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An infrastructure-based approach to design
scenarios in Qianhai Bay (China)
Questioning landscaped amenities
A LURE TO NATURE



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Foreword

This thesis is about the designing process of a park set in a floodplain beside a canal where excess rain water from the overlooking hills can discharge in its way to the sea during the rainy season. This lot of land is part of Qianhai, a neighbourhood of Shenzhen in the South of China. To achieve this goal, I'll start by analysing the actual situation of this parcel, then the cultural and historical inheritance that will affect the design and, last but not least, the environmental problematics that should be considered for any new project of architecture or urban design.

I will write about the dichotomy of artificial and natural landscapes, then about the Chinese traditional garden and the modern gardens.

The next phase will be about introducing what I want to make for different gardens, cultural buildings and commercial buildings. This will regard the philosophy and aesthetics of urbanism, landscaping and buildings.

I'll go through analysing the buildings from an ecological point of view for three influential technical features: the urban heat island, the green-roof and the ecological use of concrete. Nonetheless, it's of the uttermost important to start by imagining which of the needs and feelings of the end-users could be and find the means of satisfying them properly.

Yet there is the constrain of designing the works trying to make "nature" through an "artifice". To understand better this task, a short description of the place and the definition of nature and artifice are needed.

1

The Designed Area Levels

MAP OF DESIGNED AREA



The piece of land that is concerned in my design is a floodplain. First it must be modified in its orography leaving room enough in the middle for water discharge and rising its side stripes to make two usable stretches of land. So, there will be a central canal, whose top is at sea level. Then at both its sides two slopes.

These slopes rise to 3.4 m a.s.l. (above sea level) making the banks that will contain the streaming water in heavy-rain season. There will be no buildings there, except containment walls. The vegetation will consist of amphibian plants, such as mangroves and reeds. It's a place that can be usually flooded every year in the rainy season, but that is normally dry.

Above this buffer zone, there is a third level, more or less flat, at 5.5 m a.s.l., where regular gardens will be cultivated. This is a zone that may be flooded only exceptionally, let's say once in twenty years, and where the stream should never be so strong to destroy what's in it. Here there will be mainly gardens, so it's called the garden level.

The last and safest level, the top level, at 8 m a.s.l., is supposed not to be washed by the streaming water of the canal. Here there will be all the buildings of the park and some more gardens among them. These buildings will be the museum, the library, the community centre, the slow-food pavilion, the food-hall, the restaurant, the Spa centre, the sport centre, the sailing club and the football club.

Between the bank and the garden level and the garden and the building level there will be stone-walls to retain the earth above. They must be

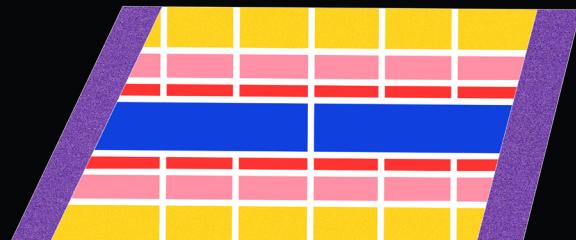
structured strong enough to sustain the ground above and the impact of eventual flooding waters.



Section



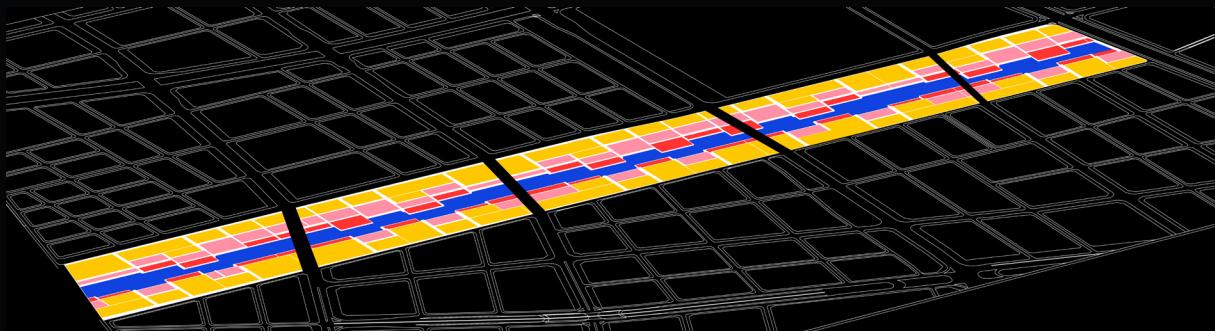
Plan layout



Layout with design zones grid

- █ Top level - 8m a.s.l
- █ Third level - 5.5m a.s.l
- █ Buffer zone - 3.4m a.s.l
- █ Sea level - 0m a.s.l

Aerial view with zones grid



2

Goal of This Design

Going back to the plot of land in Qianhai, Shenzhen, which tasks can be achieved and how?

Being a public space of limited extension, the best use of it can be for educational and social purpose. For this goal I should think about what could be useful for society, meaning by that inhabitants of nearby areas - I'm mainly thinking of Shenzhen and Hong Kong - and also tourists, if any will visit the place. What I'd like to do is design something that is environmentally friendly, since the degeneration of the earth due to pollution is a big issue and I'm afraid it's going to be even worse, if we don't put some restraints to our behaviour.

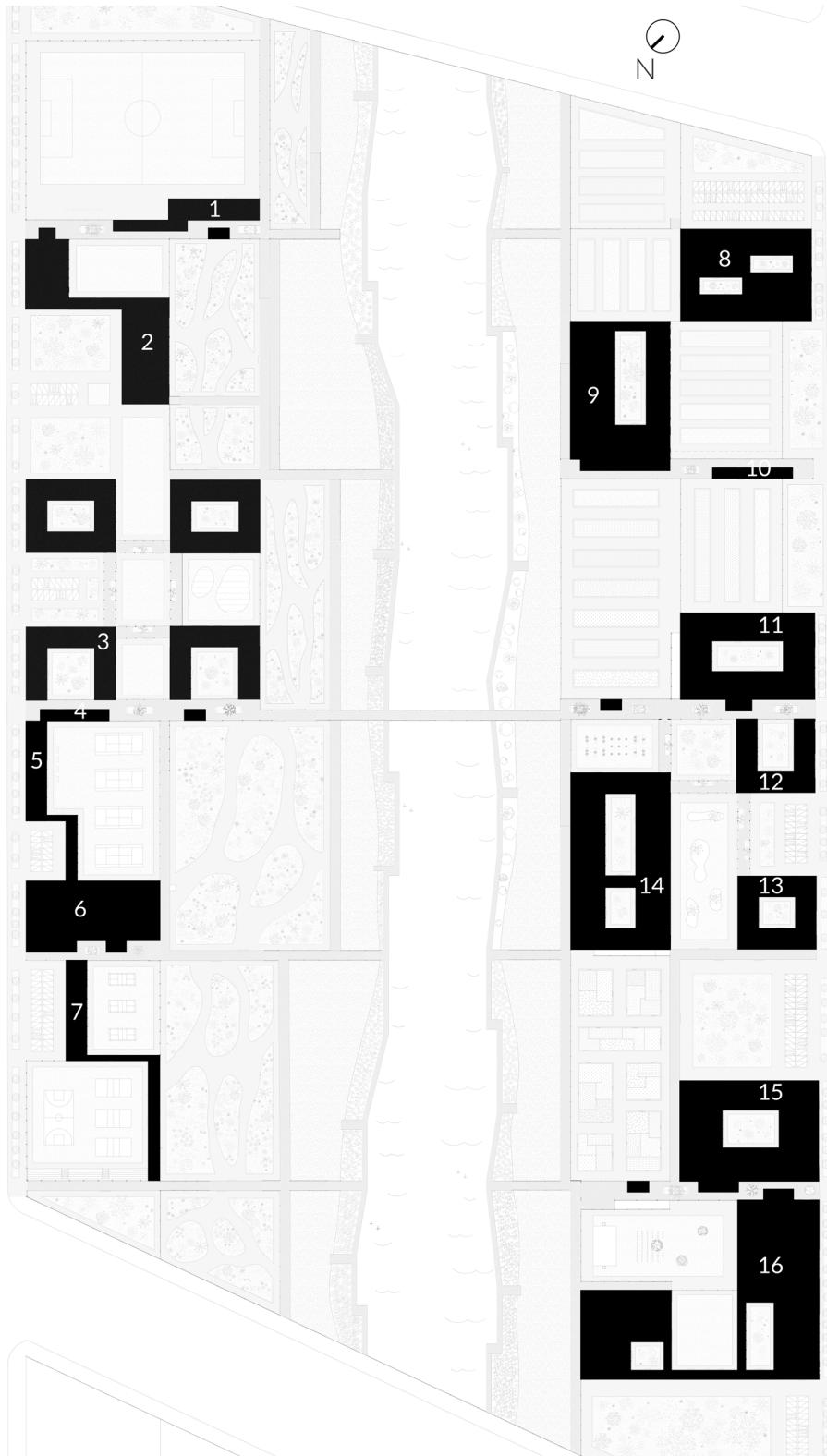
How can I achieve these goals in a relatively small plot of land of about 300000 m²? I don't think that it would be broad enough for any environmental dwelling or productive activities that might somehow affect the city. Rather, I can use it for educational purposes that can near the town inhabitants and, hopefully, also visitors toward the appreciation of a "green" life style. This can be done both by teaching about how nature and more traditional lifestyles are and by alluring people to the beauty of a less artificial environment. Thus, since I can dispose of little resource, I can pursue the goal of alluring people with a urban lifestyle toward nature in three steps.

First, I should attract people to go there, particularly those who are not already allured by an environmentally friendly lifestyle. Probably those who are already bent in such way would go to the next step by themselves. So how to lure the modern life and technology addicted average persons

to visit my place? Simply by giving them what they hanker in their every-day's life. Probably a trendy mall, a grabby fast-food and a sport centre will do for this task. But these facilities must be spread out in a bewitching natural environment where visitors can relax while going to the aforesaid establishments and gradually start to appreciate the green areas for their own essence. How this must be designed will be discussed in the next step. By now I can only start thinking how to spur these visitors to walk through the natural environment of the park.

Second, to make something attractive, it must be made in such a way that it relaxes or even amuses the people that get in touch with it but also in a way that goads their curiosity for it. Going back to my particular case, I can say that I must design a park that is inviting visitors to stroll about it, but not hampering them from reaching their main goal (step 1). You can't ask someone who wants to relax or amuse himself after a hard-work or hard-study day to be delayed from his or her shopping, sports or eating activities. You can only try to allure them to relax in a more natural way by making some paths that branch out of the main lanes linking what they consider the main attractions of the park. So, the lanes should run more or less in a straight way toward the different facilities and some smaller paths should branch out of them to let people stroll through the park gardens. They must be large enough not only to let the stream of people in the rush hours to walk without the impression of being in a jam but also to look like the main connecting arteries of the park. For those that seek a deeper touch with nature, I propose a future extension of the

GENERAL PLAN



park toward the sea, where some narrower trails swerve out of the lanes, winding around trees and bushes and driving people to rove through continually changing views. Of course, these trails will intersect quite often giving the rover the puzzle of where to go at each crossing, so taking his thoughts away from his daily worries. This concept of giving frequently changing perspectives while walking in a garden is typical of the traditional Chinese garden, as I'll explain later. In my design, it must be nature with its plants and the buildings themselves, to make the necessary screens. Of course, these trails should not be paved at all to give the impression of natural paths. Only in boggy areas close to the canal may a layer of gravel or a wooden quay be allowed. Then I should start to think of how to give people an environmental teaching. At the present step what can be done, besides the feeling for nature that should be arisen in the trail visitors, is to start to show them some notions about nature and old human traditional activities, with some billboards displayed along the way. At this point much of my hopes should be full-filled, and I must think of my ultimate goal that is to educate people about nature in a deeper way. For this I must think of a cultural centre.

The third step is aimed at educating people in a much deeper way. After staying in touch with nature for a while, visitors may become curious of knowing more about the natural environment and also aware of the need of a proper learning about some issues that arose their curiosity about some particular argument. Thus, the planner duty is to give them a cultural centre where they can quench their thirst for knowledge in

different ways. This should not be a school as the park would become a university campus. Instead, there should be a natural history museum, a library and a handicraft shop where different educational activities about natural environment and traditional handicraft can be performed. These three buildings should be at the core of the park life. In the same area there should be also the park management. Besides, it's also important to have restaurants providing ecological and traditional food. The construction of these buildings should be the token of good modern techniques that can bring comfort to people and respect for the environment. They should also have a good look that matches with the surroundings. For this goal, buildings with a simple and light look would be fit. Big windows will help to link the inside to the outside, that's to say the theoretical exhibitions to the original natural outer parts. A small parking lot for the users of this cultural centre may be made available. But the users should know that they must take advantage of it only for some special reasons. If they feel the need of going there for understanding nature better, they should be aware that one basic way of being ecologically fair is to limit the use of polluting vehicles as much as possible. Thus, moving on foot for shorter distances or by bicycle for longer should be their best choice.

An area of the park will be reserved for the ecological production of some vegetables to be sold in the food hall and used in the ecological restaurant. Thus, people from the city will have the possibility of watching the tillage methods and the growing crops.

3

The Concepts behind
This Design

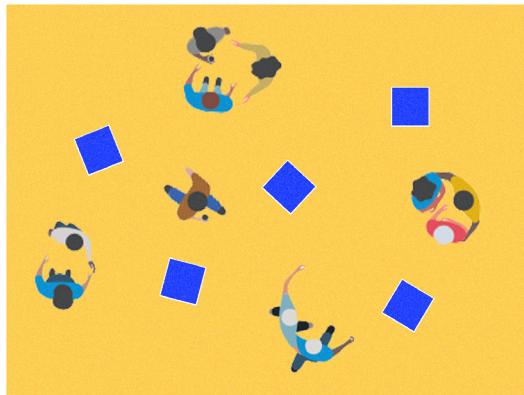
3.1 THINKING OF FREE-DOM WHILE DESIGNING

I am now trying to delve into my goal related to the end users' satisfaction. The architect's work is a very peculiar one since he has to integrate technical issues with aesthetics while keeping in mind general territorial and political demands, yet never forgetting how people will feel when they will "use" his accomplishment. All these considerations led me through the choices I made from conception to refinement of the design. I also considered how much freedom the end users will have about how to enjoy my realization. This is not at all of lesser importance.

While starting a new project, an architect is like a creating god that can organize a piece of land in an endless number of ways. Of course, the land situation is pre-set, but he can rearrange it in several ways not to mention the paramount freedom he has in drawing the buildings. In this process I believe that it is of the uttermost importance to weight how much freedom he should allow the users in exploiting his work. By this I mean that he can design a building or the arrangement of a garden with more or less constraints for the actions of its visitors. In an open space, either a big plain lawn or a broad room with little furniture, visitors are allowed to wonder in these free areas, self-organizing into several possible activities. On the other hand, a place with narrow spaces crammed with pieces of furniture would let little choice about the activities that can be started there. For instance, let's take the case of a room where people are supposed to meet in free time. It can be furnished with a few small and easily-movable tables and some benches, all of which can be readily rearranged for different activities. The same room

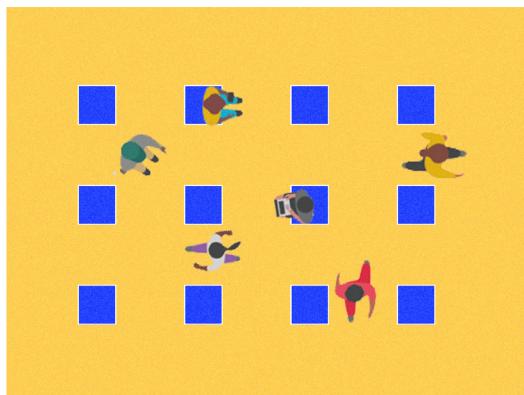
can be filled with rows and columns of fixed tables with some chairs assigned to each one. In the first case, people can fancy a variety of ways of doing something and socializing, while in the second case, they will probably be sundered into small groups by the situation, each one sitting around a table. This concept can be applicable to all aspects of a plan layout, giving more freedom of action to the users, or setting in advance what they can do. Whether it is better to lean toward one or the other choice is not pre-set; rather the architect should consider what's the goal of the place to be designed and act in consequence. In my project, too, it's important to discriminate

on the basis of which part I'm designing. As a general rule about the amount of freedom available to the users, the buildings will have a much more organized space than the gardens and these latter much more than the embankments close to the canal. Thus, referring to the land levels I designed, as defined in the former chapter, the lower ones are much freer than the upper ones. The same can be said comparing the first actualization of the park between the existing bridges to the future extension toward the sea, where much more freedom of action is allowed to the visitors. In this case more wilderness equals more freedom, as I'm going to ex-



Schematic furniture arrangements of the same room

Little and easily movable furniture allows people to different offhand activities.



Well organized and steady furniture binds people to a few predefined activities.

plain in the chapter about nature.

Thus, in my design, I'll shift from the library - for all its parts, like book-storage room and study rooms - where there will be a furniture formal array that will allow only some restrained cultural actions, to some rooms in the community centre, where wide open spaces and little furniture will spur people to organize themselves for what they want to do. These are only two extreme examples between which all the other buildings are drawn. In the gardens, too, there will be a variety of such layouts. probably the crop-garden with its flower beds array is the most organized, while the teenager park is the freest space for what can be done in it. The rule to give freedom whenever it's possible will always lead my design. In the strolling areas, whether they are lawns or thickets, the situation is intermediate in that their conformation, like some scattered flower-beds, bushes and trees will impose some constraints to the freedom of movement, yet I'll design some crossing and winding trails, that will give the feeling of endless possible paths to be followed.

Also, in the museum there is a clash between rules and freedom. When you want to show someone something in a formal exhibition, is it better to make people follow a fixed path for watching the show items, or allow them the right to decide which ones to see and in which order? If you want to educate, you can't rule out a certain amount of guidance toward those whom you want to tutor. On the other hand, if you drive them too strictly, you can only hope to indoctrinate them. This means that they will behave how you like in an acritical way like trained animals, not like responsible citizens who have developed

a thoughtful mind and high social skills that can lead them throughout their life, interacting properly with their environment and their neighbours. Thus, it's important that people who are in charge of any society-managing function - and architects are important exponents of the category - seek the inner growth and the responsibility of those they want to lead with their own work. I'm making this possible in the museum, by dividing the exhibition in several rooms, with a specific argument in each one, where people are free to choose what to see.

The designer of a building or a park can allow more or less freedom to their users. In my project, this is related to how people use the buildings and garden at different tiers. the final users' level, the workers' level and the managers' level. This can be explained much better by two short examples where this approach can be particularly favourable. the museum and the community centre. Of course, I'll see much better how to implement this method in the sections dedicated to the different parts of the park.

The museum is about ecology, so it will be involved very much in biological issues. In it, I want to make some stable sections dedicated to some basic arguments and then allow enough room for temporary shows. For this I must allow much freedom to the management by making its rooms with big open-space that can be divided with movable walls and screens in function of the actual needs that may be encountered in different occasions. At workers' level, it can be useful to provide a furniture made up of some modular pieces of a few standard sizes, that can be easily reorganized following the directives of

the managers. At public level, it will be important to let everybody deepen what he's interested in. Nowadays this can be easily achieved with multimedia stations provided that they have a good files library inherent ecological matters.

In the community centre these principles are even more essential, since here is where the visitors and users make up the three levels, as they will organize autonomously their own activities. There may be an official supervisor from the park to check that everything goes well, but the big achievement for this building would be to induce people to decide what to do in it, organize themselves for this purpose and then enjoy what they have done. Open spaces, flexible furniture, movable screen-walls for small exhibitions, a stage and a screen for films will do for general activities. A kitchen may also provide way to those who want to organize a common lunch or dinner.

The youth area or garden, that is forecast in the extension of the park toward the sea, is another example worth of analysis because lads are in an age when they like particularly freedom of behaviour; or I can say that they may have a behaviour that is peculiar of their age and like to stay by themselves, away from adults and children. They are interested in socializing and in playing sports and music. So, instead of a garden they will probably appreciate much more a big field, possibly somehow secluded from the rest of the park, where they can do their activities without interference with the other zones. Here, of course, the three levels have no more meaning, since several groups of youths must be allowed to organize their own activities independently



Different degrees of visitors activity freedom.
Darker hues mean less freedom, lighter ones more freedom. Red for buildings, ochre for gardens.

from each other. I will explain all this better in the dedicated chapter.

One more argument in favour of allowing some freedom in the park is about how some unforeseen haps or situations can add some unusual hues of magic - positive magic, of course - to our lives. By this I mean some sudden unexpected happening that can positively influence our mood. This is in analogy to what the great photographer Frank Horvat, while speaking about his activity, explained what could make a picture particularly attractive. He sustained that what makes a photograph uniquely special is something that can't be wielded by the photographer when choosing the subject, but that just happens suddenly while he's clicking the picture. So, the actual situation, depicted in it, is partly due to fate, or let's call it people's or animals or nature freedom, that can't be forecast or altered by the professional. Horvat called this situation the "miracle" of the picture, meaning that the depicted situation couldn't be duplicated in any way and also the feeling the seer had was peculiar. He stated: <Like all my contemporaries, I'm surrounded by a flood of photographic images, to which I don't pay much attention - except to tell myself that I would never have shot them. And this is precisely why I collect the few by which I'm impressed. Because they teach me something that I didn't know. Because they make me feel less alone. Because each is a unique event, that happened once and will never happen again. Because each shows the capacity of the human mind, within a couple of seconds, to be surprised by the unexpected, to recognize its meaning and to fit into a geometry. In a word, because each is

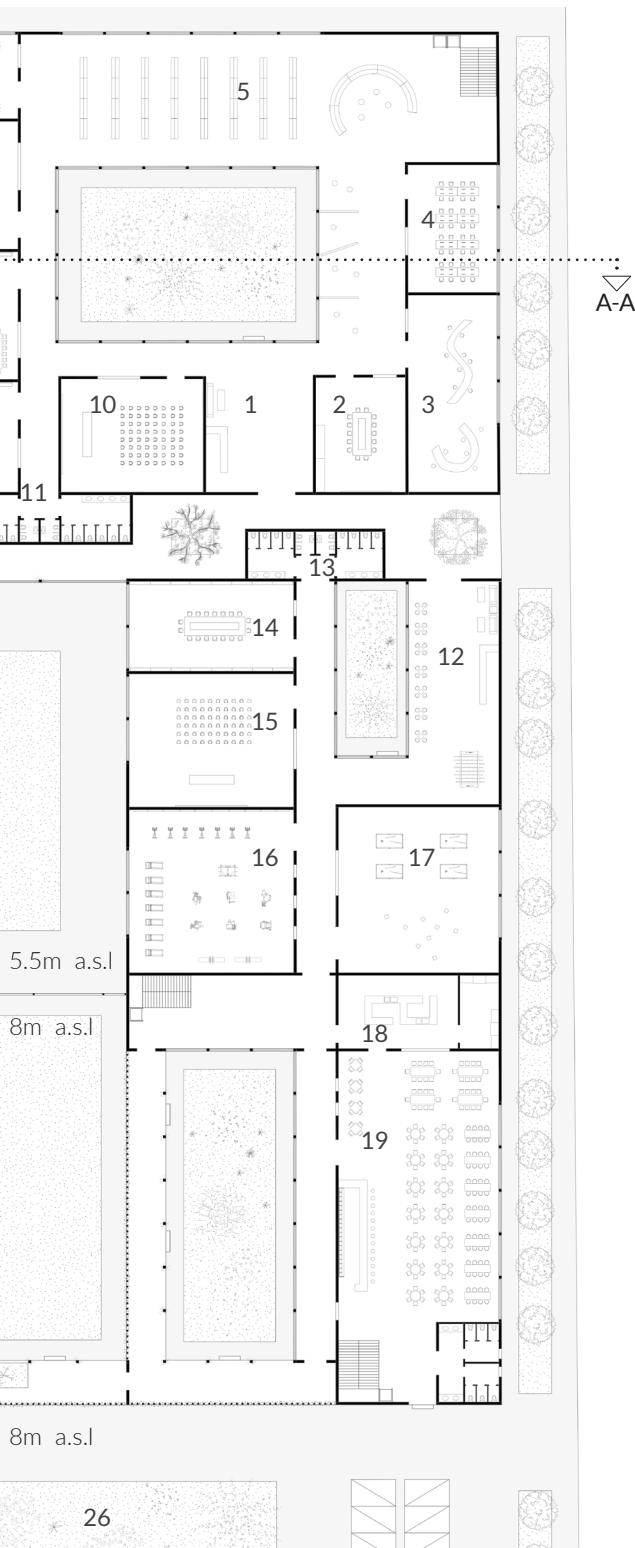
a miracle>. When I transpose this "miracle" to the built environment, I call it the "magic" of the jiff or of the day, it doesn't matter for how long it will last. The important is that someone has this special delightful feeling that he can sense because someone has allowed him to act freely in a particular moment. One may stare at butterflies wafting about a flowered shrub and find some spell in it. Someone else can be bewitched by the eddies and whirls of a babbling brook; an old man may be rejuvenated by watching some kids playing. Everybody can - and I add "must" - find something appalling in the park I'm designing, or at least I hope he will.





The cultural centre bird's-eye view – The strong interrelation between buildings and garden reminds of the traditional Chinese scholar's garden





Layout of the Cultural Centre with legend of the parts of the library and community centre. Education through personal involvement.

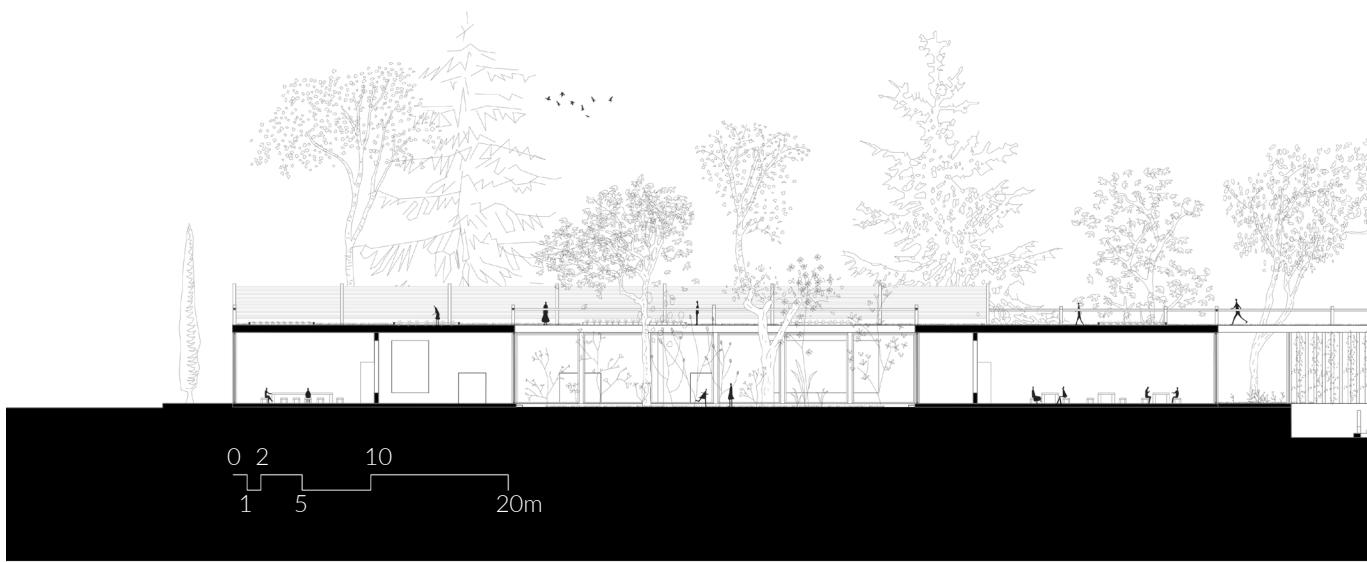
0m 10m 50m

Nature Science Library

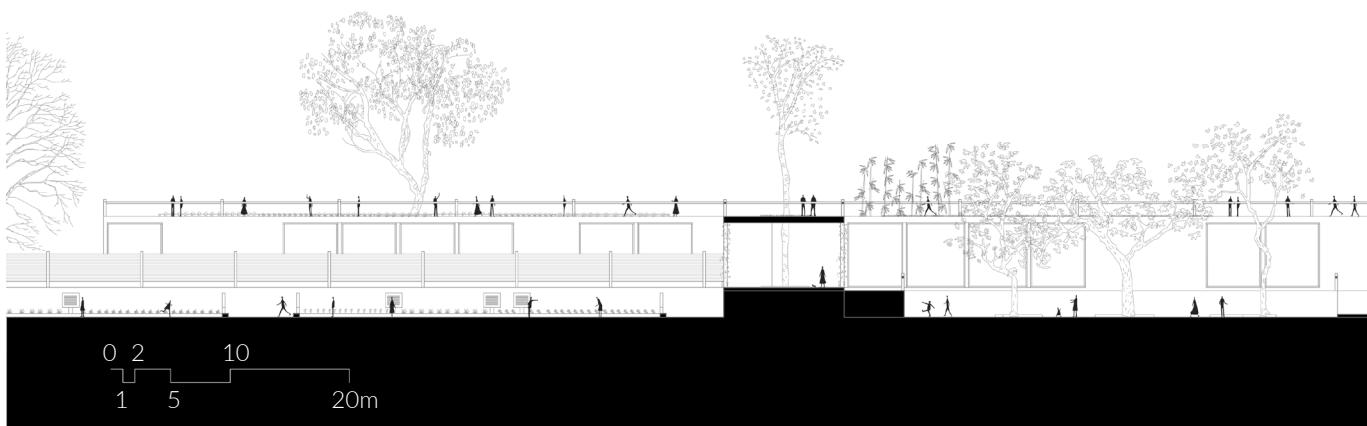
- 1 Welcome desk
- 2 Conference room
- 3 Learning lab
- 4 Computer room
- 5 Stacks
- 6 Newspaper/Magazine
- 7 Workshop/Study
- 8 Teen study room
- 9 Active playing
- 10 Theatre
- 11 Toilet

Community Centre

- 12 Lobby
- 13 Toilet
- 14 Meeting room
- 15 Classroom
- 16 Fitness center
- 17 Billiards
- 18 Kitchen
- 19 Snack bar
- 20 Reading area
- 21 Painting room
- 22 Multi-functional room
- 23 Parent-child activities room
- 24 Piazza
- 25 View point

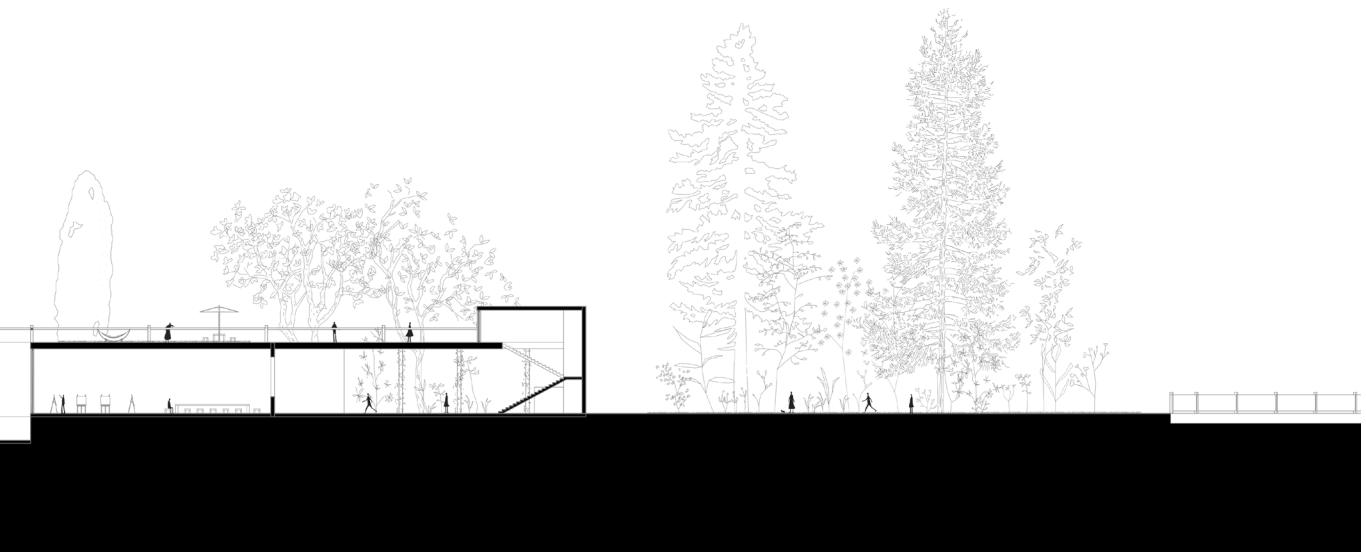
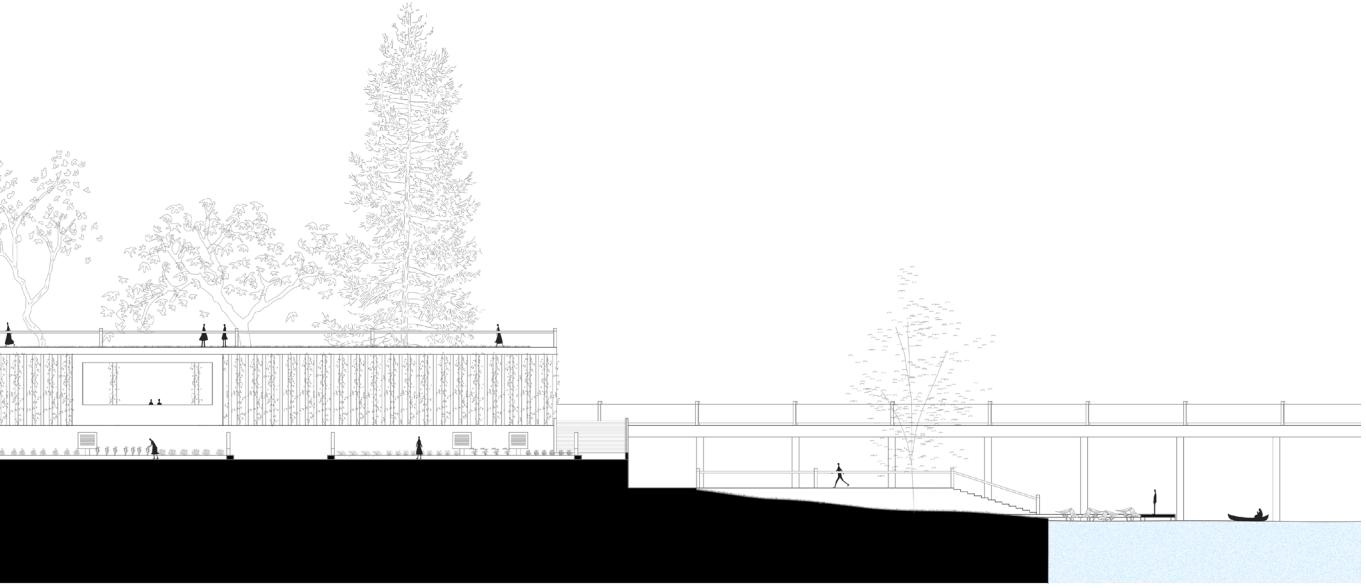


A-A SECTION



B-B SECTION

Low buildings are fit for a n



natural environment.

