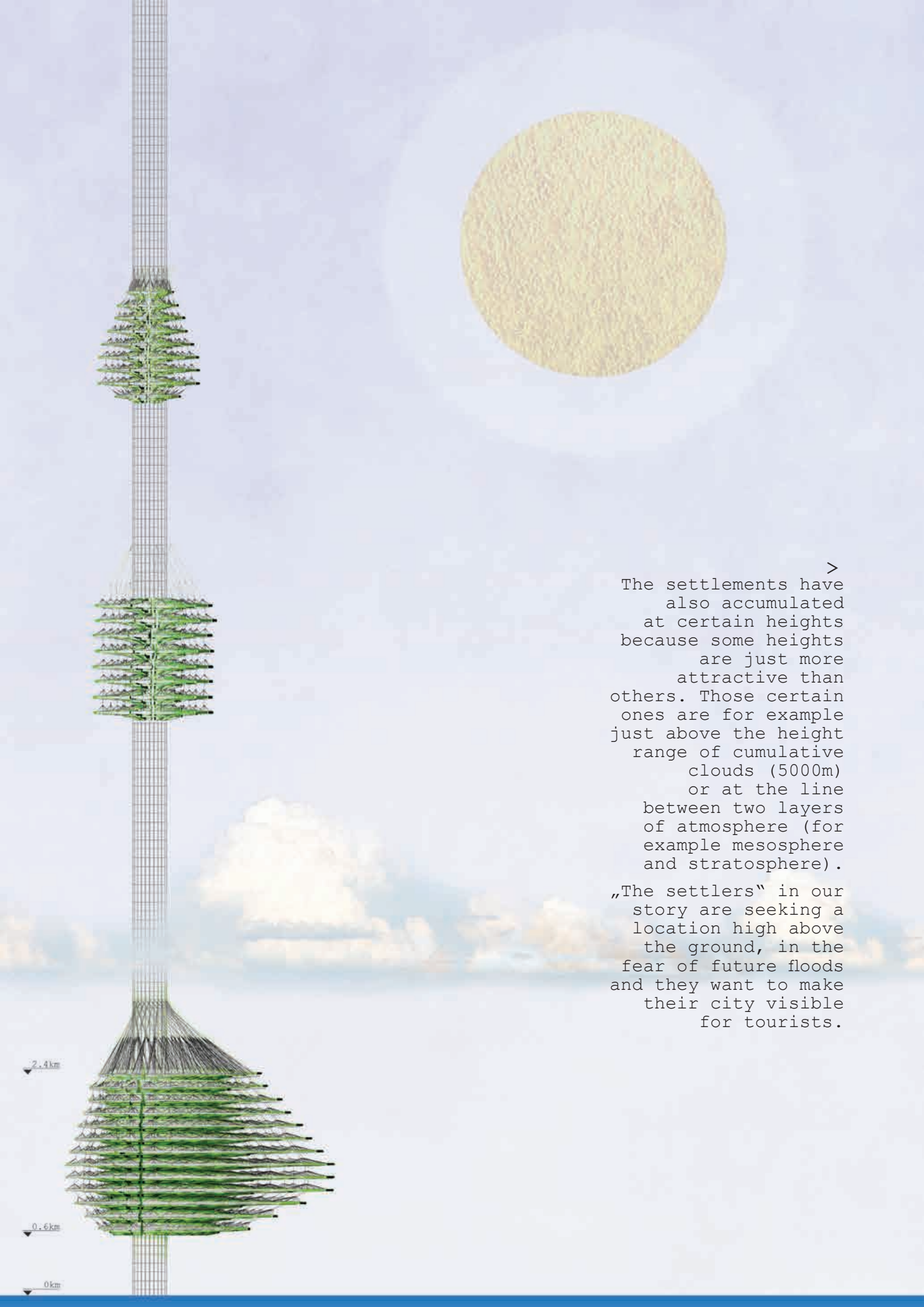
This project has been designed to discover some ideas such as how to design a city around a vertical road and incorporating in this the tourism provided by an infrastructure for space elevators, space travel as entertainment, the management of it, the vessels for it and a possible environment for it.

The idea of a vertical city is becoming more and more attractive by the developments in skyscraper technology and their growing sizes which leads the designers to organize them like cities. The extreme scenario of this project is meant to bring some new ideas into the scene.

One of these ideas is the attractor. The space elevator in the project acts as the main attractor of vertical settlements.

The settlements accumulated at certain attractive heights.





>
The settlements have also accumulated at certain heights because some heights are just more attractive than others. Those certain ones are for example just above the height range of cumulative clouds (5000m) or at the line between two layers of atmosphere (for example mesosphere and stratosphere).

„The settlers“ in our story are seeking a location high above the ground, in the fear of future floods and they want to make their city visible for tourists.

2.4km

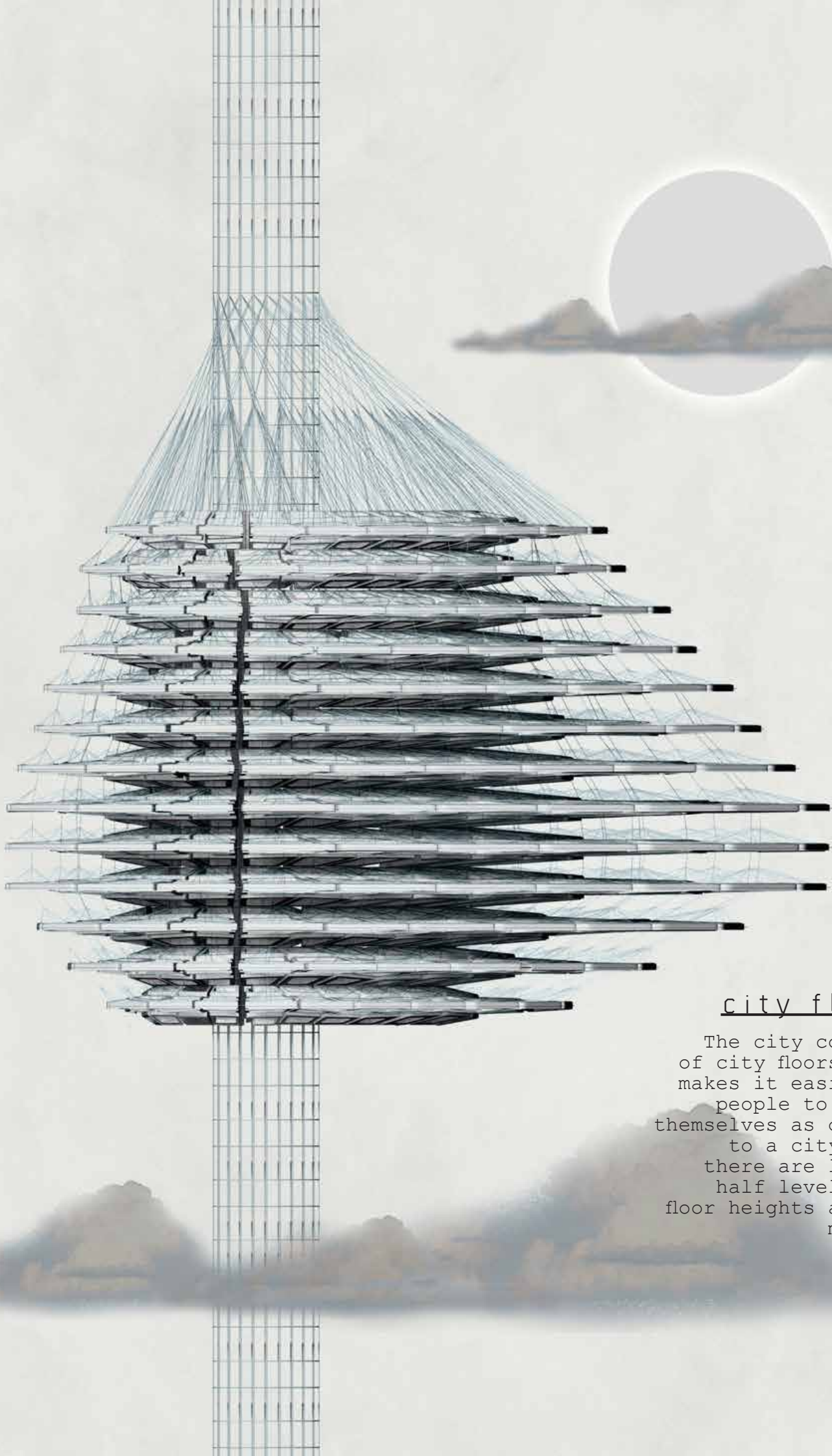
0.6km

0km

monument

The city marks itself in the sky and helps people to orient themselves. It also advertises itself by being always visible.

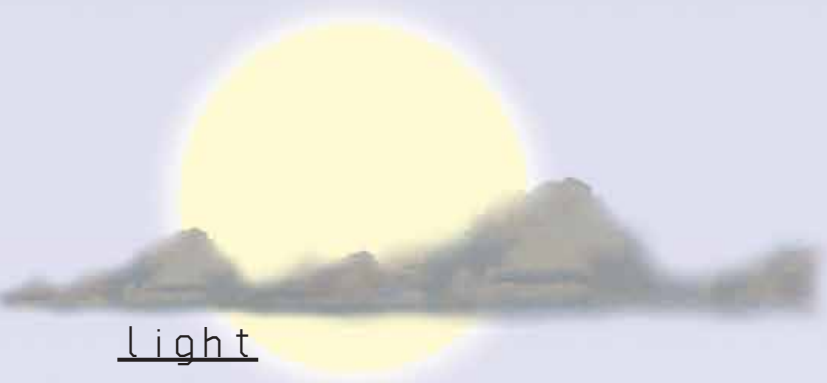




project 1

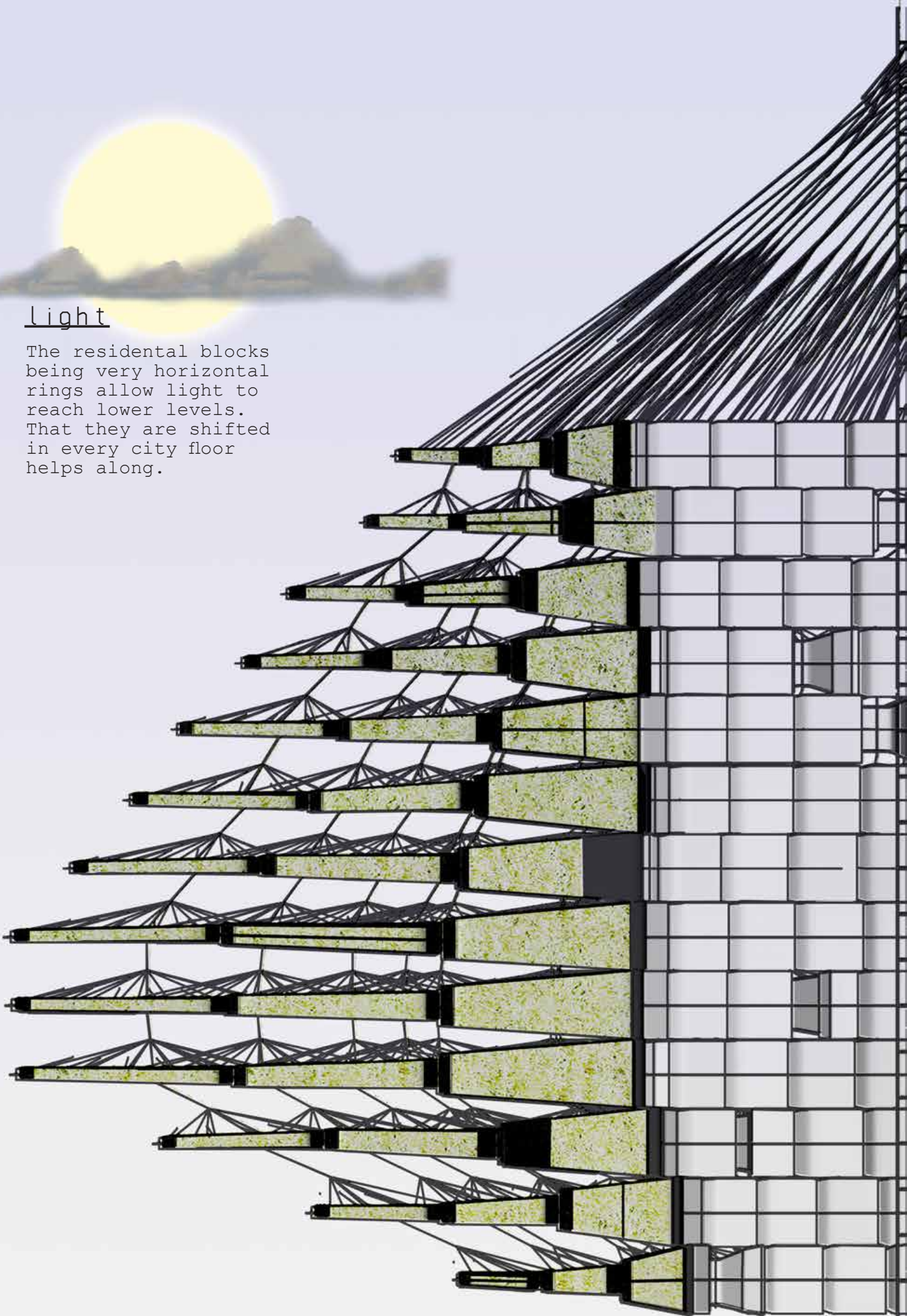
city floors

The city consists of city floors. This makes it easier for people to orient themselves as opposed to a city where there are lots of half levels. The floor heights are 150 meters.



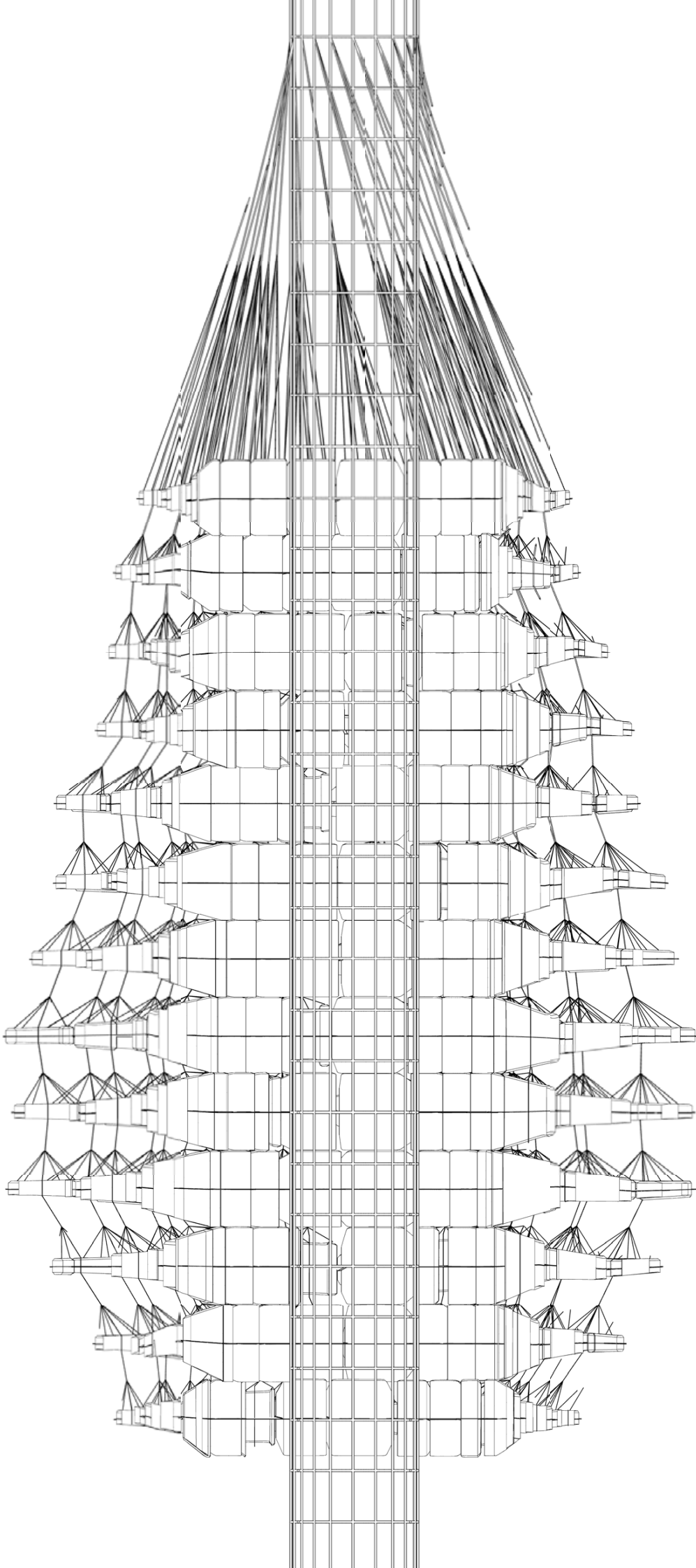
light

The residential blocks being very horizontal rings allow light to reach lower levels. That they are shifted in every city floor helps along.



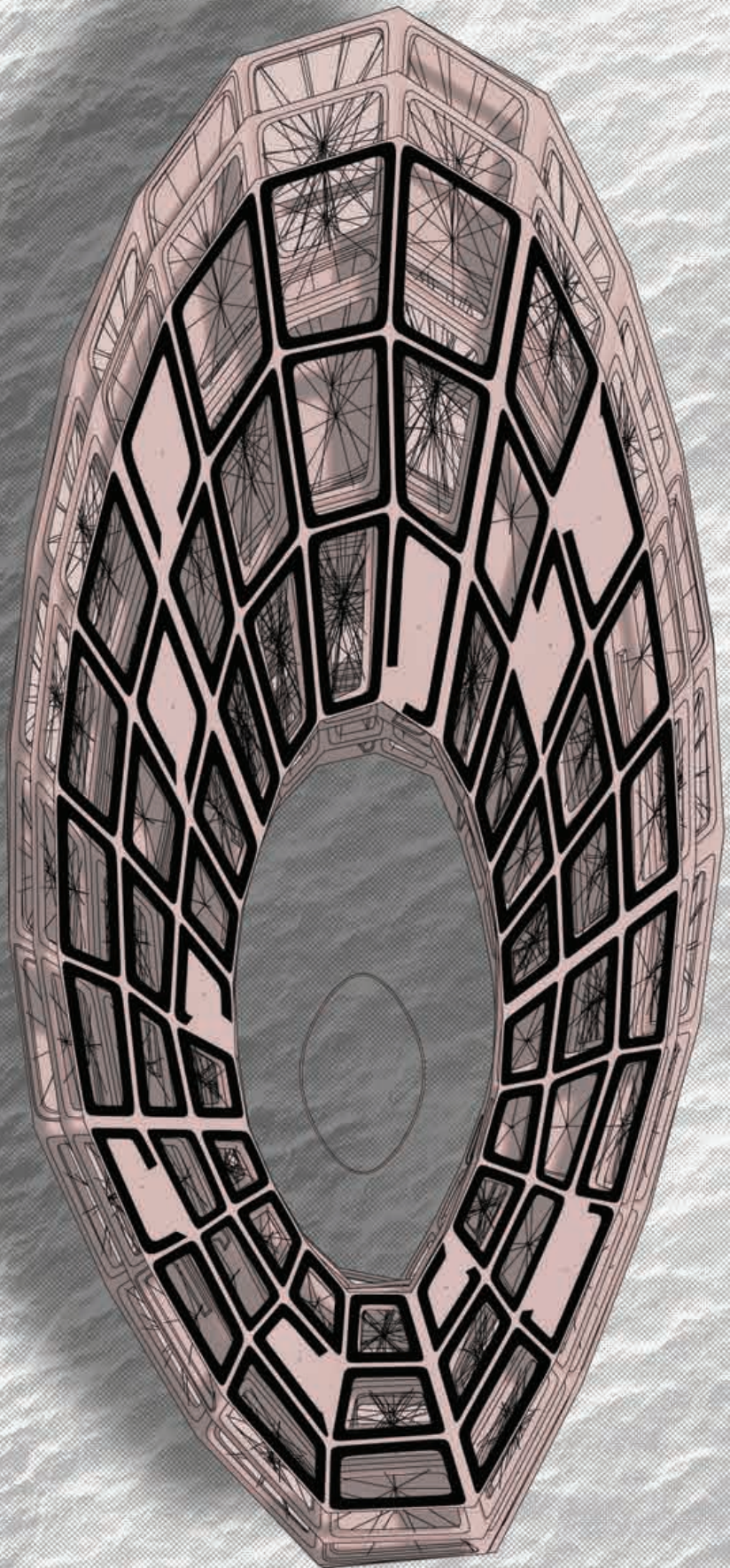
city structure

Vertically the city is carried by carbon nanotube wires hanging from the main cable. The overall thickness of the wires are about 44square meters. The horizontal loads are taken by the city blocks themselves and the roads in-between.



horizontal
transportation

Horizontal transportation takes place above the city floors by bike and by foot. Personal and public transportation works by rails below the streets. People either use their own capsules to travel or take a train.



