HEALING gardener

CURRICULUM

Co-funded by the European Union

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THEOTOKOS FOUNDATION

FUNDACIÓN intras

This curriculum has been developed within the framework of the Healing Gardener project, co-financed by the Erasmus+ program of the European Union.

Project partners:

INTRAS Foundation, Spain (Coordinator)

Jardines Terapéuticos Palmlof, Spain

Theotokos Foundation, Greece

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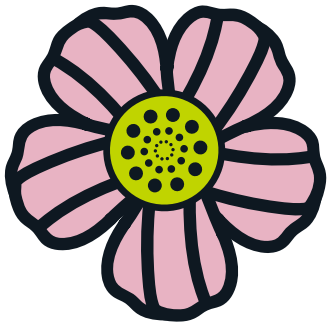
Project reference number: 2021-1-ES01-KA220-ADU-000030259

Year of publication: 2023



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1. Introduction and definition of therapeutic garden*

All design processes follow a chronological order. However, just like with everything in life, before we start walking and following the steps we must know the direction we are headed and understand our objectives. When it comes to therapeutic gardens it begins with knowing the definition of what a therapeutic garden is and then to explore and understand the needs and the interests of our users.

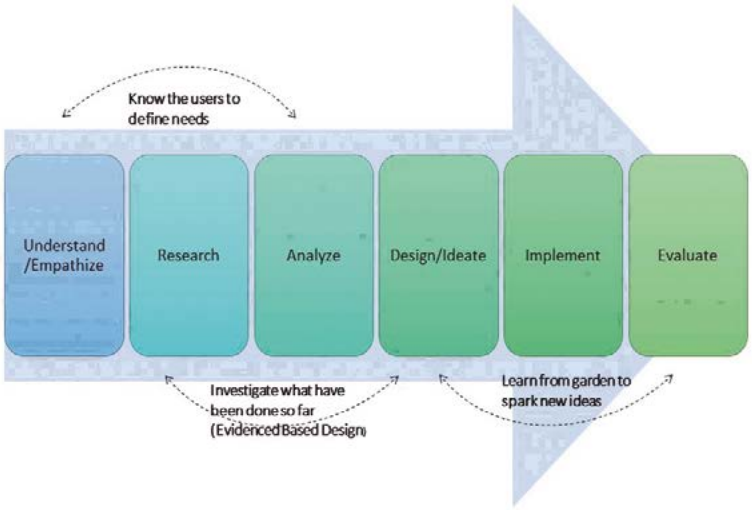


Image 1. Design process. Elaborated by Jardines Terapéuticos.

Of the three examples that follow, the first comes from the American Horticulture Therapy Association (AHTA) and is the most widely accepted definition of Healing Gardens. The second is redacted by Jardines Terapéuticos (JTP) in Spain and the third is defined by the Spanish Association of Horticulture Therapy.

“Plant-dominated environment purposefully designed to facilitate interaction with the healing elements of nature”. (AHTA)

“The therapeutic garden is a space with two protagonists: the visitor/user and nature. The features and elements of the garden support and motivate people.” (JTP)

“A garden is therapeutic when it has been designed to address the needs of a specific group of persons. The design is adapted to the goals of the participants and to facilitate interaction between people and plants. “(AEHJST).

**Terminology. the chosen word for use in this Manual is "therapeutic garden". Depending on the culture it is common to use different words such as* healing garden*, health garden or salutogenic/biophilic design. All of them actually express the same and coincide with the definitions above.*

The difference between a therapeutic garden and a park or a green space for walking, sport and general enjoyment is the rich variation in content, both in the variety of plants and other elements (pavement, planters, pergolas and fountains). The reason for integrating this mix of elements in the same garden is to be able to incorporate them into the programming of therapies and physical exercises. The design challenge is to bring all the elements of interest together to form a pleasant and harmonious environment throughout the seasons, while at the same time being universally accessible and enabling, i.e., reinforcing people's abilities. An ability-strengthening space includes functionality, aesthetics and historical and cultural context. Design is fundamental because it is the foundation on which therapies are built.

Evidence based research has been conducted on therapeutic gardens, this means the design and therapy conducted in the garden has been evaluated and validated by scientific research and publications. One of the pioneer references is "Healing Gardens" by Clare Cooper Marcus and Marni Barnes. The box below shows two references to the scientific concepts and theoretical characteristics of therapeutic gardens.

The supportive garden theory (Ulrich,1999) is based on four fundamental resources to reduce stress and improve well-being:

- Sense of control and access to privacy
- Social support
- Exercise and physical movement
- Access to nature and other positive distractions.

Not all gardens will be therapeutic. In research by P,Grahn and Stigsdotter (2009) at Alnarp SLU, it was found that there are 8 important dimensions (qualities) that people seek in nature:

1. Peace, tranquility and being cared for
2. Wild nature without human intervention
3. Richness of species and variety
4. A space that looks like a different world apart
5. Openness, a green field that invites to activity
6. Protected, a hidden place to be alone

Content of the Healing Gardener Curriculum

The Manual is written for anyone interested in establishing and maintaining a therapeutic garden, from tutors to persons with different types of disabilities to the end users of the gardens. For this reason, the manual

tries to avoid jargon and technical language as far as possible.

The intention of the Manual is to describe the methodology/the special considerations when designing a therapeutic garden. It is not intended to be a detailed construction manual. It is possible to use the Manual as a step by step guide but knowing that there will be information missing. For example: It is important to determine whether your site needs drainage for the user's comfort, but there will not be a guide on how to construct drainage, as this is a subject well known in any garden construction manual, not only for therapeutic gardens.

A designer usually works with plans/drawings and all the interventions planned are to be found in a detailed scaled drawing. This step could be completely jumped over as all measures and drawings could be done directly on ground. If the garden project is very big, more than 1000 m2, it is recommended to ask for help when drafting architectural drawings.

The balance between providing a comprehensive guide and directing the tutors to more substantial, detailed, and technical sources is not easy. The hope is that this manual provides the basics and gives information about further sources for those interested in establishing a therapeutic garden.

The design modules

"Four modules - hundreds of therapies" is the motto of the Palmlof therapeutic gardens. The four modules are a way of designing the garden to facilitate the structuring in different spaces or zones, and to group the outdoor therapies in a way that offers the most benefits. Depending on the needs of the group, these four modules can be increased to many more, for example, a motor skills module, a relaxation/mindfulness module, and contemplative module, etc.

1. The Courtyard of the Senses= Sensory Module

2. The Tree= Horticultural Therapy Module

3. The Circuit= Physical Activity Module

4. The Forest of Memories= Reminiscence Module

The following is a brief introduction of the interaction of the module with the therapy:

A. Sensory Module.

The module contains a variety of smaller perennial plants at different heights that stimulate our senses. Raised beds make it easier to care for, harvest and enjoy their olfactory sensation. Their different aromas are used in relaxation exercises and for making teas and soaps. There are aromatic plants at ground level to enjoy the smells when you step on them, or shrubs when you rub them with your hands or legs. There are also a variety of textures found throughout the module: the soft petals of roses or the rough bark of the sturdy

tree are just some examples which help us become aware of the present and give us plenty of material to incorporate into craft activities.

B. Horticultural Therapy Module

The concept of horticultural therapy is a well-developed topic in literature and in projects all over the world and for this reason we will come back to this module in many sections like the chapter “plants” and also in the methodology. In this space we can find different raised beds, water tap, small green houses, a place to store the tools and places to sit down and rest after an intensive activity. Normally it is a big area with hard pavements so everyone can move around and take care of the vegetables, flowers, and fruits.

C. Physical Activity Module

Consists of a free-form enclosed pathway accompanied by a handrail to provide safety for walking and balance exercises. In the middle is a meadow for the use of yoga, tai chi, relaxation, and sports games. There is also a slope for challenges such as leg and foot strengthening exercises. Everything is designed for moderate to mild exercise and the planting at the side of the path encourages the training. Ideally, the space is complemented by various sports equipment such as rubber bands, balls, spades, etc.

D. Reminiscence module.

The module is linked to the horticultural therapy. Here we find several trees which contain fruits or crops associated to the historical and cultural origin of the region, such as olive, fig, vine and hazelnut trees in Spain. Elements such as a wall, a fence, a well, are introduced for the cultural recognition of the geographical area. The aim is to introduce elements that inspire discussions, such as a weather station, bird houses, harvesting tools, etc. We want to stimulate positive memories and subjects for new dialogs.

Apart from the **stimulation** and **motivation** provided by the plants and the different elements, it is important that the design conveys **comfort** to the user. There should be a bench or a railing when needed, shade when the sun is scorching and a pavement where there is no risk of slipping or glare. Physical challenges should be appropriate for each space and there should always be **accessibility** for all, regardless of physical and cognitive abilities. By thinking about every detail of the design, the **autonomy** of the people is optimized.

The Therapeutic Garden is a living and changing garden where the users contribute with their interventions (for example plant signs hand made by the users) and where the professionals change and adapt the space according to the need (change chairs for shade or sun, add a table for drinks when it is hot, decide to plant a new rose garden…etc.).

2. Analisys and research (determining factors)

2.1 Get to know the users

As it was said in the beginning, we need to know where we are heading and what the needs and interests of our users of the garden are. We will analyze this in two phases. First, the interests and therapeutic needs and second, physical capabilities and needs.

Phase 1:

We will probably find two lists analyzing the interests and the occupational needs: one from the user´s point of view and one from the professionals.

The choice list with drawings seen below is supposed to make the analysis of users' interests easier, we can let the user circle interests in the chart.

- What are the interests of the users?
- What are their favorite hobbies?
- What do they dislike?

The next question is what their tutors/therapists have identified as the service users' therapeutic goals and needs). This could be for example:

- Attention to task
- Bilateral coordination
- Body awareness
- Core strength
- Executive functioning
- Fine motor skills
- Oral process
- Sensory processing
- Vestibular
- Emotional regulation

- Motivation
- Participation and social awareness
- Self esteem

Image 2. Example of poster to help analyze the users' interests.

Phase 2:

We need to know about our users' strengths and needs. We must have a general understanding to ensure the garden's accessibility and adaptability.

- How many of the users use a wheelchair or a walker?
- How many of users have vision impairment?
- How many have mobility impairments?
- How many have intellectual disability?
- How many have dementia or cognitive decline?

How do I use this information in the design process?

Phase 1: Now you will have a list of wishes and ideas. This list will most likely reveal the age group of the users, and if not, it could be useful to have in mind. We may not fulfill everything in the "wish list" in the design, but we will try to put the interests and the occupational needs together in design modules and in a priority scale. For example, we have a group of younger adults with mild intellectual disability, their priority list might be:

1. Physical activities (ball games, running and climbing)
2. Collections (collect and organize stamps, flowers, stones…)
3. Anti-stress and relaxing activities
4. Social skills and communication

The conclusion is that we need quite a big space, module for active movements and maybe for games. But it is just as necessary to provide a second module where users and professionals can find peace and calm to practice and motivate communication and to work alone without distress. A specific module for handicraft projects could also be interesting for the service (patch work with stones, like mosaic, wood art etc.).

Phase 2: Designing for accessibility follows the principle of adaption of the space for the needs of the most dependent user. This means that with only one wheelchair user the garden should be wheelchair accessible in the majority of its areas. The same applies for those with vision impairments, dementia and so on. This does not mean there should not be any physical challenges in the garden, challenges should be placed intentionally and strategically for the service users' benefit. An example could be an alternative path with different pavements to train balance. In the picture you see some of the conclusions of design consideration answering the question of user's needs.

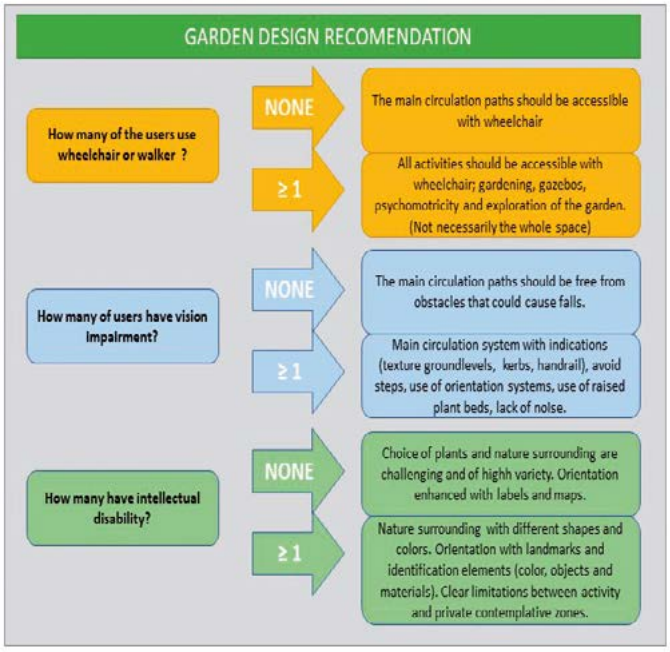


Image 3. User's needs and design considerations. Diagram by Jardines Terapeuticos.

2.2 Get to know the social and culture context

We want the users to feel at home and at ease in their new garden. Therefore, we try to use plants, stones and material common in the area where the garden is stationed in. For instance, in Portugal they love to use strong colors in combination with the plants, and in England everything is very "cottage like", with little pots and arches over the paths. We therefore suggest a short research of our culture's traditions.

What is typical in your region? Take a walk in your town and look at the houses and the parks. What do you see with your new eyes as a garden designer? Take pictures.

How do I use this information in the design process?

The information gathered in photos will guide you when choosing the materials for the elements in the garden.

Example:

We have decided to build a horticulture therapy module. We need raised beds. In northern Europe we will probably use wood for the structure. In southern Europe it could be stone or colored bricklayer.

2.3 Understand the place, the site and the plot

The analysis of the place is a continuation of 1.2, the culture context, but now we collect information in detail of the site where the therapeutic garden is going to be located.

To start this exercise, it is very useful if you have an existing scaled plan/map of the plot. Otherwise, you can draw the geometrical plan on a paper. The paper is not a MUST, because you can do this directly on the plot and then take pictures/photos.

We will now explore our plot in 5 steps. Each step will lead to a special consideration/action in our design process of the garden:

1. Orientation sun/shade
2. Wind and low temperature
3. Uneven ground
4. Soil characteristics
5. Entries and exits

1. Orientation sun/shadow:

Orientation (cardinal directions) is important to be able to tell where and when you have sun and shade in the different parts of your plot. Learn to know the coordinates south, north, east and west. You need: Sun, clock, and a stick.

"If I stand facing like this and the sun warms my neck then I have north like the shadow on top of the hill and east is to the right and west is to the left and south is to the sun, warm and lovely". (Swedish proverb)

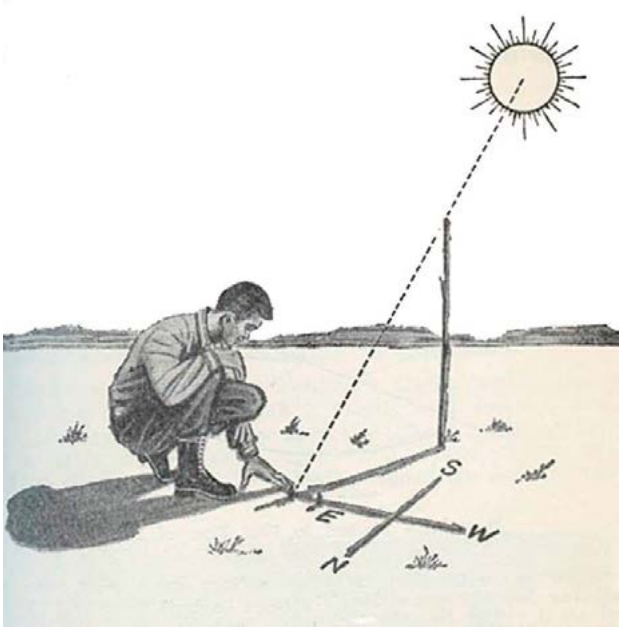


Image 4. Doing your own sun compass.

Visit the plot in the morning and in the afternoon and learn about sunny and shaded areas. You can draw this information on a plan/map, or you can paint the ground with different spray colors or chalk and then take photos to remember.

How do I use this information in the design process?

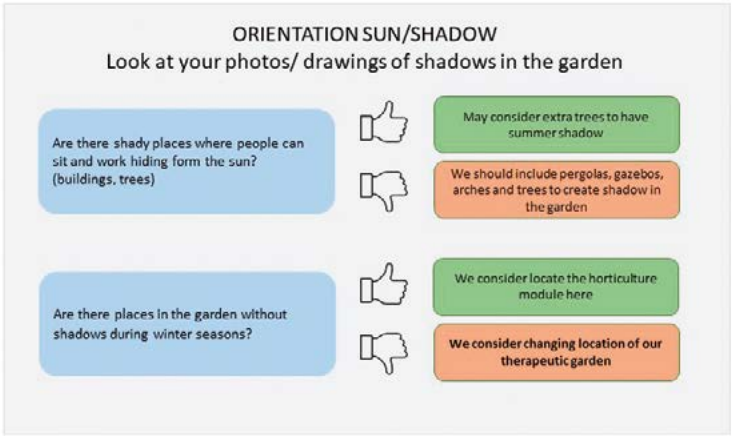


Image 5. Orientation of the garden and design considerations. Diagram by Jardines Terapeuticos.