3.2 NATURE VS ARTEFACT

The concept of “nature” is one whose meaning has been largely and deeply debated throughout human history. In the Merriam-Webster dictionary it is defined as “the physical world and everything in it”. As such it would include ourselves, seen as human beings, and our deeds. But here, man, from a very ego-centric viewpoint, can see himself and his deeds as distinguished entities from the rest of the world, hence starting the distinction between what exists independently from human action, the natural, and what is the outcome of men’s deeds, the artificial.

Nature derives from the Latin word *natura*, that at the beginning meant birth (from the verb *nascer*, *nasceris*, *natus sum*, *nasci* = to be born). Yet its general meaning changed when it was used for the translation of the ancient Greek word *φύσις* (*physis*) which at the beginning had the same meaning, but then was used to refer to the innate features of something and from this to the essence of everything existing by itself in the world. As stated before, men felt the need to distinguish what they made from what existed by itself and adopted the word artefact (from Latin *artefactus* = made with skill) for this concept. From it we got the word artefact that refers to anything that is man-made.

The concept of nature has changed in times. Cicero already spoke of a second nature (*altera natura*), meaning by that the artefact landscape of tilled areas in juxtaposition to the original wilderness. Hunt (John Dixon Hunt - Gardens and the Picturesque. Studies in the History of Landscape - MIT Press 1994 p3-4) claims that the flourishing gardens that started to be made in



雍正十二月行乐图轴.六月纳凉 郎世宁 清
Emperor Yongzheng December tour, Giuseppe Castiglione, Qing Dynasty

Italian 16th century, constitute the third nature. The fourth nature is a further development of the concept of nature that rose in the second half of the 20th century with the strengthening of the Green Movement. The idea behind it is that landscape architects try to remake artificially a natural landscape. Piet Oudolf, of which I'm going to write broadly later, is a great exponent of this category. The main differences among these

four natures is that the first one is unaffected by man, the second one is manmade with production goals, the third one is manmade with decorative purpose and the fourth one is manmade with a ecological end. I would add, and it can be likely ascribed to the last category, the centres for biodiversity preservation which, although very artificial in the way they are managed, are a very important mean of natural species protection. In my park there will be room only for the third and fourth kind of nature- the former in the stretch between the existing bridges and the latter in the lot near the sea shore. Picture of nature allegory of the past.

Nowadays the general conscience of people, particularly in the most developed countries, is very concerned about the power of men in affecting nature in a harmful way with their activities. So, whilst in the past, nature was in different times seen as an everlasting asset that God or fate had given to mankind for its exploitation, today, it is regarded as a limited commodity that is essential for human well-being and survival and that has already been spoiled by too much misuse. Holding true the juxtaposition of nature and artefacts, the problem rises of how to conjugate the respect and preservation of the natural environment with a growing humanity asking for a more and more sophisticated way of life. This may be the big question linked to our future well-being: can we behave in such a way that keeps the future world fit for our needs, or will we destroy it making an artificial hell for the generations to come? People have been asking this question more and more for years giving birth to what is dubbed the environmentalist movement. Besides, many

thinkers have been debating this issue at a deeper level, not last the architects. The point is that if most actions of man are bound by definition to make an artefact, it's important that these deeds don't have too bad consequences on the natural environment. Hence the demand by the more open minded for a new general conscience and respect about my world and of course new consequent actions. The main points are the preservation of natural habitats, the reduction of pollutions, a wise use of natural resources and, I would add, also the respect of landscapes. It's intuitive that architects are a category that can do a lot about all of these aspects. Architects can educate people toward a responsible behaviour. This can be done by designing their buildings and neighbourhoods in such a way that allures people to live in a more "natural" way that limits pollutions and makes folks keep more "old fashioned" habits in their every-day life despite the many technical innovations that they face every day. Let's make some examples.

Probably the main duty for an environmentalist architect is to make well insulated buildings both for heating and cooling purposes. I would add to it that the good designer should look far beyond this and shape the building so as to reduce the potential heat streams through its walls, for instance adding shadowing in hot weather or making more snuggled buildings to lower their outer surface. Another source of pollution is transportation. Here too, the architect can do a lot by planning good public transportations systems - better for local health if powered by electricity - and finding alternative zero-pollutions ways for local transportation. Last but not least,



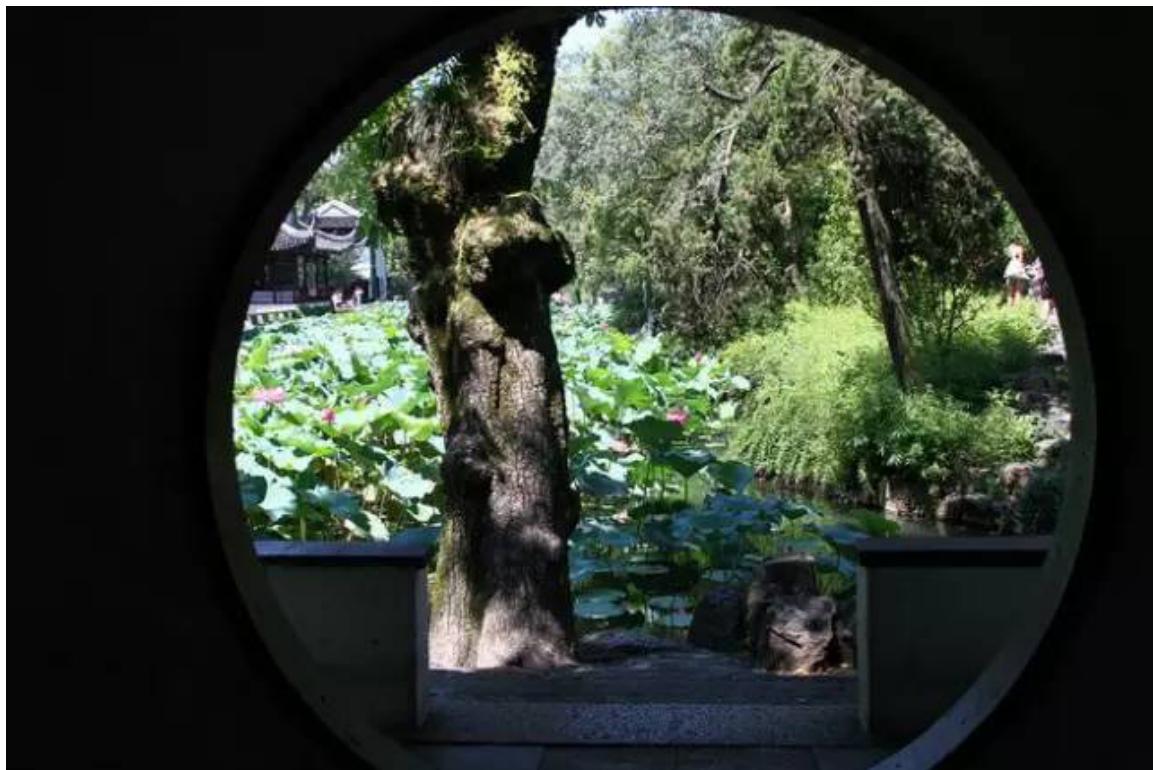
画寿意图之顾见龙竹舍玩鹤页 清
Gu Jianlong play with crane in bamboo shed, Wu
Guxiang, Qing Dynasty

An ancient Chinese painting showing the harmony of some buildings discretely inserted among trees and mountains.

it's important that people who live in big cities can be taught to appreciate nature although living in a completely built environment. So, setting broad parks inside cities is a wise way to avoid people getting addicted to a jungle of concrete. Besides it's also important to show people

how it was possible to live in a different and less sophisticated way, meaning by it how it was used in the pre-industrial era or how it is still done in less advanced countries. Traditional and open-air museums, natural parks and handicraft labs should be devised, particularly near big cities. Our park, although of small size, is a try to contribute to the ideal of a better environment.

Going back to the plot of land in Shenzhen, which of these tasks can be achieved and how? Being a public space of limited extension, the best use of it can be for educational and viewing purpose. For this goal, I should try to comprise as many of the aforesaid points as possible. But, first, let's see what's a public space.



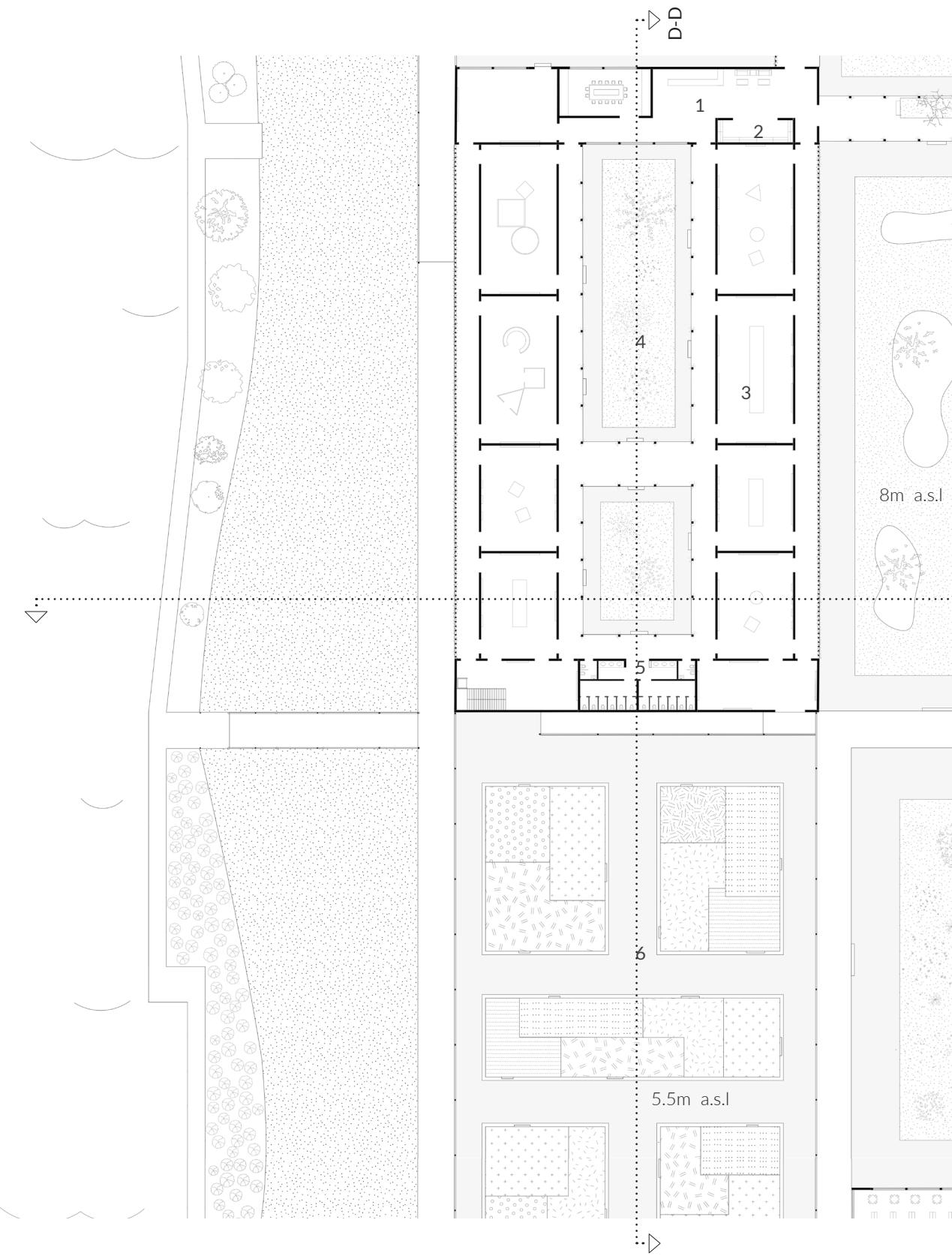
A borrowed view made by a window. Whether the outside is perceived as a decoration of the wall or an extension of the inner room, it contributes to the harmony between artefact and nature.

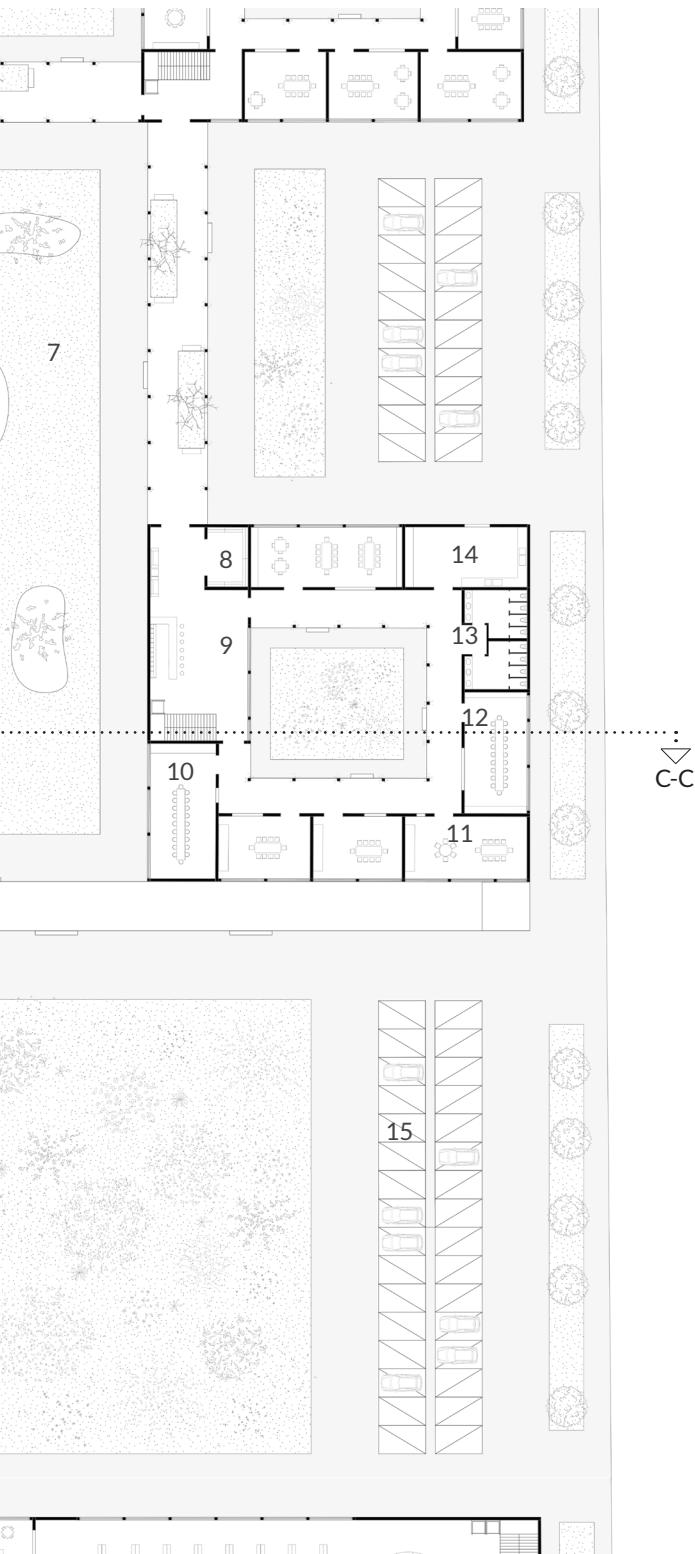
Next page:

The Cultural Centre: a museum, a library, a handicraft shop and a botanical garden to allure people toward nature through education.









Layout of the museum and the tea house. Visitors can integrate the visit to the museum with a relaxed talk about it, while sipping a nice cup of traditional tea.

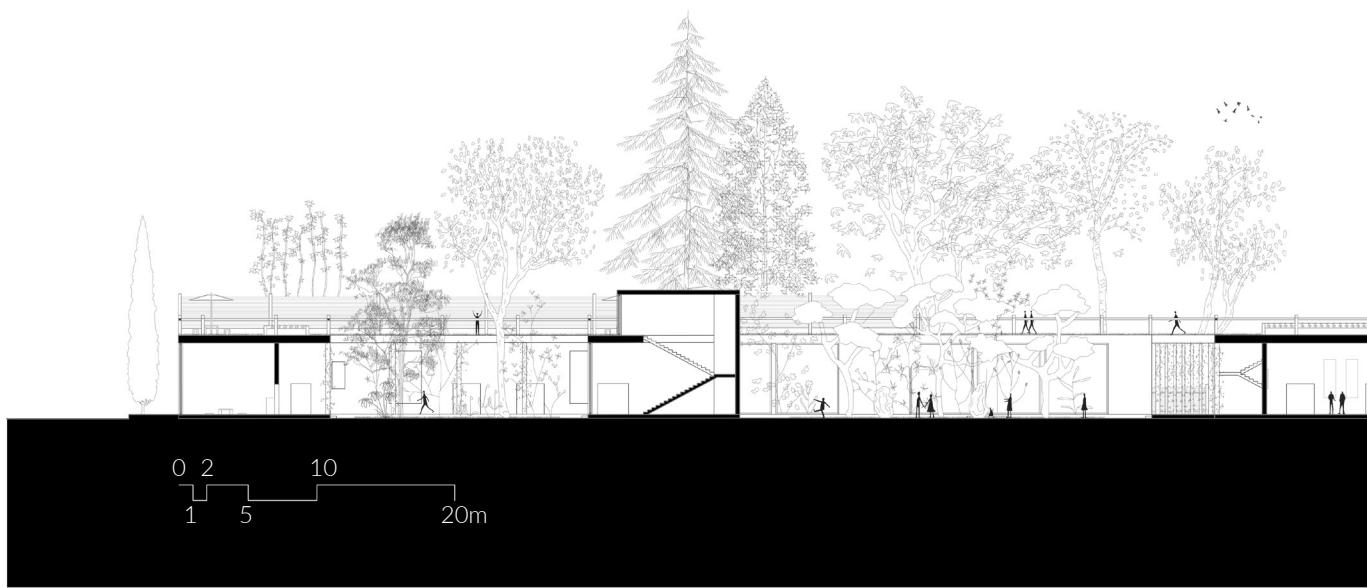
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Natural Science Museum

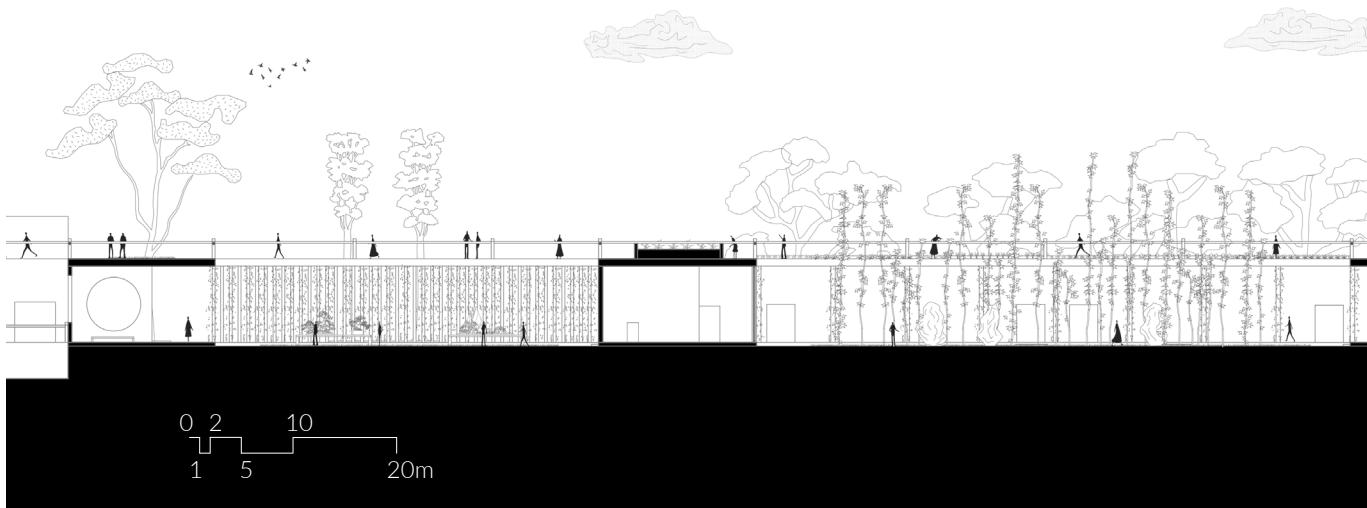
- 1 Reception
- 2 Changing Room
- 3 Exhibition Room
- 4 Interior Garden
- 5 Toilet
- 6 Educational Garden
- 7 Chinese garden +Pine trees

Tea House

- 8 Walk-in Dressing Room
- 9 lobby
- 10 Meeting Room
- 11 Tea Room
- 12 Dinning room
- 13 Toilet
- 14 Kitchen
- 15 Parking lot

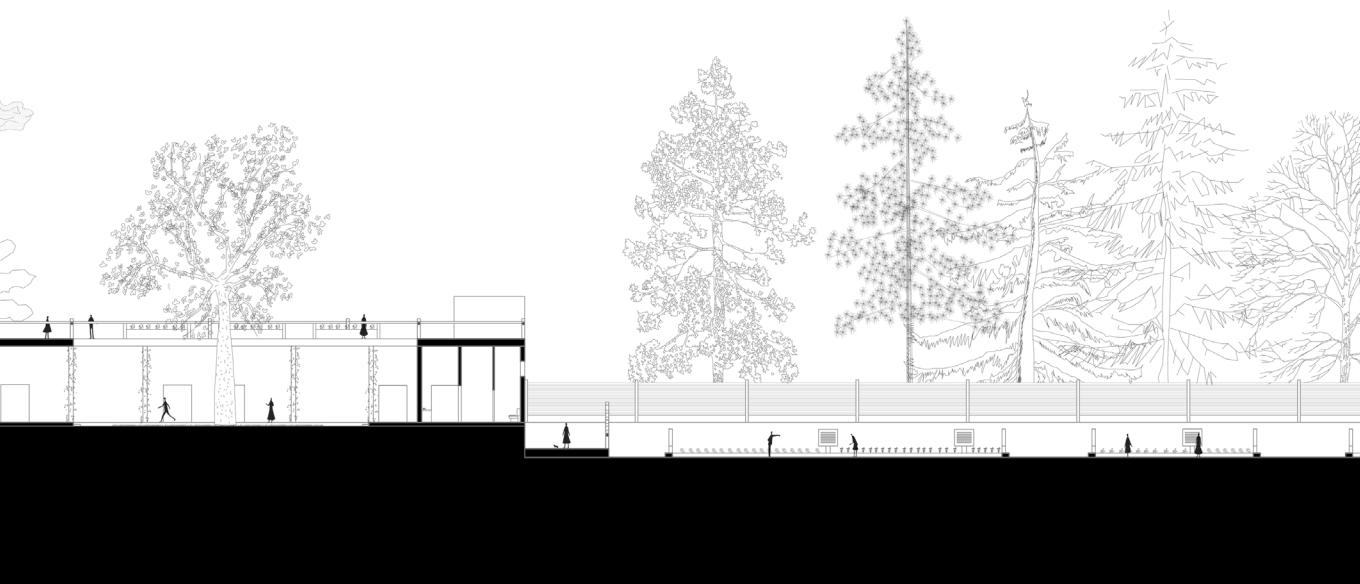
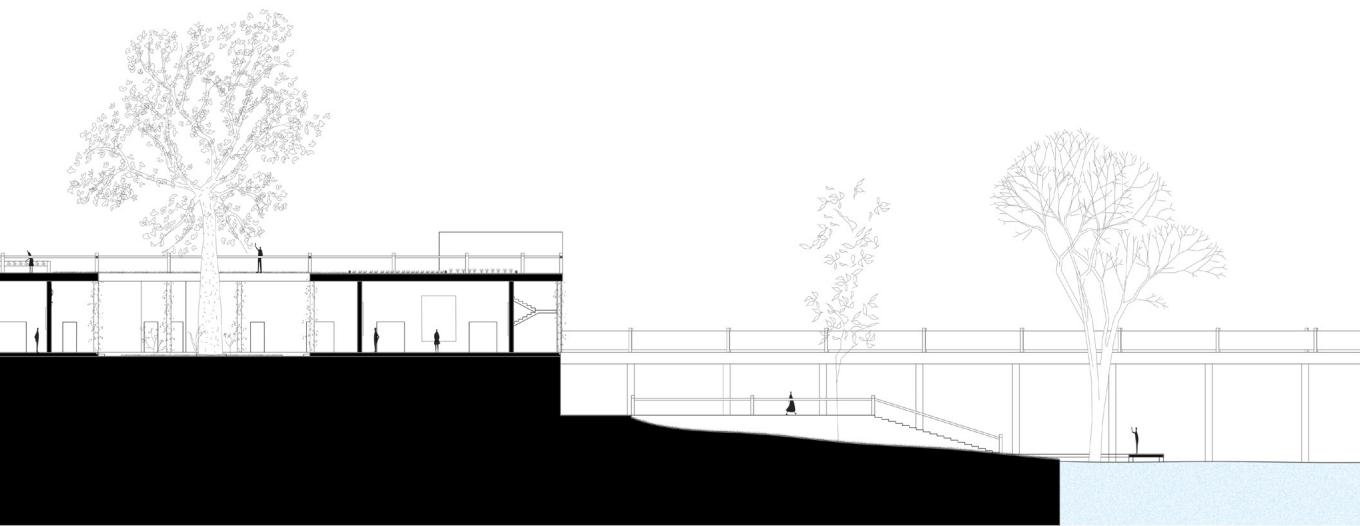


C-C SECTION



D-D SECTION

People can easily move from the mu



...useum to the more natural canal bank

3.3 THE PUBLIC SPACE

A public space is, as is meant by its name, a place, open to the public, where some social activity can be performed with high intensity. Traditionally they have been linked to the common activities of the citizens, like politics, trading, meeting and so on. For this reason, it used to be at the core of town where everyone could reach it with ease. The Greek polis with its agora or the Latin civitas with its forum are two classical examples. The market square of the medieval burgh was its natural transformation in a period when most people were subjugated to the will of the local lord. Later, when the town grew into a city during the renaissance, a single square was no more enough for the whole social life of the town, so this function was split mainly in the several church squares, where folks used to gather especially on Sundays. With the industrial revolution, the needs of people still included a place for meeting, but a new requirement rose among the city neighbourhoods dwellers- it was the yarn for nature which led to the creation of the first public parks. This new public space was peculiar with respect of the other ones in that it was not only designed to hold the people and let them practise their routinely activities, but also to allow them to relax from the stresses of every-day's life. They were inspired to the gardens of the upper-class mansions, yet they maintained that openness typical of the public spaces. I'm adding that in the last decades a new form of public space with ecological goals has developed in many countries- the natural park where nature is kept as unaltered as possible. Let's see how a public space is defined. Serena Keswani in her 1992 paper, "The Form

and Use of Public Space in a Changing Urban Contest”, stressed that a public space in general must meet some features:

- being publicly owned;
- being open to everyone with no distinction of any kind (age, sex, race, social status....);
- being always open (no timetables);
- being managed without pursuit of any profit and open to anyone for free.

The Italian “Istituto Nazionale di Urbanistica” in its “Charter of Public Space” adds some more requirements for outlining what can be deemed as a public space or it should be to fit the general public use:

- Being easily accessed in all parts (or at least in all zones) by handicapped people;
- Being a key site for the development of social life of a more or less extended area, thus a peculiar place for the community;
- Being also private-owned but freely accessible to the public.

Besides what they should be, this statement also lists what the public spaces can do for the community:

- They are places where people can do their social activities (moving, standing, trading in some areas, doing leisure activities and cultural activities...) in an environment that makes them feel as part of the same community;
- They also reflect the culture of the place for how they are made and organized;
- They contribute to the shape of the town and are an integral part of its landscape and urbanization;
- They are a resource for the public administra-

tion to implement integrated policies like “urban planning, morphological and functional upgrading of the urban fabric and of social and economic regeneration”.

All these can apply to the park, too. Yet, there is another feature that is peculiar to the park. I mean the sense of freedom that springs from its size and arrangement. Indeed, the visitor of the park is in a place where he can choose his own path, if he likes to walk; or he can sit down or even lay down, if he wants to rest; he can play with friends or talk with them; he can sunbathe; he can pick-nick; he can do more formal sports. These are only some of the common activities that can be done in a park, as many more can be fancied by the visitor. Of course, there must be some rules, but they are much less strict than in the other public spaces. Thus, the park is particularly apt for people’s relaxation, as they can stroll around aimlessly and decide to do something new at any time. In my project I am trying to enhance this trend by giving the visitor several environments with different kinds of leisure activities possible.

In my park there will be different kinds of public spaces: near the buildings, in the top level, the public space resembles mostly the urban square; in the immediately lower level, it resembles more the gardens public space; in the two lowest levels and the wood near the sea shore (possible extension) the public space is closer to that of natural parks.

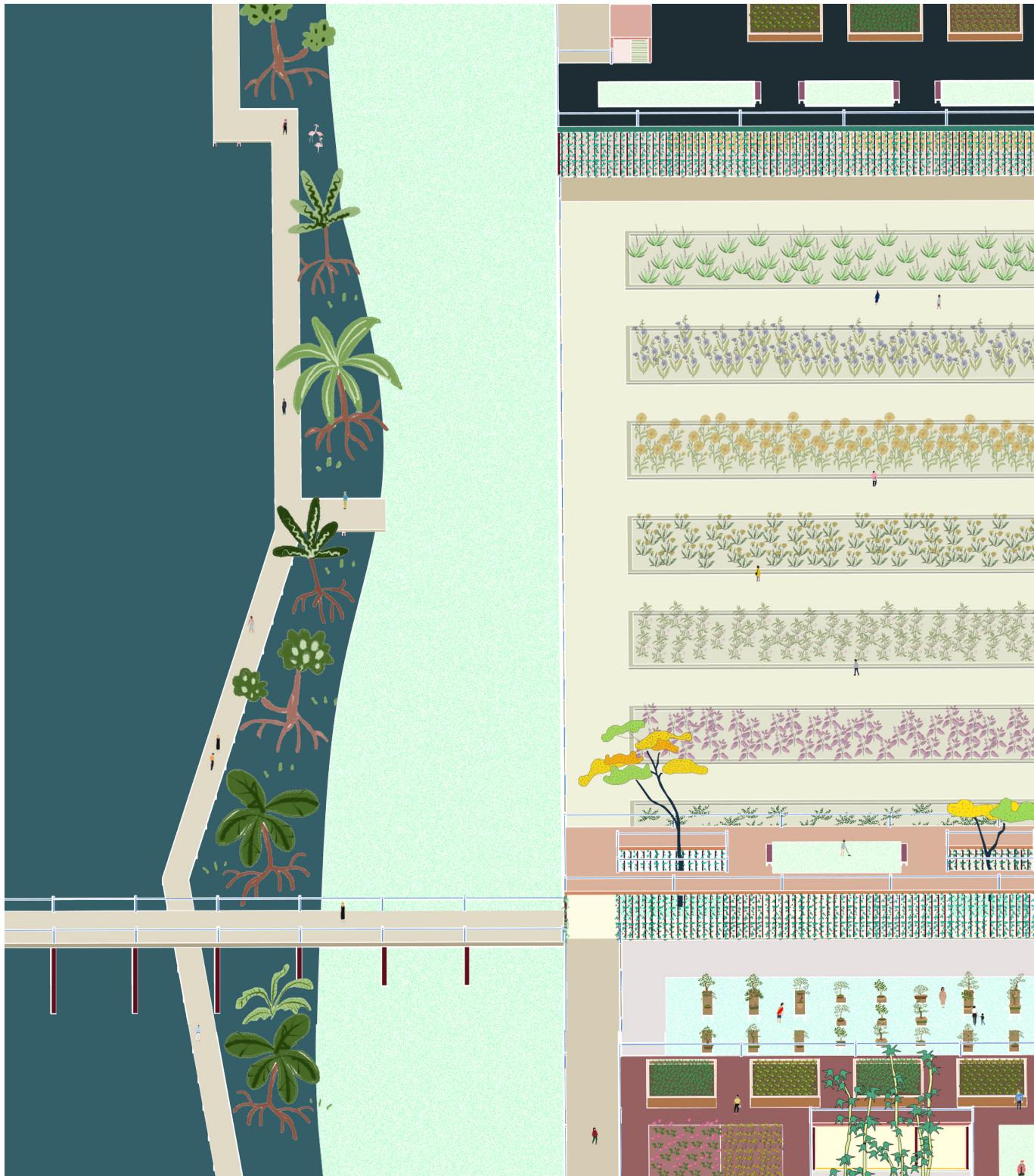


A yard for temporary activities. A stage can be used for both official and offhand shows. This is a kind of organized place.

As for most zones of the park, the borrowed view of the surrounding skyscrapers makes a continual scenery for the facilities of Cultural Centre.