1000m

3000m

500m

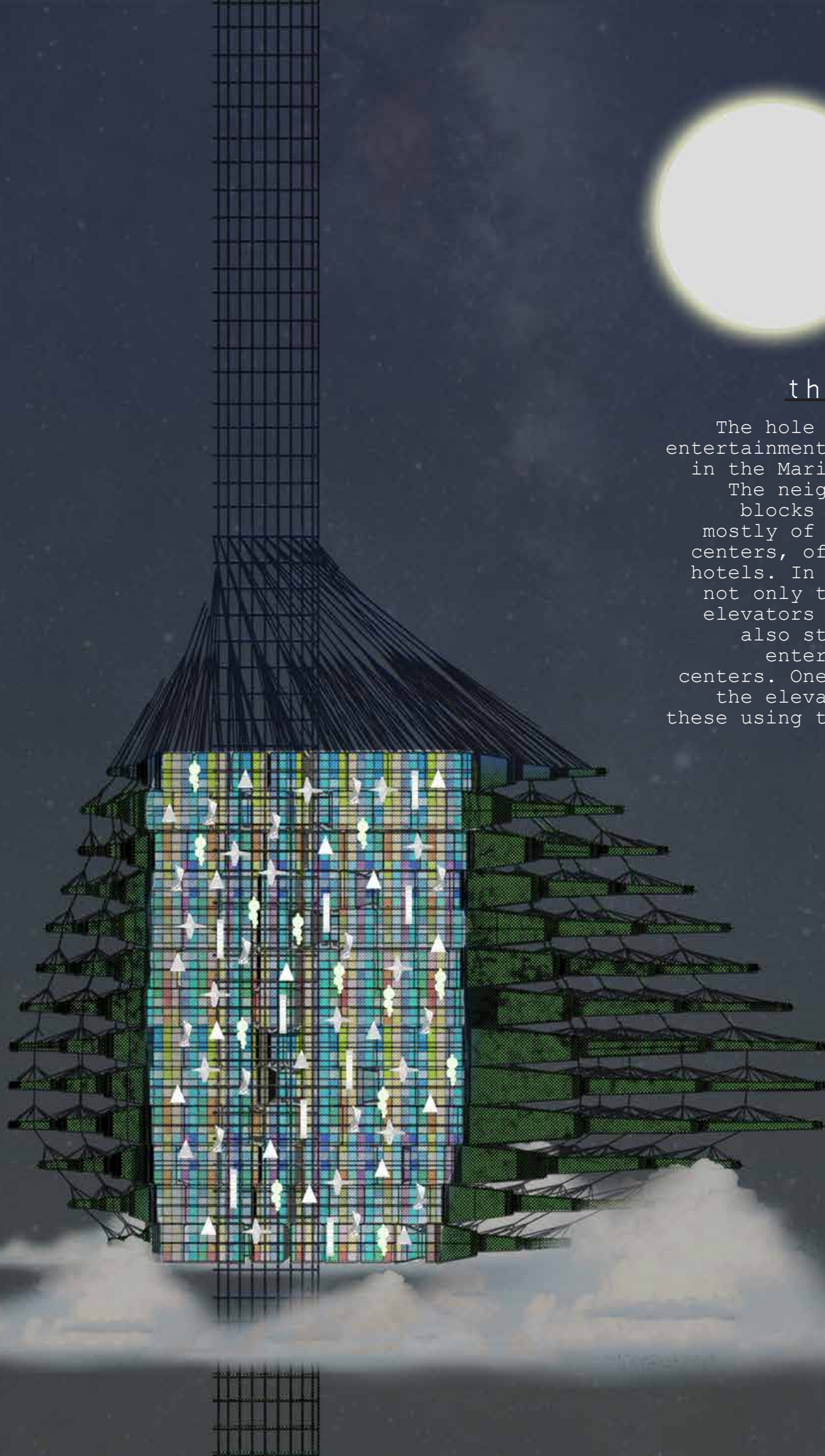
1000m



the hole

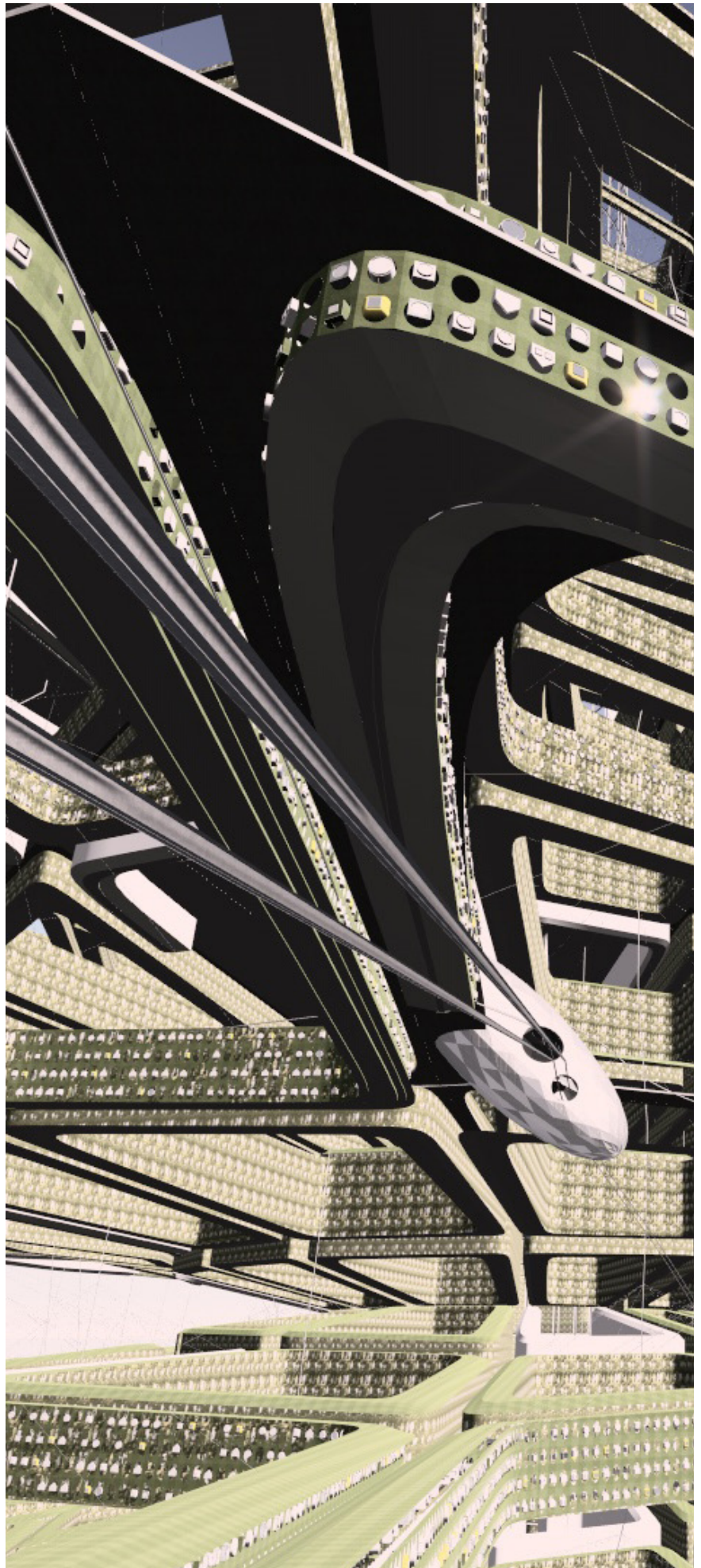
The hole is where
entertainment happens
in the Marina City.

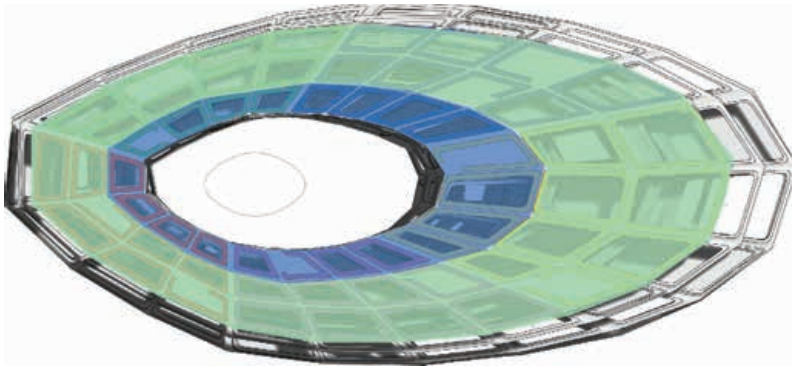
The neighbouring
blocks consists
mostly of shopping
centers, offices and
hotels. In the hole
not only the space
elevators float but
also stationary
entertainment
centers. One reaches
the elevators and
these using the cable
car.



vertical transportation

Vertical transportation to the city and between the city floors takes place mostly by cable cars. Occasionally some blocks are vertically connected by elevators and one can use them for switching floors too.



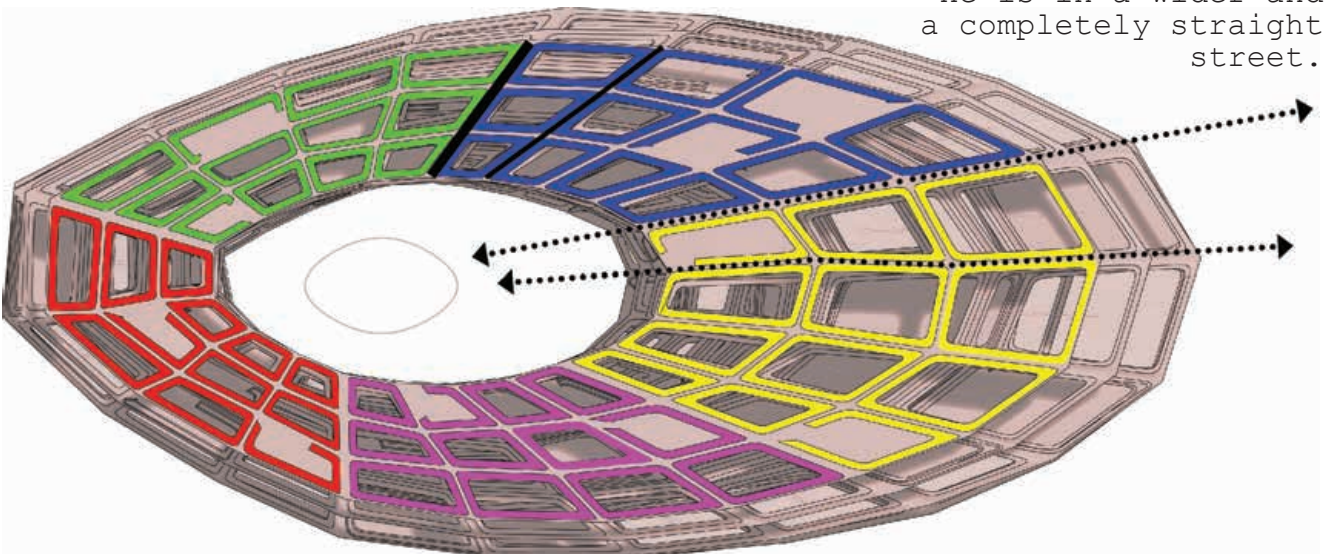


■ commercial
■ residential

districts

City floors consist of 2 outer residential rings and 1 inner commercial ring.

Districts are separated by character using different materials at facades and roads, different city furniture. One recognises the edge of the district when he is in a wider and a completely straight street.

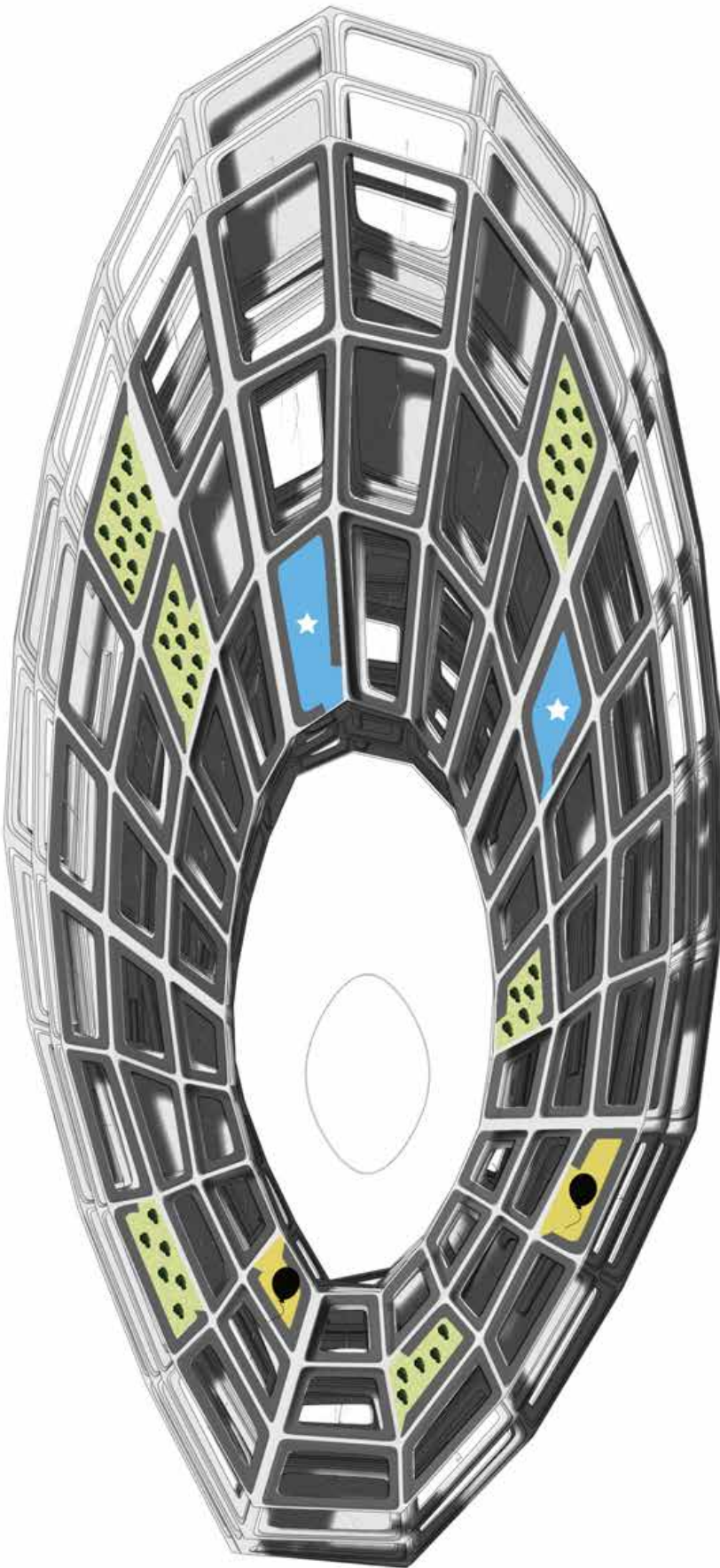


streets

Streets act as the separator between vehicular and non-vehicular transportation. Below, the surroundings are filled with machines, ventilations and pipes and the monorail for travelling. The environment is using high-tech elements for its design.

On the other hand above the streets pedestrians, personalized capsules, and green facades create a stylized residential area.





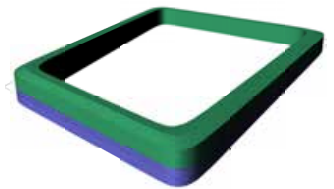
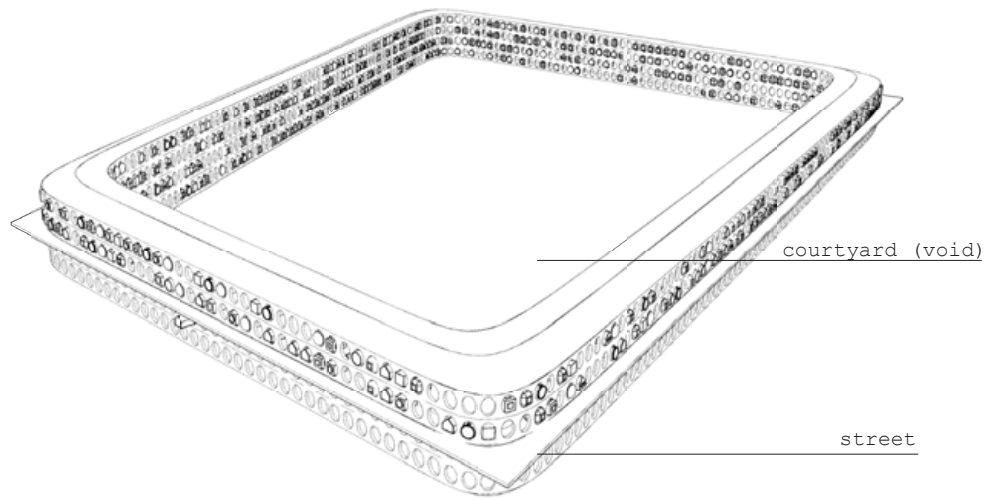
27



blocks

Some blocks (the dark grey rectangles) are not complete rings and they are not hollow in their courtyards. These are blocks mostly reserved for public functions, they contain public facilities like schools in their buildings and they serve as parks, venues or multi-function zones in their squares.

project 5

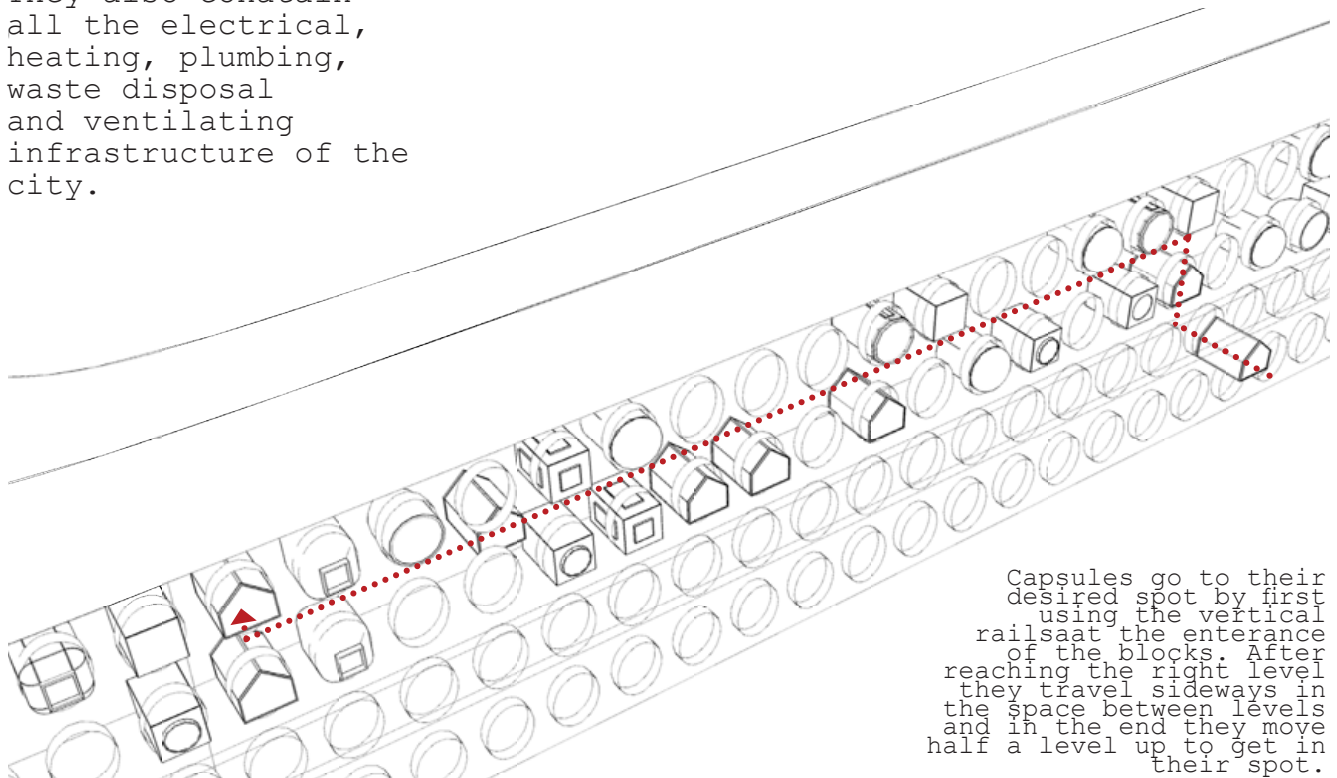
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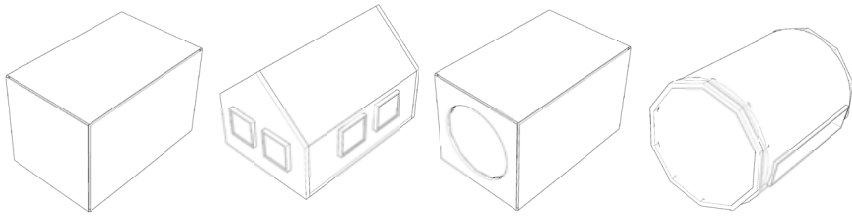
utilities 
living 

block anatomy

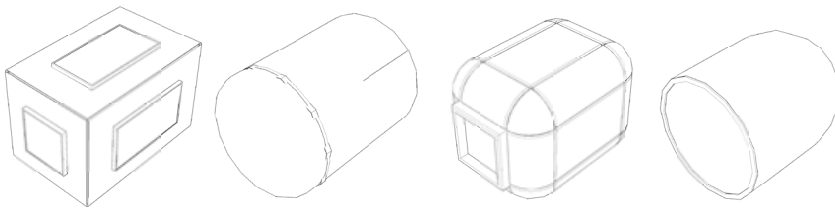
The road side of the blocks are used for the machines operating the capsules in and out of the blocks. They also contain all the electrical, heating, plumbing, waste disposal and ventilating infrastructure of the city.



