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PRINCIPLES FOR DESIGNING A MODERN ISLAMIC GARDEN
HOW CAN NEW DESIGN CONTAIN THE MEMORY OF THE PAST?

BY

FAEZEH ASHTIANI

THESIS

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Advisers:

Professor D. Fairchild Ruggles
Professor Emeritus Robert B. Riley
Assistant Clinical Professor Jessica Henson

ABSTRACT

Islamic gardens were historically gardens designed and built by Muslims for Muslim patrons, in what is traditionally known as the world of Islam. Today due to the vast immigration of people made possible by the advancement of transportation methods, Muslims have dispersed their religion and culture to all parts of the world and, as a result, Muslim and non-Muslim clients are commissioning designers to build modern Islamic gardens inside or outside of Islamic countries. For this, designers need guidelines that gather underlying design principles of Islamic gardens cohesively in one place. Therefore this thesis approaches the “sense of Islam” by analyzing Islamic gardens based on formal elements such as pathways, buildings and forms of water in the garden, and abstracting design principles from them in order to illustrate the elements that comprise an Islamic garden. This will help landscape architects design modern gardens that have characteristics that echo historic Islamic landscapes and thus evoke a “sense of Islam.” These design principles will use traditional forms to inspire contemporary designers. The proposed result is a design booklet of Islamic design concepts, visual strategies, forms, textures, and ornament for an audience of landscape architecture firms and contemporary designers.

To Mom, Dad and Tina, for all their love and support from 10589 kilometers away...

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Chapter 1: Introduction

From early in human history people have built the landscape to reflect their cultural beliefs, requirements, demands and to respond to the environment that they inhabit and that environment's resources. Gardens are one of these forms of built landscapes. Over time, people have formally developed gardens according to specific historical period conditions and environmental surroundings. For these reasons, Islamic landscapes reflect the resources and cultural beliefs of the community that inhabits them. This is true historically, and it continues to be true in the 21st century.

There are 1.6 billion Muslims living in the world today.¹ A Muslim is a person who has Islamic beliefs and faith and practices Islamic rules in life, but one can also be “culturally Muslim” without completely adhering to those beliefs and rules. Additionally, one can live *like* a Muslim - consume Middle Eastern or Persian food, for example, wear Islamic style of clothes and use or design Islamic-style architecture - while practicing a different faith. This is because, in addition to its formative role in the Middle East, North Africa, and western Asia, Islam had an important role in the development of the culture of many countries that are not considered to be part of the Islamic world. Although the first Muslim communities were formed around religious beliefs, the culture of these communities has been changing over time because of the changes happening in the global community. Because developments in transportation have made large scale immigration easier and faster in the past century, there are millions of Muslims that live in Europe and North America today in addition to the Muslims that live in the Islamic countries.² In Europe and North America, unlike in the Middle East, Muslims often form minority communities of immigrants, or second-generation citizens.

Immigrants with similar ethnic backgrounds often gather together as communities that are formed around the idea of a common identity in their new places of residence. They do this because they share common characteristics, beliefs, lifestyles and cultural customs. Some even form tightly knit ethnic enclaves that try to recreate an environment

1 <http://www.pewresearch.org/fact-tank/2013/06/07/worlds-muslim-population-more-widespread-than-you-might-think/> (visited Feb 22, 2014)

2 Malise Ruthven and Azim Nanji. *Historical Atlas of Islam* (Cambridge, Mass.: Harvard University Press, 2004).

similar to what they had in their homeland. Chinatowns are a good example of this. These familiar settings or communities serve different purposes such as protecting the habits, culture, and language of an immigrant group, introducing their architecture for enrichment of the new place, finding comfort in the new situation or to provide a transitional atmosphere for immigrants easing themselves into the new culture.

However, art and culture are not static: they evolve when they are brought to a new place in the world with the people who migrate. The natural and cultural resources that are already in the new place play a key role in this transformation. The built environment, which is a highly visible manifestation of the art and culture of a community, is especially affected since the community has to approach the requirements of the new natural and cultural systems of the new context when they begin to build buildings and landscapes there. Although new design characteristics may emerge in the new built environment of the culturally defined community, in many cases garden historians can trace the origins of those supposedly new forms far back to the homeland of the immigrant community. Even though the forms change, they often still retain important characteristics of the traditional forms. This is because in the original context, there were intentions and purposes that were related to the natural and cultural context of that place that produced the naturally and culturally appropriate forms. As the forms that arose as a result of that were repeated over time, they gained symbolic meaning for that community. Because the meaning is so powerful, the characteristics of that form can still carry meaning and be a reminder of a common memory when the community has moved to a new place, although the exact same purposes no longer exist. The new forms that had first developed in the homeland can reflect the change in the culture that occurred due to new technology, modernism, globalism and interaction with new people, as well as other changes such as living under different governing regimes, encountering different beliefs and values, living according to a different economy and lifestyle, all the while still echoing the memories of the past.

For example, the garden of the Taj Mahal, a monument of Mughal architecture [1632-1643, Agra, India], incorporates a four-part garden plan or *chahar bagh*, that was inspired by Persian gardens. The four-part plan is a way of organizing the landscape and providing a sensible means of irrigation, in which axial walkways, usually with water running in the middle, intersect in the center of the garden, dividing it into four beds. Babur (1483 – 1530), a Muslim

prince and the first Mughal emperor, was very fond of building gardens and one of his first acts was to build a large garden, inspired by Persian's *chahar bagh* on the banks of the Yamuna River in Agra.³ Although this garden and the ones built by subsequent Mughal emperors continued to have this strong formal characteristic that could be traced back to Persian precedents, the land forms were also adapted to the regional culture, history and geography of the new place. For example, the trees that were planted in a row along the pathways of the gardens in more arid climates such as Central Iran were tall and dense to cast a shadow for the person walking along the walkways. However, in Agra, which is in a more humid climate, although the trees would still appear along the pathways of the *chahar bagh*, they would be planted more sparsely and selected from species that were available or native to the new place.⁴

These adaptations occurred because of the Emperor Babur's enormous interest in landscape. His close observations about these gardens are documented in his autobiography, *The Babur Nama* (first translated into English in 1826 with the title, "*Memoirs of Zahir-Ed-Din Muhammed Baber, emperor of Hindustan*" by John Leyden and William Erskine.). Babur used the gardens of his own past as a resource for his new garden design in India. But in the present, when designers often build new places to evoke the memory of another place or time, the gardens often become a pastiche of old elements. Pastiche occurs when parts of older examples of buildings, art, sculpture, and landscape are imitated and combined into one to build a new place, instead of transforming them into a new meaningful form that carries the old memory. (Figure 1)

3 Elizabeth Mann, and Alan Witschonke, *Taj Mahal* (New York: Mikaya Press, 2008); Elizabeth B. Moynihan, *The Moonlight Garden: New Discoveries at the Taj Mahal* (Washington, D.C.: Arthur M. Sackler Gallery, Smithsonian Institution and the University of Washington Press, Seattle and London, 2000).

4 The average relative humidity is 55.8% in Agra and 32% in Kerman, Central Iran (<http://www.agra.climatemps.com/humidity.php> & <http://www.kerman.climatemps.com/humidity.php> visited on April 5, 2015)



Figure 1: *Piazza d'Italia*, Charles Moore & Urban Innovations Group (with Perez Associates), New Orleans, (1975-77)

The Islamic garden begins with Islam itself. Islam began in 622 in a town called Medina in the Arabian Peninsula from where it spread, reaching westward to Morocco and the Iberian Peninsula and eastward to central Asia by the early 8th century. Those lands correspond to where the following countries are today: Afghanistan, Pakistan, Uzbekistan, Turkmenistan, Iran, Azerbaijan, Turkey, Iraq, Syria, Jordan, Israel, Palestine, Lebanon, Saudi Arabia, Yemen, Oman, United Arab Emirates, Qatar, Bahrain, Egypt, Libya, Tunisia, Algeria, Morocco and Spain. This vast territory, traditionally known as the Islamic world, varies in climate from hot and arid to tropical humid (Figures 2 & 3).⁵ Great Islamic gardens have been created in these regions since the beginning of Islam and exist from India all the way to northern Africa and southern Spain.

⁵ D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008).

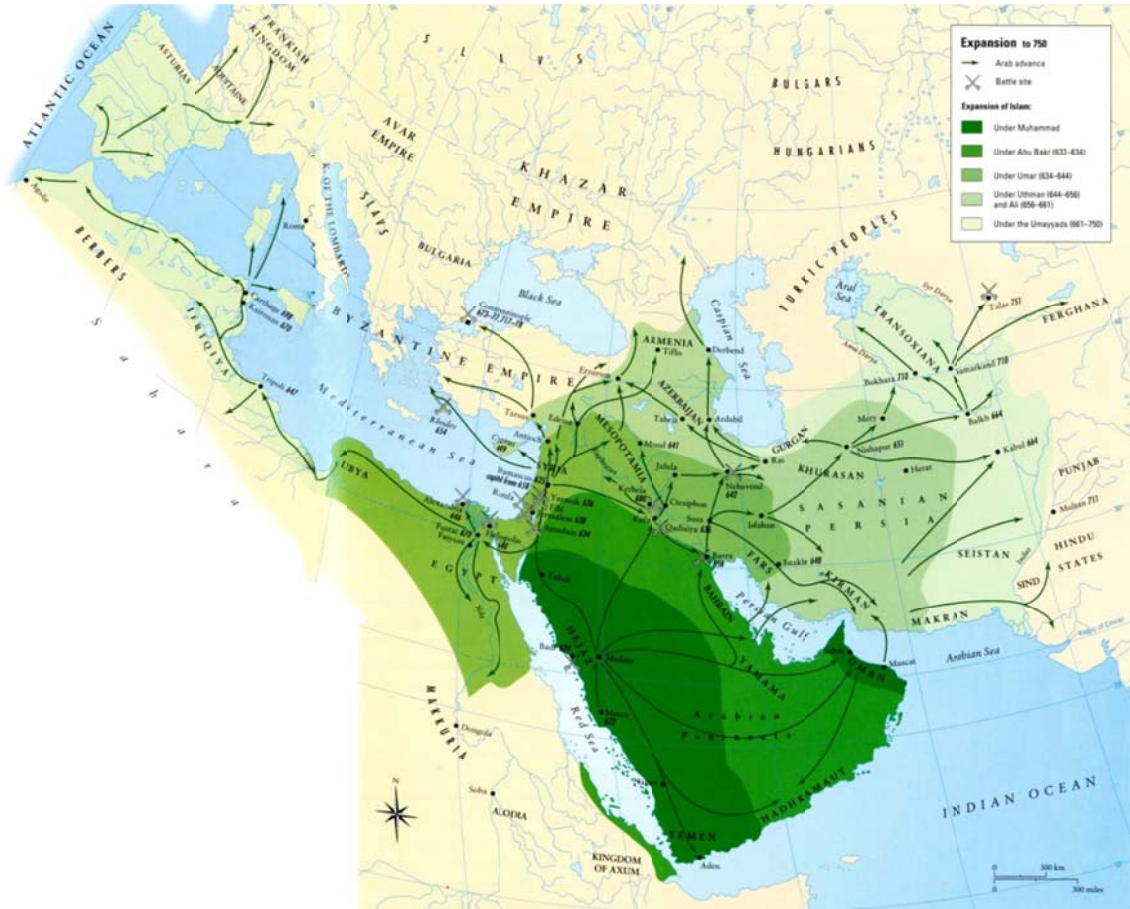


Figure 2 : Expansion of Islam until 750



Figure 3: Climate Map of the Islamic world

Today Islam continues to expand, not as a result of Muslim military conquests, as in the first centuries, but as a result of Muslim immigrants who bring their religion with them to every place in the world that they travel or resettle. In this expanded world context, Muslim (as well as non-Muslim) clients are commissioning Islamic-style gardens in Europe and North America, and designers internationally are getting commissions to build Islamic gardens in many places outside what used to be the Islamic world. An example for this is the new Aga Khan Museum garden in Toronto, Canada which will be discussed in more detail in the literature review section.

In light of this new demand for modern Islamic gardens, modern design firms need explicit guidelines for design that can convey a sense of Islamic culture and principles. Such a guideline does not currently exist in one comprehensive resource. Additionally, the newly built gardens that carry the term “Islamic” do not specify what precisely it is about their composition that earns that name. The term Islamic not only refers to communities that are predominantly Muslim by faith, but also refers to communities that have an overarching Islamic *culture* that guides social life even for individuals with other religious beliefs such as Judaism or Hinduism. Thus, some design characteristics in gardens, such as the *chahar bagh* (four-part plan) that are known as classical Islamic forms, have been used in the designs of some non-Muslim patrons for gardens made for non-Muslim audiences. The original religious and cultural meaning has disappeared from the garden designs, yet the forms continue.

An example of this is the 1987 Enid Haupt Garden, a four-acre garden built between the Smithsonian Arts and Industries Building and the Freer Gallery of the Art and over the Arthur M. Sackler Gallery of Asian Art and the National Museum of African Art in Washington, DC (Figure 4). In designing the garden, the architect, Jean Paul Carlihan, wanted to evoke the theme of the art in the underground museum galleries. He used a circular shape for the African Motif and a Diamond Shape for the Asian, but he moved the themed gardens away from their partner gallery and integrated them into one site.

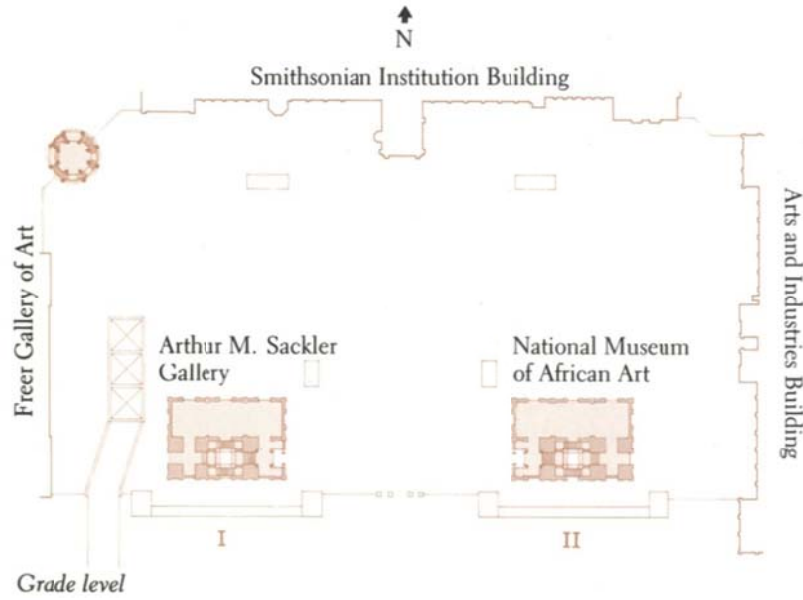


Figure 4: The location of the Galleries in the Site

In the part of the Enid Haupt garden called the Fountains Garden, an octagonal fountain is at the center of a modern *chahar bagh*. In this *chahar bagh* the four surrounding beds are raised above the pavement, as opposed to being sunken which is more typical in historic Islamic gardens. The source of inspiration for the central fountain and small water channels that run along the stone that forms the back of the benches are the Alhambra gardens in Granada, Spain, where bubbling fountains and canals of running water are a prominent feature. On the north side of the garden there is another fountain that is vertical and carved in granite. This fountain was inspired by the shape of an Indian *chadar* – a “water chute” or small waterfall that would ripple down a stone incline.⁶ (Figures 5 & 6)

⁶ D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008); Edwards Park, and Jean Paul Carlhian, *A New View from the Castle: the Smithsonian Institution's quadrangle: Arthur M. Sackler Gallery, National Museum of African Art, S. Dillon Ripley Center, Enid A. Haupt Garden* (Washington, D.C.: Smithsonian Institution Press, 1987).



Figure 5: The Fountains Garden with the raised beds and bubbling water and a vertical water sculpture on the north

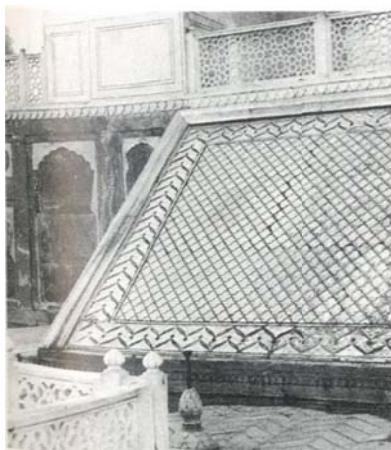


Figure 6: A *Chadar*

This brings us to the question of whether the term Islamic is used for a garden to reflect a formal style of design, or whether it reflects cultural beliefs and practices? Regarding the case of non-Muslim patrons borrowing the

Islamic forms, D. Fairchild Ruggles asks “what occurred (and occurs) in the relationship between form and meaning when highly significant forms, such as the *chahar bagh*, were assimilated into cultures that did not embrace their original meanings?”⁷

Two methods can help us to find and explain the design principles of a new Islamic garden in the 21st century in any place in the world. One is to design a garden based on the philosophy, understanding and practice of Islam and Muslim experience of life and religion in the 21st century. For this, one should study the politics, social dynamics, religion and lifestyles of Muslims in historical moments and places to find out why those factors produced the classical forms of Islamic architecture and landscape architecture. For continuing on this path and gathering a comprehensive understanding of “Islamic,” one should decide whether or not there is such a thing as “universal Muslim.” Is the meaning of the term “Islamic” the same in Iran, Egypt and Morocco? Or would it be better to look at the Islamic world in terms of “regional Islamism”? By investigating these questions and asking what is the meaning and philosophy of Islam in the 21st century, the researcher might be able to determine the basic parts of a design model or “paradigm” from which it could be possible to realize an actual design. Although this research might yield productive results, it is out of the scope of this thesis and could be a possibility of future work.

A second way to determine design principles for a new Islamic garden is to base it purely on the formal elements of the historic Islamic gardens. Form in itself can be a very powerful means of transporting memory and producing spaces that suggest familiar experiences, whether or not it carries meaning with it. The *chahar bagh* provides an example: a classic form in Islamic gardens that is understood to have two meanings. One was reflecting the four rivers of Paradise as mentioned in *Quran* and the other was representing the agricultural practices of its context. Thus there is a specifically Muslim meaning but also one that existed in pre-Islamic Mediterranean and Persian landscapes such as Pasargadae in Iran, the Achaemenid capital of Cyrus the Great (599 – 530 B.C.E)⁸

7 D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008), 131 – 132.

8 Mehdi Khansari, and M. Reza Moghtader, and Minouch Yavari, *The Persian Garden: Echoes of Paradise* (Washington, DC: Mage Publishers, 1998).



Figure 7 : Remains of the garden in Pasargadae

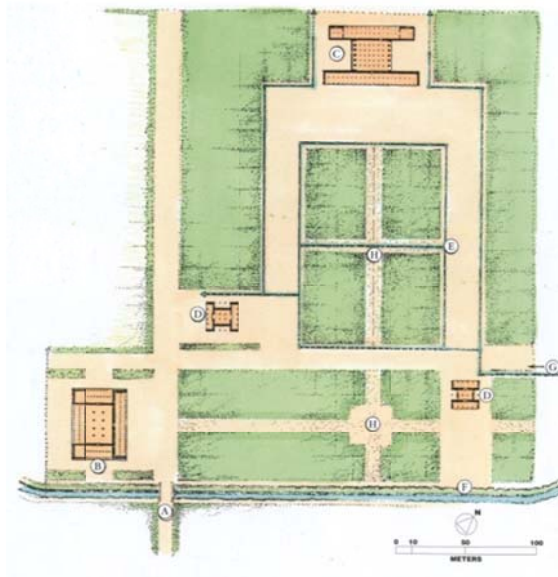


Figure 8: Plan of Pasargadae

In the Achaemenid period the *chahar bagh* could not have represented the four rivers of paradise, since Islam was not revealed until the seventh century, but the four-part plan could have been associated with methods of organizing the earth and agricultural practices since it followed a similar irrigation logic that can still be seen today in

agricultural fields of sunken plant beds that get their water supply from water channels.⁹ This example shows how a strong form can continue to exist in a region and acquire different meanings for its users at different times.

As stated above, the production of architecture and landscape forms is affected by factors that range from cultural values to climatic conditions and available technology. The corresponding forms in the built environments to these factors may produce meaning after being repeated over time. When these factors change, a new meaning can be produced. A form can also become familiar in the common memory of a society and can remind people of the older meanings it once had, even if those meanings are no longer current. As a familiar experience, it can therefore be used to express a sense of continuity. This not only happens with the change of time, but it can also accrue with the change of geographical place.

With Muslims moving from traditionally Islamic societies to Europe and North America, where they suddenly become a minority population, the forms of the Islamic gardens can be utilized as a strong medium for transporting the familiar experiences of the past place to a new place. These new forms, which have to adapt to this new time and place, then produce new meaning. This shift can occur in the Islamic world or in non-Muslim countries, in the contemporary time, without relinquishing the memory of the past.

This method creates a link between one place (the place of origin) and another (the new place of residence), but it has the danger of producing places that are a form of pastiche, do not possess much value, and do not fit into the new environment. In pastiche, nothing new is created; only the appearance of newness. The reproduction is worse than the original form and is therefore a decline as supposed to the invention of a new form. To explain this, we can consider the Fin Garden, a historic garden and palace in Kashan (Iran) built in the 17th century and restored in the 19th century. (Figure 9)

⁹ D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008).

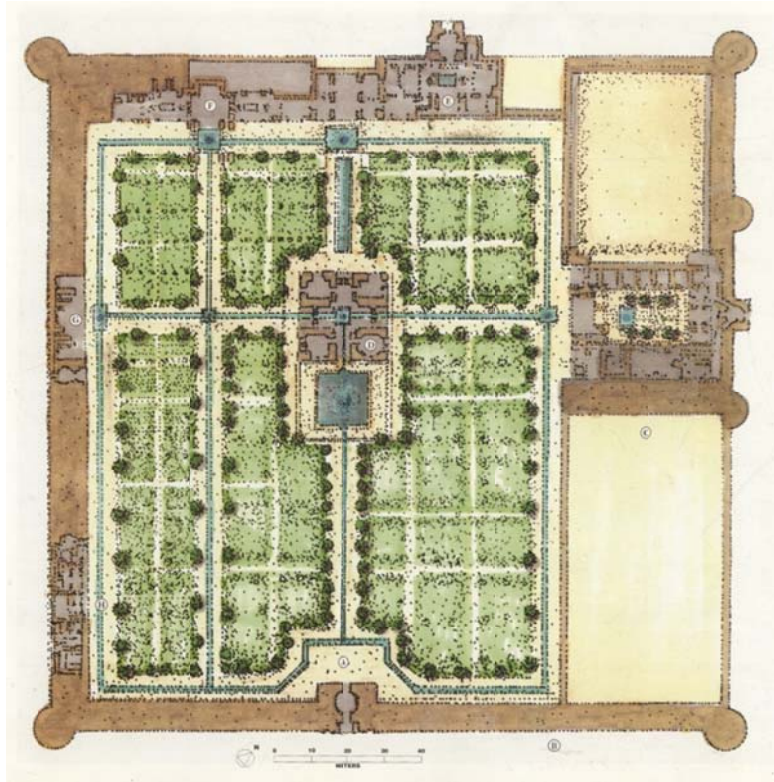


Figure 9: Plan of Fin Garden

The plan of the Fin Garden is a kind of elaborated *chahar bagh* with a pavilion at the intersection of the main garden pathways. Water fills the middle of the pathways, running in channels that are decorated with turquoise blue tile. Tall trees are planted along its pathways. The tall trees and abundance of water are in clear contrast to the Fin Garden's hot, arid context and, therefore, they offer the visitor a pleasurable experience. This is one of the most beautiful Persian gardens and is well known by the common Persians. The site could be a good inspiration for designers if the inspirations were based on deep investigations and reinvention, but to simply repeat the Fin Garden anywhere else would create an inferior copy, because the original is always more innovative, more meaningful, and, therefore, of a higher cultural value. To avoid such pastiche, it would be useful to have a set of design principles to educate contemporary landscape architects in how to design new Islamic gardens based on the deep study and investigation of available texts and historic gardens. Hopefully, if they understand Islamic garden design thoroughly, they will reinvent rather than simply copy its forms.

This thesis approaches the “sense of Islam” by analyzing Islamic gardens based on formal elements such as pathways, buildings and forms of water in the garden, and abstracting design principles from them in order to illustrate the elements that comprise an Islamic garden. This will help landscape architects design modern gardens that also have characteristics that echo historic Islamic landscapes. These design principles will use traditional forms to inspire contemporary designers. The proposed result is a design booklet of Islamic design concepts, visual strategies, forms, textures, and ornament for an audience of landscape architecture firms and contemporary designers.

Chapter 2: Literature review

Islamic gardens have been studied by scholars interested in their historical development. Key recourses for the history of Islamic gardens are:

1. Ruggles, D. Fairchild. *Islamic Gardens and Landscapes*. Philadelphia: University of Pennsylvania Press, 2008.
2. Brookes, John. *Gardens of Paradise: the History and Design of the Great Islamic Gardens*. London: Weidenfeld & Nicolsin, 1987.
3. Petruccioli, Attilio, ed.. *Gardens in the Time of the Great Muslim Empires: Theory and Design*. Leiden: E.J. Brill, 1997.
4. Shahcheraghi, Azadeh. *Paradigms of Paradise: Recognition and Re-Creation of the Persian Garden*. Tehran: Jahad Daneshgahi, 2012.
5. Ruggles, D. Fairchild. *Gardens, Landscape, and Vision in the Palaces of Islamic Spain*. University Park, Pa.: Pennsylvania State University Press, 2000.
6. Naeima, Qulam-Reza,. *Baq-hayi Iran*. Tehran: Payam, 1385. (*Gardens of Iran*. 2007.)
7. Memarian, Qulam-Hussain. *Memari-i Iran-i*. Tehran: Soroush-i Danish, 1387. (*Iranian Architecture*, 2008)
8. Khansari, Mehdi, and M. Reza Moghtader, and Yavari, Minouch. *The Persian Garden: Echoes of Paradise*. Washington, DC: Mage Publishers, 1998.
9. Koch, Ebba. *The Complete Taj Mahal: and the Riverfront Gardens of Agra*. London: Thames & Hudson, 2006.
10. Wescoat, James L., and Joachim Bulmahn, eds.. *Mughal Gardens: Sources, Places, Representations, and Prospects*. Washington, D.C.: Dumbarton Oaks Research Library and Collection, 1996.

Most of these resources focus on the gardens in one region such as Iran, India, and Spain, resulting in a discussion of only one sub-category of the Islamic garden like Persian or Mugal gardens. The three first books do talk more about the Islamic garden as one large category of gardens, and if they talk about the formal characteristics, they only talk about a few of them, not all; for example, water, plants or the geometry in the garden. Since the books are written for historians rather than designers, the question about the form of historic Islamic gardens relating to the experience of being in the garden has not been unfolded satisfactorily. Therefore, this thesis uses these historical recourses but adapts their information for the purpose of inspiring 21st century designers.

Some of the sources express interest in modern gardens that have been inspired by the historic Islamic gardens, but that is not the main focus of any of the books. For example, at the end of *Islamic Gardens and Landscapes*,

D. Fairchild Ruggles mentions two gardens which were built in twentieth-century America: *Shangri La* in Honolulu, Hawai'i, and the Enid A. Haupt Garden in Washington D.C. On Shangri La, she writes: "This Islamic-inspired estate on the Hawai'ian island of O'ahu was built in 1937-38 by the firm Wyeth and King, for the heiress Doris Duke (1912-93) who... filled it with installations of Islamic art..."¹⁰. She describes the Enid A. Haupt Garden: "[T]he octagonal Fountains Garden centers on a quadripartite courtyard where the quadrants are raised above the pavement, rather than sunken as is more typical in historic Islamic gardens. In the center of the court, a water jet recessed below a grill shoots water upward in a manner reminiscent of the water stairway at the Generalife (Granada)."¹¹ But for the most part, the book focuses on a much older history.

The Aga Khan Trust for Culture (AKTC) is an organization that focuses on the physical, social, cultural and economic revitalization of communities in the Muslim world.¹² The historic cities program (AKHCP) of this organization promotes the conservation and re-use of buildings and public spaces in historic cities in the Muslim world. It undertakes the restoration and rehabilitation of historic structures and public spaces in ways that can spur social, economic and cultural development.¹³ Azhar Park, built in 2005, in Cairo, Egypt, is a project by AKTC that together with "Darb al-Ahmar" Revitalization Project, by the same agency, improved the area's living conditions through integration of the built environment with social and economic interventions.¹⁴ The Azhar Park project is another example for a modern design and built landscape inspired by historic Islamic gardens. In the design of this park Islamic geometry comes together with contemporary site design. There are formal gardens within the contemporary landscape of the park which don't have walls enclosing them like historic Islamic gardens. In other parts Islamic patterns have merged with other traditions as well, for example water is present in the main axis but not in all parts and at a point the axis and the pathways bend but not at a 90 degree angle.

10 D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008).

11 D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008). A more detailed description is found in *A New View from the Caste: the Smithsonian Institution's Quadrangle* a book by Edward Park (1987).

12 <http://www.akdn.org/AKTC> (visited 3/1/14)

13 <http://www.akdn.org/hcp/> (visited 3/1/14)

14 Philip Jodidio, *The Aga Khan Historic Cities Programme: strategies for urban regeneration* (Munich: Prestel, 2011).



Figure 10: Bird's-eye view of Azhar Park



Figure 11: Plan of Azhar Park



Figure 12: A view from Azhar Park

AKTC has built or significantly restored other major landscape and architecture commissions in places inside the Islamic world such as Kabul and Herat in Afghanistan, Lahore in Pakistan, Delhi in India, Damascus and Aleppo in Syria, as well as sites outside the Islamic world such as the Aga Khan Museum and garden in Toronto in 2014.

The work of Aga Khan agencies such as AKTC and AKHCP is published and available for public use. These publications are great resources for getting a holistic understanding about the projects undertaken by Aga Khan as modern Islamic projects. The following are a few of the AKTC publications:

1. Jodidio, Philip. *The Aga Khan Historic Cities Programme: strategies for urban regeneration*. Munich: Prestel, 2011.
2. Bianca, Stefano, and Philip Jodidio, eds. *Cairo: revitalising a historic metropolis*. Turin: U. Allemandi & Co. for the Aga Khan Trust for Culture, 2004.
3. Jodidio, Philip. *The Aga Khan Museum, Toronto*. Munich: Prestel, 2008.

The Aga Khan Award for Architecture is given every three years to international projects that set new standards of excellence in architecture, planning, historic preservation and landscape architecture as part of the AKTC activities, aiming at the preservation and promotion of the material and spiritual heritage of Muslim societies. The Award publishes the proceedings which are also great resources to identify design concepts that successfully address the needs and aspirations of societies across the world, in which Muslims have a significant presence.¹⁵ The following are the publications of this Award:

1. Baker, Philippa. *Architecture and Polyphony Building in the Islamic World Today: The Aga Khan Award for Architecture*. London: Thames & Hudson, 2004.
2. Cantacuzino, Sherban. *Architecture in Continuity: Building in the Islamic World Today : The Aga Khan Award for Architecture*. New York, NY: Aperture :, 1985.
3. Davidson, Cynthia C. *Architecture beyond Architecture: Creativity and Social Transformations in Islamic Cultures : The 1995 Aga Khan Award for Architecture*. London: Academy Editions :, 1995.
4. Davidson, Cynthia C. *Legacies for the Future: Contemporary Architecture in Islamic Societies*. New York, N.Y.: Thames and Hudson, 1999.
5. Frampton, Kenneth. *Modernity and Community: Architecture in the Islamic World*. London: Thames & Hudson :, 2001.
6. Holod, Renata. *Architecture and Community: Building in the Islamic World Today : The Aga Khan Award for Architecture*. Millerton, NY: Aperture, 1983.
7. Serageldin, Ismail. *Space for Freedom: The Search for Architectural Excellence in Muslim Societies*. Geneva, Switzerland: Aga Khan Award for Architecture :, 1989.
8. Steele, James. *Architecture for a Changing World : The Aga Khan Award for Architecture*. London: Academy Editions :, 1992.
9. Steele, James. *Architecture for Islamic Societies Today*. London: Academy Editions;, 1994.

This Aga Khan Museum, housing the Aga Khan's collection of Islamic art, was completed on a seven-hectare site in Toronto in 2014, designed by Japanese architect, Fumihiko Maki. On the same site, across from the museum, is the Ismaili Center, designed in 2013 by Charles Correa, an architect from India. The landscape for the entire complex is designed by Lebanese designer Vladimir Djurovic. All three designers had been encouraged "to seek to renew the

¹⁵ "Aga Khan Award for Architecture." About the. <http://www.akdn.org/architecture/information.asp> (visited 4/10/15) ; "Aga Khan Award for Architecture." Publications. <http://www.akdn.org/architecture/publications.asp> (visited 4/10/15).

principles of the architecture of Islam in a contemporary vocabulary and in full respect for the context they are working in.”¹⁶



Figure 13: Site plan of Aga Khan Museum in Toronto

Vladimir Djurovic claims to reflect the essence of the Islamic garden in his design on this site by engaging the five senses in experiencing the gardens. Although he has used a contemporary style in his design, he mentions the gardens of Alhambra, Granada (Spain) as his source of inspiration. These inspirations become visible in his rectilinear designs that include pools of water that are still and reflect their surroundings, walls that are designed in parts around

16 Philip Jodidio, *The Aga Khan Museum, Toronto* (Munich: Prestel, 2008), 21.

the gardens to convey an inclusive and private feeling although they keep the gardens open for the public, and rows of trees that enforce the views and resemble plant beds in the historic gardens. (Figures 11 and 12)¹⁷



Figure 14: Garden of Alhambra

¹⁷ Philip Jodidio, *The Aga Khan Museum, Toronto* (Munich: Prestel, 2008).



Figure 15: View of the Aga Khan Museum Garden in Toronto

Examples of contemporary Islamic garden design contribute to this thesis because we can see which elements designers have retained in a contemporary design and how the elements are being used in the present.

Chapter 3: Research design and precedent study

To design a new Islamic garden anywhere in the world, it is essential that Islamic gardens be studied carefully in a historical context in relation to their origin and geographic context. This helps us understand the meaning of elements such as geometry, water systems, methods of planting, and the sense of space. The geographical context also matters. For example, if a garden is in a mountainous region, it is more likely to have terraces, resulting in cascading water and stairs for pedestrians to climb from one level to the next. But in a new place with different geographical character—perhaps a place as flat as central Illinois or the central plains of India--the design elements must be adapted to the new environment and the new situation of the people who use them. Therefore it is important to determine what the main elements that formed those gardens are and how those elements and the gardens as a whole responded to their original context.

In the years following 622, when Islam began in Medina and then expanded eastward to Central Asia and westward to the Iberian Peninsula, many gardens were built and of these, a number still survive in a condition that closely resembles their original design. I chose seven gardens to serve as models for the various territories and historical periods and that reflect the diversity of Islamic architecture. These gardens all belonged to the elite classes of the society they were built for, which sets them apart from the gardens that modern landscape architects are making today. Whereas in the past, great gardens were associated with the palaces of the very wealthy or royalty, in the 20th century, society has changed. The middle classes have risen and have higher expectations of the state, whether run as a monarchy, democracy, or other political classification. This change in the social atmosphere is reflected in the built landscape where designers are now more likely to build for a public audience than a royal patron. Nonetheless, the reason I am choosing these royal gardens is that these seven gardens are great examples from their contemporary time and place and because there are very few examples of public parks dating from those earlier periods. They form a spectrum of different forms of Islamic gardens which leads to better understanding and richer abstractions for this thesis.

Of the examples, I was able to study the four Iranian sites in person. I could not visit the ones in Afghanistan, India, and Spain, but I included them to avoid limiting my research to one region or one subcategory of Islamic garden. This decision also was necessary to make the final product of this thesis which is design principles for modern Islamic gardens to be more reliable and applicable to a bigger spectrum of climates and natural environments.

The historic Islamic gardens I chose to study are listed here in chronological order.

1. Court of the Lions and Court of the Myrtles in Alhambra, Granada, Spain from the 14th century.
2. Babur Garden in Kabul, Afghanistan, 16th century
3. Fin Garden in Kashan, Iran, Late 16th century
4. Taj Mahal in Agra, India, 17th century
5. Chehel-Sotun in Isfahan, Iran 17th century
6. Hasht-Behesht in Isfahan, Iran 17th century
7. Shahzadeh Garden in Mahan, Iran from the 19th century

3.1: Court of the Lions and Court of the Myrtles in Alhambra, Granada, Spain from the 14th century. ¹⁸

Court of the Myrtles, completed 1370, is a palace garden that has a rectangular shape with a long and wide pool (36.6 m by 23.5 m) in the middle, paralleled with two rows of myrtle hedges, which give the garden its current name. The garden is accessed from the wider side on the west and leads to the Comares tower on the north side through an arcade. The tower includes the Ambassador's Hall, which was a space for the officials to wait for reception from the sultan, a rectangular space with three sides overlooking to the valley below while the fourth side looks back at the magnificent courtyard. The pool contains still water that reflects the tower, and it has two circular basins at both ends with a two small water jets that are a pleasurable interruptions to the still figure.

