The Story of the Hands

On Earth and Community

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

where are you from I asked
he smiled in mockery and said
one half from the east
one half from the west
one half made of water and earth
one half made of heart and soul
one half staying at the shores
and one half nesting in a pearl

-Rumi, Translation by Nader Khalili

Abstract

The phenomenon that the universalization of the urban (and rural) form has disadvantaged many Iranian cities and villages of a sense of place, culture, and identity, is not a very recent one. Neither is it a novel understanding among architects and urbanists that the quality of locality in our living spaces is in need of improvement. The connection between people and their buildings has been forgotten and so in our settlements we have given in to the more accessible, mass-producible ways of building. In doing so, we have deprived ourselves of the intimacy that was once the blood in the veins of our alleys.

In search of this lost meaning, I have read the words of visionaries, pondered their words, and have gotten my hands to experience. I learned that a true sense of meaning is given to a building when it tells a story, and to me, the story is that of the hands that raised its walls. What would give a neighbourhood a greater sense of community than for the neighbours to have helped build each other's home? Participation of the community in the building process, however, faces many limitations. Our contemporary ways of building are too complex for the inexperienced and our customary materials are not local to most places.

I have therefore explored building methods that would be simple enough for the community to easily involve themselves. And earth, this abundant and generous substance that lies beneath our feet, is the most accessible and affordable building material of all. I have worked on a set of strategies and policies through which my ideal building project can be accomplished, and have chosen my paternal village to be the site for it to happen in. In a village that is rapidly losing its vernacular architecture, I envision a building that could be planted as a seed by its people to grow out a new fabric of local, meaningful, and intimate architecture.

Acknowledgments

I would like to thank my dear parents - my mother **Fatemeh** and my father **Nemat** - for all the things that one simply cannot express within written lines. Your love and support is what defines and drives my life - Thank you.

This thesis would have never become what it is today, and I would never have held it so close to my heart, if it weren't for my supervisor, **Tracey Eve Winton**. Thank you, Tracey, for always supporting me and inspiring me so profoundly to seek within for answers. What you have taught me is beyond architecture, academia, and theses. I greatly appreciate your guidance.

I am grateful to my committee member, **John McMinn**. Thank you, John, for sharing your valuable expertise and insights. I cherish your encouraging advices, which motivated me to complete this thesis.

Thanks to my dear friends **Amirhesam Monshi** and **Folusho Ashish Afun-Ogidan** who supported and helped me along the way so generously. Your diligence and kindheartedness inspired me to aspire to greater goals.

Dedication

To the Memory of my Beloved and
Honoured Uncles,

Mansour Khan Taghipour

and

Ahmad Sadighi

Who Loved Their Village, Jazan, So Dearly

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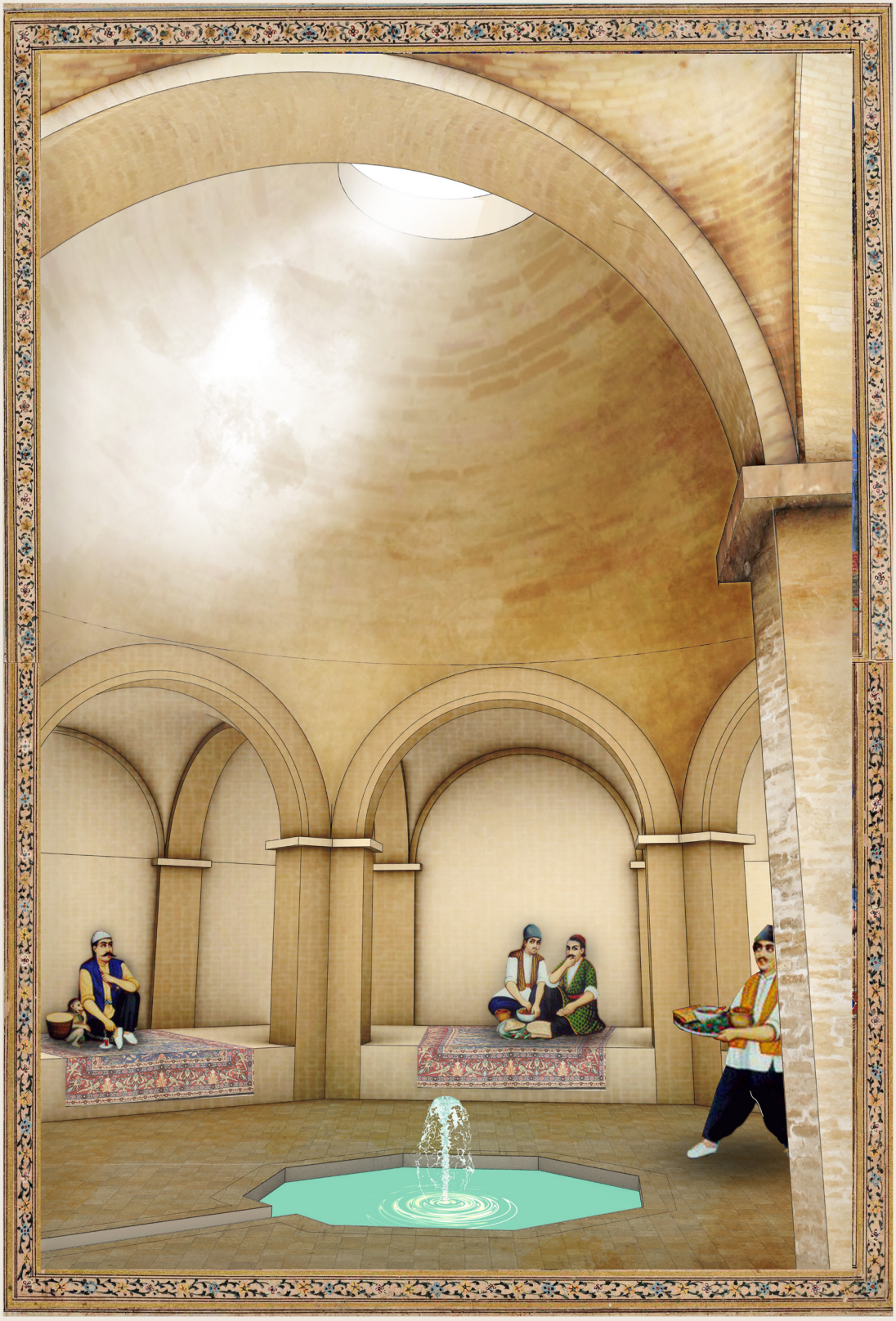


Figure 1 On Tea

PROLOGUE

By the year 200 BC, located on the Silk Road, the ancient Qumiš was the first capital of the Parthian Empire. The settlement that the Greek called Hecatompylos (The City of a Hundred Gates) is today called **Damghan**. Deh-e-Moghan (The Town of the Magi) had many smaller settlements in its surrounding, **Jazan** being one of them. When it was built during the Sasanian Empire (224 to 651 AD), Jazan was but a fortress surrounded by a moat and functioned as a military outpost for the city.

As years passed by, however, Jazan lost its military purpose and the fortress got surrounded by the houses that the soldiers and their families built. The people started keeping animals and planting pistachios, almonds, and apricots. What had once been the dwelling of an army was now a village of farmers and what was once a fortress had now become a castle for the noble, the masters of the village.

Although those who lived during the early years of the Pahlavi dynasty were only children at the time, the elderly of Jazan remember **Haj-Mohammad-Ali** to have been a kind and giving Master for the village. He and his family lived in the old castle of Jazan. Like all other villages of Iran, in the old days Jazan was governed under a somewhat feudalistic culture in which the Master owned all the land, allowing the people to build, farm, and live on it. In return, the people would pay taxes in the form of cash or produce. In the mid 1950's, Mohammad-Ali died and his elder brother**, Mohammad-Hossein** inherited all the land – and with it, the power.

Many Persian settlements in the semi-arid areas depended on an ancient irrigation system called Qanat. The Qanat were a network of underground channels that were used to transport underground water to the cities. Jazan, however, never had a Qanat system and relied on the water from a natural spring in the north of the village, called the Nosrat-Abad Spring. The water of the spring was enough for daily usage, but the orchards were irrigated only once a week, through ditches.

Haj-Mohammad-Hossein was young and naïve. He was blinded by his sudden wealth gain and wanted more. He took control of the ditches and minimized the water that was transported to the people, flooding his own orchards. The vassals, of course, were not too happy. Spending her childhood in Damghan, **Fatemeh**, the grand daughter of the late Master (Mohammad-Ali) remembers hearing stories about the fights of the people of Jazan and Mohammad-Hossein's mercenaries. She also remembers hearing about **Abbas**, one of the Jazani farmers who was afflicted by the new Master's oppression. Abbas did not know how to read or write, but he knew that the people had rights and so, he became one of the leaders of the fight for water, taking the case to the court - which ruled in favour of the people.

Some 30 years after these events, in the fall of 1988, Fatemeh, a descendant of the Master's family, Married **Nemat**, the youngest son of Abbas the farmer. I am their child.

INTRODUCTION

If you have ever made anything, a small wooden box for example, then you would know how it feels to make something with your own hands. You would know that even though it is not a perfect box, it is a valuable one, because, every time you look at it you remember how you cut the pieces, how you sanded them, and how the box was assembled. You remember how it is something you created with your own hands. With your hands, you gave meaning to scrap wood. It would not be hard to imagine the same process being used to seek meaning in architecture, to make the builder look differently at crude materials and the buildings they formed.