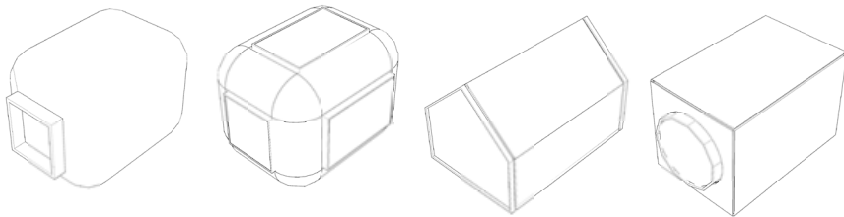
Capsules go to their desired spot by first using the vertical rails at the entrance of the blocks. After reaching the right level they travel sideways in the space between levels and in the end they move half a level up to get in their spot.



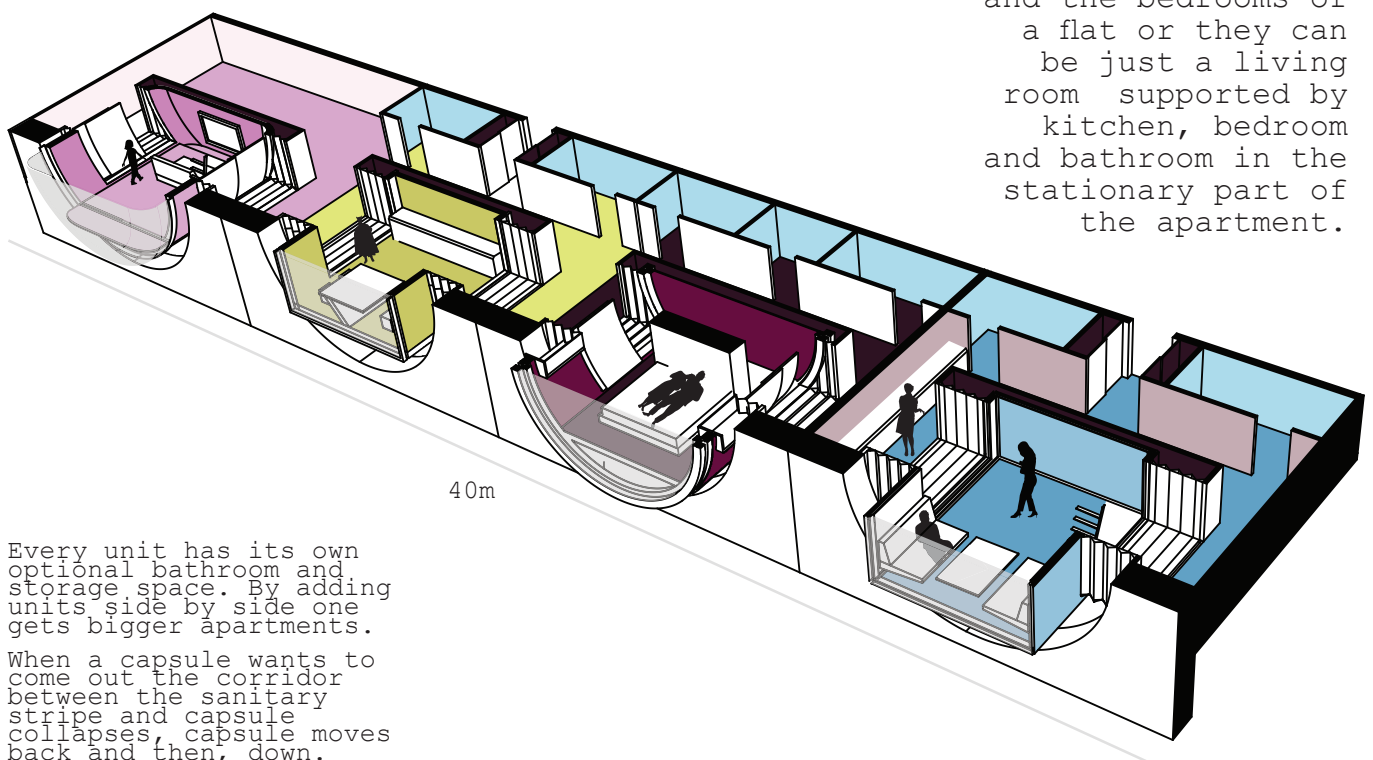
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capsules



Capsules are material- and shapewise inside and outside customisable living units. They can come together to form the living room and the bedrooms of a flat or they can be just a living room supported by kitchen, bedroom and bathroom in the stationary part of the apartment.



Every unit has its own optional bathroom and storage space. By adding units side by side one gets bigger apartments.

When a capsule wants to come out the corridor between the sanitary stripe and capsule stripe collapses, capsule moves back and then, down.

spacewalk



survive



cyberpunk

dance

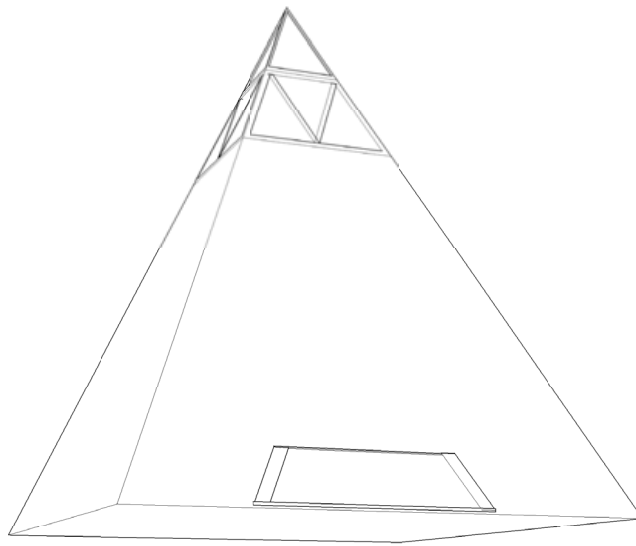


play

live music

31

elevator
concepts
cyberpunk



Cyberpunk hosts music festivals in space. It features spherical concert venues where the audience occupy the sphere surface and the band the sphere center. It features dancing in a weightless environment and a quantity of other activities like games and contests.



SPACE FOOD

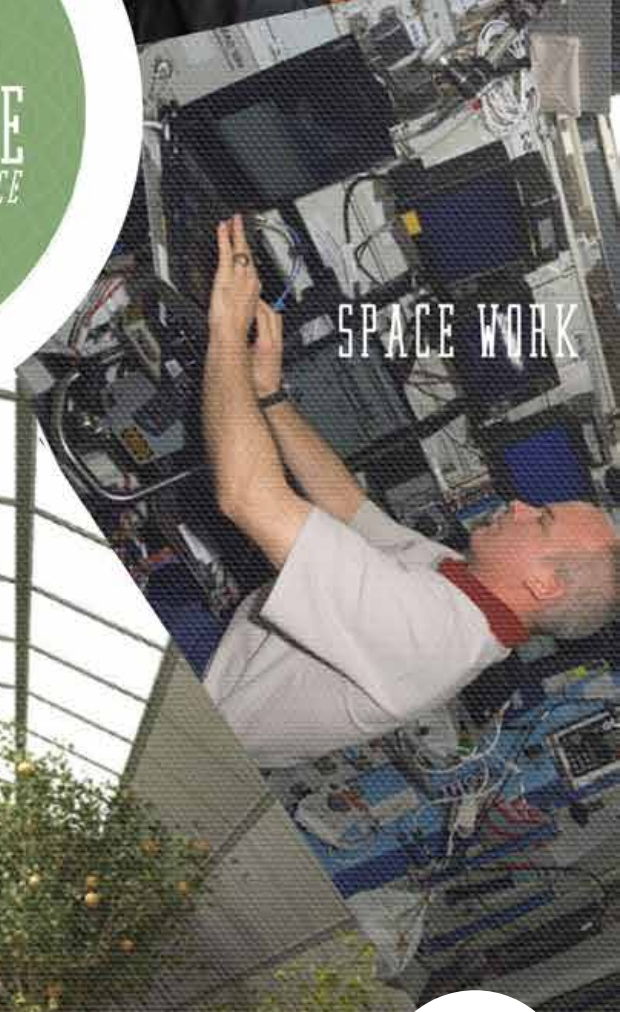


SPACE FUN



SPACE VIEWS

HEAVENVILLE
OR HOW TO LIVE IN SPACE



SPACE WORK

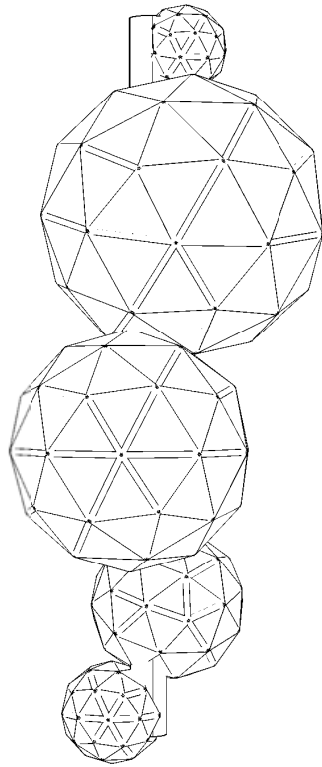
SPACE FARMING



33	34
Image Nr	
35	36
37	

33

elevator
concepts
heavenville



Heavenville is a
community living in
space. The trips
usually are one month
long. Prepare for
relearning everything
since you were a small
baby.

PRACTICE



LEARN



NASA

SPACEWALK



EXPERIENCE

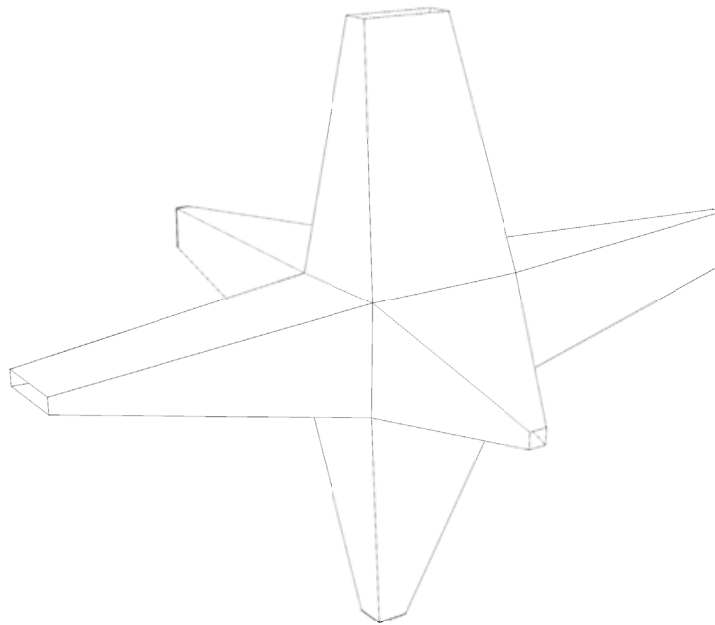


SEE

38 39
Image Nr
40 41
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35

elevator
concepts
nasa



NASA space elevator is part of
a permanent research center
in space and a museum. Trips
range from 2 days to a month.
Everything we know about space,
you'll know.

SURVIVING
REINVENTED



LEARNING
THE REINVENTED

NEWS
REINVENTED



SPORTS REINVENTED



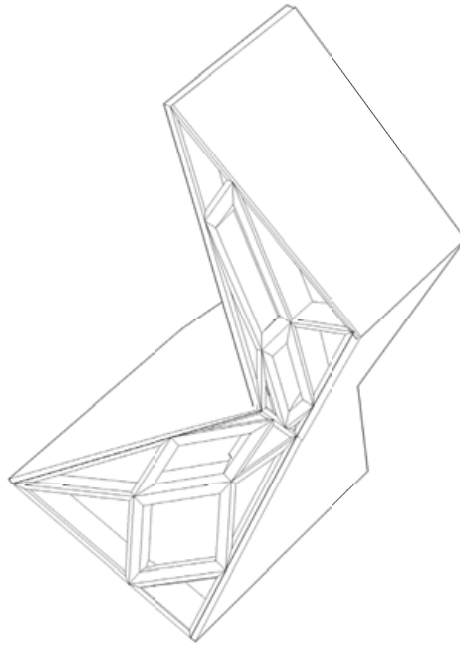
PERFORMANCES
REINVENTED



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Image Nr	
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elevator
concepts
sirius



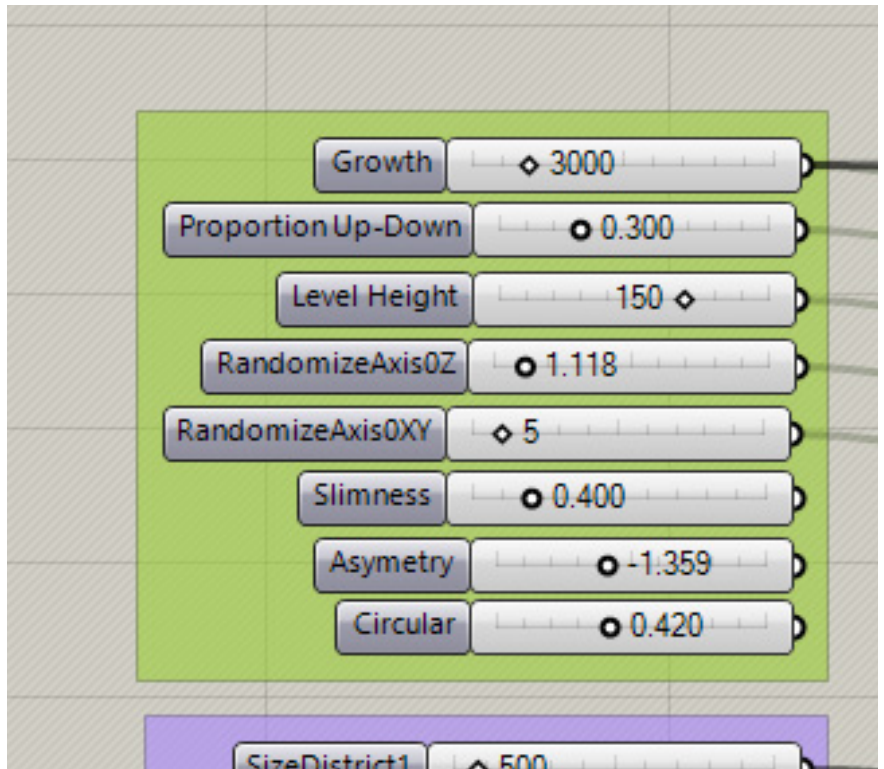
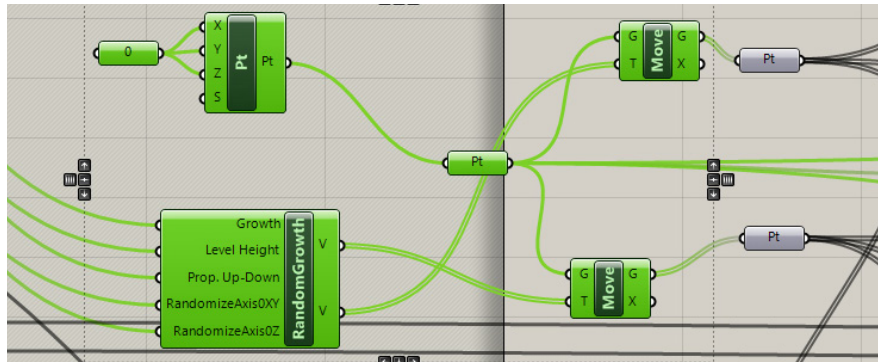
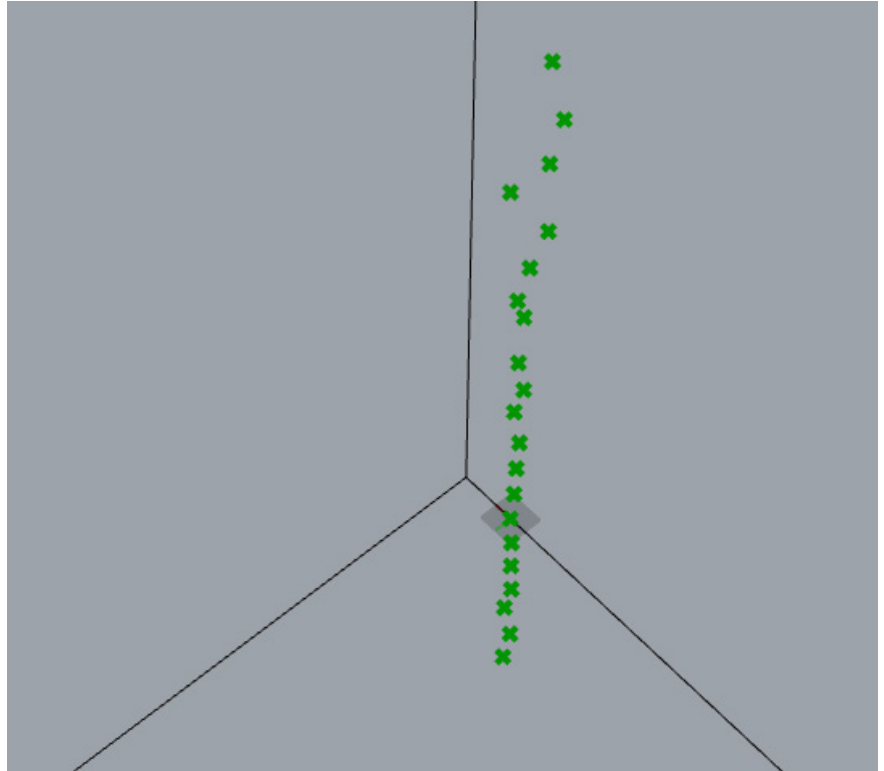
Sirius is the name behind
weightless performance arts.
A magical world awaits,
either with serene dance shows
featuring floating people or
brutal sport events featuring
people throwing cars at
eachother.