¹⁸ D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008); D. Fairchild Ruggles, *Gardens, Landscape, and Vision in the Palaces of Islamic Spain* (University Park, Pa.: Pennsylvania State University Press, 2000); John Brookes, *Gardens of Paradise: The History and Design of the Great Islamic Gardens* (London: Weidenfeld & Nicolson, 1987).

The Court of the Lions (1370 -1390) is also a royal garden in the Alhambra. Small in scale, it has extravagantly detailed ornament and is surrounded by a colonnade with two projecting pavilions into the courtyard. Four sunken water channels starting from the adjacent rooms or colonnades that run through the garden symmetrically and intersect in the center where the famous central water fountain is supported with twelve lion statues. The cross-axial pathways and water form a *chahar bagh* of sunken quadrants. These plant beds, originally planted with orange trees, were sunken slightly below the pavement surface. This allowed for the continuous view from the sides of the garden and appeared like a natural floral carpet for a person walking in the courtyard.



Figure 18: Court of Lions

Both of these gardens are comparatively smaller than the other models studied in this thesis and help us understand how the design principles of these gardens are applied to smaller proportions.

3.2: Babur Garden in Kabul, Afghanistan, 16th century ¹⁹

In contrast, the Babur garden in Kabul was built on an enormous scale. When Babur, the founder of the Mughal Empire, died in 1530, he was first buried in Agra. A few years later his body was brought to the garden which is named

¹⁹"Everything Afghanistan." Everything Afghanistan. <http://watanafghanistan.tumblr.com/page/127> (accessed September 29, 2013); Philip Jodidio, *The Aga Khan Historic Cities Programme: Strategies for Urban Regeneration* (Munich: Prestel, 2011).

after him, *Bagh-i Babur* in Kabul, which Babur himself had built. His successors, Jahangir and Shahjahan, continued to enhance and invest in the site after his death. By the mid-19th century, especially after the 1842 earthquake, the garden had fallen into repair, even despair. After that, several new buildings such as a greenhouse and a swimming pool were constructed and even part of the landscape was transformed by inspiration of European gardens. The fighting of 1993-1994 damaged the monuments and landscape greatly and transformed the garden into a no man's land. Some minor repairs were done in the 1990s, and then the AKHCP initiated a comprehensive rehabilitation program in 2002 which continued until 2008.

The Aga Khan program aimed to restore the situation of the site to its original character. Therefore a 1.5 meter thick compacted traditional wall was built around the garden and a marble lined water channel with water tanks was laid along the central axis. The water flows and cascades through adjoining terraces of orchards. The central axis pathways are parallel to the water channel, are framed with mostly plane trees, and take the visitors from the entrance uphill toward a prayer room and then Babur's tomb.



Figure 19: Plan of Babur Garden

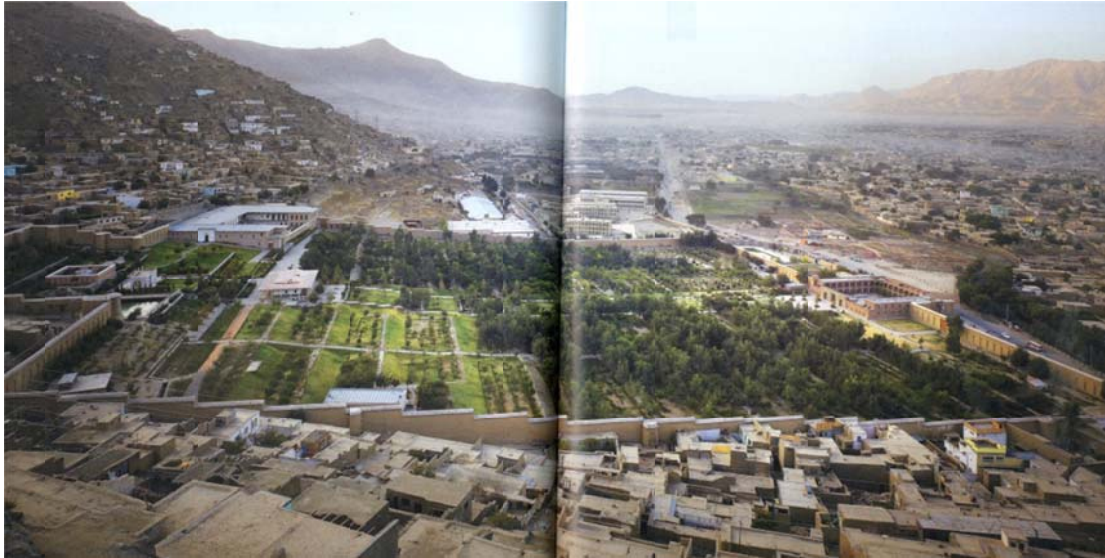


Figure 20: Babur Garden

3.3: Fin Garden in Kashan, Iran, Late 16th century²⁰

The Fin Garden is one of the oldest standing gardens in Iran. A few kilometers outside Kashan, in the village of Fin, just by the outskirts of Silak hills in the desert, the famous Safavid King, Shah Abbas I, built a structure in 1587 on a site that was used to honor the first Safavid ruler, Shah Ismail in 1504. Between 1799 and 1834 some structures were rebuilt or added to the site by Fath Ali Shah from the Qajar dynasty. Although the format of the garden seems to have remained mostly the same, the architectural structures represent both Safavid and Qajar styles.

Fin Garden is a variant of a *chahar bagh* with primary and secondary axes intersecting each other and turquoise-tiled waterways running in between the pathways. The waterways and pathways are framed with old cypress trees that cast shade in the hot and arid climate. The main axis in the garden is occupied with a pavilion at the point where it is intersected by a secondary pathway. On its four sides it is open to the magnificent garden around it and two pools of water extend the pavilion on each side on the main axis. The water is supplied from a reservoir outside the garden, constantly filled by a *qanat* (subterranean canal) that enters the garden on the west side and flows through the

²⁰ Mehdi Khansari, and M. Reza Moghtader, and Minouch Yavari, *The Persian Garden: Echoes of Paradise* (Washington, DC: Mage Publishers, 1998); John Brookes, *Gardens of Paradise: The History and Design of the Great Islamic Gardens* (London: Weidenfeld & Nicolsin, 1987); Qulam-Reza Naeima, *Baq-hayi Iran* (Tehran: Payam, 1385). (*Gardens of Iran*. 2007)

garden. It has enough pressure to bubble up through low water jets in regular intervals in the water channels and pools. It also runs through the pavilion and thus connects inside and outside. The Fin Garden contains most of the parts found in an Islamic garden such as rectilinear geometry of pathways and waterways and plant beds, a central pavilion, an entrance pavilion or gate, interweaving of architecture and landscape, rich color, tall surrounding walls, secondary buildings and service buildings.

The 6.5-acre Fin garden was used for royal ceremonies and the reception of higher class individuals and officials by the Safavid and later the Qajar kings. It also has historic significance because one of the most famous prime ministers of the Qajar dynasty, Amir Kabir, who also was the king's brother-in-law, was murdered in the garden's bathhouse on the orders of King Nasser Adin Shah. After the murder, with such a tragic association, the garden went into a decline until it was named a national monument and restored in 1935.

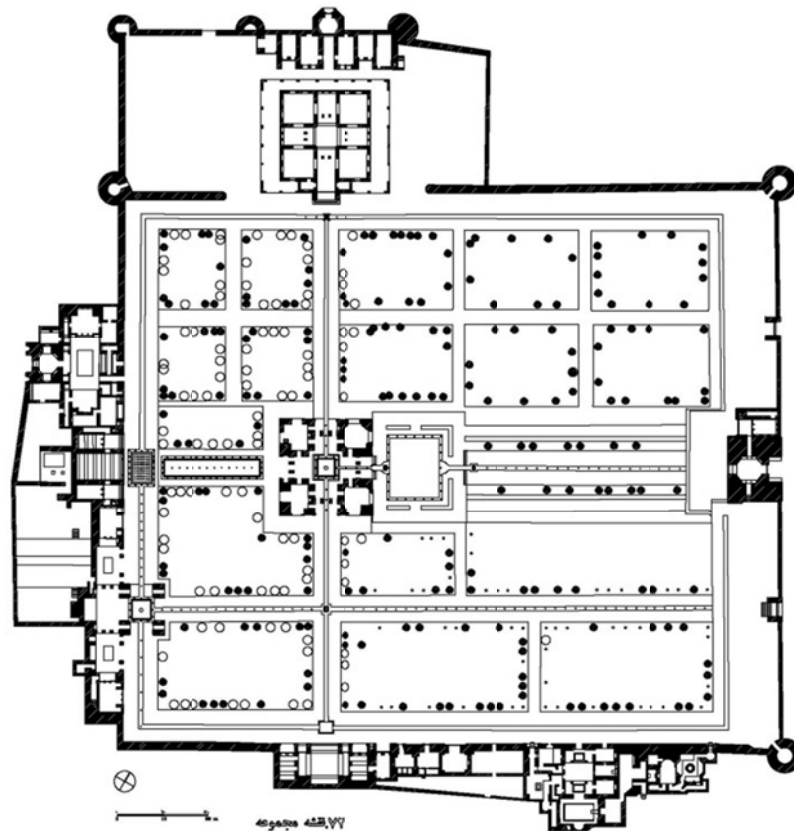


Figure 21: Plan of Fin Garden



Figure 22: Fin Garden

3.4: Taj Mahal in Agra, India, 17th century²¹

Taj Mahal and its chahar bagh garden were built in 1632 – 1643 by the Mughal Emperor Shah Jahan. He intended it for his wife, Mumtaz Mahal who is buried in the monumental white marble tomb on the north side of the garden on a raised platform, but ultimately he was also buried there. In the center of this classic *chahar bagh* garden is a raised pool at the intersection of the cross-axial north-south and east-west pathways that run parallel to central sunken water channels and plant beds. In contrast to its Persian precedents, this chahar bagh is not irrigated with a natural water flow system from near or distant mountains. Instead, water is brought to the site from the Yamuna River, which the garden borders on its northern edge, through a continuous series of chains and buckets that fill a series of water channels and storage tanks until water is brought to a storage tank outside of the west wall of the complex and from there released into the garden.

²¹ Lesley A. DuTemple, *The Taj Maha*. (Minneapolis: Lerner Publications, 2003); D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008); Ebba Koch, and Richard Andre Barraud, *The Complete Taj Mahal: and the Riverfront Gardens of Agra* (London: Thames & Hudson, 2006).

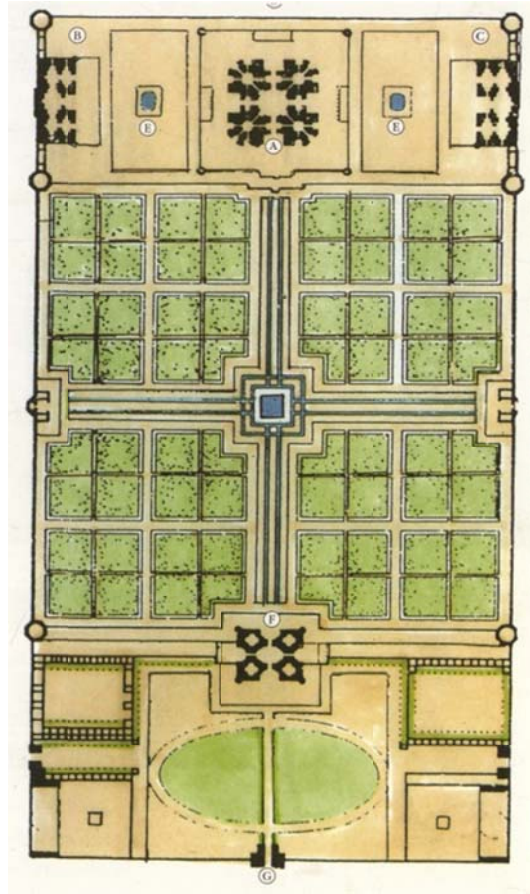


Figure 23: Plan of Taj-Mahal Garden



Figure 24: Taj-Mahal Garden

3.5: Chehel-Sotun in Isfahan, Iran 17th century²²

Chehel Sotun is a pavilion and garden built in a 15-acre site in Isfahan in 1647 by the Safavid King Shah Abbas II. Isfahan was the capital of the Safavid Empire, and the pavilion was used for royal ceremonies and official receptions. Chehel Sotun gets its name, meaning forty columns, from the reflection of the twenty columns on the façade of the pavilion in the surface of the large pool that occupies most of the main axis leading to the pavilion. The *portico*-like²³ space adjacent to the pavilion is open on three sides to the garden and extends the pavilion to the garden. The garden has two secondary east-west axes parallel to the primary and a few small north-south pathways intersecting with the main axis. The waterways surrounding the pavilion in the garden and the variety of tall and short trees around the plant beds contribute to its beauty.

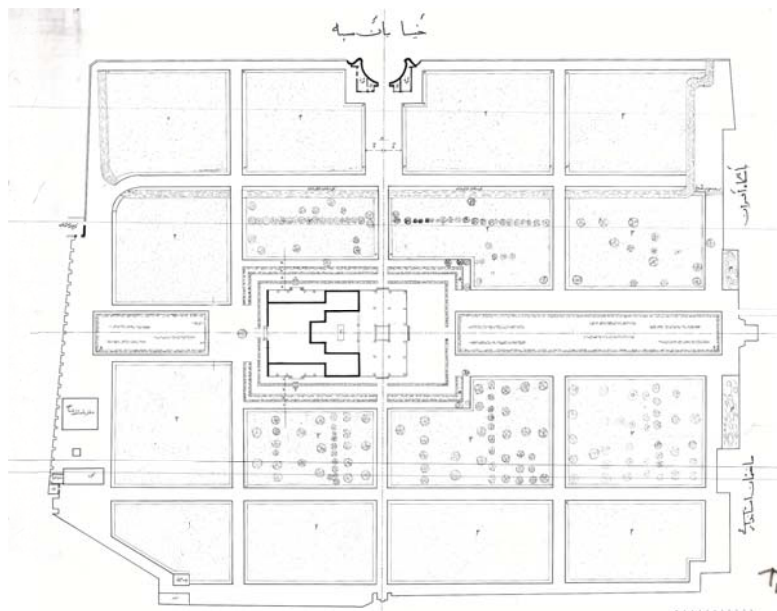


Figure 25: Map of Chehel-Sotun Garden

²² Mehdi Khansari, and M. Reza Moghtader, and Minouch Yavari, *The Persian Garden: Echoes of Paradise* (Washington, DC: Mage Publishers, 1998); John Brookes, *Gardens of Paradise: The History and Design of the Great Islamic Gardens* (London: Weidenfeld & Nicolsin, 1987); Qulam-Reza Naeima, *Baq-hayi Iran* (Tehran: Payam, 1385). (*Gardens of Iran*. 2007)

²³ *portico* is a colonnaded porch or entrance to a structure or a covered walkway, supported by regularly spaced columns. <http://www.britannica.com/EBchecked/topic/471153/portico> (visited Feb 22, 2014)



Figure 26: Chehel-Sotun Garden

3.6: Hasht-Behesht in Isfahan, Iran 17th century²⁴

Hasht Behesht is an octagonal pavilion in the Bagh-i-Bulbul (Garden of Nightingale) that is the last remaining garden of the Safavid Avenue of gardens in their capitol, Isfahan. Now the garden is a public park and most of its surrounding walls have been taken out. The garden and the pavilion were built by the successor of Shah Abbas, Shah Soleiman I, a Safavid King in 1670, and some alterations were made in the garden in the Qajar dynasty, at the time of Fath Ali Shah. The name of Hasht Behesht, which means Eight Paradises, is thought to reference the importance of the number eight in the architecture but also might be referencing to the pavilion as the entrance to Paradise since “Hashti” means foyer in Persian.

24 Mehdi Khansari, and M. Reza Moghtader, and Minouch Yavari, *The Persian Garden: Echoes of Paradise* (Washington, DC: Mage Publishers, 1998).

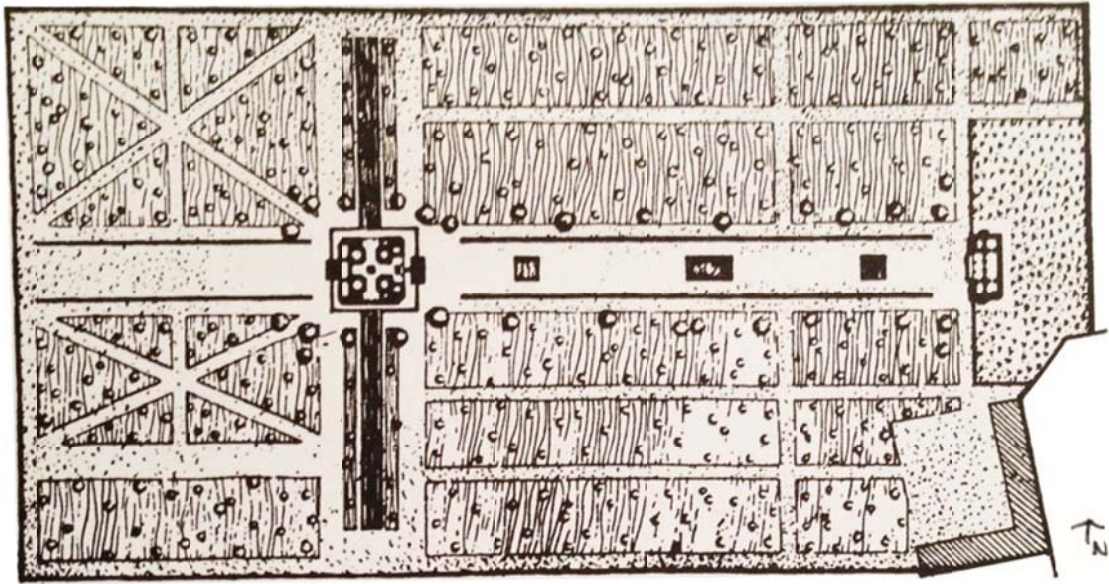


Figure 27: Plan of Hasht-Behesht Garden



Figure 28: Hasht-Behesht Garden

3.7: Shahzadeh Garden in Mahan, Iran form the 19th century.²⁵

The Shahzadeh (Prince) garden is located a few kilometers outside of Kerman near a village called Mahan. This garden was ordered by Nasir Adoleh Farmanfarma, a grandson of Nasir Addin Shah of the Qajar Dynasty, but he died before the garden was completed in 1878.

The garden is located on a sloping 18.5-acre site on the lower skirts of Choopar Mountain. To accommodate the terrain, it is built on a series of terraces with pools of water and cascades. The intelligently built water channels guide and throw down water in a way that it fills the space with a pleasant sound contributing to the character to the garden. The water for this is replenished from a *qanat* that runs from the mountain to the garden's west wall. The garden is separated from its desert environment by high surrounding walls. The main axis is framed by plane trees and cypresses, and beyond them to both sides of the garden are fruit orchards. The main pavilion is at the end of the west axis that runs through the garden. It stands on a higher elevation and has a view over the pools and through the openness of the entrance pavilion to the village of Mahan.

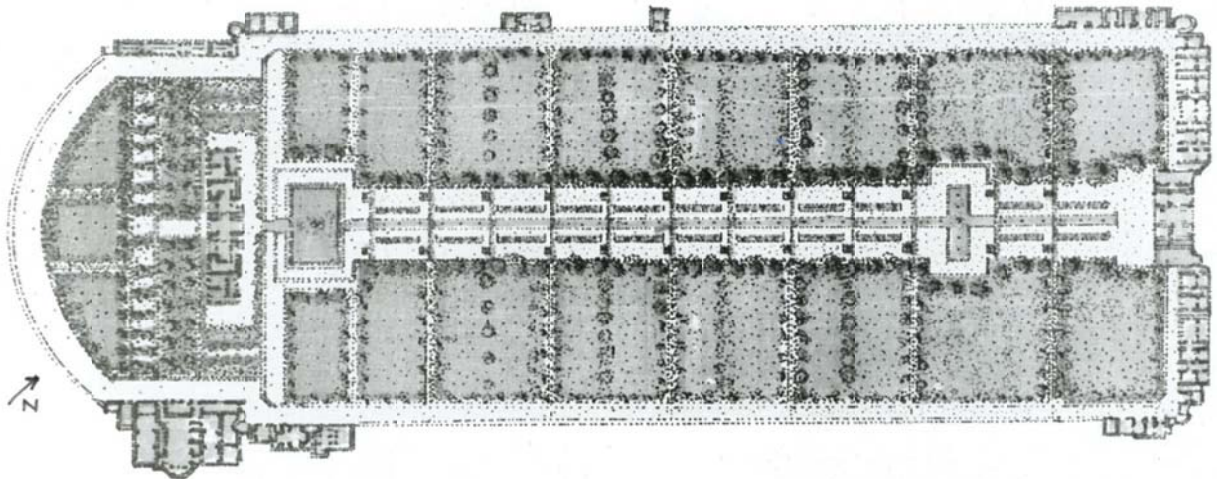


Figure 29: Plan of Shahzadeh Garden

²⁵ John Brookes, *Gardens of Paradise: The History and Design of the Great Islamic Gardens* (London: Weidenfeld & Nicolsin, 1987); Qulam-Reza Naeima, *Baq-hayi Iran* (Tehran: Payam, 1385). (*Gardens of Iran*. 2007)



Figure 30: Shahzadeh Garden

These gardens, which are the precedent studies for my thesis, are from different eras of the expansion of Islam. As a result, the research avoids focusing only on one sub-category of the Islamic gardens and the design principles can be applied to a bigger spectrum of climates and natural environments. (Figure 28)

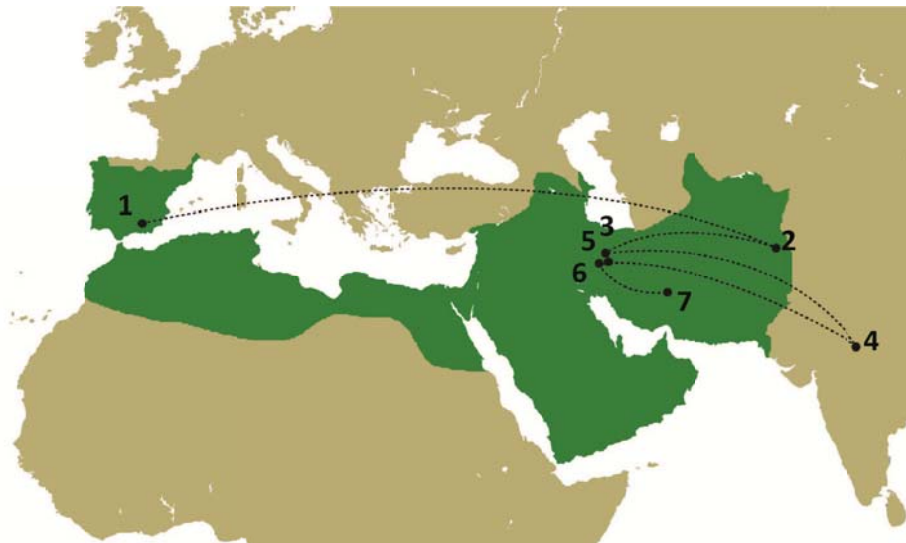


Figure 31: The location of the gardens in the Islamic world, numbered in chronological order

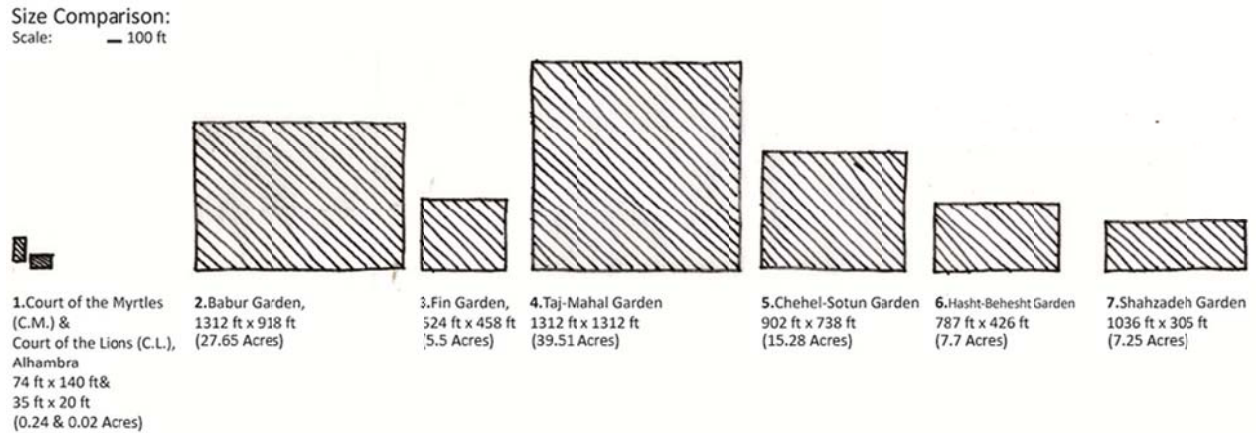


Figure 32: Comparison of the sizes of the seven gardens

Whereas written resources that explain and discuss Islamic art and architecture and introduce the formal properties of its various styles in detail, the written resources on Islamic landscapes are mostly thematic and tend not to go beyond the more obvious formal properties. They identify the geometry of the plan of Islamic gardens based on the *chahar bagh* or its variations, and they recognize the importance of the presence of water in Islamic gardens for sound, cooling, and irrigation. My goal in this thesis was to look at Islamic gardens from the perspective of a designer and study and analyze their formal elements in order to be able to introduce them in a classified manner and extract the design principles underlying their composition that brings out a specific experiment.

In order to be able to convey the experience of being in an Islamic garden through its elements, I developed specific analytical framework that would serve this purpose. I experimented with a few different classification methods to be able to find one that would be most beneficial to the research in this thesis. At first I tried to organize the formal elements of the garden based on geometry or water. This method would not allow me to include all the elements of the garden that were equally as important in a parallel manner.

Secondly, I tried classifying the elements based on 3 scales. Scale 1 which I called the “environment scale” was the biggest scale and it was taking into factor the influence of context, resources, boundary, technology and topography on the shape of the gardens. Some of these scale 1 factors even had sub categories. For example, the

context would have these subcategories: vegetation, climate, society and urban/rural. Scale 2 was actually classifying the formal elements of the garden in to two major categories of softscape and hardscape elements. Each of these categories was grouping multiple elements. For example in this method of organization plant material, soil, forms of water and sound were the sub categories of softscape in the garden. Scale 3 which I called the “details” included the elements that were somehow the product of the scale 2 elements like color, texture and ornament. This was somehow a better method of organization since it contained many factors that influenced the formal elements of the garden, but, on the other, hand there was no place for some other elements that were not necessarily a factor of scale or belonged to all three scales such as views and angles, circulation, sequence, and shade.

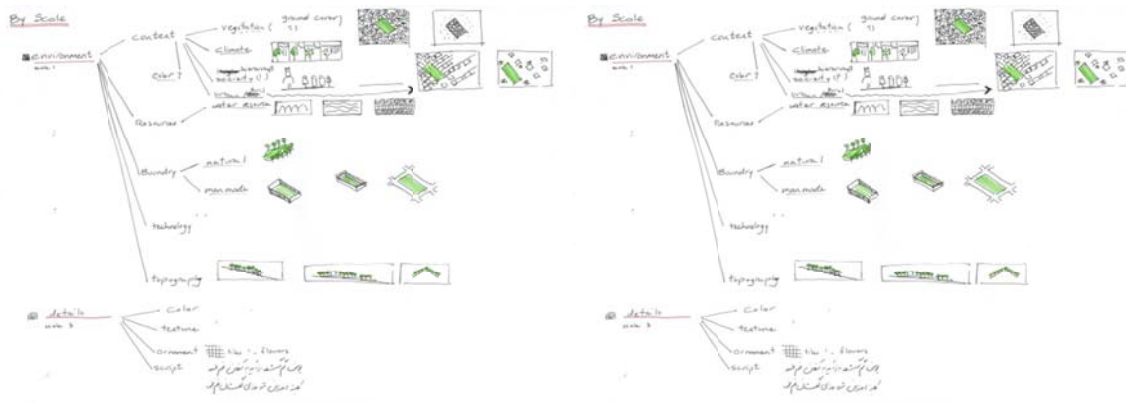


Figure 33: The Author's sketches of organizing the elements based on scale

Finally to have a systematic method of studying the formal elements and the compositions in these gardens I divided garden elements into two major groups, Hardscapes and Softscapes. Hardscape elements are the more architectural features, consisting of the boundary, entrance, pathways, building, and hardscape frames, surfaces and ornaments. Softscape elements are the water and plants in the garden, features that are important but not necessarily permanent and that require constant replenishment. For each of these elements, depending on the variety of their use in the Islamic gardens, there might be multiple subcategories.

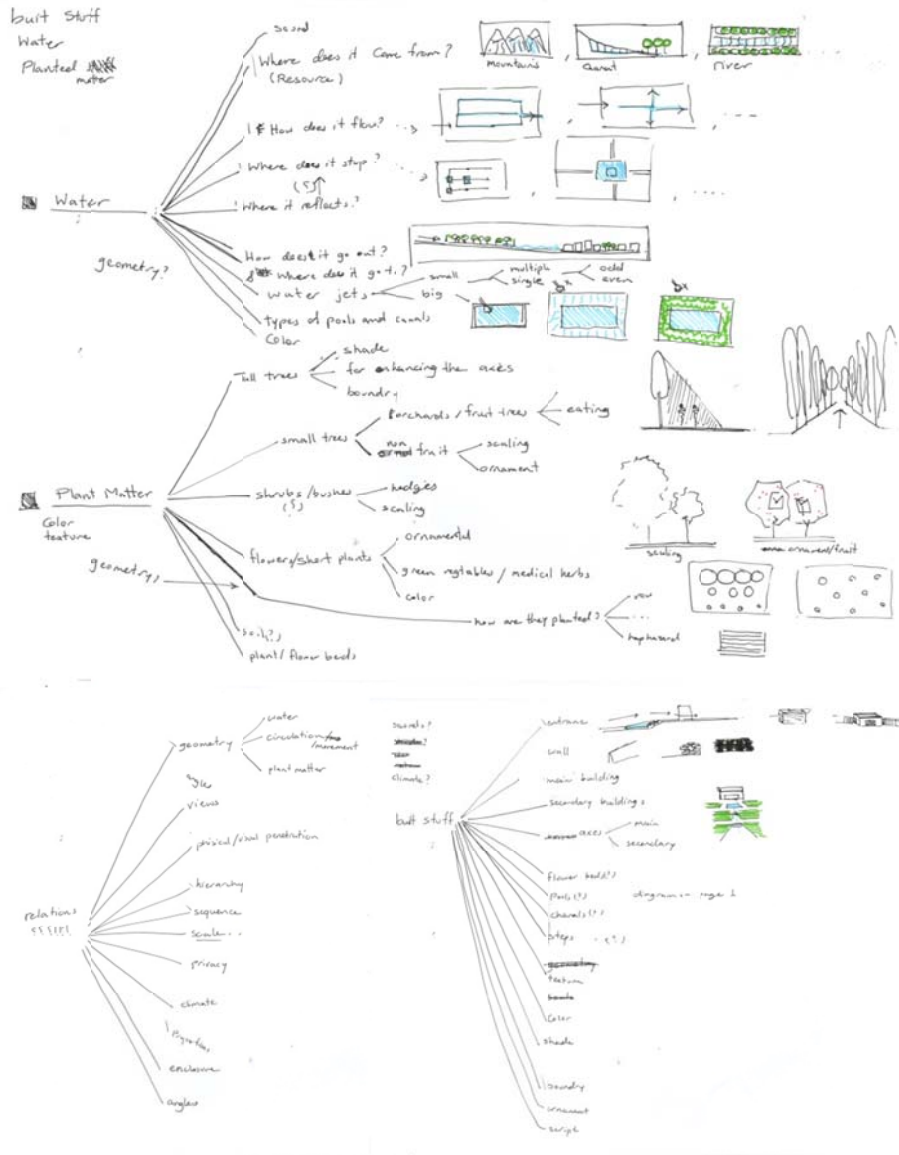


Figure 34: First attempt in organizing the elements of the Garden in the final format



Figure 35: Second attempt in organizing the elements of the Garden in the final format

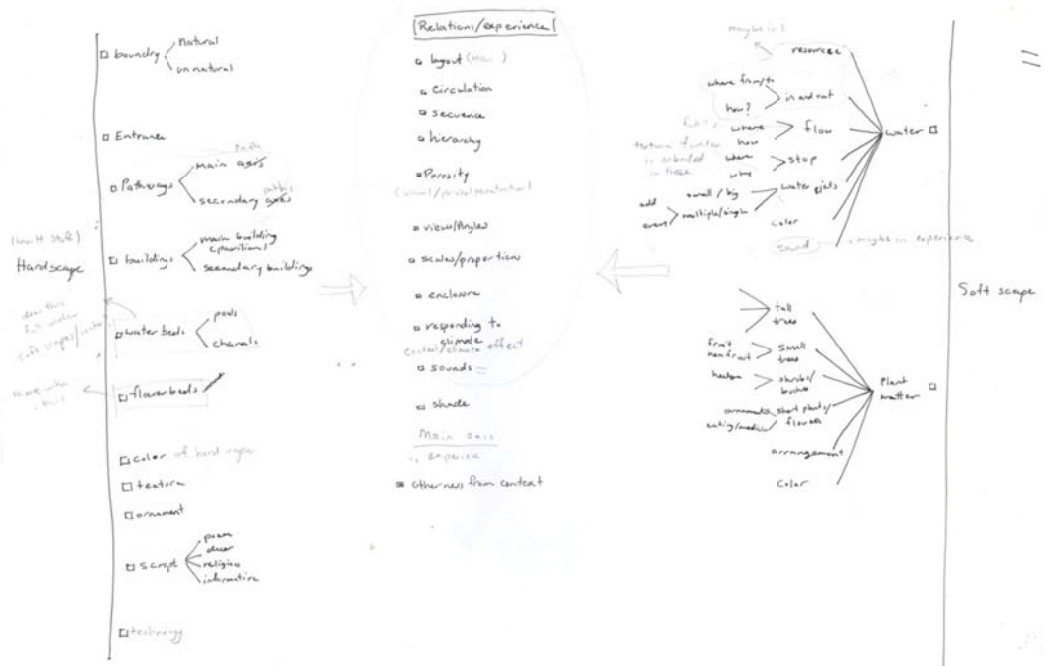


Figure 36: Sketch of the Final format of organizing the garden elements

“[G]ardens are experienced by human beings who view them as spatial constructions and also apprehend them through the auditory and olfactory senses.”²⁶ The experience of an Islamic garden is based on how each of these elements is employed in the garden and composed with other ones. Therefore, it is important to compare the proportions and relations of each of these elements to the others and to think of them from a more holistic perspective. For example, how is the experience of being on a pathway beside plants and a pool of water in an Islamic garden different from being among the same elements in an English garden? After studying Islamic gardens through the available text and visiting the sites in Iran and also watching some videos that visitors of the other sites had posted online and listening to how they saw or felt about the gardens, I came up with a list of characteristics or feelings that can be experienced in the spaces of an Islamic garden due to the presence of the elements of the garden and their spatial composition. These experiences are as follows:

- Layout

26 D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008) Page 4.

- Enclosure
- Views & Angles
- Porosity
- Main Axis
- Circulation
- Sequence
- Hierarchy
- Sound
- Shade

Here I have the analytical framework of my thesis. This diagram is key to understanding how each section contributes to the final outcome.