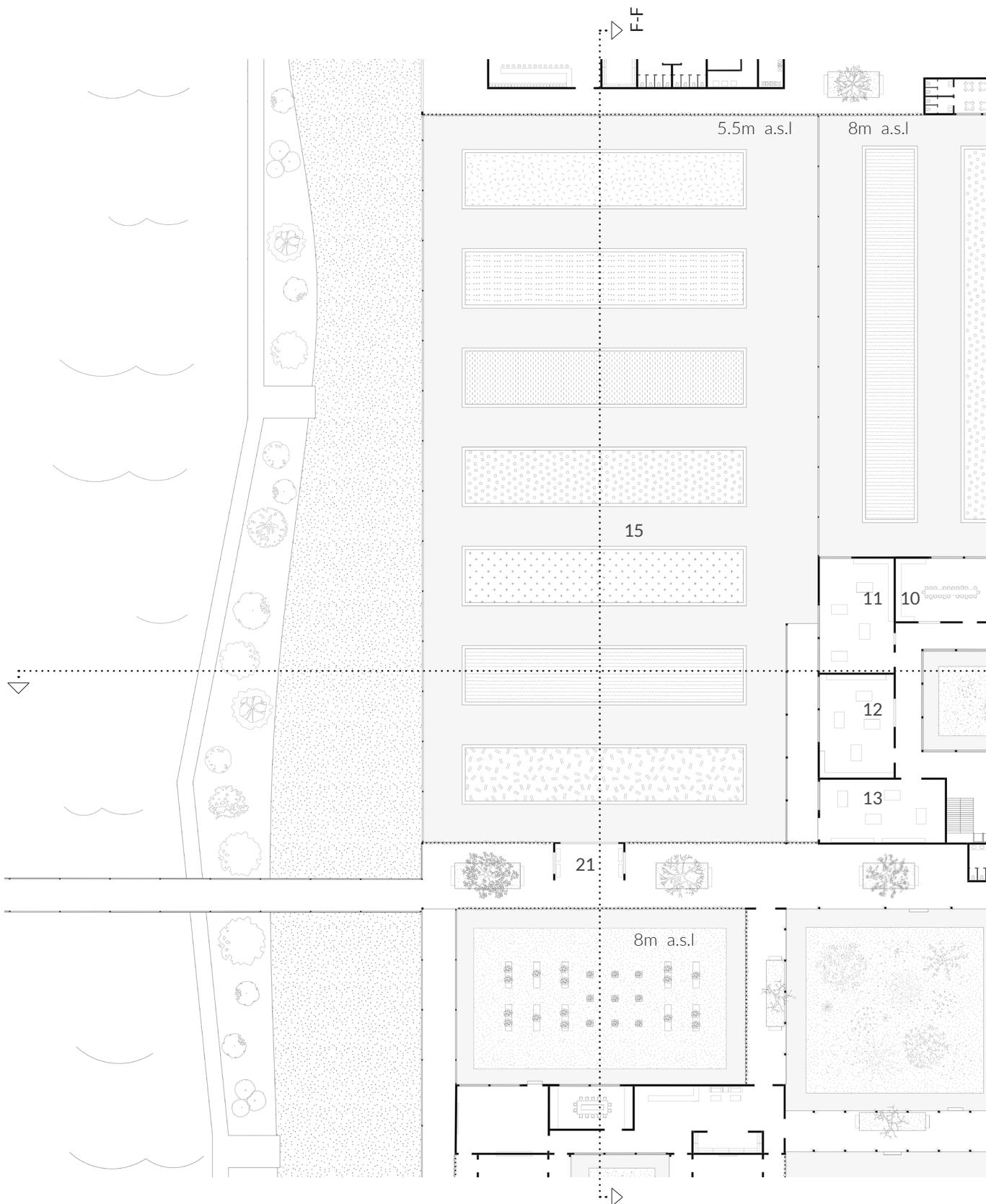


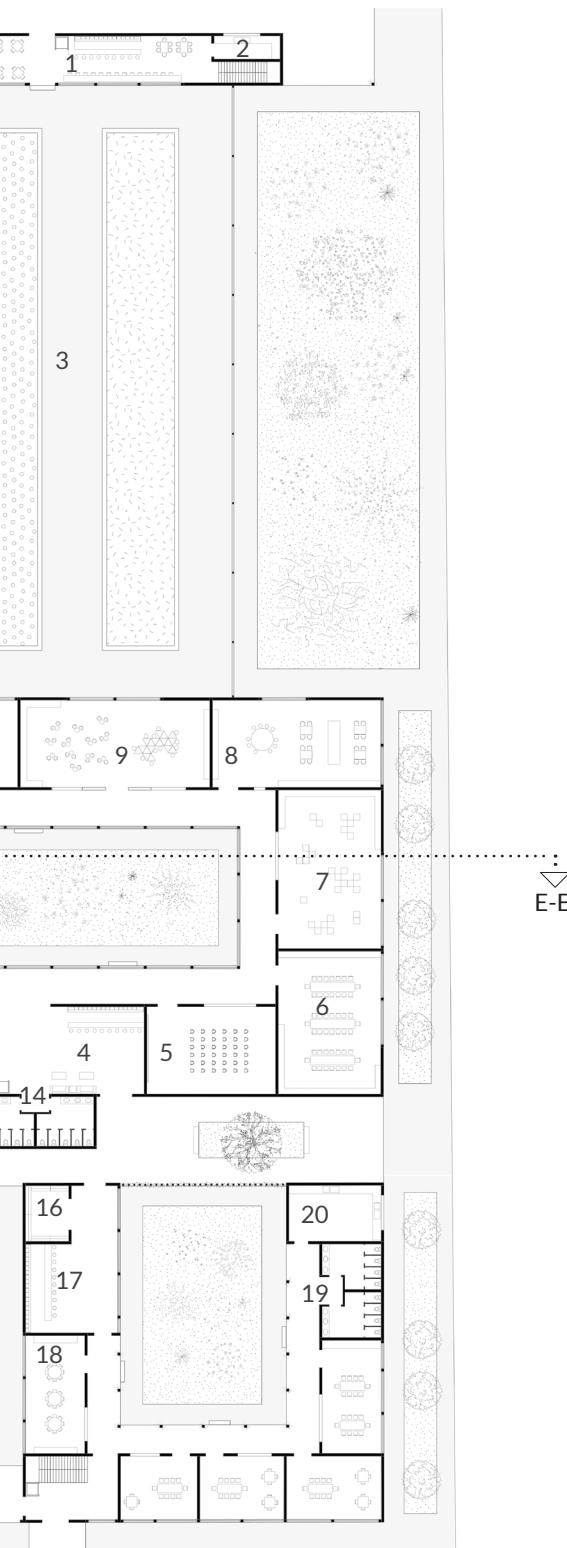
Next page:
Cultivated fields will provide the restaurant and the
Food Hall with organic crops





An infrastructure-based approach to design scenarios in Qianhai Bay (China). Questioning landscaped amenities - A lure to nature





Cultivated fields will provide the restaurant and the Food Hall with organic crops. People can appreciate tillage both by practising it in the handicraft field or buying it from the restaurant and Food Hall.



Slow Food Pavilion

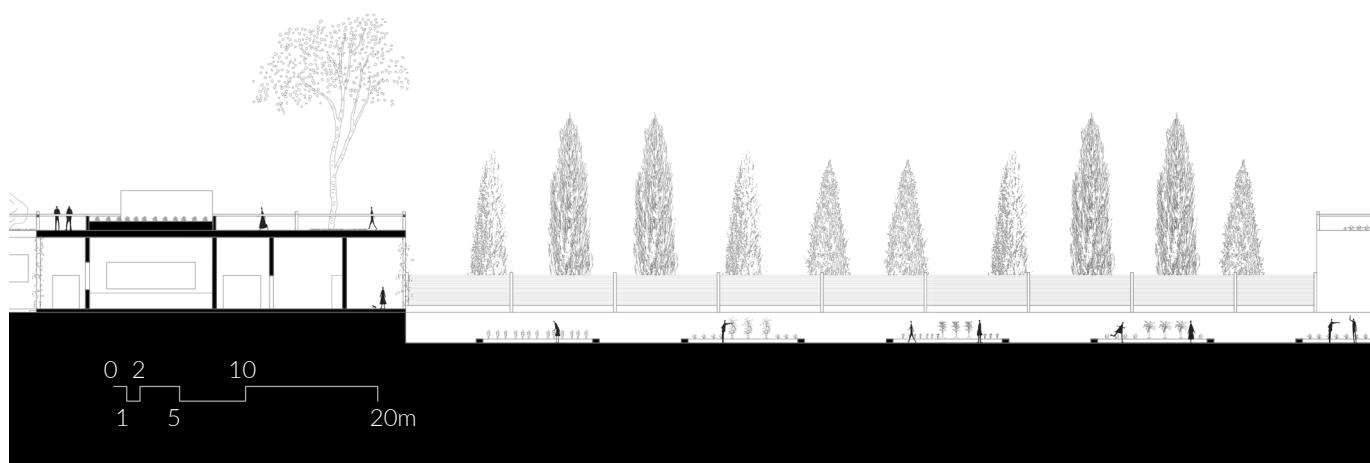
- 1 Tasting area
- 2 Kitchen
- 3 Growing area

The Handicraft-shops and Nursery Hall

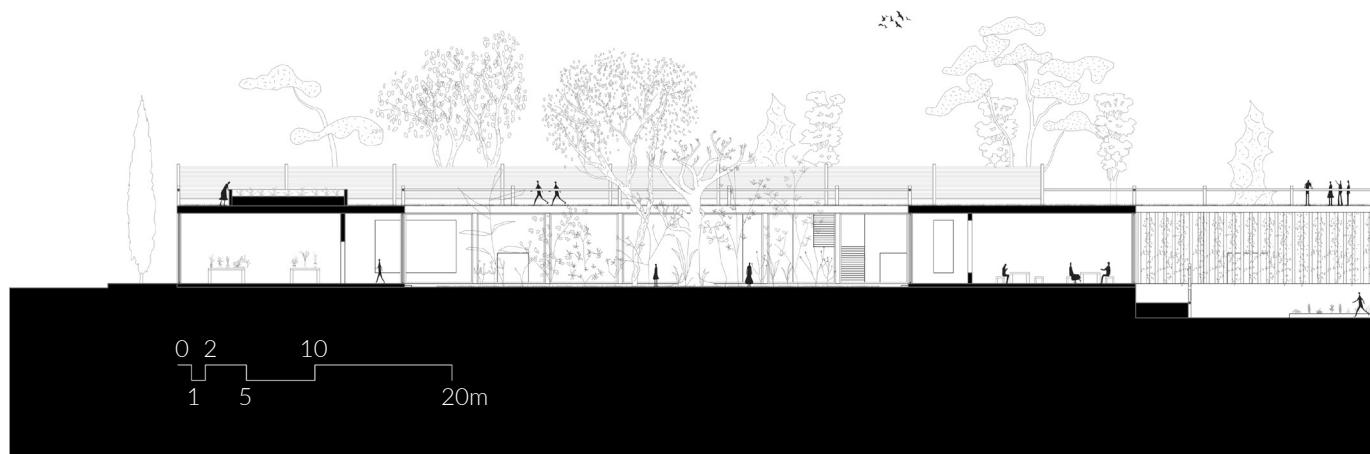
- 4 Lobby
- 5 Multimedia classroom
- 6 Woodcraft studio
- 7 Embroidery learning
- 8 Flower arrangement room
- 9 Activity room
- 10 Metalcraft studio
- 11 Inside plants
- 12 Plants research lab
- 13 Plants seeds storage
- 14 Toilet
- 15 Outside planting area

Bar Restaurant

- 16 Changing room
- 17 Bar
- 18 Dining room
- 19 Toilet
- 20 Kitchen
- 21 View point

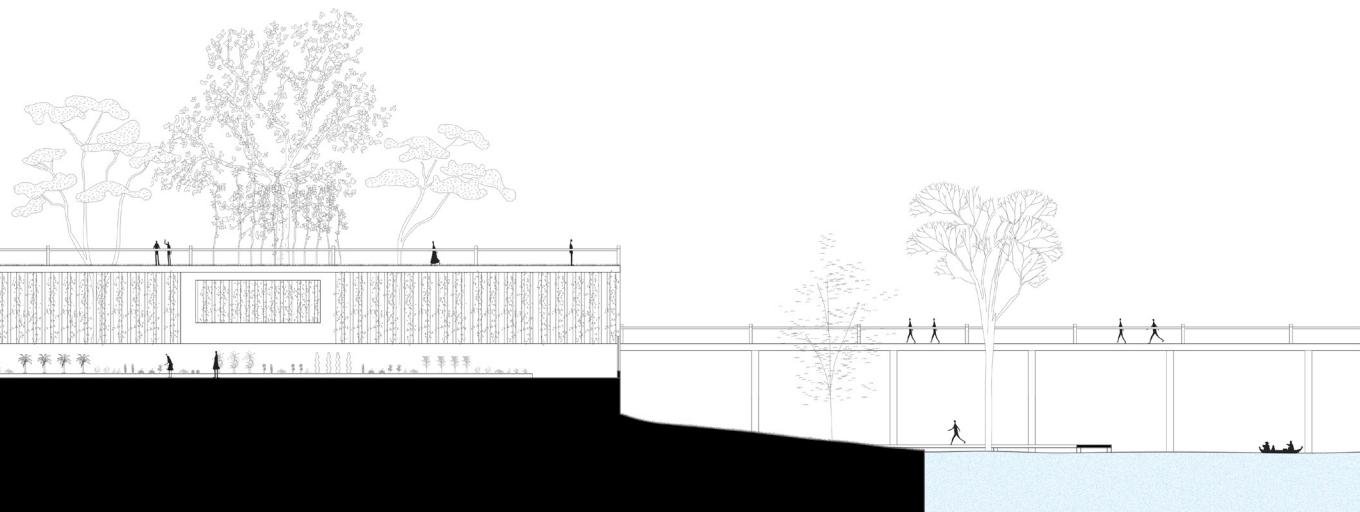
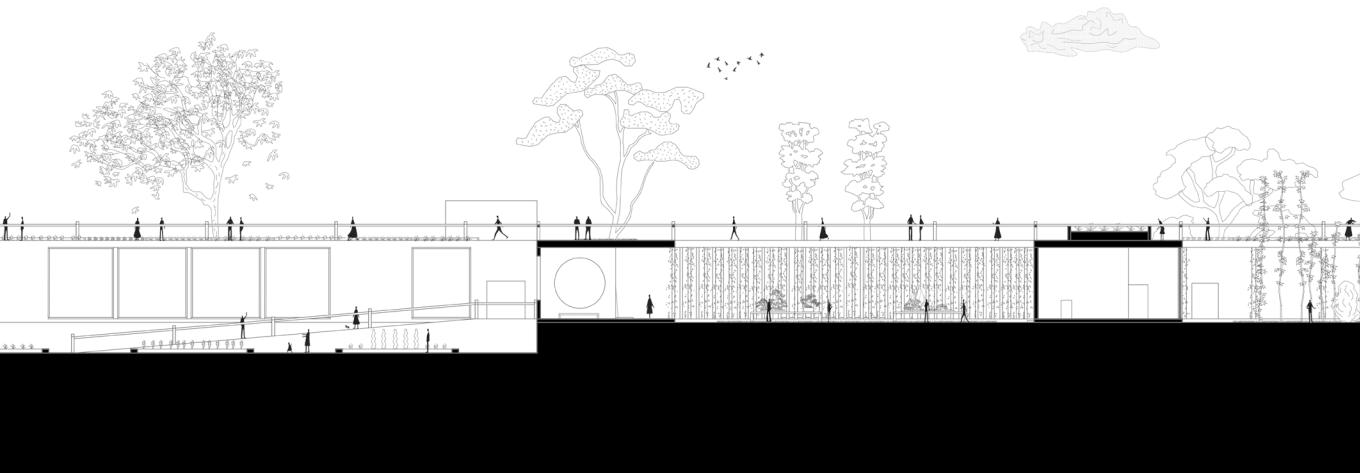


F-F SECTION



E-E SECTION

People can stroll about at three levels: green



on roof level, building level and garden level

4

The Design Project The Gardens

Gardening is essential in my project as it will contribute very much to the achievements of my goals about people's education and satisfaction. I want to give the gardens an international look, so there will be, among the other ones, two parts of it dedicated to two different cultures: the Chinese-inspired garden, close to the museum, and the Mediterranean garden. The former one will be in the area of Cultural Centre. It won't have the exact features of the traditional Chinese garden, rather just some inspiration from it and the typical plants of China. The latter one will have some plants that are common in the Mediterranean area and will be organized to look typical of Mediterranean zone.

In my final proposal for an extension of the park toward the sea, there will be also some specific gardens dedicated to some users' categories: the playground for children, the playground for youths, the area for families, the area for elderlies; then, there will be a separated section with a layout of the plants that will resemble a natural wood.

4.1 TRADITIONAL CHINESE GARDEN INFLUENCE

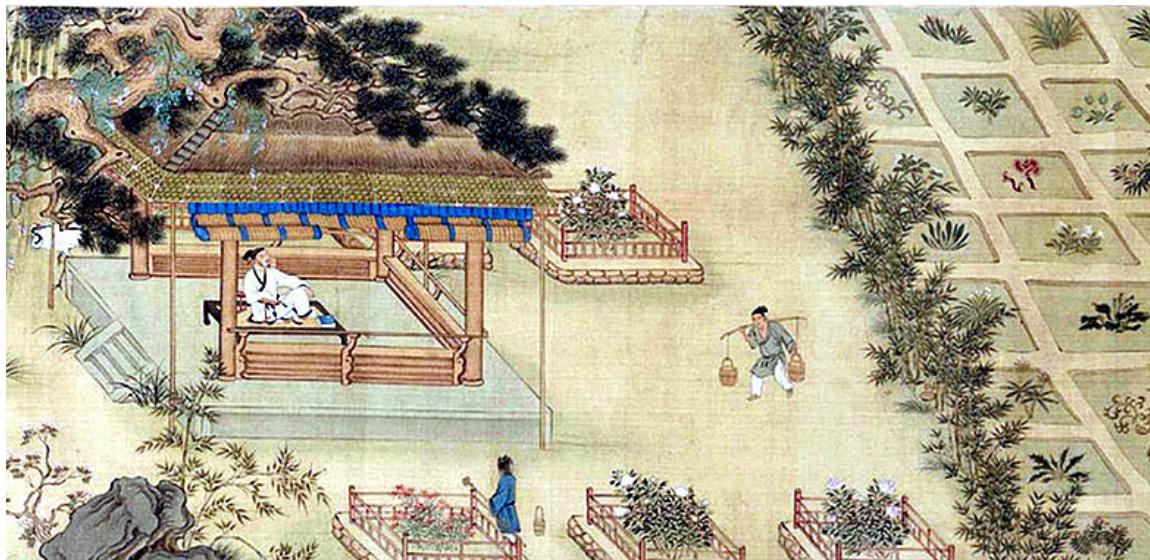


吳穀祥怡園冊 清
Book of Grace Garden, Wu Guxiang, Qing Dynasty

The old painting of a Chinese garden shows the concinnity that can be brought about by some simple elements like stones, trees and low buildings.

独乐园 刘松年 清

Loneliness Garden, Liu Songnian, Song Dynasty



An harmonious garden can induce relaxation and elevated thoughts.

The tradition of gardening (growing plants for pleasure) in China is very old. The first recorded garden was in the Yellow River Valley at the time of the Shang Dynasty (1600 - 1046 BC). Since then the tradition has spread to other provinces with a continual evolution.

At the beginning, the gardens were places where animals were risen, plants grown or the king could go hunting. Three features are noteworthy here: first, the garden was in some way delimited, so distinguished from the surrounding land gardens were distinguished plots of land from

wild areas second, there was a pond, thus a water basin was deemed an essential part of it; third, at least some of the plants were grown on purpose, which bespeaks of some kind of design and labour in making it. Later, more spiritual aims were sought in designing gardens, such as a small isle in the garden pond to symbolize paradise. All these gardens were conceived as decorative artefacts aimed at amusing and relaxing their visitors, where nature was bent to their convenience. The first time of a recorded garden where it was tried to reproduce nature, came some centuries later.



The imperial garden

Many people could join and appreciate it, yet divided in small groups for different activities.

Under the Emperor Shun (125 - 144 AD), General Liang Ji made a garden with artificial hills, gulches and woods where they kept birds and tamed wild animals. This is important because for the first time the garden was no more only a sport venue but was intended to pursue something of higher importance. Soon afterwards, Emperor Ming brought Buddhism into China. The new religion spread fast through the country and by 495 the city of Luoyang featured more than 1300 Buddhist temples, many of which were former homes of believers. Many of them had their own small garden. Also, many upper-class members of the court built their own gardens, smaller than the king's one, but very curated in the design, which aimed to reproduce nature.

They were aimed at relaxation and meditation,

rather than at seeking mere fun. In this light, Emperor Wu of the Han Dynasty (206 BC - 220 AD) made a garden with an artificial lake with three islets representing those of the Immortals. This was a leading theme for many future gardens. The calligrapher Wang Xizhi, who wrote the "Orchid Pavilion" about a garden with many other pavilions and meandering streams, contributed to spread these aquatic themes to future gardens. These pavilions didn't have only a decorative goal, rather they were buildings with specific functions spread all over the garden. So, the house was split in many parts intermingled with the garden parts. This gave to the Chinese garden a peculiar look very different from that of the European castles and mansions of the future period. In Europe, the main building dominated the landscape and the garden was a side embel-



汉宫春晓图 仇英 明

Painting Anime: Spring Dawn in the Han Palace, Qiu Ying, Ming Dynasty

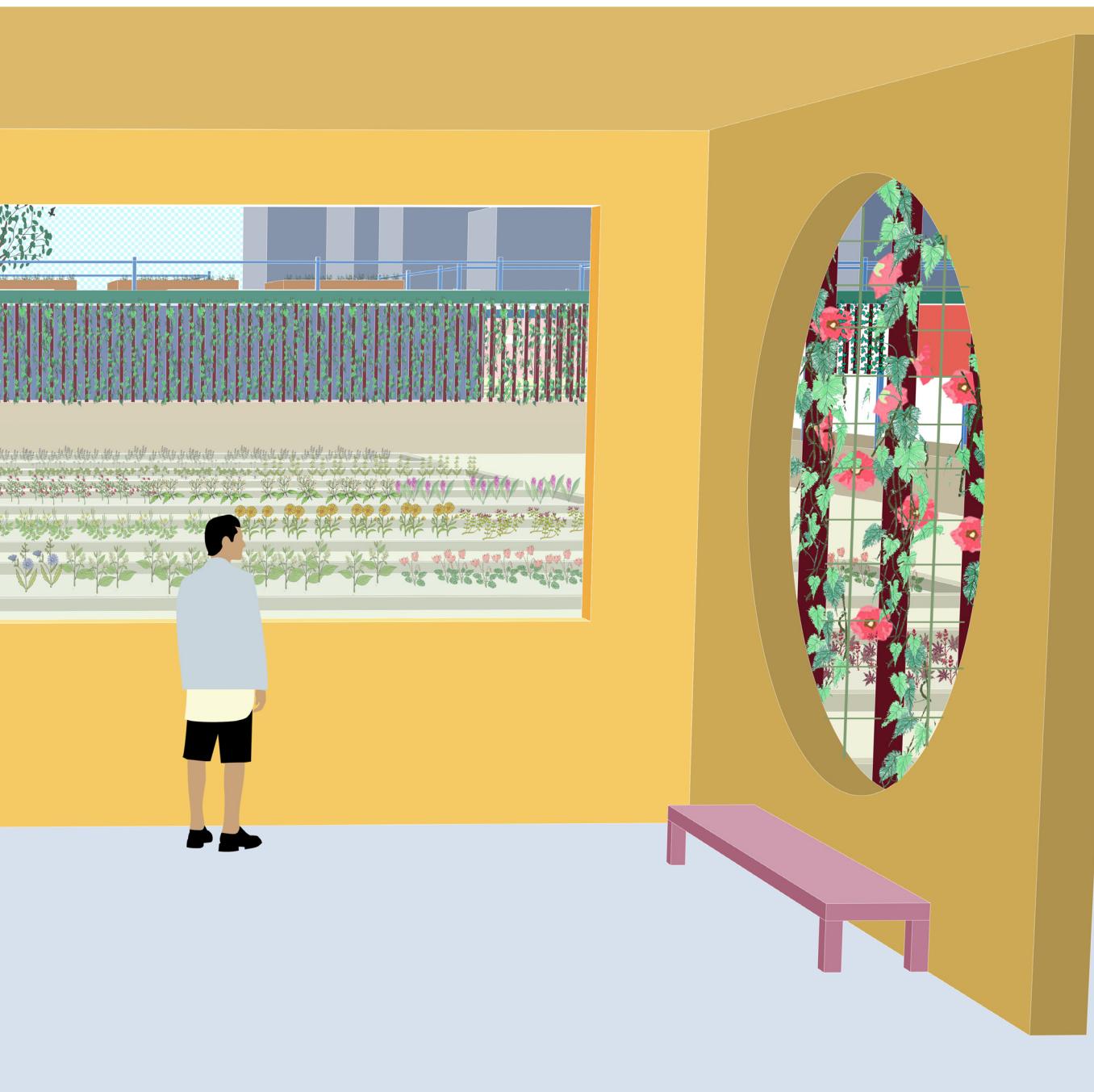
lishment to it. So, also its shape was enhanced by the garden itself: thus, the broad lawns or ornate esplanades were laid beside the facades to let these latter be visible in their fullness.

Probably also the highly geometrical pattern of the garden layout was instrumental to introducing and completing the main building. In China the style grew up in a more intimate way for the establishment houses, but not for the emperor, as I'll explain later. Poets, especially, liked more romantic environments so they developed a garden that could be lived from within, which was permitted by dividing the house into small pavilions scattered in the in it. In each one a specific activity could be done: so, there was a pavilion for taking tea, one for watching a pond, a bridge crossing it and other amenities. The lucky owner of such a mansion could then live a full

immersion into nature during his usual daily activities, with a strong enhancement of his mood and health. Yet, the spell was not limited to the buildings: also, the gardens were arranged in such a way as to induce amazement. So, by subdividing the garden into small areas screened from each other, they made a place where, by strolling around, one could find continually changing views, yet very harmonic on the whole. Everything here was sized for the owner of the garden or at most for a few friends visiting him. I'll see that this feature led later, in the 20th century, to the destruction of many of these wonderful gardens. Because these gardens were owned by the well-educated upper-class, they are usually called scholars' gardens. In the same period, another important garden kind developed in China: The Imperial gardens, that had a differ-



A borrowed view in the designed park
Everybody is free to exploit the place as he likes most. The balance between artefact and nature makes them complementing each other.



An infrastructure-based approach to design scenarios in Qianhai Bay
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ent layout because of their function. They were designed to accommodate and celebrate the king and his court, that meant a large number of people. So, they were much broader and even monumental, yet with very refined decorations. Much later, in the late 1900's, with landscaping aimed at satisfying the whole population of a town, the traditional garden style became inadequate.

In the 1990's, someone in China began heeding the old Chinese traditions and considering which of the old design rules could be kept and used again. Dillingham in 1991, Wu in 1999, Cheng in 2003 and Flou in 2004 analysed the differences between the traditional Chinese gardens and the western ones. Wu had the smart idea of checking the relative surface occupied by the five kinds of materials that composed the traditional garden: woods or plants in general, water, building, rocks and pavement. She found out that from this point of view the old imperial garden was close to the modern plaza. In their assay 'From Traditional to Contemporary: Revelations in Chinese Garden and Public Space Design', Bo Yang and Nancy J. Volkman delved into this matter. They agreed with Wu's approach for characterising the typology of gardens, but argued that, since what they were really seeking was the final aesthetical result, checking data on a garden layout was not so meaningful. Rather it was better to make the analysis from the view point of the park user: that's to say to take into account the sights that visitors could perceive while walking in the park. So, no more view from far above was considered, rather, they analysed what could be seen from many eye-level perspectives in several old and actual parks. The results are shown in

percentage in the following table.

	Planting	Water	Rock	Architecture	Pavement
<i>Imperial garden</i>	50	24	2	12	11
<i>Imperial garden</i>	34	28	16	15	7
<i>Imperial garden</i>	56	18	1	8	16
<i>Imperial garden</i>	54	3	0	4	39

From it, I can gather that, since the imperial garden and modern park are fit for receiving many people at the same time, then I should heed them while designing the garden layer. Of course, this should be done in a modern way, but I will try to put a whiff of old China in my design. What strikes the eye in the table is the heavy use of stone in the scholars' gardens. It had a good decorative effect in that intimate environment, but it would not be very fit, unless used only very slightly, in a place with a heavy load of visitors. For them I should have more open spaces with wide paths where people can walk. In my project, I am laying many buildings, that seen in plan would lead to a much higher percentage of soil occupation. Yet, as I am drawing them low, in perspective, they won't overcome the traditional ratio.

About water, the other typical decoration of old days, I think that the existing discharge channel should be enough for decoration, even if concentrated in the middle of the plot. Anyway, it will amount to about one fourth of the layout

surface.

So, what recalling the traditional Chinese garden can be found in my design? The first analogy is the water basin at the centre of the park. It's no more a pond, now. It's a canal that splits in two the whole lot and is the pivotal element of the design. It's a reference part that delimits the two stretches of land at its sides. Also, the rectangular shape of the single gardens, reminds of the first Chinese gardens, although mine are often delimited by small level differences with the nearby grounds, instead of formal walls. This feature, of the low-shaped limits, allows for a sense of unit of the whole park and also for much broader views. I'm not planning much fake issues like boulder-isles in the canal, yet I'm going to lay some stones in the gardens, not to represent a full mountain, rather to give the impression of a rocky area. What links the park to the traditional Chinese gardens are two characteristics: the many sight diversions that building and plants make for the spectator and the spiritual enhancement, that it is supposed to give to its visitor, which resembles that of the poets' gardens. Of course, here these features must be interpreted in a more modern way. In fact, I'm not seeking the visual effect of continually changing views by adding ad hoc visual edges, rather the buildings themselves, with their functional shape, will drive the visitor through ceaselessly varying sights.

In my design I'm going to insert some features of the Chinese gardens. The most obvious concern the layout of the whole park, which is divided in different areas with different features.

The first area is the built zone that corresponds

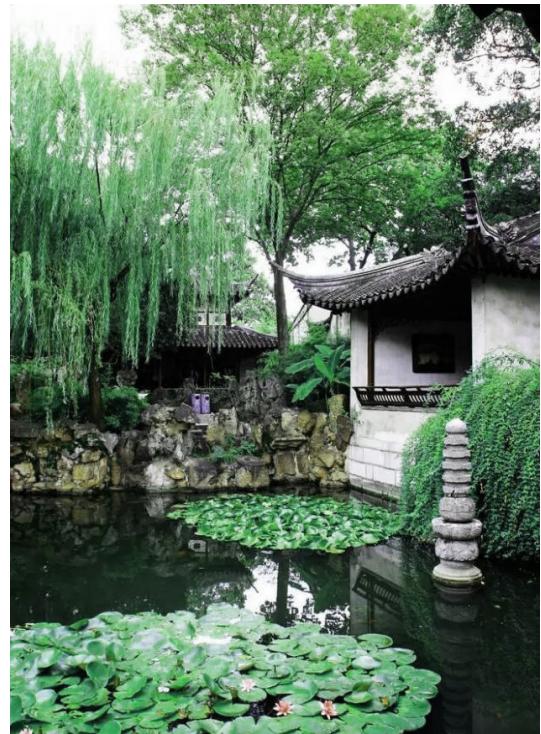
to the top level, where there is the safest situation in case of flooding. Here there will be several buildings of limited size scattered in green areas. This situation is typical of the scholars' garden, although the constructions size is much bigger. I'm trying to give this part the traditional cosiness of the scholars' garden, albeit in a modern way. I'm going to design short buildings much connected with the outside by wide openings, to enhance the link between architecture and nature. The dichotomy between the virtuality and reality, that is between lightness and bulkiness, of the traditional gardens and buildings is a constant of my design as much Ying and Yang duality was sought in the past. Big windows and walls and columns of the facades, the retaining walls and the opposite level drop that limit some gardens, a tall tree and some nearby tiny bushes are only a few examples of the contrast between bulky and flimsy ethereal elements. The decorations will be minimized for a modern approach to aesthetics. The meandering passages inside and outside the buildings, although of practical use, resemble the paths of the old garden in their sudden swerving that lead to continually changing views.

The rest of the park, that is the three levels below the top one, will be inspired to the old imperial garden or the modern plaza because the free spaces are broader and available for a much bigger afflux of people. The ground is free of big plants near the canal, so there is a gradual decongestion going from top to the canal.

The ways the ancient used to seek spirituality by adding some ad hoc elements here is tried to be achieved by the function of the park itself.

gathering people, helping to their relaxation and making them closer to nature. A witticism said. "Confucianism is the doctrine of the scholar when in office and Daoism the way of life of the scholar when out of office". Actually, in my design I'm seeking both the moral doctrine about behaviour of Confucianism, by teaching people a nature-friendly behaviour, and the Daoist harmony of life, by giving people a place where they can mellow out from their daily stresses.

Last but not least, the water is at the core of the park- Physically this happened by chance because of the place conformation. Yet, ideally, its centrality is important for stimulating the stress releasing. Because of this, I'm designing quays along the canal banks where people can stroll among water plants.



Water is an important element in the traditional Chinese garden. In my design will be central, yet confined to the canal.

4.2 GARDENING STYLE

In my design, I'm planning gardens, but the Chinese style garden, that should look as natural as possible, although fully man-made. Thus, I'm looking for a style in plant laying that imitates nature. Or at least an arrangement that can give to the seer a strong feeling of being in a natural environment. Of course, it will be the task of the gardeners equip to decide what and how to plant, yet I'd like to suggest that in the park they'll stick to a modern and natural-looking fashion.

Piet Oudolf is a Dutch landscape designer who has contributed very much to the evolution of this art in the last years. His job is not just about gardening, it is the art of arranging plants in a garden to achieve a natural aesthetic effect. He relies very much on the so called "perennials", which are mainly long-living herbaceous plants or small bushes. They don't need to be very showy, rather they must be rustic and give the impression of growing there on their own, like wild plants. Although he designs the flowerbeds very carefully, there is no apparent order in them, thus contributing to the feeling of a spontaneous growth.

Let's see some of Piet Oudolf's rules that I'm suggesting for the gardens I'm designing.

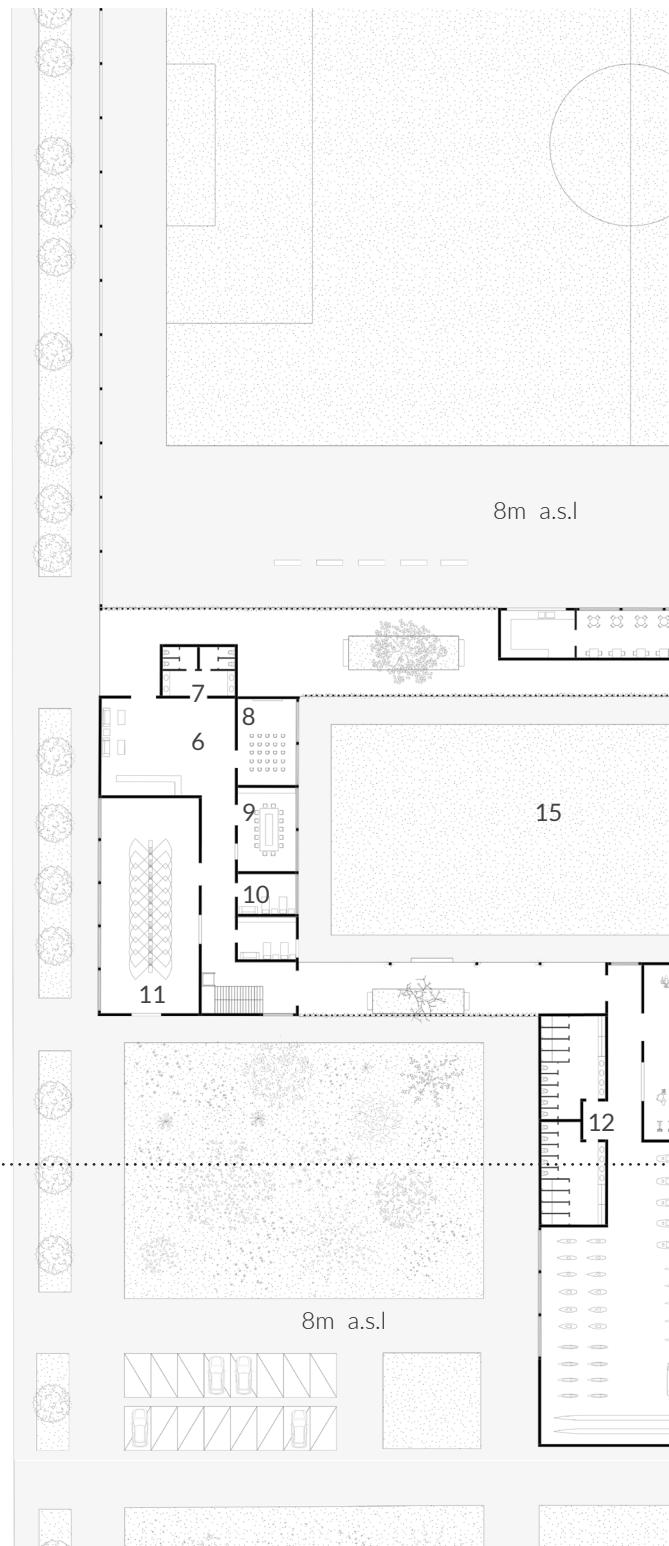


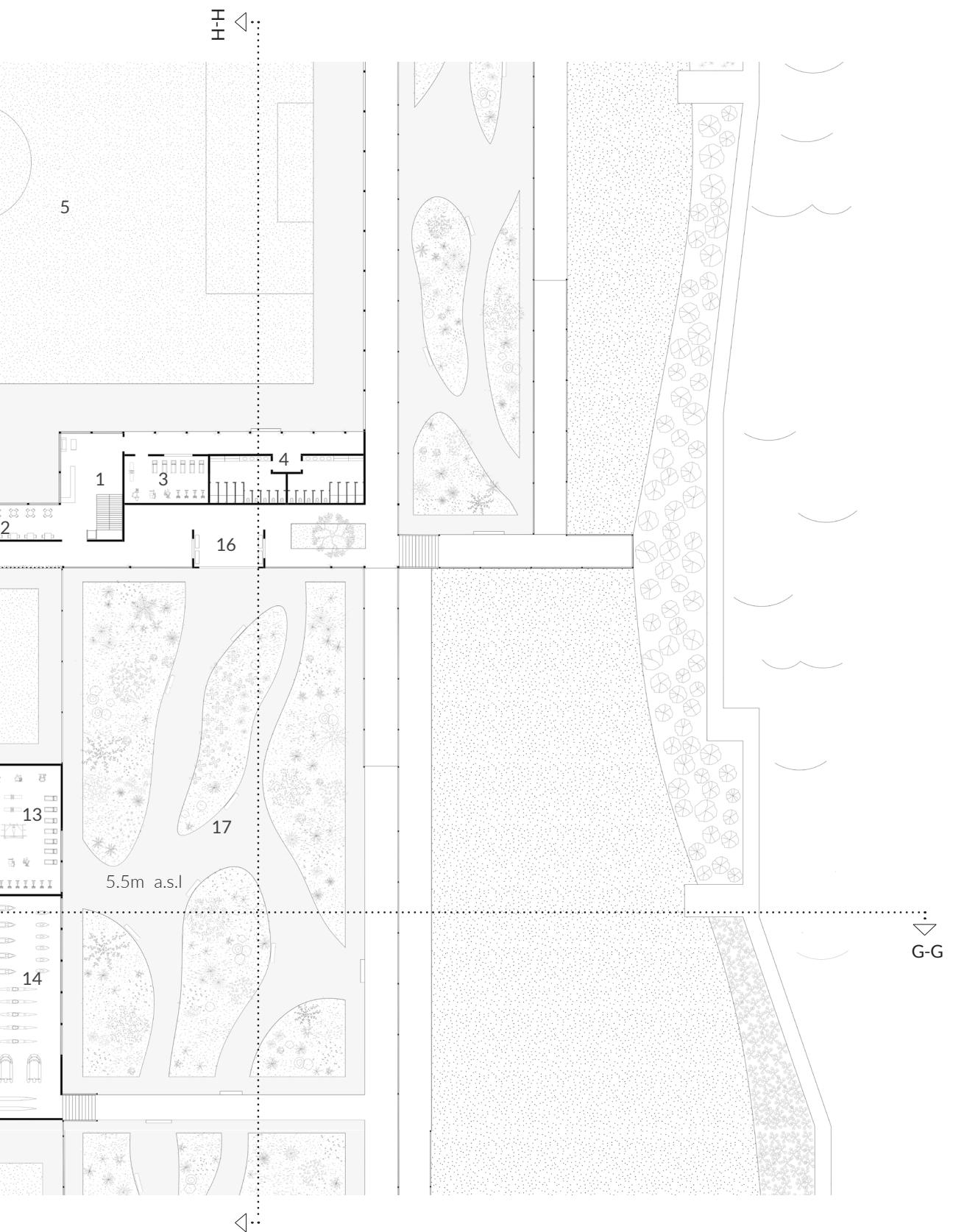


The football ground bird's-eye view.
Sport areas are important for involving
people in the park and also for their
well-being.