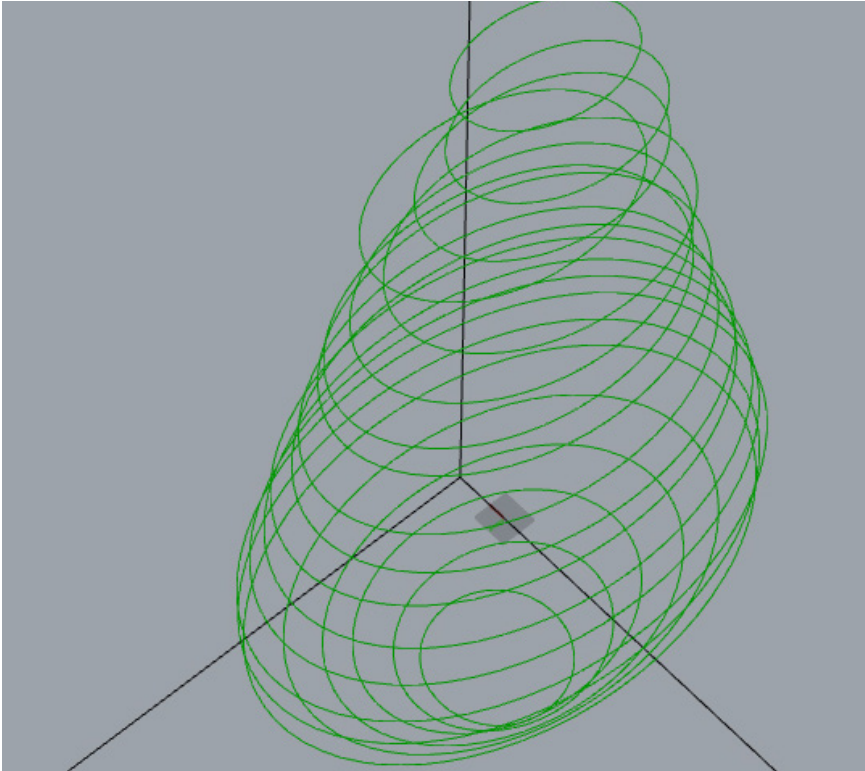
methods

38

grasshopper city script explained

The city script begins by determining the number of city floors with the growth slider. Proportion Up-Down, Slimness, Asymetry and Circular sliders change the shape of the city. Level height determines the basis distance between city floors. Randomize Axis sliders move the floor center points.



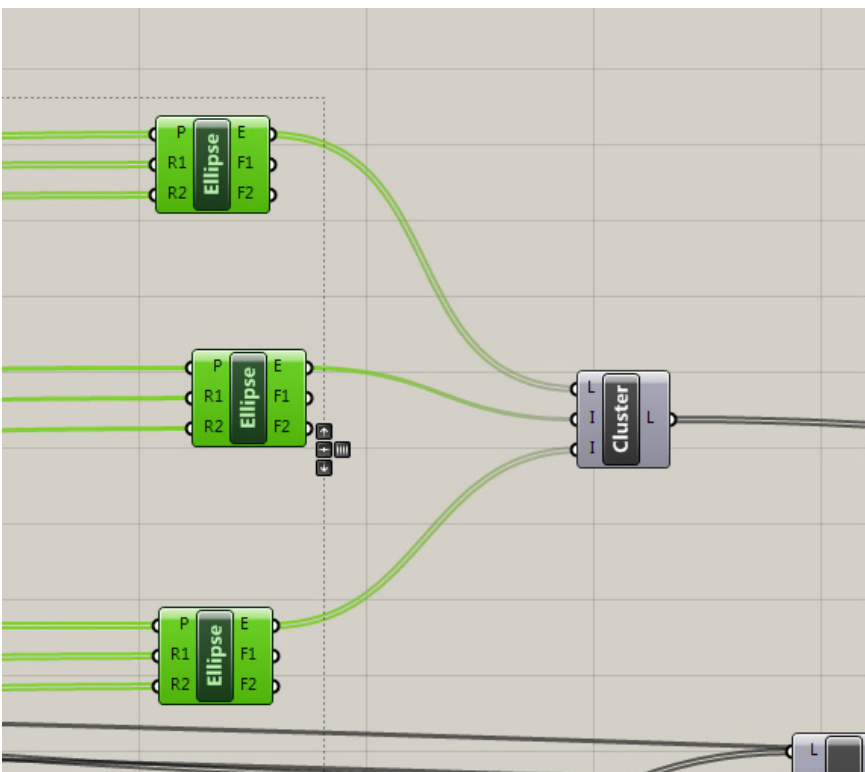


39

grasshopper
city script
explained

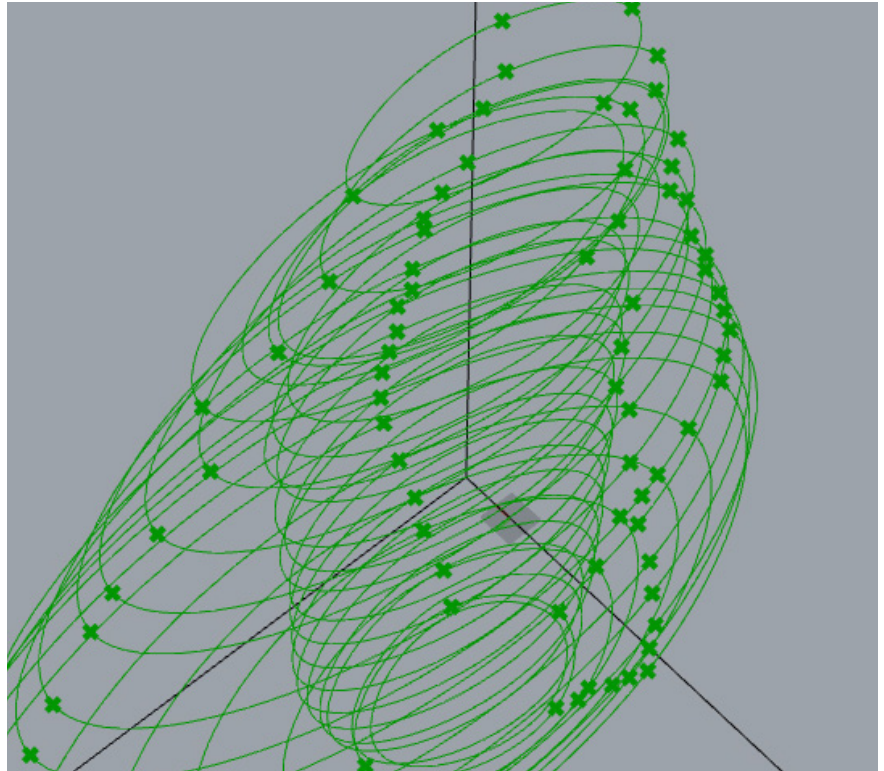
The slider Proportion
Up-Down configures
where the ellipses
have the biggest
radiuses.

Circular and slimness
determines the
difference between
two radiuses of the
elypses.



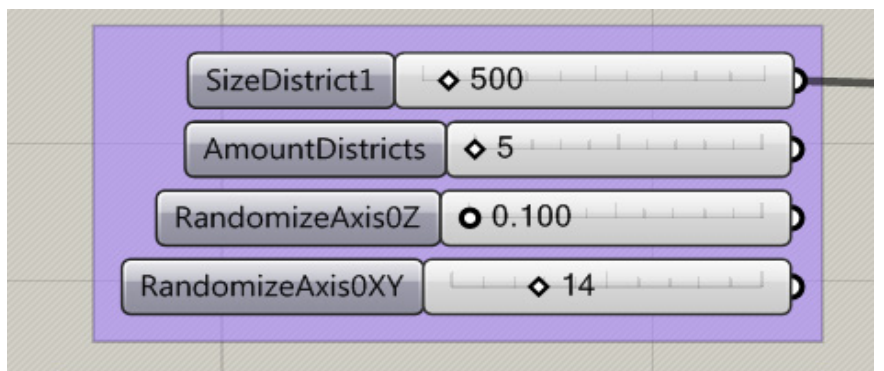
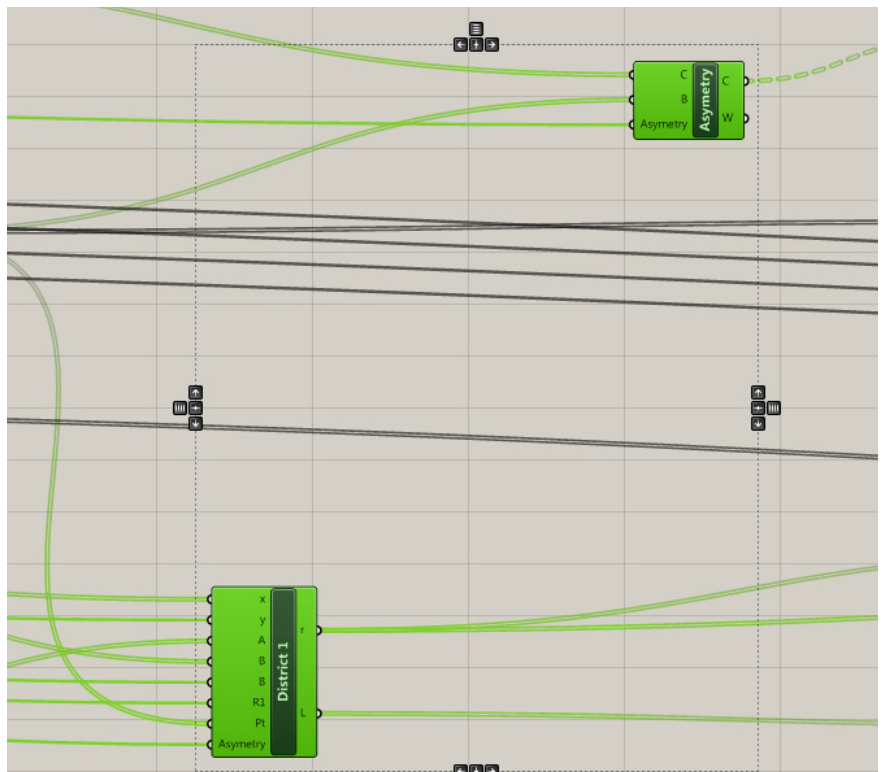
40

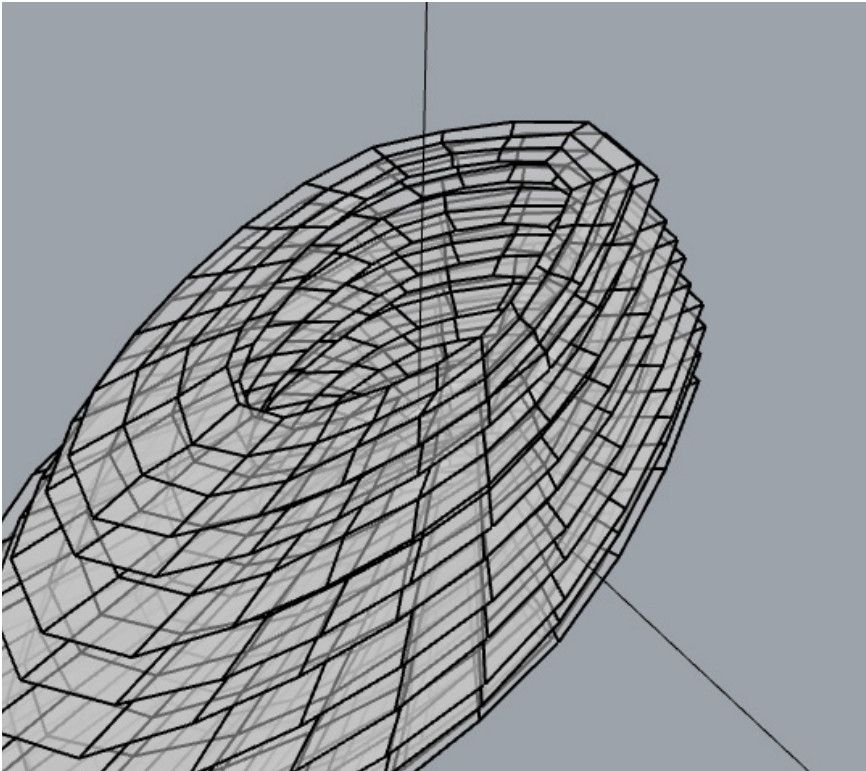
grasshopper
city script
explained



Assymetry slider
morphs the ellypses
by pulling them from
one side. (south
side, for more
sunlight)

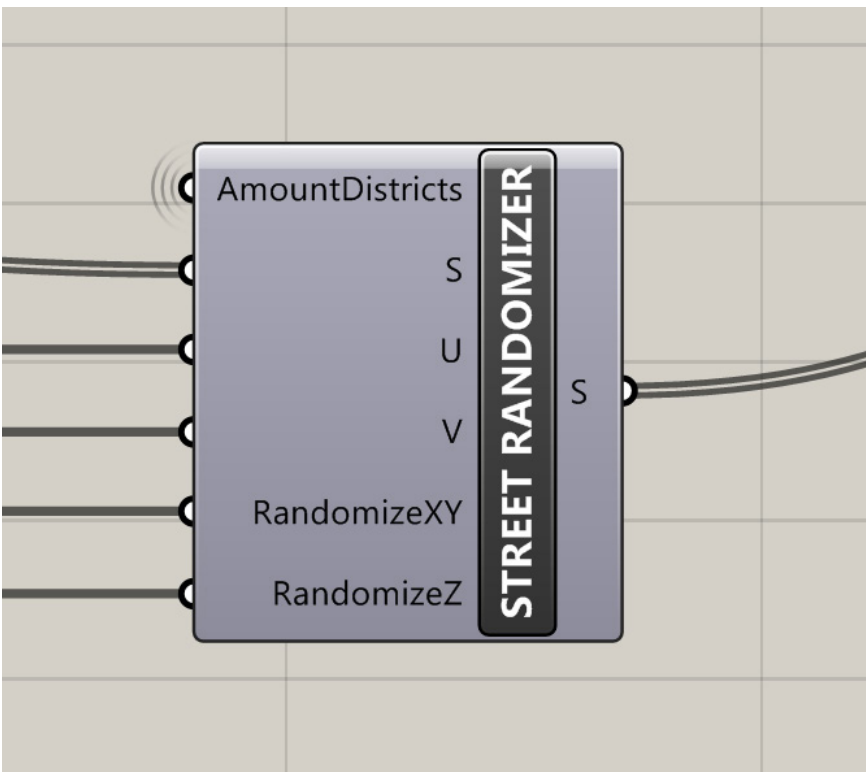
SizeDistrict1
determines the size
of the Hole in the
middle.





41

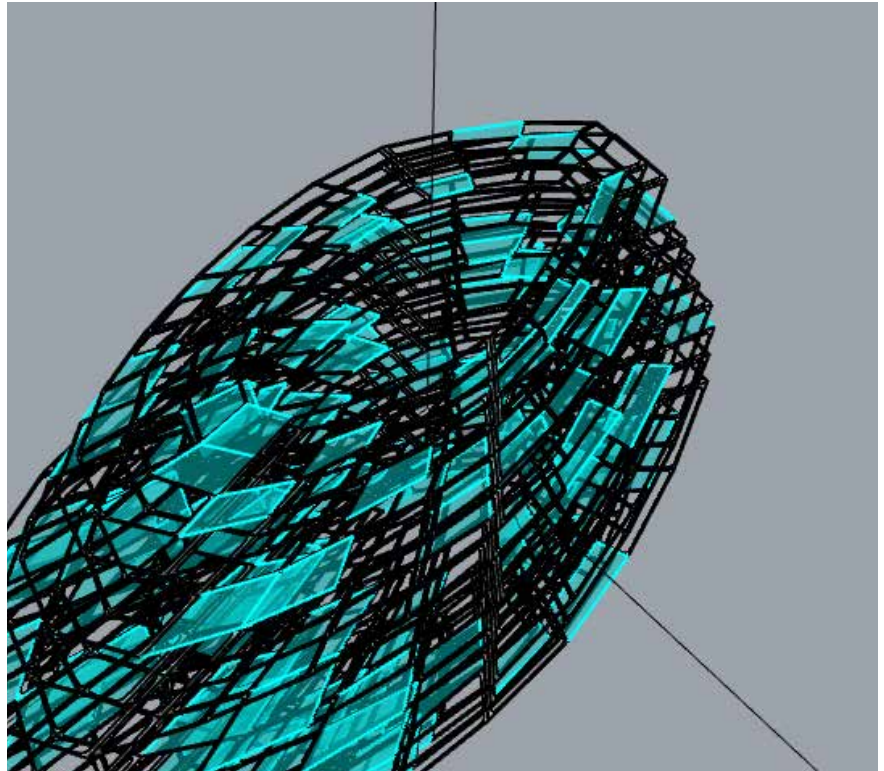
grasshopper
city script
explained



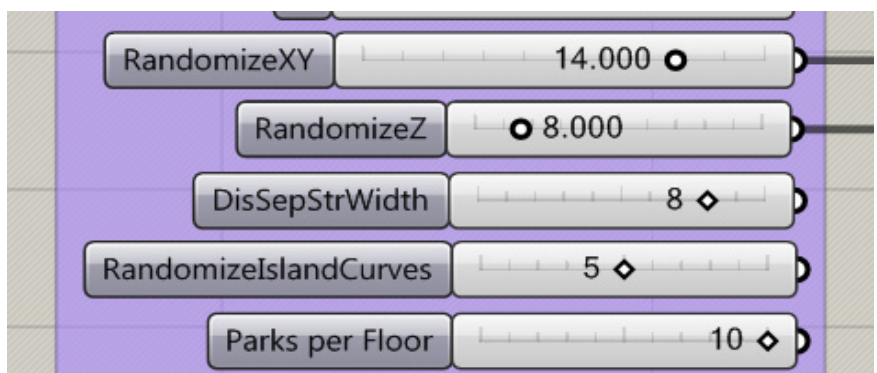
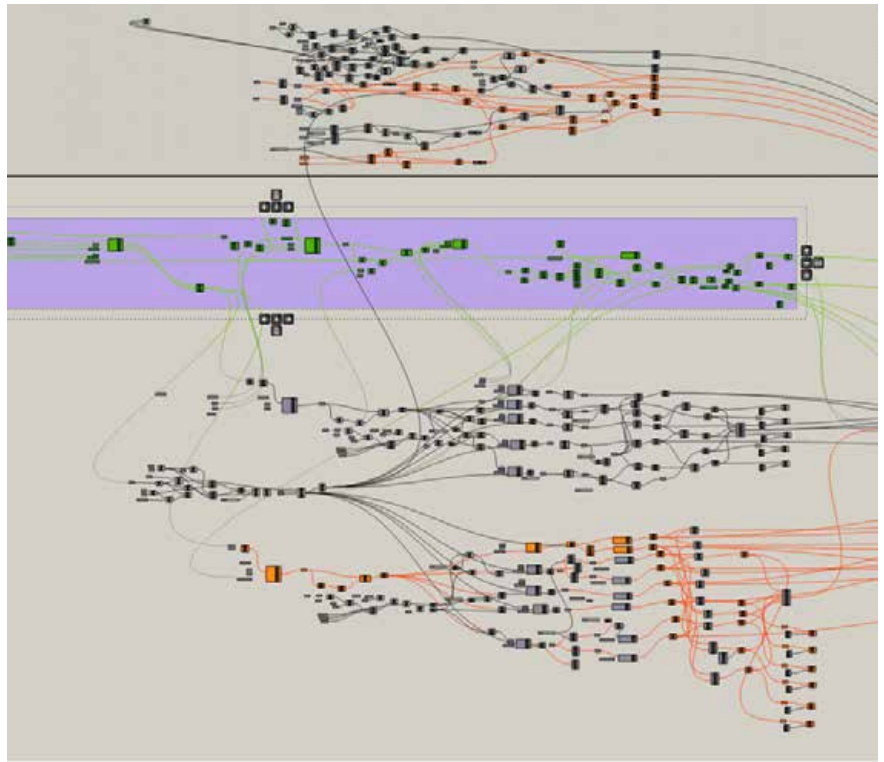
First the floors that are too small are discarded. The remaining floors are divided into surfaces that later are going to be the basis for each blocks. The whole floor first gets divided by the Amount Districts slider and all the curves separating surfaces in the district gets randomized. Curves separating districts remain straight.

42

grasshopper
city script
explained



The surfaces are then divided into two groups by Parks Per Floor slider. Some remain full for future public squares and some get their middle section trimmed by a curve inside to create a hollow courtyard. District separating streets get also another width with DsSepStrWidth slider.