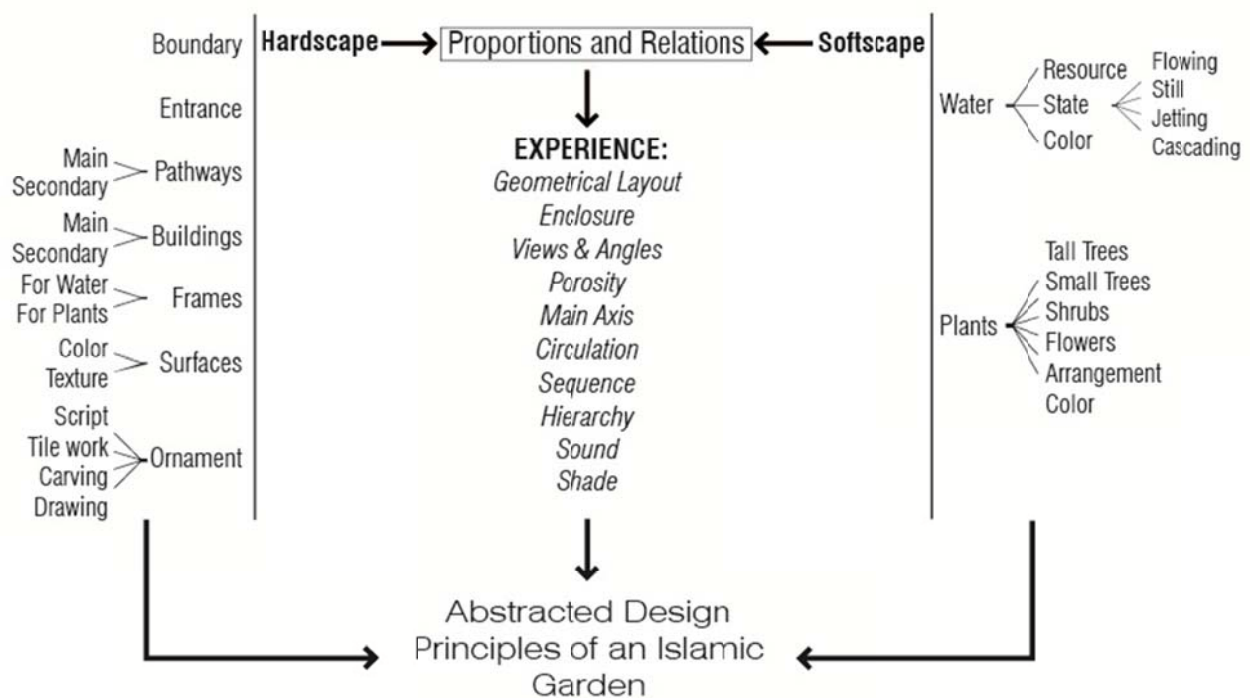


Figure 37: Analytical Framework

On the sides of this analytical framework, which is presented diagrammatically here, the formal elements of the garden and their subcategories are listed. In the middle we can see how these elements come together to contribute to the experience in an Islamic garden. At the bottom we see how the abstracted design principles originate from the

elements of the garden and their proportions and relations. The abstracted principles, which are the outcome of this thesis, will be discussed in the following sections.

To apply this analytical framework I produced charts with pictures that captured one garden element. Each chart consists of seven columns and each column is dedicated to one of the gardens. This remains persistent for all the picture charts. For example there is a chart about the main pathways in the precedents. In this chart the first column will be showing the main pathways in the Court of the Myrtles and the Court of the Lion, and the second column will have pictures of the Babur garden and so on. Charts that contain empty columns illustrate the lack of an element within that site.

Key to the picture charts

Softscapes/Hardscapes : Element -Sub-element -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
Court of the Myrtles & Court of the Lions, Alhambra Granada, Spain 14th century	Babur Garden, Kabul, Afghanistan 16th century	fin Garden, Kashan, Iran Late 16th century	Taj-Mahal Garden Agra, India 17th century	Chehel-Sotun Garden Isfahan, Iran 17th century	Hasht-Behesht Garden Isfahan, Iran 17th century	Shahzadeh Garden Mahan, Iran 19th century

Figure 38: Key for picture charts

I also produced plans, with each set of plans corresponding to a group of elements. For example one set of plans shows different kinds of plants and how they are arranged. Although the pictures are showing the condition of the gardens now, the plans represent the original form of the gardens – they reflect a certain date.

Some of the information cannot be conveyed clearly by pictures and plans, and so I produced diagrams and sections for some of the groups that required further explanation about the conditions of the gardens in a group of elements. These sections and diagrams allow more in depth understanding of the sites.

This is the legend for the colors and patterns and symbols that are used and remains the same throughout the whole catalog and design principles.

















Legend			
Flowing Water		Main Building	
Still Water		Secondary Building	
Water Jets		Main Entrance	
Lawn		Secondary Entrance	
Flower		Boundary	
Shrub		Main Pathway	
Short Tree		Secondary Pathway	
Tall Indecidous Tree			
Tall Decidous Tree			

Figure 39: Legend for plans and diagrams

After studying the formal aspect of the seven gardens I configured a list of design principles that were common through sites and can be applied to new situations and adapted to the new environments without relinquishing the experience associated with being in a historic Islamic garden or the memory these forms carry. The produced picture charts, plans, sections, diagrams and abstracted design principles will be discussed in the next part of the thesis.

Chapter 4: Analysis and Findings

This section will describe the graphics and photographs of precedent sites produced for the systematic study of the Islamic gardens. These consist of the figure charts for individual elements and the plan sets plus the describing sections and/or details. These graphics will be described in groups, according to formal relationships and similarities, as follows. :

1. Softscape : Water : Resource
2. Softscape : Water : Form + Movement (still – flowing – jetting + cascading)
3. Softscape : Water : Color
4. Softscape : Plants : Tall trees – Small trees – Shrubs – Flowers - Arrangement
5. Softscape : Plants : Color
6. Hardscape: Frames: For water – For plants
7. Hardscape: Pathways: Main - Secondary
8. Hardscape: Buildings: Main - Secondary
9. Hardscape: Entrance
10. Hardscape: Site Boundary
11. Hardscape: Ornament: Script + Tilework + Carving + Drawing & Surfaces: Color + Texture

Following each group's descriptive figure charts and plans I represent derived design principles, underlying that group's formal elements as individual elements and in relation to other elements. These tenets form the set of design principles that can serve as a resource for and inspire contemporary designers in the field.

4.1: Softscape: Water: Resource

Water is one of the most prominent natural elements in Islamic gardens. It is brought to site via surface canal, underground qanat, and other methods and comes from mountain sources, rivers, and reservoirs. The following figure chart and plans and detail set show what the water source for each garden is and with what method it is brought to the garden and where it enters the garden.

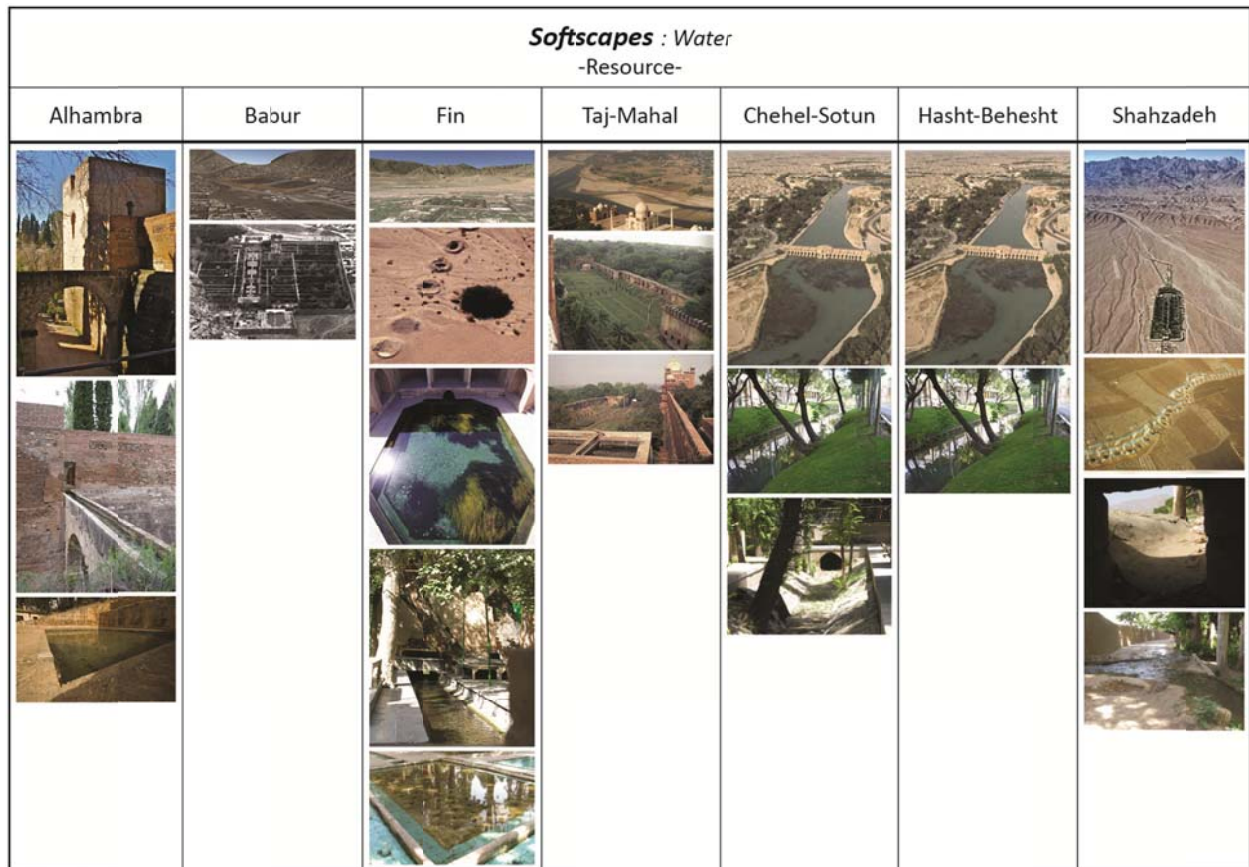


Figure 40: Image chart for softscape: water: resources

- Court of the Myrtles and Court of the Lions, Alhambra, Granada, Spain.

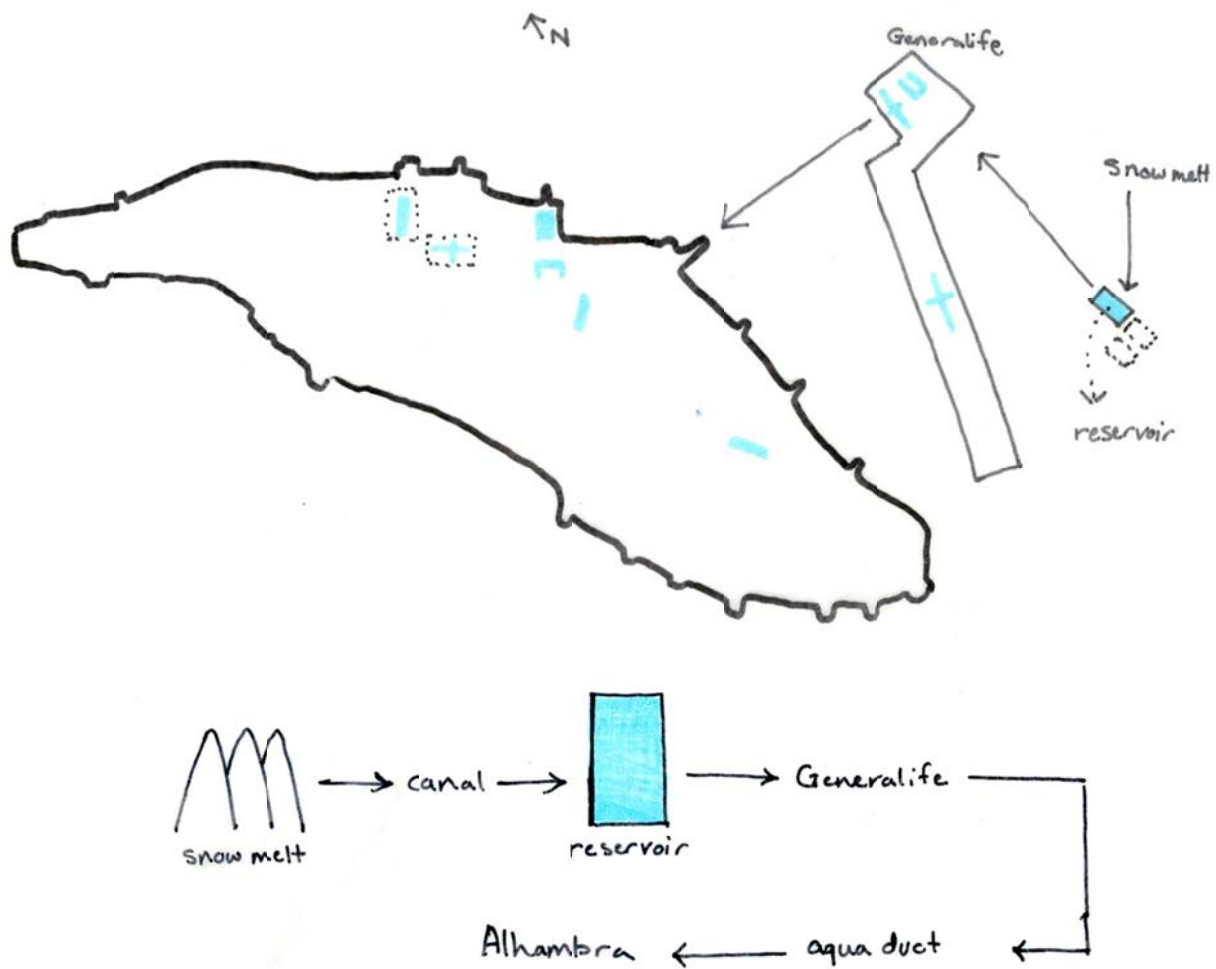


Figure 41: The water resource system of Alhambra

The resource for the water in Alhambra is the snow melt from the surrounding mountains that is brought near the site by canals and captured in reservoirs. From there the water first goes to Generalife (a nearby palace), and then to the Alhambra gardens by aqueducts.²⁷

²⁷ Foret, Amanda Sharon. "Reflections of Pleasure: The Fourteenth-Century Alhambra." Master's Thesis, Louisiana State University, 2009.; <http://www.alhambra-patronato.es/index.php/Water-ponds/183+M5d637b1e38d/0/> (visited November 10, 2013).; <http://www.alhambra-patronato.es/index.php/The-Water-Stairway/176+M5d637b1e38d/0/> (visited November 10, 2013)

- Babur Garden, Kabul, Afghanistan.

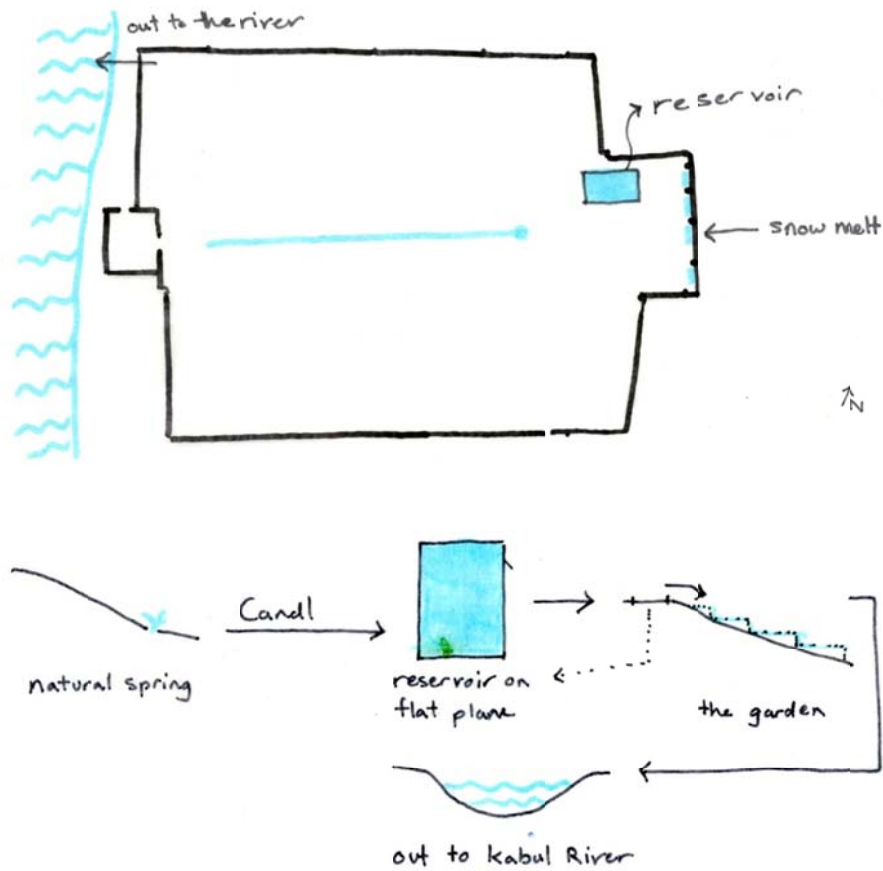


Figure 42: The water resource system of Babur Garden

In the Babur Garden the water from the surrounding snowmelt and a natural spring on the east side of the garden, up the hill, is captured in some reservoirs on site and then released downhill to fill pools and for irrigating the plants. The excess water goes out of the garden to the Kabul River on the west side of the garden, down the hill. ²⁸

²⁸ *Babur's Garden Rehabilitation Framework*. Kabul, Afghanistan: Aga Khan Historic Cities Program, 2004.

- Fin Garden, Kashan, Iran.

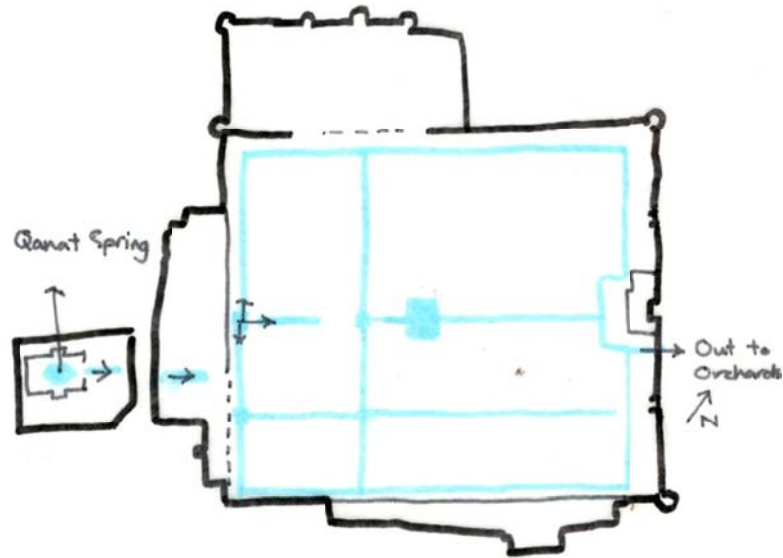


Figure 43: The water resource system of Fin Garden

- Shahzadeh Garden, Mahan, Iran.

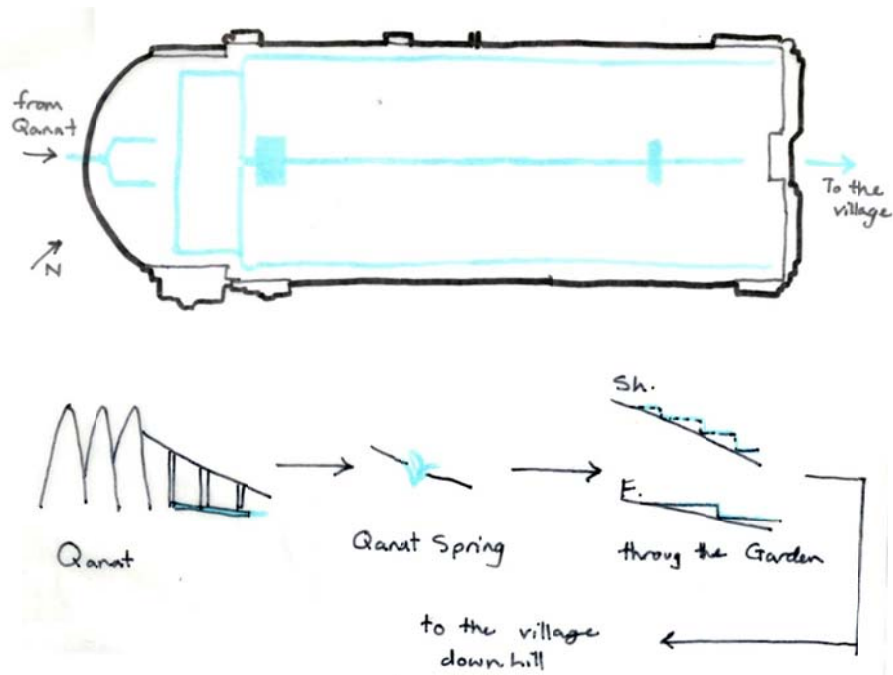


Figure 44: The water resource system of Shahzadeh Garden

A qanat or underground conduit is used in some arid parts of Iran to bring subterranean water to the surface in a distant place. The place where the water reaches the surface is a qanat spring. This water can then be used for many purposes, such as drinking and irrigating agriculture land. The water for the Fin and Shahzadeh gardens is provided by qanats. These gardens are situated so that they are on a lower elevation than the spring of the qanat, allowing the water to flow naturally through the site.

- Taj Mahal Garden, Agra, India.

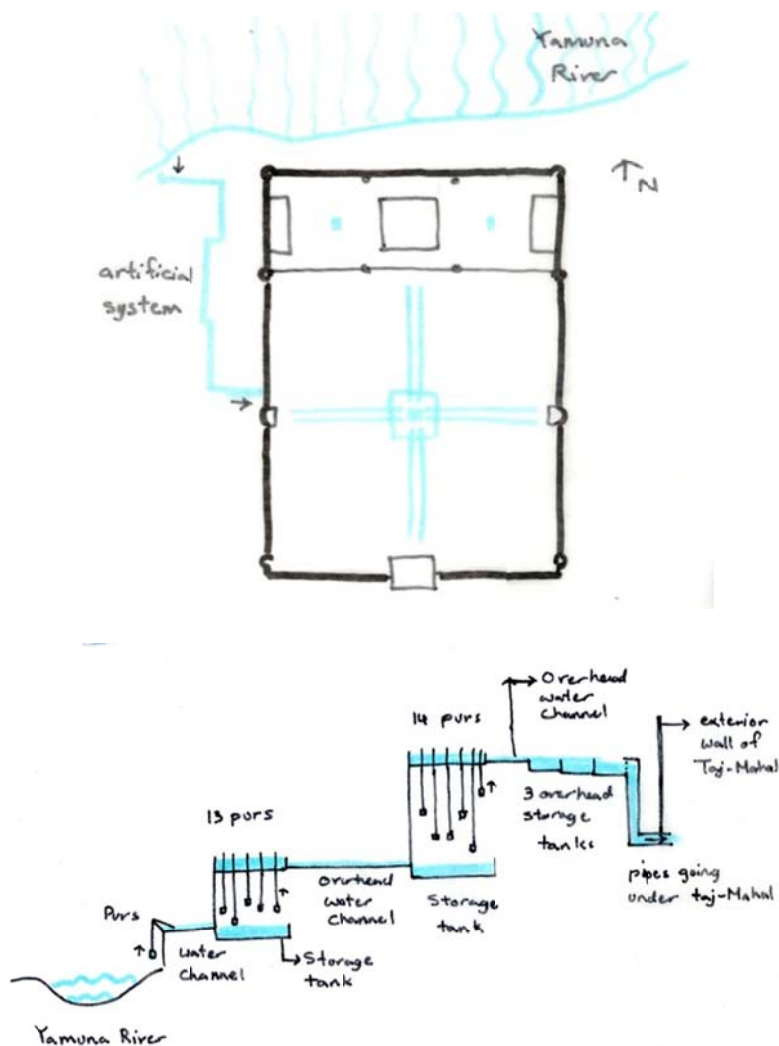


Figure 45: The water resource system of Taj Mahal Garden

In the Taj Mahal Garden the water is supplied from the Yamuna River on the north side of the tomb complex. The river is on a much lower elevation from the garden and, therefore, water does not naturally flow through the garden. Historically, it was brought to the garden from a collection point along the river from the northwest corner of the complex with a series of *purs*, ropes and buckets, pulled by animals. The water flowed through a series of water channels and storage tanks that would end up at the western garden wall pavilion. Then the water was piped into the garden from 9.47 m (31 ft) above so that it had enough stored energy to spout up from the fountains and irrigate water channels and pools inside the garden. However, in 1903 the pipes were replaced with cast iron, and presently electricity is used instead of manual labor for pumping the water.²⁹

- Chehel-Sotun Garden, Isfahan, Iran.

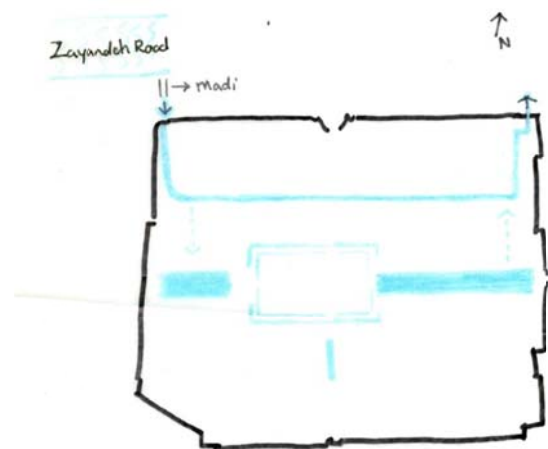


Figure 46: The water resource system of Chehel-Sotun Garden

- Hasht-Behesht Garden, Isfahan, Iran.

²⁹ DuTemple, Lesley A. *The Taj Mahal*. Minneapolis: Lerner Publications, 2003. ; Koch, Ebba, and Richard Andre Barraud. *The Complete Taj Mahal: and the Riverfront Gardens of Agra*. London: Thames & Hudson, 2006.

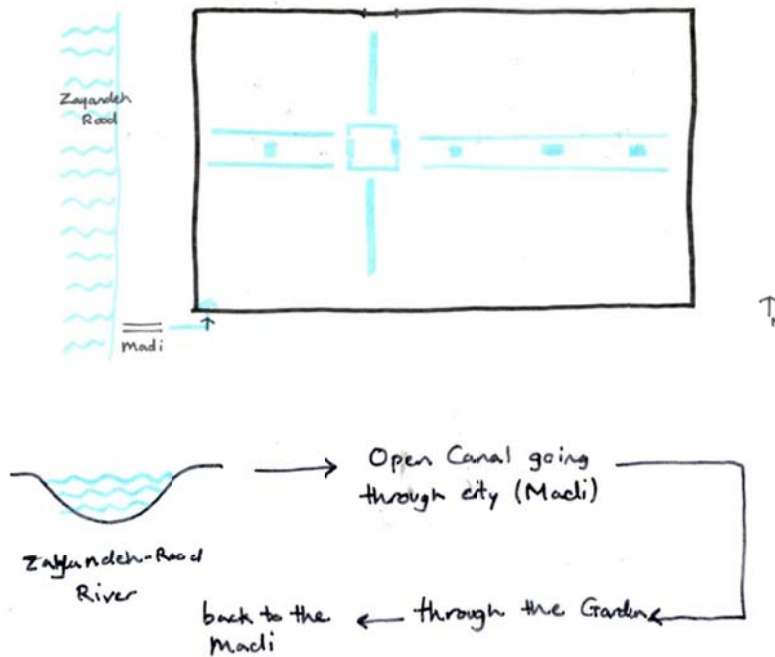


Figure 47: The water resource system of Hasht-Behesht Garden

The Zayanderoud River that goes through the city of Isfahan was the main resource of water for Isfahan and the Yazd province before it dried out. The water was mostly used for daily use and agricultural irrigation. The river water entered the city by the means of some aboveground aqueducts called *maadi*. The Chehel-Sotun and Hasht-Behesht received water from these *maadis* and any excess water remaining after the pools and the plants were irrigated would be returned back to the *maadi*.

- Tenets for group 1 are as follows:

- 1- Water is a primary element in an Islamic garden.
- 2- The source of water can be of any kind (snow melt, qanat, natural spring, river, etc).
- 3- Water is brought to the garden either naturally or artificially.

If the topography of the site allows natural water flow from the source of water to the garden, the water is then easily guided to the desirable position(s) via gravity. But if the natural flow goes away from the garden then the water is brought to site artificially, using pumps or whatever means is available.

4- The technology used for bringing the water to the garden is the technology of the day.

4.2: Softscape: Water: Form + Movement (still – flowing – jetting – cascading)

Water is manifested in the Islamic garden in four states: still, flowing, jetting or cascading. Based on the geographical and topographical context of the site, the scale and the overall design of the garden, the proportion of these states can vary.



Figure 48: Image chart for softscape: water: still


Softscapes : Water -Flowing-						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
 <p>A collage of five images showing water features at the Alhambra. It includes a close-up of a narrow channel with a small fountain, a view of a channel with fish, a large indoor courtyard with a central fountain, a close-up of a channel's edge, and a view of a channel flowing through a courtyard.</p>	 <p>A collage of four images showing water features at the Babur Gardens. It includes people sitting by a channel, a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, and a view of a channel flowing through a courtyard.</p>	 <p>A collage of five images showing water features at the Fin Garden. It includes a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, and a view of a channel flowing through a courtyard.</p>	 <p>A collage of two images showing water features at the Taj Mahal. It includes a view of the Taj Mahal reflected in a pool of water and a view of a channel flowing through a courtyard.</p>	 <p>A collage of four images showing water features at the Chehel-Sotun Garden. It includes a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, and a view of a channel flowing through a courtyard.</p>	 <p>A collage of four images showing water features at the Hasht-Behesht Garden. It includes a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, and a view of a channel flowing through a courtyard.</p>	 <p>A collage of four images showing water features at the Shahzadeh Garden. It includes a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, a view of a channel flowing through a courtyard, and a view of a channel flowing through a courtyard.</p>

Figure 49: Image chart for softscape: water: flowing







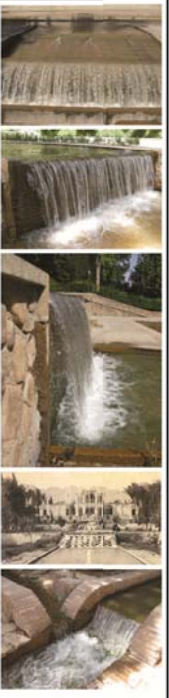
Softscapes : Water -Jetting & Cascading-						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 50: Image chart for softscape: water: jetting and cascading

- Court of the Myrtles and Court of the Lions, Alhambra, Granada, Spain.

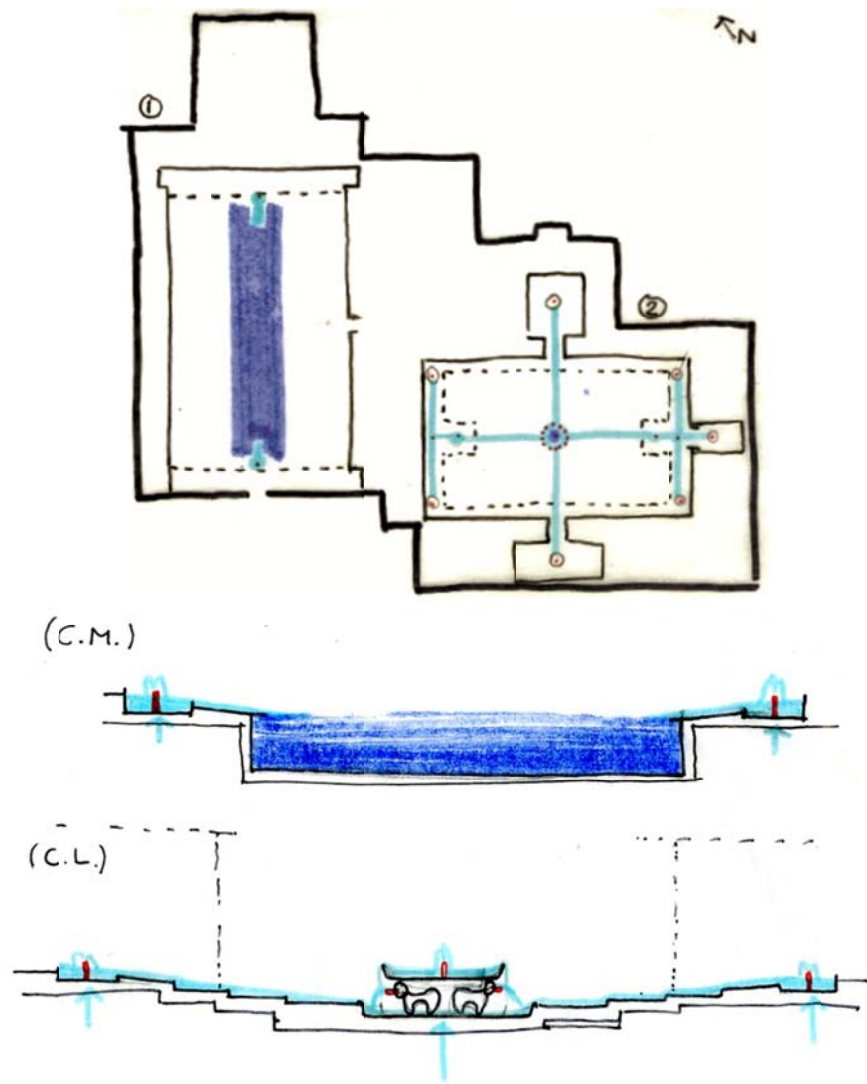


Figure 51: The state of water in the Court of Myrtles and the Court of Lions in Alhambra

The Court of the Myrtles is a rectangle divided in three sections, with the middle section occupied with a big rectangular pool of still water. At both ends of this pool are two small circular basins with a water jet in their center. The water jets out of these two small basins and runs into the pool in a subtle manner.

In the Court of the Lions the water spouts from the mouths of twelve lion statues and the large circular basin that they carry on their backs, falls into a circular channel at their feet. Also there are water jets at the start point of the cross axial water channels of the garden. The water enters these channels from the jets and then runs down from

surrounding pavilions, through the colonnade and then to the center of the garden to the circular channels under the lion water sculpture.

- Babur Garden, Kabul, Afghanistan.

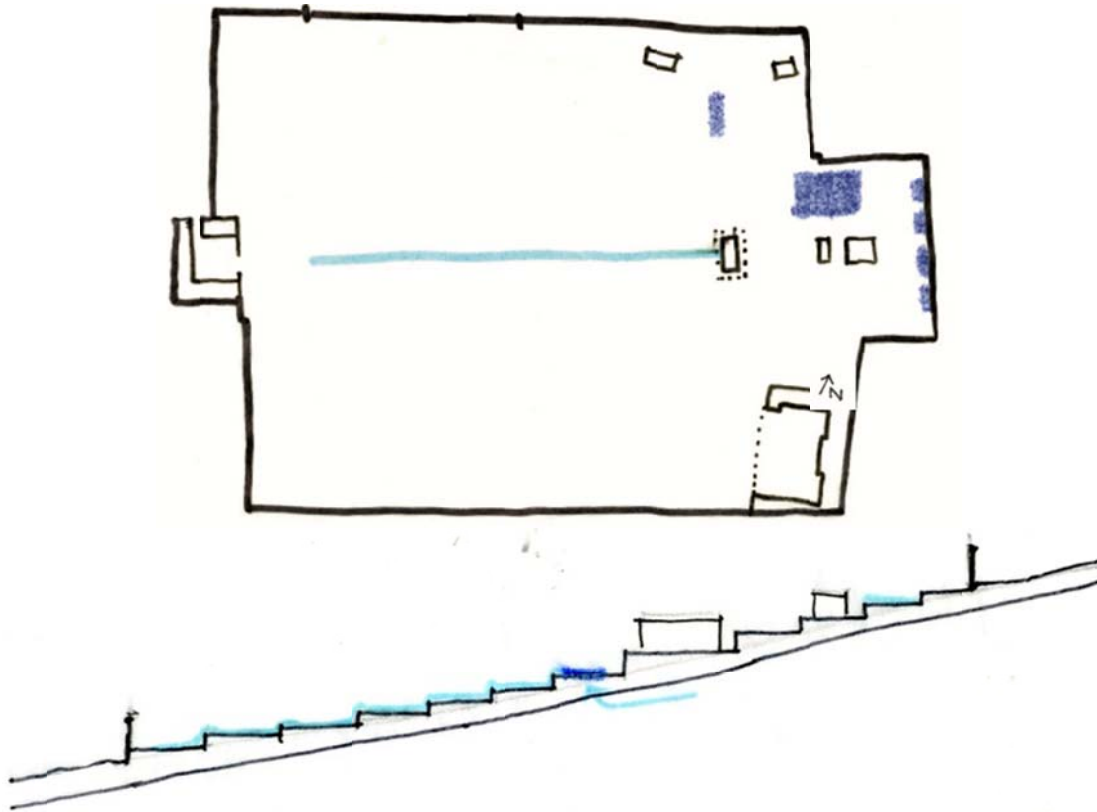


Figure 52: The state of water in the Babur Garden

In the Babur Garden a few water tanks capture water on the high point of the garden. From there, the water is brought to a pool in front of the main pavilion, from where it flows and cascades downward until it reaches the entrance area of the garden. After that it goes underground and the excess water flows out to the Kabul River.