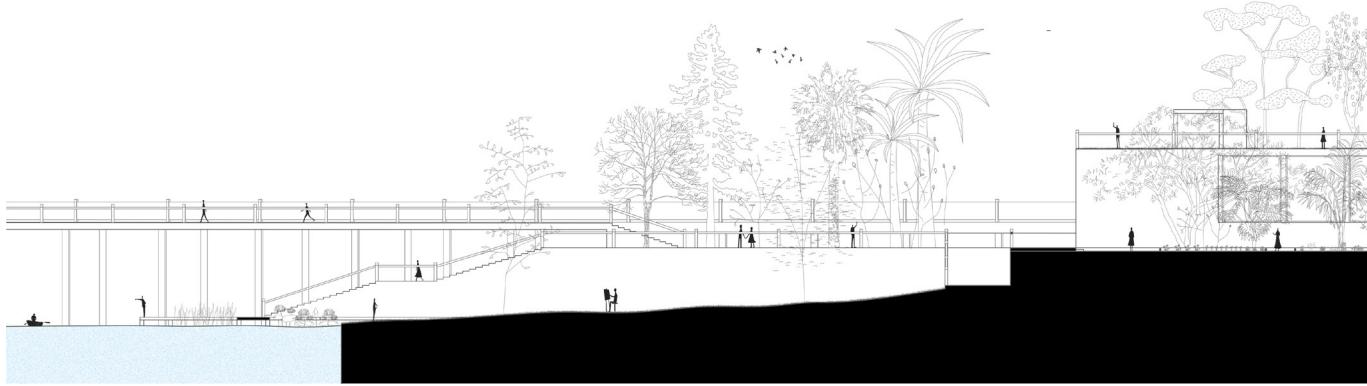
Plan layout of two sport facilities: the football ground and the sailing and rowing club.

0m 10m 50m

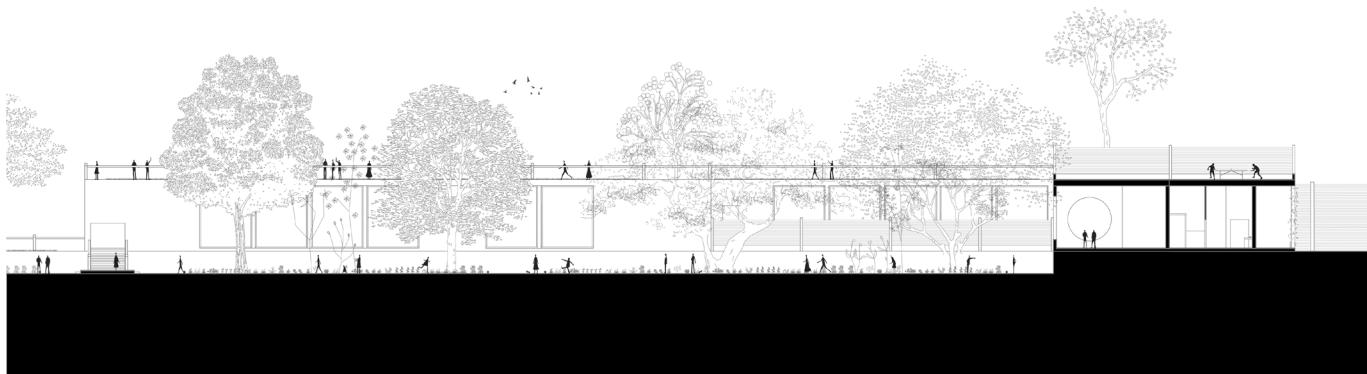




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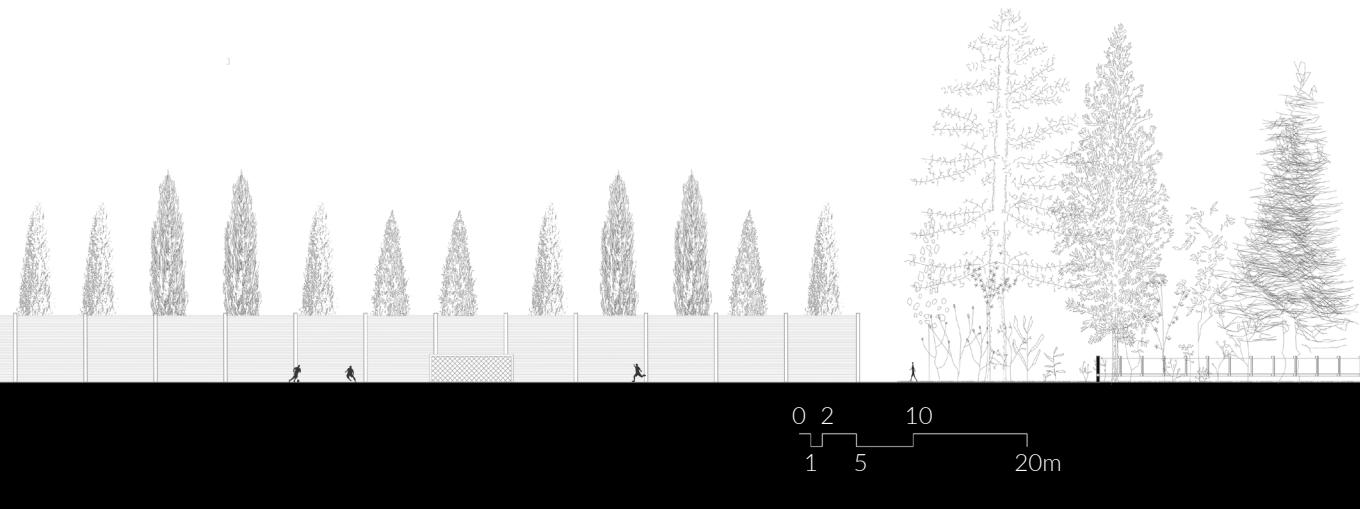
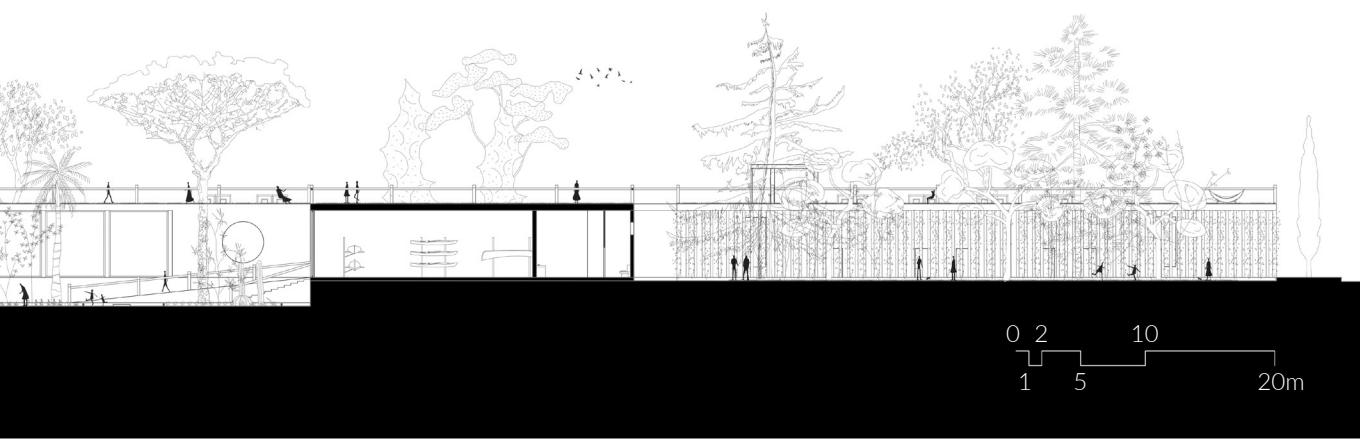


G-G SECTION



H-H SECTION

Here people can relax after some corroborate



ing activities in the canal or at sea.

Block or blend - When making a new flowerbed, besides the choice of the plants used, it's important to lay them in the proper proportion and array. Traditionally the same kind of plant, that led to the same overall effect, were placed in stretches broad enough to have a peculiar look, among equivalent different stretches, when seen as a whole. These arrangements is what Oudolf calls "blocks" of plants. In ancient classical times, these stretches had an elegant geometrical shape, token of dominance of man over nature. Then they became more irregular but there were still stretches of a single kind of a decorative plant, scattered among bushes or trees giving big paint-brush strokes effect to the whole sight. Yet, it still seemed a piece of handicraft cast into nature. This was for example the style of Gertrude Jekyll, who, about the turn of the twentieth century, was an innovative garden designer in England. Indeed, she started to make some flowerbeds in which she mingled many different plants giving a colourful sense of unit to the thing. Still they were patches of wild in a very artificial environment. Much later, toward the end of the century, with nature not thought only as a setoff of human life, but as a value in itself, someone began to think that, even in the garden artificial environment, it would be worth to try to copy nature for decoration. A pioneer in this field was Piet Oudolf who had made his first experience in Holland where he had nursery. In the 2000's he was assigned a job that probably has been a key-stone in this aesthetic evolution. He had to design the landscaping for the High Line fixing project in New York City. Since this railway facility was not torn down because of the beauty of the wild

vegetation that had grown on it, it was deemed a must to try to artificially reproduce what nature had done in the years of bereavement. So, it was almost automatic to ask Oudolf to take care of the job as he had already developed a knack for this new style. For him, it was of the uttermost importance to shun any formalism in the lay out of the plants, that could suggest an idea of artificiality. So, he shunned any geometric stretches of a single plant, rather he designed the flowerbeds by blending many different plants scattered among themselves, allowing at most some small patches of one kind of wort, to represent small natural colonies. He called this procedure blending.

Since I want to give a natural effect to the park garden level, blending is the method of choice in most places, but, in the regular flowerbeds of the nursery and crops field it's better to adopt blocking, which favours the working procedure. At the canal banks, there are some patches of aquatic plants, which of course require blocking. In the top level, around buildings and inside them, I'm going to blend some bushes and trees.

Static or dynamic garden - The traditional way of conceiving a garden was that of an artwork that should be kept adherent to its original blossomed form as much as possible. Trimming shrubs and laying new plants instead of the withered ones, was a routinely job for a gardener attending a so organized plot of land. In recent times, it's been understood that also a free-growing garden can be acceptable, provided that the right plants are chosen. This way, maintenance is much easier as the plants can be left to themselves, but for water-

ring and weeds uprooting. Of course, the plants must match each other, which means that there should be no kinds of plant prevailing on any other and they make a good aesthetic effect. So, as has been stretched before, this disposition will look much more natural. Once laid, the plants will stay there for many years, whence the name static.

I suggest of having static gardens in my park, because they look more natural. Besides, frequent visitors can appreciate their changes through the year. The only hint for the gardeners is to let the most fit plants to prosper even if they are smothering the weaker ones. It's a law of nature, and I want nature to prevail.

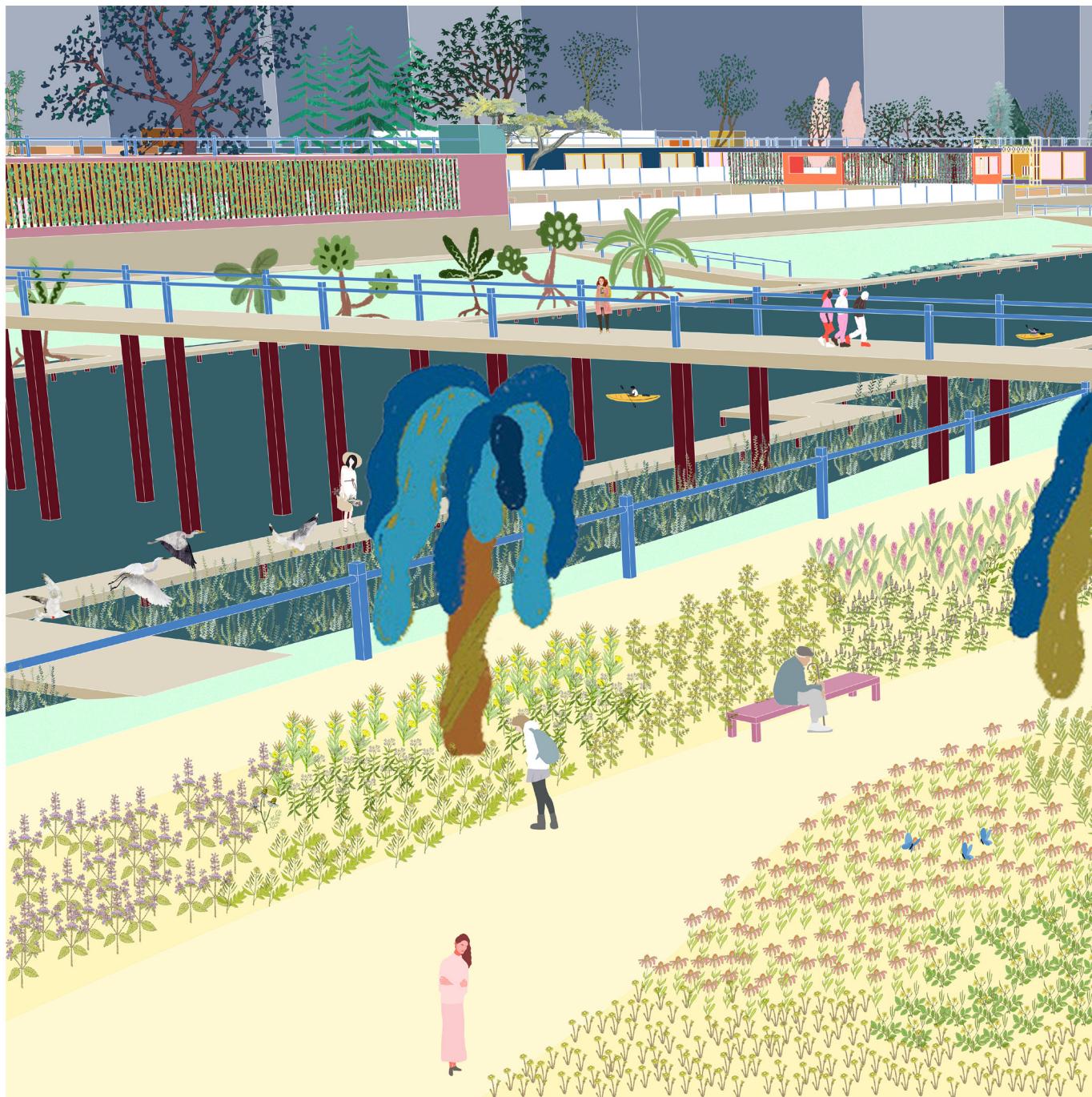
There will be an exception to this rule. in internal garden of the buildings, I will allow some degree of dynamic cultivation for having always some blooming flowers.

Layering - Layering refers to the stratification of plants in a wood: so, I may conceptually gather plants on the basis of their height range that will influence the way they'll be perceived and also how they affect their habitat. Trees make a canopy, with their branches and leaves, which shelters the ground from the sun and smothers the effects of rain and wind. Bushes are lower, but essential in making up part of the habitat for many animals by giving them shelter and food. Then I end up to the nether layer, that of the grasses and small perennials that are food and home for many animals of all sizes. When I'm making my gardens, I try to reproduce a natural situation. So there will be the contemporary presence of all the three layers all over the park, but in the

slopes near the canal. Here, trees and bushes are lacking and there's only the lowest level, which is made up of grasses and aquatic plants. This way the view along the canal will be more open, so the seer will spread his look over the water. In the garden level, there will be all three layers, with a prevalence of bushes and herbs. The big trees, although in lesser number, will have a great importance for the perception of the gardens as a whole, because their size makes them peculiar members of the ensemble. They can also influence the perception of the buildings, so must be positioned carefully. Bushes and herbs will give a more mingled effect, so won't be perceived singularly. I suggest that the mingling of bushes and herbs should be done seeking a relaxing effect, rather than a showy appearance.

I must take into account that trees cast a big shadow on the surroundings, so they can't be planted where sun is wanted. For example, near the sport facilities, I'm not going to put any tree, so people can enjoy the sunshine.

Then I must consider that the third layer of the grass-like plants gives a much broader sense of amplitude to the visitor, since his sight will not be screened by the lower-than-the-eye canopy. Shrubs and trees, on the contrary, can give a much stronger feeling of intimacy and even protection. The final effect will be given by the proper blending of the different layers, that may change with every design. Since Oudolf prefers the third layer, in his landscaping trees and bushes have only a marginal role. I think that trees and bushes are essential in a garden as in nature, so I'll put first and second layers in a higher proportion throughout my design. Yet, for the



People can stroll around watching some exotic plants and learning that some original of Eastern Asia have become part of a far culture.



An infrastructure-based approach to design scenarios in Qianhai Bay (China). Questioning landscaped amenities - A lure to nature

disposition of the short plants, I'll keep more or less to Oudolf teachings for what concerns the grass-like worts. For doing this I must rely on Oudolf's philosophy about how to design layers at herbs level. In fact, he, focusing mostly on short plants, distinguishes also different levels for his perennials. He says that there should be also a mix of herbs of different height to give a more natural look.

Plants mingling - When designing a landscaping, the end effect will be given by the combination of the piece of land, the buildings sitting on it and the chosen plants. Usually landscaping comes after the design of the buildings, so the plants must be picked for existing situation. Plants may have different effects because of their look as a whole, or for their leaves and flowers. Those plants that are more striking to the eye are called gerustbilder; they are the most impressive and di-

stinguishable plants in the garden, thus the ones that one may keep in mind as tokens of the place. Then there are the companion plants, the begleiter, that are still recognised by the onlooker, still without affecting the whole feeling of the view. Last, but not least, come the fuellpflanzen that fill in the space left empty by the other two kinds and that can't be seen as single entities, rather are felt as more or less uniform background. The choice of the plants to be put together is called mingling and it must be evaluated carefully on the basis of where they are laid.

Growing a special and important tree is an old tradition in the inside yard of Chinese buildings. People used to go visiting the place also to see it. I want to re-establish this habit in all the public buildings of the park. This tree, one for each yard, must be an outstanding gerutsbilder, that will be prominent among the other smaller trees or bushes nearby. Apt trees could be- Taxus chi-



Layering can be done at different levels: among trees, bushes and herbs or just among herbs of several heights.

nensis, Ginkgo biloba and Cathaya argyrophylla. As begleiter, to crown the important tree I suggest magnolia, laurel, bamboo, aucuba, camelia japonica and so on.

Colours have a big influence on people. In a zone there may be plants with duller colours, which result in a relaxing environment. Such could be pastel hues flowers, that give still a sense of quiet gaiety; or a mix of several greens and greyish-blues, that bear a strong relaxing power; or even a mix of drab brownish foliage that may glow with life with the right light or give a sense of intimacy in cloudy weather. For the flowerbeds, I'm suggesting to put some mingled colourful flowers that can blossom at different times, making a patch of one colour in a dull background. Also, the leave colours have a great importance: greyish leaves give a feeling of peace, while dark-green hues a sense of coolness, especially in shadowy areas. Lighter green is relaxing and dark red in a greenish background is exciting.

Plants height will influence very much the feeling of the by-passers. Higher plants, particularly beside the onlooking path, may easily give a feeling of seclusion by hampering far views. This may be intimate and romantic if the sight is snug but may become claustrophobic if the free visitor space is narrow and the plants have a wild look. I'm avoiding this sense of intimacy in the part of park I'm designing to allow wider sights, but I'm seeking it in the woods in the extension toward the sea. Oudolf normally employs mostly bushes and grass-like plants, shunning shrubs and trees. This gives an idea of breadth. Yet I think that trees can easily add a sense of natura-

lity and also contribute to the comeliness of the whole. Thus, I will employ plants of any height in my design.

I'm not going to indicate all the plants to grow in the park, but for the Mediterranean garden. Thus, it's up to the garden manager to choose the plants for other zones. In the Chinese garden, in the museum area, the plants must be typical Chinese, like the ones I wrote before.

Transparency - Transparency refers to the effect, given by some slim herbs, of letting see what's behind them as if through a haze, giving the impression of pastel colour to the screened worts. This is a fussy task since it can bring a dainty sense of placidity or, if not well in tune with the background, a feeling of jumble. For limiting this I'll employ these lean herbs in clusters in such a way that they should be perceived as more natural. The hazing effect is very changeable through the year because the herbs employed change very much in size and colour in different seasons. They are short and green when they reborn in springtime, then they grow higher still keeping a green colour and finally, at the top of their height and ripeness, they dry out and turn light brown. It's in this latter stage that they give their particular hazing decorative effect. Thus, I'm thinking of scattering this effect rather than making a continuous screen of it: this way, the feeling of the observer will be smoother and gentler.

I'm designing some transparencies only near the to enhance the effect of misty weather.

These are the rules that I suggest in designing the

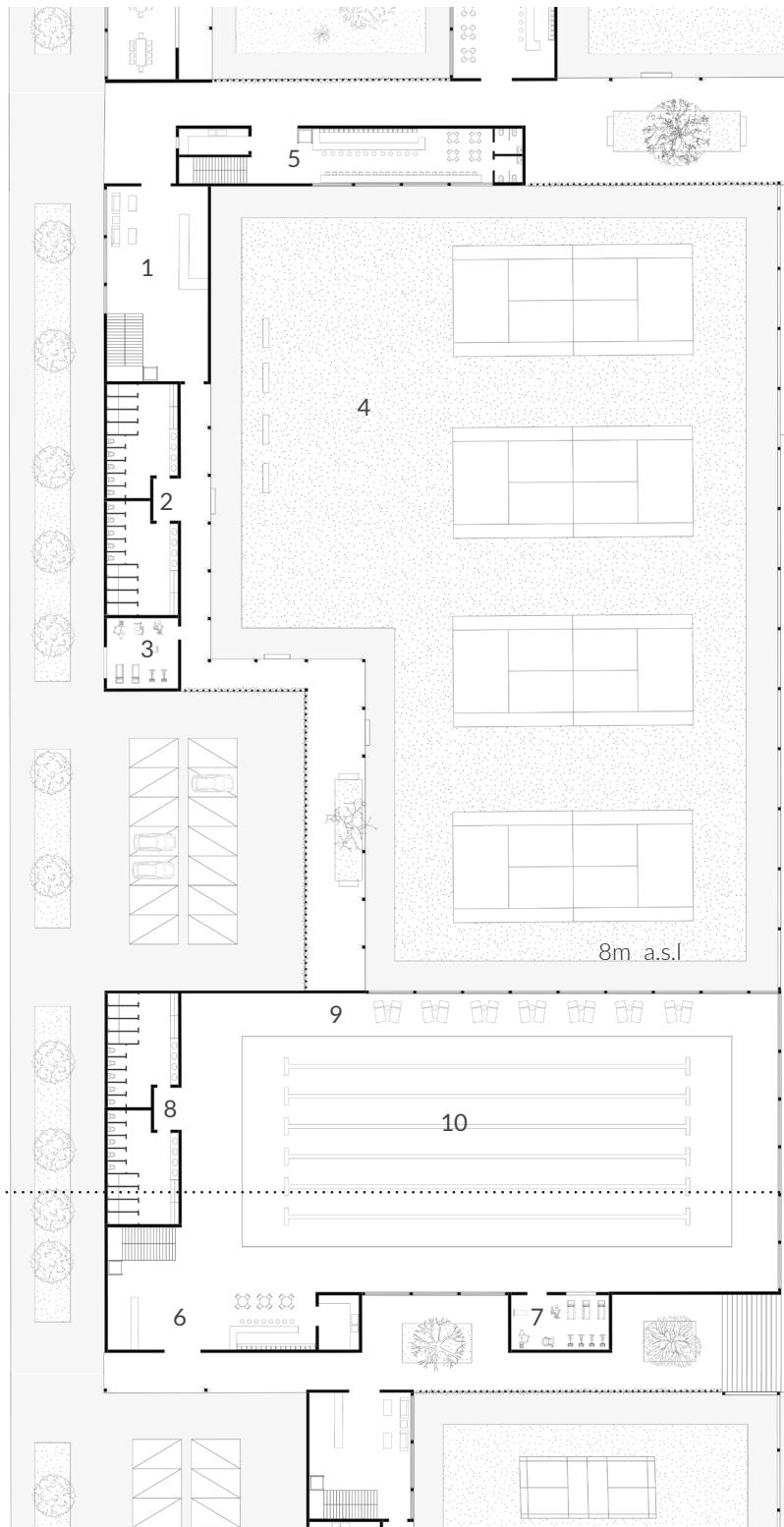


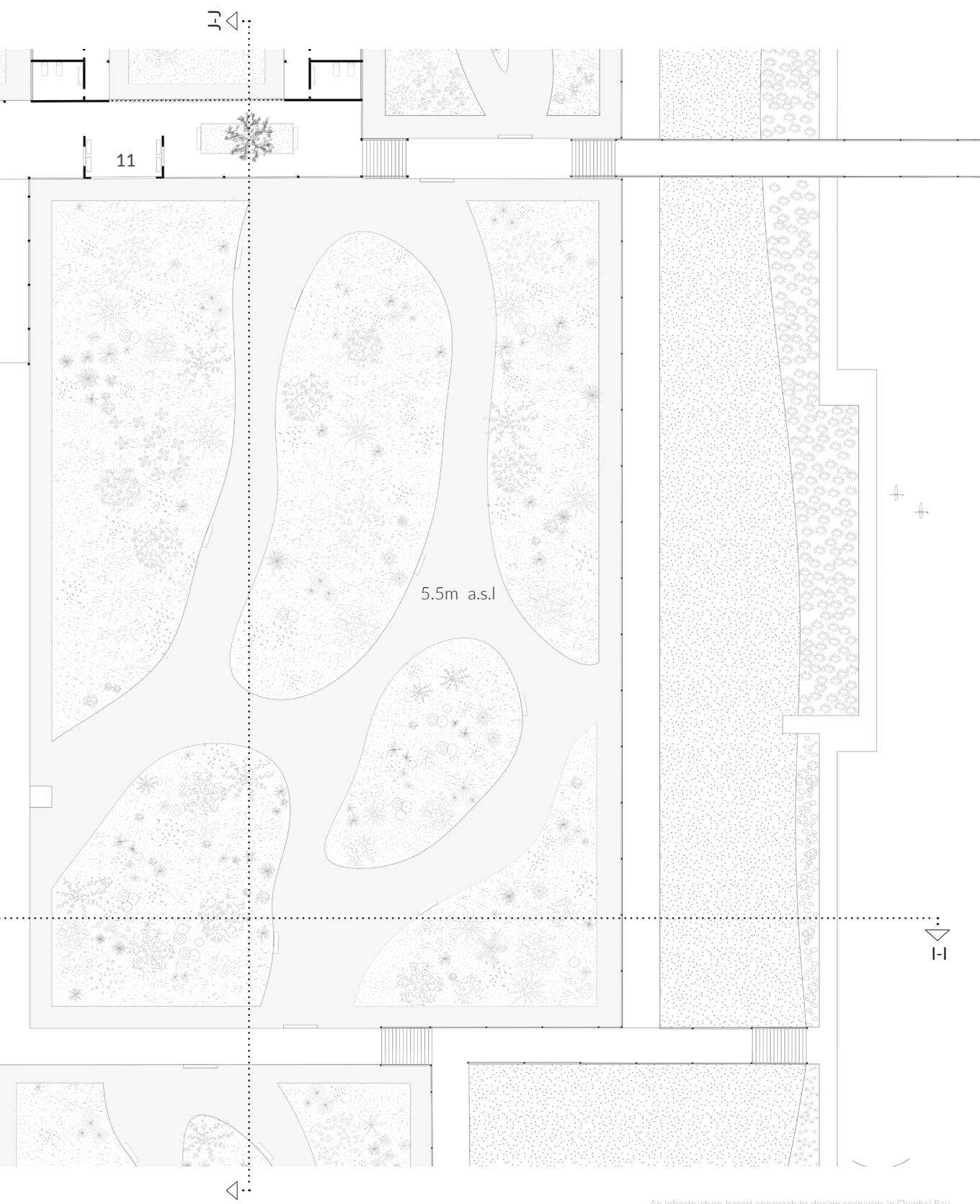


The Mediterranean style is well inserted among other ones.
Each garden can make a borrowed view for the other ones.

Layout of the Mediterranean Garden, the Tennis Club, fast-food restaurant and the swimming pool.

0m 10m 50m

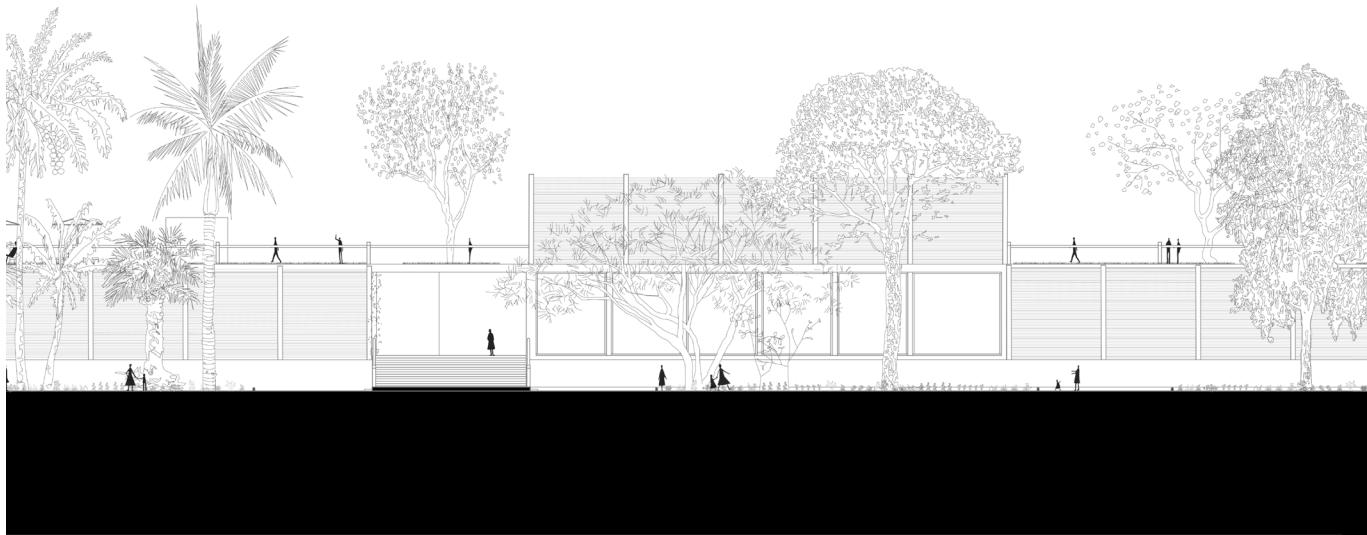




An infrastructure-based approach to design scenarios in Qianhai Bay
(China). Questioning landscaped amenities - A lure to nature

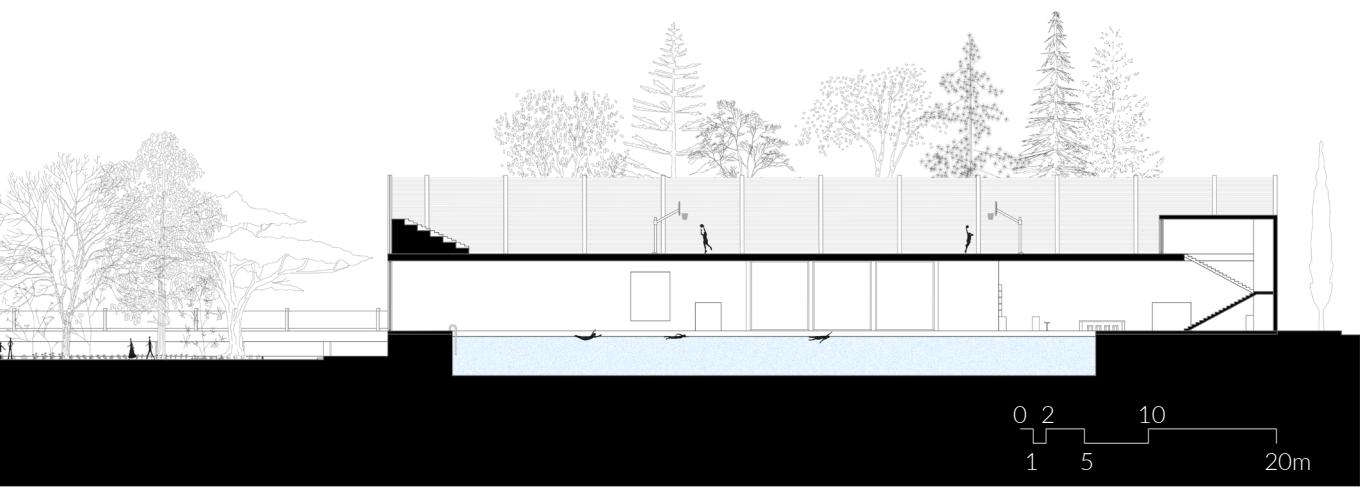


I-I SECTION



J-J SECTION

From the tennis court and basketball court



people can see the Mediterranean garden

landscaping for the gardens set on free ground and on the green-roofs. Of course, for the latter I will pick only herb-like plants and lower bushes to reduce the needed earth depth. As said before, I want to make a few gardens, each one with a different theme based on the geographical origin of the plants or for the use of the plants. So, there will be a Chinese garden, a Mediterranean garden, a vegetable garden, an aromatic plants garden and a medical worts garden.