2. Wind and low temperature:

To make continued use of the garden all year long we might need protection from wind and low temperatures in the garden.

Carry out the following exercise:

- Check weather data base on your geographic zone. What are the predominate wind patterns and what are the average day temperature during the year.
- Put a wind flag on a pole at the plot and check morning and night the direction of the wind and the intensity.

How do I use this information in the design process?

Is there a predominant wind that could become unpleasant?

YES- Your main social areas in the garden should be protected from the wind with shrubs or fences. You might want to consider a greenhouse to step into.

NO- No special design consideration

Is the temperature lower that 10 º C daytime during a long period of time?

YES- It is highly recommended to plan for a greenhouse to do activities during hard weather conditions. If these weather conditions, go on for several months it is good to choose a greenhouse that is extra isolated so it can be heated.

NO- but maybe you have cold mornings and evenings? If it is so and the users are vulnerable, the design should keep in mind a pergola or greenhouse where you can open and close the walls.

3.Uneven ground

It is good to know if your garden plot has different heights. Measuring the differences in height levels can be simple and is recommended. Some differences in levels are so obvious and you see them directly and others are not. Still, they are important if we consider for example, drainage of the plot.

*How do I measure height differences?

*(this method is only useful if my plot is less than 1000 m2)

You need a meter or a stick with marked distances, a level and a strong string. Of course, if you have a laser instrument to measure it is much easier and quicker.

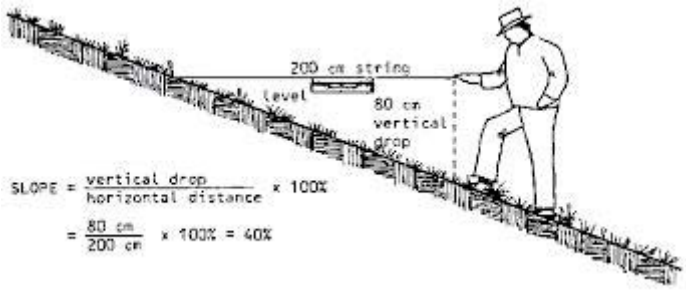


Image 5. Measure height differences.

Jot down your results of the different points on your map with different colors or with different color sticks directly on the plot. Green sticks for ground that is even and the same level as the entrance of the garden. Blue sticks for places where the level of the ground differs more than 10 cm and red sticks where the ground levels differ more than 20 cm.

It is also recommended to observe the terrain. Is it greener in some spots? Is the grass higher or is there more vegetation? This usually means there is more water accumulation and it is a lower level than the surrounding area. You might want to indicate this on the plan or directly in the terrain.

How do I use this information in the design process?

Look at the distances between:

- Green and blue indications:

Less than 2 m = consider a ramp or a step or movements of ground soil.

More than 2 m = No action necessary.

- Green and red:

Less than 2 m. = steps or ramps necessary for wheelchair accessibility or movements of ground soil.

More than 4 m = no special consideration.

This information is mainly thought to give a hint of accessibility necessities while planning the garden, but it can also be used if there is a need of drainage. In this case we should indicate the lowest points and the highest points in the garden.

4.Soil characteristics:

Soils vary enormously in characteristics, but the size of the particles that make up a soil defines its gardening characteristics:

Clay: less than 0.002mm

Silt: 0.002-0.05mm

Sand: 0.05-2mm

Stones: bigger than 2mm in size

Chalky soils also contain calcium carbonate or lime

The best way to tell what type of soil you have is by touching it and rolling it in your hands.

Sandy soil has a gritty element – you can feel sand grains within it, and it falls through your fingers. It cannot be rolled into sausage shape. If it is not coarse sand, but a sandy loam it may stick together better

Clay soil has a smearing quality and is sticky when wet. It is easily rolled into a long thin sausage and can be smoothed to a shiny finish by rubbing with a finger. If is it not a heavy clay it won't get quite as shiny or be as easy to make a sausage shape

Pure silt soils are rare, especially in gardens. They have a slightly soapy, slippery texture, and do not clump easily

If soil froths when placed in a jar of vinegar, then it contains free calcium carbonate (chalk) or limestone and is lime rich.

Another important aspect of soil type is the pH (acidity or alkalinity). This will also affect the type of plants you can grow and how you manage your soil.

Quick facts

Clay soils are heavy, high in nutrients, wet and cold in winter and baked dry in summer

Sandy soils are light, dry, warm, low in nutrients and often acidic

Silt soils are fertile, light but moisture-retentive, and easily compacted

Loams are mixtures of clay, sand and silt that avoid the extremes of each type

Peat soils are very high in organic matter and moisture

Chalky soils are very alkaline and may be light or heavy

Source: **https://www.rhs.org.uk/soil-composts-mulches/soil-types**

Drainage

Finally, we should check the drainage capacity of the soil. This is important to avoid the formation of water puddles that makes it not accessible for wheelchairs and it can also cause the roots of the plants to rot if soaked in water for an extended period. So how do I check the drainage capacity of the soil?

Process to test garden soil drainage:

Step 1: Dig a hole with approximately a 30 cm diameter and 30 cm deep. Try to keep the sides of the hole vertical.

Step 2: Fill the hole with water and let it drain overnight. It will take about 20 L of water to fill. This will saturate the surrounding soil, so that the real test will show true water drainage from your garden soil.

Step 3: The next morning, fill the hole with water. Then, lay a board or stick across the hole so that it sits flat. Measure and record either the initial depth of water, or the distance from the stick to the water. Also, note the starting time.

Step 4: Every hour, measure the distanced drained. You can do this by checking the distance from the bottom of the flat board to the water, or to the bottom of the hole. Just be consistent and record your measurements. Write down the time, and either the amount of water (height) in the hole.

Step 5: Calculate your drainage. Tally up your measurements into a sheet showing the amount of water drop over time.

Image 6: Drainage capacity. Source: **https://growitbuildit.com/garden-soil-drainage-test-percolation**

How do I use this information in the design process?

Interpreting the results of the soil classification

High percentage of sand- Add plenty of organic soil where you are going to plant. (10 cm/m2)

High percentage of clay- Add organic soil where you going to plant. (5 cm /m2)

pH or calk rich soil_ choose plants that tolerate high chalk level

Interpreting the results of the drainage test

Soil that drains 2.5-7.5 cm/hr is good for a vegetable garden. This is considered a good mix of drainage and water retention. Soils that drain in this range should hold enough moisture for plants during hot summer days without risk of roots rotting.

Drainage rate	Result
< 2,5 cm /h	Drainage is too slow, drainage installation needs to be done
2,5 -7,5 cm /h	Good drainage
> 10 cm /h	Drainage is too quick. Add organic soil to all plantations.

1. Entry and exit of the garden

Accessibility in the garden is very important. But just as important is the access to the garden. Of course, this information is only possible to gather if the garden is located close to the building or a patio. If this is the case, we should investigate how you enter and how you exit the garden. Make signs on the map o directly on the plot where you find exits and entries and take notes of following three data:

- Is the entry accessible to wheelchairs?
- Is there a door that is easy to understand and easy to open?
- Is there a sign indicating the entrance?

How do I use this information in the design process?

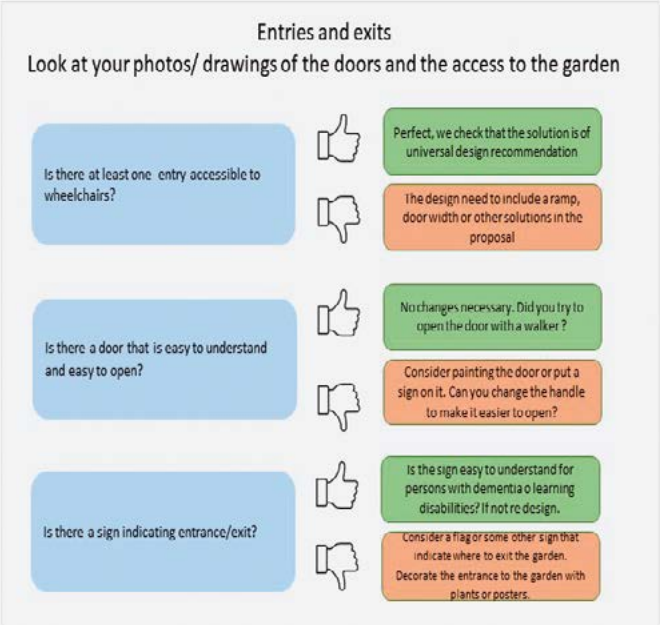


Image 7. Consider entries and exits of the garden in the design process. Diagram by Jardines Terapeuticos.

3. Scaled drawing – understanding and drawing the design on a map

It is very helpful in the designing process to be able to use maps. First of all, it is a tool to write down all the observations from the space, such as existing trees and vegetation, entries, bad drainage, shadows etc. And second, it will help us to place out the different elements in the garden taking in account the right proportion. Using different layers, it is even possible to see different information gathered separately at the same time later on. For example, I have drawn the shadows from the buildings and the trees on the map a summer morning. Now I want to place out the horticulture raised beds. With the shadow map as a background layer, I can move around the correct sized raised bed on the map to try to fit them in on a sunny place.

- How does scale drawing work?
- How do I draw a map of my spot?
- How can I use the map in designing my therapeutic garden?

How does scale drawing work?

We use units of measurement to create a ratio that is our scale. The ratio compares two things. It compares a small drawing or a figure size of the object or place to the actual size of the object or place.

A scale of 1 to 1 (scale 1:1) means that 1 centimeter on the paper represents 1 centimeter in real space. This is easy with a small object like a pencil. Here is a picture with the scale 1:1.

Image 8. Scale 1:1 of a pencil

When it comes to a garden object, I would not be possible to draw in real size on this paper so I have to scale it.

We can make scales of any size. One centimeter can represent 1,000 meters if we want our map to show a very large area, such as a continent. One centimeter might represent 1 meter if the map shows a small space, such as a room or a small garden.

Let's start by thinking about distances on a map. On a map, we have a scale that is usually found in the corner.

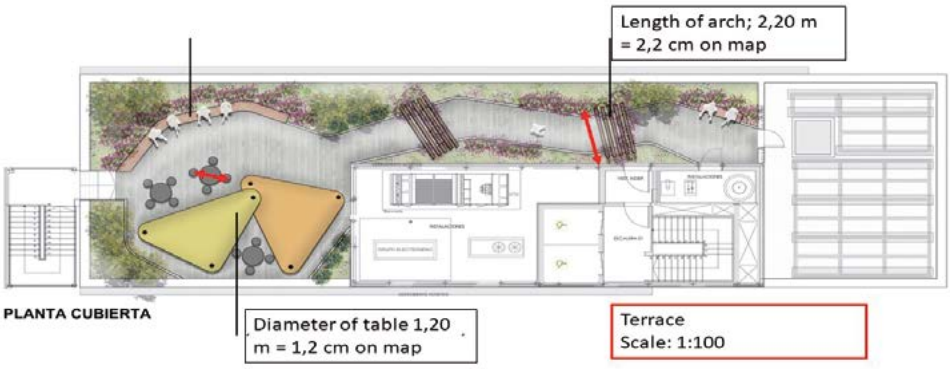


Image 9. Example of scaled map. Drawing by Jardines Terapéuticos.

This scale tells us how many centimeters on the map represents the real size. In this case the scale is 1:100, 1 centimeter on the map represents 100 cm (1 meter) in reality. We observe that the table measures 1,2 cm on this paper. The table measures 120 cm in reality.

Maps of therapeutic gardens are usually drawn in the scale 1:100 or 1:200. Where 1 cm on the map represent 1 or 2 meters.

How do I draw a map of my spot?

There are many ways of drawing a map that will later serve you as a tool to experiment and help you try different designs. In this manual the recommendation is to draw as much as you can by hand with paper, ruler, and pencils. This way you get the feeling for the size and for the geometric forms. Starting something new can be challenging, but it's important to approach it with a sense of playfulness. Eventually, one can explore using a computer-aided software.

To follow these steps, it is not necessary to be familiar with technical drawing…but it does help.

STEP 1. If there is no map available of the spot (Usually there is one. Ask administration.), it is easy to print out a map from google maps. In google you can also measure the distances of your spot. But you must always confirm the measures at the spot later on. Tutorial of how to measure distances in Google map: **https://www.youtube.com/watch?v=5AWeLl-4oJ0**

STEP 2. Copy your printed map with the distances you wrote down to a paper (A2 or A3), using the right scale (Use the scale 1:100 in the beginning. You will need set squares and a 2H pencil. If your spot has a lot of angles, you will also need a protractor to measure angles.

To keep the scale while drawing, it could be helpful to use a grid, where each square is 1 cm.

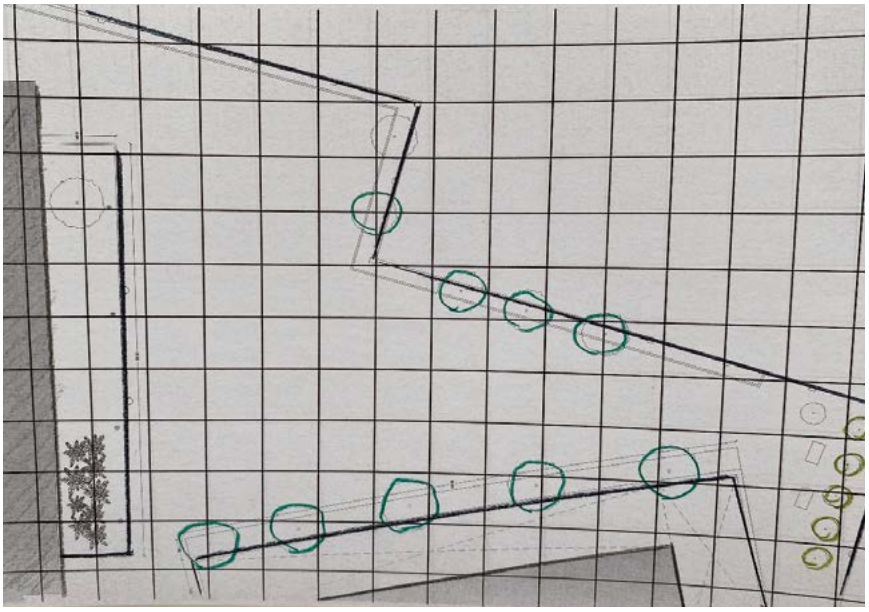


Image 10. Drawing boundaries of garden with a grid to keep the feeling of the scale. Each square is 1,00 x 1,00 cm (1mx 1m in the garden)

STEP 3. Draw existing objects and plants in the map. This is a difficult step if there are a lot of existing elements. The best way of doing this is by triangulation method and you need to measure distances on the site. See picture of how to take these measurements.

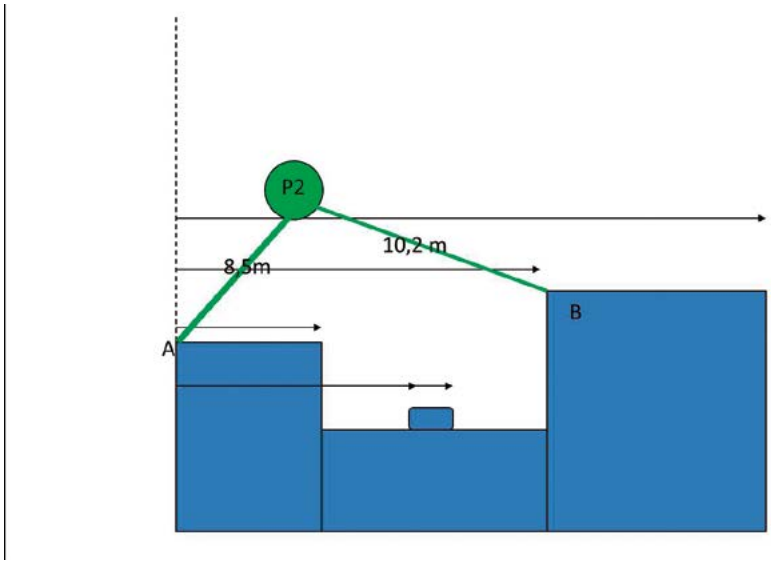


Image 11. Triangulation in technical drawing.