- Fin Garden, Kashan, Iran.

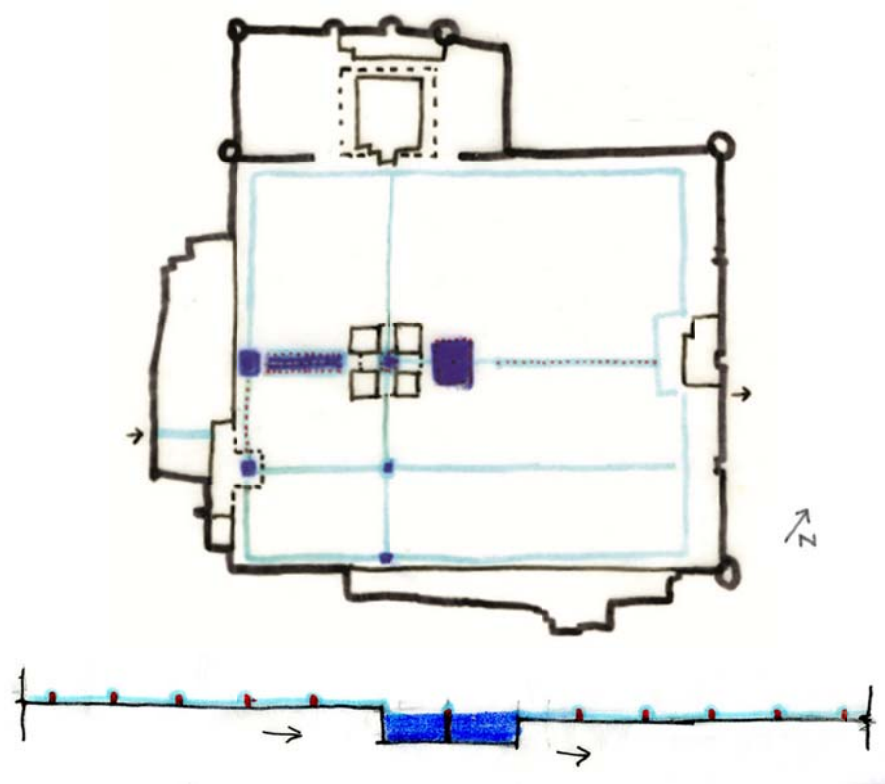


Figure 53: The state of water in the Fin Garden

In the Fin Garden there are two pools of still water on the two sides of the central pavilion in the garden along the main axis. There is also a pool of water inside the central pavilion. Around these pools there are little water jets. There are also flowing water canals in the garden. Two branches of these canals start from the source of water and follow the perimeter of the garden along the enclosure walls. One runs parallel to the main axis and another runs from the pool in the main axis toward the entrance. There are small water jets made of turquoise ceramic along the canal in the main axis. All of these flowing water canals meet in front of the entrance and from there the water goes underground to irrigate the agricultural fields in the village of Fin.

- Taj-Mahal Garden, Agra, India.

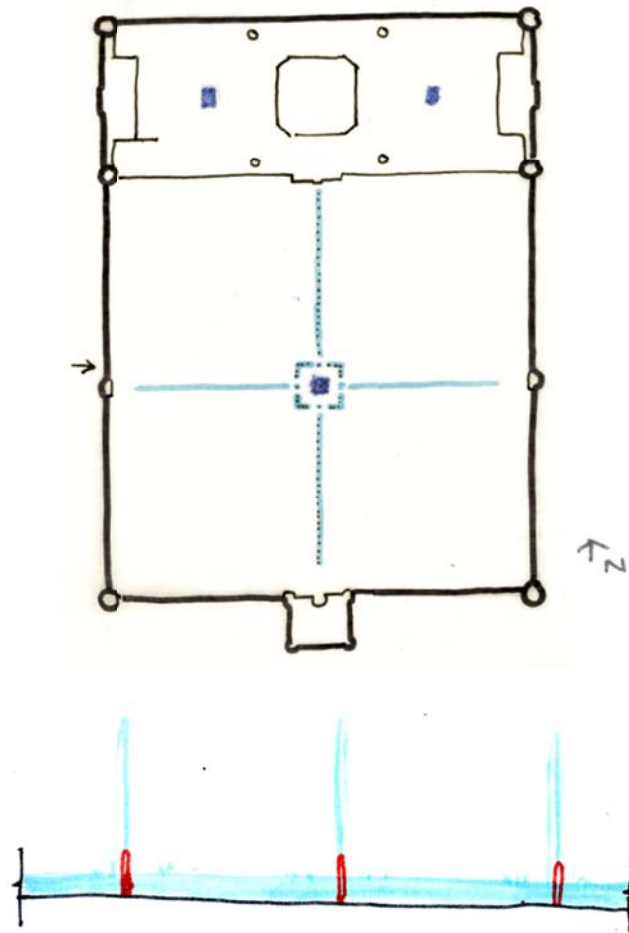


Figure 54: The state of water in the Taj-Mahal Garden

As mentioned in the last section, the water is obtained from the northwestern water intake, carried along the western side of the garden, and piped into it from a wall pavilion on the west side. It irrigates four cross-axially flowing water canals that meet in the center of the garden where there is raised pool of still water. There are water jets running down the middle of the main axis in the water canals and around the pool. There are also two water pools on the raised bed on both sides of the monumental Taj Mahal tomb.

- Chehel-Sotun Garden, Isfahan, Iran.

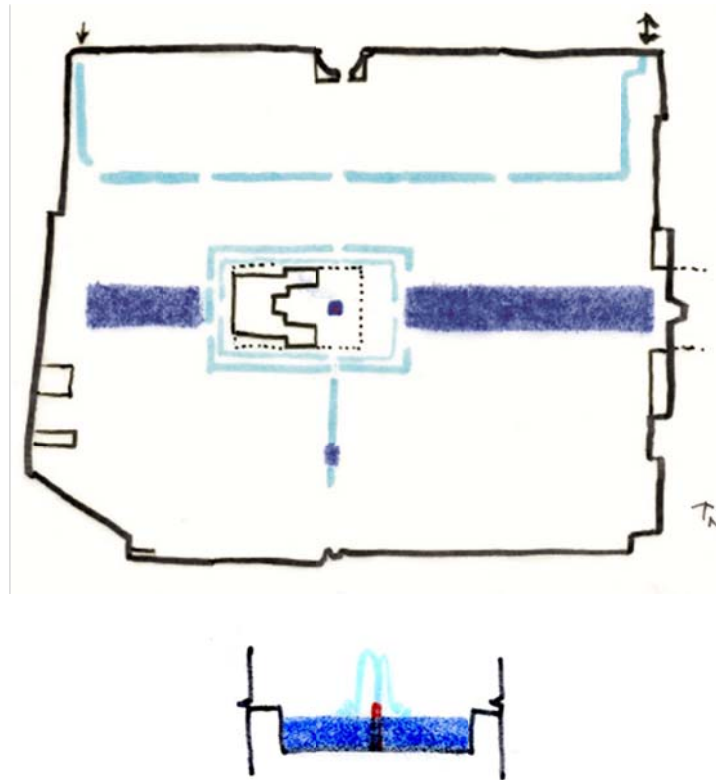


Figure 55: The state of water in the Chehel-Sotun Garden

In the Chehel-Sotun garden there is a very large pool of still water that occupies a big area on the main axis. This still body of water acts as a mirror to reflect (and thus double) the twenty great wooden columns that hold the *portico*-like space aloft and give the garden and the pavilion its famous name of Chehel-Sotun, meaning “forty columns.” There is another smaller pool of still water on the main axis behind the pavilion as well. And there are two rows of flowing water canals, the inner one smaller than the outer one, around the pavilion. Because the site of this garden is rather flat, there are no dramatic water cascades. The only water jet belongs to the small basin in the *portico*-like space of the pavilion.

- Hasht-Behesht Garden, Isfahan, Iran.

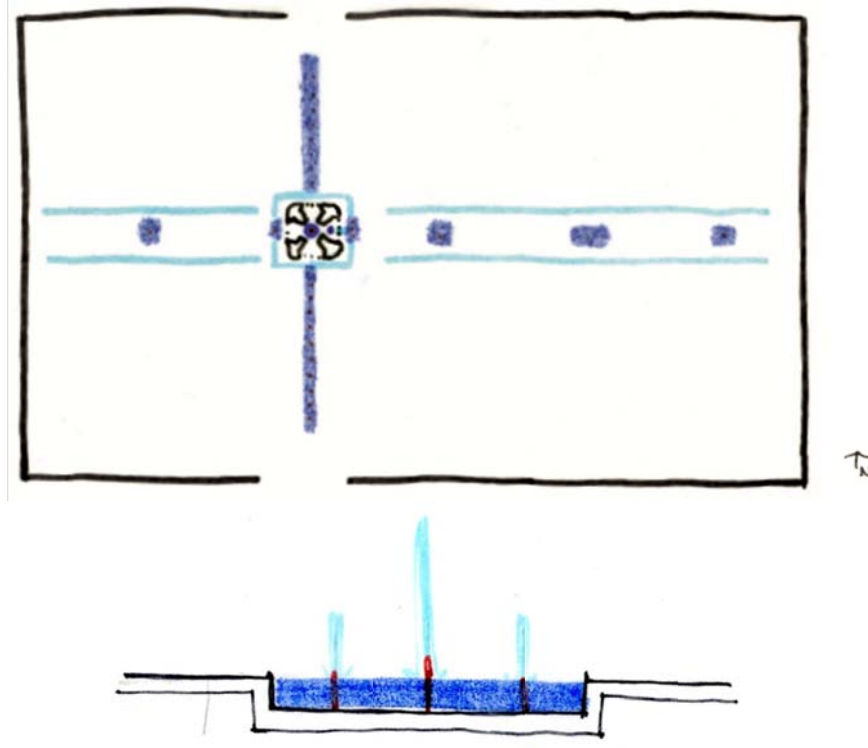


Figure 56: The state of water in the Hasht-Behesht Garden

In the Hasht-Behesht garden there used to be two rather long rectangle pools of still water on the main axis in front and on the back of the main pavilion. There also used to be two parallel flowing water canals perpendicular to the pools along the walk path and also small water pools in the middle in regular interval, and finally a shallow water canal surrounding the pavilion and small shallow water pools along each edge of the pavilion. But most of these don't exist any more today and are filled with plant matter. Of the two big pools, only one that leads to the entrance remains today. There are three water jets inside it, the middle one is taller than the other two. Also remaining from the previous organization is a small shallow water basin set in the floor in the center of the magnificent pavilion with a central water jet.

- Shahzadeh Garden, Mahan, Iran.

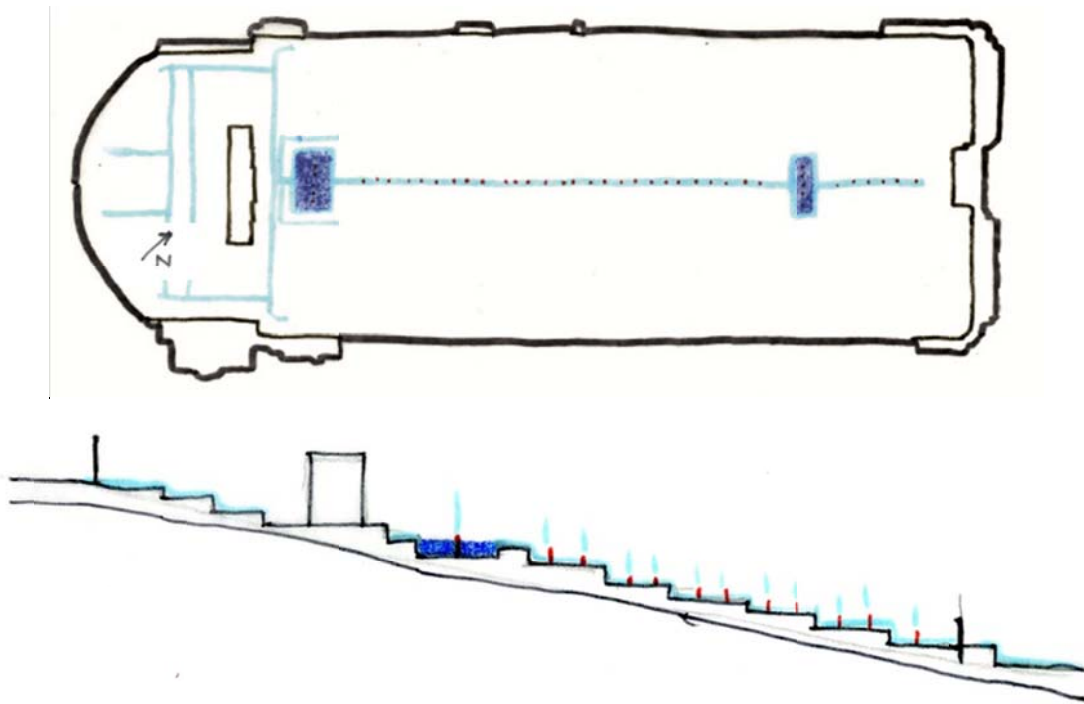
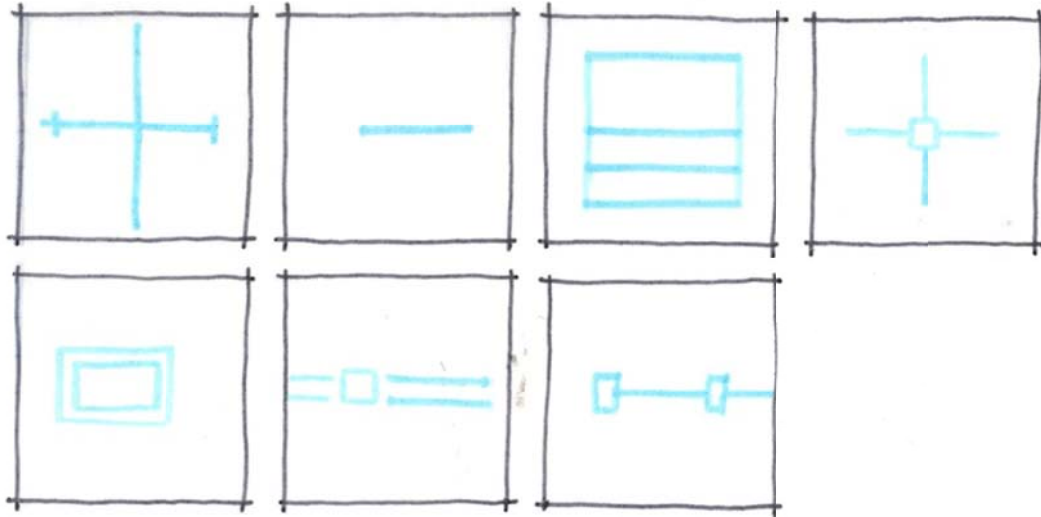


Figure 57: The state of water in the Shahzadeh Garden

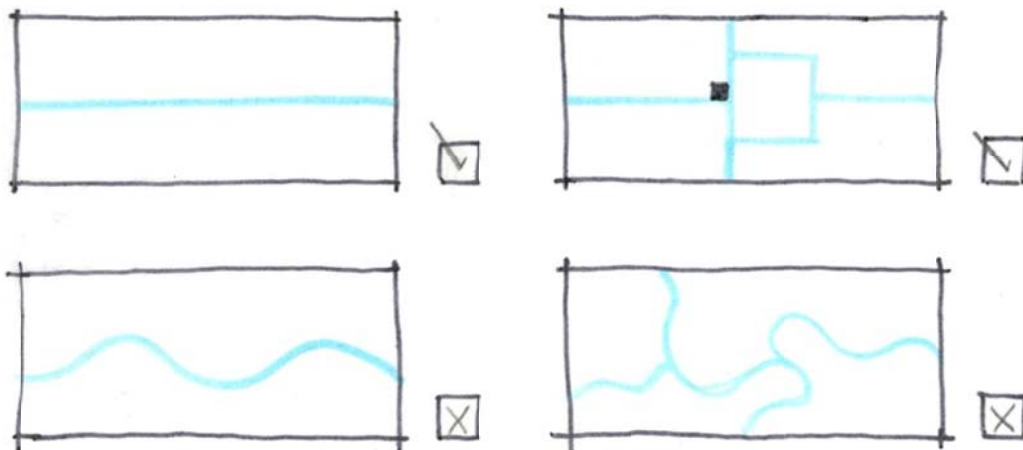
In the Shahzadeh garden water flows and cascades in water canals from where it enters the garden at the very back wall until it reaches the front of the pavilion in the main axis. There, the garden has a pool of still water that that reflects the beautiful pavilion facade. The water fills this pool and then cascades dramatically in seven stages until it reaches the entrance pavilion where there is another still water pool. There are dramatic water jets along the water canal in the main axis. The water retreats under ground on the other side of the entrance pavilion and then flows outward to irrigate agricultural fields in Mahan village. Because of the steepness of the site, the scene of the cascading and jetting water one sees within the garden is a magnificent and unexpected experience in the heart of the desert.

- Tenets for group 2 are as follows:

5- The layout of the flow of water in an Islamic garden follows various angular paths. These are a few examples:



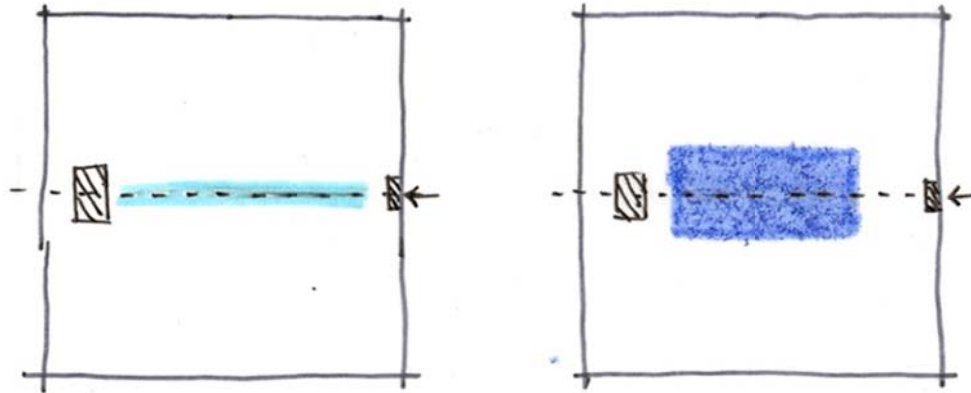
6- The water flows in a straight line and turns in 90 degree angles.



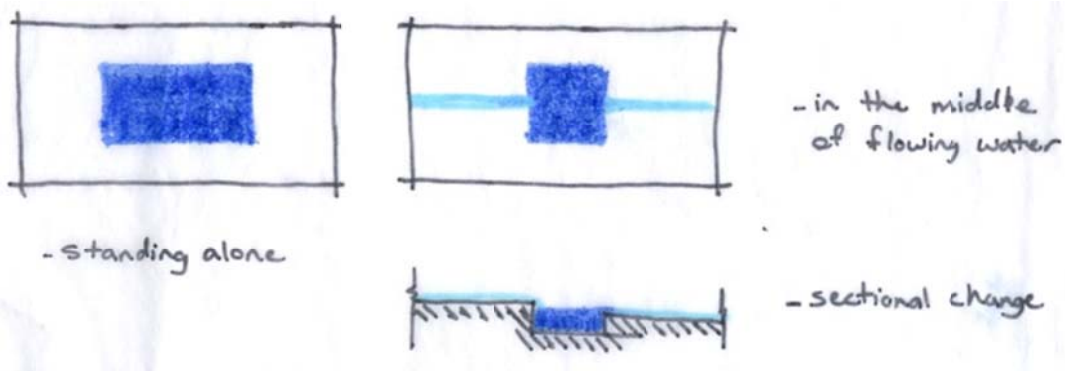
7- Water is never actually still in the garden, but in some parts it moves so slowly that it appears to be still.

8- Any percentage of the existing water in the garden can be flowing or appear still.

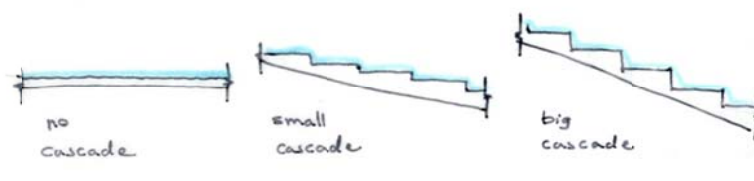
9- The central axis of the Islamic Garden (connecting the main building to the entrance) is typically occupied with a water channel or broad pool.



10- Still-looking water may be standing alone or may be placed along the route of the flowing water.



11- The water cascades wherever the topography allows. It almost always cascades and very seldom goes down on a slanted path. Even in these cases the slanted path consists of many cascades.



12- The direction of the water flow in the garden depends on the natural topography or slope.

13- Water jets could either throw water very high or low but the height is constant and regular among the jets.

14- The number of water jets in a row is an odd number (1,3,5,7...)

4.3: Softscape: Water: Color

We typically think of the color of water as blue or clear, but by looking at the pictures below, we understand the perception of the color of water can depend on the container, its state and surrounding. Designers should take this into consideration since visual experience greatly influences the total experience one has in a space.

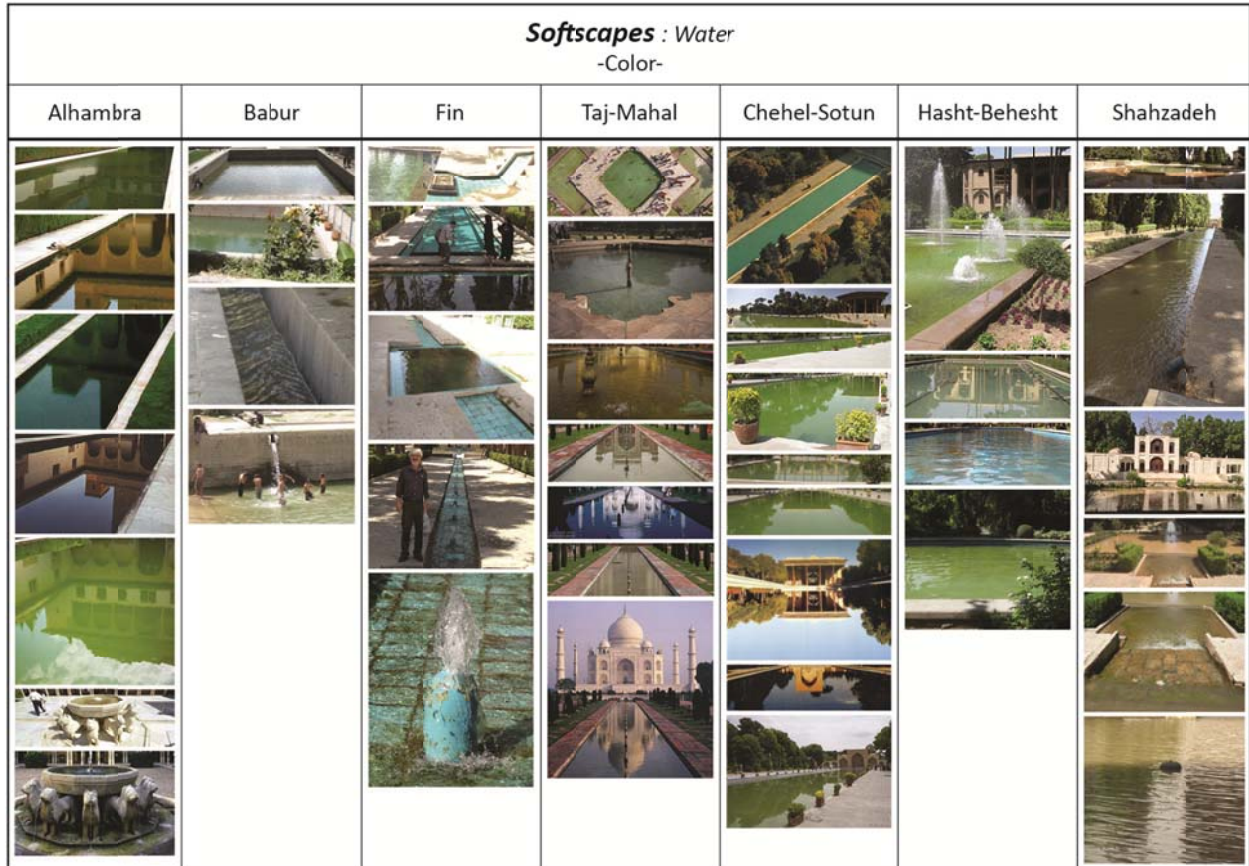


Figure 58: Image chart for softscape: water: color

- Tenets for group 3 are as follows:

15- When water appears still, it forms a reflecting surface (this is one main reason of having still water in Islamic Gardens). Like a mirror, it reflects what is around it, so that the color of water takes on the color of the plants and the buildings around it and the sky at any given movement. This depends on the time of the day and an observer's view angle.

- 16- If the canal bed is colorful, the water appears in that color. Turquoise and blue are very common, partly because of the glazed ceramic used to line the canal.
- 17- When the bed has a bright color, the color perceived from the reflection becomes secondary.
- 18- If the water bed remains the same, when flowing and still water are beside each other, still water appears darker (due to more depth).
- 19- Jetting and cascading water appear white/clear.
- 20- The color of the water is always blue or a range of white/gray/black or it reflects the surrounding.

4.4: Softscape: Plants: Tall trees – Small trees – Shrubs – Flowers - Arrangement

Unlike water, plants vary from garden to garden, but they also are unique to each Islamic garden and belong to specific environmental conditions. They might come in the form of tall trees, short trees, shrubs or flowers. The garden can have a composition of all of these or might not have all. The four following picture charts show the planting of the seven precedents. The columns that are empty indicate the lack of that plant type in that particular garden. The fifth picture chart in this set is showing the different or similar arrangements of plants in these gardens.







<i>Softscapes : Plants</i> -Tall Trees -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 59: Image chart for softscape: plants: tall trees






Softscapes : Plants -Short Trees -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 60: Image chart for softscape: plants: short trees








Softscapes : Plants -Shrubs -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 61: Image chart for softscape: plants: shrubs

Softscapes : Plants -Flowers -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 62: Image chart for softscape: plants: flowers








Softscapes : Plants -Arrangement -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 63: Image chart for softscape: plants: arrangement

- Court of the Myrtles and Court of the Lions, Alhambra, Granada, Spain.

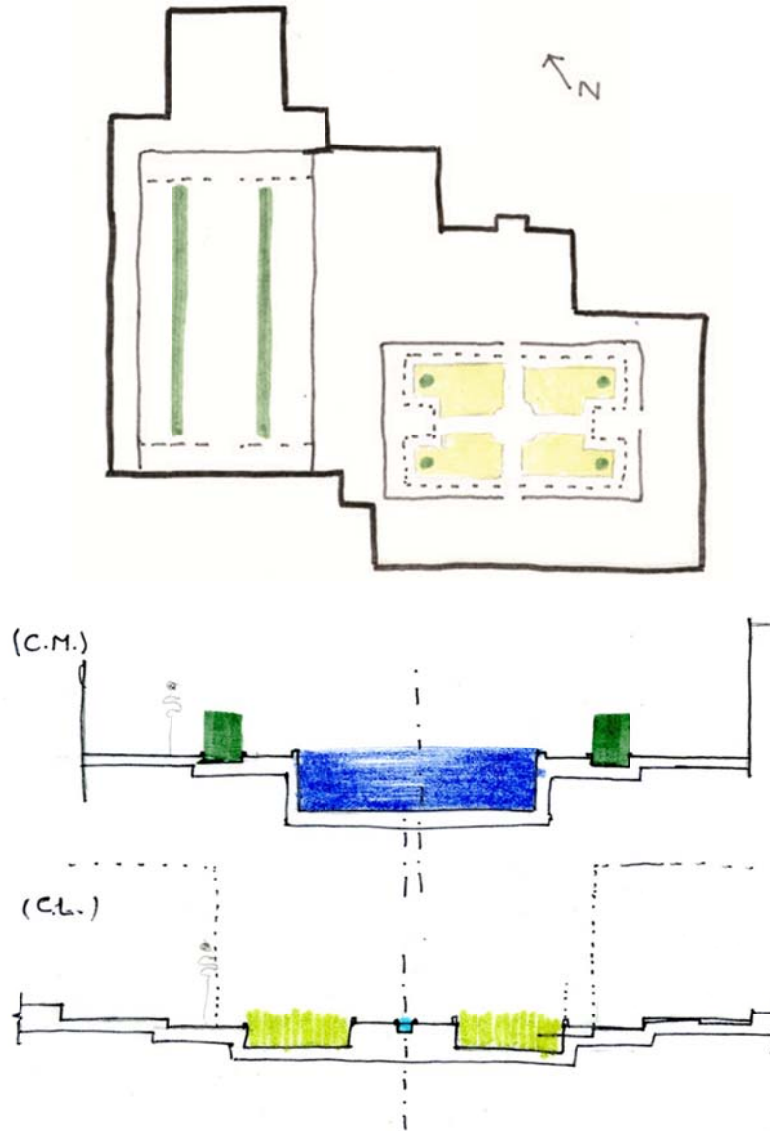


Figure 64: Plants in the Court of Myrtles and the Court of Lions in Alhambra

In the Court of the Myrtles two hedge rows of myrtle shrubs are cut to a strictly box shape and form two parallel rigid lines on the two long sides of the pool in the middle of the garden. These are the only plants found in this court which might be due to the smaller scale of the garden.

The court of the lions used to have four plant beds surrounding the cross axial pathways of the garden that were originally planted with orange trees that used to be planted 80 cm. lower than the pavement surface. Presently the original planting has not been replaced and the courtyard is void of any planting.³⁰

- Babur Garde, Kabul, Afghanistan.

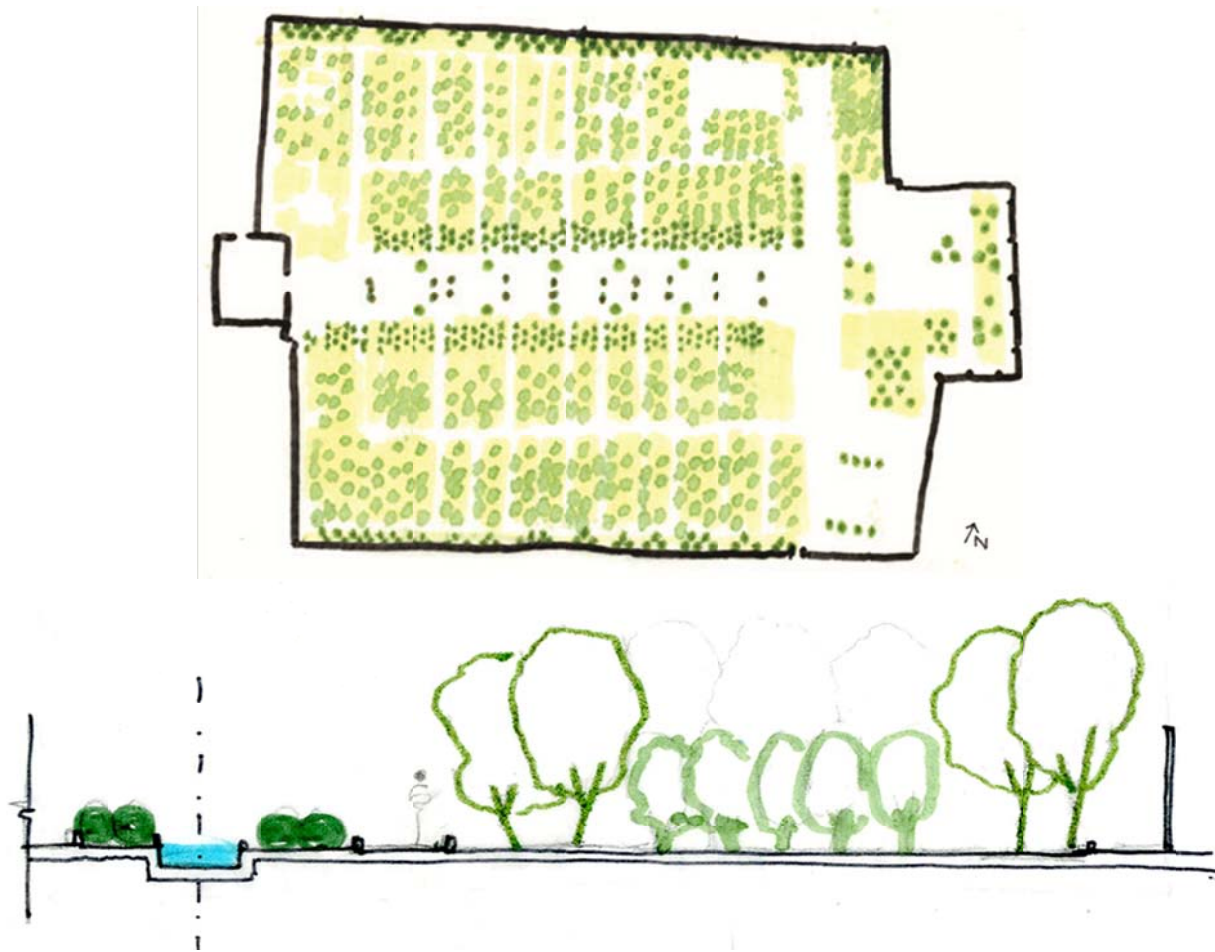


Figure 65: Plants in the Babur Garden

The new planting in the Babur Garden in by AKHCP aims to restore the character of the original garden through replanting the adjoined terraces as distinct orchards. In the plant beds adjacent to the water channel in the main axis a row of short shrubs is between the walkway and the water channel and on the other side of the walkway there is a row of tall plane trees. Another row of plane trees lines up by the walkway that goes around the garden right before the

³⁰ Ruggles, D. Fairchild. *Islamic Gardens and Landscapes*. Philadelphia: University of Pennsylvania Press, 2008.

boundary wall. Between the rows of these tall trees there are orchards with trees that would not get that high. Some beds in the garden contain rose shrubs that produce colorful and aromatic flowers.³¹

- Fin Garden, Kashan, Iran.



Figure 66: Plants in the Fin Garden

In the Fin Garden there are rows of old cypresses around all the plant beds surrounded by a row of hedge shrubs right before the pathways. The tall trees cast shadow along the pathways and make the experience cool and pleasant for the person coming into the garden from the hot and arid desert outside. Nowadays the plant beds are filled

31 Philip Jodidio, *The Aga Khan Historic Cities Programme: Strategies for Urban Regeneration* (Munich: Prestel, 2011). ; *Babur's Garden Rehabilitation Framework*. Kabul, Afghanistan: Aga Khan Historic Cities Program, 2004.

with turf grass and a few small shrubs but by looking at similar gardens in the region I suspect there were orchards, filled with trees such as plum, apricot, apple and cherry. Some annual flowers are currently planted in the bed along the still pool in front of the central pavilion.

- Taj-Mahal Garden, Agra, India.