I'm making a layout drawing of the Mediterranean garden. For ease of planting, the final drawings, specifying the plants to be put, should also have a 1-m-spaced reference grid. The whole ground will be divided in areas of uniform planting or walking space. By uniform planting I mean a matrix or a group where there is a predefined proportion among the plants number. In each area will be written the reference number of the plant kind and the number of plants to be laid in that area. If there is an intimate blending of small plants, the proportion of each kind will be indicated.

4.3 THE MEDITERRANEAN GARDEN

I'm going to make also a Mediterranean garden to show people a bit of a different and far culture. When I think of a Mediterranean landscape, I imagine a cliff surmounted by pine trees, or a beach with some low dunes and bushes in the background. Anyway, the colours that make the scene lively are always the blue of the sky and the greyish green of the vegetation. Then, the colour of the stony parts, whether it's the grey of the sand or the brown of the rocks will add a touch of fullness to the harmony of the hues. We are in a globalized world, which, in sooth, has been happening on different scales for thousands of years, so I can't discriminate between autochthonous and foreign plants, as far as they've been fully introduced in the local culture. Jared Diamond, a famous writer and researcher, in his book "Arms, Germs and Steel", argues that in the broad stretch of prehistoric and early-historic Asia and Europe, there was a kind of cultural and technical globalisation which brought to a fundamental exchange of knowledge and products, which, eventually, spurred a faster development of the involved populations. This concept may also be applied to gardening, where, introducing new species in a specific area, has led to a much better result with more dapple and variegated gardens. This influence involved also the Mediterranean plants, some of which originated from Asia and America. There isn't a specific style for the Mediterranean garden, because it's the outcome of mingling different kinds of plants grown in a casual disposition, so much can be fancied while making it. It's almost an "anarchic" garden, where plants are laid seeking the singular effect, rather than the general

organization. Often, they are simply the result of adding plants, stonewalls, stairs, trellises, paths in years of whims and intuitions of the owner. So probably its main features are spontaneity, full lack of any geometry, spreading of many small elements in a single narrow area, scattering of a few artefacts (such as gravelled paths, stairs, trellises, stonewalls, little ponds and so on) among the lustreless, yet lively, vegetation. Yet everything will look somehow natural, as if it was not the hand of man to make it, rather it has grown that way by itself. The colours have prevailingly low lustre, as the plants, being mainly fit for full sun exposition in southern countries with plenty of available light, don't need much chlorophyll in their leaves. It may be surprising for some Chinese to find out that some plants, original of their area, are now part of the culture of far-away countries. I am giving only a little hint about which ones to choose. It will be the task of the garden manager to decide which more plants to add and how to mingle them. Anyways, I think that the first thing to be done is to choose the proper plants, then to add some rocky hue here and there by laying some stones around. Now, I'm making a list of some Mediterranean plants that is worth showing to the public, because they are representative of the Mediterranean tillage culture, and some also of the culinary traditions.

Pinus Pinaster – The maritime pine or cluster pine is a tree that is a symbol of the Mediterranean vegetation. It can grow up to 30-m-tall, but usually doesn't exceed 20 m. If they grow with enough room they make a characteristic broad canopy. Another quaint feature is that if they are thrust by strong main winds, as is normal at the seashore, their bole gets a smart slant. They are sturdy evergreens that can grow either on sandy or rocky soils. Their eatable-nuts-holding cones can be fun for kids who can pick and paint them.

Olea europaea – The olive tree is most likely the most embedded in the Mediterranean culture as is the one from which oil, the typical staple fat, is made since antiquity. Yet, it's not its only use; also, olives can be a very good food. Their grey boles, twisted by winds and gnarled by the ails of time, stand like statues spreading their branches and silvery leaves toward the sky. They grow very slowly and not very big (10-m-tall), yet, can live for very long time - hundreds of years, actually. This tree is a joy for the eyes in any garden and a cultural must in a Mediterranean one.

Laurus nobilis – It's a traditional tree that has gathered many names through time- bay laurel, sweet bay, bay, true laurel and Grecian laurel all refer to it. It's been a never-ending fad since ancient Greek and Roman times when wreaths made with its twigs and leaves were worn as a symbol of success, and still do some students at graduation. It's a small tree or a big bush, depending on how you feel about it, as it doesn't grow more than 8 m. Its leaves are pleasantly smelly and are normally used for flavouring

foods.

Quercus petraea – Commonly called durmast oak, sessile oak or Cornish oak, it is a sturdy tree that can grow up to 40-m-tall. Its wood is very hard and strong as its second name petraea, which means stony, suggests, which means stony, suggests. In a garden it's an imposing tree, with a smart shape of its canopy and lobed leaves.

Quercus robur – Common oak, pedunculate oak and European oak are three names of this majestic tree that is common all over Europe. Its second name robur means strength, as it is sturdy and has hard wood. For this reason, it is often present in European folklores as a token of power and protection. It can live for very long and its bole can reach a girder of 4 m. It can be home to hundreds of insects and small animals and as such has a high ecological value. When fully grown, its canopy is alluring.

Quercus ilex – The evergreen oak, holly oak or holm oak is an evergreen tree that can grow up to over 20-m-tall. With its oval lanceolate leaves, it can have a good decorative effect, albeit without the wield of the two former quercus. It doesn't withstand frost, but in the Mediterranean shore is a widespread and tough specie. Its acorns are eatable if cooked, but their main use is for feeding pigs in the wild.

Vitis vinifera – The common grape vine, whose grapes are commonly eaten and used for making wine is a cultural symbol of Europe since antiquity. It is not self-supporting, so I must make a

Pinus pineaster is a monument in the Mediterranean garden



Laurus nobilis is a big shrub reminding of beauty and nobleness.

bower on which it can climb with its tendrils. It can be interesting to plant some kinds of grapes - there are more than 10000 among which to choose - to show the different berries they can make. Besides the fruits it provides, it can be noteworthy for the elegant shape of the supports it needs and for the red colour its leaves take after harvest in fall.

Juglans regia - The walnut is a big tree, that came from Southern Europe. It's appreciated for its broad canopy and the eatable nuts it makes. Its wood is very good for cabinet making for its hardness, texture and aspect. The trunk is not so long, but the crown is broad and decorative. It

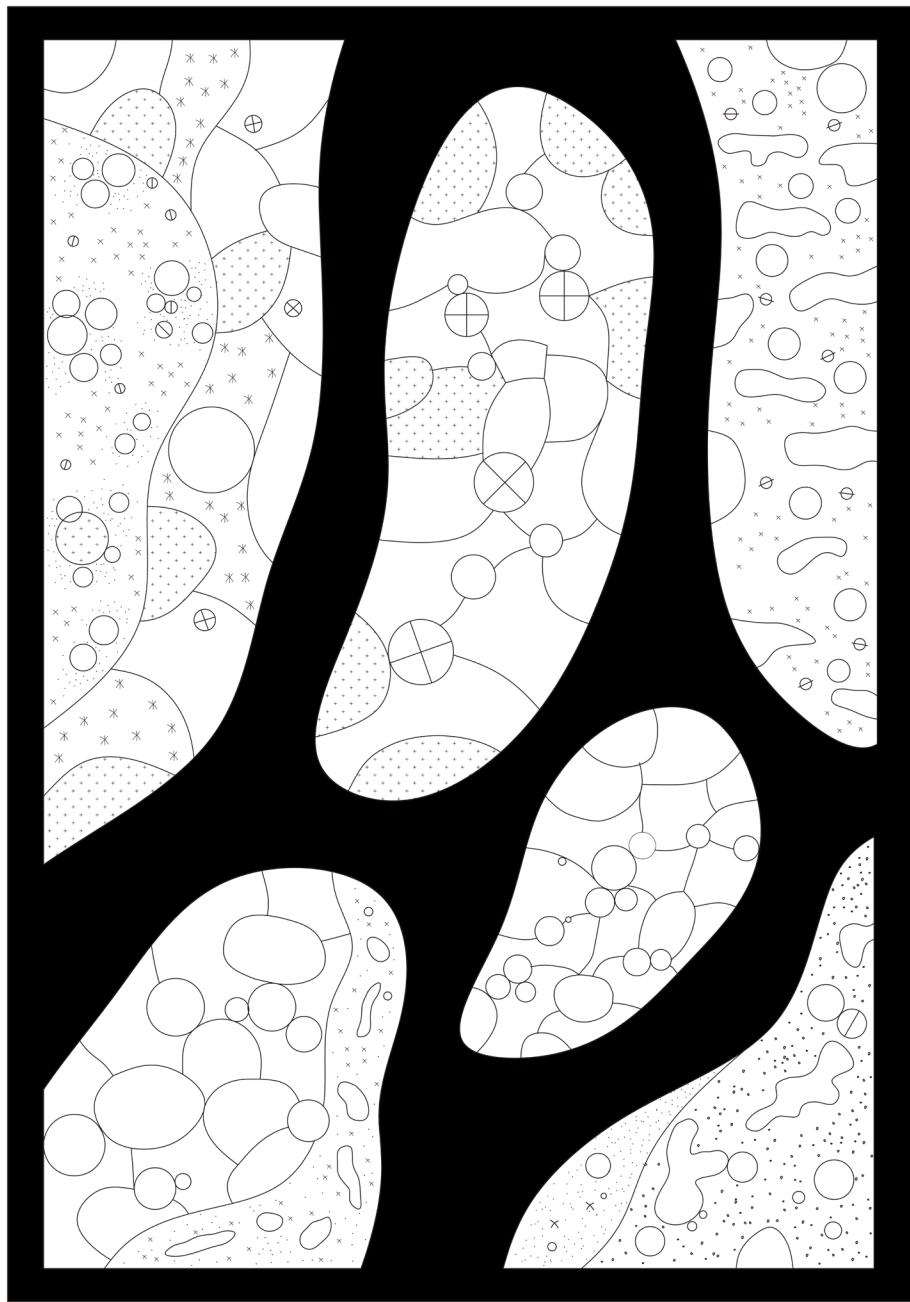
thrives in full sun and is hardy to drought but should not be exposed to strong winds.

Alnus glutinosa - Black alder is a tall tree (up to 30 m), that is normally in symbiosis with the bacterium Frankia alni that lives on its roots releasing nitrogen in the earth, which is good for nearby trees. It has both male and female catkins and bears its seeds in small cones. It thrives in moist soils and can be invasive, yet it's a good habitat for many wild species.

Corylus avellana - The hazel is a big shrub that can grow up to 10 m. If most of the suckers are lopped at the base, the left ones will grow more like trunks of a tree. It has long yellow male catkins while the female ones are very little. With its compact canopy, it's a decorative big bush.

Prunus amygdalus - The almond tree is not so outstanding, as it's not that big and its crown not very dense, yet when in bloom with light pink flowers the show is guaranteed. Then, its fruits, the almonds, are a staple food in the Mediterranean area. Indeed, it's not the fruits that are eaten, but the kernel of the seeds. It grows well in full sun.

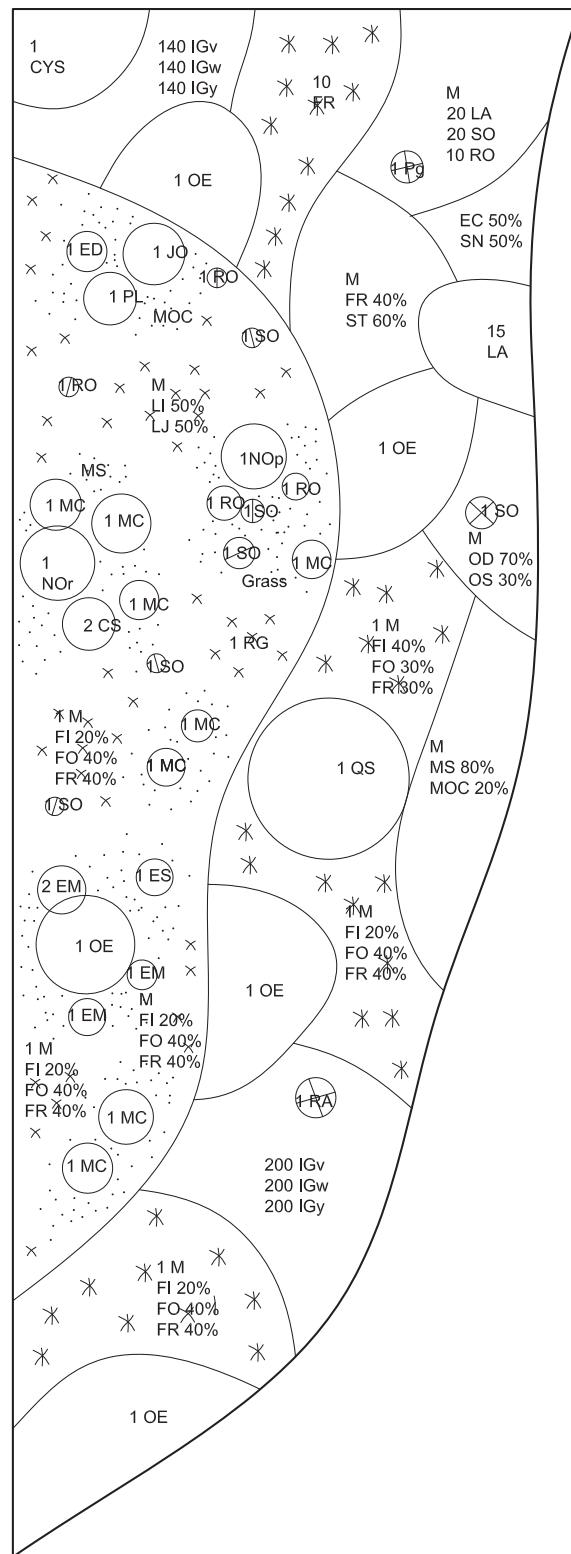


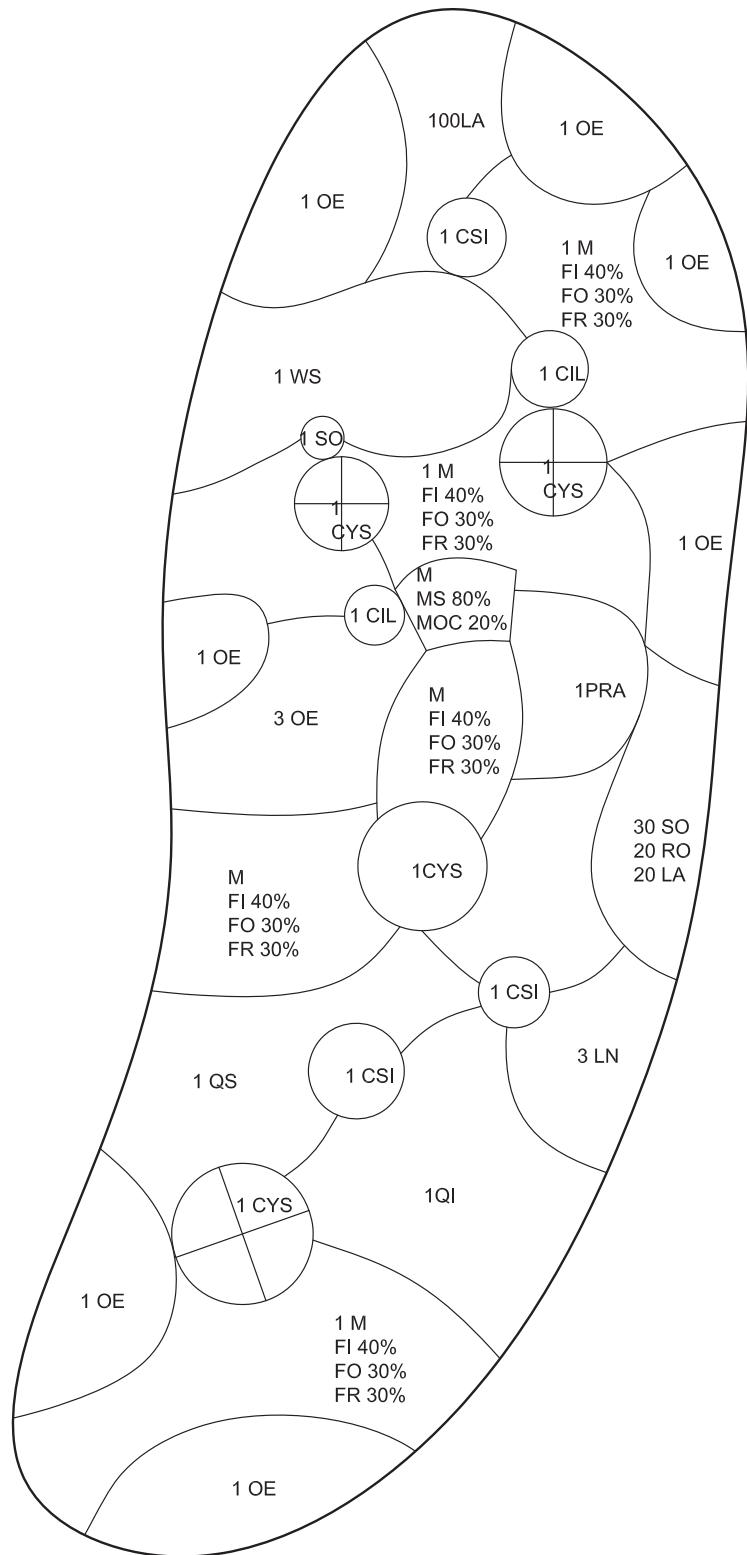


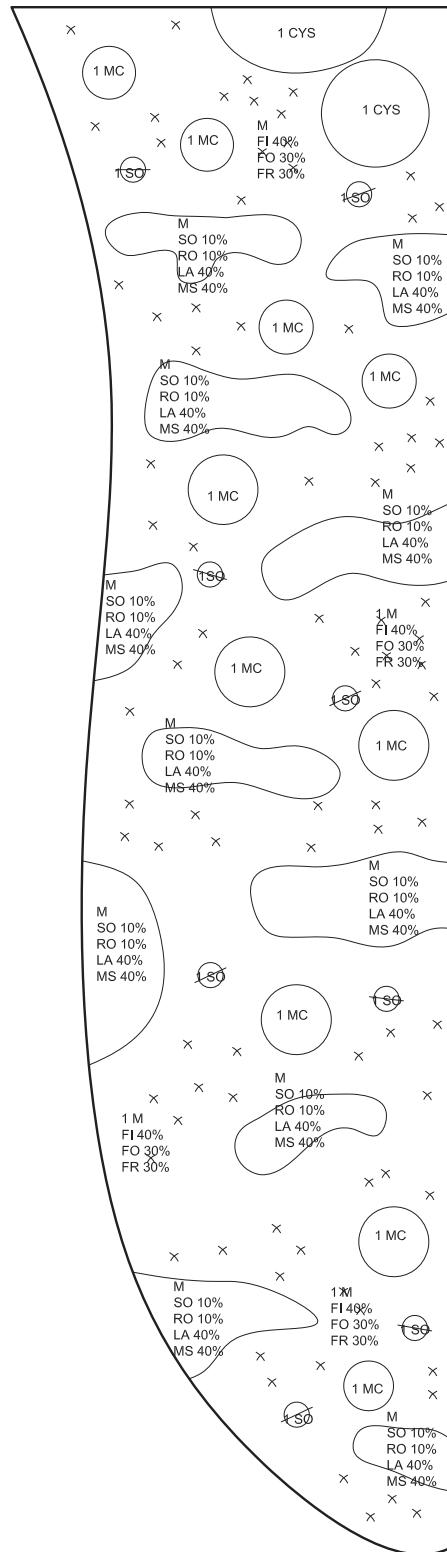
The Mediterranean Garden

Top – The general layout

Side and next two pages – Parts of the Mediterranean garden showing laying and mingling.









Nerium oleander - Oleander is a big shrub that can occasionally be grown into a tree if left uncut. There are several varieties as is usual for other species domesticated a long time ago. It has nice flowers in blossom in summertime with hues that range from white to bright red. The leaves are slender and full green. It gives a vivid touch to a garden especially if it is grown in clusters of different individuals and, if in hot weather, other plants can't blossom fully. It's very poisonous in all its parts, so watch it, but don't touch it! And keep kids and pets away.

side flowerbeds, where its look can contribute to the relaxation of by-passers. Coppicing in spring time will make it shape into an herbaceous bed. Leaving it untouched makes it grow as a low shrub.

Mentha piperita and Mentha spicata - Pepper mint (Mentha piperita) is a hybrid of *Mentha aquatica* (water mint) and *Mentha spicata* (spearmint). Pepper mint and spearmint are similar and are very common especially along the south shore. They are herbs that can grow up to 0.4 m and spread very easily by stolons. They are both dark green and their jagged leaves are decorative among more colourful plants. They are very smelly, so used for cooking and making tea. While it's raining, their smell wafts about them giving a hint of spell to those that stroll nearby.

Punica granatum - Pomegranate is a small tree with little leaves of a dark green. In springtime it has bright flowers, that contrast harmonically with the leaves. They produce fruits ripening in winter time. Inside, they have a cluster of small seeds coated by red arils, which are good for eating. Albeit original from Western Asia, it's been tilled around the Mediterranean for thousands of years. It likes sunny positions and doesn't need so much water.

Lavandula angustifolia - Lavender is an aromatic shrub growing up to 1.2 m. It's very rustic and withstands full sun also in hot weather, drought and mild frost. It's very ornamental both for its greyish foliage and for its purple-violet flowers. They lend their name to their same colour called

lavender. It's very appreciated for its smell, both live or extracted for perfumes and soaps.

Citrus limon - The lemon tree is a small evergreen tree that, although original from Asia, has been cultivated widely in the Mediterranean area. It can grow a few meters high and with its oblong leaves is very decorative. Its white flowers look pretty in contrast to the leaves dark green background.

The lemons, its fruits, are of a beautiful full yellow. It likes sunny positions but needs a good amount of watering. Doesn't like frost, which, if mild harms the leaves and the next fructification and, if strong ($>4^{\circ}\text{C}$), can kill the plant. It can't be missed in the Mediterranean garden.

Citrus sinensis - The orange tree is a small tree very similar to the lemon, but for its fruits, called hesperidia (berries with thick rind) of a yellowish-red colour called orange from it. Its original from Asia as well, but it's been cultivated widely for its fruit that are eaten in wintertime. Reaching 10-m-of height, it's somehow bigger than the lemon tree. It has the same cultivation needs of the lemon. It's a must, to celebrate a Mediterranean staple fruit



Rosmarinus officinalis – Rosemary is an evergreen creeping shrub that is typical of all the Mediterranean countries. Its needle-shaped leaves are used for flavouring foods. It doesn't grow to more than 1-m-tall and can spread a little bit more. It is dark green. It likes sunny places and withstands dry climate. It's very nice in rocky flowerbeds with other more colourful plants.

4.4 THE CROPS FIELDS

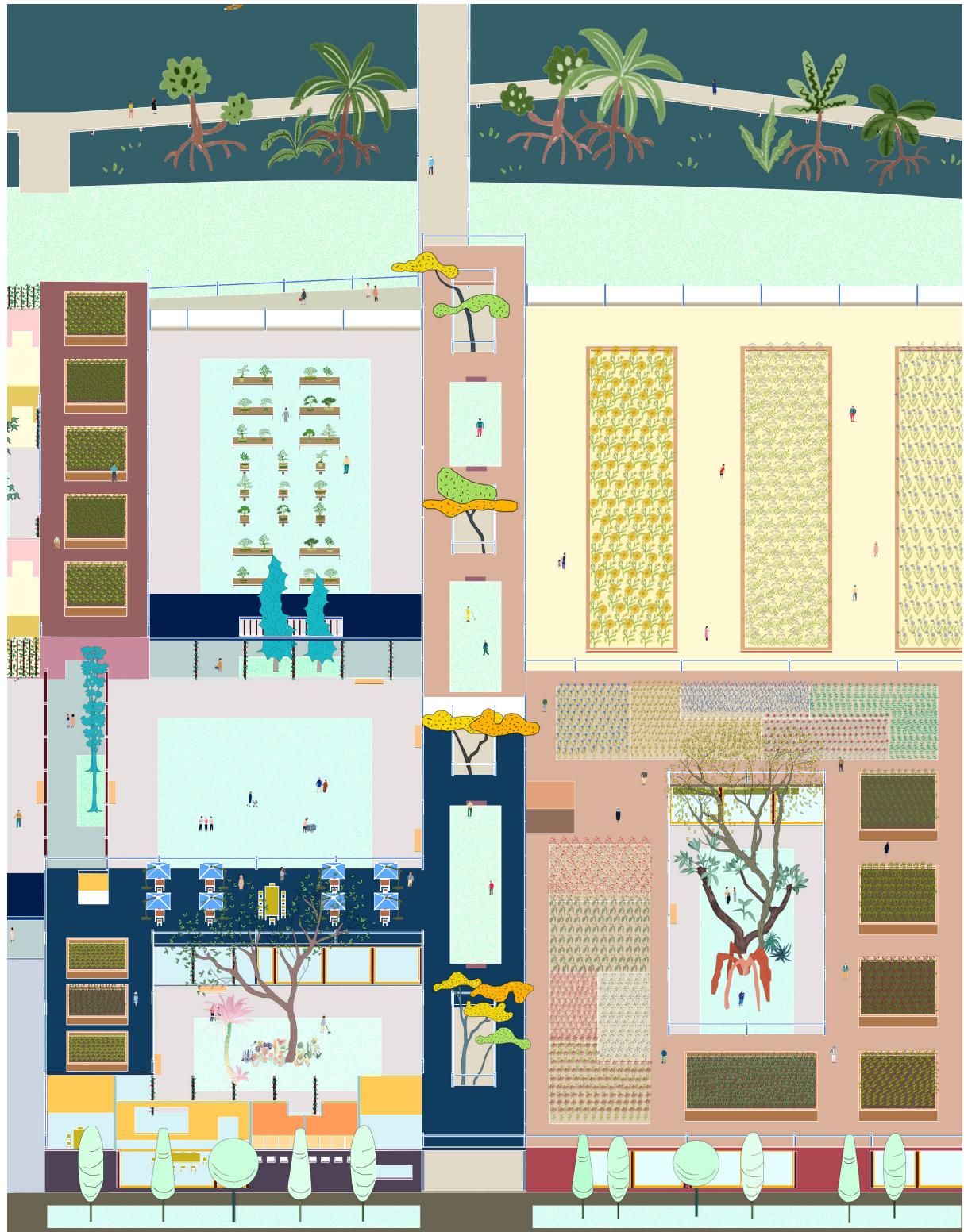
Near the restaurant, the food hall and slow food pavilion, some land is reserved to be tilled for producing eatable crops, like vegetables, berries and fruits. This way people from the city can see how crops are raised from outside the fence. The customers can go and pick some crops for eating them. Of course, these two fields will be managed by the restaurant and food hall owners who will charge the visitors when they pick the vegetables. Here, the organisation is completely left to the owners. On the restaurant and food-hall green roof there are big raised bed for plants where a full choice of aromatic plants, fit for cooking, will be raised for selling or using in the restaurant.

4.5 THE NURSERY

In the handicraft hall, one of the activities is teaching people about gardening. To add practising to theory, I'm adding a plant nursery to the facilities to allure visitors to buy some plants and do some gardening in their houses by themselves. This, too, is a commercial area and as such will be managed by its owners. They can cultivate some of the plants.

4.6 THE GREEN ROOFS GARDEN

The green-roof technical features will be discussed much more deeply in the building section. Here I'm just evaluating which kind of cultivation will be made on them. The green roofs cultivation potential is limited by the thickness of the earth layer on them, that can be 60 cm or less. Being on top of the buildings, their cultivation and handling will be competence of the manager of each building. My suggestion is to put on each one some plants that somehow are related to the activities done beneath: on the restaurant and food hall, flavouring plants and small crops which can also be sold; on the museum and library tops, I suggest medical plants; on the sport facilities, some more perennials and broad stretches of lawns that can accommodate people relaxing after sport. The green-roofs, besides the technical advantages that will be described later, have also the edge of allowing people a different position with an enhanced sight of what's about the building. Here the effect is not probably outstanding, since all my buildings are low and arranged with good viewpoints from within, yet what I want to show to the people is a new architectural concept, that, if appreciated, can be spread to future buildings downtown.



4.7 GARDEN FURNITURE

In the park's gardens, besides the plants, there will be also some pieces of garden furniture. The general furniture will be scattered all over the park to be available to the visitors in more or less all the zones where they can go. It will consist of a few kinds of benches and one kind of tables. The benches can be made for the following purposes: sitting and chatting (1); relaxing and taking sun (2); sitting at the table (3). There will be only one kind of table.

The furniture goal is mainly functional. This choice is dictated by the intention of keeping the place as natural as possible, shunning all kind of decoration. Yet, any object has some aesthetical value and my pieces of furniture are no exception. My idea is to make them very simple, even essential.

We want also to reserve one area of the park for making some user-aimed gardens. These will be zones furnished to meet specific tastes of four different kind of people: toddlers and children; teenagers and young adults; adults and families; elders. Why should I make this differentiation? It's my hope that most of the visitors, regardless of their age, will enjoy to visit the park for learning something, staying in its natural environment or simply for strolling around. Yet, to give them a fully natural relaxing tool, I want to give them also the opportunity to spend some time among their age-peers in a place suitable for making them at ease. Of course, I can't even think of reserving one particular area to any particular kind of people. The mere fact that I want to make all it looks natural prevents us from putting any restraint to the free movement of people. Rather I want to arrange each of these areas in such a way that it will be more appalling to one of these categories. The most "stand-alone" category is that of the youths. They are growing and getting independent, so they like to stay among themselves. Besides, the kind of noisy activities they like to do, suggests us to keep their zone aloof enough from those of the other three categories. These ones, while having each its own zone, can stay more or less at sight distance from each other, since their interactions should make no particular problems. Thus, they all can share a macro-zone that will be split in three smaller areas. Let's see how these four zones are characterized.

The family's macro-zone will comprise the kids' zone, the adults' zone and the elders' zone. It's important that the kids' zone is visible from the

4.8 – PROPOSAL FOR AN EXTENSION OF THE PARK

My design regards the land between the two existing bridges, yet there is another equivalent extension of land from there to the sea. In this one I want to make a more natural arrangement that consists of two parts: a set of gardens for users of different ages and a wood-like garden where people can have the feeling of a wild environment.



A long corridor-porch

It's not only a mean for linking different places. It's also a liveable element that binds building and garden and that is source of many borrowed views.



An infrastructure-based approach to design scenarios in Qianhai Bay (China). Questioning landscaped amenities - A lure to nature

adults' and elders' zones since these latter must be able to control what the former are doing. So, I can have the kids' playground bordered by the adults' area on one side and by the elders' one on another. Besides, at the outskirts of the playground there must be rows of benches (kind 2, for chatting) from where someone can look after the kids. The playground will have its equipment at its centre, surrounded by a more or less circular stretch of lawn, about 20-m-wide, where kids can play freely; then on the outer ring there will be the benches. The playing rig will consist mainly of tackles that train the kids in climbing or athletics; swings, see-saws and slides will also do.

The adult area is of course for everybody who conforms to their way of relaxing. By the way this is valid for all the other zones, with different pastimes. Adults and families like to spend time doing activities like chatting, eating and playing table games. So, in their area there must be 1-m-wide tables of different lengths to accommodate more or less numerous groups. On both of their long sides there will be a simple wooden bench. There should be some tall trees with a wide canopy that can cast some shadows on the sitting people. At the border of this zone there are some common services- taps with drinkable water, toilets and changing rooms for those who want to wear a swimming suit for sun-bathing. Furthermore, a row of barbecues will be welcome by those who want to spend the day and have lunch there; moreover, it will contribute to bring near different groups, thus easing new friendships. Besides the trees I would add very few decorative plants since here are supposed to

heed mostly to each other.

In the elders' zone, relaxation, contemplation and quiet talking will be the main activities. So the benches will be more comfortable with more ergonomic backrests. They will be put in groups to enhance gathering of lonely people. Besides the trees for decoration and shadows, there will be more decorative plants for appealing to the elders, particularly the lonely ones who may need some distraction from their tiresome lives. For this reason, the elders' zone must lay along the path that leads to the families' zone. This way those old persons that live alone far from their relatives can see children, youths and adults passing bye, and by this relieved partially of their loneliness. In the premises there must be as well some facilities like toilets and drinking water taps.

For youths the situation is more cumbersome- they like playing more noisily, playing music and singing, flirting, laying on the grass or talking in small secluded groups. Thus, for them no benches at all. Rather for sitting I can put some, 1.5 to 2-m-high and 2-m-wide, blocks of stone on which they can lay or sit with dangling feet. This will give to small teenager groups some feeling of intimacy even if they are in sight of all the other ones. These blocks will be scattered in the big lawn, that is the essential part of the zone, where most of the visitors will lay down or sit for their social activities. At the outskirts there will be some sport facilities like informal football, volleyball and basketball grounds. In the groves around the lawn there will be also paths for jogging and biking. Toilets, drinking water taps and changing rooms with showers will be also nec-

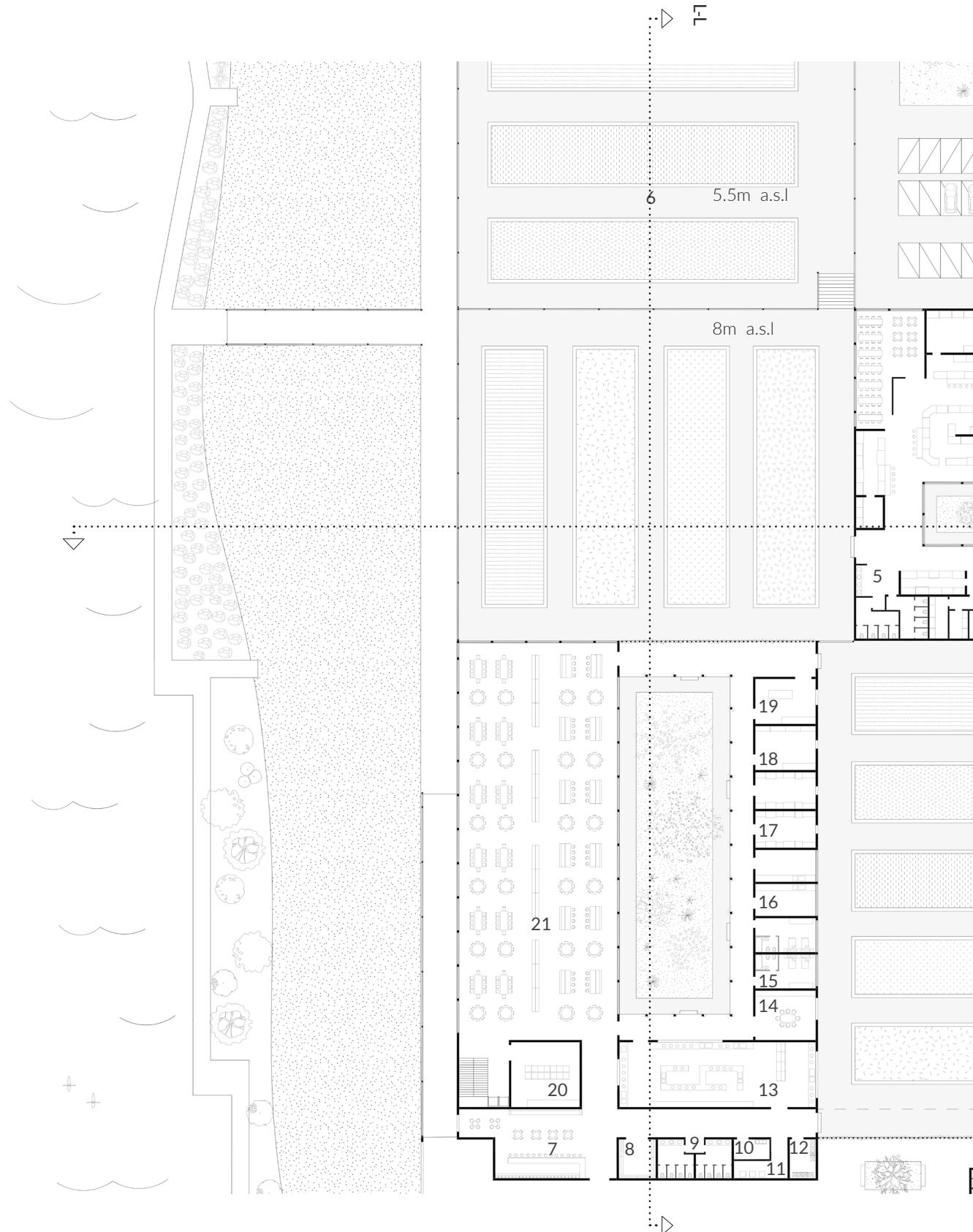
essary for this area. This area must be secluded from the other three that would be disturbed by the noise and also to give the youths a place where they can feel they stay away from the control of their families.