POSITION OF AN OBJECT-TRIANGULACION

1. *Look for two reference points (A y B, The corners of the house)*

2. *For each object (trees, shrubs, fence) you want to draw and locate on the map, you have to take two measures: Point A -object (8,5 m) and Point B -object (10,2 m). These are the measures needed to locate the tree P2 on the map.*

3. *Keep on doing the same for all the object you need to locate and draw on the map.*

Now you can locate the object on your map with the help of a compass. See picture,

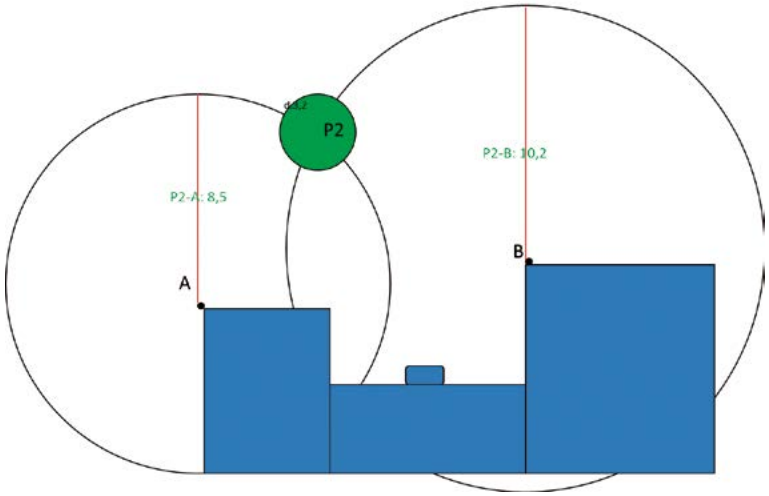


Image 11. The P2 on the map where the tree is located is the intersection between the two circles drawn with the radius of the measurements taken in corner A and corner B (with the center of the circles at the reference points A and B).

STEP 4. Now you have a scaled map of your garden as it is. A nice way to explore the site is to write down all gathered information in a second layer. This second layer is a transparent paper that you lay on top of your map. On the transparent paper you can write down all interesting information that you gathered in the first chapter, for example:

- Drainage
- Pavements
- Winds
- Orientation of the plot: shadows at different times of the day
- Accessibility
- Views: from the garden to the outside and from the outside to the inside.

- Topography
- Water supply
- Soil quality: aspect: clayey, sandy,

It might look like this:

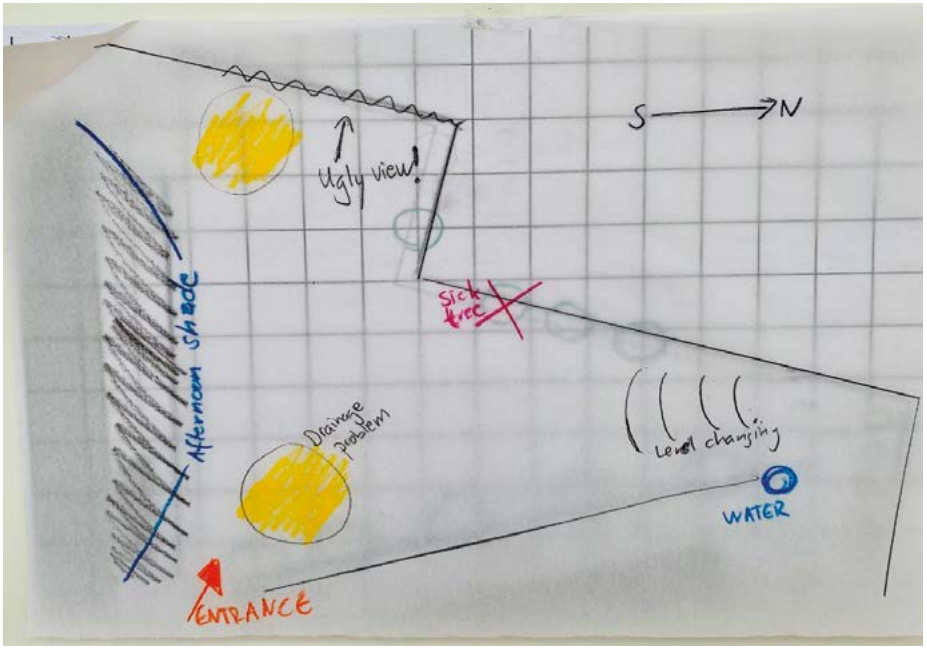


Image 12: Gathering useful information about the spot to be considered during the design process. Example Jardines Terapeuticos.

STEP 5. Now you are ready to design your therapeutic garden. Remember to use the scale 1:100. Take a new transparent paper and locate it over your map.

- Start to draw pathways with the correct width, areas of activities, areas of plants, trees for shadows and green house, shelters. Please see chapter 4, before continuing with this step.
- Continue with smaller objects like raised beds, furniture, water features and all other objects you decided to have in the garden.

A design is never done in one drawing. You probably will have to do many, trying different solutions. Look at other garden maps…perhaps there are good ideas of how to design for places like your garden.

Another way to verify that you did not forget important design items for the therapeutic garden is to use the assessments that you can find in chapter 5.

Computer assisted applications for drawing garden plans:

Sketch up: Take some time to learn, bit very helpful in understanding geometrics and scale.

Iscape: Easy to use and understand BUT does not consider real volumes and scales. Only for iOS devices.

Home design 3D outdoor. This application is very nice, but it takes some time to learn how to use it. Give the real size of elements and can even give you the size of the plants with different ages. Only for apple units.

4. Design step by step

4.1 Site and climate considerations

In most cases there is little choice as to where we can establish the site of the therapeutic garden. Even if it is possible to be part of a project from the very beginning, the architects are frequently faced with a difficult task in planning the site and its optimal use, following laws, such as minimum parking spots per square meter of a lot ,etc. However, assessing the site is vital to choose the best areas to provide “outdoor rooms”. The following attributes should be taken in consideration:

- Building form and layout
- Climate and microclimate
- Features within and outside the site that may affect it; buildings, landforms, noise
- Flood risk, soil and drainage

Different categories of common outdoor spaces that define location of a possible Therapeutic Garden:

- Public realm- environment around the building, roads, parks, parking areas etc
- Courtyards- internal open spaces surrounded by the building
- Private/enclosed garden- Partially enclosed by walls or fencing
- Spaces at upper levels- balconies and terraces

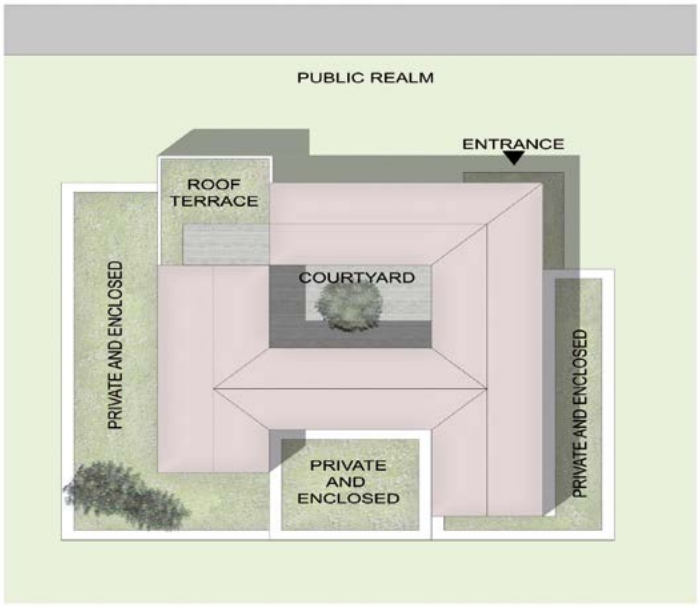


Image 13. Different categories of common outdoor spaces. Drawing by Jardines Terapeuticos Palmlof.

Special care should be taken around the transition inside/outside, meaning exits and entrance. These intermediate spaces (lobbies, verandahs, hallway), allow:

Visibility of the outdoor area

- A sheltered place for people to decide whether they want to go out or not
- A space to watch other people
- A place for putting on and taking off outdoor clothes

What are the warnings when establishing the site for the therapeutic garden? It is essential to consider and beware of:

- Sun angles and orientation
- Solar radiation
- Shelter from wind

Sun angles and orientation

An ideal outdoor area in Europe is to have several areas facing different direction: east, south and west to choose the area after winter/summer and time of the day. In the northern hemisphere east orientation for morning use and south orientation during all day is best. In southern hemisphere, east facing spaces are good for morning and north facing during most of the day. West facing spaces in hotter climates are generally too hot in summer months.

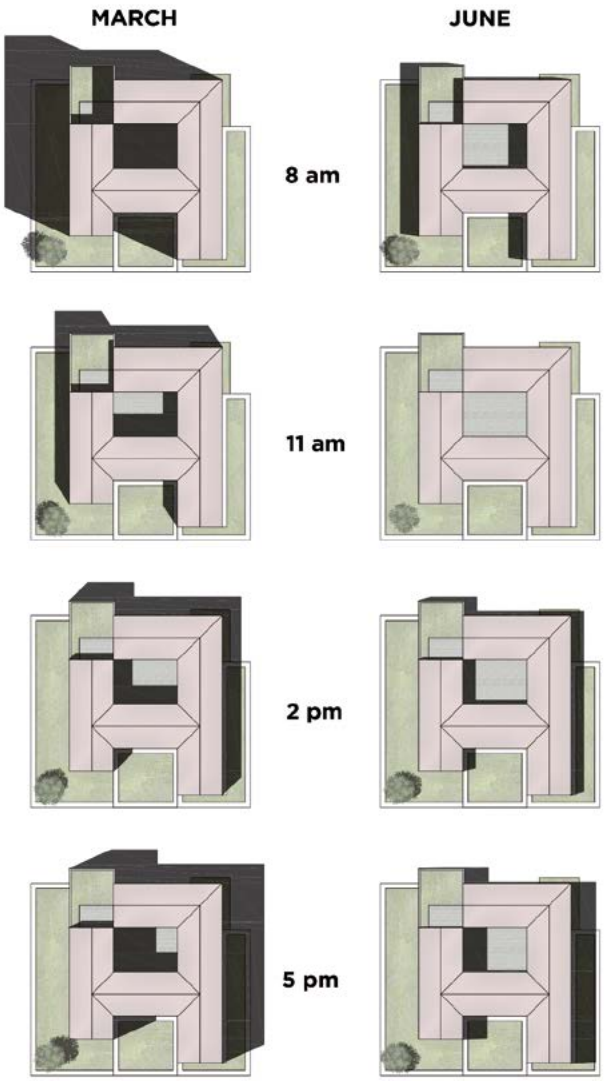


Image 14. Sun Access throughout the day in the northern hemisphere. Source: Drawing by Elisabetta Nucera, JTP, inspired by "Designing outdoor spaces for people with dementia". Annie Pollock and Mary Marshall

Solar radiation

Solar radiation is the radiant energy emitted by the sun. The material and the color that we use when designing is of importance for the amount of heat retained and subsequently radiated. Here are some key points:

- Dark exterior surfaces are beneficial to absorb radiation, whereas in hot climates light surfaces are needed to reflect radiation. Carefully choose your material and colors to maximize comfort and avoid glare.
- Minimize heat gain by using a balance of hard surfacing and plants and grass- a common rule is 40:60 hard surfaces to soft landscape

Shelter from wind

Wind is more complex and unpredictable than sun and difficult to deal with, but none the less important. We “feel” wind physically on our hair, skin, eyes and clothes. We “see” wind when it moves objects and we “hear” wind when it passes through plants and buildings. To create a comfortable outdoor environment is important to know where the wind could become a nuisance. (Wind accelerate in between buildings, it tends to flow around obstructions rather than bounce off it in random directions, etc.). Here are some key points to consider:

- Wind is potentially hazardous for people with dementia and over sensitive reactions (autism spectrums disorders).
- Upper levels like roof terraces or balcony might not be a good option while wind usually is a problem
- A combination of permeable barrier and planting may be the most effective solution, since visually the planting will not only soften a fence and prevent imprisoning appearance but also decrease the permeability.

4.2 Functional zoning- layout and design

Path system and continuous flow

One way of starting a design of a therapeutic garden is to do the layout of paths and ways to stroll and to circulate in the given area. If the area is very small, it might not be possible, and we would have to start at the second step, zoning.

First step, circulation or flow, is a fundamental of any landscaped space and can be very frustrating to the people using the space if it is not done correctly. In most cases, there should be a closed loop of continuous flow from and to all entrances and exits to a space – there shouldn’t be a lot of dead ends and closed corridors. So you wouldn’t want to plant a hedge halfway across the middle of a lawn area and make people walk a long way out of the way to get into the next space.

Usually, it is the minimum measure of the path width that will give the information if it possible to use a path

system circulating through the garden or not. The minimum width for a wheelchair and a person to walk comfortably side by side is 1.80m.

Walking around the outside spaces should provide exercise and be a journey, with things to look at and enjoy on the way. Maybe a combination of planting, hard surfaces, places to sit and rest in sun and in the shade. Paths should lead somewhere, at the very least around a feature. Features might be games, ball plane, pergolas, trees, or horticulture activities. Paths should not lead to dead ends or locked gates if it can be avoided. The loop is a very easy way to divide the site and create an interesting tour for everyone in the garden.

Image 15. Flow and Circulation in the healing garden, a Loop in the courtyard in Pryconsa Residence of 650 m2 that connect different functional zones. (Source: Therapeutic Gardens Palmlöf)

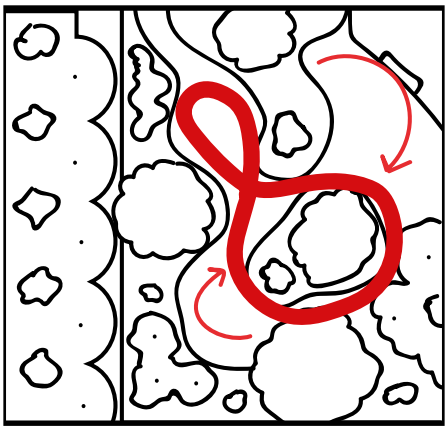


Image 16. Flow and Circulation in a smaller garden (450 m2) enclosed by walls. Even in a small place it is important to consider the movements we would like to happen in the garden. (Source: map from therapeutic Gardens, Cooper ,Marcus,Barnes)

There are no fixed rules when designing the path system. Sometimes the cultural environment and the buildings force us to use a different solution than a “Loop”. Like in the next picture where the garden is a rectangle a long a building.

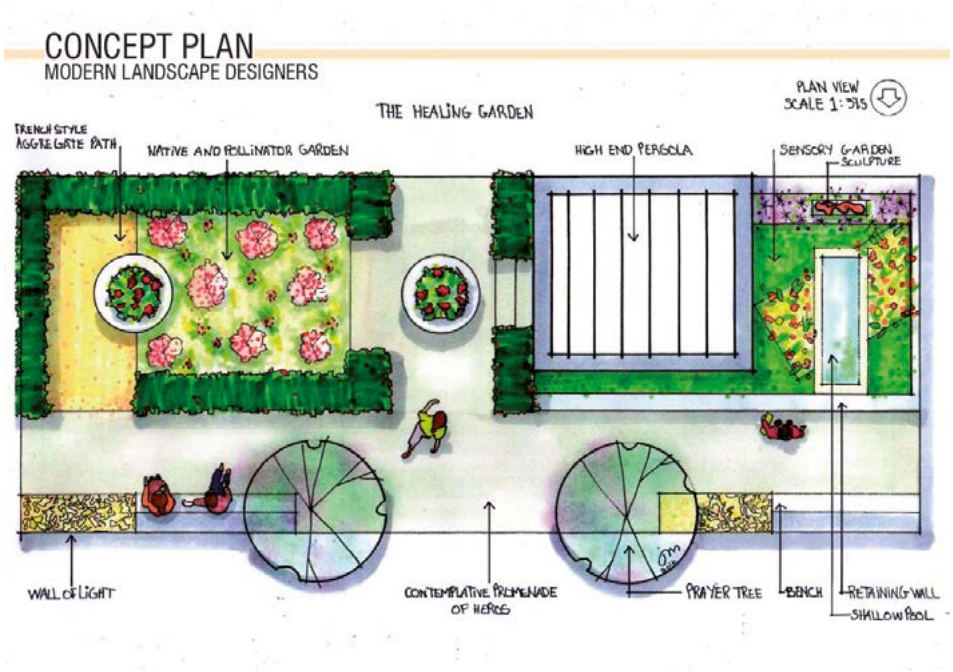


Image 17. Example of a rectangular narrow garden with straight lines. There is no space for walking in circles and the walk must be a line of transport through the different functional zones. Source: Modern Landscape Designers

Utilizing curves and circles is a way to break away from the typically squared designs of houses and interior rooms. Nature is more likely to use organic forms and not very often straight lines. In this way we imitate nature, and the feeling will be involvement by nature. Using curves there is also a bigger possibility that unplanned surfaces will appear, flower beds to fill with vegetation. This usually does not happen when planning in rectangles and squares.

The use of organic shapes is a recommendation, but it is not necessary. As said before, there will be places where using organic shapes is not possible for example long rectangle terraces or very small courtyards. It is also easier to use straight angles when designing for examples porches and social areas along the building to place to as many chairs and tables as possible.