Contemporary architectural knowledge has failed to bring locality and sense of belonging back to our cities and villages. The connection between people and their buildings has been forgotten, and so, in our settlements we have given in to more reachable and mass-producible approaches - the universal ways of building. In doing so, we have deprived ourselves of the intimacy that was once the blood in the veins of our passageways.

Jazan, the site of my project, is not the only village in Iran that faces the problem of losing its vernacular identity. It is only one example in many where the need for growth and development has been changing the face of the village into that of a small city, a face that does not resonate with the cultural background of the village. Neither does the village have the economical resources to maintain its new face. The result is a township of detached buildings with unfinished enclosures and unmaintained streets. Streets so wide that the people gradually grow apart until they move out of a town towards which they feel no affection, into the nearest city.

As an avid follower of the works of Nader Khalili and his efforts in creating economic housing, I recognized that his work has always had a key component: the community or the users' participation in the building process. I noticed the way people felt about the buildings that they built, whether with the help of Khalili himself or just using his techniques. I saw the strong connection between the people and the walls they had put up. The traces of their touch on a building would have given it a new meaning, a new familiarity.

Therefore, I started working to find the effects of this phenomenon. Looking at similar projects and works, in self-build architecture I looked for intimacy, for belonging, and for locality. I am not suggesting that the community-based or the self-build are the only answers to these questions. But I do believe that where possible, they are excellent ones.

Nader Khalili

Nader Khalili was an Iranian-American architect whose quest was to build housing for the poor, focusing on affordable materials and techniques. Greatly inspired by the poetry of Rumi and the unity of the four universal elements he looked at earth as a sacred building material to which most people have access to at a low cost.

Earth turns to gold, in the hands of the wise

-Rumi, translation by Khalili

Trying to gain a new understanding of this ancient material, Khalili spent most of his professional life researching traditional building techniques and experimenting with new ones which he pioneered at CalEarth, an earthen architecture institute that he found in 1991. Khalili's technique, called Super Adobe, is being taught at CalEarth and many other places around the world to people who want (or need) to learn to build their own houses, making it a great inspiration for my work.

Castle Mofid was the name of the village where Khalili did his first experiments. Located not too far from the capital of Iran, Tehran, 60 families used to live in this village that was shaped like a fortress. Khalili noticed that the poor quality of the mud structure and its inability to withstand long exposure to rain and snow has caused the tenants to move out of the village to the point where only 12 families were left in the late 70's – when the architect started his work. Working with the people of Castle Mofid, he set fire to the remaining houses, firing the mud into solid brick and as a result, the fortress was now strong enough for the people to keep living in.

This was not merely a question of stability, however. The people chose to stay and maintain their village because they had participated in the project of strengthening the structure. By putting effort into the houses, they had given the village new meaning. The village is now called Dehshad-e Payin and has a population of more than 1000 people.

To view the image, please refer to the printed copy at Musagetes Architecture Library, Cambridge, ON

Figure 2 Nader Khalili in one of his Super Adobe Structures

Figure 3 Castle Mofid in 1979 constructed based on Khalili's descriptions

Figure 4 Latest image of Castle Mofid (Deshshad-e Payin)

Figure 5 The tools used in the Super Adobe technique

Figure 6 Super Adobe construction in progress

Figure 7 Venezuela - By Alejandro Lopezy

Figure 8 California, USA - By Lisa Starr

Figure 9 Colombia - By Jose Andres Vallejo

Figure 10 Oman - By Cal-Earth (led by Hooman Fazly), URC, and SSH

Short after the Islamic revolution of 1979, Khalili moved to California and founded CalEarth Institute of Earthen Art and Architecture. At CalEarth he developed the "Super Adobe" method, a method of building with earth that requires minimum hard or soft resources. The Super Adobe technique has been adapted around the globe to build affordable housing and shelters.

Earth, Community, Building, Builders

In certain climates where building with earth is possible, it appears to be the most readily and cheaply available material. No other material can be more local than the earth of the ground on which we are building. Moreover, earthen structures have proven to function very well in keeping the temperature and the humidity of the interior comfortable. However, earthen buildings do not function as well during seismic activities or prolonged contact with water. But, it is hard to imagine that today's technology and knowledge would not be capable of addressing these issues and finding suitable solutions.

Earth was long the main building material in Iran as well as other places with similar climates. In Persian culture, earth has always been looked at as the stuff of life. Mankind was created out of mud and each of us return back to earth at the end of our lives.

I was crude, I was baked, and then I burned

-Rumi, translation by author

But the material, as important as it is, does not define the whole project. Looking at precedents in community-based construction and through comparison, I have carried out analyses of the best and the worst in each, learning the dos and don'ts in such projects. The results of my case studies led me to approach the project from another angle: design. Through design I would be able to showcase what the project could be, in one particular situation.

My design provides the village with a new project that is not solely after a final result. The real design, is the process through which the site is going to be transformed. While on completion the village would have a new community hub, the process has much more value at the time it is being built. A strong belief in "learning through making" is the backbone of this process, and so, the element of "making" must remain in the site after the completion of the project.

ON EARTH

In traditional Persian culture, earth has always had a great importance. Believed to be what human beings are made out of, the Persian poetic (as well as Islamic religious) world view is that God created Adam, the first man, from a handful of clay. The clay had no life until God breathed into him of his own soul – the soul that creates.

Much like Adam before coming to life, buildings are but things on their own. They are only alive when we breathe into them of our creator soul. The building is the body, and we are the life.

Earth As a Building Material

Earth was one of the first materials that was used by humans to build shelter in many parts of the world[1]. While disadvantages such as not being a standardized material or a water resistant one have rendered them useless today, earthen structures can prove to be advantageous in many other ways.

Being able to "breathe" humidity in and out of itself, earth balances air humidity to a greater degree in comparison to other materials[2]. It is also one of the environmentally cleanest, financially most affordable, and most readily available materials known to us. It can be found on site, minimizing the transportation costs while being easily recyclable[3]. Furthermore, earthen buildings are usually built using rather simple methods. For all the aforementioned reasons, earth is an ideal material for projects where non-professional builders are involved.

Having all of the advantages of earth in mind, it is hard to believe that today's knowledge and technology have no solutions for its disadvantages. The two main natural happenings that affect earthen buildings the most are erosion and weakening due to drown-out contact with water and not being able to withstand stronger seismic activities.

To minimize contact with water, we must first know what kind of a climate our project is located in. As later discussed, this thesis is focusing on a site in a semi-arid climate at the edge of the Great Salt Desert in Iran. Therefore, provided that proper drainage is built on site, we do not need to worry about flooding at the site of Jazan. Seasonal rains, however, can dampen earthen walls and progressively lead to their erosion. Cob plasters were traditionally used in this area as a coating layer to protect the adobe walls from this moisture. Due to the plaster's ability to absorb water, it might need a moderate level of maintenance. Nevertheless, cob would delay the contact of water with the structural core of the wall and dry off before the moisture reaches it.

However, traditional knowledge was only able to address seismic activities to a certain level.

2 Minke, *Building with Earth: Design and Technology of a Sustainable Architecture*, 14.
3 Minke, 15.

Some of the more common passive ways to minimize the harm of earthquakes are as follows:

In General, symmetry can increase the structure's strength. Therefore, square plans are more appropriate than rectangular ones, and circular plans are more appropriate than square ones. The closer the plan is to a circle, the better are its chances at canceling out lateral forces and withstanding them[4].

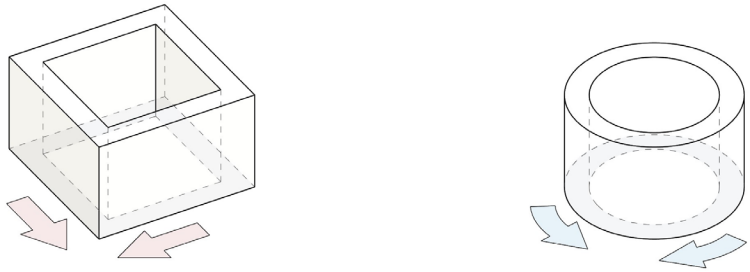


Figure 11 Symmetry as an earthquake-resistant approach

If different parts of the building have separate structures, they would have the ability to resonate separately instead of pushing and pulling each other back and forth at dissimilar frequencies[5].

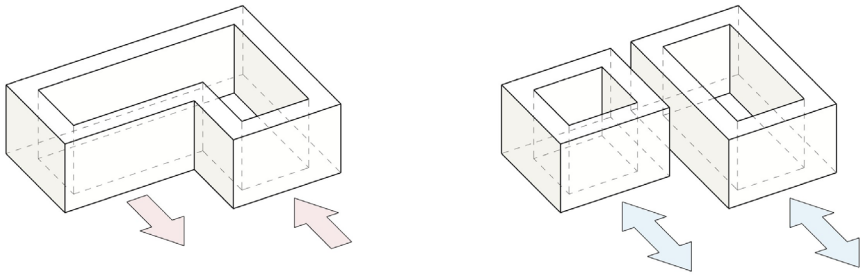


Figure 12 Structure division as an earthquake-resistant approach

Avoiding right angles helps transfer shear forces to adjacent walls and prevent a concentration of stress[6].

4 Minke, 136.
5 Minke, 136.
6 Minke, 139.

Figure 13 Angle management as an earthquake-resistant approach

Having the second point in mind, there are two options for roofing earthen spaces. One would be to support a roof separately from the building so that it would react to lateral forces independently from the walls. The walls must be supported by a foundation and a ring beam to maximize their rigidity.