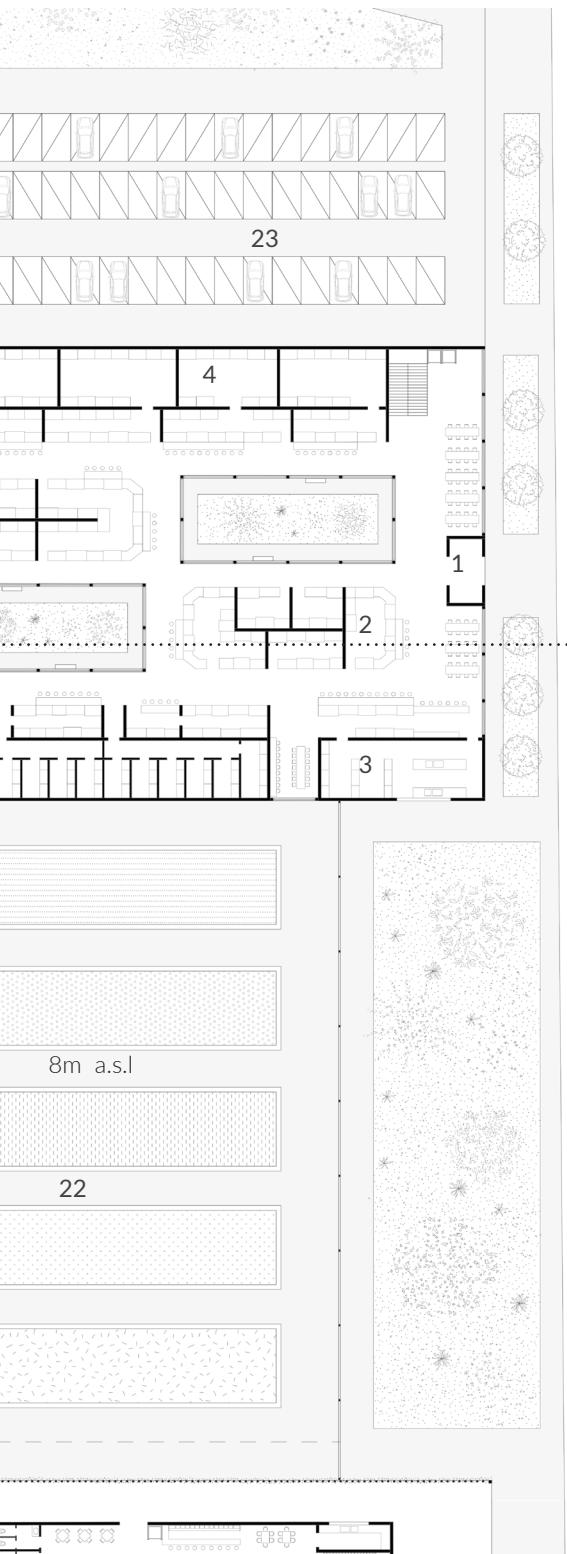
The garden can be made more alluring by adding some pieces of furniture to the plants. This equipment must be aimed at making people at ease while spending time in the premises. The most important pieces of furniture are benches and tables. The former for letting people sit and relax; the latter for letting them doing some particular activities such as pick nicking, reading, playing games and so on. Besides, they can add some personality to the park so they must be designed very carefully. This must be done thinking which goal should be linked to them. I want to divide this task in two- general equipment for the park; some theme-aimed equipment for a few zones designed for particular users.





Cultivated fields and green-roofs provide healthy food to those that appreciate it.





Layout of the market hall and organic food restaurant with their premises

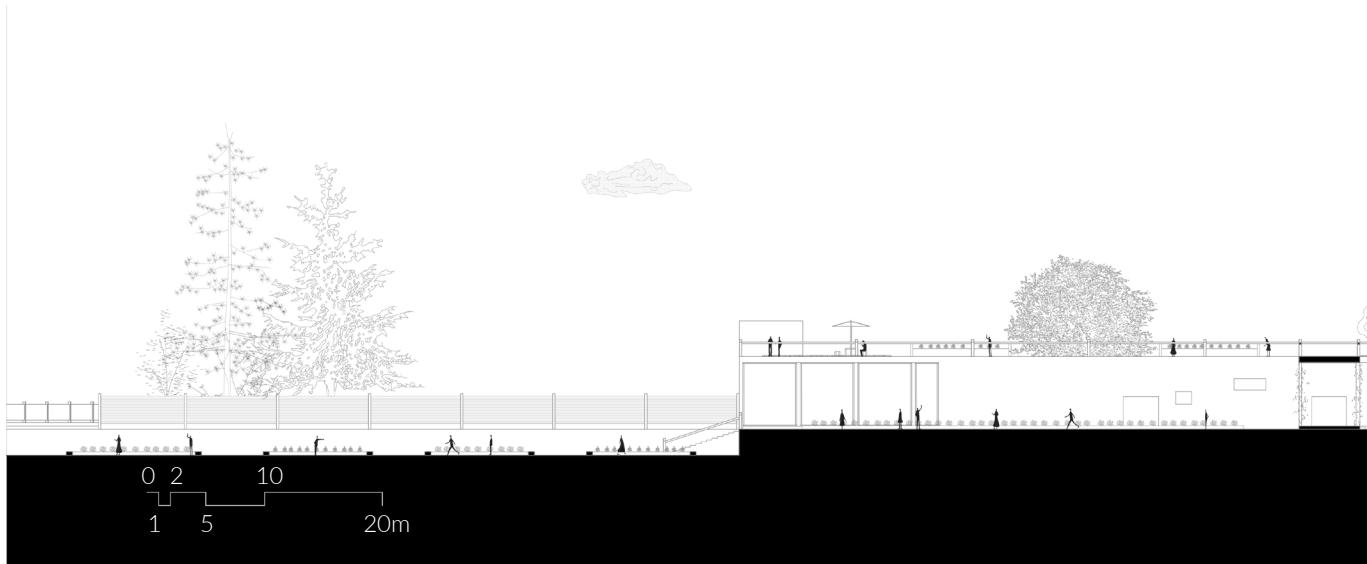
0m 10m 50m

Market Hall

- 1 Main entrance
- 2 Stands
- 3 Kitchen
- 4 Storage room
- 5 Toilet
- 6 Growing area

Organic Restaurant

- 7 Bar
- 8 Changing room
- 9 Toilet
- 10 Smoking room
- 11 Garbage storage
- 12 Laundry
- 13 Kitchen
- 14 Office
- 15 Staff rest room
- 16 Preparation room
- 17 Storeroom
- 18 Pre-cleaning
- 19 multi-functional room
- 20 Cleaning room
- 21 Eating hall
- 22 Growing area
- 23 Parking lot

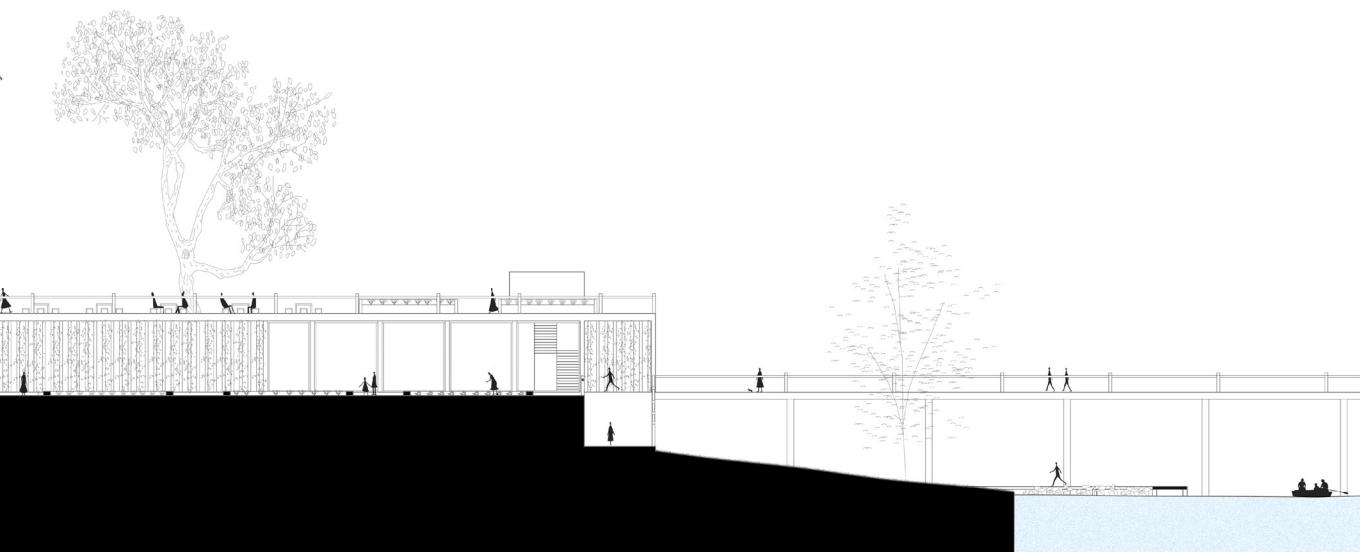
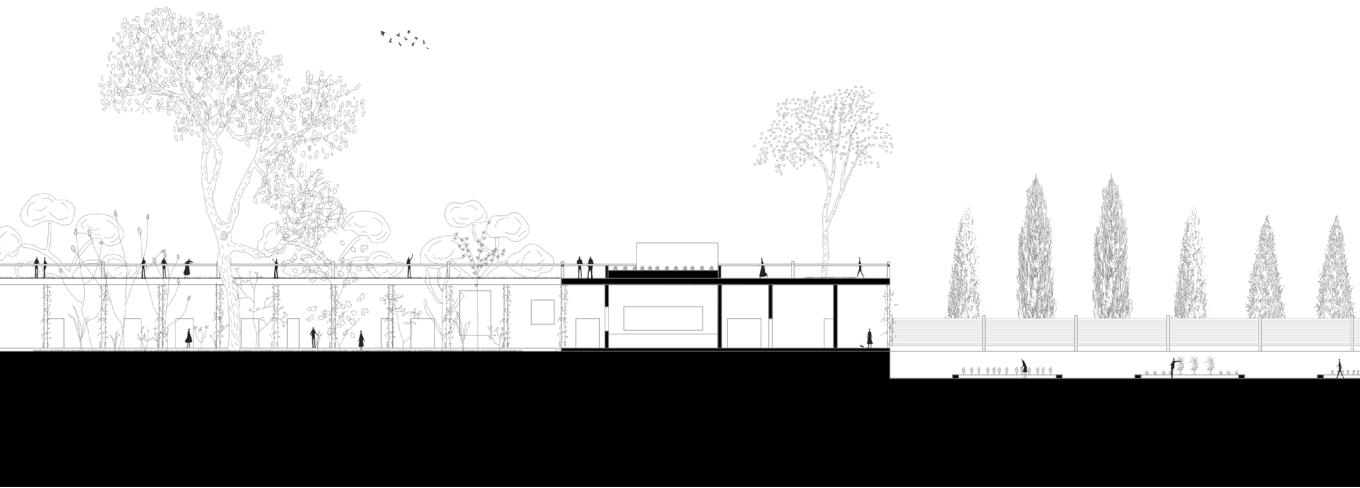


K-K SECTION



L-L SECTION

Section of the market hall and organic food
A relaxing promenade after a good meal is v



od restaurant with their premises.
very healthy.

A bird's-eye view of the Spa centre.
It's another facility for relaxation and a healthy life.





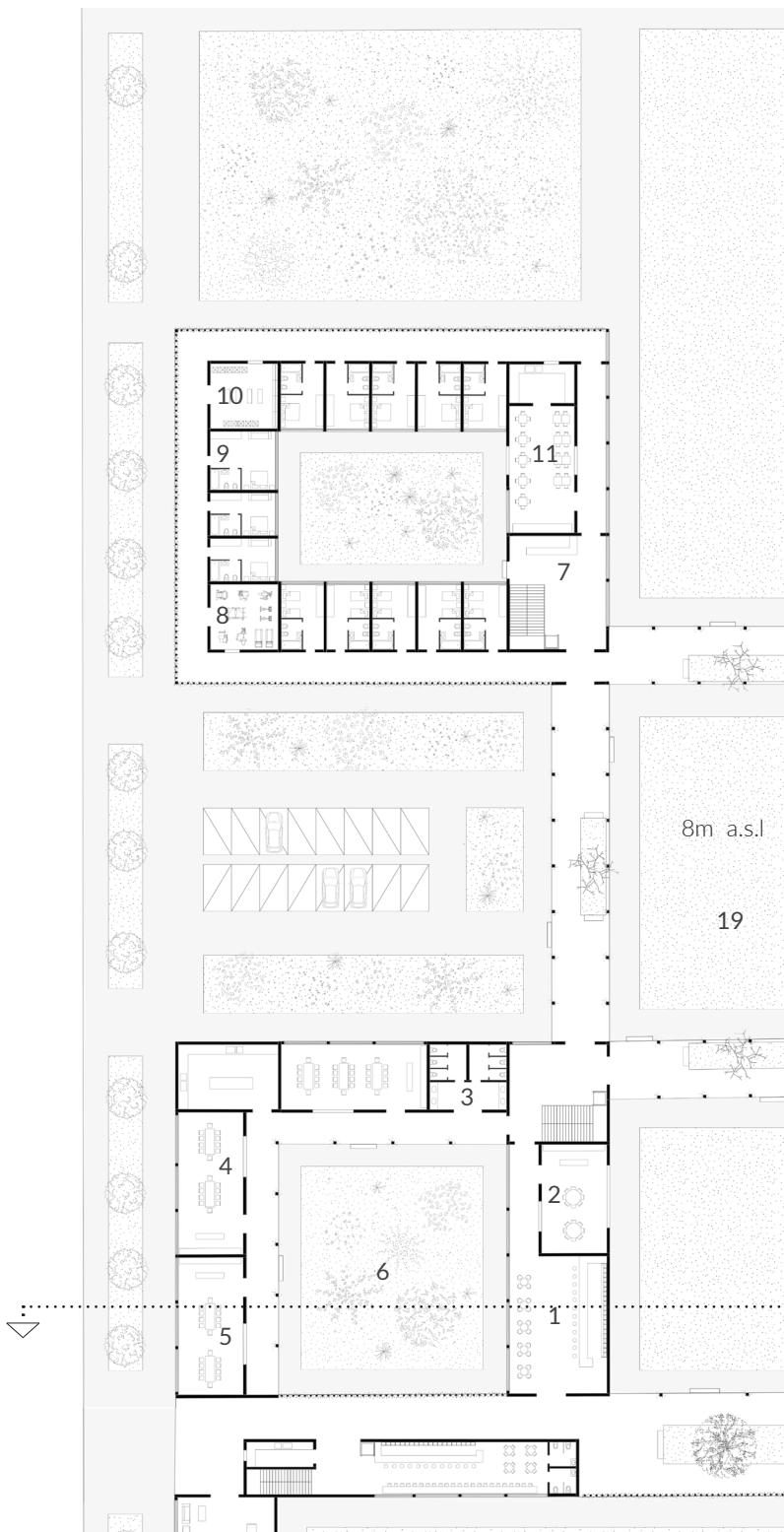
An infrastructure-based approach to design scenarios in Qianhai Bay
(China). Questioning landscaped amenities - A lure to nature

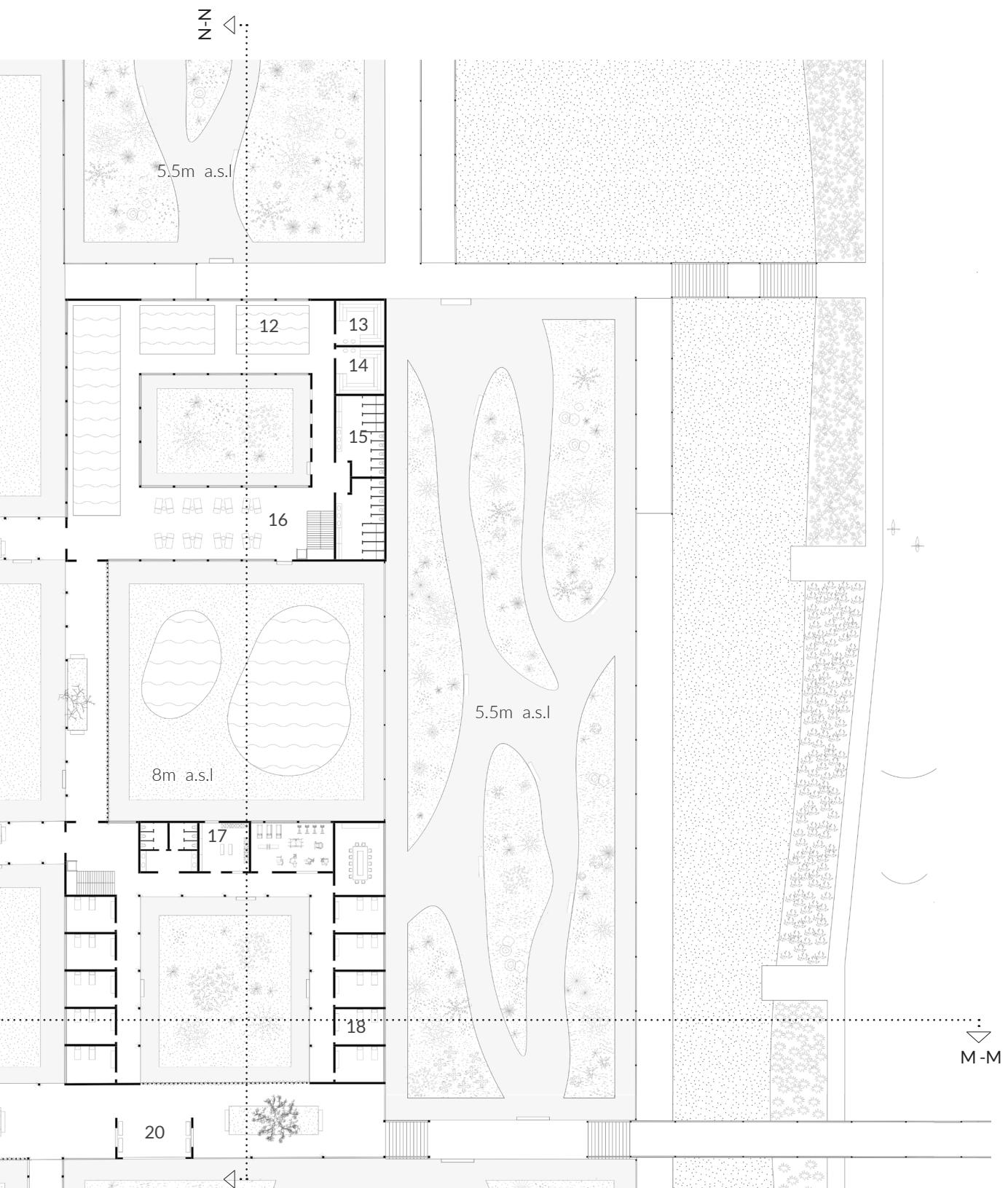
Layout of the Mediterranean Garden, the Tennis Club and the swimming pool.

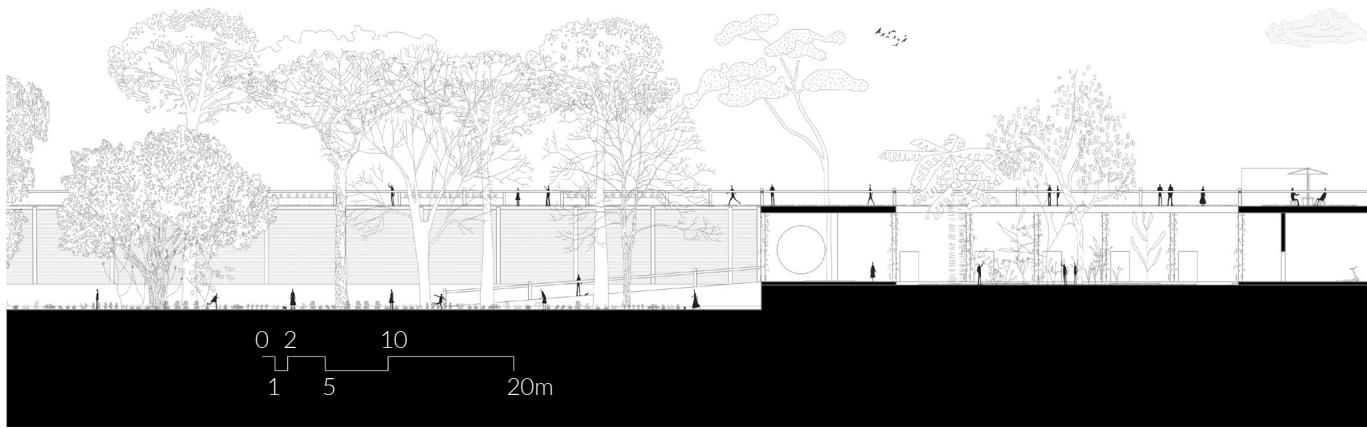
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Lounge Bar + Spa Centre

- 1 Reception
- 2 Administration
- 3 Toilet
- 4 Kitchen
- 5 Dinning room
- 6 Orchard
- 7 Lobby
- 8 Gym
- 9 Guest room
- 10 Laundry
- 11 Breakfast
- 12 SPA
- 13 Steam room
- 14 Sauna
- 15 Locker room
- 16 Relaxing area
- 17 Cleaning room
- 18 Massage room
- 19 Lawn
- 20 View point



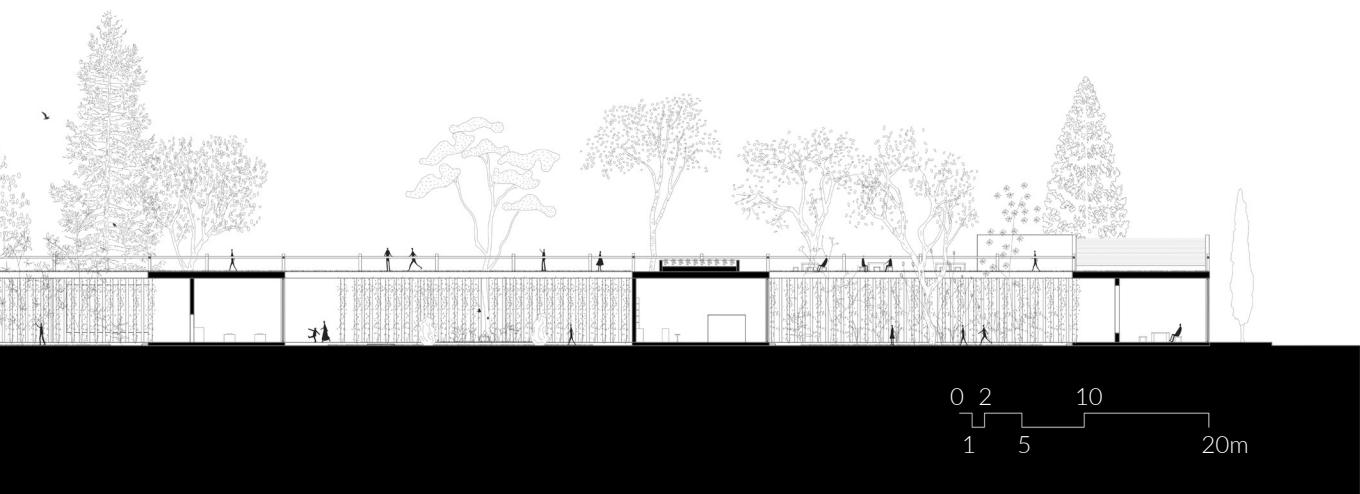
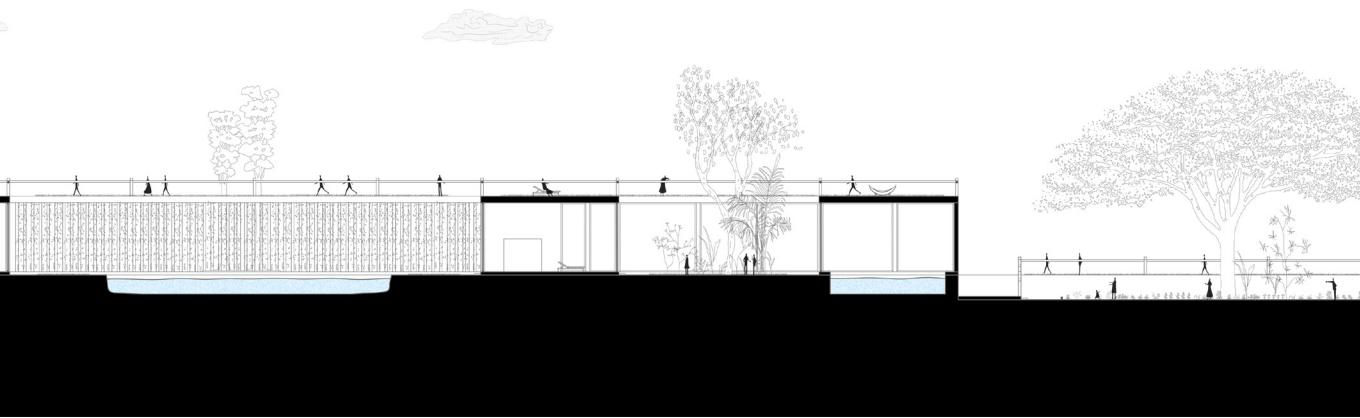




N-N SECTION



M-M SECTION



5

The Design Project The Buildings

5.1 THE PARK STANDARDS FOR BUILDINGS

Since I am designing this park for an empty area, I have a lot of freedom in doing whatever I like without any constraints from existing structures. Yet it can be helpful for a harmonic and functional development of the site, in accord to my starting goals, to set some general rules about how all buildings, both private and public, must follow. They must concern their size, look, energetic performance, handicapped people respect, customers enjoyability and ecology. I can take a quick look at these goals.

The height of the buildings will be limited to let people perceive them like part of the environment and not as stand-alone structures inside which visitors feel in an environment wholly different from the outside. Thus, they must also have big windows to link the inside to the outside. One more step, would be to arrange the garden out of a window like what was in an old tradition of the Chinese gardens. I'm referring to the pavilions they used as privileged points of view for what was in the garden. I'm also designing four such viewpoints for the botanical garden, the common public garden, nursery and Mediterranean garden. In the rest of the park, I won't have any such kind of view point, rather it will be the buildings with some other specific function to work also in such way. Their big glazing will allow the visitor to see different and spectacular sights of some plants and decorations arrangement. Also, the winding path and galleries will be in this case replaced by the corridors, trails and rooms of my buildings. So, some garden views will become decorations for the inner room integrating inside and outside. Hopefully this should link the seer to the nature

outside, even if he is more used to the metropolitan landscapes.

From the outside - the visitor must see a building that matches with the garden. For this, the facade should have a natural look, so I must choose a material that blends well with the garden. My first idea was to pick stone and wood, as they are historically the natural building materials. Then I thought that making the structure of reinforced concrete and then coating it with some other material would somehow be a hoax. I came up with the conclusion that showing people what's used for the construction is the "natural" way to do, avoiding any disguising technic. So, I'm going to keep concrete on the facades, and glass, of course, as its transparency makes it a "non-material" that delimits the building without limiting the sight. The glazing will increase the lightness of the buildings, which will blend with the trees like the kiosks did in the Chinese garden. And the big glasses reflecting the garden can give the by-passers some magnificent borrowed view of a particular point.

The energetic performance of the buildings is obtained by improving its insulation and using green roofs. The insulation in the walls will be made in a usual way of interposing an insulating material inside the wall. For the roof, besides the insulating material, there will be one more knack consisting in putting some grass or other vegetation on it. It will absorb most of the sun radiation, limiting that part of it that will reach the inside as heat.

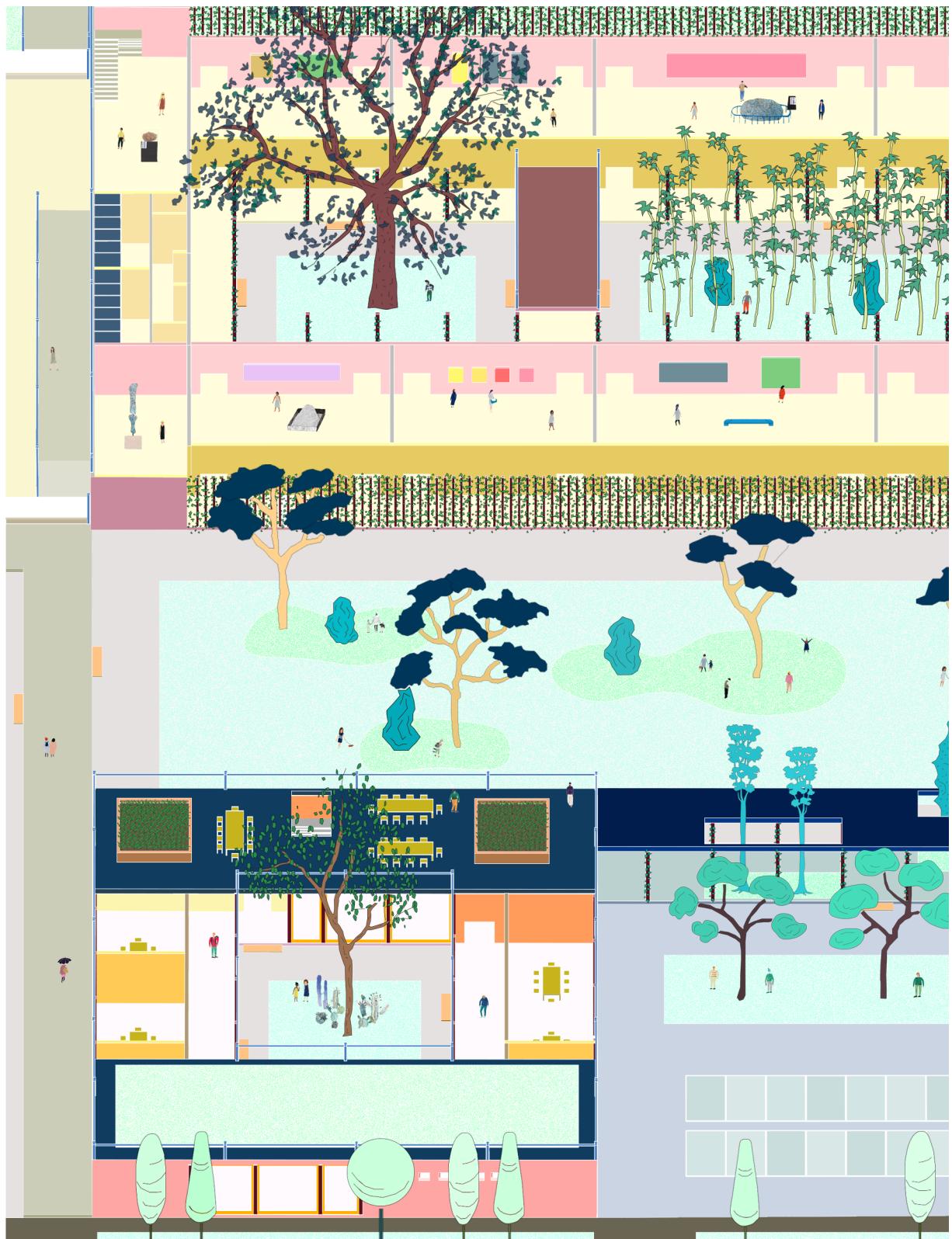
We want the whole park open to everybody. This includes handicapped people. The first ones that you may think of are those impaired in walking.

For them it's important that whenever there are steps there must be a substitute path where a wheelchair can go easily. If there are only a few steps a mild-slope ramp will do, otherwise some mechanical device like a lift with fit accessibility will be appropriate. Unluckily there are other categories of impaired people and also for them the park must provide fit means of help.

The enjoyment of people is of paramount importance since it's the feature that determines whether it's worth or not to make the park. Suffice here to say that it should allure most kinds of people as possible: kids, youths, mature and elders; well-educated and of lower instruction; sporty or intellectual.



An infrastructure-based approach to design scenarios in Qianhai Bay (China). Questioning landscaped amenities - A lure to nature



5.2 THE BUILDINGS SIZE

The actual trend in modern big city, urbanization is to design many tall and also relatively broad buildings that are separated by proportionally wide stretches of land. The city becomes huge and people become lost in it. Lost because they live in an environment that is no more fit for their size. The single building may become a town in itself.

(Put building view) In the modern skyscrapers, there are very few public places where people, either living in it or coming from elsewhere, can gather to socialize. So, they lose the possibility of socializing with their neighbours as it was normal to be done for their grandparents that lived in small towns. This way people miss what should be an essential part of their life: develop their social skills by mingling with neighbours either for playing or chatting. This is a traditional way of spending leisure time that in modern cities is dwindling more and more, giving way to a more artificial kind of relationships condi-

tioned by what I choose to do in my life. In my park, I can try to re-establish makeshift natural relationships. Of course, they can last only the time people spend in the park, but I hope that it will induce them to return there on a regular basis once they start to appreciate this life style. The idea is that I should provide them an environment where they can easily get in touch with each other for doing whatever they like at that moment, provided their behaviour is licit.