43

grasshopper
city script
explained

The cables of the city is programmed to be separated into two groups. The primary and the secondary bearers. The primary bearers lead the load from the lower to the upper floors.

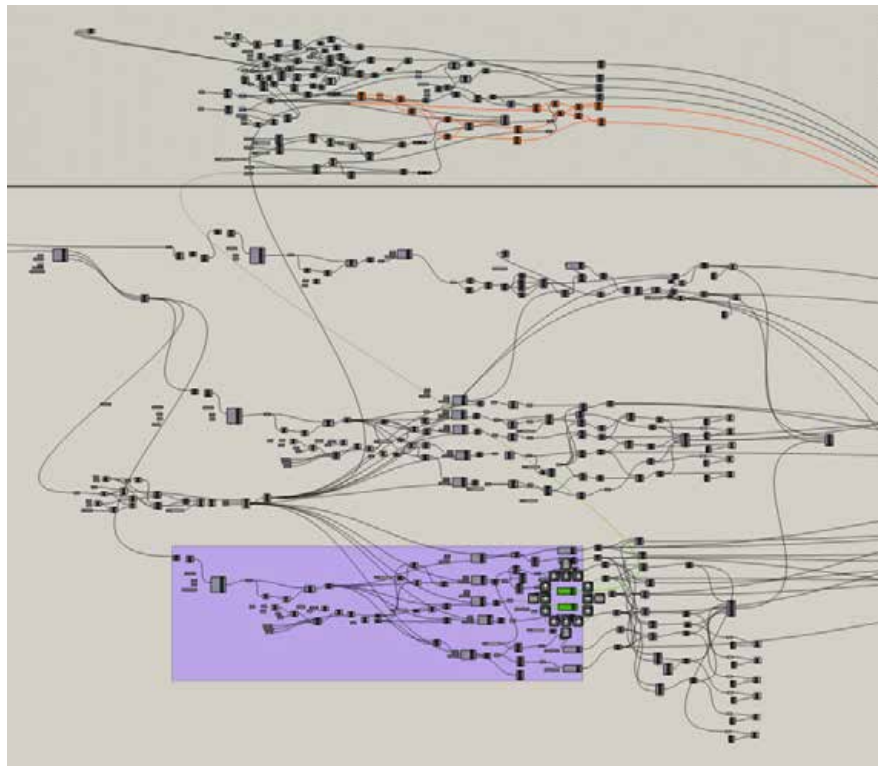
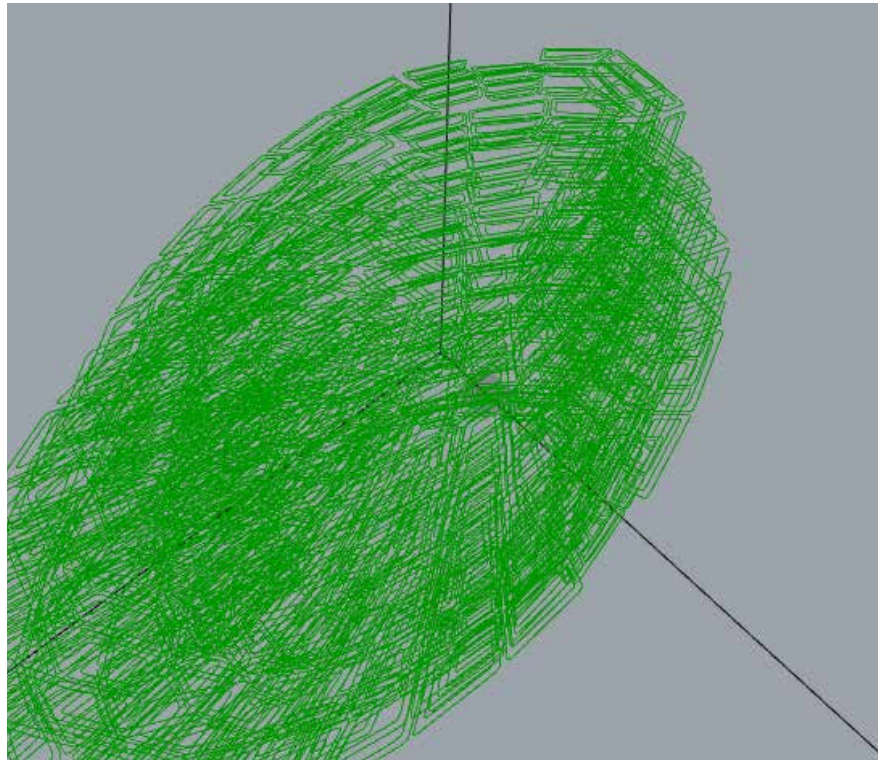
They begin from the middle of each block and end in the next. The secondary bearers take the load from each block and transfer that to the primary bearers.

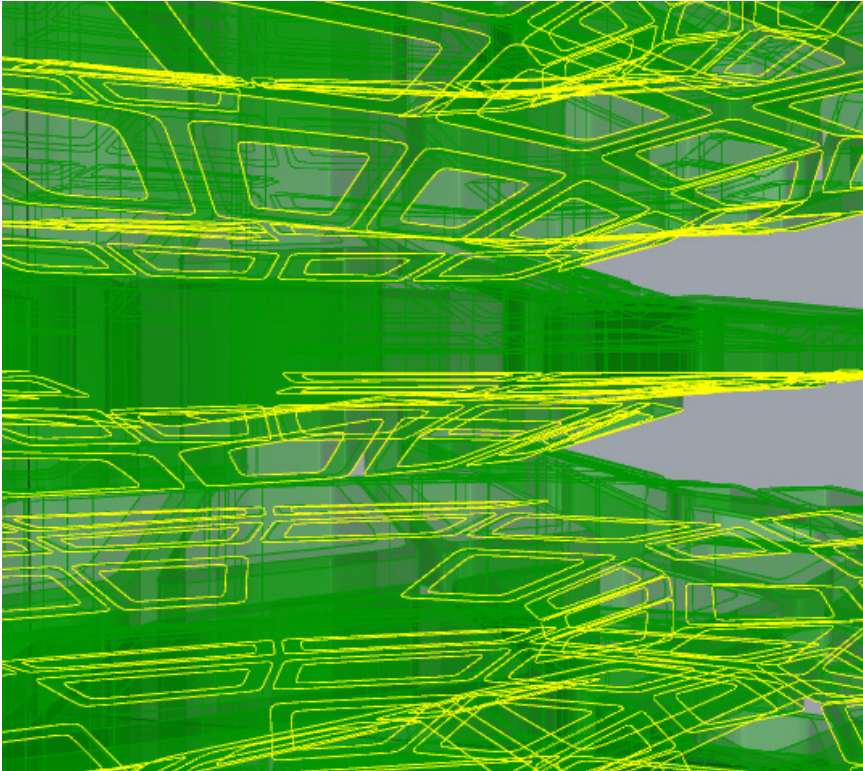


44

grasshopper
city script
explained

The non-public blocks have their basis in 2 offsetted curves. The offset determines the depth of buildings and range from 7 to 20 meters according to the light and space conditions.



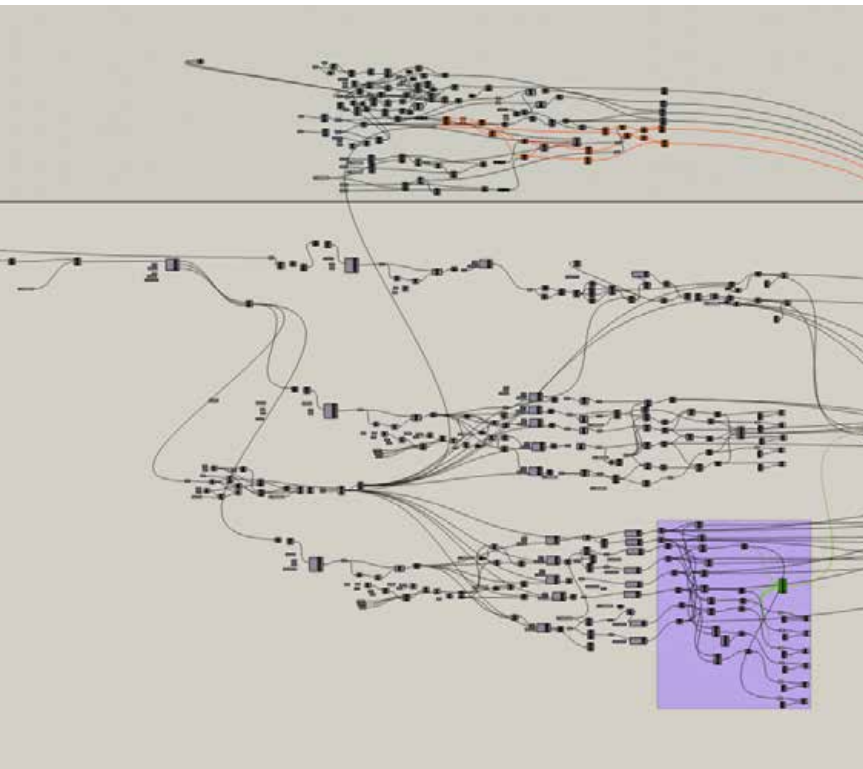


45

grasshopper
city script
explained

Then they get extruded according to where they are.

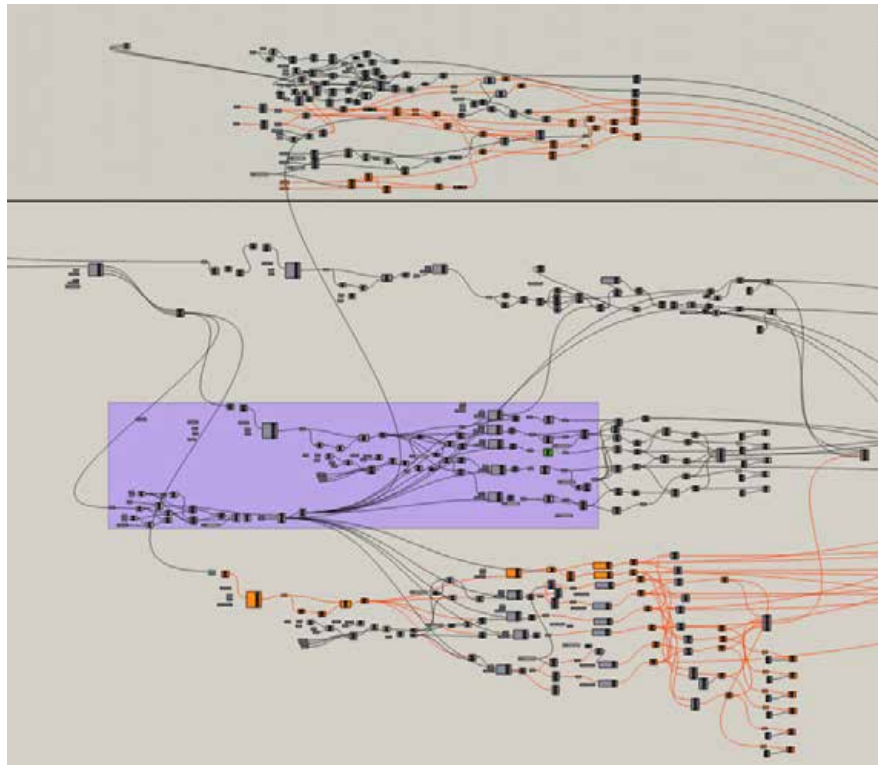
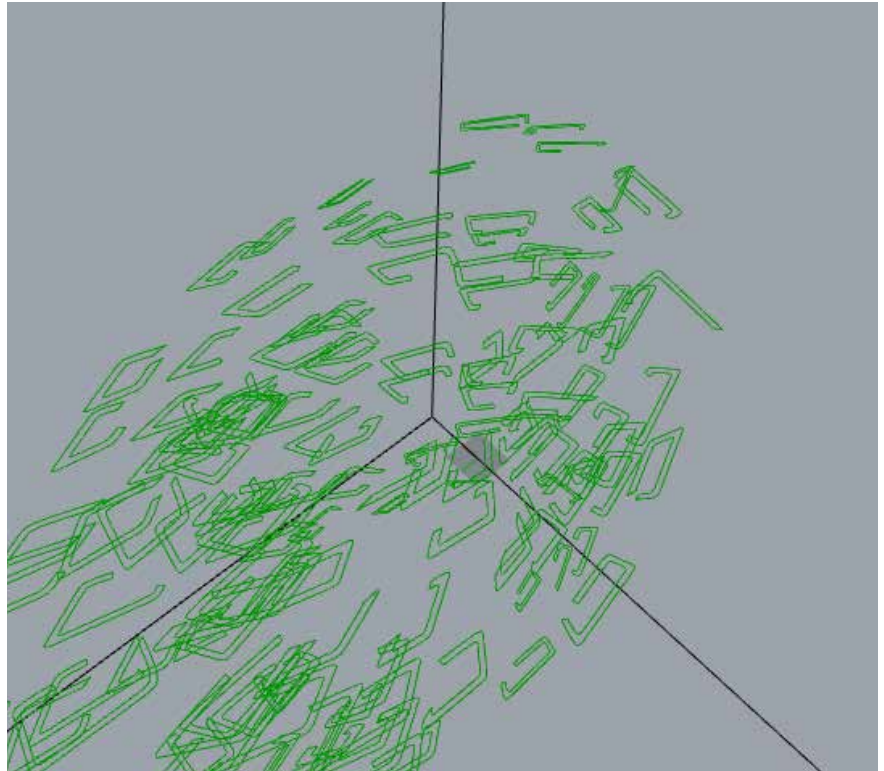
The inner ring of the project, the commercial part, closes the hole so they are as high as the half of the level height. The height of the other blocks range from minimum 8 meters and end at maximum 24.

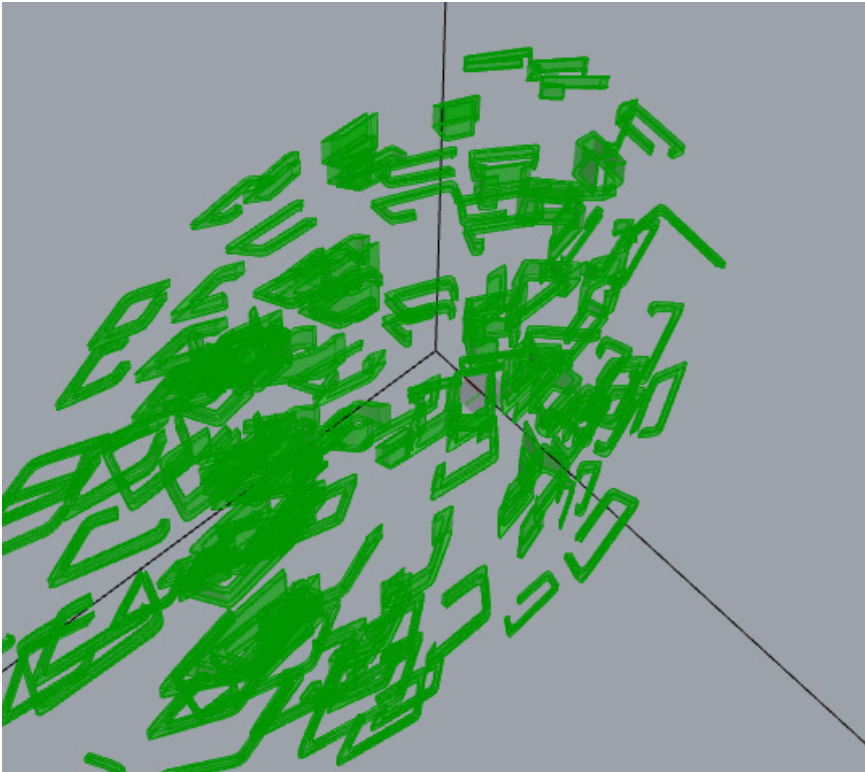


46

grasshopper
city script
explained

Public blocks are made from two offset non closed curves. This provides access to the inner courtyard which is in their case not trimmed.



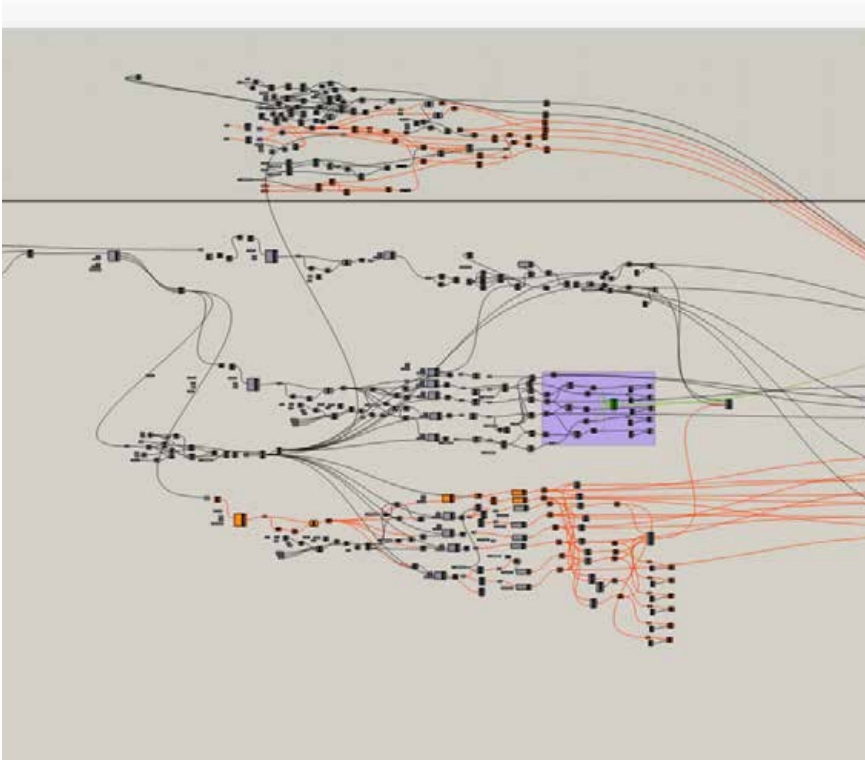


47

grasshopper
city script
explained

The height of the public blocks follow the non-public ones.

They contain more residential functions like parks in outer rings and more commercial functions like open-air concert venues in the inner ring.



48

animation

Animations and videos deliver the mood of spaces better than any other format of architectural representation. They combine the moving in space, sound and visuals together. Animations can also tell the story of a project. In Highway To Heaven we have two characters talking about the city, while traveling to it and walking in it. In their conversations they introduce the backstory of the city as well as how it functions. They criticise it. They also put it into a context, creating a story around it.

Highway To Heaven begins with a three minute intro telling a visual story of the fictional background events that have led to the building of Marina City.



50

animation

We continue with an image of measures taken by Singapore Municipality. Two kids are witnessing how it was not enough. The scene ends with immense amount of water until the horizon.

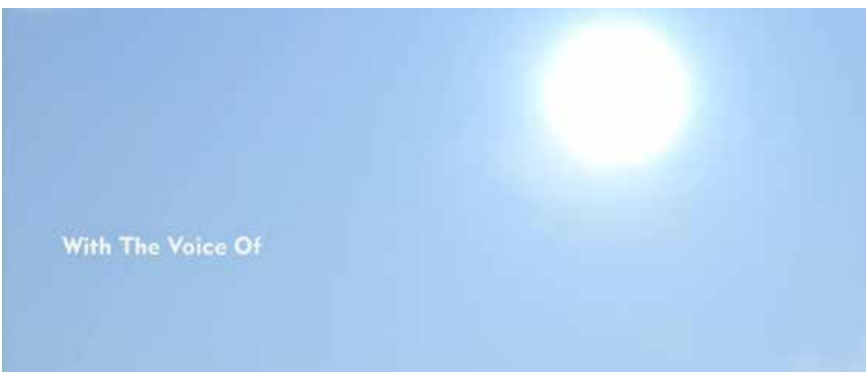
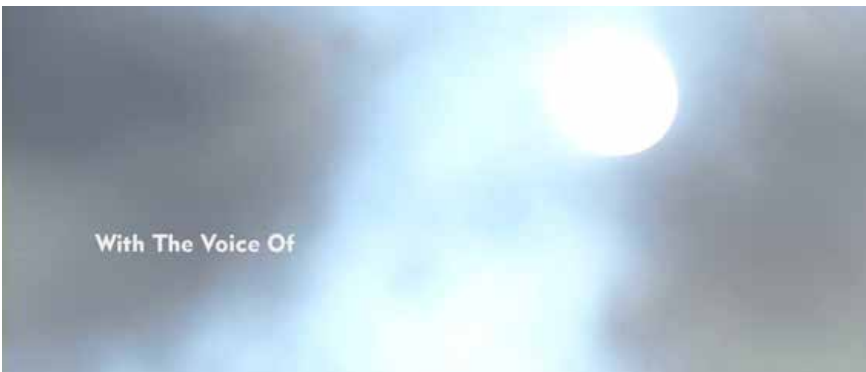
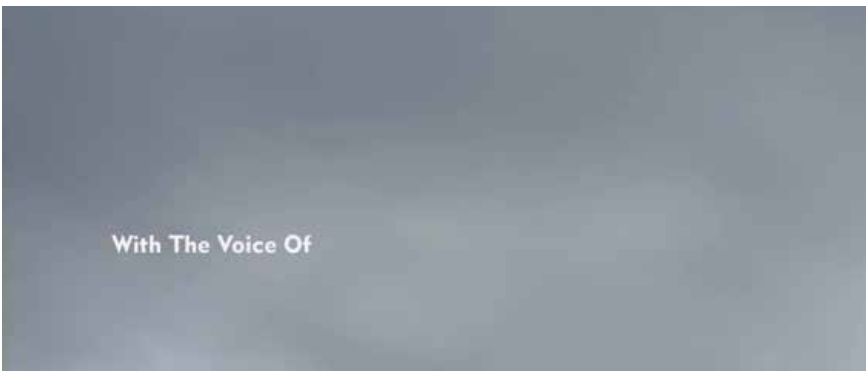




51

animation

In the next scene
we see the sun.
This indicates that
the weather getting
milder.