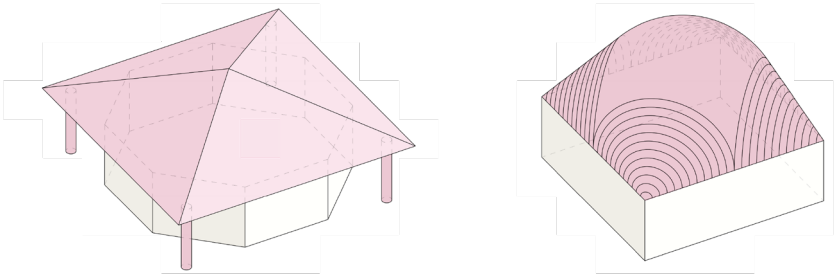


Figure 14 Roofing options

The other option would be to build a rigid masonry cover that has a strong bond with the walls. In this option the Walls and the roof must be well interconnected and heavy enough so that the kinetic energy of the earthquake moves them together. Therefore, the connections between the roof and the wall must be extremely well built.

Having these guidelines in mind from the beginning helped me in the design process, where the plans and sections could determine how strong the structure is.

ON COMMUNITY

When discussing user participation in architecture, depending on the project and its goals one may be addressing different categories of the topic, each based on various levels of involvement in the building process. Participation can also mean different things in terms of the specific steps of a building process in which the user is involved. The users might be only consulted about a building project without even having a guaranty for their needs to be met[7] or they might be more assuredly involved in any or all of the processes of decision making, design, and construction. While the participation of the inhabitant is involved in any of these steps, it can have many effects on the final outcome.

Focusing on the effects of participation on the relationship between the user and the building(s), a common assumption is that the users' participation, in the process of construction allows the final result to have a true sense of touch, character, and locality. In this particular level of participation, the people of a community usually come together and using their own labor they invest themselves in the construction of their buildings. For a building project to be executed by an inexperienced crew from the community, one of the architect's most important roles is to ensure the building techniques and drawings are simple enough for the people to understand and learn. For that reason, an analytical focus on the methods of building and communicating with the community seems to be necessary.

Numerous projects have benefited from (or have been hindered by) the practice of user participation in construction – self-build – but they have only been criticized individually. Therefore, there appears to be a lack of a more comprehensive discussion on the self-build. As this certain type of participation is very rare in the contemporary, it narrows down the discussion to a point where only through an analysis of examples can we explain its effects on the building. The most promising way to learn from them and to see if there is anything valuable to be found in the self-build for the architecture of today, seems to be to look at these examples simultaneously. In doing so, their common components and differences can be brought to the forefront, revealing the most important and the most effective elements of such practices. Two significant projects were chosen to be compared with this intention, which are similar in essence but very different in outcome.

Mexicali

In 1975, architect Christopher Alexander was commissioned to manage a housing development project in Mexicali, Mexico for a low income community[8]. With a critical look at modern day mass

7 Sherry R. Arnstein, "A Ladder of Citizen Participation," *Journal of the American Institute of Planners* 35, no. 4 (Jul, 1969), 216-224. doi:10.1080/01944366908977225. https://search.proquest.com/docview/1296116260.

8 Ana Laura Ruesjas, "The Mexicali Experimental Project: An Analysis of its Changes" (McGill University, 1997), 11-21.

housing procedures, he decided to take an unorthodox approach and set a few principles to work with in the project[9]. Alexander's group asked the help of the community to build their own houses[10] and built a total of five houses with the hope that this community housing model would grow in the region[11].

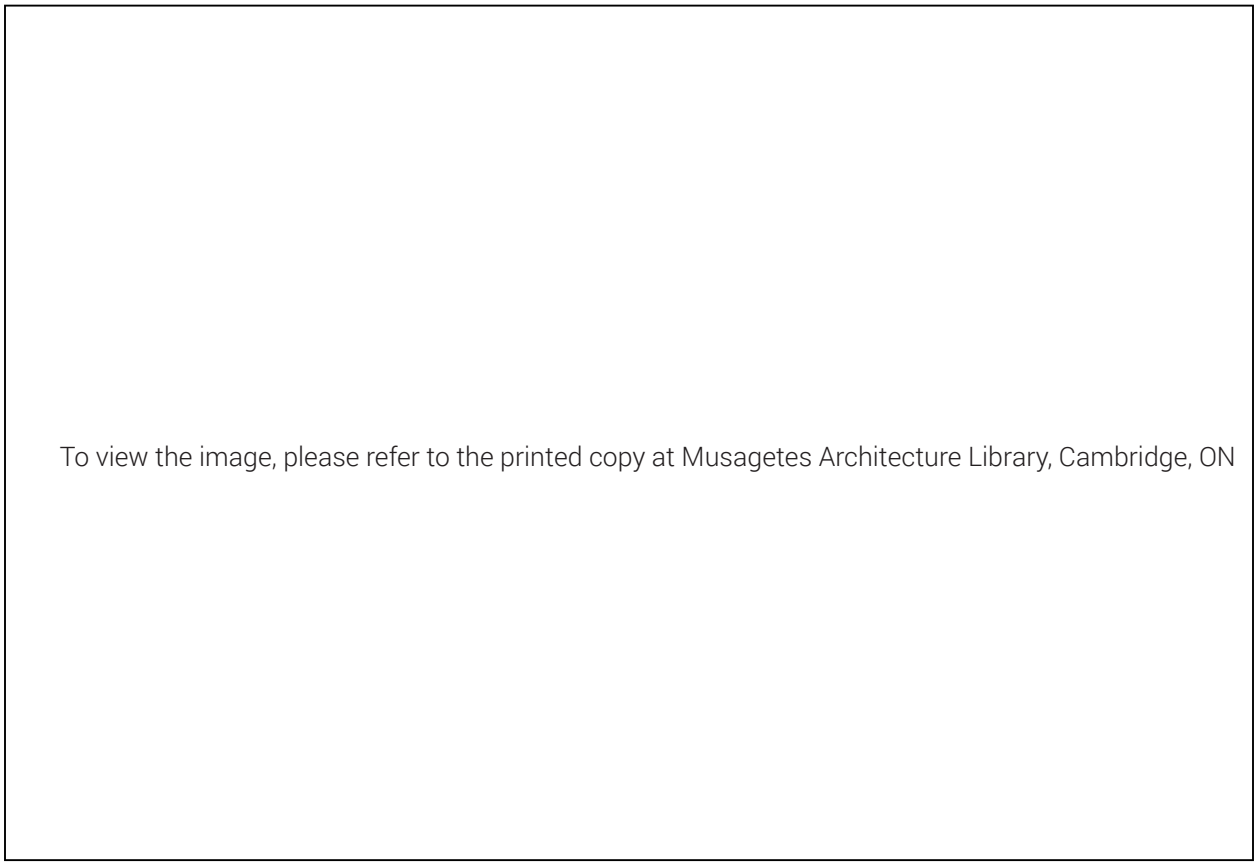


Figure 15 Builders drawing plans in chalk on the Mexicali site

One of the most significant components of Alexander's work was the creation of the "Builder's Yard". The Builder's Yard was a place for the "Architect Builders" to experiment with construction methods, build the building components, and learn how to build their own houses[12]. The Builder's Yard proved to be a very useful component of the project since it created a base laboratory for the builders to get familiar with the materials and the methods, and also to embark on the design of the houses. The yard, however, was abandoned after Alexander left the project and the community sought the help of local experts, masons, and craftsmen for the creation of the rest of the housing

9 Christopher Alexander 1936-, *The Production of Houses*, eds. Howard Davis, Julio Martinez. and Donald Corner (New York; New York : Oxford University Press, 1985: Oxford University Press, 1985).

10 "Mexico, the Mexicali Community," , accessed Dec 15, 2018, https://www.livingneighbourhoods.org/ht-0/mexicali.htm.

11 Ruesjas, "The Mexicali Experimental Project: An Analysis of its Changes", 11-21.

12 Alexander, *The Production of Houses.*

and the renovation of the ones that Alexander had built [13].

Also, the invented construction method was simple enough for the people to practice without the help the experts but they seem to have been unable or unwilling to continue building in that manner. This proves that the presence of the expert was essential in the realization of the buildings[14]. What can be learned is that the architect must never take people's dependence on their local building techniques for granted, and instead it appears to be more realistic if we try to recover and add back what has been lost in the local techniques to improve them or simplify them, instead of proposing a completely alien technique. However, this might only be true in more conservative communities that have strong bonds to their traditions, such as that of Mexicali.