Functional zoning

The second step in the layout will be to plan for shapes where activities such as social come- together, games, workshops, and therapy can take place. Most of the time these areas are planned to be scaled with a size

that will be in harmony with the house and the surroundings. In the therapeutic garden these areas need to be dimensioned for the number of persons that are going to be active in this area. The biggest challenge is to balance these areas with vegetation while they normally are paved areas or hard surfaced areas. We will come back to materials and characteristics of these pavements later.

In the first needs analysis there will be an outcome of what kind of areas should be planned. The following are some examples of different spaces and how to consider their dimensions.

Social areas

These areas are always present, and it could be wise to start planning for your social area first. The size should be large enough for tables and chairs and if it is possible adjacent to the building /entrance in the garden. In many communities, there might be individuals that never go further into the garden while staff and tutors do not have the time to take them, and it is therefore interesting to plan social areas close to the entrance.

Calculate for various groups of seats and tables. Depending on the table and chairs the groups occupy more or less 6 m2. In between there should be at least 4 m2. See size dimensions picture.

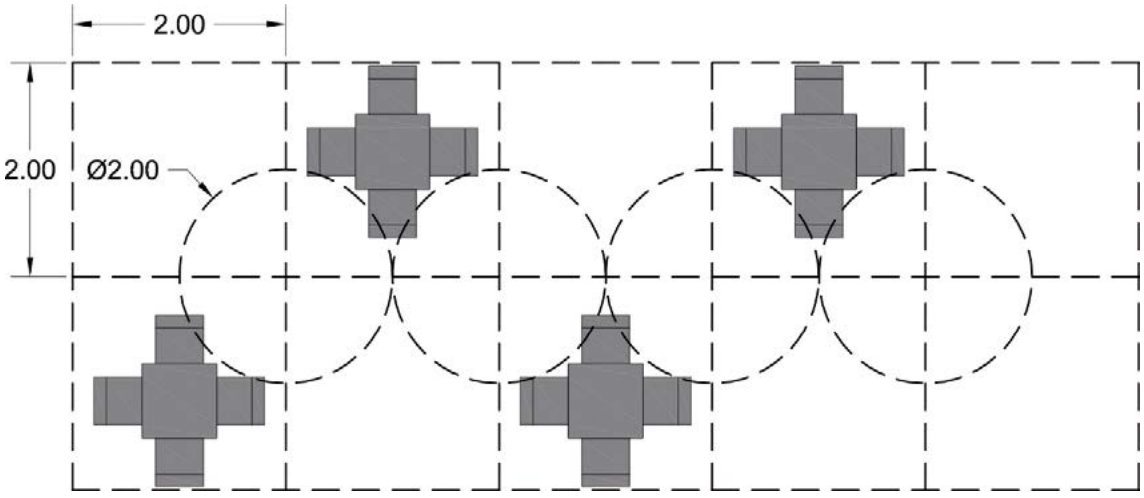


Image 18. Example of garden furniture dimensions. Drawing by E.Nucera, JTP.

Social areas next to the entrance need protection from the climate to ensure maximum usage, for example, the use of parasols or a simple roof structure to provide protection from rain or strong sun.

Horticulture therapy area

The next area to plan might be an area for horticulture therapy. In the needs analysis it is important to find out where this area should be located. To grow vegetables and to have a greenhouse there should be as much sun as possible during the day. It is also highly recommended to have a water source close by, and not to have a water hose laying out all over the garden, as it could be a falls risk. The dimension of the area depends again on the available space and on the number of people and their abilities when carrying out horticulture activities. In a care home, it could be enough with 4 raised beds and flowerpots. For younger adults with higher physical endurance, we would prefer to have ground level /cultivation beds that occupy at least 50 m2. Remember to check all the measures for raised beds and measures in between the raised beds. At least 1.50m between the raised beds. See more about raised beds in the chapter about furniture's.

Horticulture is not only digging and weeding. Cleaning flowerpots, potting, pruning, sowing and taking cuttings are all activities that could be done while seated by a table or a work bench (even inside). Therefore, it is a good idea to create a working area with a big sturdy table and benches. Perhaps protected by shade.

If there is space enough it is nice to plan for a compost container. This container must not be very big and is not only recycling the plant material to useful soil, but is also an educational opportunity.

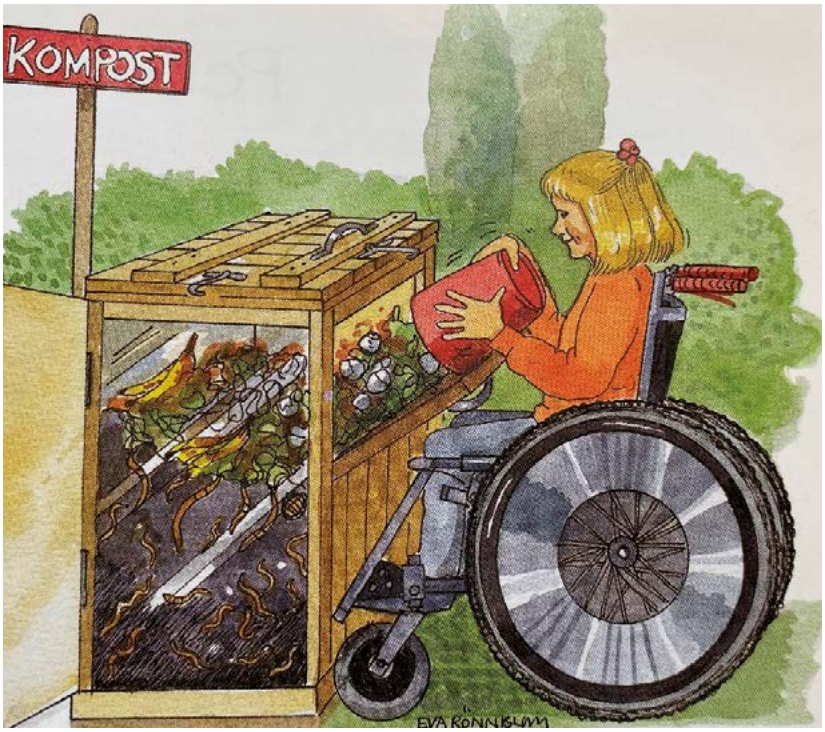


Image 19. Idea for an adapted compost container. By Pia Winnber-Lindquist. Möjligheternas Trädgard. Hjälpmedelsinstitutet.

Another element that is very useful close to the horticulture area is a place to store tools, bags of soil, pots etc. This doesn´t have to be a big storage but it is recommendable that is has an easy access for everybody to be able to serve themselves and it should have a lock to be able to lock the door when the tools are not in use.

Image 20. Elements in the horticulture area. Illustration by Jardines Terapeuticos Palmlöf.

Image 21. Storage for tools. Photo Karin Palmlöf from Chicago botanical garden.

Physical exercise and game areas:

There are many kinds of physical activity and the most common might be the strolling. Even a small stroll of 50 -100 m is worthwhile, and it is possible to design in small spaces. Another possibility is to design a surface for ball games (hard surface). Ball games like basket and football are not considered here. A surface for aerobic exercise, yoga and other activities that could be done on a lawn or a paved area is useful in most *gardens. To make an exercise with a group of 10 persons you will need a surface of at least 80 m3. This size* is also suitable for games like crocket and exercise in a circle.

If the users need gross motor training, part of the lawn could be used for this. These kind of training elements could also be included in alternative paths with changes in levels. In the therapeutic garden it is more common to use natural elements than prefabricated equipment. With natural elements we refer to designed elements that still belong in the garden or in nature. An example is a path made from sand or a tunnel made from climbing plants that force you to bend or stones to climb etc. See comparison pictures below.

Image 22. Comparing space occupied by gross motor equipment, prefabricated, and natural designed gross motor challenges in place. Photos Karin Palmlöf. Therapeutic gardens in Madrid and in Denmark.

Relaxation and private areas:

Perhaps this area is small, and the form and the layout are not so important. However, the location should be carefully chosen. Quiet areas are a necessity for some service users, a place to escape and be private. So, if there is enough ground, a retreat can be much appreciated. Plants and the surrounding area should be chosen with care to create a healing place. It should be located with no interfering circulation or noisy activities beside it. Nevertheless, it should not be completely isolated. Preferably, the area should be visible to the staff.

Image 23. Small quiet area with orange planters. Apart but visible. Photo Therapeutic Garden Palmlöf, Barcelona.

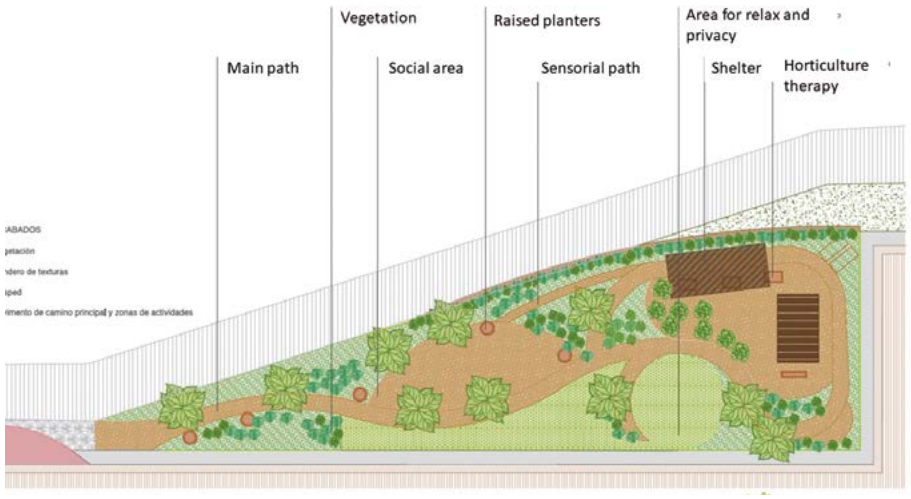


Image 24. Functional zoning. Example from the therapeutic garden in the national Centre of Alzheimer's in Salamanca, Spain. Illustration by Jardines Terapéuticos Palmlöf

Sensory Modules and Reminiscence Module

To facilitate the understanding of the different environments in the garden JTP created a modular system for the different needs of the users. As explained in the introduction, each module contains some of the elements that would be needed in certain therapies and are supposed to help the designer and the therapists in the design process of the garden. Apart from the general areas explained above, here we include the reminiscence module and sensory module.

Sensory Module-design elements

The main features in this module are the plants. A separate chapter will go further into plant specifications, but here the interaction between the person and the plants is essential in order to have a meaningful experience. How do we achieve this? With paths going through the vegetation, raised beds and smaller paved areas so you feel you can reach and touch and smell the vegetation.

Apart from plants a sensory module can contain other interesting elements:

- Water features (see chapter 4.10) to listen to running water, reflect the light or reflect the sky…
- Sensory paths (wood, sand, vegetation)
- Different pavements that are naturally included as secondary paths (stones, bark, grass…)
- Stones, sand from your area. Stones have their own world. There are small stones that you pick up and rattle in your hands, there are big stones to sit and crawl on and there are soft and sculptured stones.
- Perennial shrubs for the birds to hide in (listening to their song in springtime)
- Bamboo and other moving plants to hear and feel the movements of wind
- Create “a roof with plants” to feel “the change of temperature” and the difference between dark and light under the plant roof (pergola, arches, trees).

The meaning of the sensory module is to bring nature experiences to those that cannot go to the beach and feel the sand and smell the sand between their feet or take a walk a rainy morning in the woods to feel the cool drops and air and to smell the wet ground and maybe a special flower that smells of honey. Thinking this way will guide us to include the elements that could bring experiences for the senses.

Image 25. Sensorial elements in the gardens. Photos JTP, except from the lady climbing stones. Helle Nebelong therapeutic Garden at Christians Have Nursing Home.

Reminiscence module

Objects that trigger memories are usually underused in the gardens. They depend on the background of the users and must be culturally appropriate, as outside spaces and how they are used vary greatly from one culture to another. The plants also have an important role in the reminiscence module and they constitute the most natural way of evoking positive memories and start communications. An example is the orange tree from southern Spain. A therapeutic garden in Seville or Granada would plant orange and lemon trees in this module to smell the typical “azhar” during spring.

Here is a list of other reminiscence objects, except from plants that can be incorporated. It is important to avoid creating an amusement park atmosphere as this only would be confusing for the users.

- Sheds, green houses, chicken coops,
- A place where something happens: mending bicycles, a beehive without bees, wood work
- Post boxes
- Thermometer and pluviometer
- Barbecue
- Sports games
- Bird feeders and birdhouses

Part of the memories are also the materials we use to build the garden. The brick wall or the brick path is something very common in Great Britain and Germany and would be appropriate to incorporate in the garden there. Greek gardens would have typically lighter colors of stones and perhaps sculptures hidden in the planting, while in the Scandinavian countries a fruit yard (orchard) is something common that make persons “feel like home” in the garden.

Image 26. Reminiscence module in the basque country in Spain. A typical country house, “caserío”, where vegetables were grown and animals taken care of. Design and photo, JTP.

4.3 Access and limits

Many users of therapeutic gardens have difficulty analyzing and identifying danger, so it is important that any outside spaces should be unobtrusively safe and secure. This means, users should not be able to access any potentially unsafe or unsuitable area.

The purpose of limits is to provide a safe environment without creating a trapping environment or depriving the person of their human rights. Creating environmental barriers will allow the staff to feel relaxed and comfortable to encourage the users to go outside.

There is a danger that limits, such as fences and walls, create a feeling of imprisonment. Therefore, the height and the design of fencing and other barriers are critical factors in the therapeutic gardens.

The height of fences and buildings affects the microclimate within the garden. Very high fencing may cast a shadow and create a cold area where plants cannot thrive and users are uncomfortable. The minimum acceptable height as not to feel imprisoned is recommended.

The visual impact of a fence can usually be concealed with plants that draw the attention away from the perimeter. Another example is if the garden is on a terrace, then a balustrade (fence) is crucial. To keep a normal, no to high, designed look of the fence, one can add an inward slope or a curve on the top to make it difficult to climb.

Sometimes a very simple railing is desired because of a beautiful surrounding that should not be visually blocked. The Impeding climbing is important for any barrier. Try to avoid potential foothold on the garden side.

Easy access to the garden starts with a door which should be highly visible. A fully glazed door is recommended, but it is important to ensure the door is clearly distinguishable from the glazing on either side. Doors should be very easy to understand and the door handle clearly visible and easy to operate both for residents and staff. In case of wheelchair users, the doors could be self-opening or at least possible to be held open or have an overhead door closer which stops the door from shutting too quickly.

It can be very helpful to have some “In between” spaces, very common in cold countries. These are transition areas between the indoor and outdoor spaces. Where you can store boots, sun hats, scarfs, a place to stop and change to the new state of mind. Coat hooks and umbrella stands can be placed along with shoe benches and traditional barometers.

4.4 hard and soft surfaces

“Hard landscapes” are still something over-represented in cities and towns around Europe. Concrete and asphalt surfaces are laid in abundance and even becoming popular with sharp edges and steel features. In contrast we find the “soft landscapes” that are the opposite and represent meadows, vegetation and organic materials. This would not be a big issue if we didn´t know that soft landscape is known to lower

rates of cancer, obesity, depression and other NCD´s. (Stigdotter et al. 2011). We also can observe that the reaction and the behavior of humans changes depending on which type of landscape we have around us. Soft landscape promotes a more peaceful rhythm, and our tendency is to slow down, observe and relax. The hard surfaced landscape induce fast pace living and feelings of aggressiveness and stress.

Apart from the psychological benefits, soft surfaces that contain foliage will improve quality in green space over all:

- *Boosts biodiversity*
- *Restores Habitats*
- *Reduce the heat island effect*
- *Reduces storm water run off*
- Promote positive interaction between people and nature

This knowledge has a high value when designing HG and striving to keep the 40/60 rate of hard surfaced/ planting . This chapter will be divided in two parts: Hard surfaces where we discuss different pavements for paths, walk ways and areas for activities, and Soft surfaces, where we discuss the soil quality and the preparation of the ground before planting.

Once decided what pavements and what type of soil to apply, it could be a good idea to create a special garden map where one can consult the different surfaces during the construction of the healing garden. See below.