52

animation

Yet the next scene shows us that it is not over when we see a reporter looking at the news title: "20 cities still under water."

We then see a commity celebrating a founding of New Singapore.





53

animation

Next we see containers. As the camera zooms out we see that we are looking at ships traveling to a destroyed city that was once Singapore. The New Singapore is on its way.



54

animation

In next scene we see a big construction. New Singapore is being built very rapidly. We see then the result of this being quite a gray city.

In this scene lots of elements that make a place cold are used to give that feeling of monotoneness of a modern concrete city: The cold fluorescent lights, the non matching, not so artful billboards, construction sites of naked concrete, lightless streets and dirty water.





55

animation



Next we see a road advertisement:
"Carbon Nanotubes Are The Future" The advertisement proves this by hanging a concrete mixing transport truck (pointing to the old concrete becoming obsolete) of a very thin carbon nanotube string.





56

animation

Here we see the first glimpse of the rise of the space tourism by the first space elevator. We also see that the story has progressed into the 22nd century.

In the next scene we are reminded of La Madre again. Though the number of flooded cities have significantly decreased.





57

animation

We then see one of the first space elevators going up to space between the clouds.

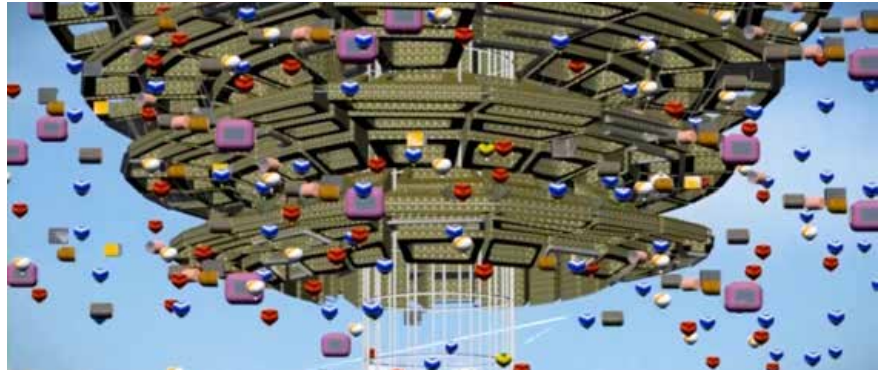


Next image is the Marina City being constructed. An advertisement on one of the hot air balloons say: „New Marina: A Floodfree Haven“. It points out to one of the goals of the project which is being seperated from earth protecting itself against certain catastrophes.



The construction site of the city also acts as a touristic spot showing the construction techniques for the interested.





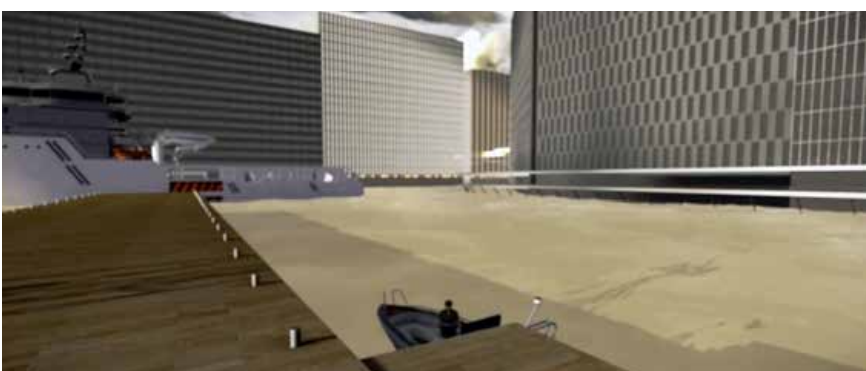
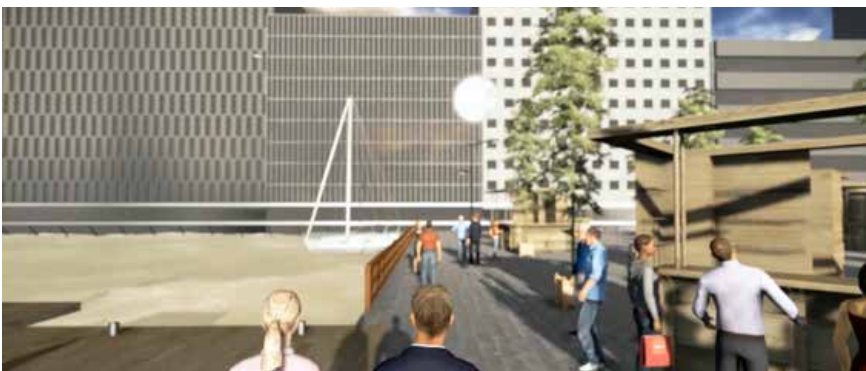
58

animation

Next we see the opening Marina City. The image is supposed to give a picture of a vibrant city. For this it is decorated with colorful inflatable structures of similar sizes but varying shapes.

This marks the finish of the intro having reached to the present time of the animation, that is mid 22th century.



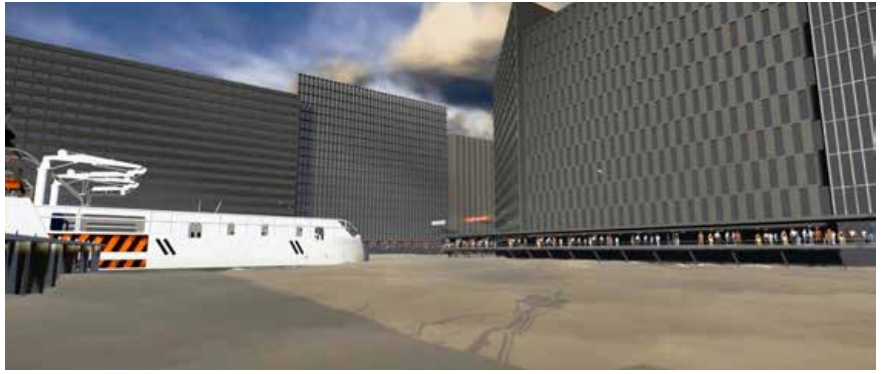


59

animation

In the next scene we find our two characters beginning with an interview. In the first scene we get to know who they are: Willie Musk who has been living in New Singapore and who have coordinated the Highway To Heaven project. Sofie plays the sceptical and curious interviewer.

In this scene they talk about how it feels to be back in New Singapore and the effects of Marina City on New Singapore.



animation

In the next scene they take a boat towards the cable car station that is going to take them to Marina City.





61

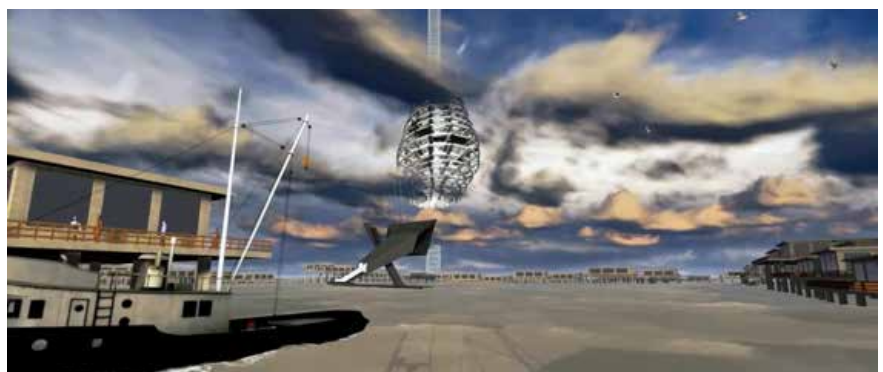
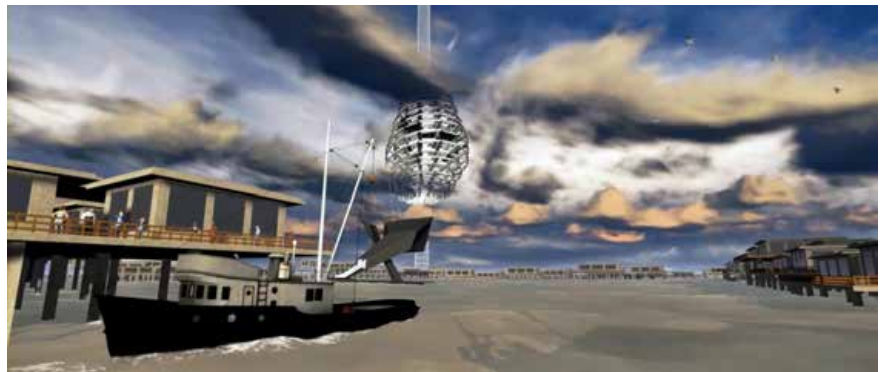
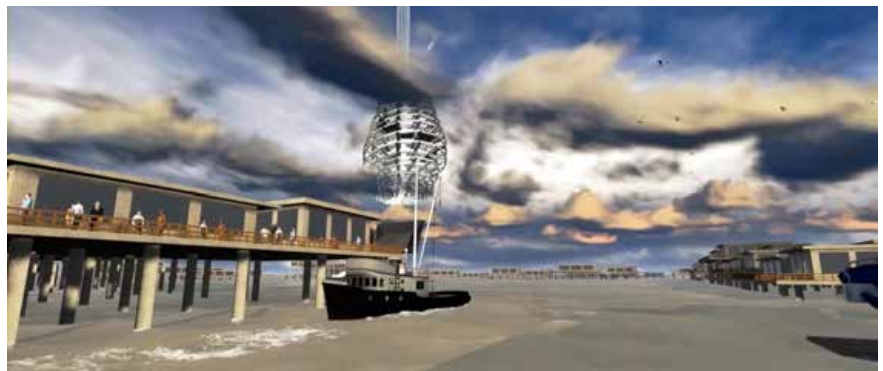
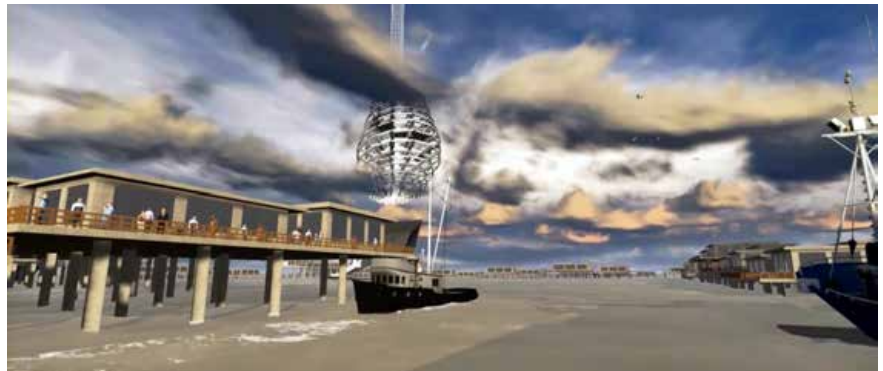
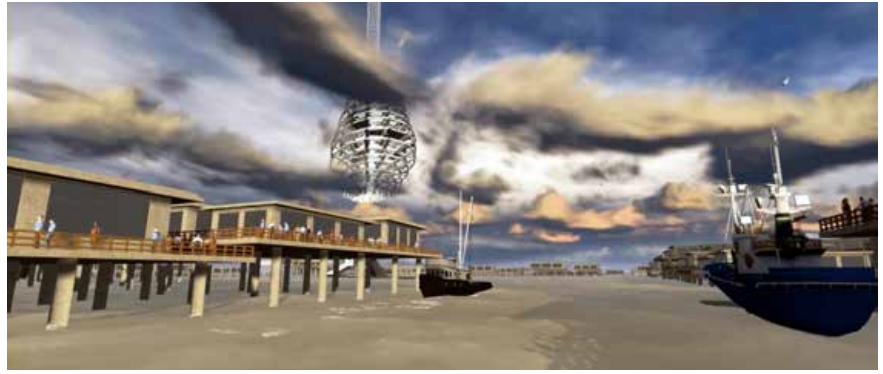
animation

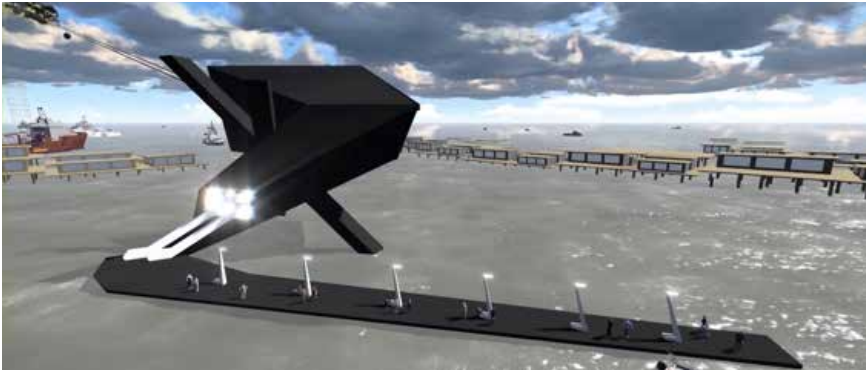
Here they talk mostly about the backstory of building the space elevator and the Marina City. Towards the end of the scene we get the first glimpse of Marina City seen from the surface of earth, hovering between the clouds.

62

animation

In the end of this scene we see the cable car station that is going to take our characters to Marina city.





63

animation

The cable car station has a very linear design that makes the eye follow a Z shaped line. This technique is often found in photographs and paintings. It helps leading the eye to a destination.

64

animation

The stairs leading up into the cable car station decorated with very strong lights marks the going towards the unknown. This kind of effect is seen in many science fiction movies where the characters move in awe dive into the light where the other side of it is a mystery. A similar effect in architecture can be seen in Kunsthalle Graz by Peter Cook where upon entering the exhibition spaces the visitors take an escalator to the upper level of darkness and unknown.





65

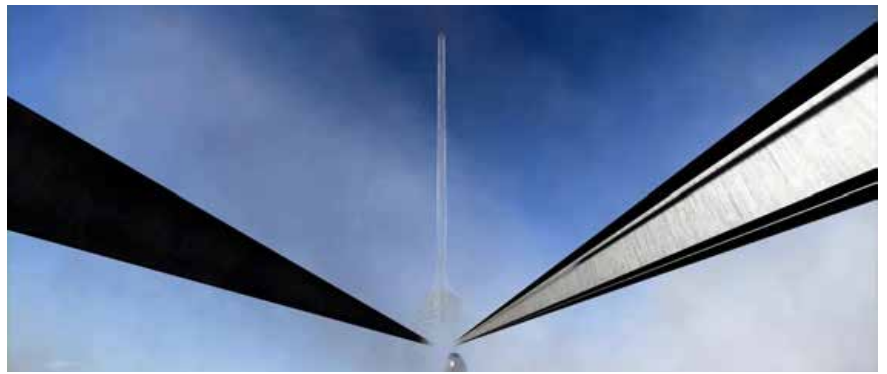
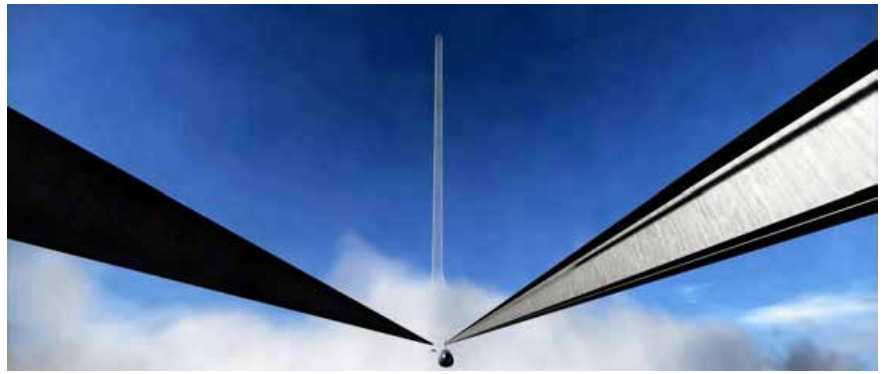
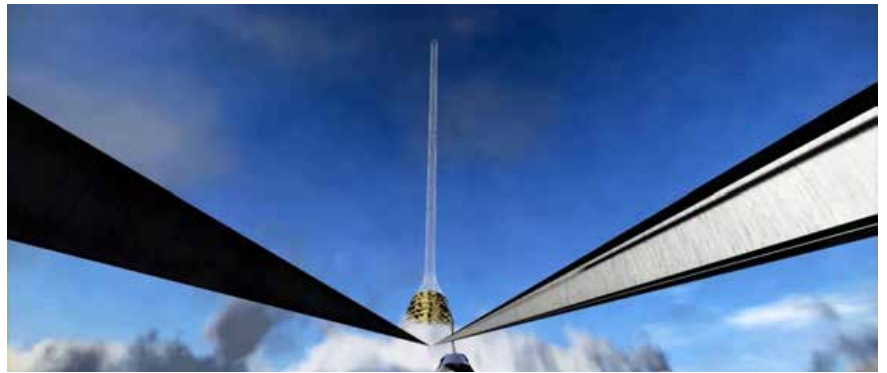
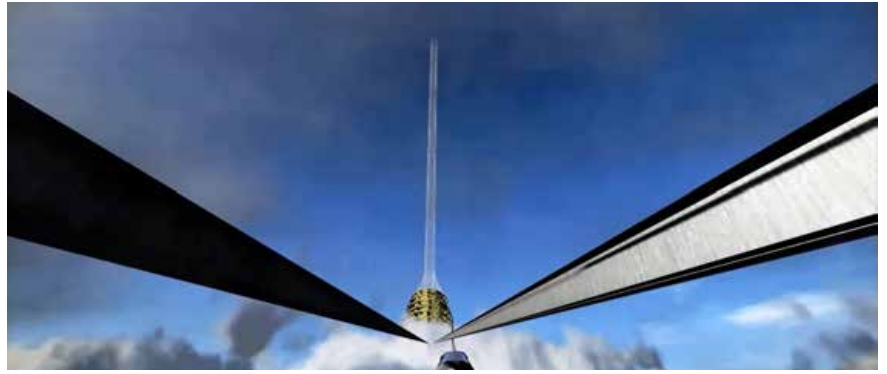
animation

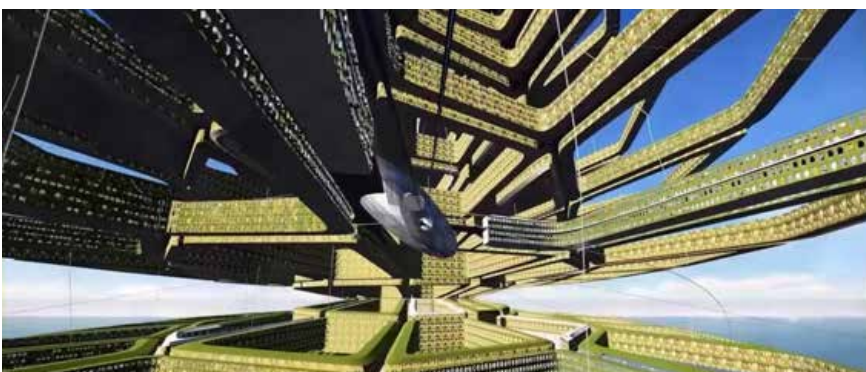
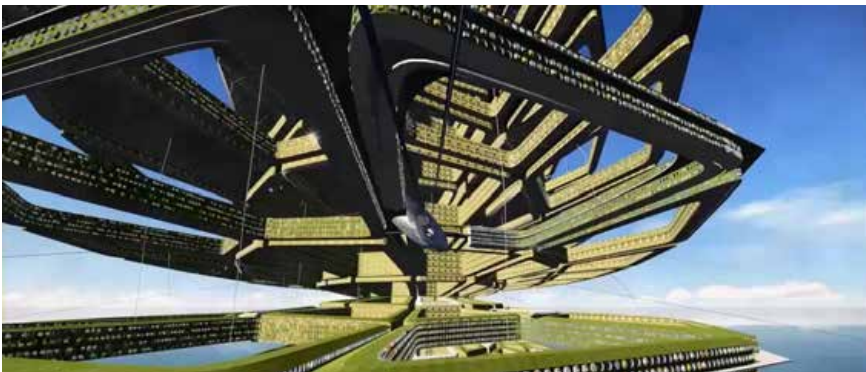
The characters take the cable car and begin traveling to Marina City. At this point since the Marina City is slowly coming into view they begin to talk about how the city was designed.