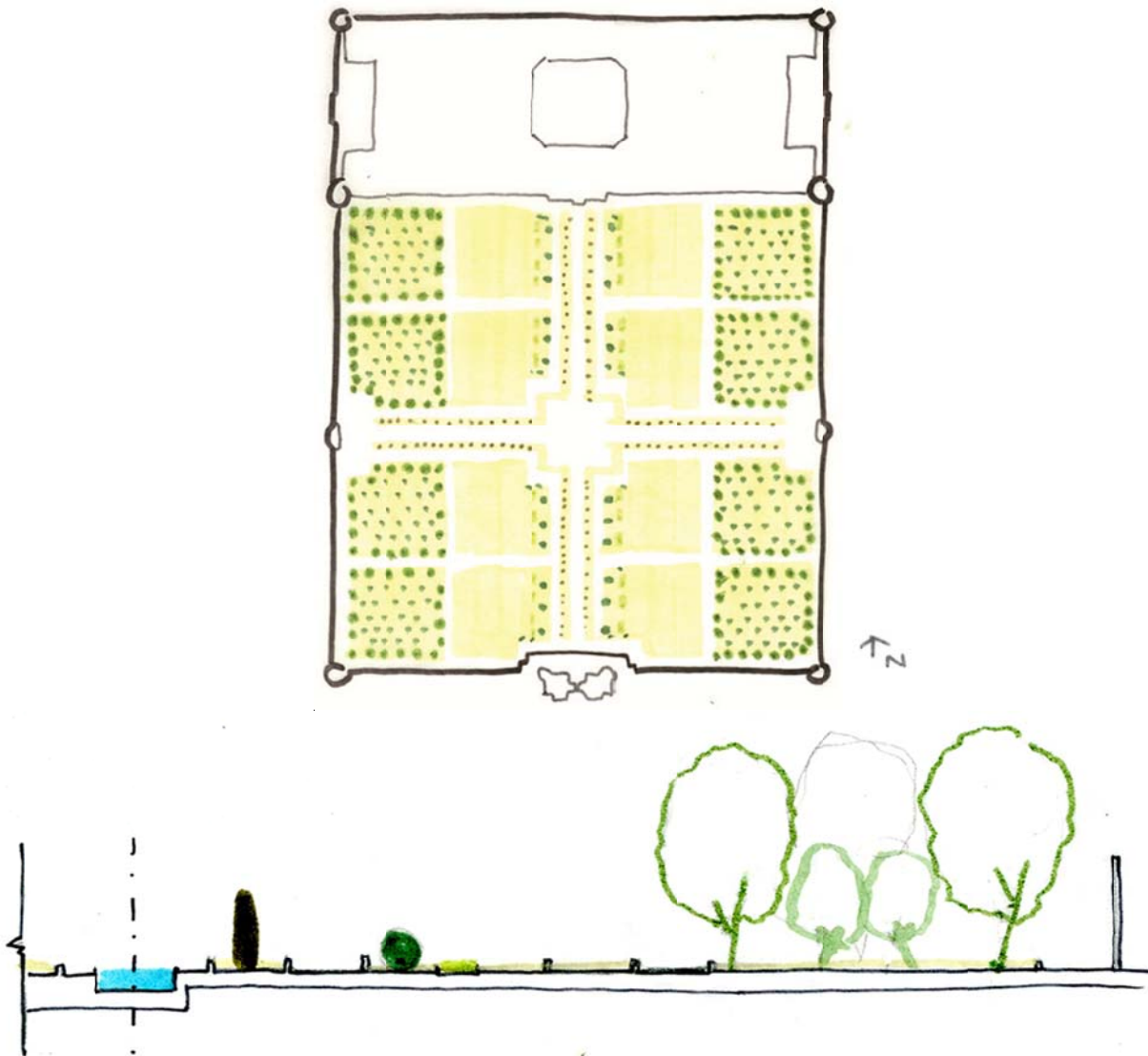


Figure 67: Plants in the Taj Mahal Garden

In the Taj Mahal garden the rows of trees and shrubs on the main axis along the pathways are short and spaced at intervals. This current planting scheme might be due to the climate of the site, which is fairly humid, and to

allow the air to flow (whereas big trees would shade the space). In the plant beds further toward the east and west wall though, larger trees are planted and more densely. This special arrangement of the shorter plants in the middle and framing with tall trees farther aside might be due to the contemporary designer's intent of keeping an open view to the magnificent marble monument. The big plant beds on the east and west of the main pathway are filled with turf grass and small annual flowers.

- Chehel-Sotun Garden, Isfahan, Iran.

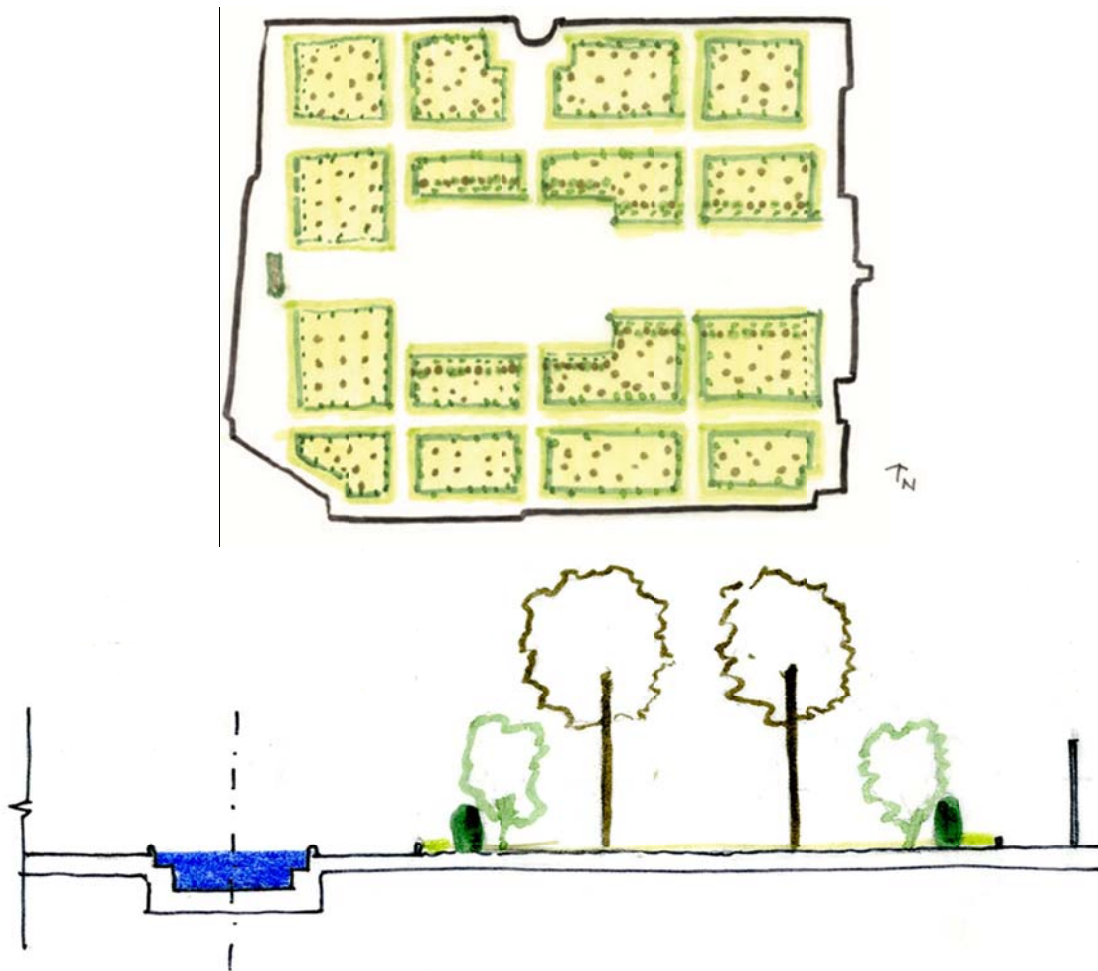


Figure 68: Plants in the Chehel-Sotun Garden

In Chehel-Sotun garden the plant beds are very similarly planted. From the outer edge they have a ring of short shrubs or perennial flowers, then a ring of shrubs or very short trees followed by a row short trees that are slightly

taller but not as tall as the trees that are planted in the middle of the plant beds. There also used to be a small bed of short rose plants that had colorful flowers framing the main pool but this bed does not exist any longer.

- Hasht-Behesht Garden, Isfahan, Iran.

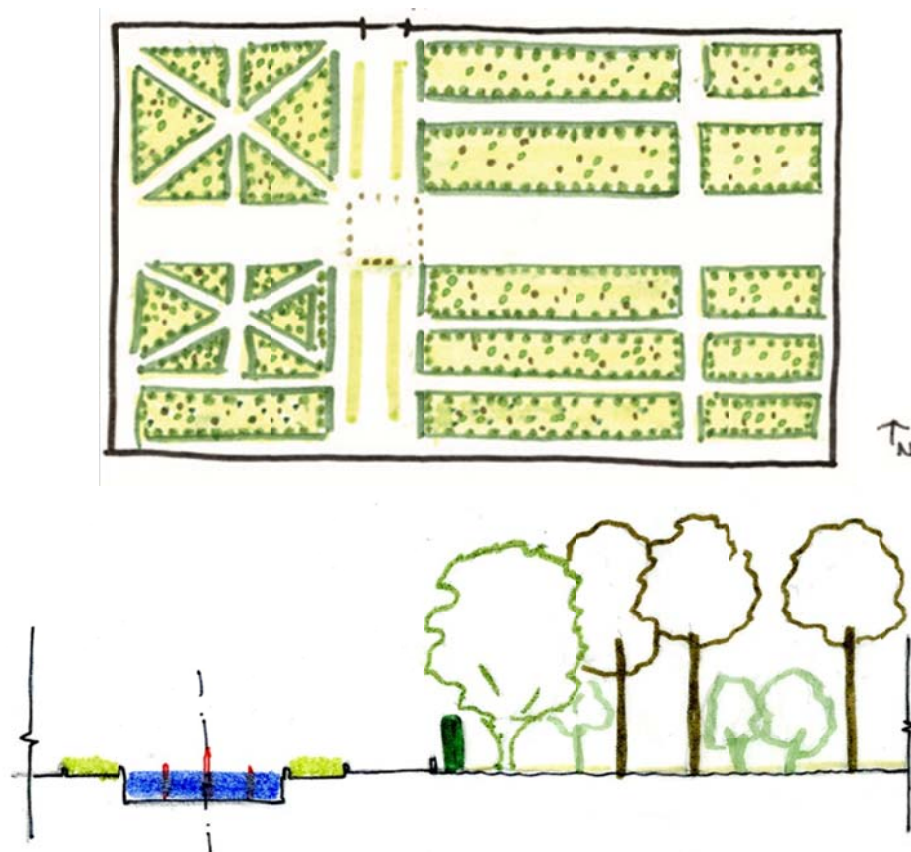


Figure 69: Plants in the Hasht-Behesht Garden

In the Hasht-Behesht there are short flowers and shrubs framing the pool and there are annuals where there used to be small pools around the pavilion next to each side of the building. There is also a row of old tall cypress trees around the pavilion that cast shadow on it. As for the other beds, they are framed with a hedge of shrubs and then there is a row of tall cypresses or elm trees that cast shadow on the pathways. Inside the plant beds there is a mixture of shorter trees and shrubs and sometimes a tall tree that seems randomly planted.

- Shahzadeh Garden, Mahan, Iran.

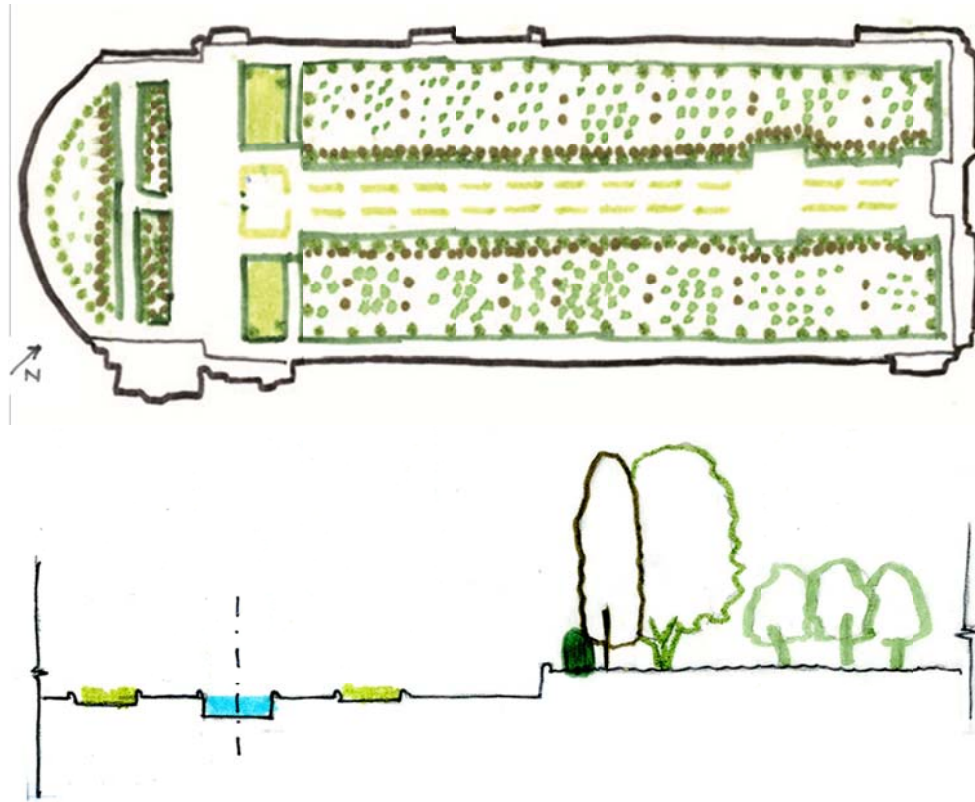


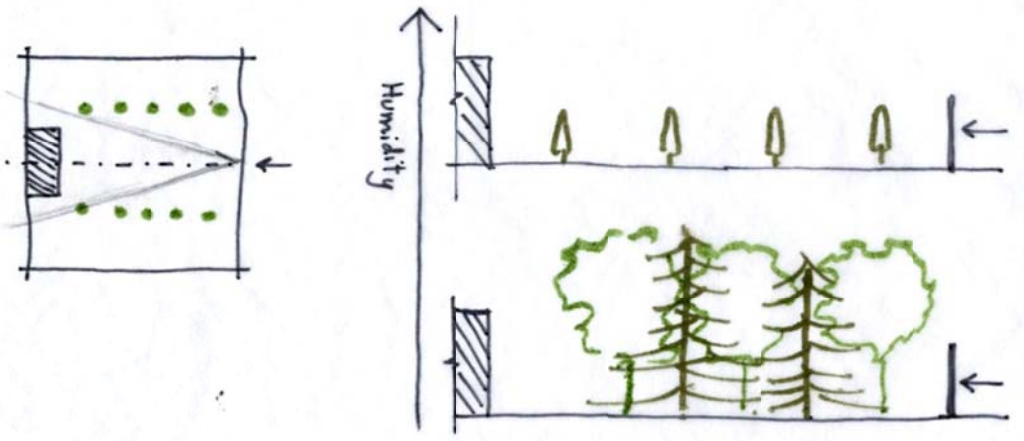
Figure 70: Plants in the Shahzadeh Garden

A row of beds filled with annual flowers lies along the magnificent water canal on each terrace. Otherwise, from the entrance of Shahzadeh Garden to the main pavilion there are two densely planted main beds that are also terraced parallel to the main pathways. These plant beds have very tall cypress and plane trees framing the view of the main axis back and forth from the main entrance to the pavilion and vice versa. Behind this row of tall trees is an orchard of mostly fruit trees such as pomegranate, fig, cherry, and apricot. There are two flower beds right in front of the pavilion to the sides filled with rose bushes. Behind the pavilion the beds are filled with tall plane trees and cypresses that work as the backdrop to the view to the pavilion.

- Tenets for group 4 are as follows:

21- Trees are planted in a row along the main axis to guide vision.

- In more arid climates these trees are more dense and tall.
- In more humid climates the trees are shorter and planted with more space in between.



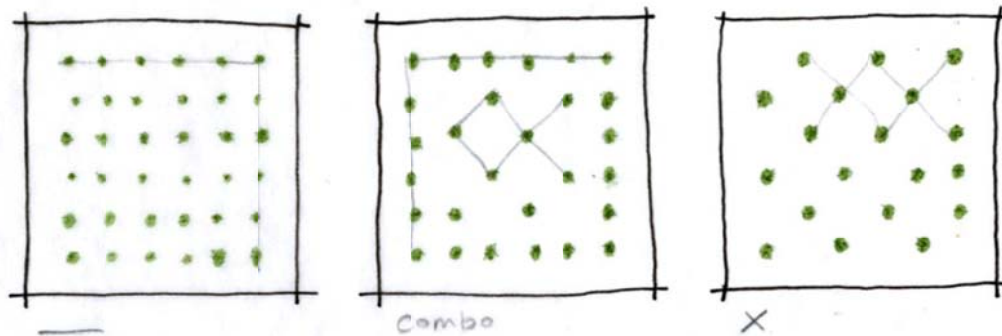
22- Tall trees provide shade in hot and arid climates.



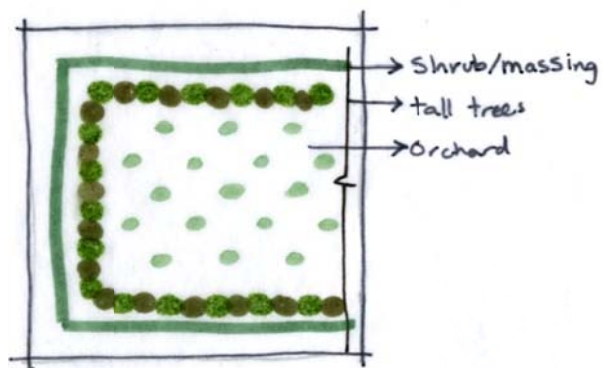
23- Short trees in Islamic gardens are usually fruit trees or medical trees and they are sometimes flowering trees.

24- The types of plants used in the garden depend on the region of the garden.

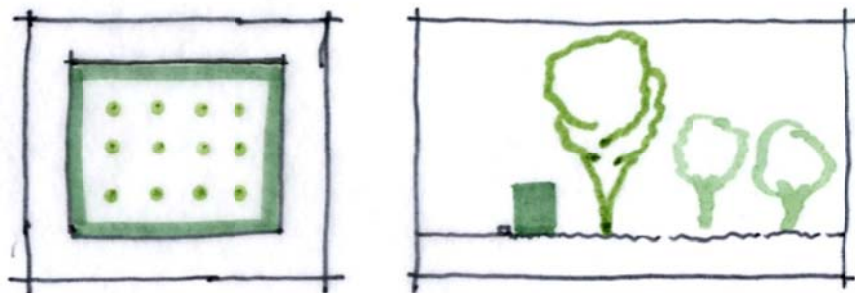
25- Trees can be arranged in a row, an X or diamond pattern.



26- If the garden contains orchards, the orchard tends to be toward the center or inner section of an arrangement.



27- Massing shrubs as hedges is a common way of framing plants.



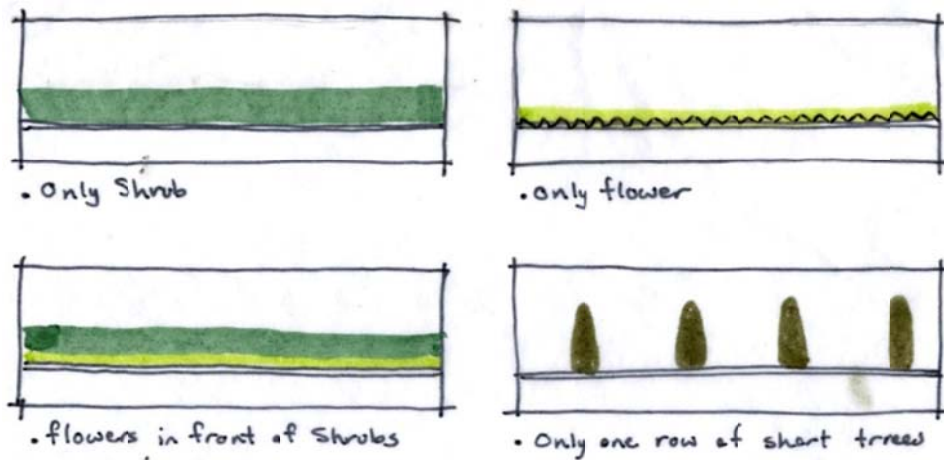
28- Both deciduous and non-deciduous trees are used in an Islamic garden.

29- Shrubs can be planted individually or in masses for framing purposes.

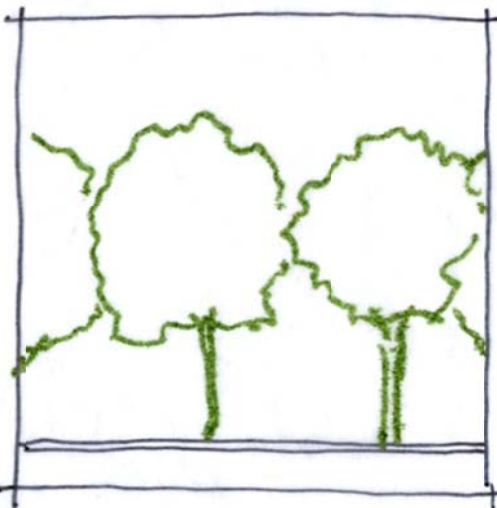
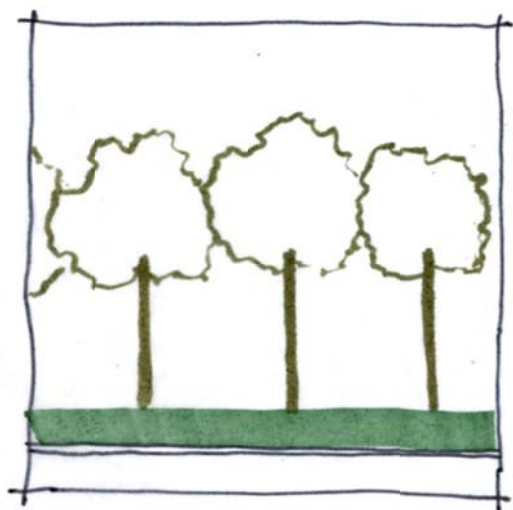
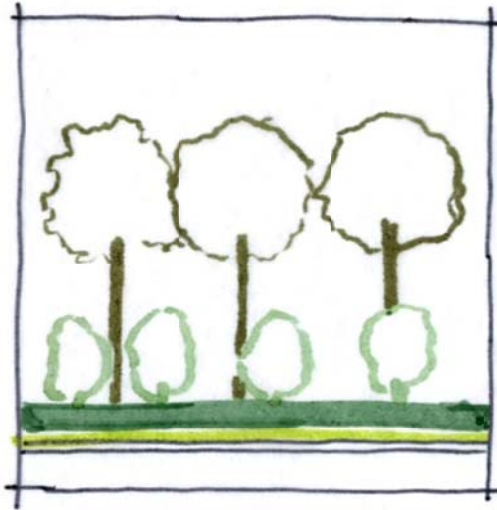
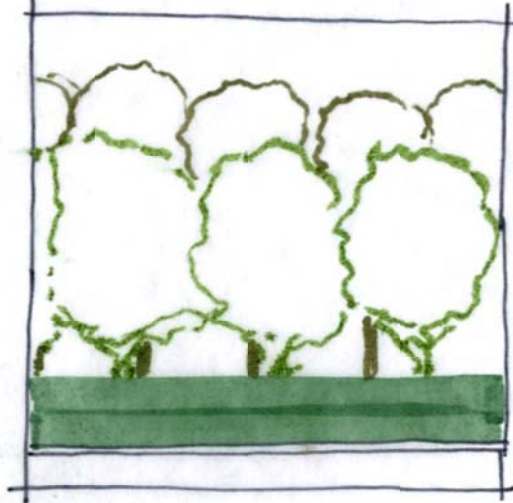
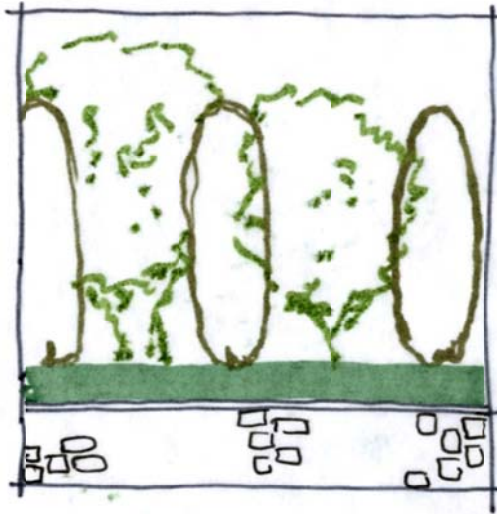
30- The ground cover flowers in the Islamic garden may be annual, perennials or biannuals. They are usually the common flowers of the region.

31- Flowers are either close to the pathways or the main building.

32- The arrangement of the plants along the edge of the plant bed can be various. These are a few examples:



Examples continue on the next page.



4.5: Softscape: Plants: Color

Plants add color and vibrancy to gardens, either with their summer foliage or winter structure. The flowers usually add accent around the points that the user of the garden is meant to be close to, which is by the pathways or close to the building. The existence of indeciduous trees (such as the cypress) in the gardens helps that the garden remains colorful throughout the cold months of the year as well and of course this color depends on the type of the plant and season.







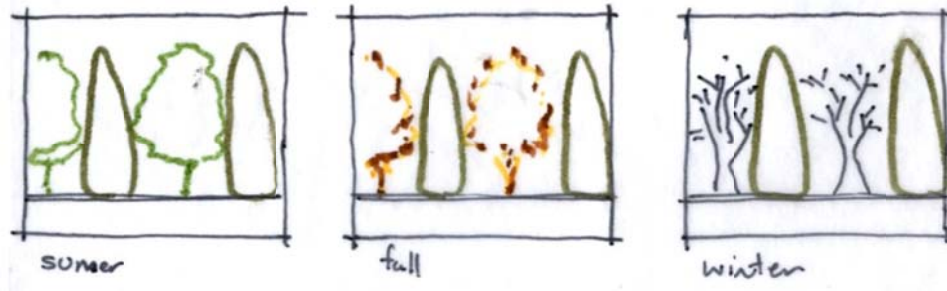
<i>Softscapes : Plants</i> -Color -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						

Figure 71: Image chart for softscape: plants: color

- Tenets for group 5 are as follows:

33- The colors of the plants in the garden change with season, and this is something to have in mind when combining deciduous and indeciduous trees in a design.



34- All colors are possible in flowers.

35- The green color of the foliage is a dominant color in plants in the garden.

36- The color of the soil in the plant beds depends on the region.

4.6: Hardscape: Frames: For Water & For Plants

Water and plant matter exist in Islamic gardens as well as other kinds of gardens but the geometry they appear in is different and, therefore, the experience one has in each one differs from one kind of garden to another. In the two picture charts below, one shows the frames that contain water in an Islamic garden, and the other picture chart shows the geometry of the plant beds in the seven precedents.

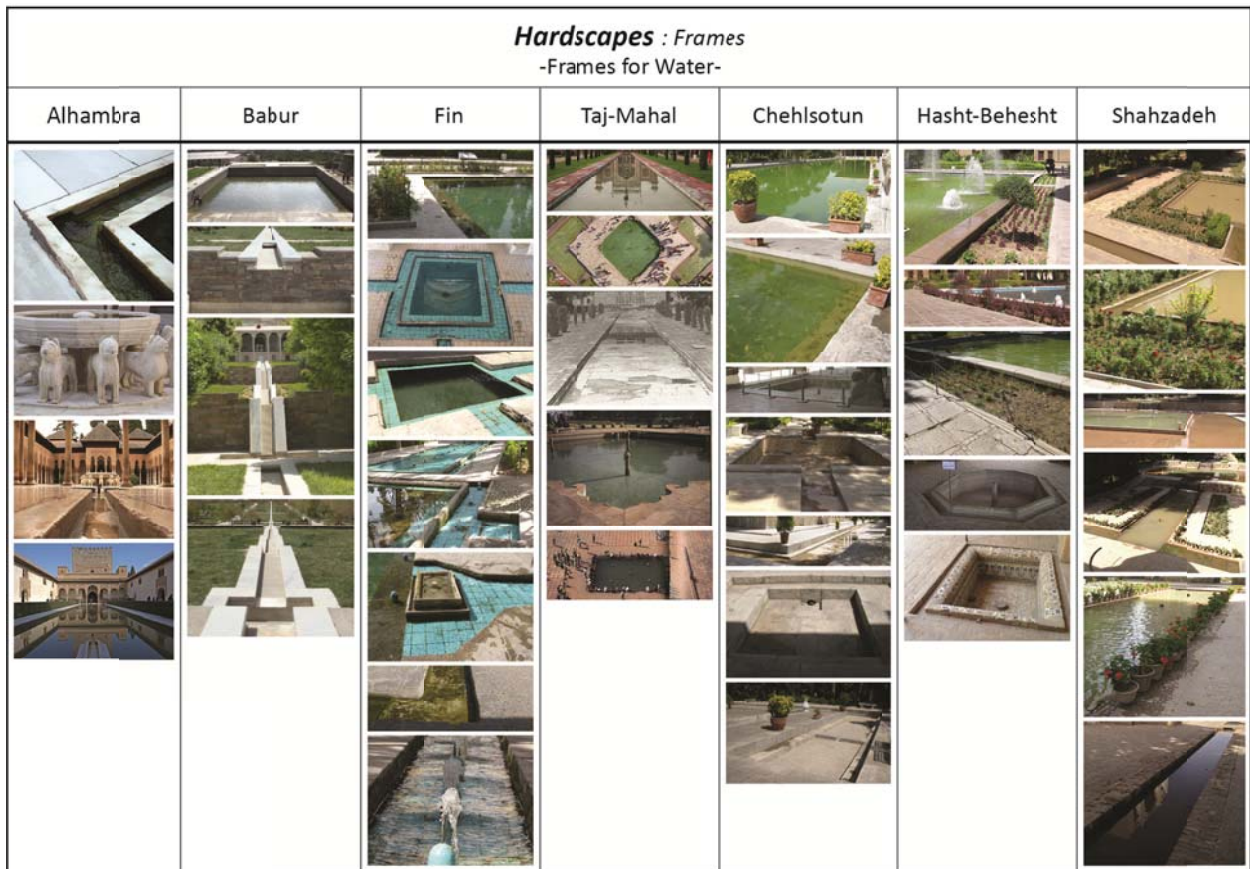


Figure 72: Image chart for hardscape: frames: frames for water

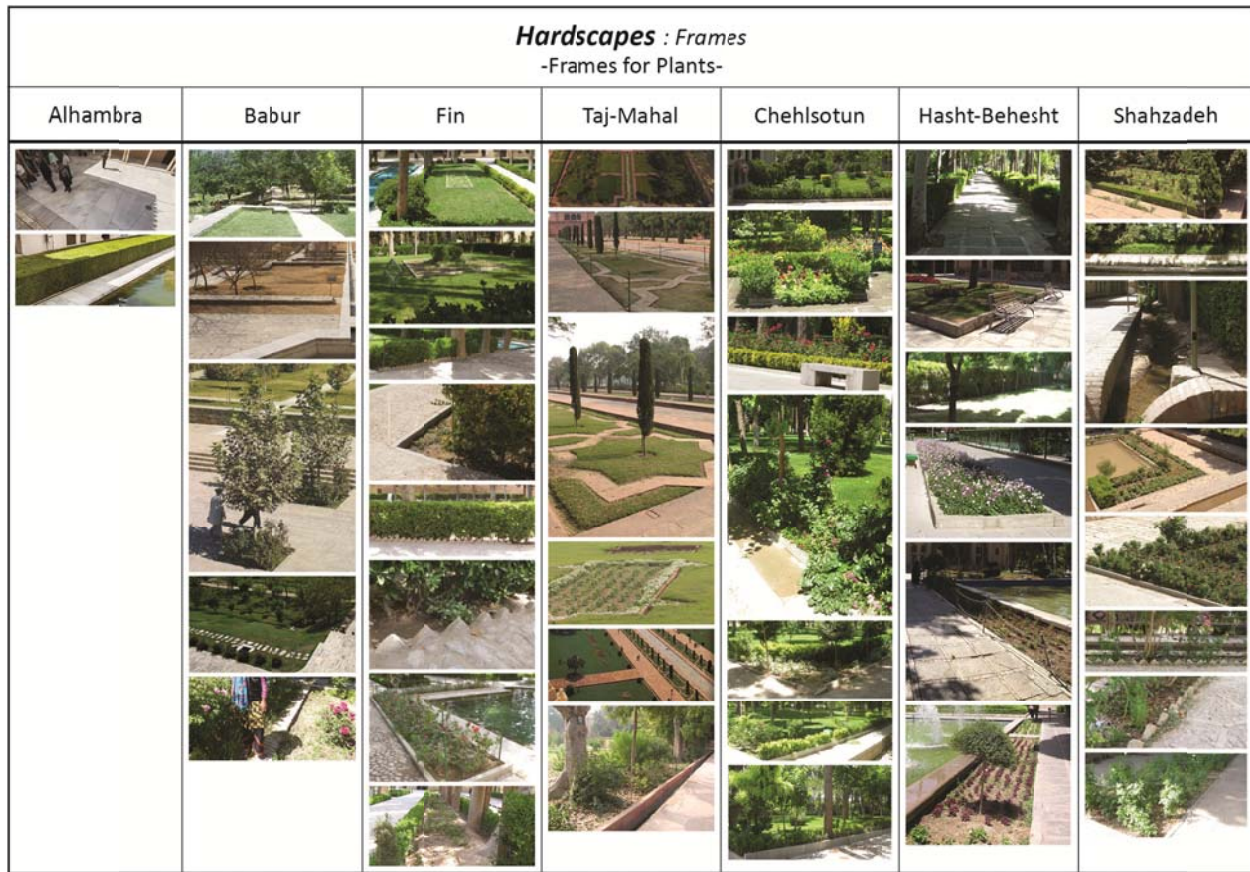
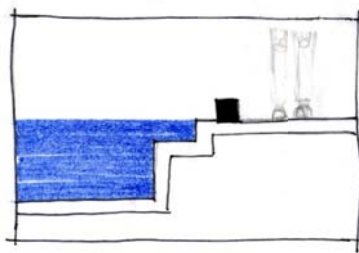


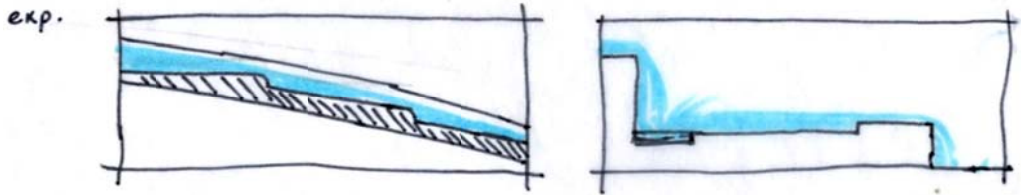
Figure 73: Image chart for hardscape: frames: frames for plants

- Tenets for group 6 are as follows:

37- There is always a visible physical boundary (frame) between the water and surrounding.

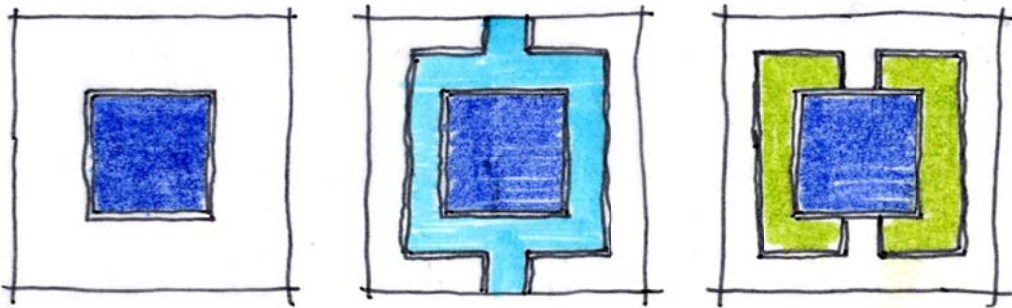


38- The section of the flowing water bed (canal) changes along its path for hydraulic purposes.



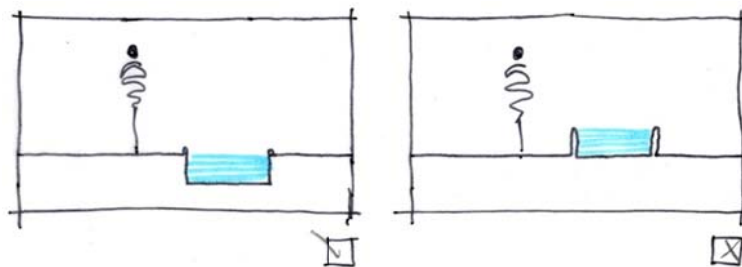
39- Still water pools can be framed in three different ways:

- Individually (touchable water).
- Flowing water around still water (Untouchable).
- Plants around still water (Untouchable).

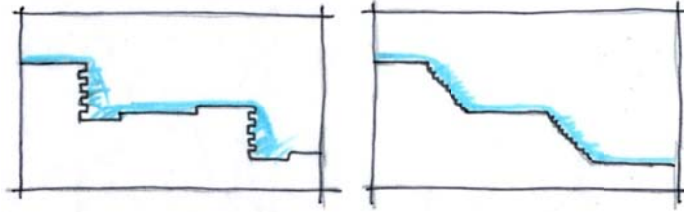


40- Pools usually have a rectangular shape, but they might also be octagonal or dodecagonal or take an Islamic ornamental pattern.

41- Water is almost always sunken in Islamic gardens.



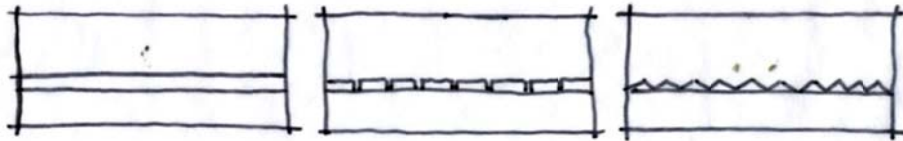
42- When the topography allows the water to cascade, the surface of the canal bed is formed so as to make this fall more dramatic.