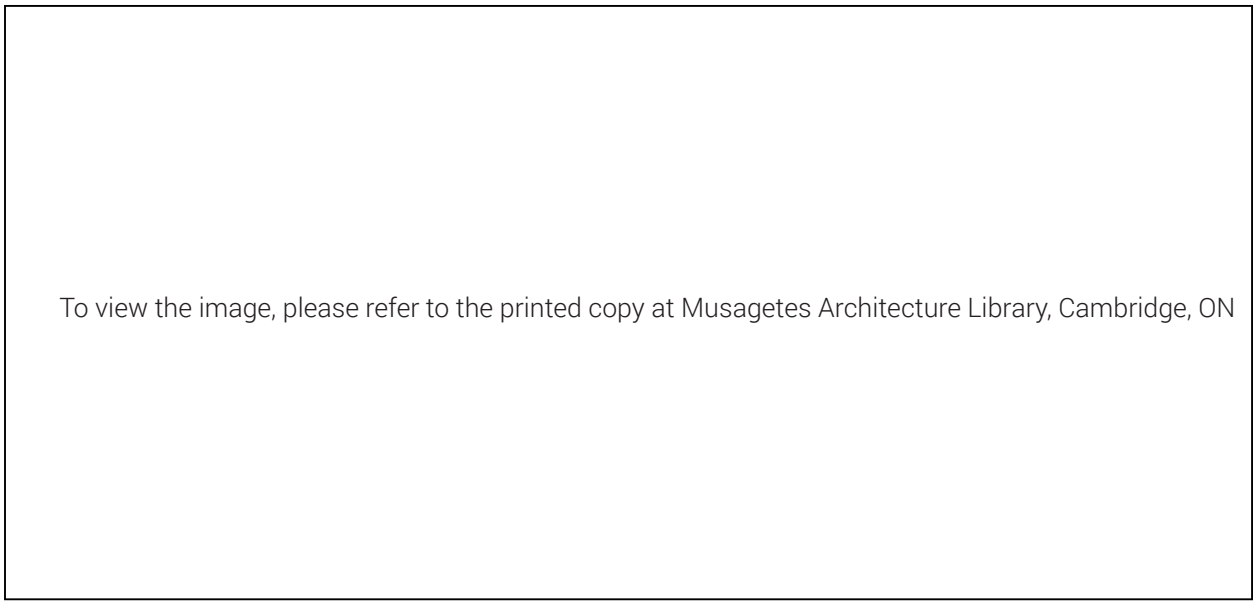


Figure 16 Mexicali community

The builders, when laying out the plans of their homes on the ground with chalk, were able to have agency in the design of the "plans" of their houses[15] but the amount of renovations and changes that the tenants made to their houses afterwards shows that the architect controlled the participatory development to a too great degree, failing to completely meet the needs of the families[16]. A stronger and deeper research into local architecture and the cultural life of the community could have helped Alexander's team avoid this problem.

Overall, Alexander's endeavours in Mexicali were successful in delivering an alternative approach to mass housing methods, and the connection between the architect and the Architect Builders was deep enough for the builders to build the houses for as long as the expert supervised

13 Ruesjas, "The Mexicali Experimental Project: An Analysis of its Changes", 11-21.
14 Ruesjas, 11-21.
15 "Mexico, the Mexicali Community,"
16 Ruesjas, "The Mexicali Experimental Project: An Analysis of its Changes", 11-21.

the project. Nevertheless, the current condition of the buildings, the changes made to them, and the fact the community did not fully adopt Alexander's method, show that the connection between them remained only on a superficial level, and that there was no vital connection between the architect's team and the background and the local reality of the community.

Walter's Way

In the 1980's, architect Walter Segal started working on a social housing project in Lewisham, London, U.K.[17]. Segal asked the future residents of the development to build their own houses using a technique that he had invented, inspired by traditional timber frame techniques. These houses

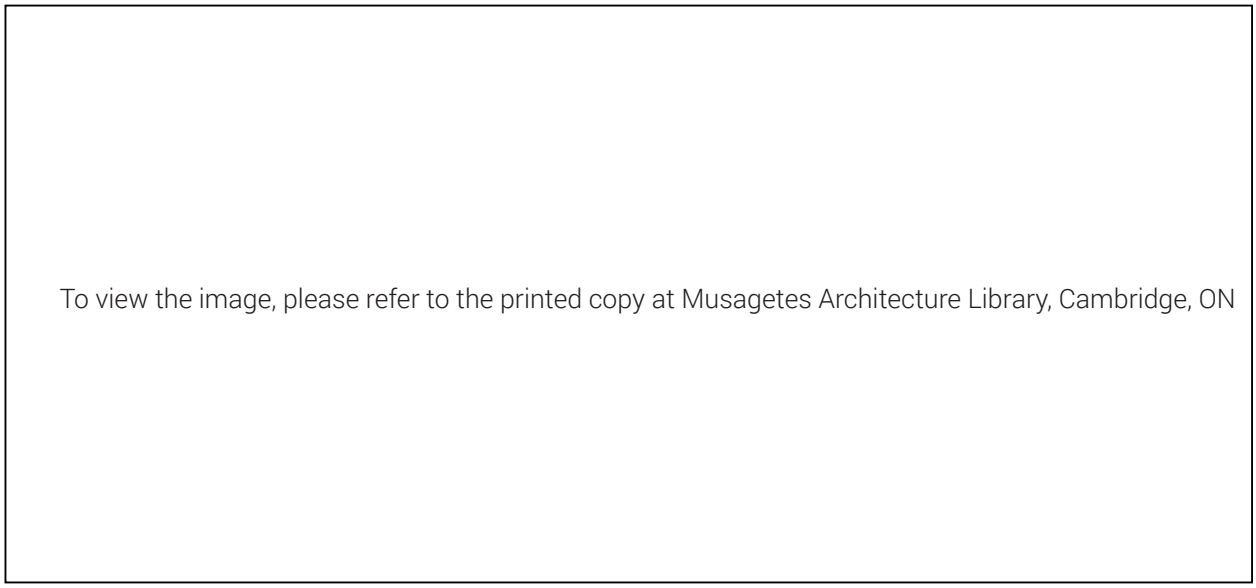


Figure 17 Walter's Way

were all located on one street, which was named "Walter's Way" by the request of the residents. Segal made sure he was spending long periods of time talking with the families and going over the design of their homes before construction began. With the supervision of the architect, each family built their own house, helping each other out as well when needed[18].

The significant aspect of Segal's project was that the technique was completely new to the context of London and the houses were made of materials that were almost never used prior to that in the city. However, the simplicity of the method and the modularity of the design allowed the residents to easily get involved in the construction. Also, the materials were chosen in a way that they could

17 "Walter's Way, Lewisham," 2015, accessed Dec 20, 2018, https://www.youtube.com/watch?v=0JbqJNAUOR8.

18 Alice Grahame, "'This Isn't at all Like London': Life in Walter Segal's Self-Build 'Anarchist' Estate," *The Guardian*-09-1, 2015. https://www.theguardian.com/cities/2015/sep/16/anarchism-community-walter-segal-self-build-south-london-estate.

be acquired at the local shops and did not need to be ordered from elsewhere. The spaces were sized so that minimal alteration needed to be made to the bought-off-the-shelf material, decreasing the needed labor and waste. Segal also provided the residents with construction documents that were specially curated for the non-professional user/builder.

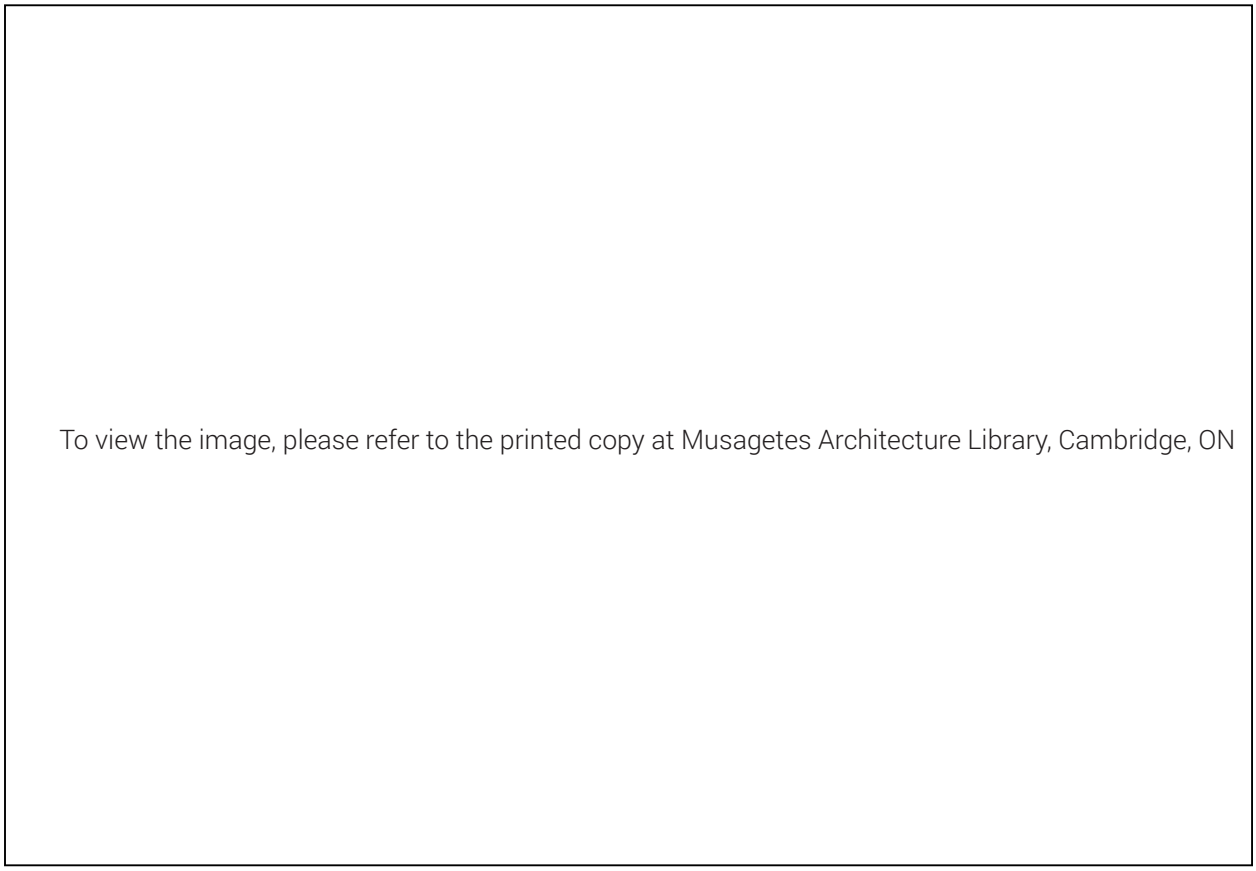


Figure 18 The Segal Method

Although the building method and the chosen materials were completely unfamiliar in the conservative context of London, Walter's Way residents are extremely happy with their houses – and the community that was built through collaboration and participation[19]. As the street is privately owned, it is maintained by the residents and because of the close relationships that is made between them, the neighbourhood is extremely safe to the point that children can play outside and doors can be left open[20].