66

animation

Hiding the Marina City behind the clouds creates another tension where the release of it by showing the city creates the feeling of wonder.

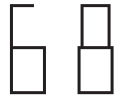




67

animation

The transition of being outside of the city and perceiving it as a sculpture and then being inside of it and perceiving it as architecture (or stage design) is being made clear here. Steen Eiler Rasmussen also describes this in the introduction of his book *Experiencing Architecture*.



animation

In the next scene we find ourselves suddenly in a different, colorful world contrasting with the muted colored world of New Singapore. Our characters begin walking in a square. The trees in the square are acting as sculptures with their giant flower pots marking their points. They walk towards the hole and on the way they go through a residential street with different capsules. Different and vibrant colors here again create a positive atmosphere.





69

animation

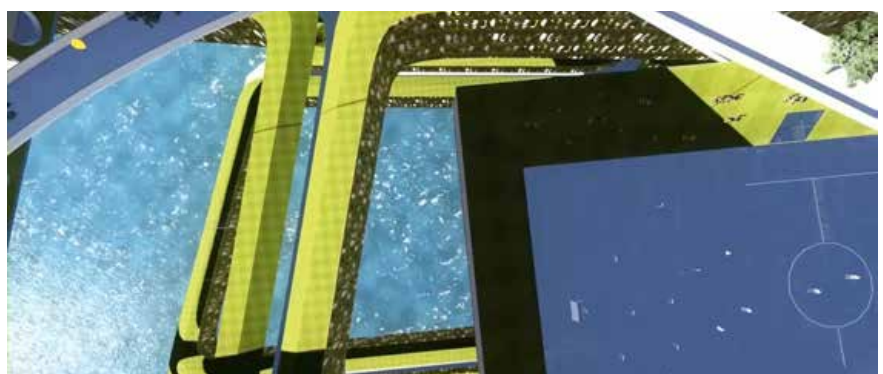
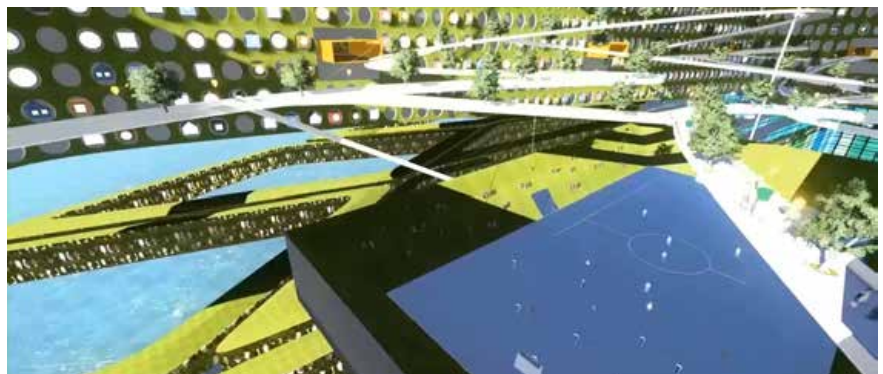
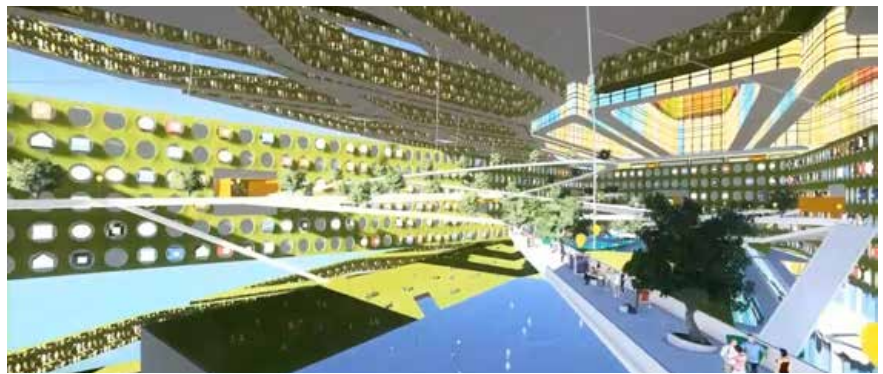
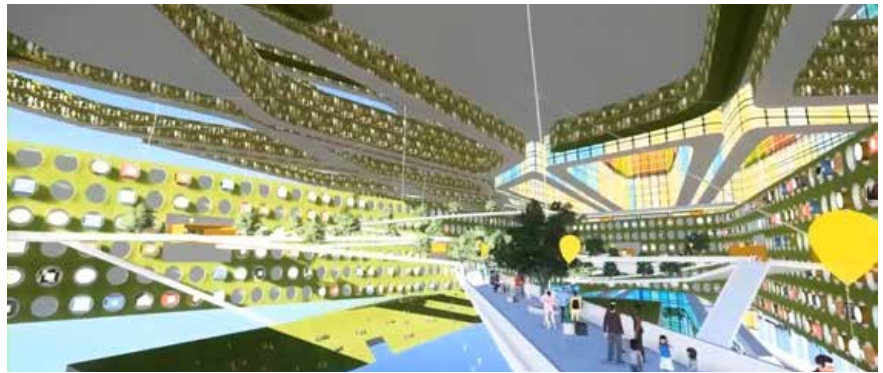
The varying basic shapes (squares, circles...) in their round slots contribute to this atmosphere as well by showing a happy variation (different basic shapes) within a repeating frame (round slots).

This technique is described in detail in the book *The Visual Arts As Human Experience* by Donald L. Weismann.

70

animation

Next, our characters go to one of the courtyards of the city. Here they find one of the places for activities, in this case a football field with a glass floor where you can have the feeling of playing football in air.





71

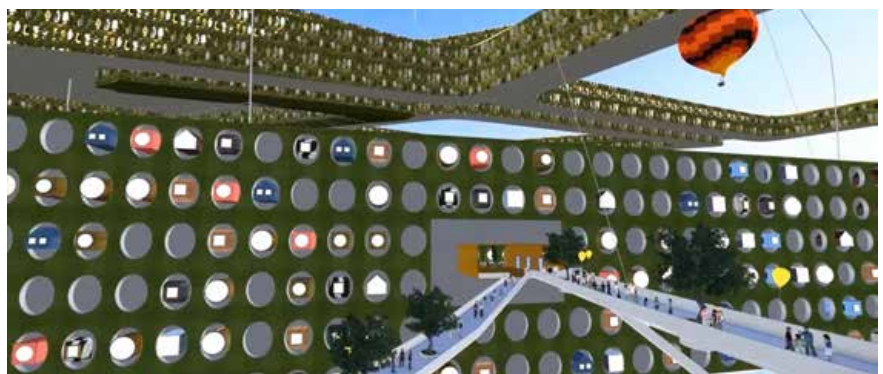
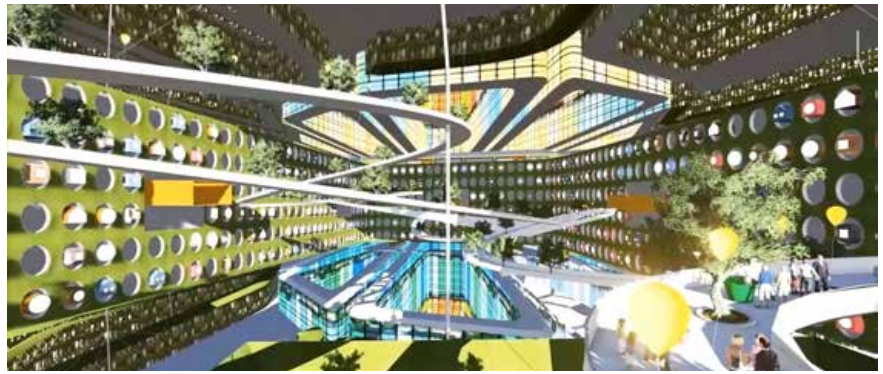
animation

Going further we take in more of the atmosphere in the courtyard.

72

animation

The vibrant character of the district is also present in this districts courtyard. The characters also talk about another district where Willie Musk used to live. It is described as being dark, having an atmosphere similar to the movie Blade Runner.





73

animation

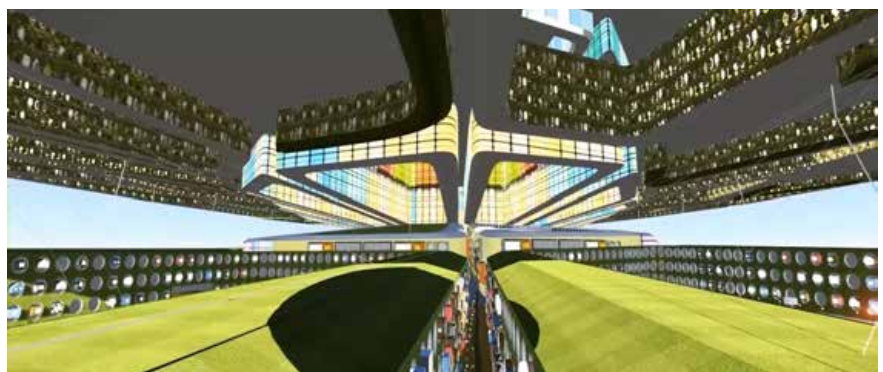
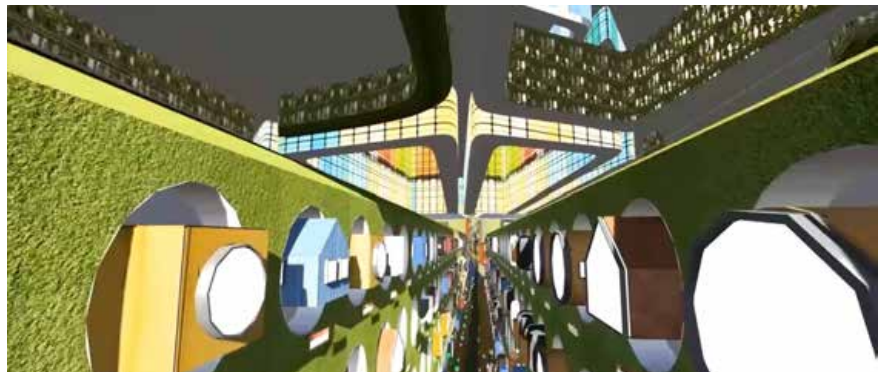
They also talk about these designs evoking certain expectations in people.

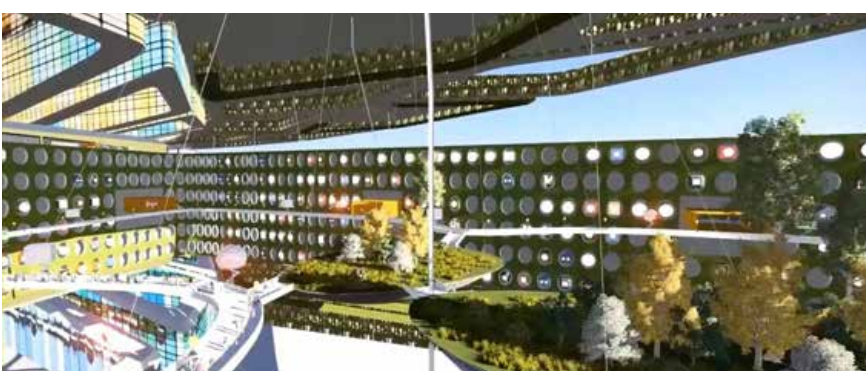
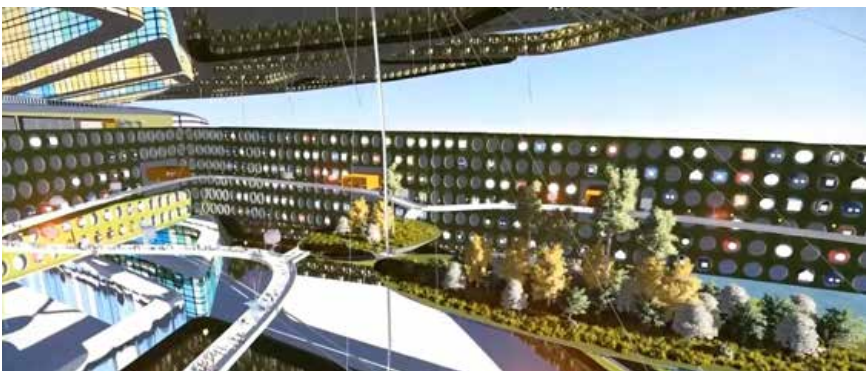
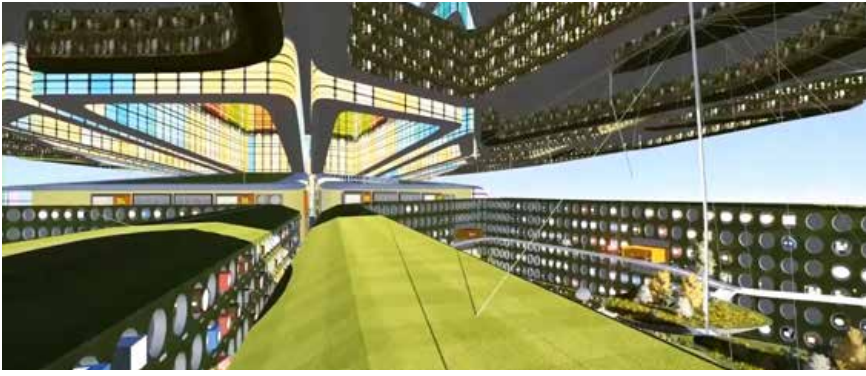
By having different themes in its districts Marina City brings together people of similar tastes into each district.

74

animation

The animation also provides views from different points for us from time to time so we get to know how the city looks like from the point of view of its users. In this case we see the street from a higher angle as if we would be living in one of the capsules.





75

animation

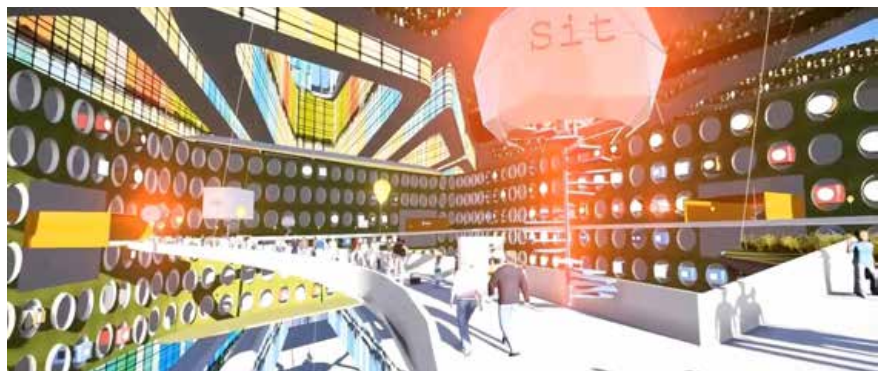
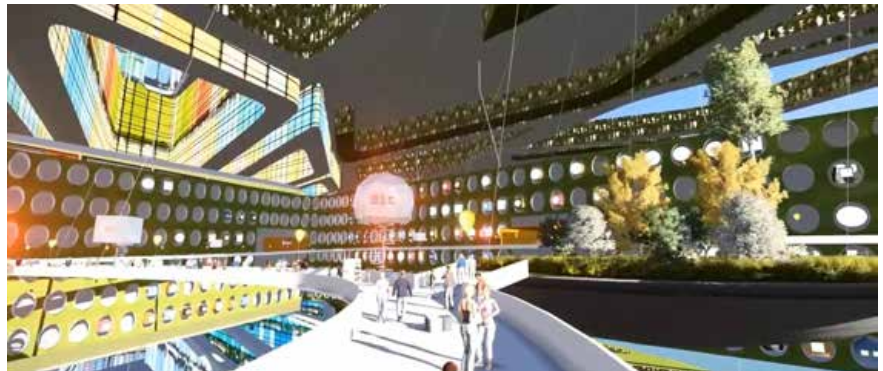
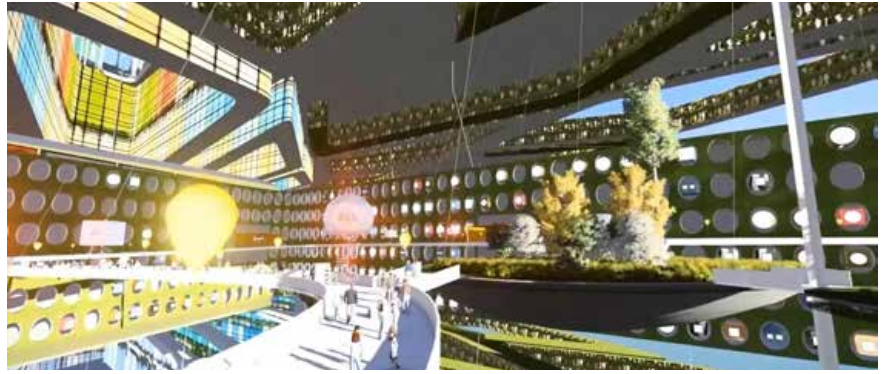
We then travel further to the next courtyard where we see a park island.

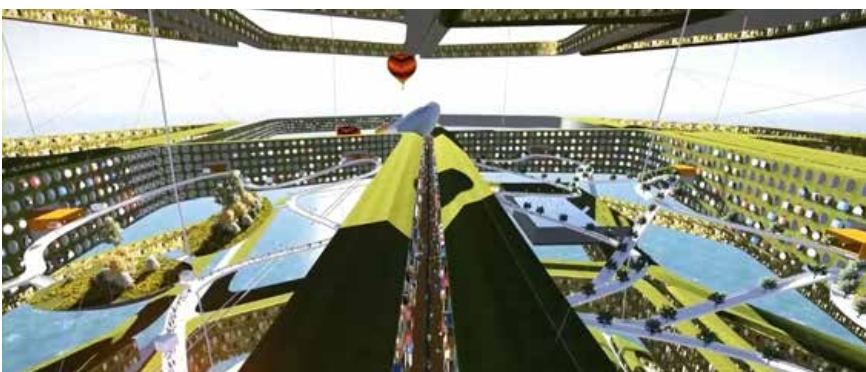
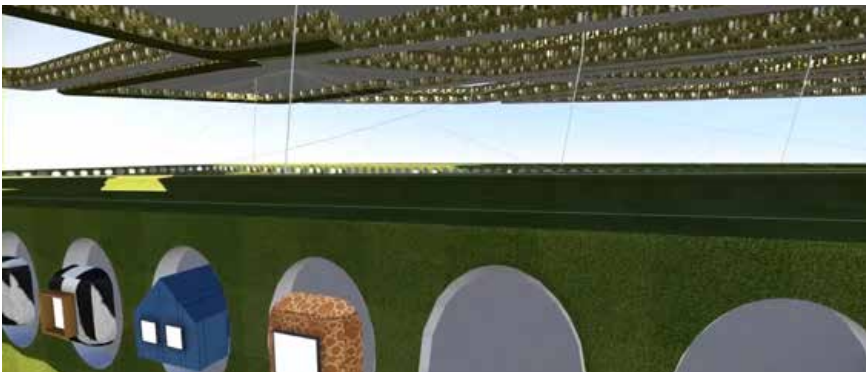
The activities in Marina City are designed to be special experiences which one can't find in other cities to make them attractive to tourists and also to its users.