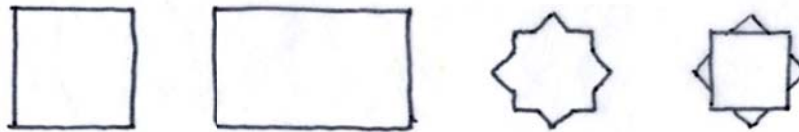
43- There is a visible physical boundary between plants and the surrounding.



44- The plant boundary can be made in different ways with various materials.



45- The geometry of plant beds is either rectangular or star-shape (by rotating squares).



4.7: Hardscape: Pathways: Main & Secondary

Pathways are very important in Islamic gardens since they guide the user through the garden experience. The visitor listens to the sound of the water and birds in the garden, watches, touches and smells the plants around, and it is via the pathways that she or he is actually *in* the garden. The main axis has a set of parallel walkways that lead to the main building which receives special design attention, to give the user a tightly controlled experience. The secondary pathways which are parallel or perpendicular to the main pathways are also important for other purposes such as circulation and accessibility to different parts of the garden.

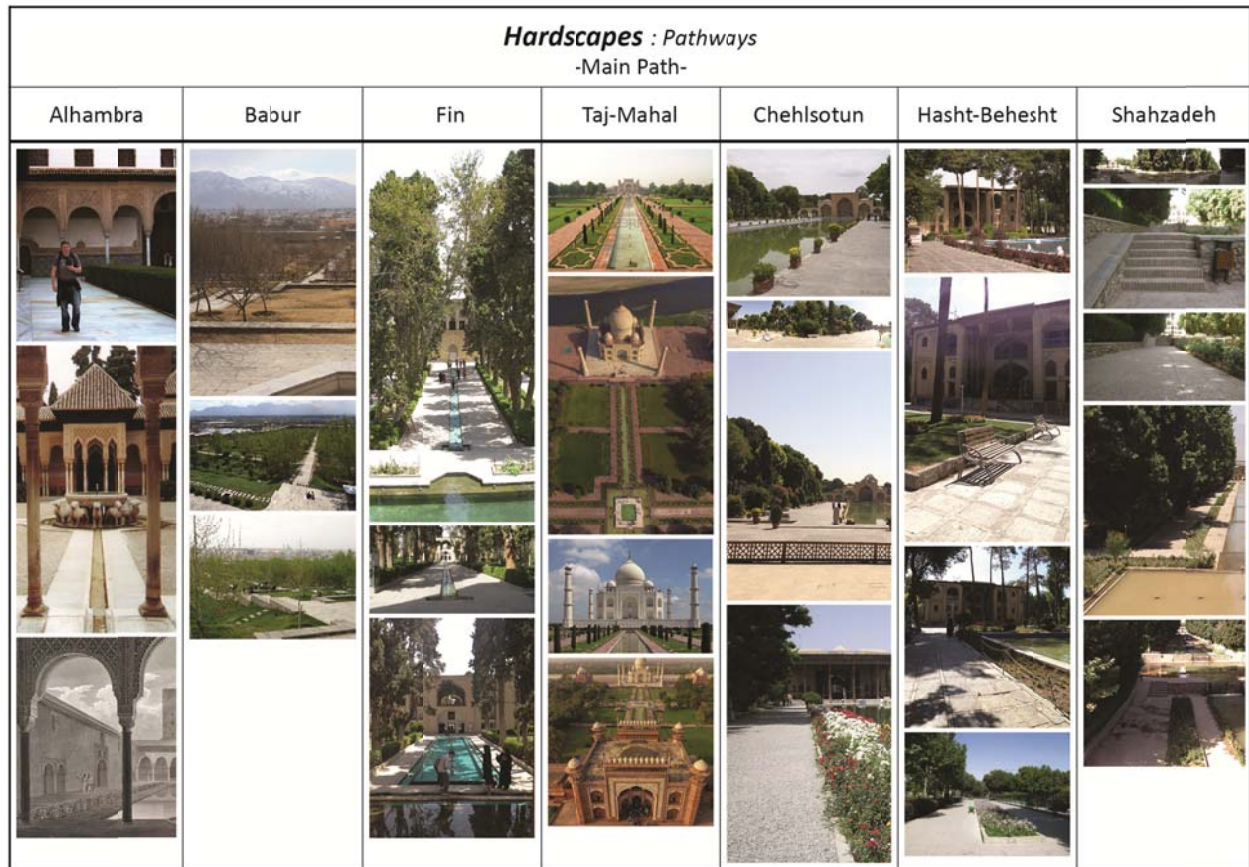


Figure 74: Image chart for hardscape: pathways: main pathways

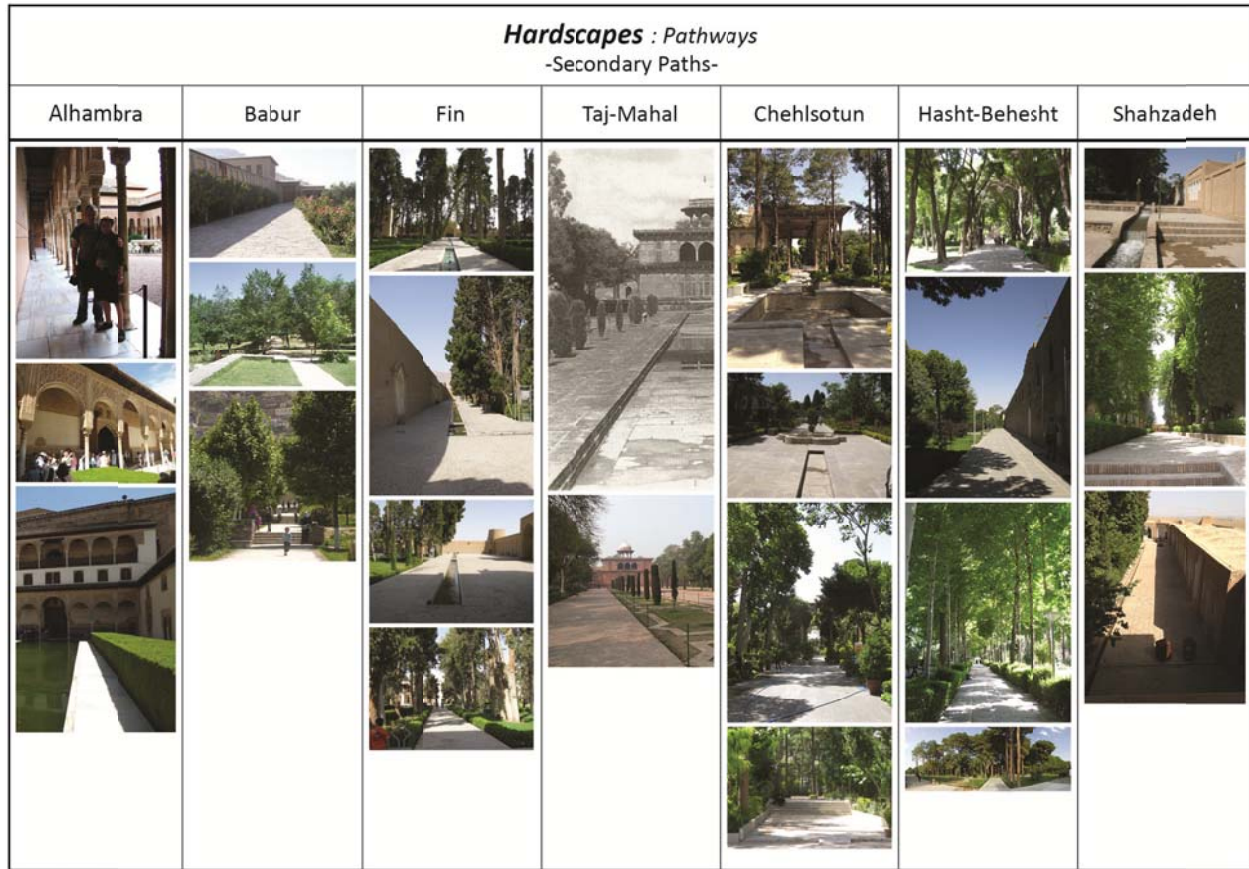


Figure 75: Image chart for hardscape: pathways: secondary pathways

- Court of the Myrtles and Court of the Lions, Alhambra, Granada, Spain.

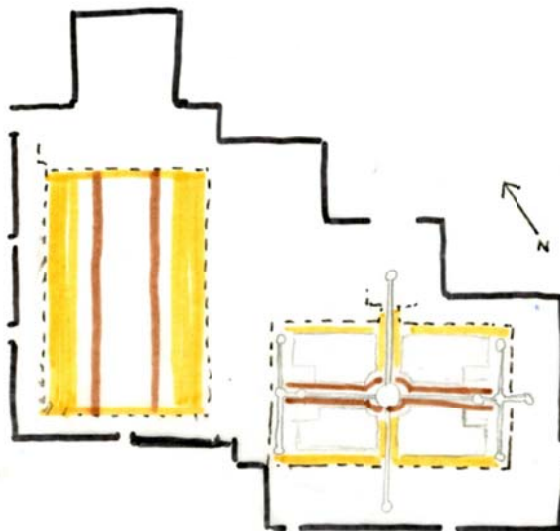


Figure 76: Pathways in the Court of Myrtles and the Court of the Lions in Alhambra

In the Court of the Myrtles the main pathways are rather small and pass between the pool and the myrtle shrubs, leading to the Comares Tower on the north side. The secondary pathways parallel to the main pathways are larger. In the Court of Lions the main and secondary pathways have equal width and go from the colonnade facades around the courtyard to the center where the lion water monument is.

- Babur Garden, Kabul, Afghanistan.



Figure 77: Pathways in the Babur Garden

In the Babur Garden the main pathways guide the user uphill from the entrance, along the water canal but opposite to the flow of water, to the main pavilion and then to the prayer room of Shah Jahan's Mosque and Babur's tomb. Many secondary pathways in this garden make the various areas of the garden accessible.

- Fin Garden, Kashan, Iran.

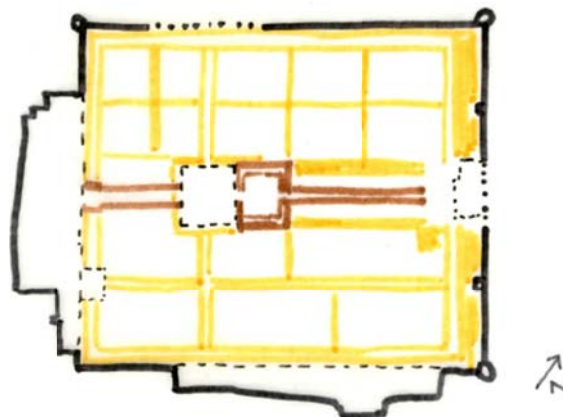


Figure 78: Pathways in the Fin Garden

In the Fin Garden two parallel pathways begin at the entrance, go through the colonnade of tall cypress trees beside the shallow water canal, and pass around a pool of water until they reach the pavilion. The pathway is not blocked by the pavilion but actually goes straight through it since the pavilion is open on the first floor. Then the pathway continues beside the second pool until it reaches the back wall. Secondary pathways go around the garden and through the garden beside other water canals and plant beds.

- Taj Mahal Garden, Agra, India.

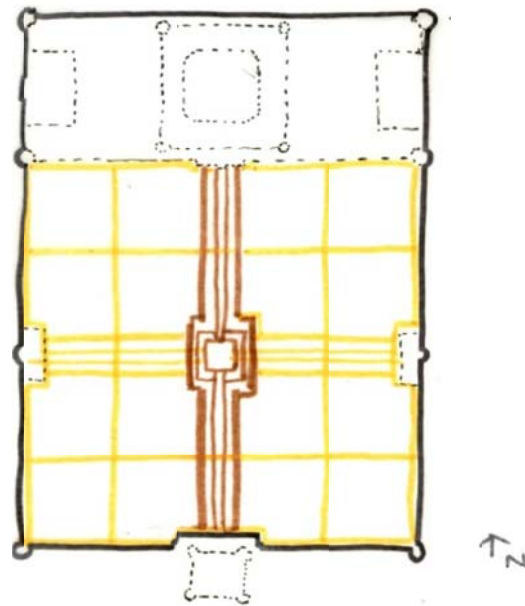


Figure 79: Pathways in the Taj Mahal Garden

In the Taj Mahal a set of four parallel pathways lead from the south entrance to the tomb. These are the main pathways with a magnificent view framed with plants and shrubs. Another set of four parallel pathways coming from the east and west entrances intersect with the main pathway in the center of the garden around the pool, thus forming a clear *chahar bagh*. There are other tertiary pathways as well around the garden and going through the plant beds.

- Chehel-Sotun Garden, Isfahan, Iran.

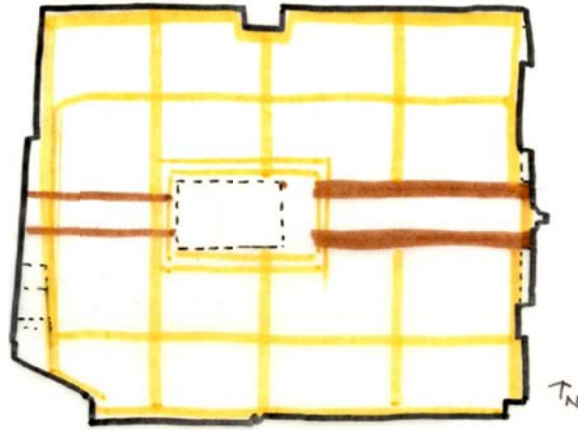


Figure 80: Pathways in Chehel-Sotun Garden

In Chehel-Sotun the main pathway takes the user alongside the big reflective pool of water, toward the beautiful central pavilion, passing around it and then continuing behind it toward the back of the garden. Secondary pathways go along the walls of the garden and through the plant beds.

- Hasht-Behesht Garden, Isfahan, Iran.

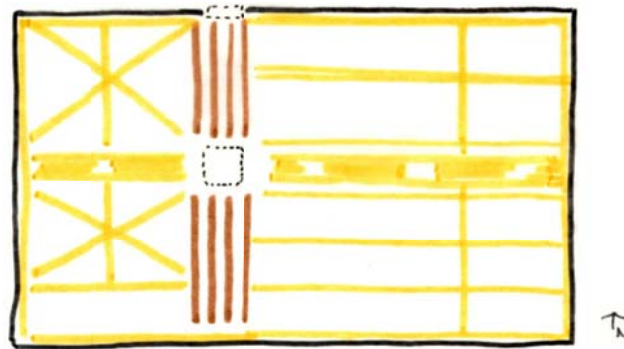


Figure 81: Pathways in the Hasht-Behesht Garden

In the Hasht-Behesht garden parallel pathways from the south and north go toward the main building. These form the main pathways of the garden with direct vision toward the pavilion. There are other pathways that intersect with the main pathways at the pavilion and some other going through the plant beds and around the garden by the wall. Formerly there were diagonal pathways that went through the west plant beds but these didn't exist in older Islamic garden designs and they are no longer present.

- Shahzadeh Garden, Mahan, Iran.

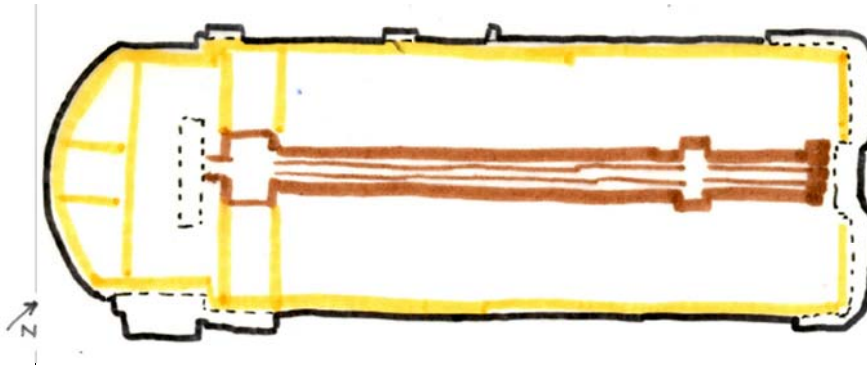


Figure 82: Pathways in the Shahzadeh Garden

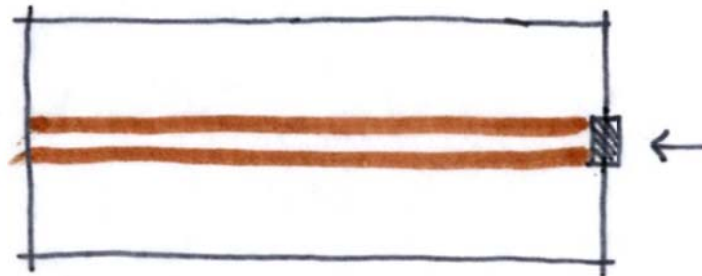
In the Shahzadeh garden's steep site, the main pavilion is on a terrace that is higher than that of the entrance so that the main path that goes from the entrance to the pavilion goes up against the flow of water that cascades and climbs the terraces with seven sets of stairs. A secondary pathway from the entrance goes around the garden by the surrounding walls and it also goes in between the plant beds behind the main pavilion.

- Tenets for group 7 are as follows:

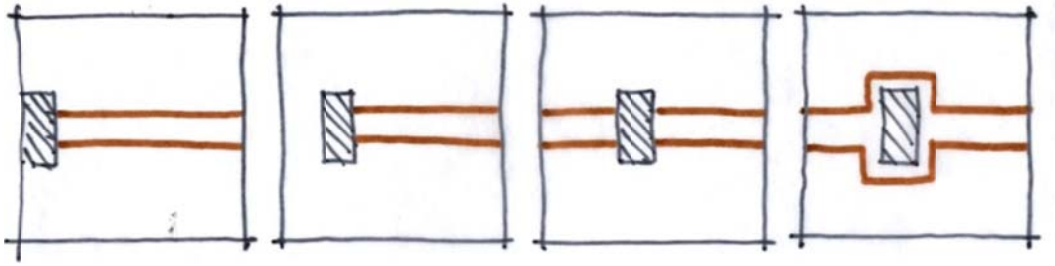
46- The body of water that occupies the central axis has a big influence on shaping the main pathway.

47- The main pathway does not occupy the central axis because water always occupies that line.

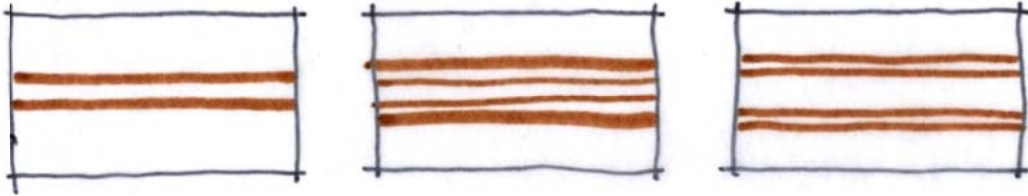
48- The main path starts from the entrance area and continues perpendicular from the wall of the entrance



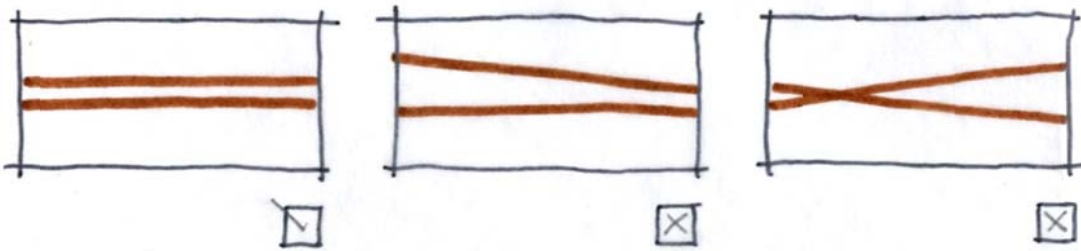
49- Main pathways are disrupted or cut off by the main building.



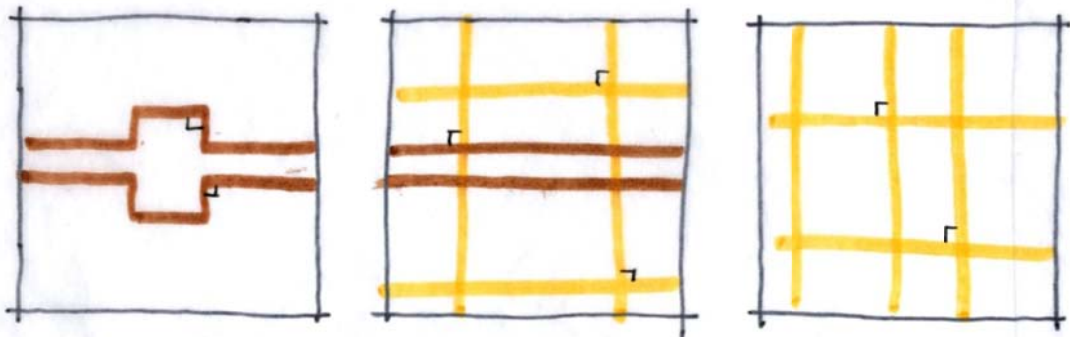
50- The main pathway consists of even number of paths (2,4,6...).



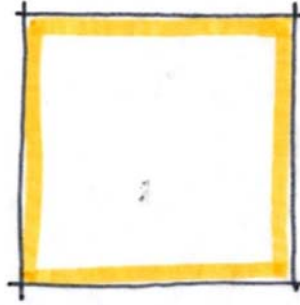
51- The main paths are parallel to each other.



52- Pathways are straight lines and turn in 90 degree angles when they need to change course.



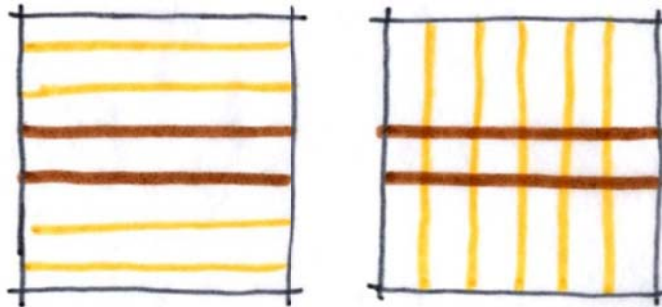
53- There is always a pathway around the garden on the inner face of the wall.



54- Stairs and ramps are used in the pathways as needed by the topography and they follow the other rules for pathways.



55- The secondary pathways are perpendicular or parallel to the main pathways.



4.8: Hardscape: Buildings: Main & Secondary

Gardens usually have buildings either inside or adjacent to them. Serving different purposes, the main buildings may be tombs or places for the king to hold ceremonies or receive guests, or for the royal or aristocratic family to enjoy the lovely setting of the garden. Secondary buildings might also include residential spaces either for the families or servants and gardeners, or may include service facilities such as baths or prayer rooms. Not all gardens have secondary buildings. The maps following these two picture charts show the main building in dark gray and the secondary buildings in hatched pattern. They also show the main and secondary entrances and the shape of the boundary of the garden in a dashed line. These elements will be discussed after the buildings.

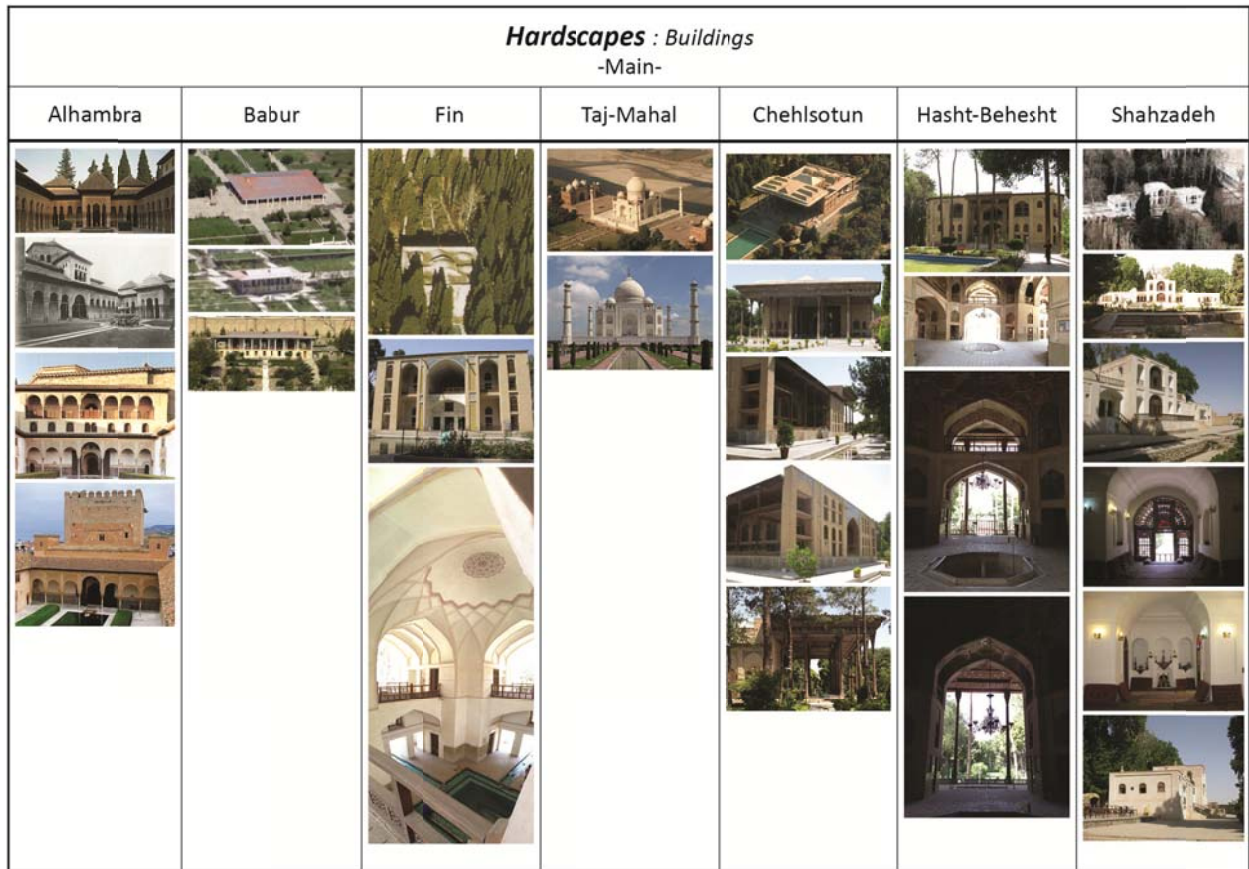


Figure 83: Image chart for hardscape: buildings: main buildings




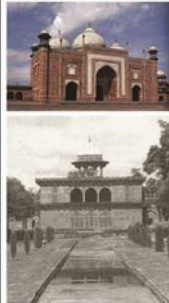


<i>Hardscapes : Buildings</i> -Secondary-						
Alhambra	Babur	Fin	Taj-Mahal	Chehlsotun	Hasht-Behesht	Shahzadeh
						

Figure 84: Image chart for hardscape: buildings: secondary buildings

- Court of the Myrtles and Court of the Lions, Alhambra, Granada, Spain.

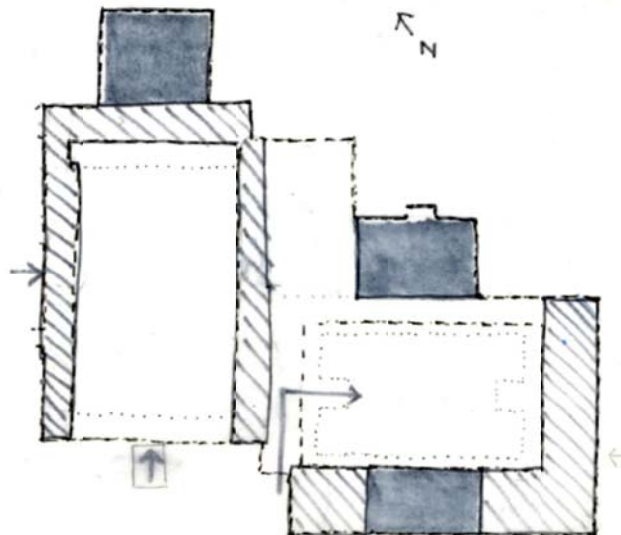


Figure 85: Buildings, entrances and the boundary of the Court of Myrtles and the Court of Lions in Alhambra

In the Court of the Myrtles the main building is the Comares Tower (containing the Hall of the Ambassadors) on the north side. In the Court of the Lions the main buildings are Hall of the Two Sisters and the Hall of the Abencerrajes on the north and south of the court. The north south axis of the water channel of this court extends to these halls reaching to a small circular water basin in the center of their main room. The secondary building of the Court of the lions is the Hall of the Kings on the east. Between the east rooms of the Court of the Myrtles and the Hall of the Two Sisters in the Court of the Lions there is a tertiary building that functioned as a bath-house.

- Babur Garden, Kabul, Afghanistan.

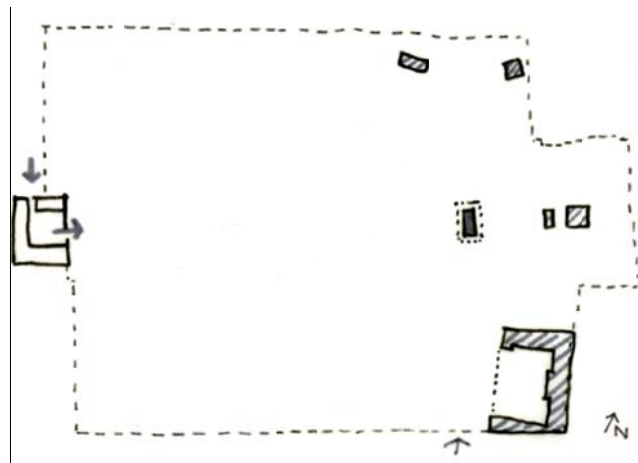


Figure 86: Buildings, entrances and the boundary of the Babur Garden

In the Babur Garden, even though Babur's tomb has high importance and provides the name of the garden, it sits at the very end of the main axis. On the axis from Babur's tomb toward the main entrance is Shah Jahan's Mosque which used to be the main building of the garden until another pavilion was built not so far in front of it. This pavilion was added to the garden by Amir Abdurahman Khan by the 1880s along with the Queen's palace which was a royal residence. This residence and a *Caravansarai* or guesthouse by the entrance and two small structures on the north which are recent additions to the garden are the secondary buildings. One of the newer structures is a water pump.³²

³² *Babur's Garden Rehabilitation Framework*. Kabul, Afghanistan: Aga Khan Historic Cities Program, 2004.

- Fin Garden, Kashan, Iran.

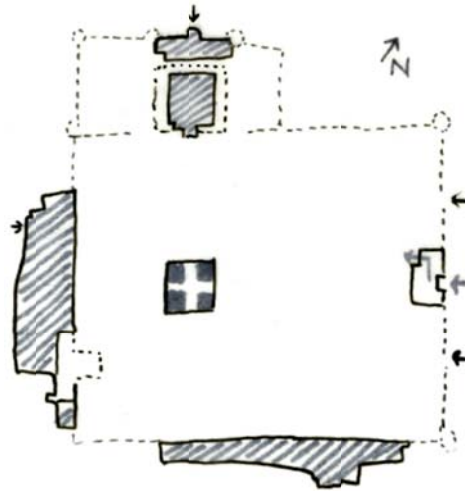


Figure 87: Buildings, entrances and the boundary of the Fin Garden

The main building in the Fin garden is the central pavilion which is open to the garden on the first floor and has several rooms which were intended to provide views to the garden from the elevated second floor. The other buildings are around the garden which used to be residential spaces for the royal family and servants and also a bathhouse on the south.

- Taj-Mahal Garden, Agra, India.

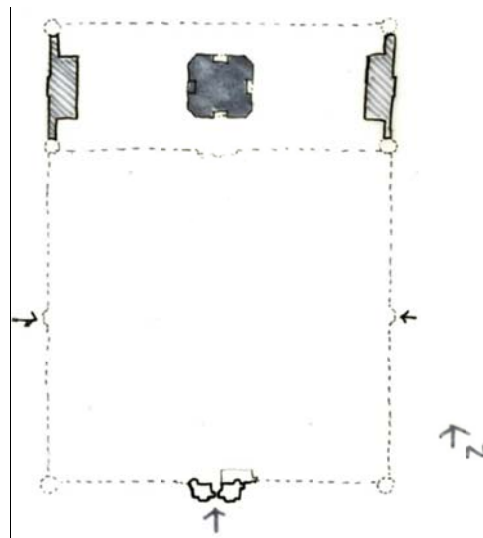


Figure 88: Buildings, entrances and the boundary of the Taj Mahal Garden

The world renowned Taj Mahal contains the tomb of Mumtaz Mahal, Shah Jahan's wife, which stands as the main building in the garden complex. This building is set at the northern end on a terrace higher than the rest of the garden. There is a mosque and a guesthouse on the east and west ends of this terrace.

- Chehel-Sotun Garden, Isfahan, Iran.

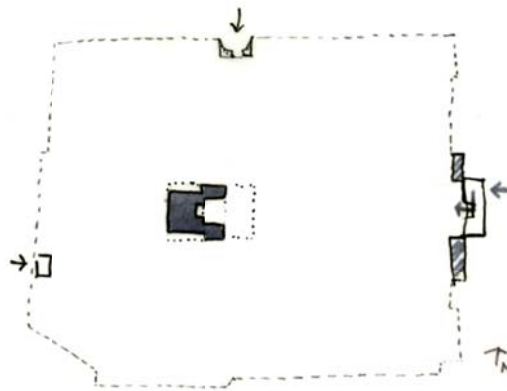


Figure 89: Buildings, entrances and the boundary of the Chehl-Sotun Garden

The Chehel-Sotun pavilion used to be a place for the king's occasional residence where he celebrated holidays and received ambassadors and other politicians. Two small secondary buildings by the entrance were for servants.

- Hasht-Behesht Garden, Isfahan, Iran.

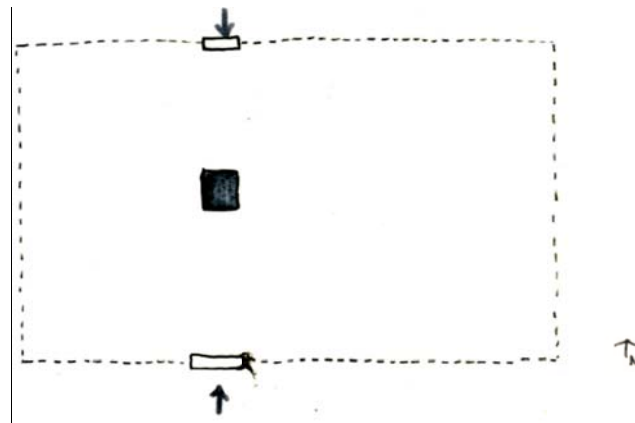


Figure 90: Buildings, entrances and the boundary of the Hasht-Behesht Garden

The beautiful pavilion of the Hasht-Behesht—the main building of this garden—is very open on its four sides to the garden on the first floor and has a few rooms above. This is the only building left from the complex’s original state.

- Shahzadeh Garden, Mahan, Iran.

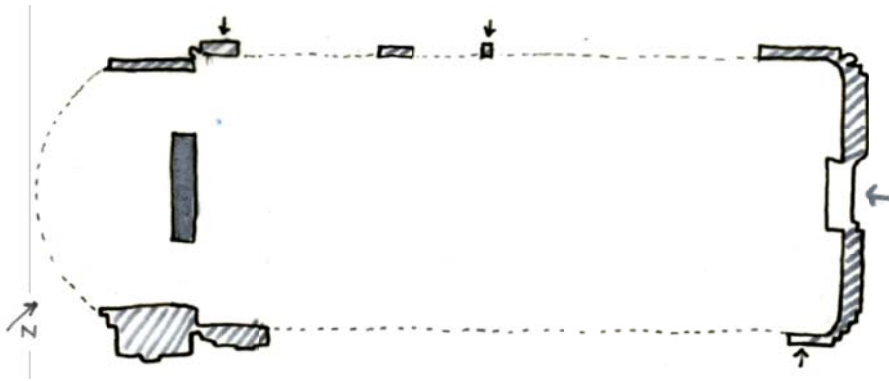


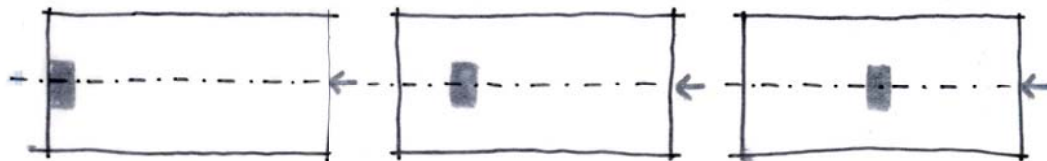
Figure 91: Buildings, entrances and the boundary of the Shahzadeh Garden

In the Shahzadeh garden the central pavilion is the main building, built for the family’s occasional visits to the garden and for temporary residence. Other buildings built around the site’s garden contained rooms for guests and servants and also a permanent residence for the gardener and housekeeper of the garden which is converted to a restaurant for tourists today.