19 "Walter's Way, Lewisham."

20 Grahame, "'This Isn't at all Like London': Life in Walter Segal's Self-Build 'Anarchist' Estate,"

Conclusion

In an overall look, the Walter's Way project seems to have been more successful than the Mexicali project in terms of meeting the needs of the community and building a constructively positive atmosphere in the neighbourhood. However, Segal's method is not used in too many projects in London, showing that however successful within the community, it has been perhaps too hard to break the old habits of this ancient city. Being located in a big city, however, seems to be an element that led to the success of Walter's Way, because, it was able to attract people who were more open-minded about architecture and ways of life than it would have been able to, say, in a more suburban or rural context.

Through the comparison of these two projects, one lesson to be learned is that for a self-build project to be successful within the community that builds it, the architect needs to build a close relationship with the users in order to learn about their lifestyles and backgrounds. It would be necessary in such a project to assess how accepting the users would be of new ways of living and building, if that is what we are proposing for them. What seems to have made Alexander fail in this matter is that although he let the users get involved in the design process, he certainly limited them in a way that made the residents carry out major renovations to their buildings afterwards. A user who is given the chance to build their own building, naturally would also like the opportunity of making it in a way in which he or she would feel comfortable. Consequently, it appears to be exceptionally important to give the users the agency to get involved in the design of their homes while keeping it within the realities of the construction method.

The idea of the Builder's Yard was useful while the buildings in Mexicali were being built. But the fact that it was no longer used for the future developments as Alexander hoped, demonstrates that these type of programs can only live as long as the construction process takes. The absence of the expert might be a reason for this matter. Experimenting with the materials and testing out design ideas can be a vital element of a self-build project, and so, the idea should not be completely dismissed. What can be done, however, is to accept the eventual death of this playground of experiments and let the actual building site be the place for getting acquainted with the material, the tools, and the techniques.

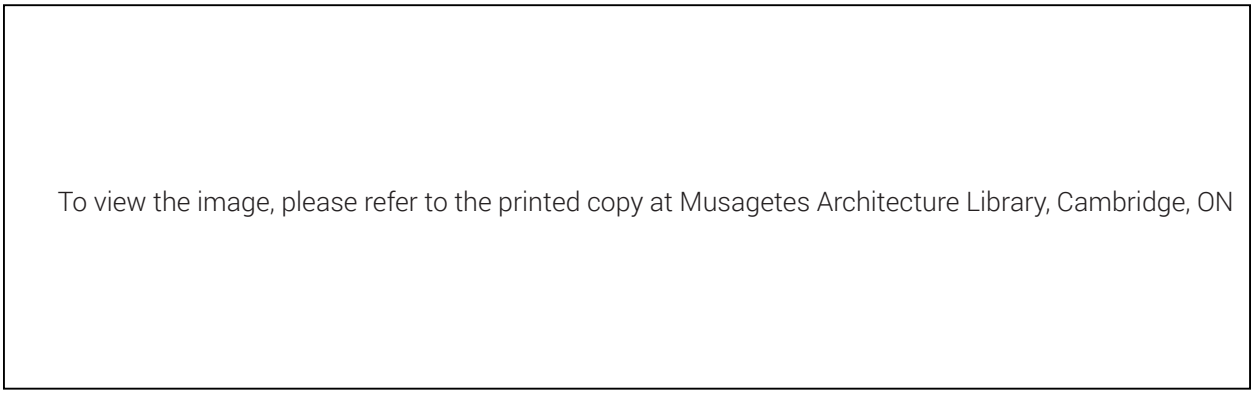


Figure 19 Alexander's details for the Mexicali project

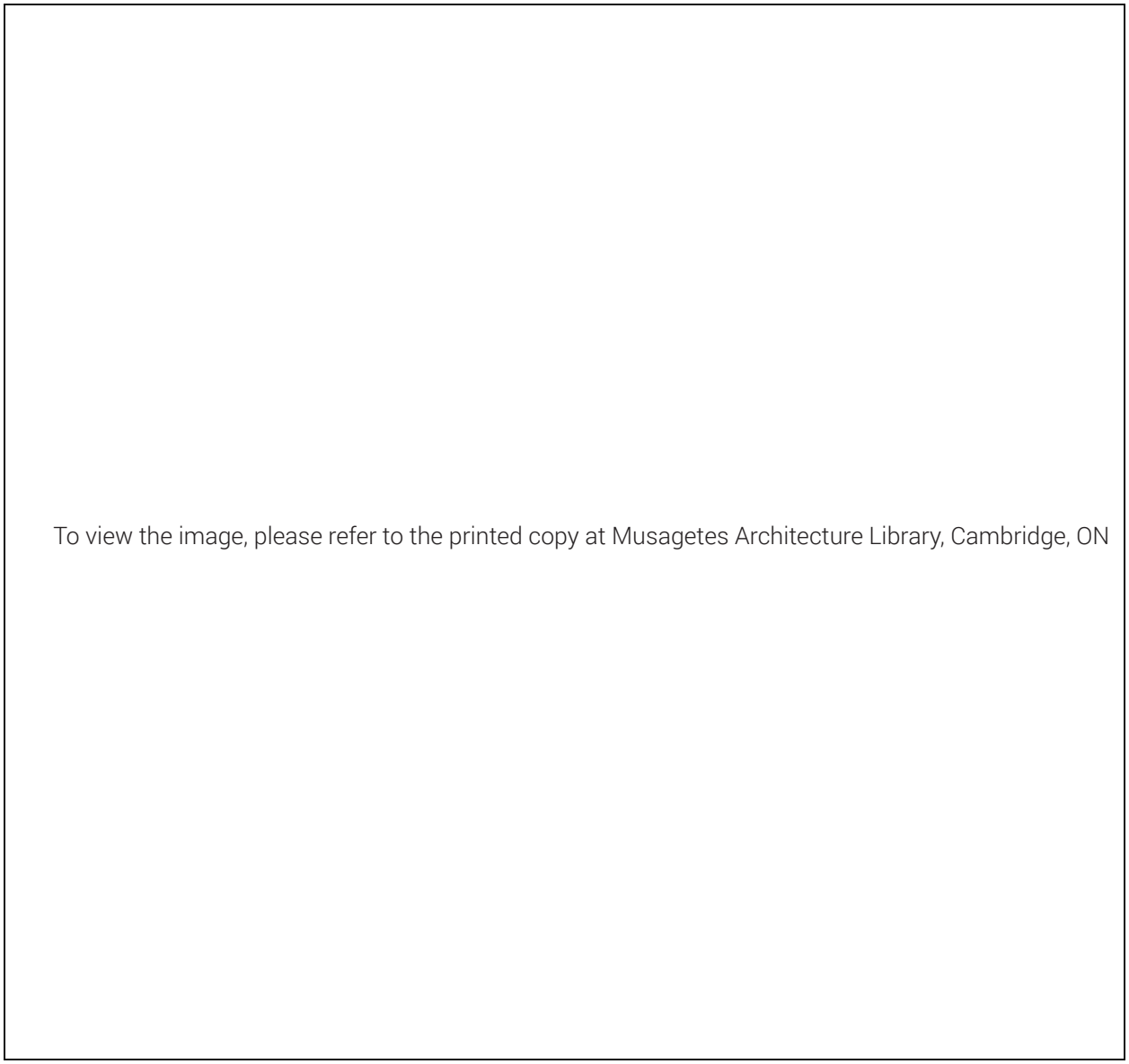


Figure 20 Segal's guidelines for the Lewisham project

Another principle that both projects followed was creating documents and building codes that were tailored towards the non-professional users who were going to build. Technical complexities were avoided in drawings and the step-by-step instructions for the processes were completely clear and comprehensive. This effort was crucial in both projects to ensure the users understand everything and that they would be able to build. If the two projects failed in anything, they certainly did not fail at running their construction sites efficiently and having an overall pleasant building experience for the users.

But even if we incorporate all of these principles that can help us build successful buildings, what can make a project effective in a larger scale? How can we bring up the chances for the self-build technique to be picked up by other members of the community as well? As this is a sought goal that was not reached in either of the two examples, we might be able to find the answer in what they both lacked. The techniques that were used in Walter's Way or Mexicali were incongruent with the context of the cities they were built in. Alexander used local materials in a completely innovative method that the local experts were not familiar with and Segal used materials that are even today hard to find in other London houses. An extensive research into and a deep understanding of the locality of materials, methods, and lifestyles of the context is necessary for any self-build project to thrive.