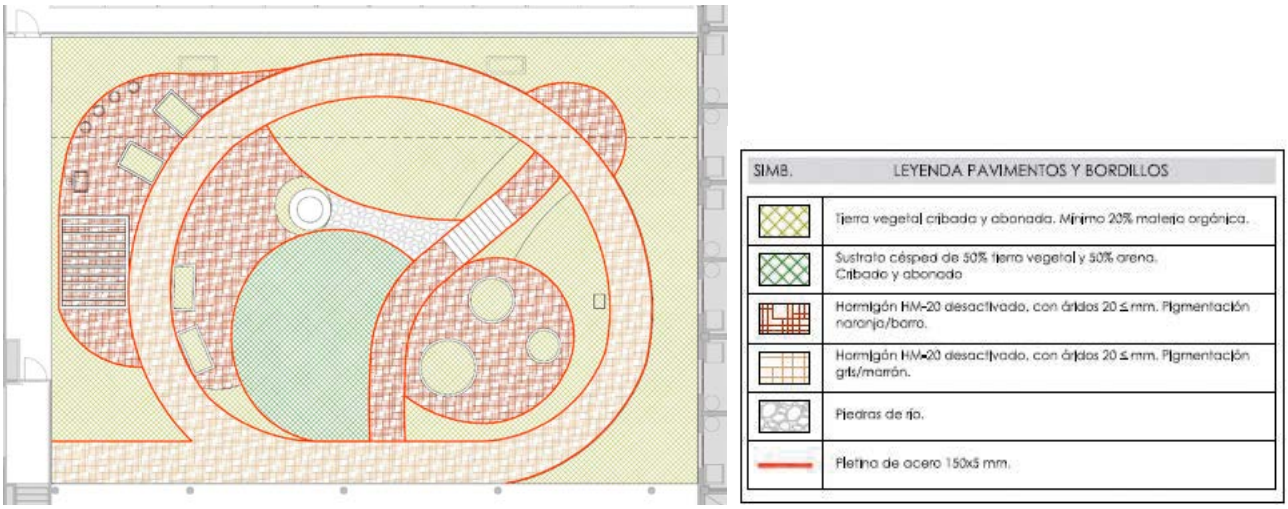


Image 27. Legend of hard and soft surfaces in the garden. Indication of the kind of pavements, type of soil and the depth needed. Map by JTP.

Hard surfaces

Hard surfaces are key features in all outdoor areas because they provide a safe surface to walk on as well as a directional guide for people with impaired memory or vision. Level, non-slip and with no trip hazards, surfaces need to feel and look safe. A smooth and nonreflecting surface is important. Achieving this is not always easy without making it difficult for people who walk with a shuffling gait or who use walking aids.

Color contrast edging can be helpful for people whose eyesight may be impaired. If such edging should be raised to prevent walking frames with wheel to run off the edge of the path could be discussed. Raised edges could lead to additional costs and may also cause trip hazards.

The color of the pavement should be of concern in the Healing Garden, as it is common for certain tones to cause glare. If concrete, slabs or pavers are selected as pathway material, they should be tinted. Asphalt does not create glare problems except for when it is wet. However, asphalt is not very aesthetically pleasing.

Another critical issue when selecting materials for paving could be those areas where people use a walking frame or other walking aids. It is important to avoid cracks and expansion joints. Expansion joints in concrete should never be more than 4 mm wide. Jointing of slabs is not recommended since it causes problems with weed growth in the long term.

The following are pavement material suggestions with a short description, as well as the advantages and disadvantages of each. It is meant to be a guide and not a technical description.

Decomposed granite

Decomposed granite is an ideal material for firm pathways where a natural look is preferred. It's where hardscape meets softscape: a durable surface with natural qualities. Its resilience to high traffic wear and tear works well for pathways that carry pedestrians and vehicles on a daily basis. It is affordable, environmentally friendly, and an aesthetically pleasing alternative to traditional hardscape materials. Commonly known as DG, decomposed granite is granite that is naturally broken down into gravel and sand by millions of years of pressure underground. Solid quarry rock and recycled materials can also be carefully crushed, sized, and blended into aggregates that mimic decomposed granite composition, so you have even more natural colors to choose from.

The DG should have a depth of 10 cm and must be used on a pre worked surface, for example a 10 cm compressed aggregate/road base (Zahorra). This means, for pedestrian areas, removal of any existing surface material to excavate around 20 cm from the end of the graded slope. Keep in mind that this will create many m3 of rest materials…

Edging

Edging must be used to separate adjacent soil or sand from the decomposed granite. The edgings could be

made of any materials such as pavers, hardened wood* or metal. Steel or aluminum metal edging will hold its shape and its versatility enables you to create any radius you need when it comes to garden beds or pathway curvatures. With its strength, metal edging won't crack in the cold, shift with maintenance, or erode over time.

If the purpose of the edge is to facilitate the orientation for those with visual impairments or balance difficulties for example, we advise using a different from the path so it stands out.

*Ground pressure-treated wood, for example wood stamp with UC4 (American Wood Protection Association), if it will be buried. Then you know it is treated for ground contact.

Image 28. Decomposed granite must be packed very well if to be used by wheelchairs. Photo JTP

Advantage: cheaper than any other pavements, easy to repair, natural look with the color of your nature (use of autochthonous rocks), It is possible to establish this pavement by yourself, although you need a special machine to compress.

Disadvantage: Could become soft when it rains a lot. Nor recommendable where you use walking aids, while little tiny stones sometimes could give a feeling of insecurity.

Stabilized Decomposed granite

Crushed granite can be stabilized with natural binders such as Organic-Lock and Stabilizer Solutions. These binders help create a durable surface that resists the erosive powers of weather or heavy traffic—all while maintaining the natural aesthetic you may have been going for in the first place.

Advantage: The surface will keep a natural look of granite. The surface will not become soft when it is raining

Disadvantage: If there is a damage to the surface it is difficult to repair without redoing a big part of the paved area.

Imprinted Concrete

Pattern Imprinted Concrete is a technique of incorporating colors and patterns to freshly poured concrete on patios and paving, re-creating the look of authentic materials such as stone, slate, and timber without the associated high cost of these natural products.

You install the concrete on a compacted and stable sub-base /road base (10 cm). After placing drainage, a high strength fiber matrix concrete is laid and levelled to create a 2 % slope for natural drainage. There are several techniques. Some companies use steel construction nets to give the right angle to the paths before pouring the concrete.

After giving the desired printing, the surface is treated with a wax sealing.

It is Important to use stress cuts to minimize the risk of surface cracks, they work by absorbing the natural movement that occurs in the land.

The preparation is the same as for other pavements, removal of any existing surface material to excavate around 20 cm from the end of the graded slope. Keep in mind that this will create many square meters of rest materials for recycling.

Image 29. Imprinted Concrete. Photo JTP

Advantage: Quick to install. Cheaper than using paving stones, high variety of prints and colors, establishes a firm surface for everyone to use safely.

Disadvantage: Must be established by professionals and during specific weather conditions for optimal results. Access for machinery is necessary. For example, this could be difficult in patios with NO access to the street other than through the buildings. Frost could be an issue when it comes to long lasting results. Re-sealing may be necessary every 2-3 year to maintain an optimal finish.

Paving stone and natural stone

Paving stones and natural stones will give the longest lasting and elegant result. If your area is known to have a tradition in paving with natural stone, this could be an interesting option.

Just as for all the other pavements, it is necessary to remove any grass or existing hardscape surfaces of the area where you will lay your pavers. For pedestrian areas, excavate 20 cm from the end of the graded slope. Use a level to grade the area at a 2 percent slope to ensure proper water drainage.

A strong sub-base is essential for a long-lasting, structurally sound paver installation. A tamper or plate compactor to compact the soil or gravel is needed. This should be poured in increments of 4-5 cm, compacting twice with plate compactor before pouring the next 4 cm.

After laying the road base, one should hose it down and compact it until it reaches a compaction level of 95%.

Finally, before laying the chosen paves on, sharp angled bedding sand should be poured over the entire base. Important that the screened sand is leveled before moving on.

Advantage: A long lasting pavement with excellent performance. Very nice possibility to use the traditional stones from the geographic area.

Disadvantage: It is expensive. Professional installation is highly recommended. If you like to use curves and organic forms, it is difficult to make a perfect cut to many paving stones.

Slopes and ramps

Slopes need to be gradual with highly visible handrails provided to ensure people feel steady and comfortable. See also current legislation for each country, although handrails are usually demanded for any slope of 1:20 or greater. In addition, it is a good idea to provide steps as an alternative to ramps.

Soft Surfaces

By soft surfaces here we are referring to all surfaces occupied by plants in the garden. These are some factors to consider when adding or improving the soil:

- Choice of plants; different plants thrive with different types of soil.
- How you plan to grow the plants—in a raised bed, directly on the existing ground or in a pot.
- Size of your plants, which will decide the depth of good soil that is needed.

In therapeutic gardens the soft surfaces are very important as they strive for a very high biodiversity of plants at all levels: ground levels, raised planters and shrubs, tresses, and climbers. The following are two titles / two options for establishing soft Surfaces: Planting directly on the ground or Planting in raised beds. Usually there is a combination of both in a therapeutic garden. The choice of using planters or raised beds and in what percentage depends on:

1. Aging population or wheel chairs users.
2. Type of soil. In very hard clay soil it would be expensive and difficult to prepare and cultivate and easier to raise the planters.
3. Contaminated soil.
4. No help with maintenance

Planting directly on the ground

All trees and shrubs are usually planted directly in the ground. Plants like flowers, perennials and vegetables and even small shrubs could be planted in raised beds or planters. See title “planting in raised beds”.

This means that one will always have to consider, first, the demands of the soil the trees and shrubs have, and second, the depth of the soil layer needed. In the following table, you will find a recommendation for soil depth for different vegetables, normal soil depth recommended for trees and shrubs, and directly after, we provide recommendations of plants suitable for different soil types.

If the soil on the site of the therapeutic garden is decent, one could perfectly mix the existing soil with fertilizer, more organic materials or sand, whatever is needed.

Soil depth requirements for different vegetable products:

Shallow Rooting	Medium Rooting	Deep Rooting
25-35 cm	35-45 cm	45 + cm
Arugula	Beans, dry	Artichokes

Broccoli	Beans, pole	Asparagus
Brussel sprouts	*Beans, snap*	*Beans, lima*
Cabbage	*Beets*	*Okra*
Cauliflower	*Cantaloupe*	*Parsnips*
Celery	*Carrots*	*Pumpkins*
Chinese cabbage	*Chard*	*Rhubarb*
Corn	*Cucumber*	*Squash, winter*
Endive	*Eggplant*	*Sweet potatoes*
Garlic	*Kale*	*Tomatoes*
Kohlrabi, Bok Choy	*Peas*	*Watermelon*
Lettuce	*Peppers*	
Onions, Leeks	*Rutabagas*	
Potatoes	*Squash, summer*	
Radishes	*Turnips*	
Spinach		

Shrubs and big perennials (80-150 cm): **40 -60 cm**

Trees: **100 cm ***

*Trees are usually planted in a hole and therefore it is NOT necessary to plan for this depth of soil layer in the garden. See chapter about plants.

Source: **https://learn.eartheasy.com/guides/raised-beds-soil-depth-requirements/**

Demand of soil:

Loamy soil

Loamy soil has a great structure for planting, it has a good amount of drainage, it retains moisture, and it holds nutrients fairly well. Its drainage properties mean that nutrients wash out and you will need to add nutrients back into the soil, so add compost often. Also, loamy soil tends to be acidic.

- *Pros: Loamy soil has great structure and drains well. It also holds nutrients well, though they can wash out at a moderate rate.*
- *Cons: Loamy soil is acidic, and you'll need to add nutrients to help plants thrive. Plants like cacti don't like loamy soil.*

Trees suitable for loamy soil: Pine species, soft maple, honey locust, cottonwood, willow,

Shrubs: Rose, sumac, honeysuckle, hazel, hortensia, azalea and juniper

What Thrives in Loamy Soil?

- Climbers
- Vegetables
- Berries
- Root Crops

What Struggles in Loamy Soil?

- Tomatoes, after the seedling stage
- Green Beans
- Late-growing cabbage and brassicas
- Cacti

Chalky soil

When compared to other soils, chalky soil has larger grains and a stony feel. Usually, it overlays limestone bedrock or chalk, so it's free draining. Chalky soil is alkaline, so it can cause plants to experience stunted growth, as well as yellowish leaves.

It is possible to change chalky soil, but it takes some work, like adding organic fertilizers and balancing the pH levels. Add humus to the ground to help improve water retention and to improve the workability of the soil.

- *Pros: Chalky soil is a champion at draining well. It's also easy to work.*
- *Cons: Chalky soil is alkaline, so plants that need acidic soil won't do well. It also leaches out iron and magnesium.*

Trees suitable for chalky soil: Apple Trees, Pear, Cherry, Ginkgo, Pine, Beech, Common Oak

Shrubs: Lavender, Rosemary, Buddleia, Ceanothus

What Thrives in Chalky Soil?

- Spinach

- Beets
- Sweet Corn
- Cabbage
- Lilacs

What Struggles in Chalky Soil?

- Blueberries
- Tomatoes

Sandy soil

Sandy soil often requires some organic amendments like organic fertilizer blends, glacial rock dust, or kelp meal. It is also a good idea to add mulch to gardens with sandy soil because it helps retain moisture.

- *Pros: Sandy soil drains well and warms up fast. It's ideal for seedlings and it's easy to dig in.*
- *Cons: Nutrients drain away quickly in sandy soil. It's not as fertile as other types, and it dries out quickly.*

Some of the best **trees** for dry, **sandy soils** are maple trees, cercis, grafted cotoneaster trees, eucalyptus, hawthorn, laburnum, magnolia, oak, flowering cherry trees, robinia, silver birch and sorbus trees.

What Thrives in Sandy Soil?

- Vegetable root crops, such as carrots, potatoes, and parsnips
- Lettuce
- Strawberries
- Corn
- Squash

What Struggles in Sandy Soil?

- Cabbage
- Broccoli
- Peas

Clay

The biggest problem with clay soil is its low draining qualities and lack of air pockets. Imagine molding clay; it's thick and dense. That is what clay soil is like. Also, clay earth takes time to warm up in the spring, and it's difficult to cultivate.

On the positive side, if gardeners enhance the drainage for the soil, then clay soil is fantastic for growing because it provides plenty of nutrients to the plants. This means that in a therapeutic garden it might be the most preferable soil type many interesting shrubs and perennials to thrive in.

- *Pros: Water doesn't drain as fast as some other types of soil.*
- *Cons: Soil can become waterlogged, and it takes time to warm up. It's also harder to dig in.*

Trees suitable for clay soil: Usually the same as chalky soils, tree families such as Malus, Sorbus, Alnus, Betula,cornus lousa, magnolia, Japanese maple, cotoneaster.

What thrives in clay soil?

- Summer crop vegetables
- Fruit trees
- Ornamental trees
- Perennials
- Aster
- Bergamot

What struggles in clay soil?

- *Carrots*
- *Parsnips*
- *Soft berries*

If you don't want to create raised beds, here are some solutions:

1. Adjust the pH Level

Most plants prefer a neutral soil, but some favor slightly acid or alkaline soils. Adjusting the levels help make the soil more hospitable to the plants you want to grow.

- To make the soil more alkaline, add ground lime.
- To make the soil more acidic, add aluminum sulfate or sulfur.

2. Adding Nutrients

Some soils, such as sandy soil, lose their nutrients quickly, so you need to add more. Organic matter, like compost and rotted manure, enriches the ground while also improving the texture. In the case of sandy soil, adding compost makes the soil hold onto moisture longer.

You also can use organic mulches, like grass clippings and shredded leaves. Organic mulches break down over time, sending nutrients into the soil and improving the soil structure.

3. Increasing Drainage

If your soil is holding onto too much water, you need to increase the drainage. Some gardeners add compost or sand to the earth to help it drain better. Mixing soil types can create an ideal situation.

4. Retaining More Moisture

On the other hand, sometimes soil drains too quickly, so you need to help it retain moisture. One way to do that is by using organic mulches around your plants. Not only does mulch help to retain moisture, but it will change the soil structure. You can also add peat moss or compost to help retain moisture.

Source: **https://morningchores.com/types-of-soil/**

Planting in raised beds*

*How to build raised beds and different recommended measurements will be detailed in the chapter on furniture.

In a garden for persons with sight problems or physical limitation it is recommended that the majority of the perennials and flowers be planted in raised beds along paths or other pavements that make them reachable. See picture.

Image 30. Raised beds in Hälsoträdgarden , Kristianstad, Sweden. Photo Karin Palmlof

Since the height recommended for planters and raised beds does not always match the soil depth, there could be a need for filling. This filling substrate is important as it can help keep moisture in the raised beds. It is also important not to use soil with that contains weeds or other seeds. Another important aspect could be the weight of the soil. If we are implementing the healing garden on a terrace or on top of a garage, the filling substrate recommended is expanded clay or similar and the end weight of the mixed substrate should be calculated at kg/m2 being humid.

It is common to use a lasagna method to fill up the raised bed. Leaves and grass clippings are great bulk organic materials which can be layered into the lower regions of tall raised beds, where they will slowly compost over time into rich soil. Aim for two parts shredded leaves to one-part grass clippings. Add grass clippings in thin layers to prevent matting. Straw (not hay, which contains seeds), wood chips, or shredded bark could be included as well.

Once the beds are full to within 6-12 inches of the top, add a compostable barrier such as untreated cardboard (it prevents your good soil from sifting down too quickly) and then fill the remainder with your chosen soil mix. Next year, you will find the soil level has sunk due to the decomposition and settling of the lower layers, so you will have plenty of room to add a fresh layer of compost on top.