So how can I achieve that? The small scale of space of the building can do a lot to induce people to meet each other. In fact, all the covenants to one building or the garden in the park will share the common spaces - there are no private spaces there - so end up interacting with each other. Probably the first time, it will be just a shy interaction but those who will go again to the park should develop a deeper and deeper relationship that may even lead to a friendship. This should happen especially in some buildings: the fittest for this influence is the Community Centre where people gather to make some particular activities or go to other rooms where they can simply chat and make new acquaintances. This may also happen at the Museum and at the library or at the Handicraft Hall where people go for some specific activity. Then, why does the size of these building influence so much the human behaviour? It's because when people must share a room, their physical distances are closer that they will probably start to speak instinctively. This is very important because it's the traditional - I would say even atavistic - way people interact for socialising. Besides, in the outside, people should do the same.

5.3 THE BUILDINGS INFLUENCE ON LANDSCAPE

As it can be seen in the drawings, the buildings arrangement is irregular. This is strongly wanted because it is a try to remake the feeling of the old Chinese scholars' garden as I mentioned before. In fact, although the relationship between landscaping and buildings here is reversed, in that in my design, the buildings come first and then plants and other garden stuff are laid around them, the end feeling of the whole project should be alike the traditional scholars' garden. It can be understood from the plan layout that the sight of anyone strolling in the building area will change very often, continually revealing a new scenery that may be a slight evolution of the one just left, or an astonishing new one. This is very important as it will give the visitors that peculiar feeling of intimacy that can be experienced in a snug and hemmed place. Here every little space, may it be a porch, a courtyard, a room or a corner of a gardens perceived as a unit of space where the visitor is included and from where he can see what is beyond as a borrowed view, no matter if it's still within the park or out of it, such as hills or skyscrapers. Thus, there I can have a polyhedral experience by just turning around or walking a few steps toward a new wonder. The point is that although I start by designing the buildings, there must be an aesthetic exchange and unit of purpose between them and the surrounding gardens.

5.4 THE BUILDINGS LOOK

It's important that the buildings in the park have a look that can somehow enhance the goals I aim. A simple look with very few decorations will help people to relax by thinking that they are in a common place that doesn't browbeat them. In simple words, they will feel at home among other known or unknown persons. So, whether they come from trendy neighbourhoods or from more popular ones, they should feel at ease in the very natural behaviour of speaking to each other. The materials and the colours must have a great importance in all of this.

The facades are the interface between a building and the environment about it. So, they are an important element for blending it with the landscaping. My first idea was to choose stone and wood for the facade, then I thought that, since the structure of the buildings in the park is going to be of reinforced concrete, feigning a different material on the building surface, but not at its core, would be an architectural lie. Thus, I chose plain concrete also for the facades. Its greyish colour can be inserted well in the green envi-

ronment of the park. So, the whole building will stand out in the garden in an harmonious way. The glazing part is made with smoked glasses that limit the radiant energy inlet into the building. The glazing will be pretty broad, so, on the outer side, it will reflect the plants and the sky giving continuity to the sight and somehow camouflage the building in the surrounding nature. Inside the building, I should distinguish between those areas that are more informal and aimed at socialising and those more formal, where an institutional activity is performed. In the former ones, such as bars, chatting rooms, halls of the Community Centre and so on, a simple ambient with concrete walls and floors and some colourful pieces of furniture will blend simplicity with a hint of glee that will stimulate a good mood; in the latter ones, such as the library or museum, where people devote themselves to some more demanding activities, the environment should be more relaxing to stimulate concentration. Light colours of a pastel hue can make the room snug. A general soft lighting will contribute to the atmosphere; then specific lamps, aimed at the undertaken activity can enhance the concentration and relieve the eyes from too much effort.

Next page:

The view of SPA centre
Big windows, long porches and green-roofs minimize the aesthetic barrier between built and cultivated areas, unifying their perception.





5.5 THE BUILDINGS LIST

The building in this park are those that can satisfy the needs listed above. They are divided in clusters after their functions.

The cultural centre includes

- The museum with the managing centre
- The library
- The community centre
- The handicraft-shops and nursery hall

The commercial centre includes:

- The food hall
- The restaurant
- The slow-food pavilion

The sports centre includes:

- The gym
- The sauna, whirlpool and massage centre
- The swimming-pool
- The basketball court
- The tennis courts
- The football grounds
- The badminton courts
- The volleyball courts
- The rowing and sailing pavilion
- The fast-food bar

5.6 THE CULTURAL CENTRE

The cultural centre is at the core of the park. It's made up of the museum, the library, the handicraft pavilion and the community centre. Its goals are to lure common people to learn about nature and natural sciences and try to slake their curiosities about such issues. These tasks can be done at different levels. The museum will show specimens and issues about nature in an interactive way; the library will let people interested in a particular subject to delve into it by providing both the books and a comfortable place where to study them; the handicraft pavilion will allow people to practise, under the guidance of an expert, their skills in making some practical activities that may also concern the subjects of the museum; in the community centre people can self-organize some activities about nature, such as conference about some topics or exploratory trips in some natural environment and so on.

5.7 THE HANDICRAFT HALL AND NURSERY

The handicraft hall has an important task in the park, because it's the "laboratory" where people can practise what they've learnt about traditional activities. Here, they will start doing or improve their skills in pottery making, painting, sculpture, cooking, gardening and wood carving. All these subjects will be taught on a regular basis. Some more could be held as temporary classes if people require them. The space should be organized, first by having a room for each of the main activities, so there can be placed the devices, implements and tools needed for them on a stable basis. In each room there should also be seats and desks to accommodate pupils while theoretical lessons are held. Then some working benches must be provided. Yet, for these and the implements, it's better to ask the specialists that will give the lessons what to buy and how to organize it.

Architecturally it's important that there is a good illumination, both natural and artificial, for a good comfort during the practical activities. In each room there should be at least a sink for washing hands and implements.

There is one room, dedicated to gardening, that has direct access to the nursery and practising tillage field where people can do some training. The nursery is also available to those who want to buy some plants and gardening implements for their home. In each room there might be a shelf for reference books, but only a small one, since all research should be done at the library.



The Cultural Centre court.

At the core of the Cultural Centre, this yard, reminding of the traditional Chinese gardens style, inspires relaxation and meditation.



The natural environment made up by the cultivation of plants will attract many small animals, like butterflies and birds, which will contribute to the spell of the place.

5.8 THE MUSEUM

Museums are places that by gathering some particular specimens pursue some cultural goals. The main ones are shielding these specimens, that normally have a high cultural worth, from spoilage and destruction; making them available for the study of specialists; showing them to the public for general education. Since my museum is made for the park and this has the inbred aim of nearing people to nature, the last one of these goals will be the preponderant one. Of course, if a biologist or other specialist would like to watch the museum items, he will be welcome, yet the museum design must be performed mostly to the advantage of the average visitor. This can be achieved in different ways. In my case it's worth considering that I am starting from nothing, so I have no particular specimen that can be shown inside it. My choice will consist in making an innovative museum where swatches from nature will be only a slight part of the offer.

The museum will be divided in small sections, each one placed in one of the 8 exhibition rooms and delving about one specific argument. I suggest that the rooms should show the following subjects:

- 1 Physics and Chemistry
- 2 Biology of the Cell and Evolution
- 3 Viruses, bacteria, archaea and other unicellular organisms
- 4 Plants
- 5 Fungi, lichens
- 6 Animals 1
- 7 Animals 2
- 8 Ecology and Healthy Life

This can be achieved in several ways. with swatches with a short label identifying the item; with deeper explanations written on bills with pictures posted on the wall; with multimedia available in each section, some playing the same film or slide-show continually, others for delving into some specific argument on request. For each of these multimedia players to be used on demand there should be some chair. For the round-playing multimedia there must be some rows of benches for letting watchers relax while seeing them. All these sections are in the museum rooms. Activities inside them can be delimited by movable screens, so they can be easily rearranged if needed. The general lighting should be not too strong, but the specimens must have spot lamps pointing to them to enhance their visibility. The environment must be relaxing so the colours on walls and floor should be pastel. There must also be one or more rooms for lectures and conferences.

The museum has a green-roof where many kinds of traditional medical plants from all over the world will be tilled.

The bonsai garden - Beside the museum there is a small bonsai garden that is there to testify an old Chinese tradition that was spread to Japan and, recently, from there to the whole world. The miniaturized trees, kept so by carefully lopping them, give the spectator a feeling of beauty, harmony and wonder. They are a sublime junction of nature and art, technic and culture. Thus, I couldn't avoid displaying them in the park, where they found their natural site in the cultural centre. The gist of bonsai culture is to better

the fengshui of the place where it is grown. Specifically, in its origin it was used for balancing the Yin and Yang of a house with the proper kind of trees. In my park it has mainly a cultural value and the goal of relaxing people.

The botanical garden - The botanical garden can't be missed in my park, because it's a show of botanical specimens than can be interesting for the visitors that, after learning about plants with the museums multimedia, want to see them in real. It's made mainly with herbs or small bushes, organized in flowerbeds with similar plants together. For each kind of plant only one or at most two specimens will be displayed, since here the main purpose is to show as many different kinds of plants as possible, with little care for the esthetical effect. Its plant layout is very geometric, as this will help to categorize the plants.



The Museum seen from above.

Its green-roof, tilled with traditional medicine herbs, is an example of an old nature-oriented wisdom.



An infrastructure-based approach to design scenarios in Qianhai Bay
(China). Questioning landscaped amenities - A lure to nature



The bonsai garden beside the Museum.
Here people can relax admiring an old Eastern tradition.



An infrastructure-based approach to design scenarios in Qianhai Bay (China). Questioning landscaped amenities - A lure to nature

5.9 THE LIBRARY

The library will be aimed at educating people about nature and its preservation.

So, its content will be mainly about biology and ecology. Yet, there must be also books about other sciences, history, politics and architecture regarding those matters in which they are interwoven to the main topics. The library building will accommodate the bookshelves rooms and some smaller rooms aimed at satisfying different needs: seven study-rooms with tables and chairs and a conference room. With a screen, an orators' desk and row of seats in four of the study-rooms, the furniture will be versatile, that is made up of small tables, so the users can rearrange them after their needs, as they can study in groups. In these rooms it will be possible speaking at low voice. In the other three study-rooms, the tables will be bigger as their disposition should not change, as here people will study singularly. Here it will be forbidden speaking and making any noise. In each study-room there will be bookshelves along one wall, with books for fast consultation. In each room these books will concern a specific subject.

The roof of the library is arranged as a green roof, where there is a patch of lawn available for people who want to relax or read a book and some flower beds with some perennials laid in Piet Oudolf's style.

5.10 THE COMMUNITY CENTRE

The community centre is made up of two buildings, linked by a porch, and a garden for some temporary activities. In this garden there will be a screen for film projections and some implements for children to play. The community centre has an important role in my concept because it is where people can have a more active attitude about what they can do. In fact, here, they can organize their activities autonomously in groups or just go there and relax meeting each other and speaking. The basic idea is that the different rooms are bespoke to be suited for offhand activities of many kinds: just relaxing and chatting, discussing some subjects collegially, listening to music or watching films, holding teaching classes, eating a common meal, making book presentations or conferences and so on. For this purpose, there are many rooms, 13 in my case, in which the furniture is very versatile. In each one there must be folding chairs and some tables, sturdy, but not heavy so they can be easily moved by two persons. When a group of people meet there and decide to do an activity, they can easily rearrange the space in the way they think the best one. In some room, more dedicated to informal meeting and chatting, some benches with simple cushions can also be provided to accommodate people in a cosier way. These benches should be normally laid along the walls. The style of the rooms and their furniture must be very simple and linear because it should

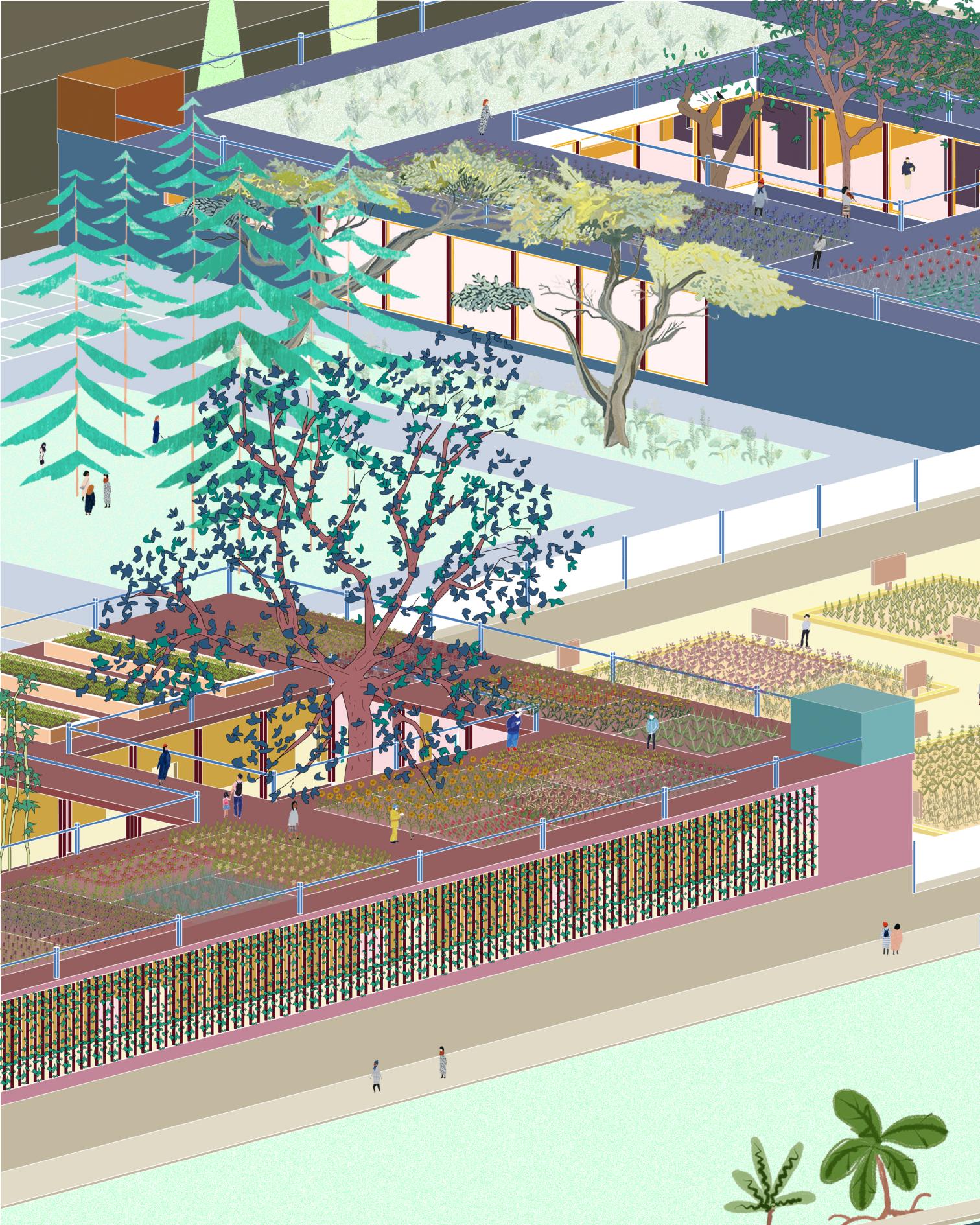
not distract people from what they organize or intimidate them with heavy decorations. Some boards can be hanged on the walls, so people can attach pictures, drawing or messages.

The roof of the community centre is partially cultivated. There will be raised flowerbeds, some of which, on the smaller building, will have rows of seats around them. There will be much space for people to go up there and also some tennis-tables.

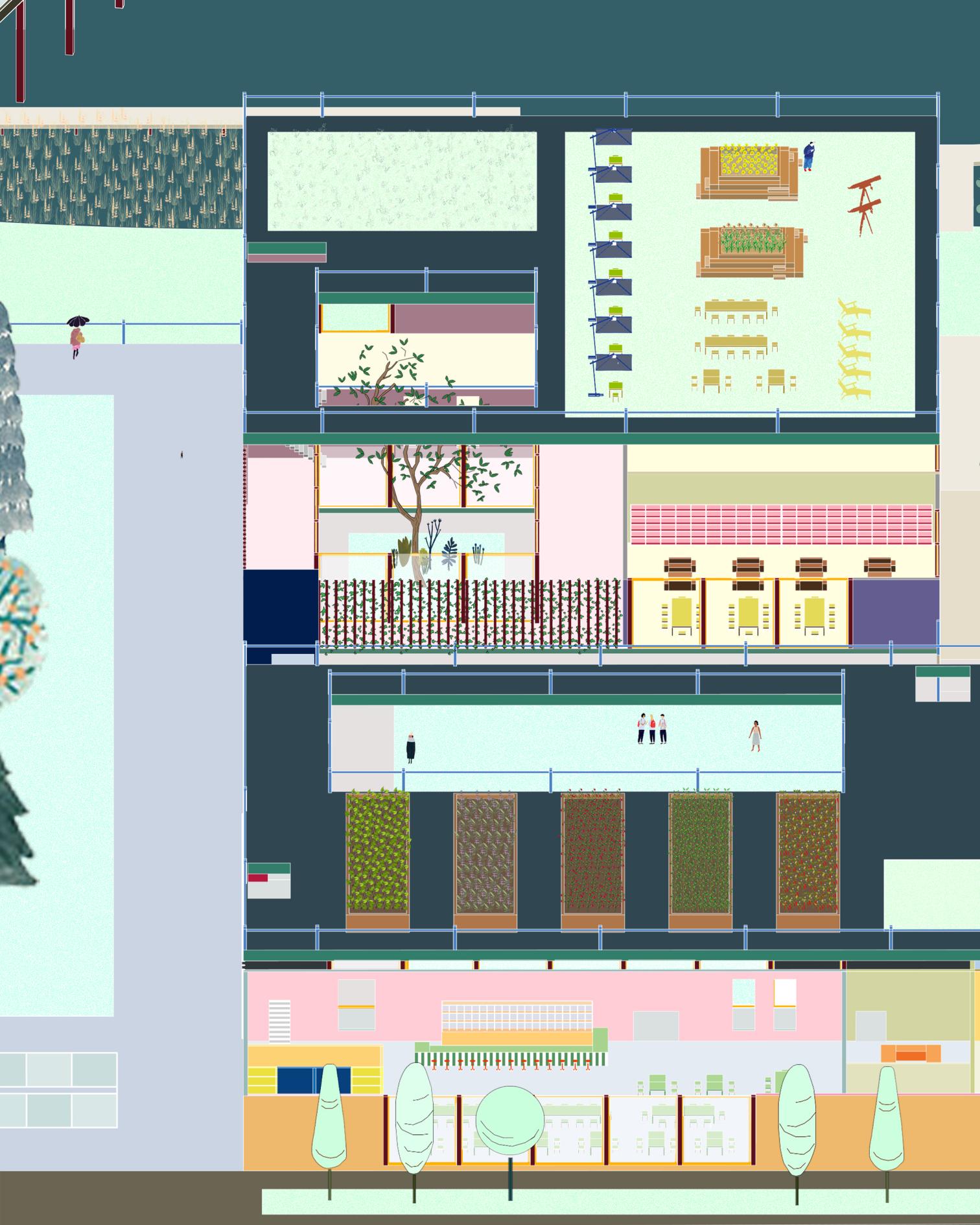
There should be someone, from the park administration, supervising the community centre to check that it is kept in proper order and that no illicit activities are performed there. Yet, this control should be done in a reserved and friendly way.

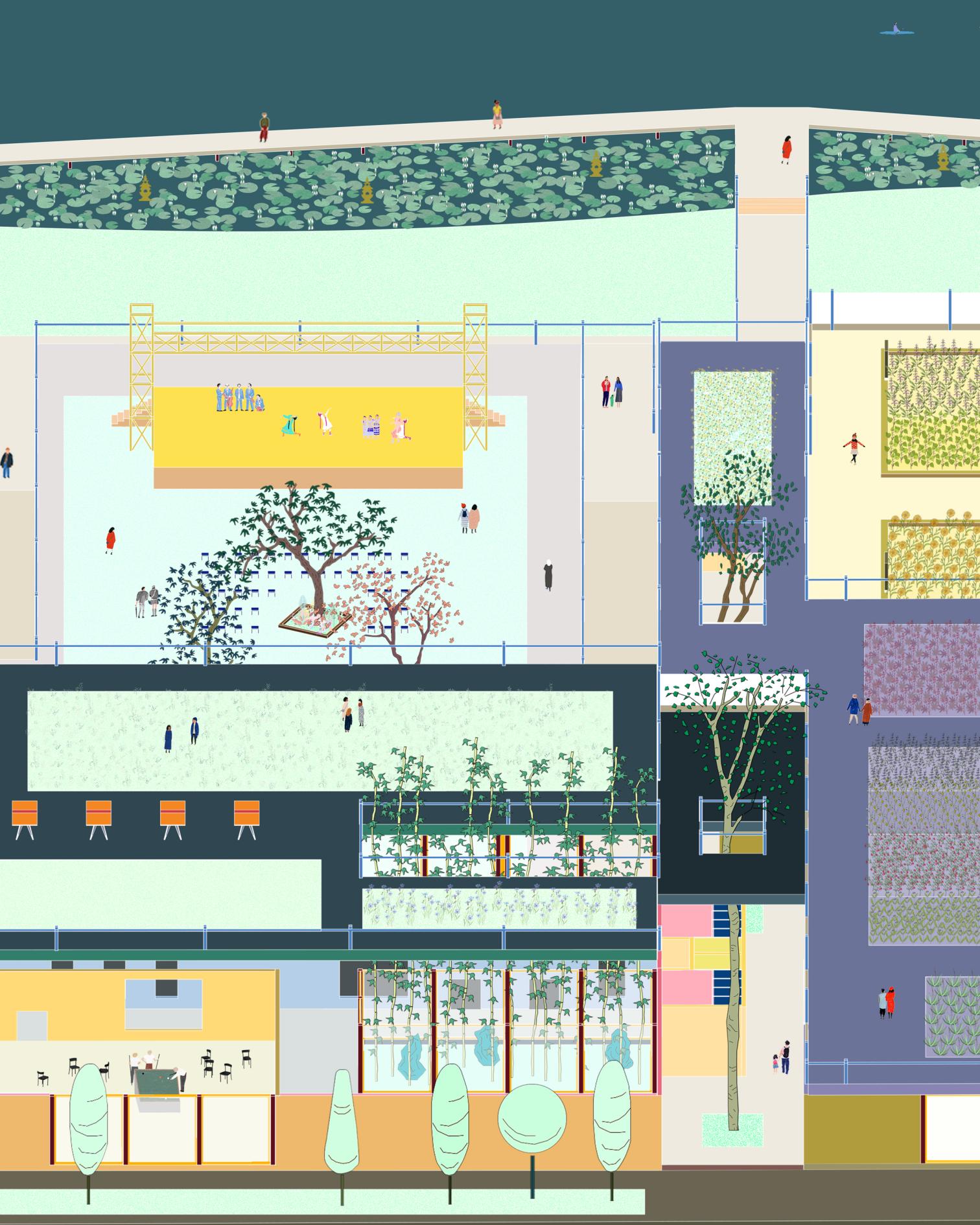
Next four pages:

Two Birds'-eye view of Cultural centre. The first one shows the Library and the Museum, the second one shows community centre.





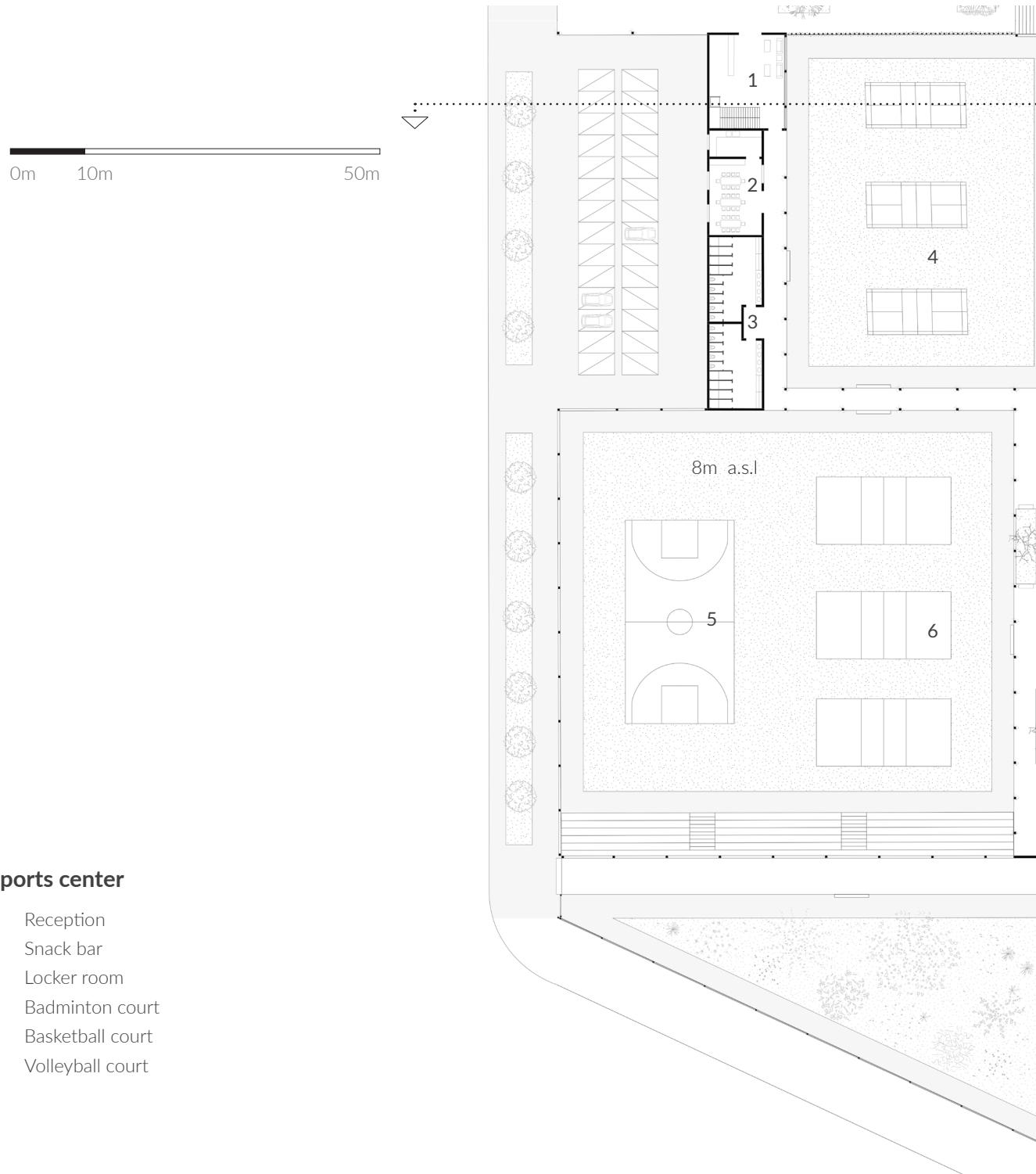








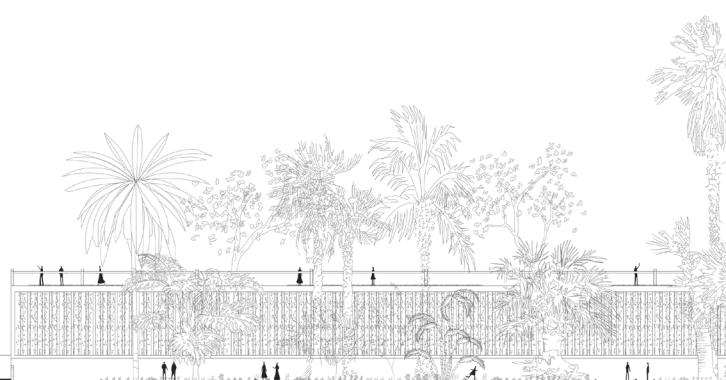
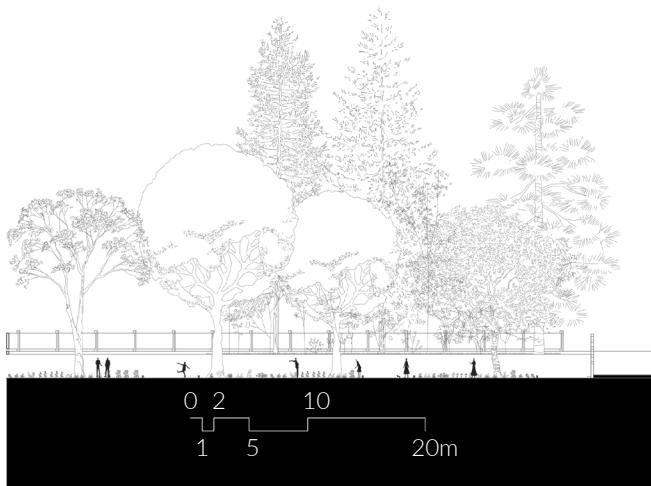
Sport facilities bird's-eye view.



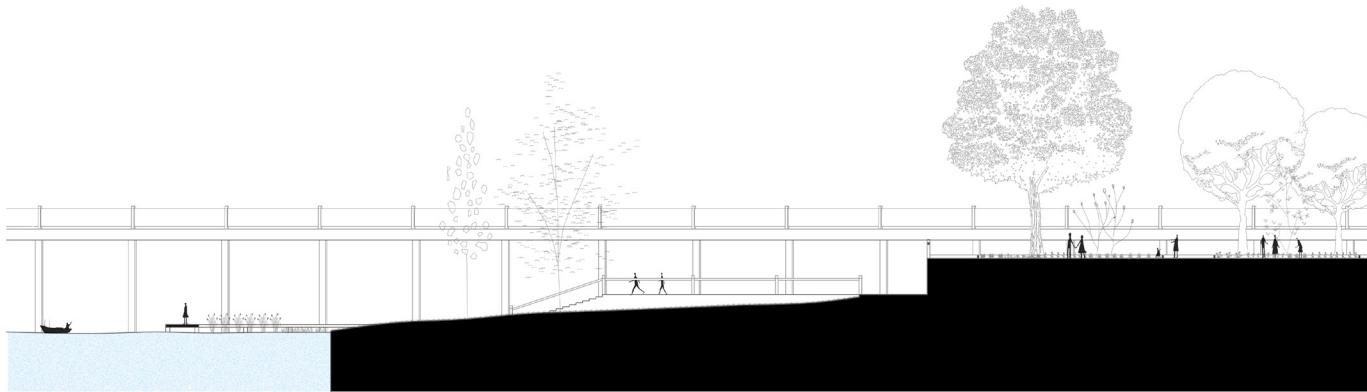
Sports center

- 1 Reception
- 2 Snack bar
- 3 Locker room
- 4 Badminton court
- 5 Basketball court
- 6 Volleyball court



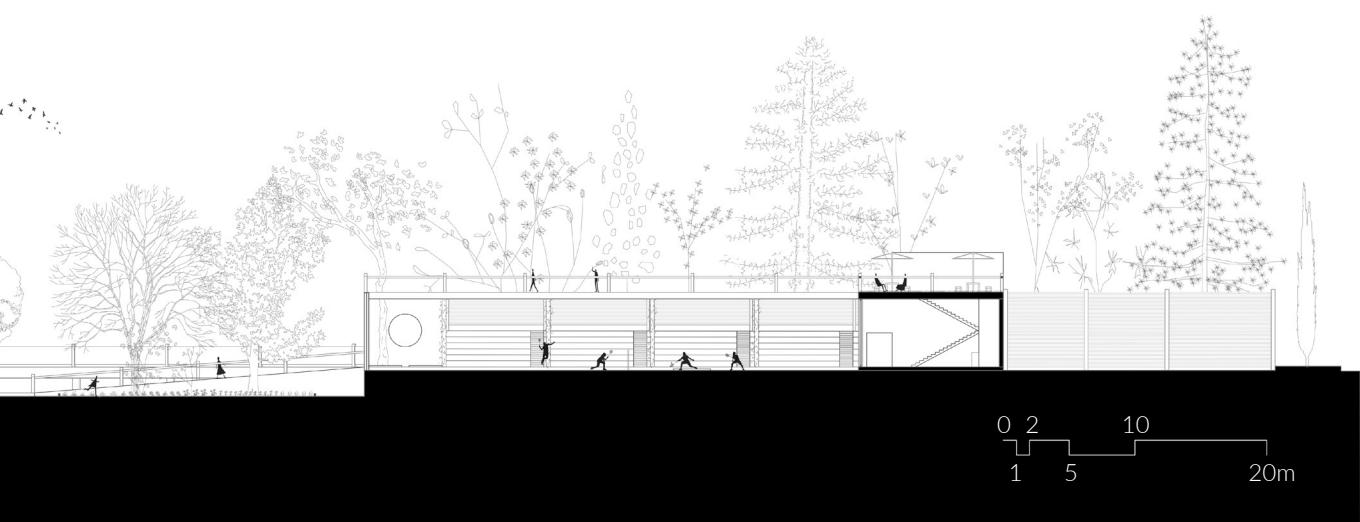
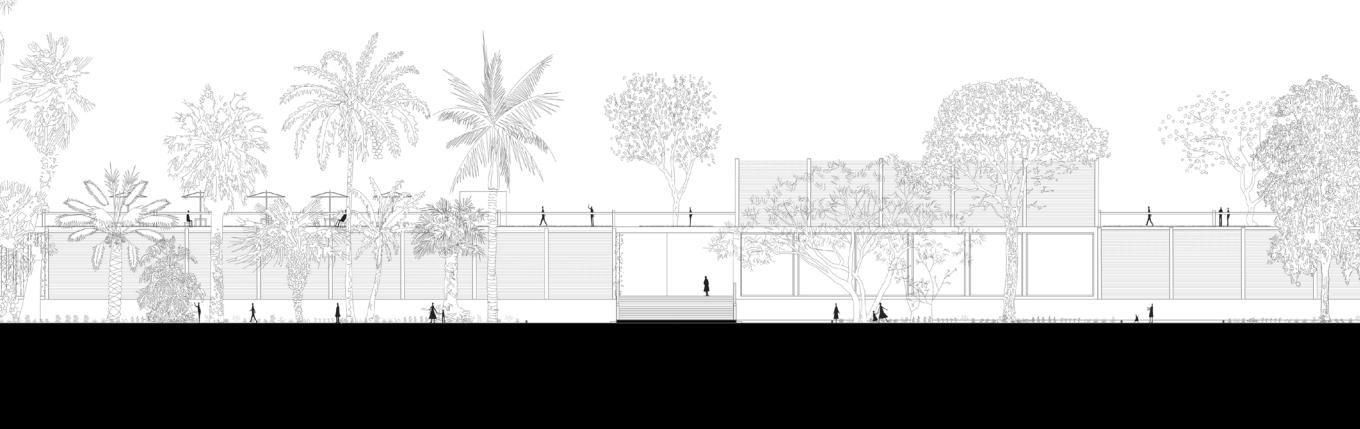


P-P SECTION



O-O SECTION

The sports centre is sur



rounded by trees.

5.11 THE FOOD HALL

The food hall is a place where people should go to appreciate food in a traditional way. Thus, I conceived this hall in such a way that will invite people to relax and appreciate good food and the related culture. There are many stands selling different kinds of food, so visitors will have plenty of choices while picking a meal. They should be able to distinguish different foods both from a dietary and a cultural point of view. To this end there is a show case at each stand with a description of its different offers. The purchasers can decide if to bring the food home or to eat it right there in some areas rigged with tables and chairs where people can go freely. To make people at ease, the place should look relaxing, even mellow, but also efficient and bright. It could be opined that a more traditional furnishing, made with dark wood might be more fit for my traditional way of eating, yet I thought that, since I am designing it nowadays, it will seem more "natural" if I use light colours and big windows as in the actual custom.