ON BUILDING

… what miracles walls can do. … good neighbours, in the land of Persia, start their love by sharing the shadow of the same wall from opposite sides; and … in the Persian language the word "neighbour" is hamsayeh, "united in shade"" and … a whole village or a community starts by building the first walls <u>together</u>[21].

-Nader Khalili

The comparison between Alexander and Segal's works shows that in rural contexts, the success of the work is closely related to how regional the project is. Less versatility in culture, beliefs, and lifestyles in villages means that the architect needs to look very closely at the region: the local materials, crafts, and traditions. Traditional contexts are by nature less likely to accept or adopt new ways of building that sacrifice locality for innovation. These ways would seem completely alien to the people and the project would also be disregarding the local workers' skills.

As a result, each project becomes unique, because, each site and each community are unique as well. While certain aspects such as climate might lead us to similar conclusions for sites with similar climates, other considerations can diverge our process of decision making – as the opportunity of using available material did in this project. From this point of view, the process and the core concepts are the only attributes that are common between different project. The methods of building, the designs, and the materials are a few of other things that separate each project from another. So, in this thesis, I intend to discuss how one project of such can happen in one instance.

This instance happens in the village of Jazan. Being where my father was born, Jazan is not only extremely dear and important to me, but it is also facing problems that I believe can be addressed through community participation.

21 Nader Khalili, *Racing alone : a visionary architect's quest for houses made with earth and fire* (San Francisco: Harper & Row, 1983).

Figure 21 Location of Damghan within the climate of Iran and in between Tehran and Mashhad

Jazan: A Dichotomy

The village of Jazan is located in Semnan province of Iran, 6 kilometers outside the city of Damghan. Due to closeness to the city and to the freeway that connects the east and the west of the country, the village has grown to a population of 1800 in 2019.

Around 15 years ago, the village expanded with a new development plan, augmenting a set of low-rise apartment buildings – a type which is more consistent with the urban form of Iranian housing. The new buildings were built with no regard to the context of the village and created a very

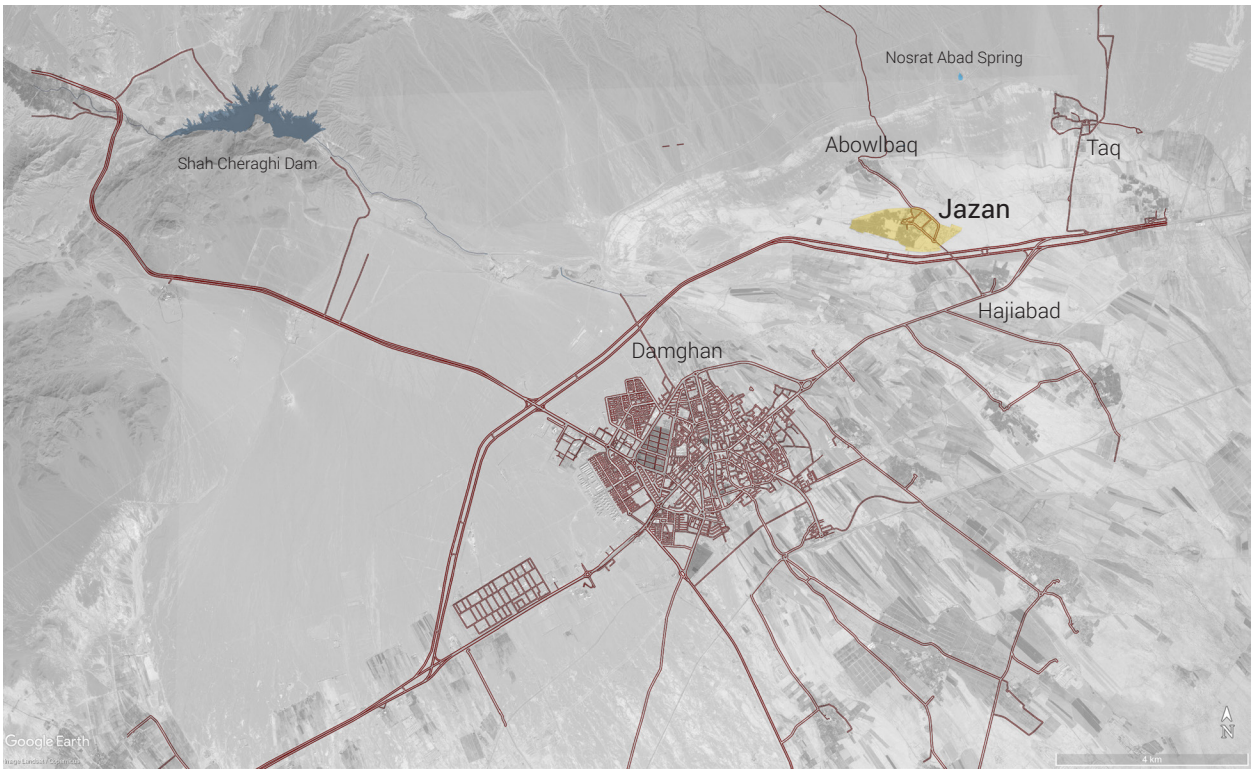


Figure 22 Damghan and its nearby villages, including Jazan

visible dichotomy in the fabric of Jazan. With further plans of development at hand, it is expected that the patched on "modern" planning would continue growing in the village, transforming its identity forever. Using materials and methods that are not local to the village along with an absence of expertise and economic support, has resulted displeasing, crude buildings that lack a sense of identity.

The proposed site for the project is located at a plot that was once an orchard at the edge of Jazan. The only memory trace of the orchard that was once here is an ancient dead yellow fig tree in the middle of the plot. The site is located between the old and the new parts of the village, making it a desirable location for a reconciliation between the two, if such a thing might be possible.

In the heart of the village, the ruins of the village's old castle have eroded into a solid mass from the top of which one can view the village's characteristic skyline. Across from the castle is the village mosque which is the only community hub for the village where many gather everyday to pray or to attend funerals. During religious holidays, the mosque is busier than ever when the people who live elsewhere but are originally from Jazan visit. The older part of the village was gradually and organically formed around the castle and the mosque over the years.

A look at the aerial image of the village at different times reveals how the newer neighbourhood was developed on a rather arbitrary pattern.

Figure 23 Neighbourhoods of Jazan

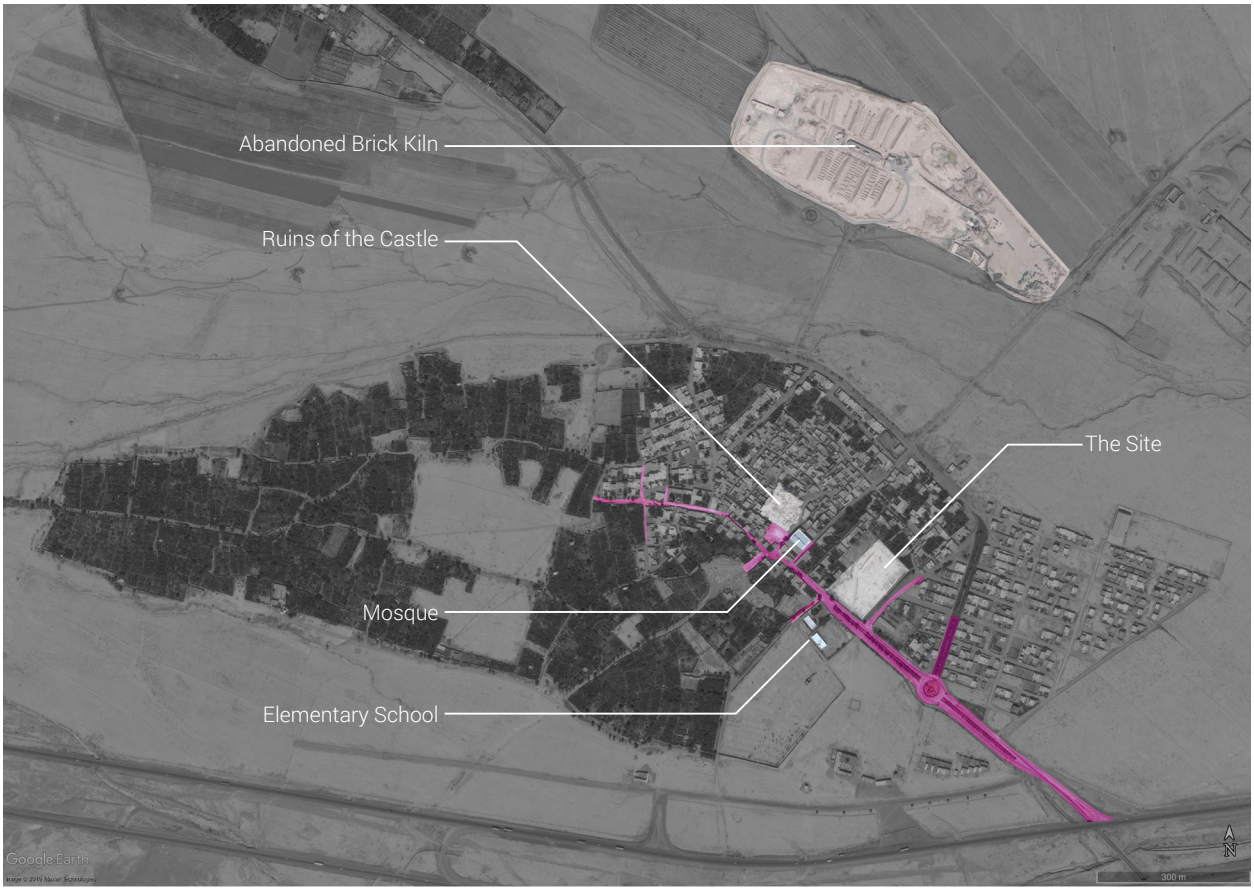


Figure 24 Rural armatures of Jazan and points of interest

What Jazan needs is a reminder for the people, a tangible experience that would reconnect them with their local architecture. This is not to say that I seek an imitation of the past, but *I believe that a modern solution and a solution which employs the local materials, skills, and context are not mutually exclusive*. The community can learn and observe once again how walls can be built and how arches are formed. Through making with their hands, they can learn about the earth beneath on which they stand and how to build with it.