Eventually, the lower layers can be turned over and used as a soil amendment. If working with extra-deep containers instead of raised beds, you can add an inert “filler” to the bottom of the container, such as bricks, milk jugs, or stones. Cover the filler with landscape fabric, which will enable drainage but prevent soil loss, before adding your chosen soil mix.

4.5 Protection

Cohen Mansfield (2007) noted that one of the main reasons people did not use gardens was because of the weather. It may be too hot, too cold, too windy etc. In a therapeutic garden one should be able to enjoy the space in any weather, although clearly every effort needs to be made to maximize shelter from sun, wind or rain and this must be a key consideration in any layout. Shelters need to be provided either by the building or by built features such as walls, trellises with planting, pergolas, green houses and tunnels of vegetation.

In some places it can be helpful to have some sorts of "in between" transition space linking inside to outside so that people can go out in any weather and be able to change or to acclimatize to the light and the weather. This "in between" space may take a form of a verandah, lobby or roofed area just beyond the exit doors. It is interesting to consider these spaces for populations who are especially fragile as they allow:

- Visibility of the outdoors
- A sheltered place to decide whether to go out or not
- A space for undertaking outdoor activities such as potting plants if the weather is bad
- A place for putting on and taking off outdoor clothes and shoes

The following are recommendations and references of types of protection for each weather condition.

Sun- creating shade

For many southern region countries this is a key issue. It is recommended to investigate how the shade moves in the space before thinking of the lay out of the design. Mid-day might not be the most important shade while it is usually the hottest time of the day and nobody is using the garden anyway. It might be more import to think of morning and afternoon shade. The shade in the garden will be planned in three steps:

1. Study the existing shaded areas in the morning and in the afternoon (AM and PM).
2. Plan where to create shade during spring and summer. Do not forget to leave space for sunny spots during winter.
3. Choose tree varieties or structures that create shade.

In a therapeutic garden one tends to plan the need for shade after the activities that have been planned for the users of the garden. Each therapy/activity can have a different solution for shade. For example

Walking:	Arches, pergolas, Trees
Horticulture:	Sails, Parasols

Crafts:	Pergolas, Parasols, canopies
Relax:	Trees, pergolas
Social gathering:	Pergolas, Parasols, canopies
Sports:	Trees

There is a mix of what we call a permanent solution and a temporary solution for shade. Both should be considered while, for example, the horticulture zone might need all the sun it can get during winter and spring but might need to be partly protected when working there in summer.

References and recommendations to the different varieties of shade:

Trees are wonderful sun protectors but take time to become big enough for a good shade and sometimes the size of the garden will not allow a good shade tree. Deciduous trees are especially good for places with movements such as sport and walking*. Trees give a large area under the canopy to move around and in winter it is nice to feel the heat of the sun even when doing exercise. Remember to plant trees calculating the shade you want! For recommendations of trees that create shade please see the chapter Planting.

*Remember that it is very important to clean up the leaves in autumn to avoid fall risks. If this is an issue, it is better to plan for perennial trees.

Pergolas are easy and cheap to build. The structure could be wood, or metal and it has to be fixed in the ground with a concrete footing. Be careful when choosing the shade material so it doesn´t create an undesired shadow with uncomfortable patterns. See picture. Some recommended material for pergolas used only for shadow (not complete roof structure) are heather, cane or canvas, pictured below. When planning the pergola, make sure to leave space around so it is possible to move furniture when the shade moves throughout the day See picture.

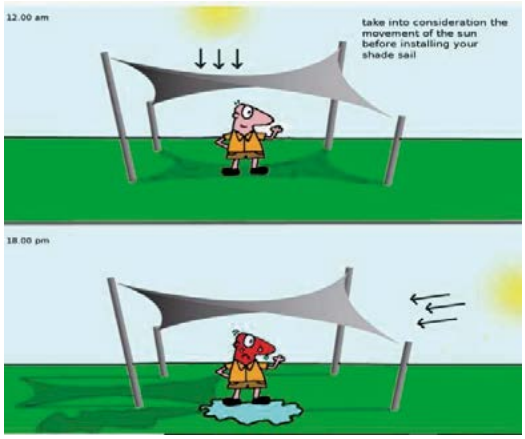
Image 31. Uncomfortable pattern on the ground instead of a protecting shade.

a

b

c

d



e

Image 32.

a. Heather protection / b. Sails out on special treated canvas / c. Cane protection / d. Arches to create shadow / e. Leaving space around the pergola "to catch" the shadow all day.

Arches Mainly for decoration but they can be installed along a pathway to give a feeling of shade. It is not always easy to find arches in the right size, as most gardens do not ask for a width of the path of 1.80. Consider “designing” your own archway. This could be a quicker option. The advantage of the arches is that you can obtain immediate results with fast growing climbers.

Temperature and Precipitation

There is very little to be done against heat and the best tip is to create a microclimate with plants. Using as much green as possible is the most effective way to lower the temperature in your Healing Garden.

Extreme cold temperature is also a difficult condition for garden use. The use of a heated greenhouse is in many ways a good solution to avoid the cold. The greenhouse can be built away from the buildings and have a garden surrounding it. This way the users will only have to do a short walk outside while still having the feeling of “being in the garden”, as well as still being protected from the harsh temperatures. When planning a greenhouse for therapies the following should be considered:

1. Size. If a group of 8-10 people is going to sit and work comfortably in the house it should have a minimum size of 22-25 m2 (4,2 x 5,6 meters).
2. The light in the green house could be strong, even if it is cold outside. Canopies/adjustable canvases should be placed in the ceiling to protect from strong light.
3. The glass should be security glass (tempered glass) to avoid any danger of cutting glass in case of accident.
4. Electricity outlet to have an electrical socket to be able to connect a small heater/light etc. This way the house is useable for dark winter days when no natural sun light is available to heat the house up.
5. Plan for a floor that is easy to clean such as paving stone.
6. Check that the green house has sliding doors that are easy to open and wide enough for wheel-chairs users.

Most green houses on the market are not considered to be used by persons with physical limitations. Most likely there will be delivered with a typical edge to climb over when entering the green house door. Consider place for a ramp when choosing the location for the green house.

Although not related to the therapeutic use, certain considerations should be kept in mind with regards to the location site. Choose a site with solid, well-drained soil, and consider a concrete base for a good pavement. Place your greenhouse 10 meters away from larger trees if you have the possibility to do so. This is not only important from a shade point of view, but also because trees drop branches which can cause damage to roofs and walls. Most trees drop their leaves in the autumn which means you will need to clean the gutters much more often. Also bear in mind that some types of trees secrete sticky sap which causes anything in their vicinity to get it on them. You will then have to wash the glass more often to prevent mold and fungi from growing and to reduce the amount of light.

Recommended good quality green houses for therapy use:

- “Green room”, willab garden
- Dining/orangerie, Dancover
- ACD

Wind

Depending on the geographical situation, the wind could become an important issue to be able to spend time outside. Some considerations were mentioned in “climate conditions”, when planning the site of the therapeutic garden.

There are really two basic approaches to modify wind:

- Deflect wind flows to provide shelter
- Dissipate wind energy by frictional processes to reduce wind velocity.

If it is not possible to change building or landform, one can still provide shelter with trees, shrubs and fences. The denser the shelter, the greater effect in the wind speed, but the smaller is the area affected. Solid windbreaks can generate excessive turbulence in their wake. The result on the wind speed when using a more porous windbreak, like a hedge, will be less, but the area affected is larger. A combination of permeable barrier and planting may be the most effective solution.

4.6 Orientation and understanding the site (interpretation)

One of the main characteristics of the therapeutic garden is that all persons feel autonomous in the garden. Autonomous to move around and participate independently of fragility and reduced capacities, from physical strength to cognitive impairments. To easily interpret and understand a garden is to feel that one has control when finding different places in the garden and understanding the signs, or to stroll around in the garden without feeling afraid of becoming lost. This chapter aims to explain how to help the users of the garden orient themselves and understand the lay out through some different design theories.

There are three major overlapping design principles or schema for the design of healing gardens. These are: natural mapping (Norman); latent image elements (Lynch); and housing zones (Zeisel).

Naturally mapped environments and objects are those in which all the information needed for their use is designed into the object or environment itself. No instruction book, map or memory is needed to negotiate the environment or figure out how to make the object work. A naturally mapped environment is one with a

few clearly recognizable pathways that can be seen from anywhere in the setting, with an entrance and exit that everyone can see and understand as such, and with destinations that users of the environment can see easily. One that is not naturally mapped would have several forks in the pathways leading to destinations that are hidden around curves and bushes, would leave users in places with no clear way out and might even have paths that lead back on themselves without an indication of a way out.

The easiest way to use this theory is to try to create a “loop” in the garden that takes you through different planned zones. Sometimes when the site is narrow it is not possible to design a loop for examples rectangular terraces or along a building. Then it could be a good idea to plan a path along the site that ends up in a round plaza that ask the visitor to walk in a circle and then back through the same path. See pictures.

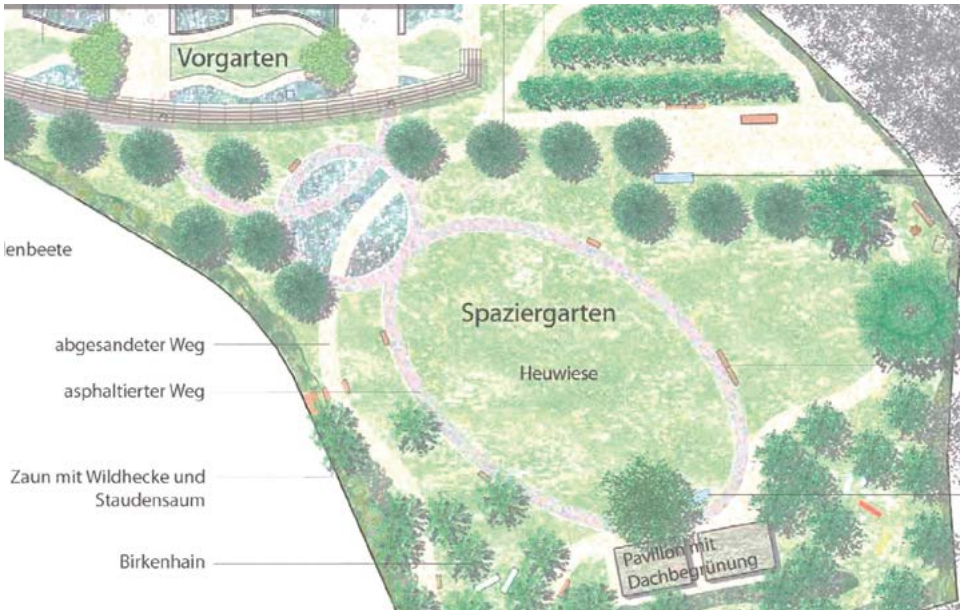


Image 33. Example orientation in therapeutic garden, Reuzzpark, Wädenswil, Switzerland. A “loop” leads to an orangerie and to a fruitgarden. Clearly passing through different zones and bringing the user back again. Before walking in the loop there is a small entrance garden along the building, indicating an intimate, small and safe garden.

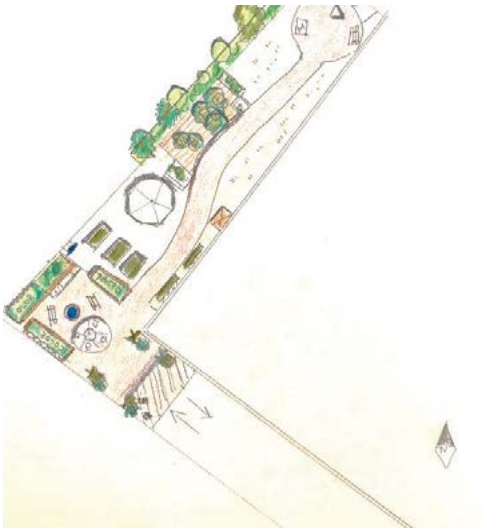


Image 34. Example orientation and way finding, terrace garden at Orxtaga residence, Bilbao, Spain. This site is too narrow to design a "loop", so the winding paths been designed to end in a small plaza with a statue and benches. The circular form helps one move around and find the way back. (Design by Jardines Terapéuticos Palmlöf)

Another example of natural mapped environment is to carefully think of associations to the therapy or activity that this area is designed for. If one area is going to be used for social activities and family meetings it is a good idea to show this with lot of chairs and tables, perhaps a typical barbecue or bar or whatever is usually seen in the plaza of the city in the culture you are designing for.

Another example to help separate different activity zones and therefore assist with orientation, e besides walls and fences, is to use specific color codes or building material for this zone.

Latent image elements, defined by Kevin Lynch in his landmark study and book Image of the City on how taxi cab drivers organize information about the cities in which they work, include:

Paths: The channels along which people move; the predominant element in their

image of their environment as they move through it.

Edges: Boundaries between two areas; either penetrable barriers or seams that join parts of a garden together. Edges like the fence around a garden define and hold together general areas.

Districts: Sections of a garden that someone can enter into; recognizable as having a unique identifying character. This could be a horticulture place with pots, raised beds, watering tap and fruit trees.

Nodes: Nodes can be junctions, the crossing of paths or places of intense activity.

Landmarks: Reference points singled out from a host of possibilities in a setting:

towers, domes, signs, trees, doorways; “increasingly relied upon as a journey becomes more and more familiar”.

These five elements appear to be central to the way the brain processes environmental place information. Research has shown that landmarks play a central role in how people organize mental information for wayfinding – to develop their cognitive maps. Outdoor environments such as a garden can be fully described using these descriptive elements. In the therapeutic garden it is typical to use trees that draw attention by special colors or leaves. Perhaps it is a good idea to use landmarks associated to the different activity/therapy area. For example, an area for relax training, introducing bamboo fence to shelter as this often is associated with the Asian tradition and relax techniques.

The last theory of Zeisel is applicable when there is a residence building adjacent to the therapeutic garden. Zeizel defined the following housing ‘zones’ as natural organizing principles for residential settings.

‘Outsider public’ i.e. a park where everyone is welcome.

‘Insider public’ i.e. a residential street where everyone is free to walk, but those who live there keep a close eye on strangers.

‘Front personal areas’ are front gardens and lawns that belong to someone but are physically accessible, if, for example, a ball should bounce into them.

‘Building edges’ (front) include porches and front stoops that clearly are off-bounds for strangers with no business there, but are accessible

‘Back stage areas’ are represented by back yards where children play and people gather.

The significant characteristic of this spatial typology is that successful residential plans include all these zones, either by space or by some other defining element such as a change of grade with a hedge or a pavement or a fence.

Use of signals and maps

Signs usually have one of the following objectives in the therapeutic garden:

1. Share knowledge about something.
2. Help interpret the space, indicating where things are located
3. Guide those with vision impairment

1.Share knowledge about something.

This could be as simple as letting us know that we are located in a therapeutic garden. The use and the will to go out in the garden is connected to the awareness of the user and the professionals that the garden exists. There are several ways to improve this awareness, such as:

Giving a name to the garden and create a sign with the name that is clearly visible.

Signs with photos of gardens/plants already inside the buildings

Let the garden “come inside” the building, putting branches and flowers inside

Make sure the garden is clearly visible from inside through windows.

Social and digital publishing

Another example of sharing knowledge is the by sharing a scientific or interesting fact with the visitors of the garden, for example: “Eating a bilberry is good for your health. Bilberry is one of the richest natural sources of anthocyanins; it lower blood glucose, it has anti-inflammatory effects, and lower oxidative stress” or “The pomegranate is a very old fruit, already mentioned in ancient Greece, where the fruit was a symbol of gods, such as Astarte, Demeter, Persephone, Aphrodite and Athena. The trees were planted on the tombs of heroes to make their lineage numerous, symbol of fertility because the fruit contains so many seeds”

2 Help interpret the space.

This second purpose usually is divided in to three parts: pictograms to help people find the toilet, meeting points, water taps. Sometimes it could be necessary to put up a map to help people orient themselves. Designing a map that is easy to interpret is very, very difficult. Therefore, it is a better idea to use natural mapping as mentioned above. An idea is to use maps that incorporate little pictures to facilitate understanding. See picture below:

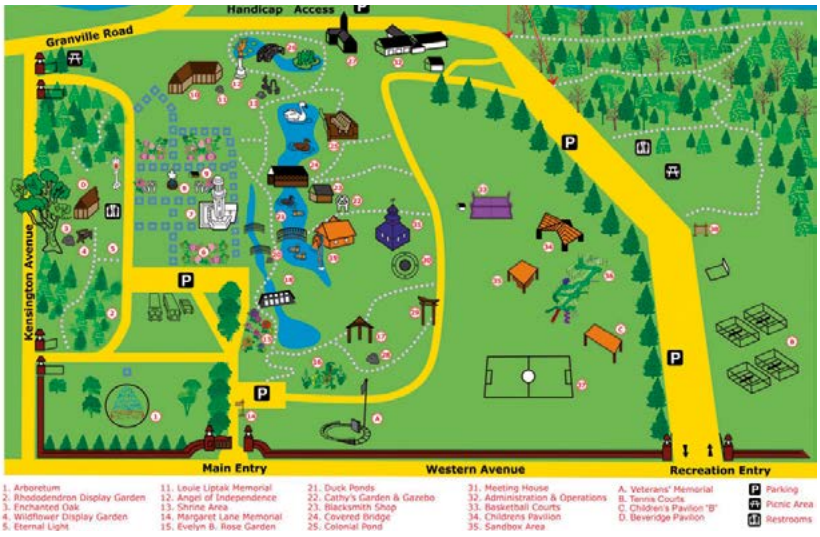


Image 35. If using a map to help persons with the orientation in the garden, try to include pictures to facilitate the interpretation.