The stands for selling food should have all the same style, although they may have different size. They must be made of light wood.

In the food hall, there are two inner yards where

trees or shrubs can be grown. The walls around them have big windows so people can see them from inside of the hall. I suggest that the plant in the inner yards should be fruit trees and berry bushes to show people the fruit cycle from budding to ripening. This is not the only show in the hall: a small field on its northern side is cultivated with some berries that will be sold in the croft-shop inside the hall. The green-roof of the hall will be accessible to the public and tilled with flavouring herbs and bushes. There will be also some tables and chairs on the top of the roof.

5.12 THE RESTAURANT

The restaurant is an important building in that it can attract people to the park and also spread the culture of food and cooking to people. The importance of the first point is intuitive: if the restaurant will be managed well, many customers will go there to relax and appreciate good food and then probably discover or enjoy the park by themselves while on the way. The second one is moot, since I must first define what I mean by food culture.

Food is a means of life. Without nutrition we would die. Yet, for humans as well as for higher animals, it's more than just something they seek for surviving, rather it's something that is deep-

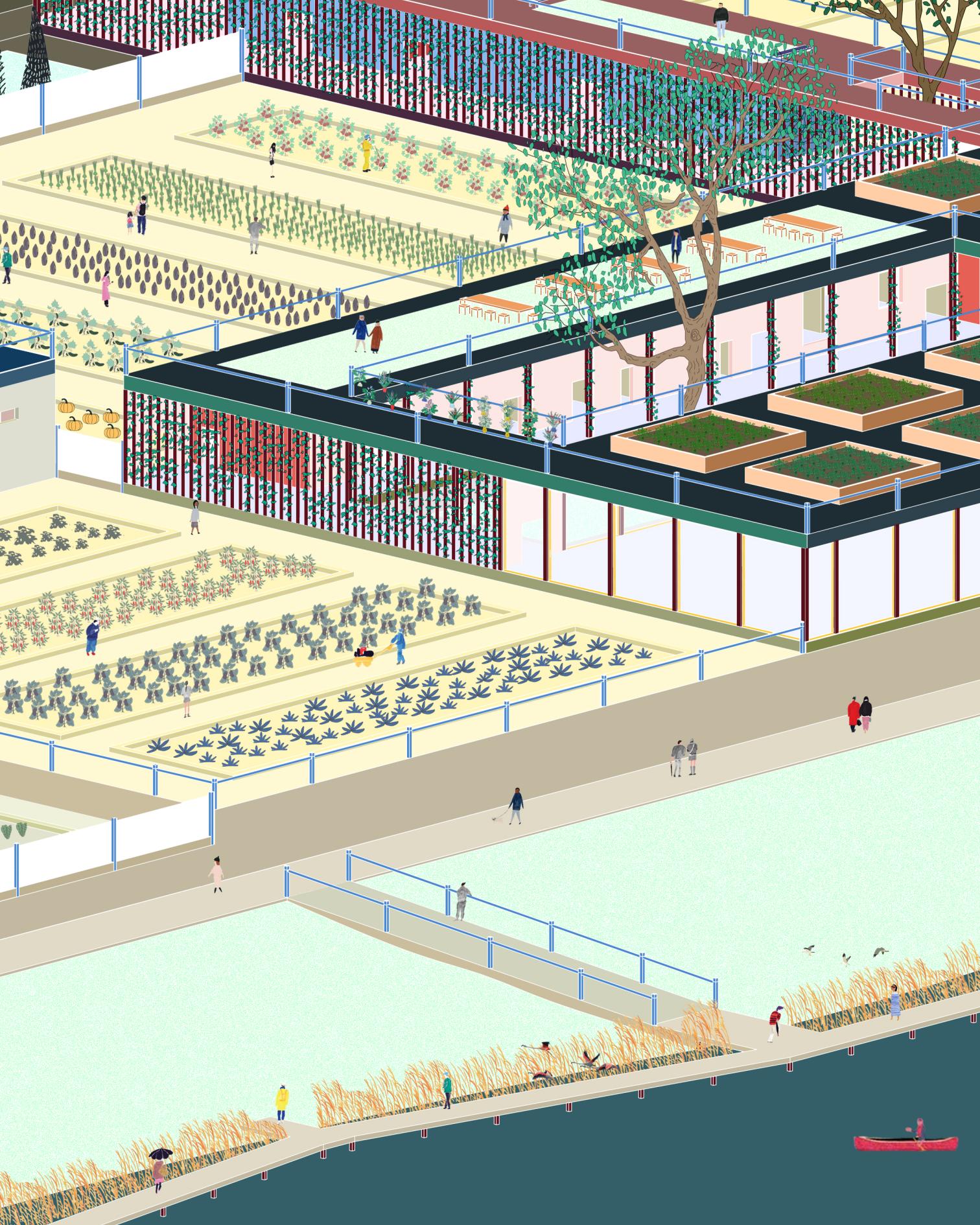
ly embedded in their psychology in that they are more or less allured by different foods. In our evolution, we have developed a bent toward particular foods that we like because of their taste - these are normally very nutrient because they are rich of proteins, fats and carbohydrates. This inclination toward what we eat has developed along our evolution giving rise to an instinct that should make us fit for exploiting our environment for our best nutrition. Yet, biological and psychological evolution times are much longer than those that occur for modern cultural changes. So, lately, our innate predispositions don't match our environment as well as they did in the past. The strong progress in our life conditions has led us to a situation with a slew of available food, while the energy needs of our body - heat for homeostasis, work for movement and production - have lessened very much because of artificial subsidiaries. Thus, our instinct to accumulate nutrients in our body is no more fit for our wealthy modern life, rather it can lead some problems related to over-weight, diabetes, circulatory problems, heart disease and so on. Besides I should not forget the misdeeds that can happen in the food chain: animals fed with hormones, antibiotics and steroids that permeate their flesh; vegetables and fruits treated with poisons while tilled and with preservatives while traded; foods sophisticated with new substances for the sake of alluring more and more consumers. Well, all these tricks of food and cooking have become part of a misleading culture of every country. Thus, recalling the old worldwide food traditions, we must start educating people to eat wisely - by it I mean eating in a healthy

and pleasant way. This should be the goal of the restaurant in accord with the park general purpose. Of course, the customers should not be forced to learn the culture of food, rather they must be allured to it by giving them good quality dishes. Then, it will be also important that the waiters can make a brief description of the dish, while delivering it, so transmitting to the eater the culture behind it. This will stimulate the customers' curiosity about some scientific subjects concerning food. The customers can learn more about these issues at the library or the museum. All food must be organic, so the production chain must be checked continually. This is what should inspire the management of the restaurant, but let's see how it is designed.

The restaurant building must accommodate the customers with a good comfort and a relaxing environment. A good view to the surroundings is fundamental for this purpose. Thus, on the walls there will be big windows that will give the feeling of contiguity with the open. On one side there is a big garden in a yard. On the other side, there is the canal view. In this building, also, there is a green roof. It will be built following the general rules of the green roofs in the park. There will be a cultivation of aromatic herbs that can be used in the restaurant or sold to the customers. There will be also some tables for eating.

Next two pages:
The facility integrates ground and green-roof of tillage of organic crops.





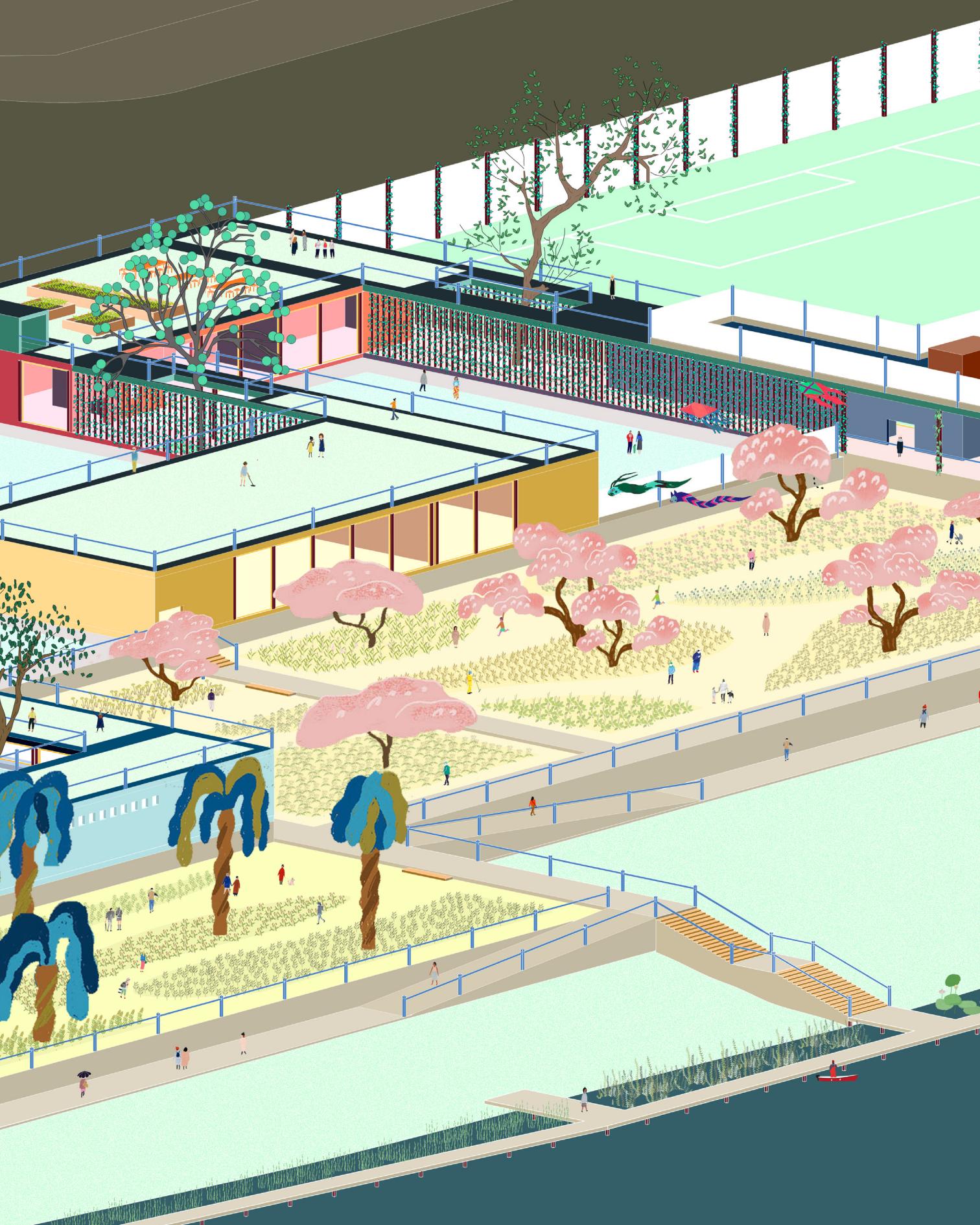
5.13 THE SPORTS CENTER

The sport facilities are included in the development of the park because I believe that sport must be a part of every one's life since we are all structured to do some everyday movement, but in our normal life, we are seldom compelled to do it. Thus, in the optic of nearing people to nature, I must also drive them toward a natural and healthy lifestyle. All these facilities will be owned and managed by private entrepreneurs, so, although I'm designing all the sport facilities, these will be rearranged by their manager on the basis of their needs.

All the sport facilities will be fenced, as only paying people will be allowed in.

These buildings will have green-roofs accessible to the customers. There perennials will be grown and there will be space for people for strolling or relaxing on benches and chairs.







6

Ecological Issues

6.1 ENERGETIC PERFORMANCE OF THE BUILDINGS

All buildings in the park should be the examples of nature friendliness. The main feature that can characterize them for this task is a good energetic performance that can spare the environment from some of the pollution bound to fossil fuels burning. To this end, I must heed mainly the walls and the roof. The overall heat transfer coefficient must be kept as low as possible for walls, glazing and the roof. There are different levels at which this can be achieved: the insulation, the shadowing and the shape of the building are the main ones. The climate of Shenzhen is such that for a good comfort it's necessary some air conditioning in the buildings. Luckily, the climate there is mild, as in wintertime it is cool, but not really cold, while in summertime it is hot, but not excessively. Thus, if I can make well insulated buildings, a conditioning system made up of reversible heat pumps engines will do the service with a little energy consumption.

6.2 THE URBAN HEAT ISLAND

Albeit first studied by Luke Howard in 1810, the urban heat island effect (UHI) has been neglected for many years, but it's worth taking it into consideration. The UHI consists in an overheating that happens in widely urbanized areas in comparison to the surrounding countryside. This temperature difference is not very high – only a few Celsius degrees – yet it may affect dwellers well-being and also widespread pollution. In this section I'll delve into what it is, how it can arise and also how it can be shunned or at least strongly reduced.

The UHI is an overheating of a densely built area compared to the neighbouring more natural zones. The temperature rise is normally a few Celsius degrees, seldom exceeding 5 °C. In the same town is normally higher at night than in daytime and in wintertime than in summertime. In some cases, the phenomenon is reversed, with daytime temperatures lower down-town for the minima. This may even be beneficial if the temperature rise isn't harmful for people. In other places it may rise the temperature throughout the day, and this will make most people uncomfortable in many southern cities. It can be the case of Shenzhen that has a subtropical climate, although it's geographically a tropical city. In summertime, because of its high humidity, a mean low temperature of 26 °C is likely felt as uncomfortable by most people. So, it can be worth to take in consideration the UHI effect in my open-air museum, to show its visitors how it can be reduced. Of course, I can't pretend to affect positively not even a neighbourhood with what I am doing to this goal, but I can suggest some ways for taking care of the problem.

Many causes can lead to the UHI, but they all are linked to human activities. As stated above buildings make up the greatest part of this phenomenon, while pollutants and dwelling-related human behaviours play a minor, although meaningful role. I have seen above that different substances absorb sunlight in different amounts. Buildings – here intended in a broad meaning that, for instance, includes also roads – have usually a higher absorptivity than natural items like earth, light rock or vegetation. For this latter a much deeper discussion will be taken later. So, in urban areas much more of the sunlight is absorbed, leading to a net rise in temperature of the building. Part of this heat is then given, mainly through local convection, to the nearby air with a generalized local heating. The shape of the city itself can contribute to increase this phenomenon by entrapping the electromagnetic waves and the heat itself making what is called the “canyon effect”.

The canyon effect happens when many tall buildings cover an area leaving only narrow stripes of land between them. This situation leads to two main effects: the “waveguide effect” and the reduction of natural convection by hampering the winds. The waveguide effect happens when electromagnetic waves propagate in a cavity from which they can't escape and whose walls can reflect them so driving them to a path other than their natural. Of course, there is no perfect reflection in any material, so part of the waves is absorbed at each bounce. In modern buildings standing one in front of another, it often happens that a sun ray impinging onto one facade bounces and strikes the facing building and then

goes back to the previous one in its way toward ground, giving some of its energy to the surface on which it's reflected. On the contrary, if the first building were standing alone in an open area it would be struck only once. If its surface were highly reflective, like the mirroring glazing of many modern buildings, only a small fraction would be absorbed. The other problem in cities arises from the hampering effect of thickly-built areas on the free movement of air with an important lessening of its cooling action. Of course, in my park the canyon effect won't be present at all because the few buildings are low and broadly scattered broadly. The UHI effect will be negligible in general, yet I think it's worth taking some measures apt to shun it, for educating people about this problem and its mitigation. What can be done in this perspective is keeping the buildings low, using light-hued concrete, that reflects radiation, making light colour paved roads and making green roofs.



Wide-spread vegetation will minimize the Urban Heat Island effect.



An infrastructure-based approach to design scenarios in Qianhai Bay
(China). Questioning landscaped amenities - A lure to nature

6.3 THE GREEN ROOF

The green-roof was a traditional kind of cheap countryside covering in some parts of northern Europe, and now it's still appreciated there as a token of old times, yet in modern architecture, its concept and merits have been adapted to the city buildings. A green-roof is basically a roof made up of living plants growing on an earth substrate laid on its bearing structure. It has some edges and some drawbacks; the former are its comeliness that makes it even fit for being used as a terrace; thermal insulation that betters both the viability inside the building and the building structural situation by lessening thermal expansion of the upper slab; pollution and heat island effect reduction and a sensible reduction of water runoff in case of storms. The drawbacks are its higher making and maintenance costs, its weight, and its likelihood to become a good habitat for pest insects that would not otherwise develop in an urban environment. Depending on the thickness of the earth layer it can be more or less heavy. Nowadays it's used mainly in broad buildings requiring wide spans between columns so the green roof load has become very important.

Picture of lavish gr

The most conspicuous positive feature is the beauty of the lavish vegetation that can be grown on top of a building. Its profile can be seen from far away, while the whole of it can be enjoyed by the dwellers and visitors of the building like a privileged garden where the landscape is made up not only by the vegetation but also the surroundings that can be seen from above. Thus, the intensive green roof can become a common ground where dwellers of the building can meet

and socialize, which is normally lacking in our cities.

The green roof I'm making has different layers that, from bottom upward, are:

1 A reinforced concrete structural slab fit for holding the weight of the green topping besides all the normal loads of the roof. It's important that the concrete is of good quality to assure its water-proofing ability and that there is always an enough thick layer over the rods to prevent rusting.

2 An insulation layer to prevent heat flow to/ from the outside.

3 A waterproof layer to avoid any leakage of water to the concrete. It must be able to withstand any pricking action, particularly from the roots of the above plants.

4 A drainage system for discharging the excess water from rain or overwatering. It can be made by putting a porous layer over the waterproofing. Its thickness and porosity must be such as to allow the maximum foreseen water flow.

5 The earth layer fit for supporting the overlaid plants life. Its thickness is a very important parameter to be chosen. The thicker the better for plants tillage, rain water absorption and thermal insulation, but the worst for the load acting on the roof structure. Thin-soiled green-roofs with an earth thickness up to 13 cm are dubbed extensive roofs. Those with a thicker earth layer intensive. The practical difference between the two is that the thinner one is fit for growing only short grasses and so is designed, both for what concerns the plants choice and the general structure, for needing very little maintenance- normally it asks for a single yearly maintenance of

up-rooting unwanted weeds and spreading some compost to feed the grass. Thus, it is not normally used by people and it only needs a small service access. The intensive roof, having a much thicker layer of earth, must have a much stronger supporting slab and so is more expensive for its construction and, as I am going to show also for its maintenance.

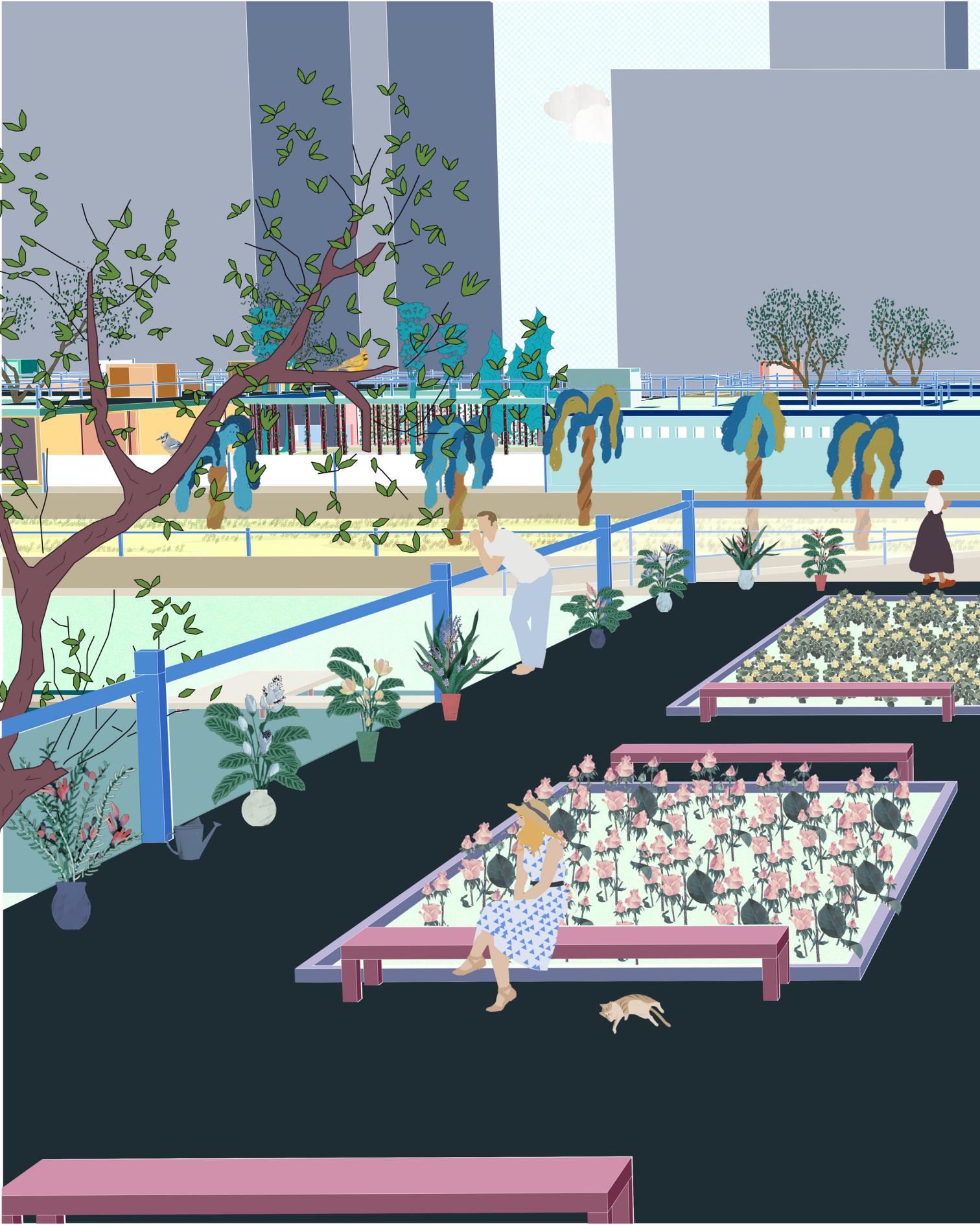
Sketch of layers

The high ground of making such a roof is that many more kinds of plants, some bushes included, can be grown on it, so it is normally conceived for some practical leisure use, besides the advantages it gives to the building itself. The drawback is that it needs a regular maintenance with higher costs. Then deep earth also increases the thermal insulation and the amount of water that can be kept during rainstorms. Yet, for my case, the main advantage will be that, if it's well designed, people will like it and spending time on it and likely want to diffuse the idea to other existing or future buildings. So my choice is for a green-roof with an earth depth of 60 cm.

The main visible features of my green-roofs are the access structure and the parapet all around the accessible area. In some green-roofs, there will be flowerbeds and wooden paths among them. A watering system, much better if automatic, is also necessary. Some benches and deck chairs will add some comfort to visitors.

The next two pages:

Green-roofs contribute to the aesthetics of the park and the preservation of nature.
They are an example that should be followed in more densely built areas.





The parapet function is to prevent people from falling off the roof. Its lower part has also the goal of holding the earth of the roof. I think that it should be a sticking out part of the underneath structural slab. As such its lower part must be made of reinforced concrete, while the upper part will be a stainless-steel railing. For safety reasons it should be at least 1.2m-high from ground. To prevent young kids to go through it, there should be no gap between railings wider than 0.15 m

6.4 ECOLOGICAL COST OF BUILDINGS

Buildings always have some impact on nature both while they are being made and while they are used. Here I am dealing with pollution generated by building itself. This is not restricted to the act of making a construction, but it involves also all the forms of pollution generated by making the materials, employed for it, available at the construction site. The main polluting agent is probably CO₂ that is made in huge amounts by human activities and is responsible for the greenhouse effect that induces the warming up of the earth. Most of man-made CO₂ is the consequence of energy production by burning fossil fuels. This is linked to architecture in many ways related to the making of the buildings and then to their

use. The former ones consist in the production of basic materials, their shaping, their transportation and finally their assemblage at the construction site. The latter ones are mainly related to the climatization inside the building: heating in the cold season, cooling in the hot season and dehumidifying. It must also be taken into consideration the waste of resources and the consequent pollution deriving from the maintenance or rebuilding of a deteriorated artefact. So, there are many aspects to be delved. Here I'll take care of the problems concerning concrete. For concrete there are several ways it can be handled friendlier to the environment.

As I have already seen, concrete is a material made up mainly of cementitious material, stony -and in special cases artificial - aggregates and water. There may be also some admixtures, but these are in a lesser amount. Each of the main components has a different environmental impact, cement being the worst. I will analyse it in the dedicated chapter.



6.5 CONCRETE AND ENVIRONMENT

All animal actions have an impact on the environment. Nowadays, human deeds have reached a high degree of nuisance on nature and the building industry has a big share of it. Here I am concerned about the effect on environment of building materials, particularly of concrete, which is largely employed in my park.

Concrete is a relatively new material in modern buildings, as its wide-spread use started about one hundred years ago. It is a heterogeneous material as it is a solid mix of three phases: an artificial matrix made by hydration of cement, stones of several sizes, called aggregates, and an intermediate thin layer between the two with specific features. Its widespread use is due to some positive features: its basic constituents are abundant in nature, uniformly scattered all over most of the countries and relatively cheap; concrete is easily shapable and can be made and cast befittingly by readily instructed workers; besides it can last for a long time if properly designed and cast; last, but not least, its main blotch, the low tension strength, can be easily overcome by steel rod reinforcement. Its fast use growth, made it the first material used in buildings, steel being its only big competitor particularly in tall skyscrapers, since it has a better ratio between its yield stress and specific mass. This latter aspect is becoming less important with the development of high strength concretes that can overcome this problem. Now I can see how the use of concrete affects the environment.

As I said before, concrete is made mainly by mixing cement, water and stone aggregates. Their energy analysis shows that cement is the com-

ponent that requires most of the energy bound to concrete making. The aggregate is not man-made, but its extraction, crushing and delivery to the place of mixing asks for some energy expenditure. Fit water, that is with no harmful solutes, has a little energy requirement, compared to the former two, but it's a natural asset of limited availability and of high need for humans, so it should be spared as much as possible. It's used both for mixing and for after-cast curing of concrete. Since the delivery costs of all the components and of concrete itself are relatively low and can be improved only locally, I will focus in low-impact. Another very important point related to nature preservation is to make the buildings durable and with little maintenance needs, since both fixing and rebuilding have the same kind of impact on the environment - rebuilding even more as it asks for the disposal of what is substituted.

Let's see which kinds of concrete will be needed in my project

Kinds of concrete fit for my needs. The theory and practise of concrete are very cumbersome. Here it's not wise to delve much more into them or it will take too much space into this exposition; yet I can't shun from considering and analysing which kinds of concrete are going to match my goals. So I must start from stating where the concrete must be employed. The main uses are the buildings foundations, some structural use, the retaining walls of the terracing, the main roads, eventual garden furniture, the canal banks.

Concrete for foundations - Foundations should be very resistant to chemical attack because

they will be in touch with a humid environment where many potentially harmful ions from the earth can be present. Thus, it's important that they have a low porosity for their own protection and that of the reinforcing rods. The chosen mix is the one proposed by Mehta as a high-volume fly ash concrete (HVFA) with these amounts expressed in kg/m³.

Cement Portland I	154
Fly ash	154
Water	120
Coarse aggregate	1210
Fine aggregate	775
Superplasticizer	4
Total	2417

This results in a concrete with a w/c (on cementitious material) 0.39 and a strength of 25 MPa. The slump is about 140 mm. Here it's important noting that the relatively low w/c and the low fraction of cement paste (half of the cementitious material is fly ash) will reduce both the thermal and the drying shrinkage of the concrete with an important reduction of porosity and, in consequence, of chemical attack.

Structural concrete for beams and columns - In general, structural parts are reinforced with steel rods. It is very important that the concrete, when cast, can permeate fully all the room inside the formwork covering completely the rods. So, it must be very fluid. The concrete of choice must be a self-compacting concrete (SCC) with a good strength. The following mix, given in kg/m³, satisfies these conditions.

Portland cement	400
Fly ash	35
Slag	30
Water	120
Superplasticizer	5
Sand	726
Gravel (< 10 mm)	1000
Total	2316

With a w/c=0.258 (on cementitious material) it should have a low porosity. Fly ash will reduce bleeding and the weakness linked to it. Slag reduces the free portlandite, so, enhancing the strength of the final concrete. The limitation on the gravel size is bound both to limit the bleeding in the interface zone between coarse aggregate and cement paste and to facilitate the flow of the slurry in narrow spaces around reinforcing concrete. The formwork should be removed at least 21 days after casting to allow the proper reactions without any loss of water; anyway, wherever there is the risk of water loss and drying it should be kept wet. The slump is forecast at least 240 mm and the slump flow to 730 mm. The 28-day compressive strength should be over 90 MPa.

Concrete in contact with sea water - The canal is a big part of the park and its water is normally salty because of tides. In rainy season the water is much less aggressive, but the stream toward the sea may be very strong and wearing out the surface in touch with the stony particles suspended in it. So, depending on the place, there may be the need of water tightness or also of wearing

resistance in addition. Water tightness is needed because concrete may be crumbled by sulfate attack if the SO_4^{2-} ion can penetrate it. The iron of the reinforcement can be eroded as well by Cl^- ions. Both these ions are abundant in sea water, so, it can be well understood that in this environment it's of paramount importance to shun porosities in concrete as much as possible. These two needs can be satisfied by a high-quality concrete, since there is a strong correlation between strength and wear resistance and low porosity. Yet, a very good concrete is more expensive than a lower quality one, so I must think of this. For bulky embankments and bridge piers, probably it's worth to use two kinds of concrete: a good water-tight one for the inner part and a stronger one for the outer layer (in touch with water) that can be about 30 cm-thick. This way the artefacts in touch with the canal water should achieve a very long life of over 100 years. For these purposes I can use a high-performance concrete. I propose two kinds of concrete: an abrasion resistant concrete for the embankments and piers of the bridge and a class A concrete for the structures of the bridge. Both were used for the Confederation Bridge between Prince Edward Island and Canada mainland. Proportions expressed in kg/m³.

Wear-resistant concrete for bridge piers and important embankments.

Portland cement	478
Silica fume	42
Class-F fly ash	60
Sand	650

Gravel	980
Water	142
Superplasticizer	6

Properties:	
Water/cementitious	0.25
28-days strength [MPa]	100

Class-A concrete for the bridge structures.

Portland cement	416
Silica fume	34
Class-F fly ash	0
Sand	737
Gravel	1030
Water	153
Superplasticizer	3

Properties:	
Water/cementitious	0.34
28-days strength [MPa]	82

Concrete for road pavements and broad floors
- The top of roads and floors made of concrete is a broad slab. When the concrete hardens, it's subject to shrinkage, which, particularly in the case of thin restrained elements gives rise to cracking and fast deterioration. So, for concrete floors and especially roads, I request a shrinkage compensating concrete, which expands upon setting in the first week after casting and, later, shrinks likewise a normal concrete. By binding the cast with at least 0.15% reinforcement rods, at the end of the expansion there should be a restraint compression of ideally about 6.9 MPa. The

following shrinkage releases this actions without leading to the usual tensions and cracking of common concrete.

The shrinkage compensating concrete I'm suggesting is made by using K-type cement in which there is C4A3S, which, when hydrated, forms ettringite with a strong expansion of the paste. Because of this process, it will need more water than a standard concrete and also to be kept thoroughly wet for at least one week after casting. To avoid slump loss it should not be cast with temperatures over 27°C. Anyways, it's important to make a single cast not exceeding a safe length. Two adjacent slabs can be made fast by embedding, half-length for each, 0.5-m-long steel dowels. Here is the receipt I'm suggesting (proportions expressed in kg/m³):

Type K cement	350
Coarse aggregate	1070
Fine aggregate	770
Water	185

Properties	
Water/cement	0.53
Slump	120 mm
Average 28-day strength	41 MPa

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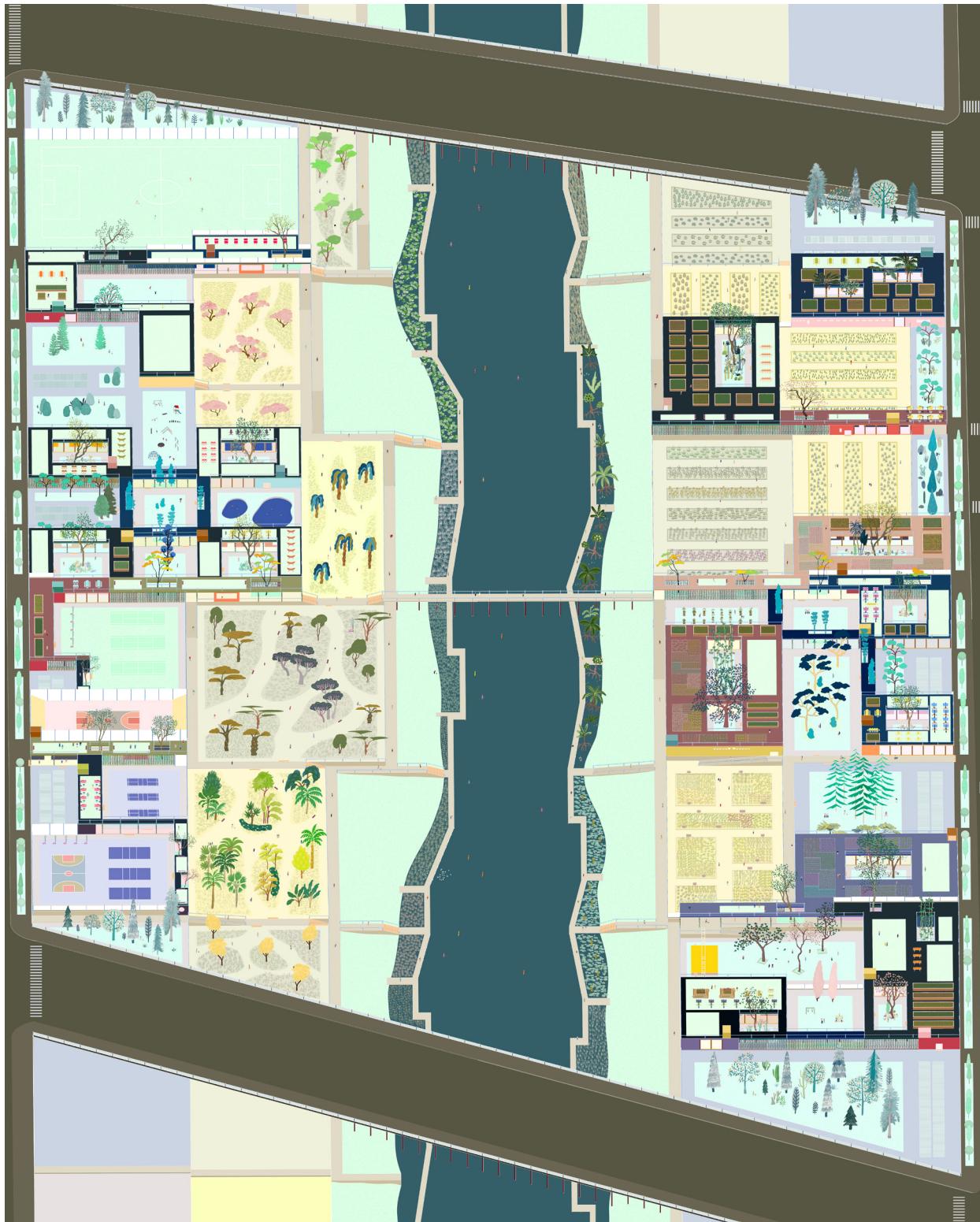
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