To encourage and attract a larger group of people to join the project, the building must be able to service the whole community. While housing has traditionally been the main concern for community-participation projects, what Jazan needs is a centre for all. A new community hub that would act as a beacon in the region's architecture, demonstrating the people's effort and advocating learning through making. But what could be that forum? What kind of a building can serve as a community hub in Jazan?

Sometimes the simplest answers can be found in the traditional context of our projects. Looking at a not too distant past of the cities and villages of Iran, one could observe that people would meet to observe and discuss the economy of things in the bazar. They would gather to listen to the preaching of the Imam in the mosque. They would sit together in a tea house, to catch up over a

cup of tea on the latest developments in each others' lives and in the world around them. Traces of many of these activities can still be seen today in smaller towns and villages.

Therefore, I propose a new community centre in the village of Jazan: a tea house. The tea house is to function not only as a recreational space but also as a bond between the past and the present of the village. It's a building to be built by the people and for the people to teach them that they can create better spaces for their dwelling, and how to fulfill it.

Figure 25 The ancient fig tree on the site - remaining from the old orchard

Figure 26 Traditional construction in the older neighbourhoods

Figure 27 Newly developed neighbourhoods

On Tea

The first Persian teahouses evolved from a completely different archetype. Before the development of advanced plumbing and the luxury of private bathrooms, bathhouses in Iran were among the most important public spaces in any settlement. People of all ages would spend most of a day in the bathhouse and during that time, they would also meet friends and family to discuss the latest news and local gossip. Most of these interactions would happen in the locker room –Bineh.

The Bineh was a space that worked as many things. As a medium between the warmer areas of the building and the vestibule, the Bineh would hinder the loss of temperature in the building. Moreover, the room provided a space for customers in which they were able to wait for service before entering the bath, and to rest after a bath. It was also a space where you would talk to your companions over a cup of tea. The Bineh typology was then adopted over time to base the design of teahouses on.