Pictograms are very useful because they help users feel safe. There should be signs with arrows entering the garden to tell users where to find the most important places and then the same signs in the actual place. Keep it as simple as possible and only use the most important pictograms like: toilet, emergency, seating and sign with entrance/exit.

Image 36. Signs that everyone understands to indicate places in the garden of special importance.

If one decides to share more information about the garden such as explaining the purpose of a therapeutic garden or explaining the different modules, keep in mind to use a text that is easy to understand and read for everybody.

Examples and help to use easy language:

https://www.learningdisabilities.org.uk/learning-disabilities/a-to-z/e/easy-read

https://www.lecturafacil.net/es (Spain)

https://blogceapat.imserso.es/lectura-facil/ (Spain)

3. Vision impairment

Signage for persons with visual impairment is usually referred to as Braille text. It is always a good idea to include braille text if there are signs in the garden. For visually impaired persons, the pavements are very important. Through changes in textures and patterns they will be able to interpret where they are and for example, be aware of exits and entrances. To design for visual impairment is a well-designed therapeutic garden, giving special attention to contrasts, pavements, hand rails, clear pathway system and sensory stimulation.

4.7 Plants

After the visitors, plants are the second most important element in the therapeutic garden. It is a good idea to take time and carefully chose plants for the garden. The rule of 40 /60 percent hard surface / soft surfaces (planting) is usually a challenge, but even if it not possible to have a percentage of 60 percentage of plants on the garden surface there are ways of creating a feeling of exuberant green atmosphere in the garden. One recommendation, in addition to the following text, is to introduce plants on all levels: groundcover, creepers, climbers, and shrubs, small and middle sized trees. (English garden style)

Image 37. Ulla Molins garden, Höganäs, Sweden. Mixture of groundcover, shrubs, climbers and trees. Picture pinterest.

The actual plants, shrubs and trees used in the therapeutic garden will vary with the location of the garden and tastes and culture of the users. Still, choosing plants will consider different purposes in the design such as:

- Trees for shade
- Planting for activities, for example vegetables, fruit and herbs to be grown and harvested, bulbs and annuals can be plants to be picked and arranged etc.
- Trees and shrubs as landmarks to provide good orientation
- Plants with year-round interest so there is always something to enjoy.
- Plants for sensory stimulation
- Plants that attract wildlife and birdlife
- Plants that trigger memories (specially in care homes)

In the following chapter there will be suggestions of plants for different purposes, most of them for use in central Spain, but many of them can be used all over Europe. A recommendation is to check out the requirements for each plant and see if it is possible to use in the geographical location, and if it is not possible, try to find a similar plant adapted to the geographical area.

Attached to this text you will find annex with suggestions of plants from Mediterranean therapeutic gardens and a Scandinavian therapeutic garden.

As for all parks and garden designs, it is important to choose plants thinking of their maintenance and keeping environmental awareness in mind. Some considerations are: choosing plants with low water consumption, plants adapted to the area, and use resistant varieties, (not use unnecessary chemical pesticides). Sometimes it could be justifiable to use a variety in a therapeutic garden even though it does not pass the environmental exam. One example is the use of lawn in the Mediterranean countries to encourage people to walk on it without shoes or just sit and smell the freshly mown grass.

Last, but not least, there are plants that are NOT suitable for a therapeutic garden. The following type of plants are better to avoid*:

- Toxic plants
- Plants with thorns (exceptions are roses…)
- Common allergy inducing species (grass pollen, birch, cedar…)
- Very fast-growing invading plants (Mentha, ivy, cortadería and other gramineas…)
- Plants that cause problems to keep garden clean (trees with fruits and continues falling leaves/needles)
- Plants that are sensitive to pests and diseases

*Please consider security for each user and visitor of the garden.

Trees for shade

Most countries have a season when it might be necessary to find protection from the sun. One of the most natural and comfortable shade is from a tree, as it provides soft moving shade in the form of a canopy. Trees for shade are very often used along paths and to shade small sitting areas. There are some properties that should be considered when choosing the tree shade in the therapeutic garden:

- Use varieties that do not have a heavy leaf fall or fruits that can fall on the paving and cause slippery surfaces.
- Use varieties where the roots do not grow horizontally to search for water causing roots on the ground

level or even lifting pavements

- Use small or middle-sized trees, except where there is a park sized outdoor space. The small sized trees could be used in planters and in that way given extra length and altitude to create a bigger shade. (Bigger trees that one can prune is also a good alternative)

Examples of perennial trees for shade:

Pinus mugo Mops (uncinate) / Pinus mugo Pumilio/ Picea omorika/ Cupressus/ Arbutus Unedo, Ligustrum japonicum, Magnolia, Citrous (lemon and orange)/Laurus nobilis

Examples of deciduous trees for shade:

Catalpa bigonoides, Tilo, Prunus cerasifera 'Nigra', Robinia pseudoacacia 'Umbraculifera', Morus alba fruitless, Albizia julibrissin, Cercidiphyllum japonicum, sorbus comixta /sorbus/ Amelanchier arborea 'Robin Hill'./

Smaller varieties to be used when very small space or in a pot:

Acer japonés, Sumatra, Pterocarya rhoifolia, Pyrus salicifolia, Salix caprea 'Kilmarnock', Salix integra 'Hakuro-nishiki', Malus Everest

Plants for Activities and year-round interests

A therapeutic garden should present surprises to be discovered during the whole year. Most of these plants could be associated with some kind of therapeutic activity.

The most common activities to strengthen the relation between person and plant are the horticulture gardening activities. The selection of horticultural production is not emphasized in the design; instead, its significance lies more in the methodology and therefore treated very briefly in this chapter. In the next image you will find some examples of how to think when choosing plants for a year-round interest and with a connection to an activity/culture/tradition.

The most important thing to keep in mind is biodiversity, the more species present in the garden, the more activities and therapies choices.

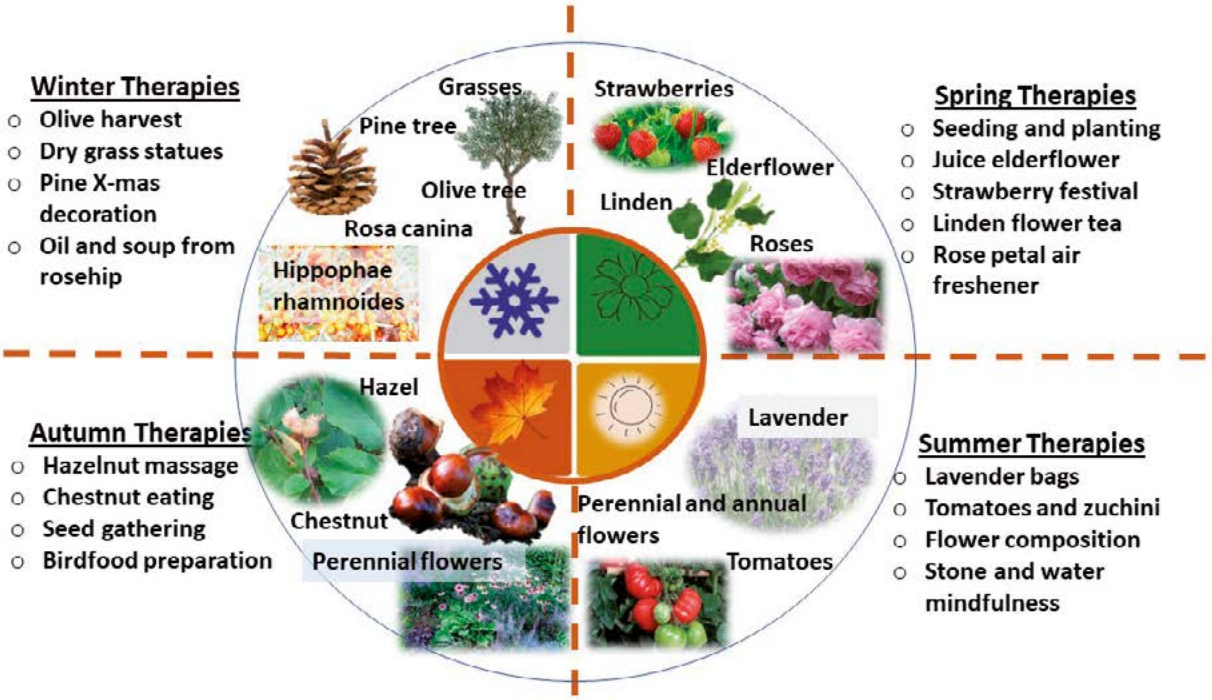


Image 38. Choosing plants for a year-round interest in the therapeutic garden. Poster by Jardines Terapéuticos Palmlöf)

Plants for sensory stimulation

Sensory stimulation needs to be addressed on a daily basis and year-round to support all five sensory realms. This work can help to compensate for sensory changes and losses, to maintain function and to provide a high level of engagement in the therapies. As seen in the chapter about modules, not only plants provide this sensory stimulation but the garden room as it is designed to be able to: observe wildlife, night sky, having a footbath, feeling cool change in the air, sounds from water and air, smelling humidity etc.

Almost all plants in the therapeutic garden provide some kind of sensory stimulation. The most popular are the use of aromatic plants and herbs (salvia, oregano, sage, rosemary…). Many of the aromatic plants are small and it is a good idea to plant them in raised beds.

Perennial flowers and plants not only give sensory stimulation but are also decorative and attract wildlife to the garden. It is usually easy to grow a combination of perennials that could give plenty of activities in the therapeutic garden. Many aromatic herbs belong to perennial plants and the taller ones can be easily mixed with flowers in the same flower bed.

Image 39. Flower bed with a mixture of aromatic herbs and perennial flower. This flower bed gives plenty of sensory stimulation and elements for therapy.

To choose sensory stimulation plants for the whole garden area, the following hints could be good to keep in mind:

Sound – To stimulate hearing, choose flora that makes noise when the wind passes through them, such as bamboo stems. Many seedpods make interesting sounds as well and the end of season leaves provide a fun, crunching sound under feet.

Touch – There is no shortage of plants that offer interesting textures, perfect for encouraging the sense of touch. From the baby-soft feel of a lamb's ear to the irresistible sensation of cool moss through the fingers or the brush of rough seedpods, it is possible to incorporate many different textures into the garden.

Smell – The sense of smell is extremely memorable and aromas easily find their place in our memory banks. Most sensory gardens are full of mingling aromas that entice a wide range of emotions. Highly aromatic plants, such as the sweet smelling gardenia, honeysuckle, herbs, and spices, provide ample opportunity for stimulation.

Sight – Adding visual interest to a sensory garden can be achieved by using plants with varying habits such as those that creep, climb, trail, bush, or stand upright. Incorporating plants with different bloom, leaf, bark, and stem colors provide visual appeal as well. Remember to add plenty of flowers with different blooming times. In this way the garden will always have a colored feature.

Taste – Edible fruits, herbs, and spices planted in a sensory garden allow visitors an opportunity to experience nature's bounty while enticing their taste buds. Vegetables can also arouse the taste buds.

It could be a good idea to gather interesting sensory plants at one place in the garden, where the professionals know they can find plants for their session in sensory stimulation. To lead visitors to explore on their own it is a good help to put up signs. Next there is a list of recommendations of sensory plants that will fit into pots and raised beds. The list indicates if the plant is present all year round or only summer /spring season.

Image 40. Plants for sensorial stimulation gathered in raised planters. Jardín Terapéutico Residencia Nª Sª Perpetua Socorrro, Madrid (foto Jardines Terapéuticos Palmlöf)

TEXTURE	
Salvia argentea	ϕ
Lunaria anua	P,V
Sempervivum	ϕ
Liatris spicata	P,V
Stachys byzantina	ϕ
Pennisetum	V,O
Geraniums	V
SMELL	
Thymus vulgaris	ϕ
Salvia nemorosa	ϕ
Lathyrus odoratus	V
Heliotropo arborescens	V,O
Salvia Greggii	ϕ
Geranios aromáticos	P, V
Sambucus nigra (shrub)	O

TASTE	
Basillicum	P,V
Fragaria	P,V
Caléndula	V
Menta citrata	ϕ
Anethum graveolens	V,O
Allium schoenoprasum	P,V O
Cilantro	ϕ
Ajenjo	ϕ
(Endivia, Ruccola)	V
COLOR	
Festuca glauca	ϕ
Zinnia columbus	V,O
Caléndula	V,O
Geraniums	P,V O
Dahlia	V,O

Syringa vulgaris (shrub)	p	**Iris (iridaceae)**	p
Cistus (shrub)	p	**Bellis**	p
Humulus lupus (climber)	V,O		
Lonicer caprifolium (climber)	P, V		

P= Spring

V= Summer

O= Fall

∞= All year round

Literature to help choose plants:

- **https://www.flowerpotman.com/sensory-gardens-at-home/sensory-garden-plants/**
- *Horatio's Garden Plant List (Annex)*
- *Gestlatningsprogram för utemiljön vid V`rd och Omsorg, Hjälpmedelsinstitutet (Annex)*
- *Jardines Terapéuticos, Madrid (Annex)*

Plants that trigger memories

Plants, especially flowers, are great for triggering memories. This can be especially rewarding for older care home residents, where popular favorites can bring a sense of the domestic garden. Familiar plants can have powerful associations for people living with dementia and memory loss. If possible, involve people in collecting memories and stories so you know what plants you need, for example by making collages of pictures of flowers and plants.

In a garden it can be as simple as including some containers of annual flowers that are old favorites e.g. marigolds, forget-me-nots, pansies and snapdragons. Try letting the grass grow longer between cuts so the daisies can flower and have a tub or two for planting favorite vegetables e.g. potatoes, runner beans or growing some fresh mint for making tea.

Designs can also include features intended to bring back memories. For example, an old garden shed with tools, a border of old-fashioned scented roses or old clay pots.

Horticulture garden

The best choice of vegetables, berries and fruit in a therapeutic garden are usually the common horticulture crops in the geographical area. It should be easy to grow and maintain. In many European countries, horticulture has become popular and there is a lot of information online:

- **https://www.thrive.org.uk/get-gardening?tags%5B%5D=255354**
- **https://www.planteaenverde.es/**

The main objective of a therapeutic horticulture garden is not production but to improve or maintain the capacities of the users.

Here an example of an easy year round horticulture crop (*graphics by Jardines Terapéuticos Palmlöf*):

Grows quickly				Consider buying plants		Easy and well known			
MONTH	Lettuce	Peas	Radishes	Strawberry	Tomato	Peppers	Zuchinni	Swiss chard	Fava beans
January	Y	X						Y	
February	Y	X	X				Y	Y	X
March	X	X	X				YX	X	X
April	X		X		*		YX	X	
May	X		X		*		X	X	
June	Y		X		*		X		
July	Y		X						
August	Y		X						
September	X		X					YX	
October	Y	X	X					Y	X
November	Y	X						Y	X
December	Y	X						X	
How many weeks to harvest?	4 to 6	6	3				12 to 16	8	12 to 15
Comments	Thin out every two weeks		Thin out every week		*Prune the second outbreak		12 to 16		
Cosecha									
Sembrado directo	X								
Sembrado interior	Y								
Trasplante	TR								
Compra									
Flores									

Colorfull easy to mantein					Aromatic herbs easy to germinate			
MONTH	Sun flower	Garden Nastrutium	Marigold	Geraniums	Oregano	Basil	Dill	Coriander
January	Y		Y					
February	Y	Y	YX					
March	YX	YX	YX	*	YX	YX	YX	YX
April	X_TR	X	X	*	YX	YX	YX	YX
May	X_TR	X	X		YX	YX	YX	YX
June	TR		X			YX	YX	
July			X					
August								
September			*					
October	*		*					
November								
December								
Comments	*Collect seeds		*Collect seeds	*Or prepare cuttings				
Harvest								
Direct sowing	X							
Seed bed inside	Y							
Transplantation	TR							
buying								
Flowers								

4.8 Furniture

Furniture design is also important. Many older adults benefit from having two arms on chairs for stability in standing up. Because of that, some designers feel there should be no benches (which typically preclude

having bilateral support) while others argue that not every older person needs bilateral support, and therefore benches are acceptable. This may depend on the functional abilities and preferences of your users. Being able to sit close enough for easy conversation is also important, so chairs at right angles to each other or face-to-face can promote conversation.