The tenets for group 8 are as follows:

56- The main building could be a pavilion, tomb, or reception hall.

57- The main building is usually somewhere along the garden’s central axis, at a distance from the entrance.



58- Gardens may or may not have secondary buildings.

59- Secondary buildings may be in any part of the garden following the overall geometry underlying the design.

4.9: Hardscape: Entrance

The entrance of an Islamic garden is usually well defined and has a distinct structure. A garden might have more than one entrance, as in the Court of the Myrtles. Not all the entrances necessarily have equally aesthetic structures. Usually when the entrance is for utilitarian purposes, they are modest and not very visible. Some entrances bring the user inside the garden directly and some have the form of a bent entrance in which vision is delayed. This is evident in the plans presented in the previous section for buildings.

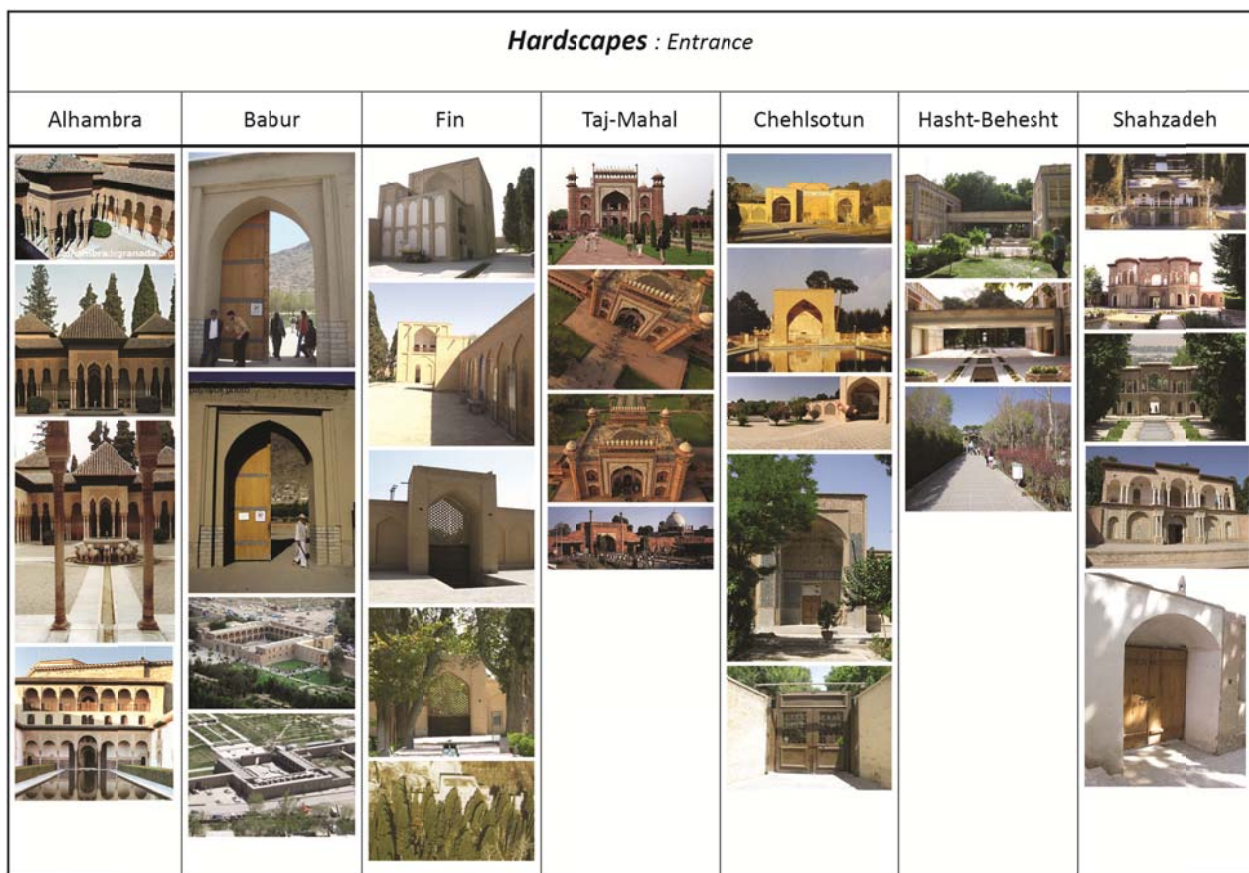
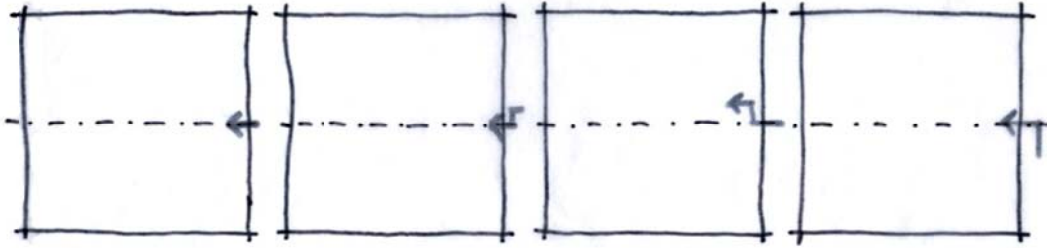


Figure 92: Image chart for hardscapes: entrance

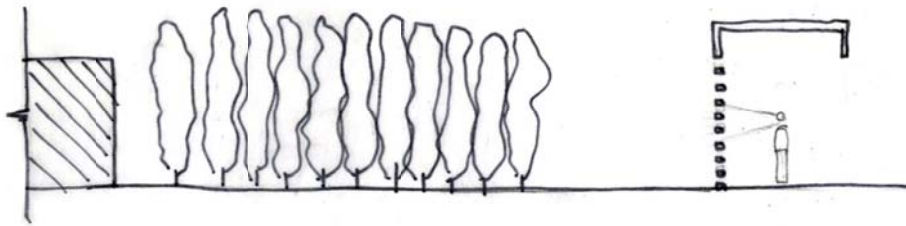
- Tenets for group 9 are as follows:

60- The main entrance can open directly on the main axis or be a bent entrance either on the middle line or on a small buffer from it.



61- Gardens with bent entrances do not reveal the whole garden but offer a delayed view of it, which can be a magical moment.

62- In the gardens with bent entrances there is usually a porous curtain wall (usually made by bricks) between the garden and the door that offers a filtered view.



63- There is no building between the main entrance and the main building.

64- There may be one or a few entrances other than the main entrance.

65- The secondary entrances are for service such as trash removal, or secondary buildings.

66- The secondary entrance(s) may be on any side of the garden.

4.10: Hardscape: Site Boundary

Islamic Gardens are walled gardens. The walls provide border, security, privacy and enclosure. Some of these walls are simply a wall but some have buildings in some parts of them. This is obvious in the plan sets presented in group 8.

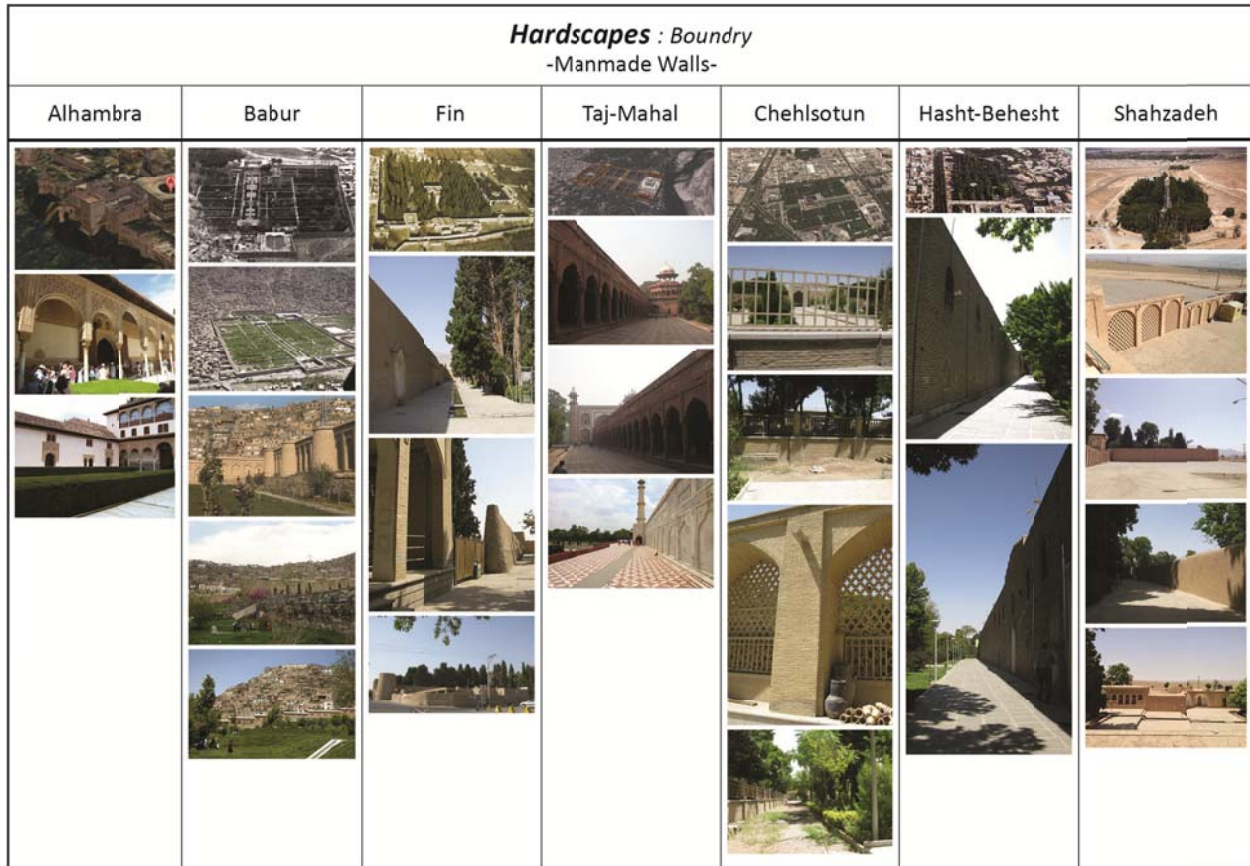
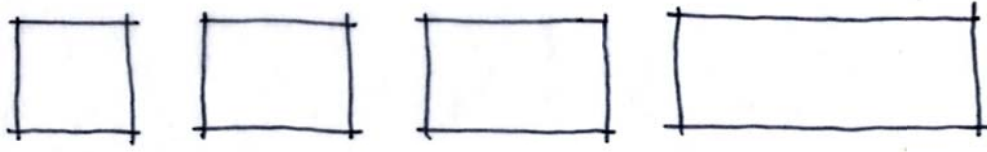


Figure 93: Image chart for hardscape: Boundary

- Tenets for group 10 are as follows:

67- The geometry of the garden is generally a rectangular shape. Even when the plot of land is irregular, the garden within it is bound in such a way as to form a regular rectangle.



rectangular



68- Most gardens have a wall around them.

69- Some parts of the walls may contain the secondary buildings of the garden.

4.11: Hardscape: Ornament & Surfaces

Islamic ornament is a very vast research and discussion territory and has been the subject of many books looking in depth at it. But as we see in the picture chart below, it is an inseparable part of the architecture of the Islamic gardens as well. Therefore, it is important to take it into consideration. The ornament and color and texture of the built environment of these gardens are as influential to the experience of the user of these gardens as the color and texture of the water and plants.

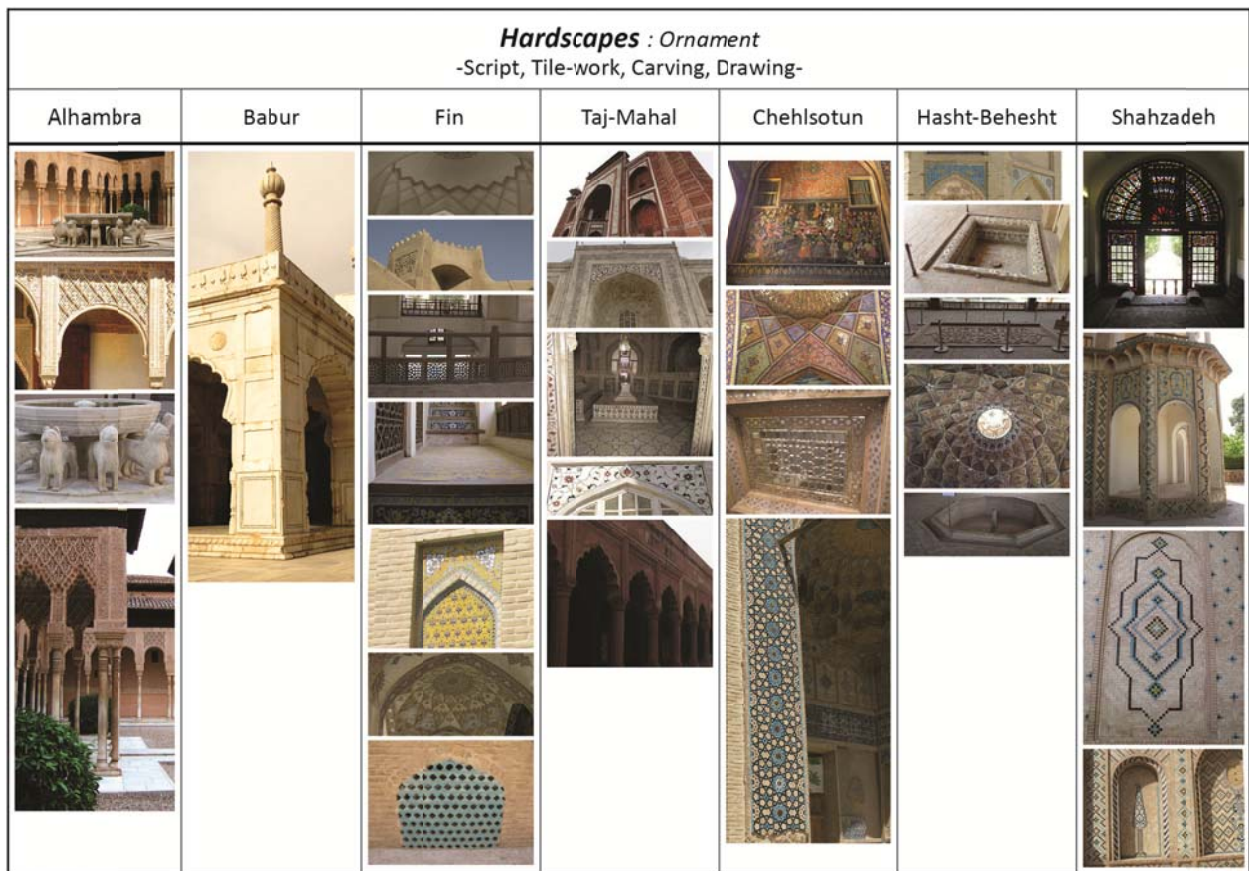


Figure 94: Image chart for hardscape: ornament

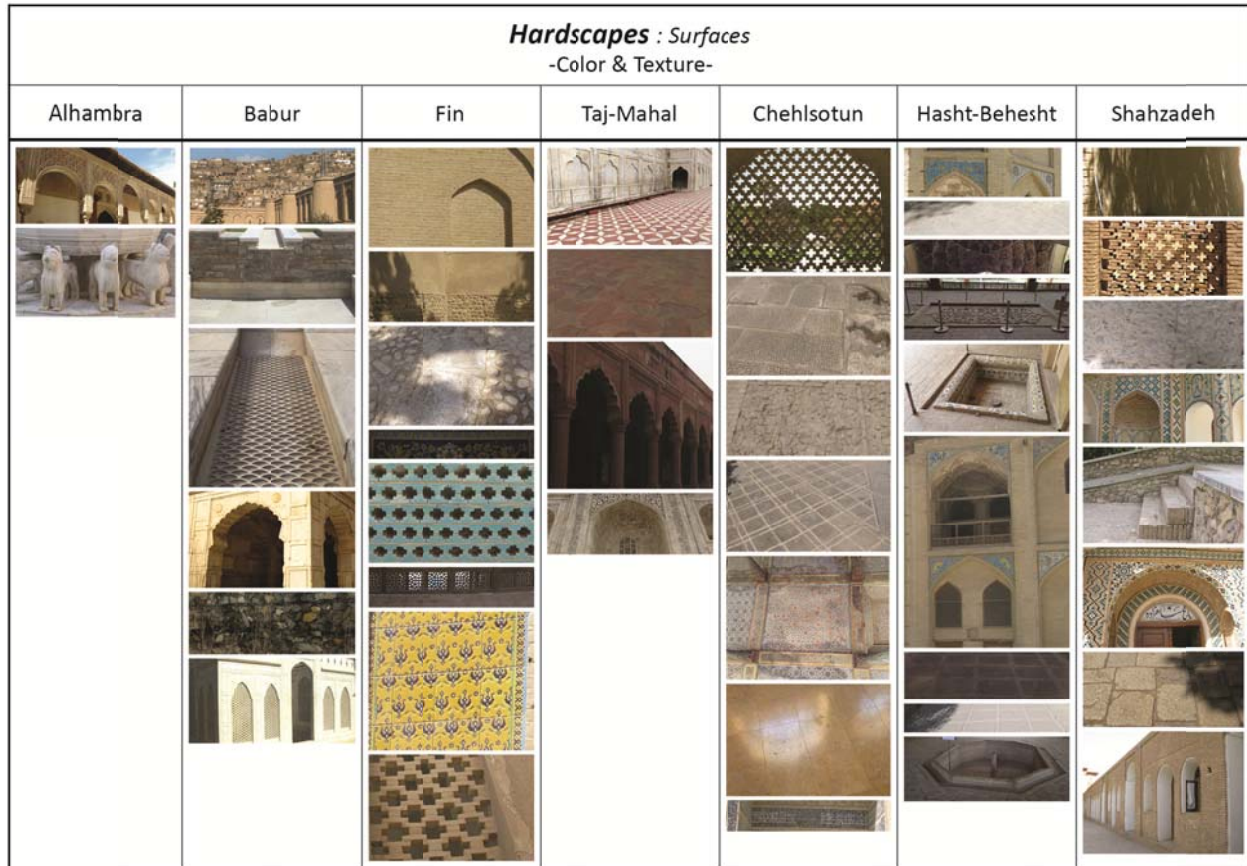


Figure 95: Image chart for hardscape: Surfaces

- Tenets for group 11 are as follows:

70- The ornament is usually abstracted from natural patterns.

71- The ornament usually follows geometric patterns.

72- The overall color of the built environment reflects the color of the mountains (if using stone) or soil of the region (if using clay or brick).

73- Since the language of the holy book of Islam, the Quran, is Arabic, the script used as ornament in these gardens is also usually Arabic for religious verses. Poetry is sometimes written in flowing Persian script. The script is usually converted to abstract form, especially in tile-work.

74- The texture of the built environment reflects the technology used in building it.

75- There is a lot of blue and turquoise, yellow and white seen in the ornamental colors, especially in tile-work. There is some red also in the ceramic ornament of Turkey.

76- There is almost no orange or purple used in the ornaments.

Chapter 5: Summary

The Islamic garden begins with Islam itself. Islam began in 622 in a town called Medina in the Arabian Peninsula from where it spread, reaching westward to Morocco and the Iberian Peninsula and eastward to central Asia by the early 8th century. This vast territory is traditionally known as the Islamic world and great Islamic gardens have been created in these regions since the beginning of Islam and exist from India all the way to northern Africa and southern Spain. Today Islam continues to expand, not as a result of Muslim military conquests, as in the first centuries, but as a result of Muslim immigrants who bring their religion with them to every place in the world that they travel or resettle. In this expanded world context, Muslim (as well as non-Muslim) clients are commissioning Islamic-style gardens in Europe and North America, and designers internationally are getting commissions to build Islamic gardens in many places outside what used to be the Islamic world. In light of this new demand for modern Islamic gardens, modern design firms need explicit guidelines for design that can convey a sense of Islamic culture and principles. Such a guideline does not currently exist in one comprehensive resource.

Form in itself can be a very powerful means of transporting memory and producing spaces that suggest familiar experiences. The production of architecture and landscape forms is affected by factors that range from cultural values to climatic conditions and available technology. The corresponding forms in the built environments to these factors may produce meaning after being repeated over time. When these factors change, a *new* meaning can be produced. A form can also become familiar in the common memory of a society and can remind people of the older meanings it once had, even if those meanings are no longer current. As a familiar experience, it can therefore be used to express a sense of continuity. This not only happens with the change of time, but it can also accrue with the change of geographical place.

With Muslims moving from traditionally Islamic societies to Europe and North America, where they suddenly become a minority population, the forms of the Islamic gardens can be utilized as a strong medium for transporting the familiar experiences of the past place to a new place. These new forms have to adapt to this new time and place. This

shift can occur in the Islamic world or in non-Muslim countries, in the contemporary time, without relinquishing the memory of the past.

This thesis approaches the “sense of Islam” by analyzing Islamic gardens based on formal elements such as pathways, buildings and forms of water in the garden, and abstracting design principles from them in order to illustrate the elements that comprise an Islamic garden. This will help landscape architects design modern gardens that also have characteristics that echo historic Islamic landscapes. These design principles will use traditional forms to inspire contemporary designers. The proposed result is a design booklet of Islamic design concepts, visual strategies, forms, textures, and ornament for an audience of landscape architecture firms and contemporary designers.

To design a new Islamic garden anywhere in the world, it is essential that Islamic gardens be studied carefully in a historical context in relation to their origin and geographic context. This helps us understand the meaning of elements such as geometry, water systems, methods of planting, and the sense of space. I chose seven gardens to serve as models for the various territories and historical periods and that reflect the diversity of Islamic architecture. They form a spectrum of different forms of Islamic gardens which leads to better understanding and richer abstractions for this thesis, and avoids focusing only on one sub-category of the Islamic gardens, therefore the design principles can be applied to a bigger spectrum of climates and natural environments.

The historic Islamic gardens I chose to study are listed here in chronological order.

1. Court of the Lions and Court of the Myrtles in Alhambra, Granada, Spain from the 14th century.
2. Babur Garden in Kabul, Afghanistan, 16th century
3. Fin Garden in Kashan, Iran, Late 16th century
4. Taj Mahal in Agra, India, 17th century
5. Chehel-Sotun in Isfahan, Iran 17th century
6. Hasht-Behesht in Isfahan, Iran 17th century
7. Shahzadeh Garden in Mahan, Iran from the 19th century

My goal in this thesis was to look at Islamic gardens from the perspective of a designer and study and analyze their formal elements in order to be able to introduce them in a classified manner and extract the design principles

underlying their composition that brings out a specific experiment. In order to be able to convey the experience of being in an Islamic garden through its elements, I developed a specific analytical framework that would serve this purpose. For having a systematic method of studying the formal elements and the compositions in these gardens I divided garden elements into two major groups, Hardscape elements and Softscape elements. Hardscape elements are the more architectural features, consisting of the boundary, entrance, pathways, building, and hardscape frames, surfaces and ornaments. Softscape elements are the water and plants in the garden, features that are important but not necessarily permanent and that require constant replenishment. For each of these elements, depending on the variety of their use in the Islamic gardens, there might be multiple subcategories.

“[G]ardens are experienced by human beings who view them as spatial constructions and also apprehend them through the auditory and olfactory senses.”³³ The experience of an Islamic garden is based on how each of these elements is employed in the garden and composed with other ones. Therefore it is important to compare the proportions and relations of each of these elements to the others and to think of them from a more holistic perspective. After studying Islamic gardens through the available text and visiting the sites in Iran and also watching some videos that visitors of the other sites had posted online and listening to how they saw or felt about the gardens, I came up with a list of characteristics or feelings that can be experienced in the spaces of an Islamic garden due to the presence of the elements of the garden and their spatial composition. These experiences are as follows:

- Layout
- Enclosure
- Views & Angles
- Porosity
- Main Axis
- Circulation
- Sequence
- Hierarchy

33 D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia: University of Pennsylvania Press, 2008) Page 4.

- Sound
- Shade

Here I have the analytical framework of my thesis. This diagram is key to understanding how each section contributes to the final outcome.

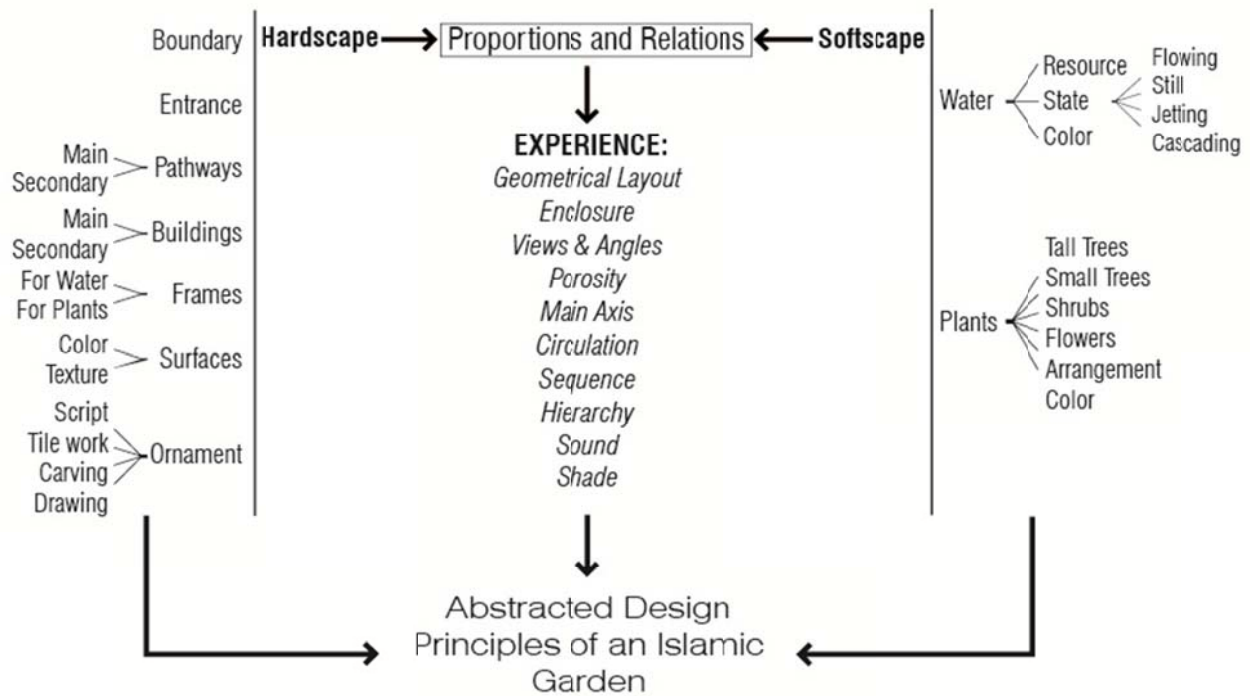


Figure 96: Analytical Framework

On the sides of this analytical framework, which is presented diagrammatically here, the formal elements of the garden and their subcategories are listed. In the middle we can see how these elements come together to contribute to the experience in an Islamic garden. At the bottom we see how the abstracted design principles originate from the elements of the garden and their proportions and relations.

To apply this analytical framework I produced charts with pictures that captured one garden element. Each chart consists of seven columns and each column is dedicated to one of the gardens. This remains persistent for all the picture charts. For example there is a chart about the main pathways in the precedents. In this chart the first column will

be showing the main pathways in the Court of the Myrtles and the Court of the Lion, and the second column will have pictures of the Babur garden and so on.

I also produced plans, with each set of plans corresponding to a group of elements. For example one set of plans shows different kinds of plants and how they are arranged. Although the pictures are showing the condition of the gardens now, the plans represent the original form of the gardens – they reflect a certain date. Some of the information cannot be conveyed clearly by pictures and plans, and so I produced diagrams and sections for some of the groups that required further explanation about the conditions of the gardens in a group of elements. These sections and diagrams allow more in depth understanding of the sites.

These analytical graphics of the formal elements of the garden are divided into 11 groups according to formal relationships and similarities, as follows. :

1. Softscape : Water : Resource
2. Softscape : Water : Form + Movement (still – flowing – jetting + cascading)
3. Softscape : Water : Color
4. Softscape : Plants : Tall trees – Small trees – Shrubs – Flowers - Arrangement
5. Softscape : Plants : Color
6. Hardscape: Frames: For water – For plants
7. Hardscape: Pathways: Main - Secondary
8. Hardscape: Buildings: Main - Secondary
9. Hardscape: Entrance
10. Hardscape: Site Boundary
11. Hardscape: Ornament: Script + Tilework + Carving + Drawing & Surfaces: Color + Texture

After the rigorous analysis of the formal aspect of the seven gardens I derived a list of 76 design principles that were common through sites and can be applied to new situations and adapted to the new environments without relinquishing the experiment associated with being in a historic Islamic garden or the memory these forms carry. These tenets form the set of design principles that can serve as a resource for and inspire contemporary designers in the field.

Chapter 6: Conclusion

The design analysis that I have provided above can now be used to help a patron or a designer who wishes to design a garden in an Islamic style. We can, for example, imagine a home owner in Chicago, or a business owner in Denver with an office in the outskirts of the Rocky Mountains, or a doctor who has an office in Miami, or a Middle Eastern art center in Los Angeles. For these people, who have decided to commission a landscape architect to design a formal landscape for their home or surrounding their business or complimenting the public center, the chart of design principles that I have made can help them to understand what formal elements should be considered in designing an “Islamic garden.” In our imagined case, the designer will have to research to learn about Islamic Gardens and to try to capture the sense of Islamic gardens though reading historic texts or looking at images from Islamic gardens. At present, the kinds of aids that are available are largely history books and “coffee table” picture books. There is no extant discussion of Islamic gardens from a design perspective. If the designer is lucky s/he might be able to visit a garden or two in this process as well, and learn about them through actual observation. But all through this investigation, the designer would be dealing with built landscapes that correspond to natural resources and cultural beliefs of the communities that inhabited them centuries ago. The historic gardens are necessarily ideal models for designing a modern garden. Additionally, this kind of investigation might endanger the new design by producing pastiche. Pastiche occurs when parts of older examples of buildings, art, sculpture, and landscape are imitated and combined into one to build a new place, instead of transforming them into a new meaningful form that carries the old memory. The goal of this thesis is to facilitate this process of meaningful adaptation from old to new.

Through the abstracted design principles of this thesis, the designer who wants to understand Islamic gardens and learn how to create a modern one, realizes that Islamic gardens can be built anywhere and can deliver a similar experience of being in a historic Islamic garden by adhering to the same design principles of geometry, display of water in channels and fountains and chadars, with pavilions, all within an enclosure. These gardens can revive the memory of the past by producing similar view angles within the main axis or other parts of the circulation pathways, through the

same hierarchy and sequence of formal elements of the garden such as the arrangement of plants composed in adjacency to water channels and buildings.

The set of tenets that I have identified and charted, illustrate the commonality of the formal Islamic gardens despite differences in hardscape elements (boundary, entrance, pathways, buildings, frames for water, frames for plants, surfaces and ornament) or softscape elements (water and plants) or due to the differences in key influential factors such as climate, topography, scale, time and culture. The design principles produced in this thesis are based on in-depth investigation and analysis of seven historical Islamic gardens from around the Islamic world, as historically defined. They can guide landscape architects and inspire designers all around the world to design new Islamic gardens or integrate these modern formal gardens into landscapes that follow nontraditional patterns at other parts, in their future work. Although, the translation of these design principles into the design of a public park might be influenced by the scale and the heavy usage of these places. Whether or not this becomes a difficulty can be tested in future. This is an example where integrating these principles with other design methods would be beneficial. An example of this would be in the Azhar Park in Cairo where the formal, Islamic garden parts of the park are not enclosed within solid walls and therefore are a more cohesive part of the park as a whole.

This thesis is not an attempt at literal recreation of an Islamic garden, but a study of principles, principles within which innovation can take place. The set of tenets is a toolkit to guide designers and inspire them to create new Islamic landscapes. This could be a very good subject for a future educational design studio. In this way it could be tested on how well the principles work. This test was not feasible in this study. Another related subject that can be a future work on this study is to investigate the nightlife of the historic Islamic gardens and realize how they can translate into contemporary design. On another slightly different subject, in the future, another study can test whether or not the feeling experienced within these Islamic gardens is related to the cultural and educational background of the users of the space or not.

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Figure 1: "thinkingaboutobjects | Pastiche and Parody, from Pomo to the Present.." thinkingaboutobjects.

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Figure 4: Edwards Park, and Jean Paul Carlhian, *A new view from the Castle: the Smithsonian Institution's quadrangle* : Arthur M. Sackler Gallery, National Museum of African Art, S. Dillon Ripley Center, Enid A. Haupt Garden (Washington, D.C.: Smithsonian Institution Press, 1987).

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Figure 7: Mehdi Khansari, and M. Reza Moghtader, and Minouch Yavari, *The Persian Garden: Echoes of Paradise* (Washington, DC: Mage Publishers, 1998).