76

animation

Another one of these experiences is named as „Sit“. These are similar to tree houses where people have a semi private space to hang out in the middle of the street. They vary in design some being more and some being less private.





77

animation

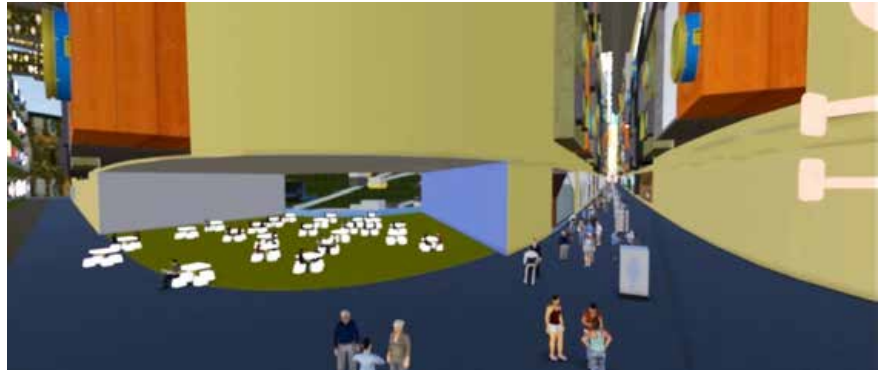
In the end of this scene the camera moves above the road between the two blocks and look back to get a general picture of the scene.

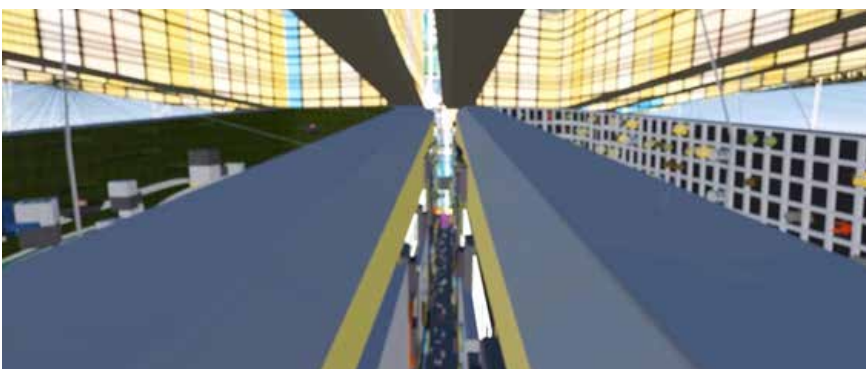
78

animation

In the next scene our characters begin to walk between two hotels. The hotels have shops and offices in their facades facing the street.

The characters talk about how the commercial zone of the city works. They explain that these bigger capsules don't move around but they are a way for firms to represent their own corporate identity.



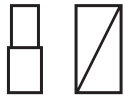


79

animation

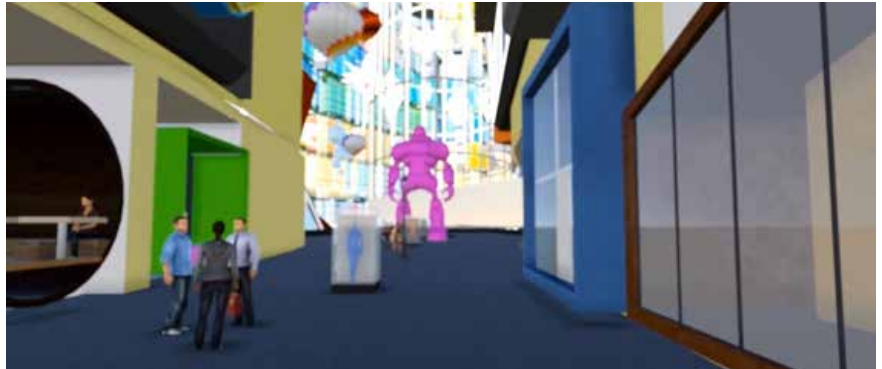
They also talk about that there are small capsules that can travel around and dock themselves to certain slots in the facades acting as traveling shops. They slightly change the flavor of the neighbourhood they are in.

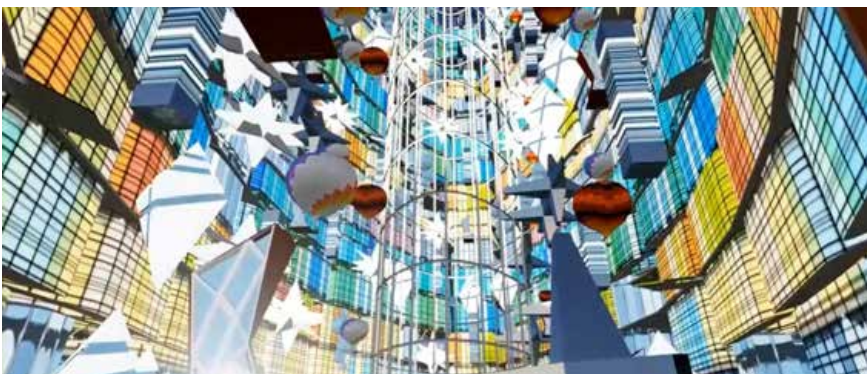
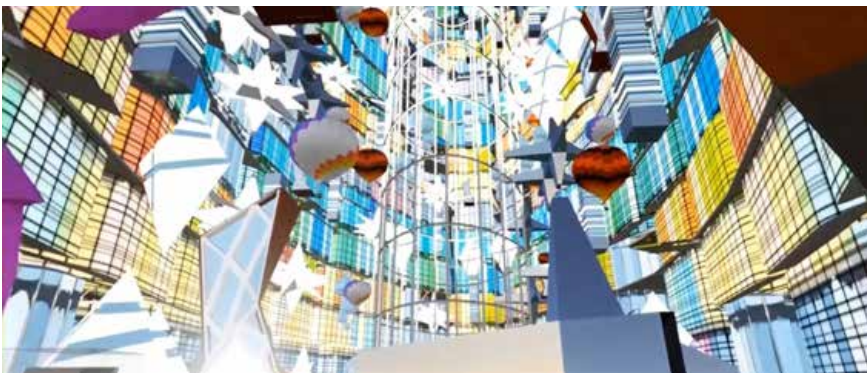
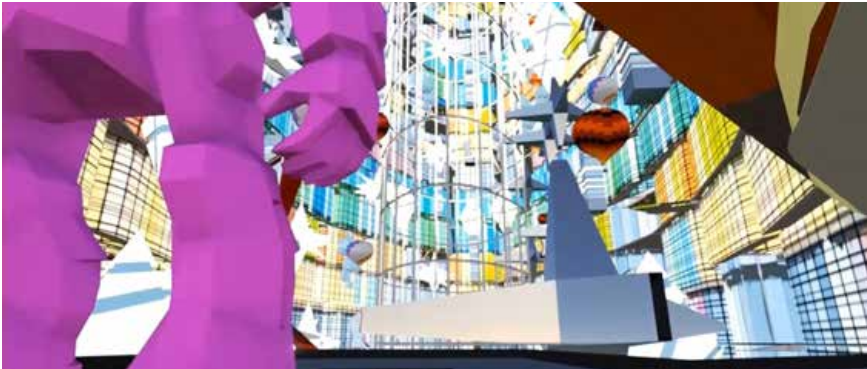
Facing the courtyard we see the two hotels. They both play with the idea of living inside objects. On the right one the rooms are in the shape of daily objects like bread or apple. The one on the left side we see rooms with themes. For example we see themes of spaceships, pools.



animation

The walk and talk part of the animation ends towards the end of this street. The camera suddenly moves faster accompanied by the energetic song „(You Got) What I Need“ by Freddie Scott.





01

animation

We suddenly enter a very big space with lots of color and lots of different objects.

This space is inspired by two things. One is rivers in the cities. They make the cityscapes possible by creating some distance between viewers and the city. Same effect was targeted by the design of the hole where the city is in the background and there are special structures swimming in the foreground. The second inspiration of this space is Times Square with its lots of billboards, screens and lots of movement. This is to create a rich, busy looking atmosphere which provokes people to come here and make the atmosphere even richer.



48



49

animation

One minute into the
outro, it begins
to tell the space
elevator experience.



50



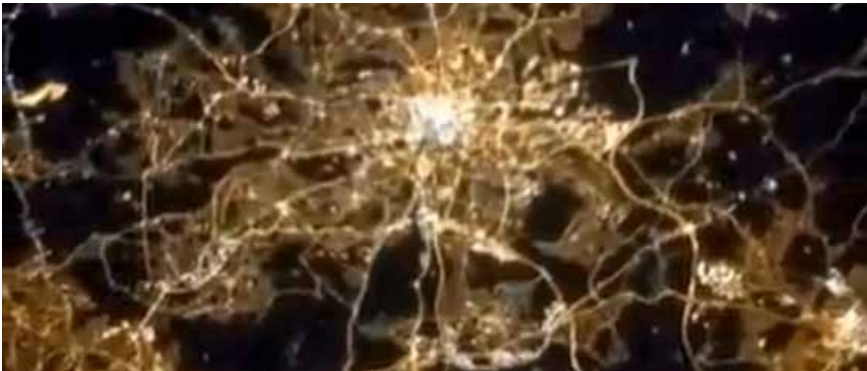
51



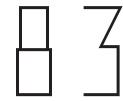
52



53



54



animation

It begins with views you might encounter when you are travelling to space. First images are of clouds, then we see patterns of weather or man-made structures from earth.



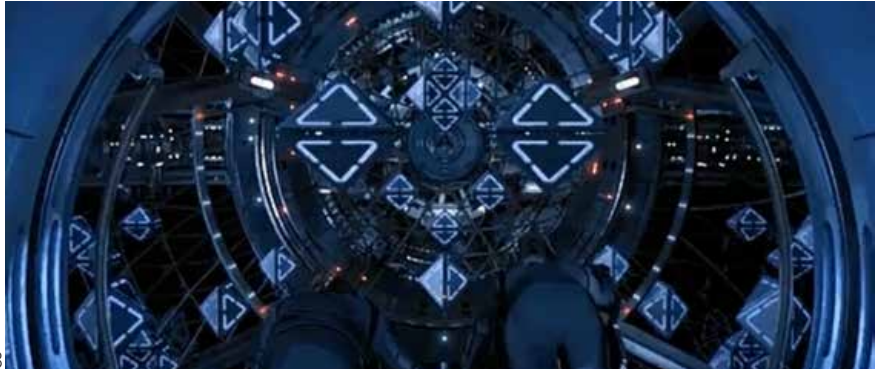
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84



59

animation

Next, we are looking at the potential space elevator activities. The images are taken from movies such as Gravity, Enders Game or from footage in vomit comets or from footage in International Space Station.



60



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62



63



64

85

animation

The footages try to show how many different things can be done in weightless environment.



65



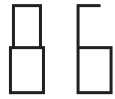
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69

Animation

The things one can do range from simple tasks like eating or washing your hair, which are not so simple in space to new kind of sports like the laser tag game shown in the movie Enders Game.



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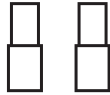
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animation

The animation ends after the outro and we see the credits, showing the bibliography of the project and other sources like youtube videos, documentaries and songs.

list of images



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- 02 Constantinos A. Doxiadis, Ekistics, Oxford University Press, New York, 1968, p114
- 03 Constantinos A. Doxiadis, Ekistics, Oxford University Press, New York, 1968, p115
- 04 Constantinos A. Doxiadis, Ekistics, Oxford University Press, New York, 1968, p137
- 05 Constantinos A. Doxiadis, Ekistics, Oxford University Press, New York, 1968, p137
- 06 Constantinos A. Doxiadis, Ekistics, Oxford University Press, New York, 1968, p149
- 07 Kevin Lynch, The Image Of The City, MIT Press, Cambridge MA, 1960, p47
- 08 Kevin Lynch, The Image Of The City, MIT Press, Cambridge MA, 1960, p47
- 09 Kevin Lynch, The Image Of The City, MIT Press, Cambridge MA, 1960, p47
- 10 Kevin Lynch, The Image Of The City, MIT Press, Cambridge MA, 1960, p47
- 11 Kevin Lynch, The Image Of The City, MIT Press, Cambridge MA, 1960, p48
- 12 Archigram, Peter Cook, Princeton Architectural Press, New York, 1999, p37
- 13 Archigram, Peter Cook, Princeton Architectural Press, New York, 1999, p23
- 14 http://www.staschok.info/galerien/nasa_gallery/imagepages/image16.html
- 15 <http://hi-seas.org/?p=267>
- 16 <http://diveivedive.org/trips/doing-it-and-doing-it-in-prague-332717>
- 17 <http://renaudfavier.com/2013/03/16/tout-le-monde-plane-en-france-maintenant/>
- 18 <http://www.flickr.com/photos/geroyche/5528519975/>
- 19 Ernst H. Gombrich, The Sense Of Order, Phaidon Press, London, 2002, p94
- 20 Ernst H. Gombrich, The Sense Of Order, Phaidon Press, London, 2002, p8
- 21 Ernst H. Gombrich, The Sense Of Order, Phaidon Press, London, 2002, p8
- 22 Ernst H. Gombrich, The Sense Of Order, Phaidon Press, London, 2002, p8
- 23 Movie Snapshot: Artificial Intelligence
- 24 Movie Snapshot: Ghost In The Shell
- 25 Movie Snapshot: 5th Element
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- 28 http://www.staschok.info/galerien/nasa_gallery/imagepages/image16.html
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- 31 <http://renaudfavier.com/2013/03/16/tout-le-monde-plane-en-france-maintenant/>
- 32 <http://www.flickr.com/photos/geroyche/5528519975/>
- 33 http://www.gorgelous.com/?attachment_id=9760
- 34 <http://science.howstuffworks.com/zero-g.htm>
- 35 <http://www.glogster.com/dustincollins/jupiter/g-6m9jfp828rid9dbssuolpa0>
- 36 http://www.acclaimimages.com/_gallery/_pages/0124-0611-0118-2052.html
- 37 http://media01.bigblackbag.net/39126/portfolio_media/lwsm_citrus-tent-i_1006.jpg
- 38 http://www.theregister.co.uk/Print/2012/04/10/whisky_space_experiment/
- 39 http://www.nanmeebooks.com/webboard/topic.php?postid=00005725&wbr_id=18
- 40 http://www.staschok.info/galerien/nasa_gallery/imagepages/image16.html
- 41 <http://zharifalimin.blogspot.co.at/2010/08/jam-moden-vs-jam-matahari.html>
- 42 <http://www.glogster.com/dustincollins/jupiter/g-6m9jfp828rid9dbssuolpa0>
- 43 <http://www.iafastro.net/?id=912>
- 44 <http://www.broadwayworld.com/philadelphia/article/Walnut-Streets-Peter-Pan-Flies-High-20071117#.UyHzkd95N8E>
- 45 http://commons.wikimedia.org/wiki/File:Milky_way_2_md.jpg
- 46 <http://www.visualact.se/products/fly-and-3d/>
- 47 http://www.imogenheap.com/iblog/archive/2006_11_01_archive.html
- 48 Earth From Space, Iain Riddick, PBS Nova, 2013
- 49 Earth From Space, Iain Riddick, PBS Nova, 2013
- 50 Earth From Space, Iain Riddick, PBS Nova, 2013
- 51 Earth From Space, Iain Riddick, PBS Nova, 2013
- 52 Earth From Space, Iain Riddick, PBS Nova, 2013
- 53 Earth From Space, Iain Riddick, PBS Nova, 2013
- 54 <https://www.youtube.com/watch?v=FBK-4JkKfxE>
- 55 <https://www.youtube.com/watch?v=FBK-4JkKfxE>
- 56 Earth From Space, Iain Riddick, PBS Nova, 2013
- 57 Earth From Space, Iain Riddick, PBS Nova, 2013
- 58 Ender's Game, Gavin Hood, Orson Scott Card, Summit Entertainment, 2013
- 59 <https://www.youtube.com/watch?v=7hlxpLF4u4A>
- 60 <https://www.youtube.com/watch?v=FdQA-pE2luQ>
- 61 <https://www.youtube.com/watch?v=xrjosOjv1Oc>
- 62 <https://www.youtube.com/watch?v=P5FuPC6nsH0>
- 63 How Earth Began - Beginning Of Life On Earth, David Hutt, Pioneer Film & Television Productions, 2009
- 64 <https://www.youtube.com/watch?v=FdQA-pE2luQ>
- 65 Ender's Game, Gavin Hood, Orson Scott Card, Summit Entertainment, 2013
- 66 <https://www.youtube.com/watch?v=kOIJ7AgonHM>
- 67 Ender's Game, Gavin Hood, Orson Scott Card, Summit Entertainment, 2013
- 68 <https://www.youtube.com/watch?v=ZQ2T90JY1lg>
- 69 How Earth Began - Beginning Of Life On Earth, David Hutt, Pioneer Film & Television Productions, 2009
- 70 Gravity, Alfonso Cuarón, Sandra Bullock, Warner Bros., 2013
- 71 <https://www.youtube.com/watch?v=doN4t5NKW-k>
- 72 <https://www.youtube.com/watch?v=3R7iMv2GXHI>
- 73 Ender's Game, Gavin Hood, Orson Scott Card, Summit Entertainment, 2013
- 74 How Earth Began - Beginning Of Life On Earth, David Hutt, Pioneer Film & Television Productions, 2009
- 75 <https://www.youtube.com/watch?v=ZQ2T90JY1lg>
- 76 <https://www.youtube.com/watch?v=doN4t5NKW-k>
- 77 Gravity, Alfonso Cuarón, Sandra Bullock, Warner Bros., 2013

bibliography

Bradley C. Edwards, *The Space Elevator NIAC Phase II Final Report*, Eureka Scientific, 2003

Bradley C. Edwards, *Design And Deployment Of A Space Elevator*, Los Alamos National Laboratory, Los Alamos, 2000

Mark S. Avnet, *The Space Elevator In The Context Of Current Space Exploration Policy*, Engineering Systems Division MIT, Cambridge MA, 2006

Steen Eiler Rasmussen, *Experiencing Architecture*, MIT Press Cambridge MA, 1966

Constantinos A. Doxiadis, *Ekistics*, Oxford University Press, New York, 1968

Kevin Lynch, *The Image Of The City*, MIT Press, Cambridge MA, 1960

Archigram, Peter Cook, *Princeton Architectural Press*, New York, 1999

Ernst H. Gombrich, *The Sense Of Order*, Phaidon Press, London, 2002

Christoph Duesberg, *Megastrukturen*, DOM Publishers, Berlin, 2013

George R. Collins and Christiane Crasemann Collins, Camillo Sitte *The Birth Of Modern City Planning*, Dover Publications, New York, 2006

R. Mike Mullane, *Do Your Ears Pop In Space?*, John Wiley & Sons Inc., New York, 1997

Robert Venturi & Denise Scott Brown & Steven Izenour, *Learning From Las Vegas*, The MIT Press, Cambridge MA, 1977

Robert Venturi & Denise Scott Brown, *Architecture As Signs And Systems*, The Belknap Press Of Harvard University Press, Cambridge MA, 2004

Jane Jacobs, *The Death And Life Of American Cities*, Vintage Books, New York, 1961

Jane Jacobs, *The Economy Of Cities*, Vintage Books, New York, 1970

David E. H. Jones, *The Inventions Of Daedalus*, W.H. Freeman And Company, New York, 1982

Donald L. Weismann, *The Visual Arts As Human Experience*, Prentice Hall Inc., New Jersey, 1970

David Bordwell & Kristin Thompson, *Film Art*, McGraw-Hill, 2004

Sabrina Van Der Ley & Markus Richter / *European Art Projects*, Megastructure Reloaded, Hatje Cantz Verlag, Ostfildern, 2008

Rem Koolhaas, *Project Japan Metabolism Talks*, Taschen, Cologne, 2011

Bernard Tschumi, *Event Cities 2*, MIT Press, Cambridge MA, 2001

Cedric Price, *Re:CP*, Birkhäuser-Publishers For Architecture, Berlin, 2003