Also consider group size: sometimes people want to gather in larger groups, say for a meal or snack outside, and other times people want to be further away to have a more private conversation. Stable, lightweight furniture is important so it can be moved around the garden. Not every seat needs to be a chair or a bench. Having ledges to lean on or perch against, either the edge of a stable planter, or a handrail, or other solid surface, can provide a place to pause for a moment. Consider ledges at different heights, so children can also have a place to easily sit down. (Source: *Recommendation furniture's, Pioneer Network*).

Characteristics of good benches:

- Benches with arms and back support
- Benches with ergonomic design
- Made of materials that don´t get hot in the sun or cold in low temperatures- Wood is a good material because it is warmer than stone or metal and tends to dry faster after rain or dew

The same characteristics applies to chairs, only adding the importance of being light weighted. In the following pictures there are examples of recommended chairs and benches.

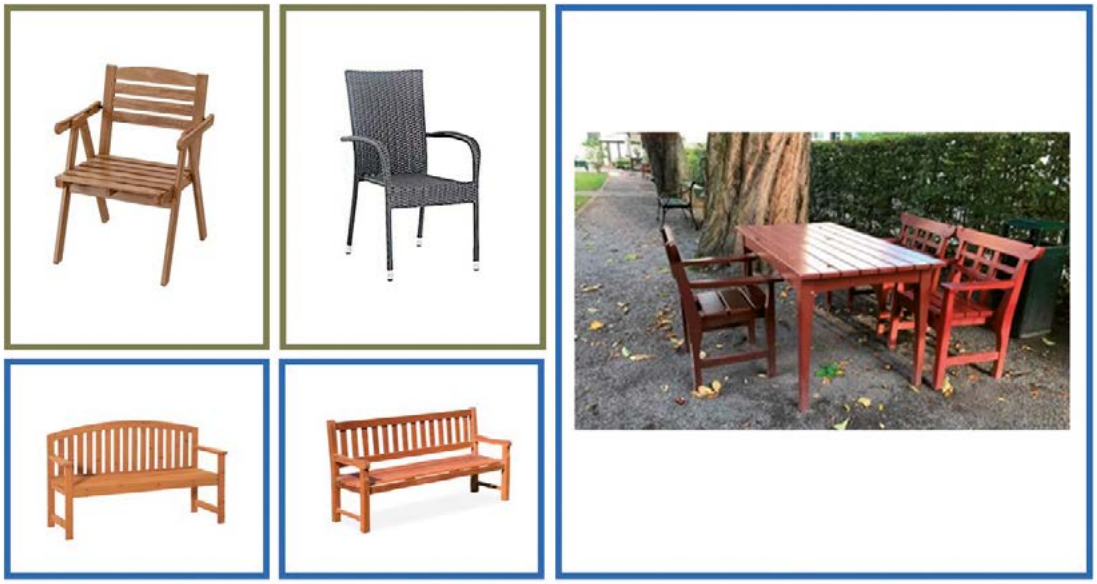


Image 41. Recommended chairs and benches for the therapeutic garden, comfortable and robust with arms and back support. (Photo Jardines Terapéuticos Palmlöf, the chairs and benches are commercial photos)

Some furniture in the therapeutic garden could be difficult to find in common hardware stores. Those are:

- Outdoor tables for working with potting and handicrafts that are stable and suitable for wheelchair users
- Raised beds
- Vertical planters
- Compost structures

In the garden having at least one robust table treated for outdoor climate and that can withstand use of handicraft activities such as working with plants and soil, hammering and cutting, is recommended. Most tables on the market are for dining and having coffee in the garden and are fragile with materials such as glass or fine wood structure. It is very recommendable for this table to have the measurements for wheelchair users, (70 cm between ground and board) otherwise it is a good idea that it is equipped with adjustable legs. One can also equip the table with adjustable floor levelling screws. See image 42.

Image 42. A robust table for therapy activities with tools. Adjustable flor levelling screw. (foto Jardines Terapéuticos Palmlöf)

Another interesting additional adaption of tables, if working a lot with horticulture therapy in the garden, is to use comfortable “working tables” for a standing position. See image 43.

Image 43. Planting table. To the right, a homemade planting table with place to store. Design by Lars Lallerstedt, Stockholm.

Raised beds and vertical planters

There are raised beds that only aim to elevate the plants so the users can touch and smell them more easily. In this case, the design is up to each implementer of the therapeutic garden. Exact height and material is not important for its function. But keep in mind that many plants grow to a considerable height, and it might be a good idea not to make these raised beds much higher than 50 cm.

For raised beds that are aimed to be used for horticulture where users are taking an active role, there is some advice to take into account:

- It should be possible to manage the raised beds from hard surface areas. A leveled surface is important for safety, and raised beds with pavement around are easier to manage and weeds do not invade as easily.
- A cultivation that can only be accessed from one side should not be more than 60 cm wide if you want to reach it comfortably
- If you sit in a wheelchair and work from the side, 60 cm is usually an adequate height for cultivation, while 80-90 cm is required if you want to stand comfortably.
- A cultivation table with space for the knees under the table may be most comfortable for seated work. The height may vary depending on the type of wheelchair. However, the growing depth of the table should not be less than 15-20 cm, unless the plant material is limited to drought-resistant rock garden

plants, which can cope with only a few centimeters of soil.

- For visually impaired, it is good to have contrasting surfaces and materials at corners and ends.
- It is a good idea to consider automatic irrigation while vegetables and flowers that grow in raised beds tends to be short of water quicker than if they are planted in the ground (southern Europe).

Today there are plenty of choices on the market to buy prefabricated raised beds. If it is possible, it is a good idea to try to look at it physically and confirm its measurements, stability and also materials. Metal horticulture tables can become very hot in the summer which dries out the soil and could be a burn danger.

One can also choose to build a raised bed, out of timber, wood planks or brick. The table below illustrates possible ideas and the measurements to consider when constructing your own raised bed.

Raised beds	Height	Width (one side)
STANDING	90-100 cm	50 cm
SITTING	69-75 cm	50 cm
WHEELCHAIR	61 cm	50 cm

Image 44. Raised beds with different appereance. All photos Jardines Terapéuticos, except the wheelchair adapted bed .

Another way of caring for plants without bending over is to use hanging or vertical structures. This does not refer to the nowadays so popular “green walls” with integrated irrigation, but structures for pots and planters

that facilitate people with disabilities to care for the plants. This can easily be done out of wooden planks and then use common pots or hanging pots. See image 45.

More ideas at: **https://www.thegardenglove.com/15-diy-vertical-vegetable-garden-ideas-projects/**

Image 45. Cultivating herbs, flowers or strawberries in hanging pots vertically makes it easy to reach for everyone.

4.9 Other components and items

The potential list of garden features is endless, so here we will just give some ideas of features that might be especially useful in a therapeutic garden such as water features, handrails, toilet, bird life, and outdoor games.

Water features

Water is a great attraction and gives life to the garden through movement or with living fish and frogs in a pond, or insects and birds searching for water. The sound of running water can also be very smooth and relaxing in the nature surroundings. But there are some warnings using water features in the therapeutic gardens. It must be made safe. Safe for falling and hygienically safe.

Creating a safe space to prevent falling can be done by constructing high borders or waist high grab rails that make it difficult to fall in, or by providing a metal mesh over the top, which, if well designed can be attractive.

Moving water that is well maintained (at least one cleaning every three months), should not be a hazard to health. There are special filters that could be installed that purify the water, if there are special concerns, like in hospital gardens. In still water it is much more complicated to guarantee no bacterial growth and is therefore not recommended. This doesn´t mean that a pond with fish can be installed, but the installation

for water circulation and cleaning must be taken seriously.

There should be a sign on all fountains, even though it is drink water that is used, that indicates it is NOT recommended to drink.

Some other aspects that are important when choosing fountain or water features is that the water doesn´t splash to the pavement around and make it slippery and a potential fall danger.

The resulting sound of the fountain is also of importance and not necessarily pleasant. A good water feature should be soothing to listen to. Water falling along a wall or water in a waist high trickling fountain usually provides a comforting sound.

Handrails

In most countries the law imposes handrails when there is a slope with an inclination bigger than 6-10 %. But for some users in the therapeutic garden, it could be of great help to have a single handrail also when the ground is flat, for example for users with visual impairments and poor balance. Many older adults may also appreciate having a handrail close by, giving them security in their daily strolling tour outside.

The handrail should be at 0,90-1,05 m from the ground and the rail should be comfortable to grab. Usually, it is easier to grab a round rail than squared big wooden rails. Handrails should be continuous and with a recommended diameter between 40-50 mm.

The most common material is aluminum, but it has the inconvenience to become very hot in the sun. It is preferable to use iron or some other metal and paint it with metal paint of good quality, in a color that will not become excessively hot in the sun. (light grey, moss green, beige).

Toilet

Most gardens have a building close to the garden and no extra “garden toilet” is needed. If the distance is too large and the users are not able to plan their need of going to the toilet, the proximity to the toilet will give people the confidence to go outside without worrying.

The installation of a toilet is a nuisance, but it could be a factor of high importance to the USE or NOT USE of

the garden.

Bird and insect life

It might not always be possible to keep animals in the garden, even though it is a wonderful way for users to care for hens or rabbits. Most places do not have professionals that can guard and make sure the animals are taken care of. A substitute for pets could be to encourage birds and insects to come into the garden. Seeing and hearing birds can be therapeutic and provide familiar sounds that users find calming. Apart from using plants and shrubs that attract butterflies and birds, this can be done with water baths for the birds, little food tables, insect homes and bird houses.

Image 46. Apart from plants, we can encourage wildlife and biodiversity in the garden by adding water, insects' home and bird feeders. Photos by Jardines Terapeuticos.

Games

In the functional zoning chapter, we mentioned a zone for physical activity and how to implement special equipment to strengthen muscles and coordination. Sometimes being in the garden is just a question of pleasure and fun or a group training. The most important aim is "to be outside". A typical outdoor game can be an interesting complement. Some examples include:

- boules
- La rana (skee ball)
- Crocket
- Kubb (swedish skittles game)
- Mini golf
- Throw rings

If the users wish to enjoy games in the garden it is important to know the size needed and also what kind of hard surfaces are desired. Except for boules, most games are temporary and the surface can be used for other activities as well.

5. Assessing the outdoor environment

In the research paper of Naomi Sachs, where she explores the possibility of creating a Toolkit to evaluate therapeutic gardens at health care facilities (HCFs) that provide access to nature, which not always meet the needs of the users. In some cases, so-called "therapeutic gardens" may even be counter-productive: Outdoor spaces designated as 'healing' often lack such basic necessities as shade, comfortable seating, places for privacy or enough greenery to even be perceived as a garden. Components that have become popular…are incorporated without consideration for their appropriateness to the site, understanding of their meaning, or potential users' ability and energy levels (Cooper Marcus & Sachs, 2014).

Very few rigorous health care facilities' (HCF) garden evaluations had been conducted, and only nine had been identified in publications. The methodology and findings from these studies vary significantly depending on the evaluator, instruments used, site, budget, and stakeholders involved. When no single study is strong enough to stand on its own, researchers and designers must rely on what Ulrich and colleagues refer to as "reliable patterns of findings," where findings from multiple studies converge to demonstrate the strength of the evidence. This approach is not optimal for evidence-based design. Nevertheless, information from HCF garden evaluations has been extremely useful in filling knowledge gaps about why and how people use a particular outdoor space, how these spaces influence users' physical and psychological wellbeing, and how the spaces affect users' satisfaction with the facility and the care they receive. Evaluations have also provided answers to specific design questions, which have in turn informed design guidelines.

Here we have chosen to comment three of these design guidelines that have been put together as assessments. But we recommend using them as a help or as a check list. Each Healing Gardens has its own requirements depending on the users. Of the following three assessments, the two first are intended to be used in hospital and care environments and the last is special for old care homes and dementia environments.

The first assessment is called "Garden Assessment tool for evaluators". It was developed by Naomi Sachs in 2017, and is also referred to as "The healthcare garden evaluation toolkit: a standardized method for evaluation, research, and design of gardens in healthcare facilities".

Naomi Sachs divides the assessment in five sub chapters that analyze the garden in terms of: Access and visibility; Sense of being away; Nature engagements; Walk and activities; Places to rest.

This assessment is the most advanced of the three and it is helpful to know about landscaping and gardening to extract the full essence.

Author: Naomi A. Sachs, University of Maryland, College Park | UMD, UMCP, University of Maryland College Park · Department of Plant Science and Landscape Architecture

The assessment can be downloaded in the following link:

https://www.researchgate.net/profile/Naomi-Sachs/publication/349466416_The_Healthcare_Garden_Evaluation_Toolkit_A_Standardized_Method_for_Evaluation_Research_and_Design_of_Gardens_in_Healthcare_Facilities_Doctoral_dissertation/links/6031665792851c4ed5878b9b/The-Healthcare-Garden-Evaluation-Toolkit-A-Standardized-Method-for-Evaluation-Research-and-Design-of-Gardens-in-

Healthcare-Facilities-Doctoral-dissertation.pdf

The second assessment is a list of characteristics and elements (plants, furniture, shadows, etc.) that should be present in a therapeutic garden. The person doing the evaluation has to score from 1 to 5 and so judge if this element is present and being successful (completely fulfilling the intention) or present and not working well or absent. This assessment is very general but useful as a tool also during the design of the garden.

The two authors are very experienced and have written many books about therapeutic gardens. The name of the assessment is: COOPER MARCUS AND BARNES THERAPEUTIC GARDEN AUDIT TOOL (CMB AUDIT).

Authors:

Clare Cooper Marcus, Professor Emerita of Architecture and Landscape Architecture & Environmental Planning

Marni Barnes, LCSW ASLA APATH

The assessment can be downloaded in the following link:

https://www.researchgate.net/profile/Naomi-Sachs/publication/349466416_The_Healthcare_Garden_Evaluation_Toolkit_A_Standardized_Method_for_Evaluation_Research_and_Design_of_Gardens_in_Healthcare_Facilities_Doctoral_dissertation/links/6031665792851c4ed5878b9b/The-Healthcare-Garden-Evaluation-Toolkit-A-Standardized-Method-for-Evaluation-Research-and-Design-of-Gardens-in-Healthcare-Facilities-Doctoral-dissertation.pdf

The third assessment was created by Susanne Rodiek. She has been researching outdoor quality since the early 90's and has been promoting for increasing outdoor usage in residential facilities. Her Senior Outdoor Survey is a very easy and useful tool for anyone. Questions can be answered just by observing and walking around in the garden. The answers are rated from 1 to 7, based on the climate, items, function level of residents, considering what you could expect in this kind of setting.

Author: Susanne Rodiek, Texas A&M University | TAMU · Center for Health Systems & Design Ph.D.

The assessment can be downloaded in the following link:

https://www.accesstonature.org/SOS-ENGLISH.pdf

6. Resources and literature

recommendation

Books:

- Cooper Marcus, C., & Barnes, M. (1999). Healing Gardens: Therapeutic Benefits and Design Recommendations.
- Bengtsson, P., & Grahn, P. (2014). Outdoor Environments in Healthcare Settings.
- Souter Brown, G. (2015). Landscape and Urban Design for Health and Well-Being: Using Healing, Sensory and Therapeutic Gardens.
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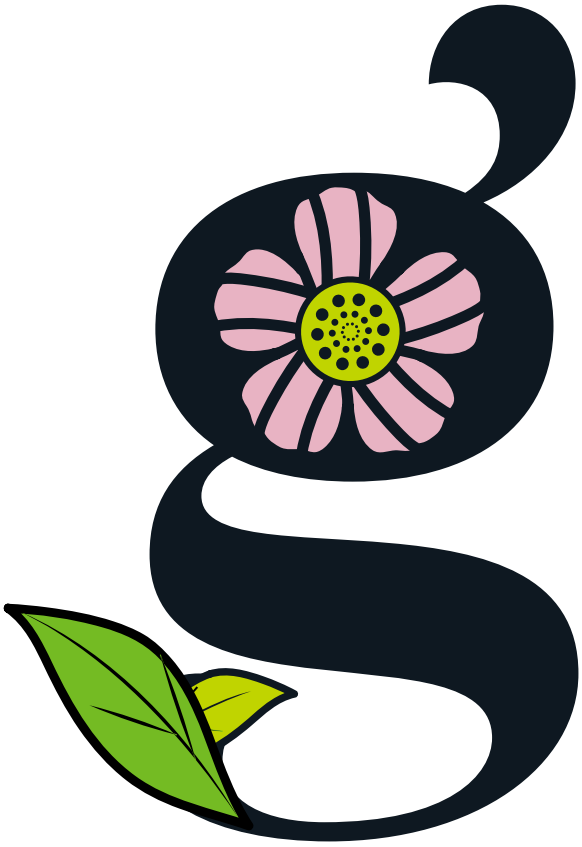

PALMLÖF JARDINES

Diakonie-Klinik Mosbach

THEOTOKOS FOUNDATION

FUNDACIÓN intras

HEALING gardener CURRICULUM

Co-funded by the European Union