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Figure 40:

Softscapes : Water -Resource-						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						
						
						
						
						

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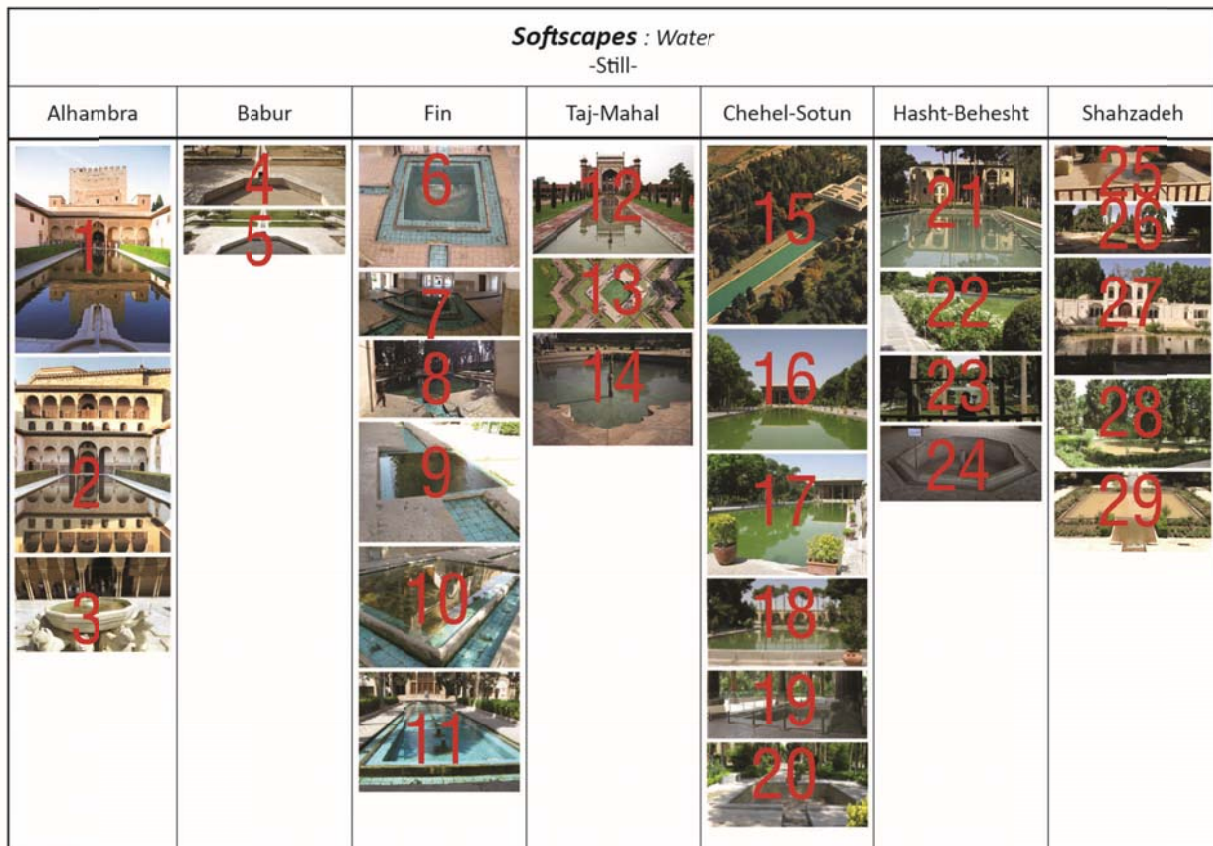
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Figure 49:

Softscapes : Water -Flowing-						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						
						
						
						
						

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37. Author
38. Author
39. Author
40. Author

Figure 59:

Softscapes : Plants -Tall Trees -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
	 	 	 	  	   	  

1. <http://ridingthebuses.com/2013/09/babur-gardens-photo-gallery/>
2. http://www.panoramio.com/photo_explorer#view=photo&position=0&with_photo_id=38982799&order=date_desc&user=4817621;
3. Author
4. Author
5. <http://www.taj-mahal.net/pr/prEng.htm>
6. D. Fairchild Ruggles
7. Author
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Figure 60:

<i>Softscapes : Plants</i> -Short Trees -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
	  		  	   	  	   

1. http://en.wikipedia.org/wiki/Gardens_of_Babur
2. <http://a2108infantry.blogspot.com/2008/07/baburs-garden.html>
3. <http://www.panoramio.com/photo/52204783?source=wapi&referrer=kh.google.com;>
4. http://commons.wikimedia.org/wiki/File:Taj_Mahal_gate-4.jpg
5. http://commons.wikimedia.org/wiki/File:Taj_Mahal_gate-5.jpg
6. D. Fairchild Ruggles
7. Author
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15. Author
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Figure 61:

Softscapes : Plants -Shrubs -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						
						
						
						
						

1. <http://www.alhambra.degranada.org/en/info/galleryofphotographs/courtofthemyrtils.asp>;
2. <http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/>;
3. <http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/>;
4. Doug McKinlay / <http://www.lonelyplanet.com/afghanistan/kabul/sights/parks-gardens/babur-s-gardens>
5. Author
6. Author
7. Author
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10. D. Fairchild Ruggles
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Figure 62:

Softscapes : Plants -Flowers -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						
						
						
						
						
						
						

1. http://en.wikipedia.org/wiki/Gardens_of_Babur
2. <http://ridingthebuses.com/2013/09/babur-gardens-photo-gallery/>
3. http://en.wikipedia.org/wiki/Gardens_of_Babur
4. <http://ridingthebuses.com/2013/09/babur-gardens-photo-gallery/>
5. Author
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9. D. Fairchild Ruggles
10. D. Fairchild Ruggles
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Figure 63:



1. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
2. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
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13. D. Fairchild Ruggles
14. D. Fairchild Ruggles
15. <http://www.dailyege.ie/taj-mahal-aerial-tour-533347-Jul2012/#slide-slideshow7>
16. <http://www.businessinsider.com.au/amazing-photos-of-the-taj-mahal-2012-7#it-took-20000-workers-20-years-to-build-12>
17. Author
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26. Abbas, Mas'udi. *Bāzshināsi-i Bāgh-i Irāni; Bāgh-i Shāhzadah*. Tihrah: Nashr-i Fazā, 1388.
27. Author
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Figure 64: Author

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Figure 70: Author

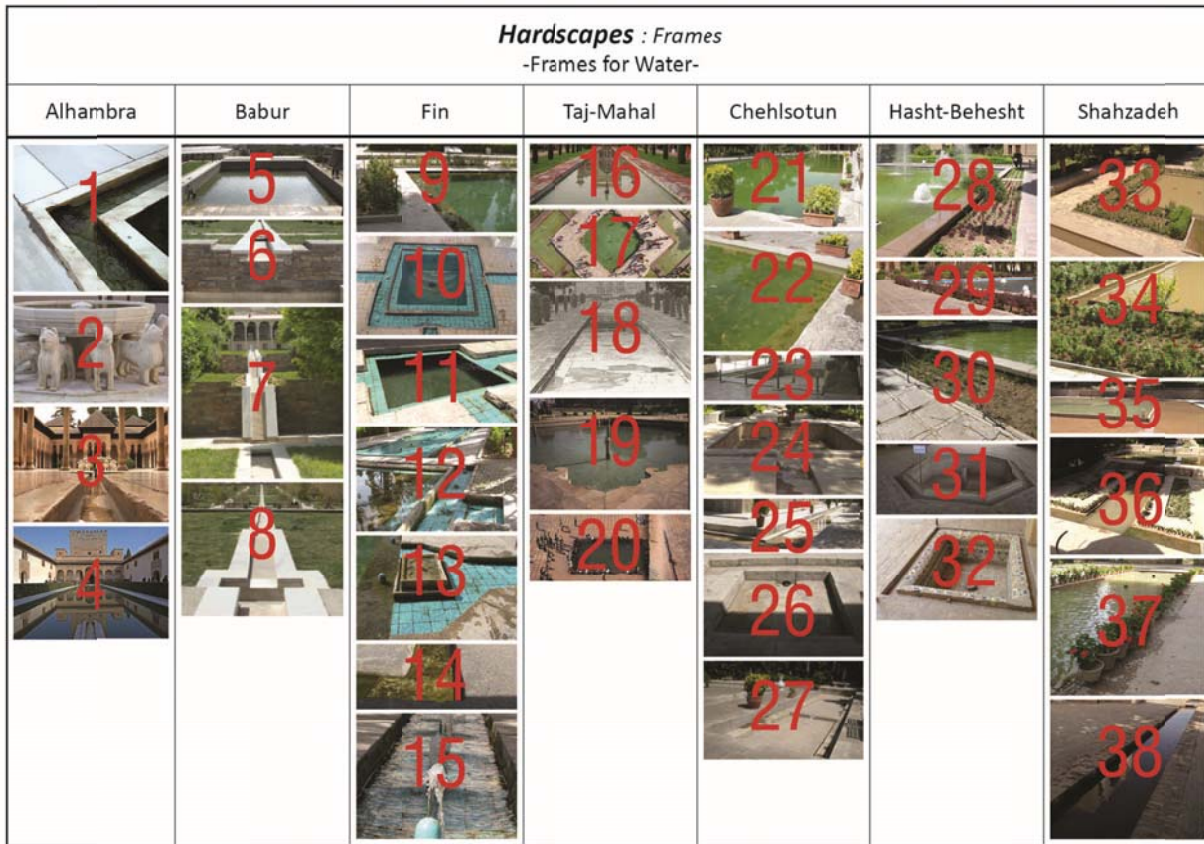
Figure 71:

Softscapes : Plants -Color -						
Alhambra	Babur	Fin	Taj-Mahal	Chehel-Sotun	Hasht-Behesht	Shahzadeh
						
						
						
						
						
						
						
						

1. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
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34. Abbas, Mas'udi. *Bāzshināsi-i Bāgh-i Irāni, Bāgh-i Shaḥzadah*. Tihrān: Nashr-i Faẓā, 1388.
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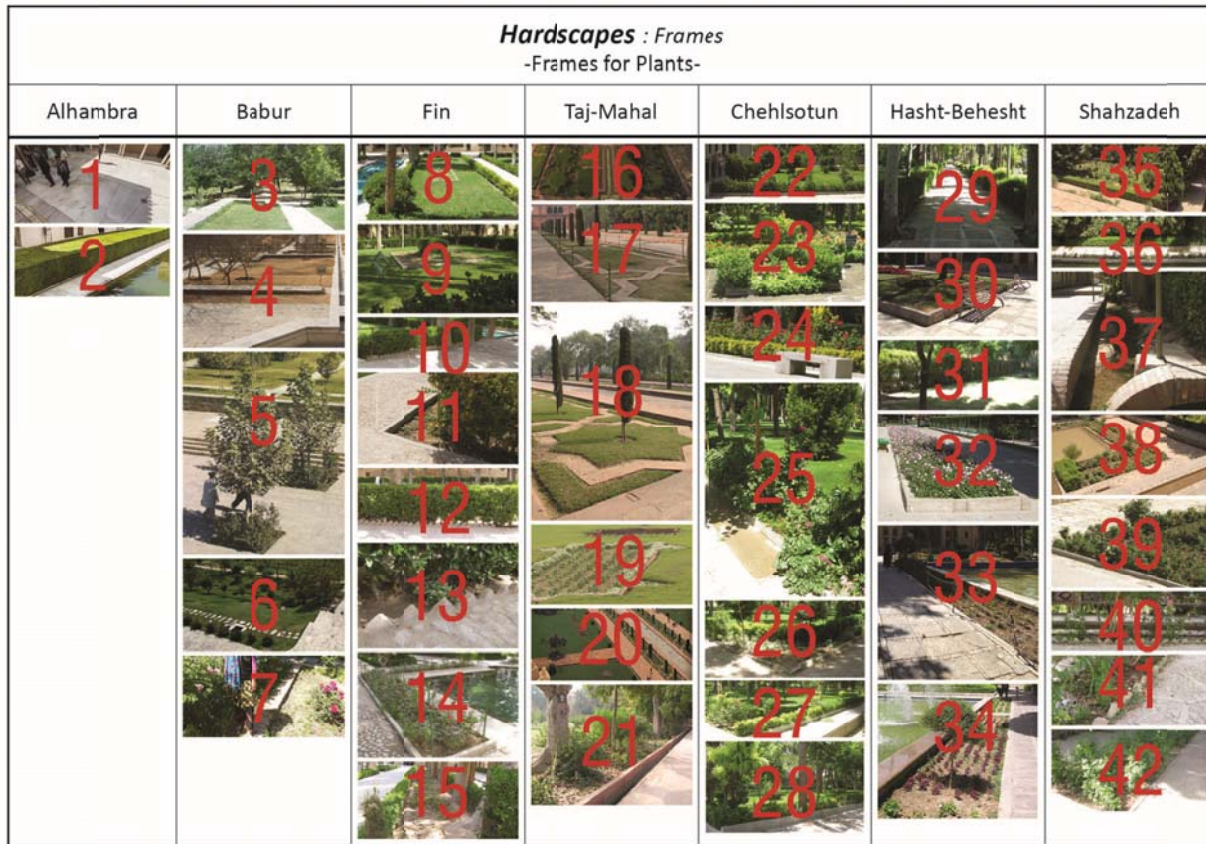
Figure 72:



1. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
2. [http://www.lehigh.edu/~anc304/cities/granada.html;](http://www.lehigh.edu/~anc304/cities/granada.html)
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16. http://commons.wikimedia.org/wiki/File:Taj_Mahal_gate-5.jpg

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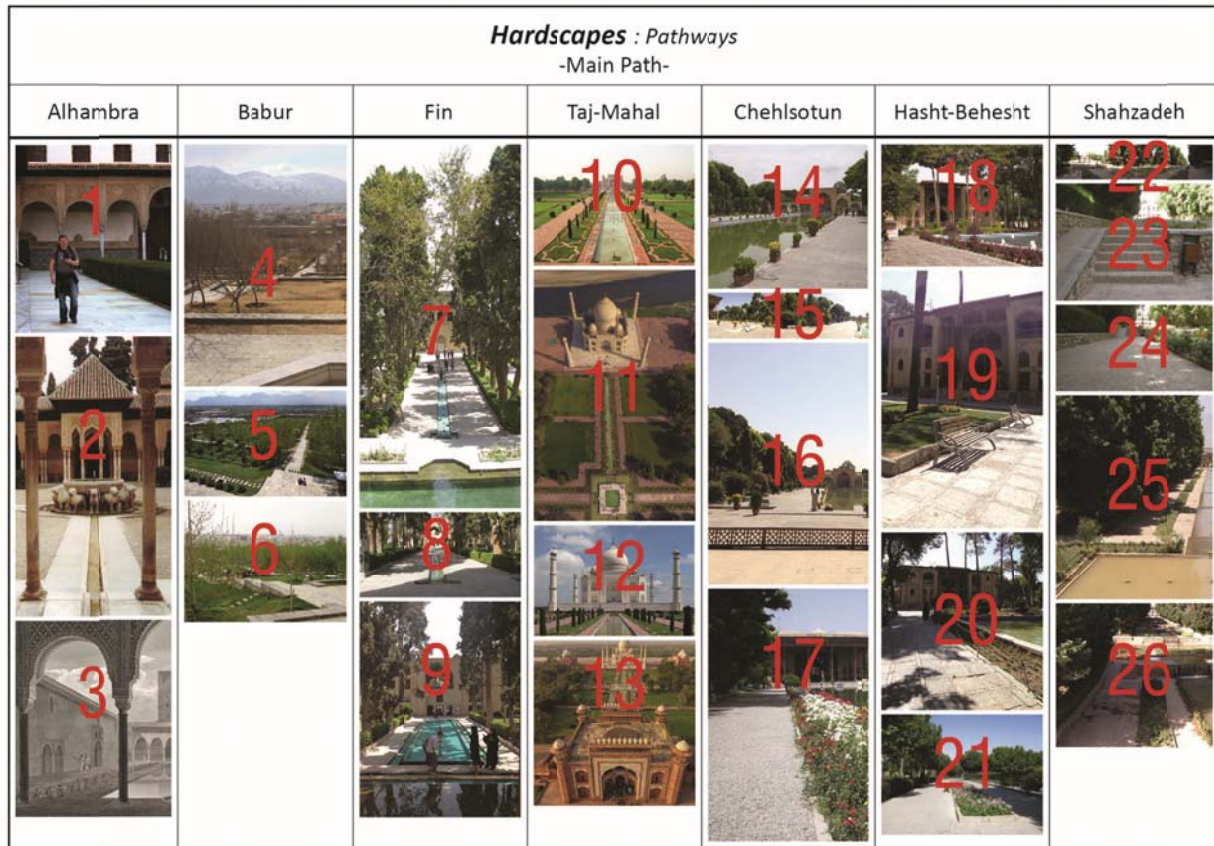
Figure 73:



1. http://www.360cities.net/image/the-lions-palace-in-alhambra-of-granada-spain-2?utm_source=google_earth&utm_medium=all_images;
2. http://www.360cities.net/image/the-arrayanes-courtyard-in-alhambra-of-granada-spain?utm_source=google_earth&utm_medium=all_images;
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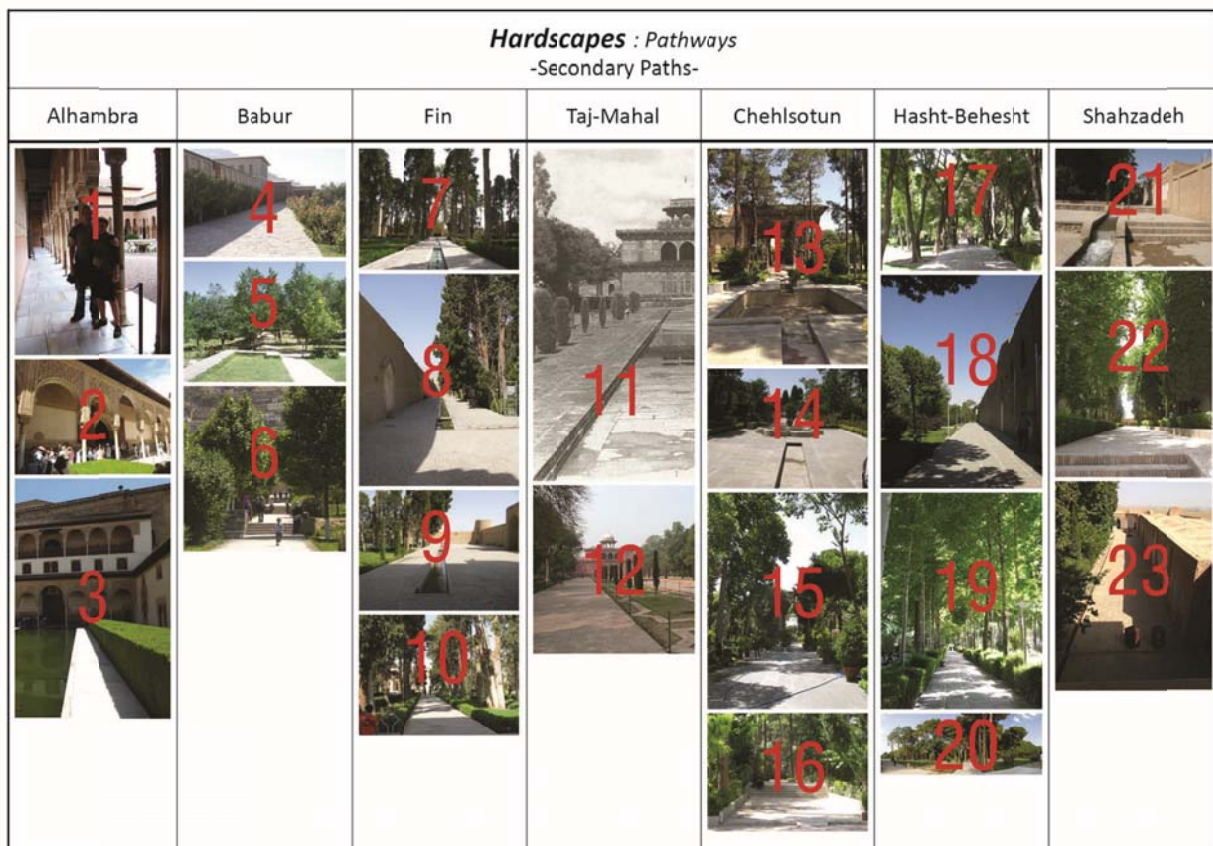
Figure 74:



1. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
2. http://en.wikipedia.org/wiki/Court_of_the_Lions;
3. [http://islamic-arts.org/2012/the-alhamra-at-granada/;](http://islamic-arts.org/2012/the-alhamra-at-granada/)
4. <https://mumbaiinsomniac.wordpress.com/page/3/>
5. <http://watanafghanistan.tumblr.com/page/127>
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7. Author
8. Author
9. Author
10. <http://www.tajmahal.com/14/places/taj-mahal-garden.htm>
11. <http://www.dailyedge.ie/taj-mahal-aerial-tour-533347-Jul2012/#slide-slideshow7>
12. http://commons.wikimedia.org/wiki/File:Taj_Mahal,_Agra,_India.jpg
13. <http://www.dailyedge.ie/taj-mahal-aerial-tour-533347-Jul2012/#slide-slideshow6>
14. Author
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Figure 75:



1. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
2. <http://www.singlecamp.ro/forum/index.php/topic,1549.0.html>
3. <http://www.singlecamp.ro/forum/index.php/topic,1549.0.html>
4. [http://en.wikipedia.org/wiki/File:Gardens_of_Babur_\(September_2011\).jpg](http://en.wikipedia.org/wiki/File:Gardens_of_Babur_(September_2011).jpg)
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7. Author
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12. D. Fairchild Ruggles
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Figure 76: Author

Figure 77: Author

Figure 78: Author

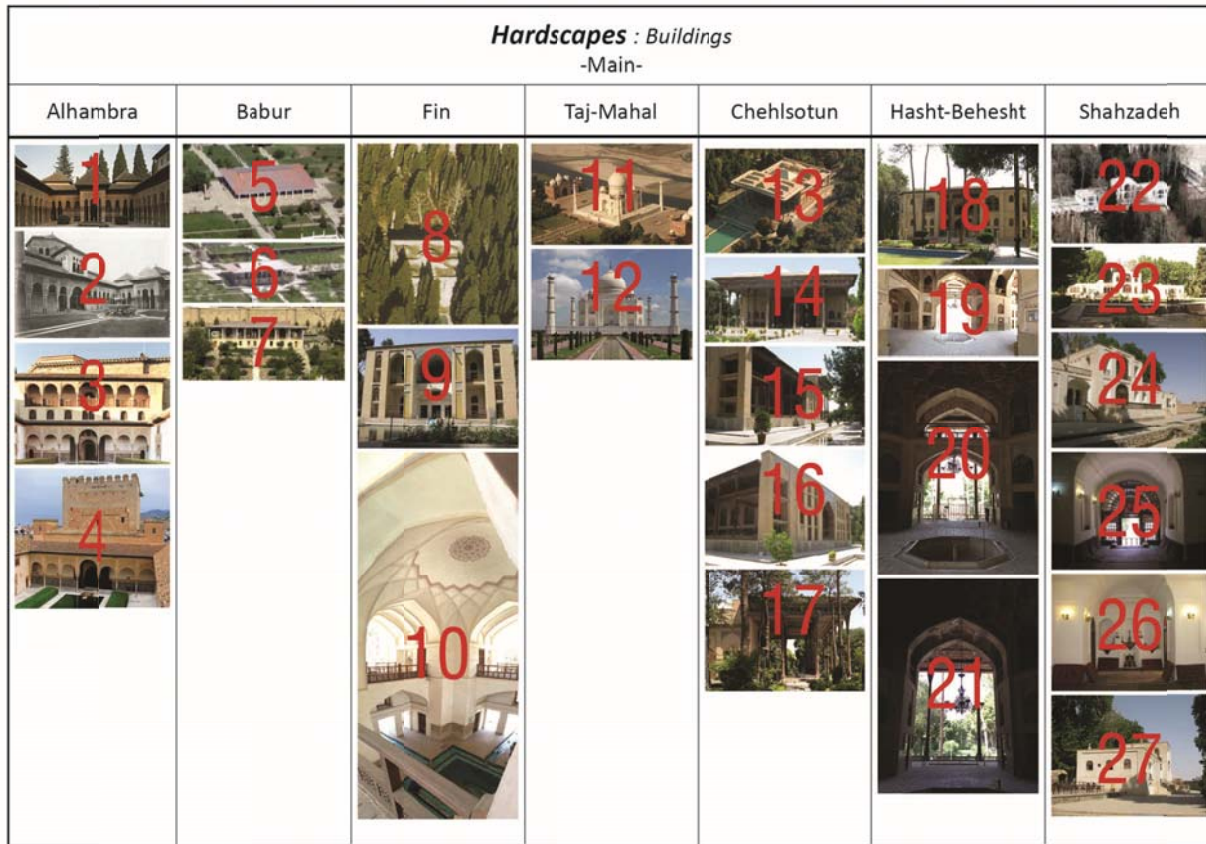
Figure 79: Author

Figure 80: Author

Figure 81: Author

Figure 82: Author

Figure 83:



1. [https://www.studyblue.com/notes/note/n/art-history-test-3/deck/4508775;](https://www.studyblue.com/notes/note/n/art-history-test-3/deck/4508775)
2. Ruggles, D. Fairchild. *Gardens, Landscape, and Vision in the Palaces of Islamic Spain*. University Park, Pa.: Pennsylvania State University Press, 2000.
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4. [http://www.alhambraGranada.org/en/info/galleryofphotographs/courtofthemyrtilles.asp;](http://www.alhambraGranada.org/en/info/galleryofphotographs/courtofthemyrtilles.asp)
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9. Author
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12. http://commons.wikimedia.org/wiki/File:Taj_Mahal,_Agra,_India.jpg

13. Khansari, Mehdi, and M. Reza Moghtader, and Yavari, Minouch. *The Persian Garden: Echoes of Paradise*. Washington, DC: Mage Publishers, 1998.
14. Author
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19. Author
20. Author
21. Author
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23. <http://www.etedaal.ir/fa/print/1438>
24. Author
25. Author
26. Author
27. Author

Figure 84:

Hardscapes : Buildings -Secondary-						
Alhambra	Babur	Fin	Taj-Mahal	Chehlsotun	Hasht-Behesht	Shahzadeh
						
						
						
						
						
						
						

1. <http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/>;

2. [http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/;](http://images.mooseyscountrygarden.com/spanish-gardens/granada-gardens/alhambra-generalife/)
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21. Author
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Figure 85: Author

Figure 86: Author

Figure 87: Author

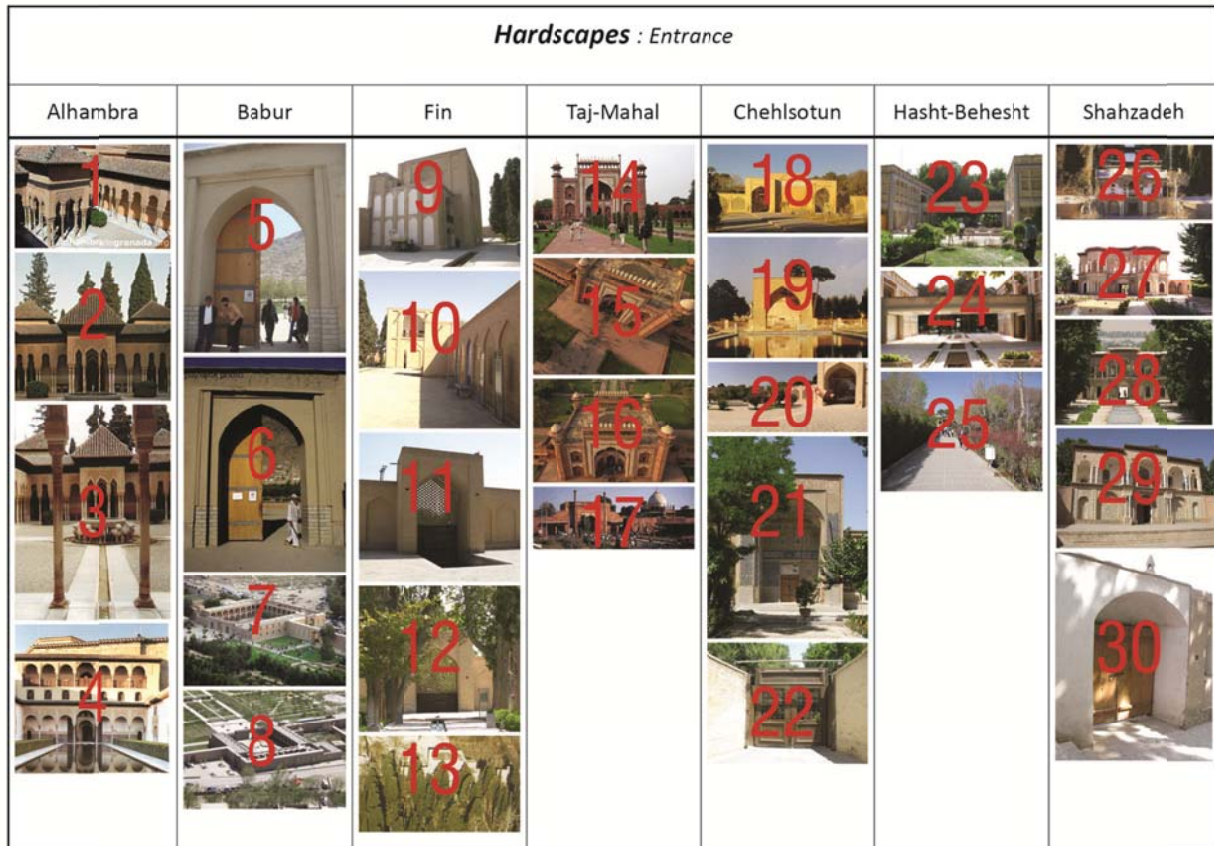
Figure 88: Author

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Figure 91: Author

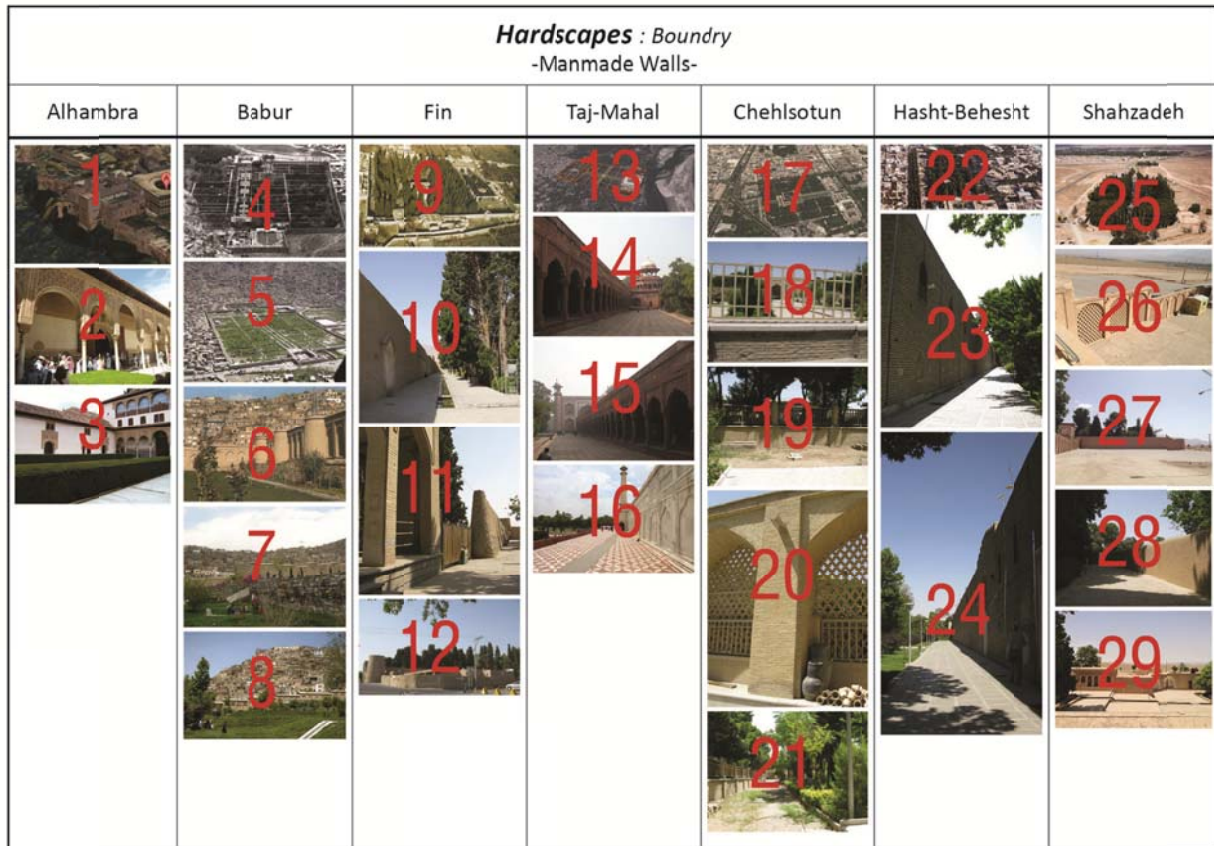
Figure 92:



1. <http://www.alhambra.degranada.org/en/info/galleryofphotographs/patioofthelions.asp>;
2. <https://www.studyblue.com/notes/note/n/art-history-test-3/deck/4508775>;
3. http://en.wikipedia.org/wiki/Court_of_the_Lions;
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27. Author
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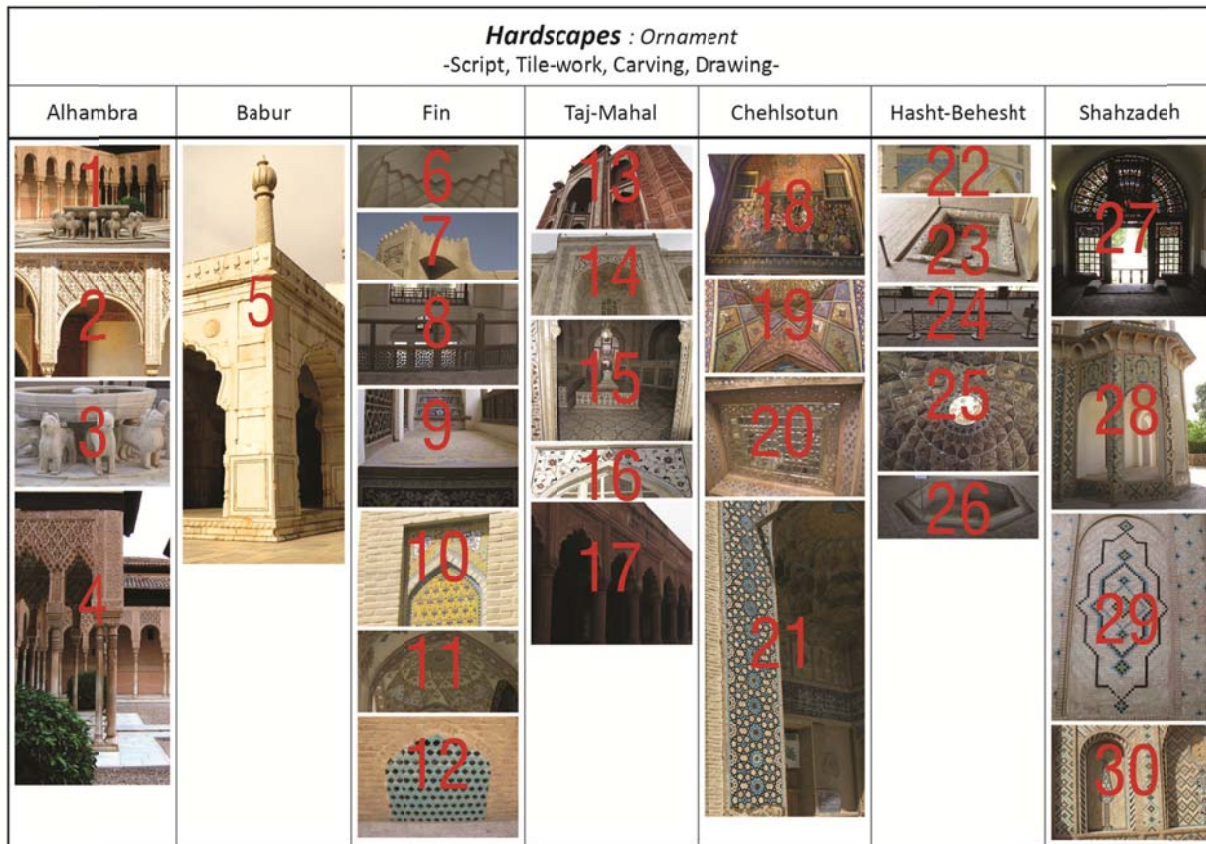
Figure 93:



1. Google earth
2. <http://www.singlecamp.ro/forum/index.php/topic,1549.0.html>
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15. D. Fairchild Ruggles
16. <http://www.flickr.com/photos/juliansim/2594203295/sizes/l/in/photostream/>
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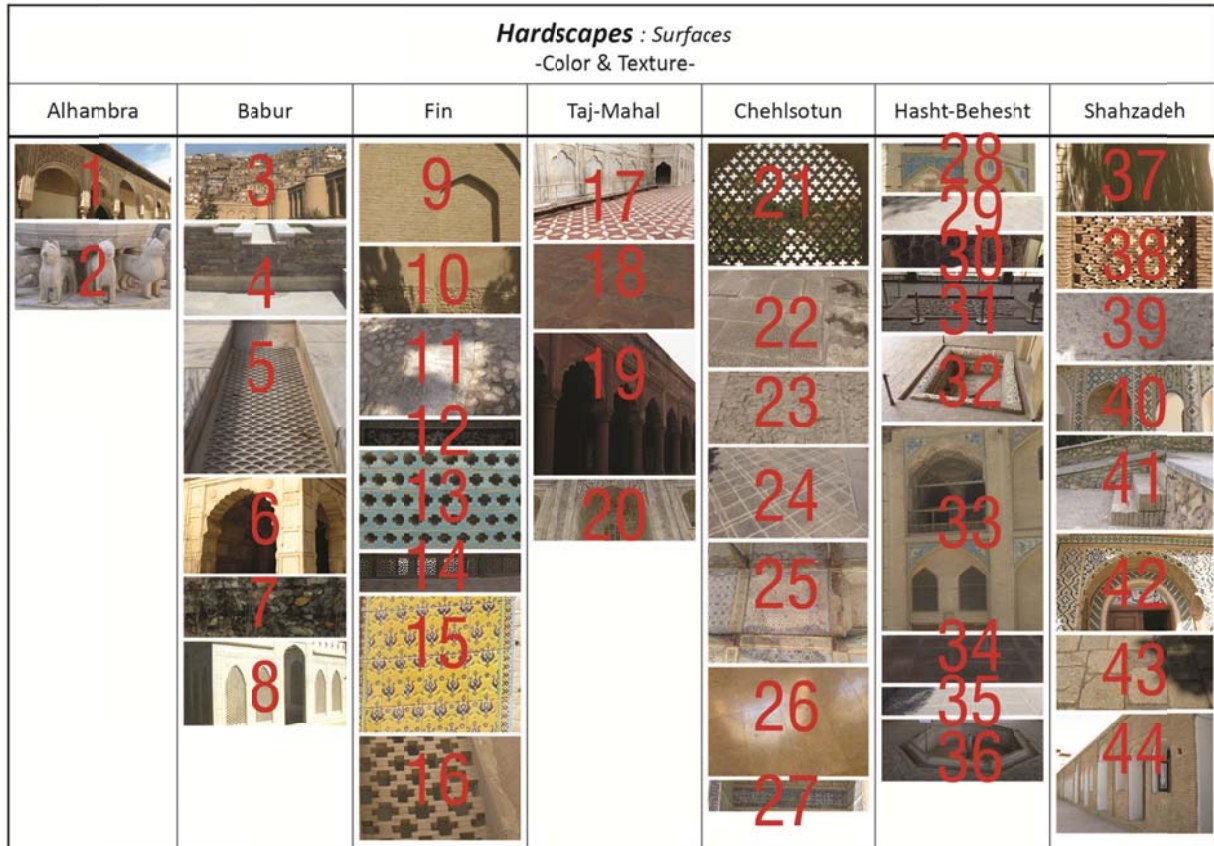
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