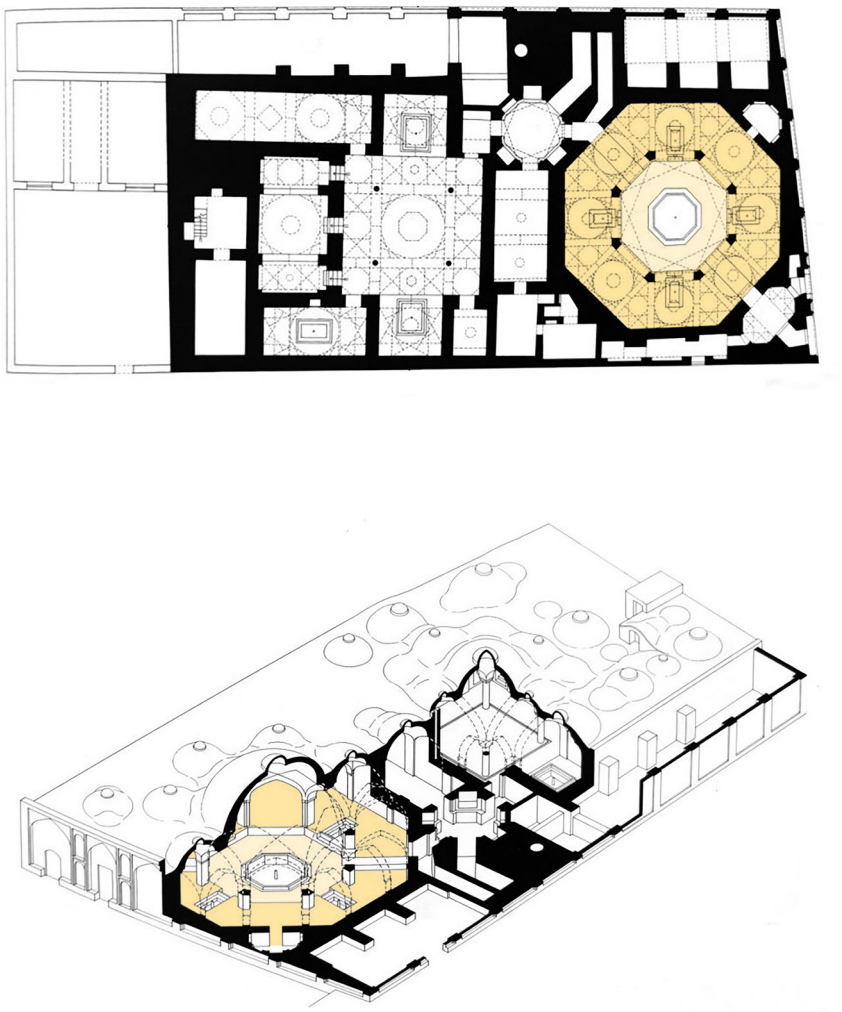


Figure 28 Vakil Bathouse, Shiraz, Iran

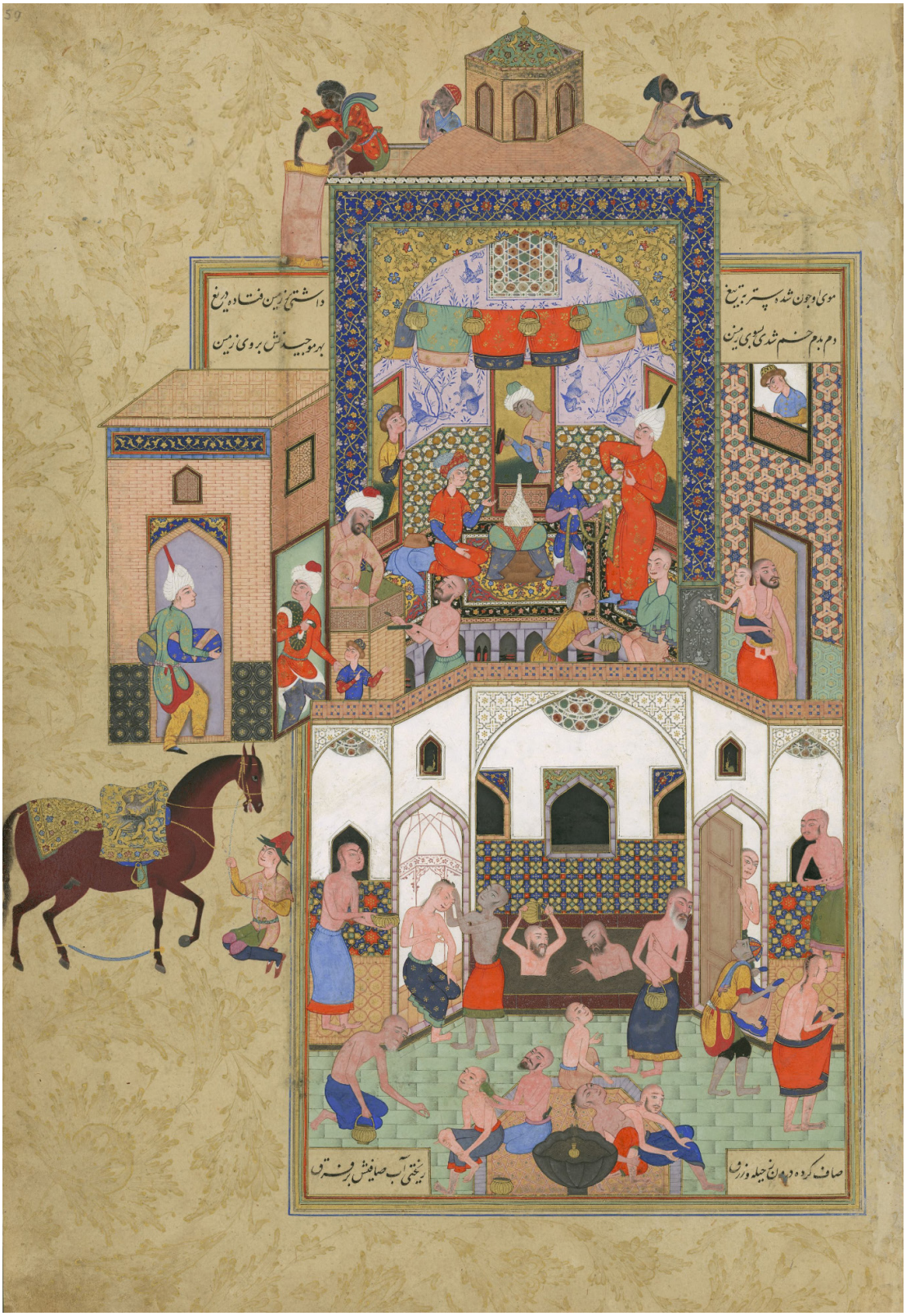


Figure 29 Depiction of a bathhouse in an Iranian miniature from Haft Awrang

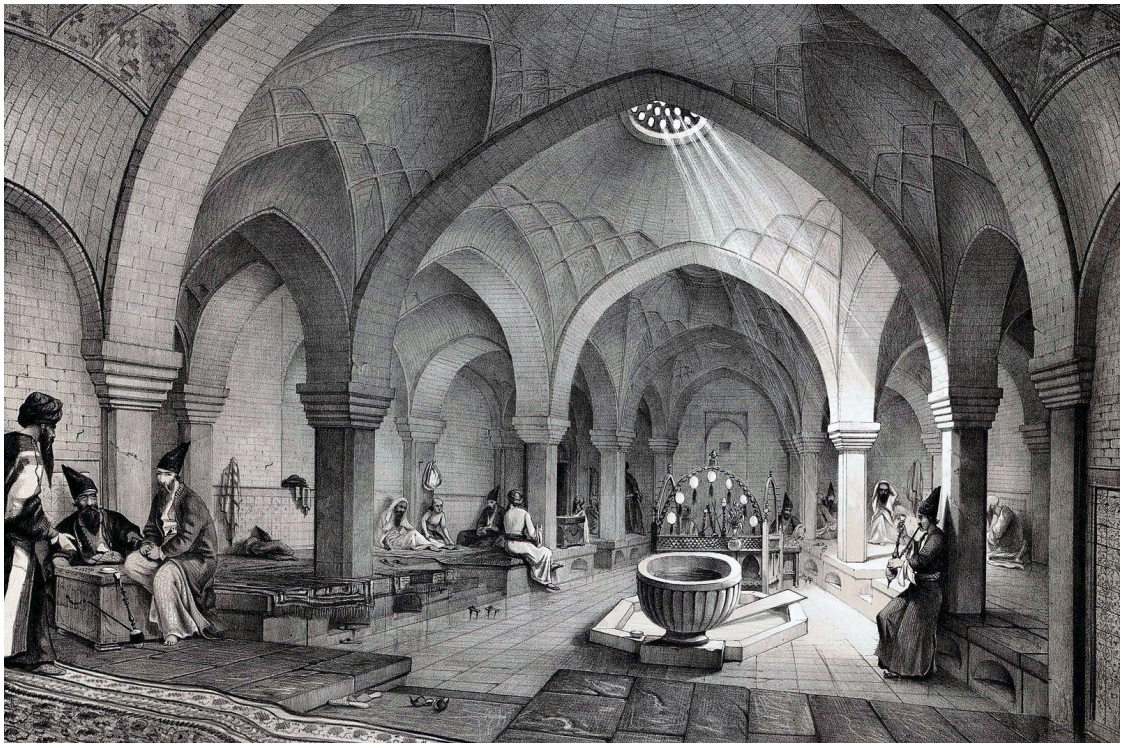


Figure 31 The Bineh (locker room) of Khosro Agha Bathhouse, Isfahan, Iran

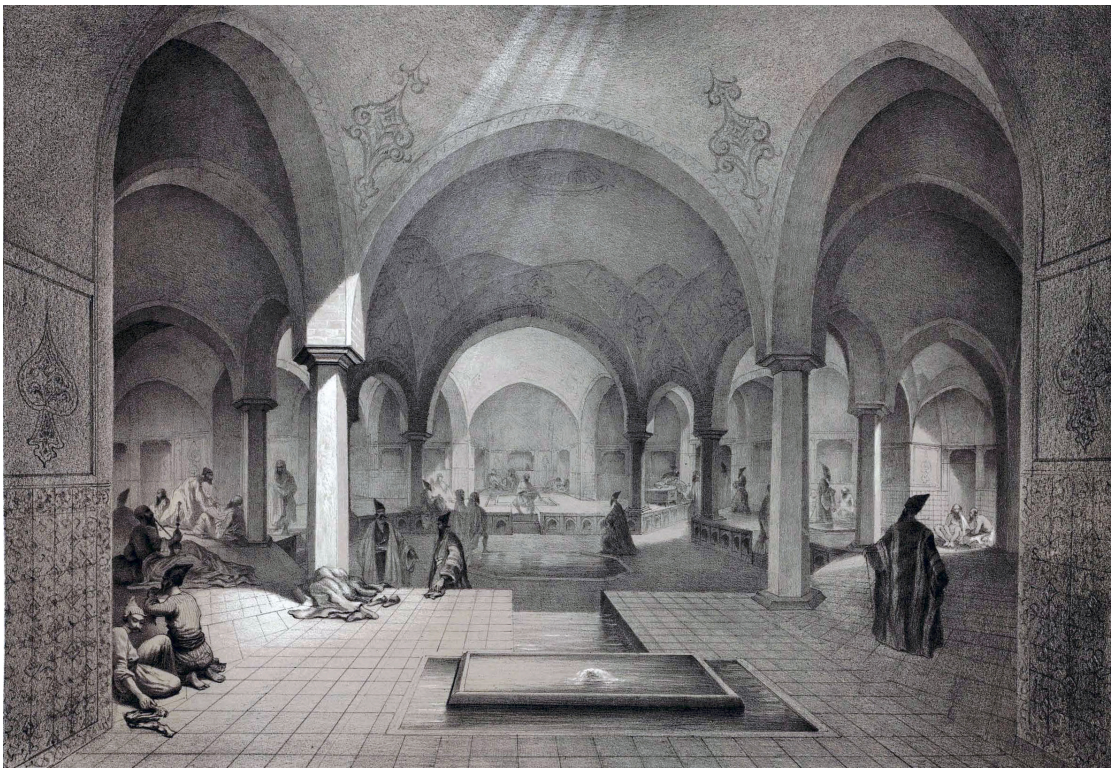


Figure 30 The Bineh (locker room) of Fin Bathhouse, Kashan, Iran

The Teahouse

The orchard site is divided into four main spaces: The Builder's Yard, The Garden, The Teahouse, and The Housing Ground.

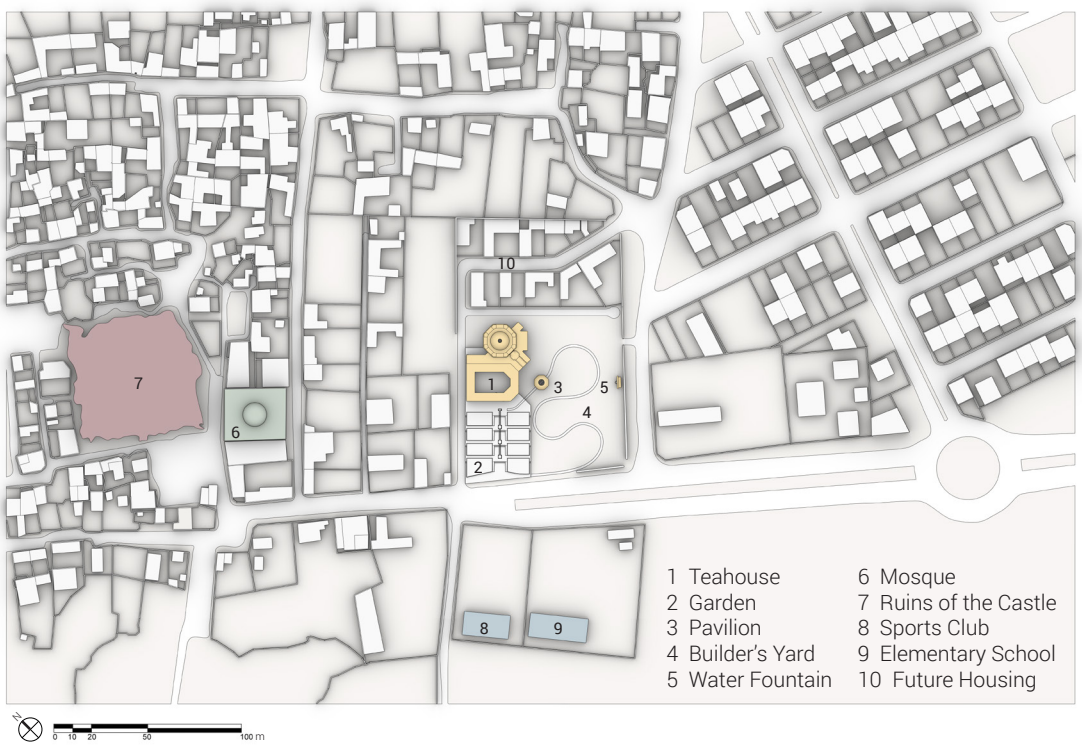


Figure 32 Site Plan

As you enter the site from the south-western end, you see a stream of water, with a rhythmic array of small fountains. On the two side, Cypress trees are also arrayed on a linear pattern, leading you forward. With their year-round greenness keeping the garden alive, in traditional Persian culture the Cypress is a symbol of endurance, perseverance, and virtue. Narrow walkways cut into the two green spaces, invite you to step closer and sit under the shadow of the fig trees that spread their branches above your head, with ripe yellow fruits winking at you through the thick leaves, resembling furtive rays of sunlight.

Following the sound of the fountains and ascending the gentle steps or ramps to approach the building, you notice an arcade in front of you. Between a few of the columns, thin brick walls have been laid in a way that creates a translucent screen. Through the cross-shaped perforations in the screen or from certain angles, you might see the old tree peeking through, calling you to step closer and discover.

Figure 33 View of the garden from the entrance

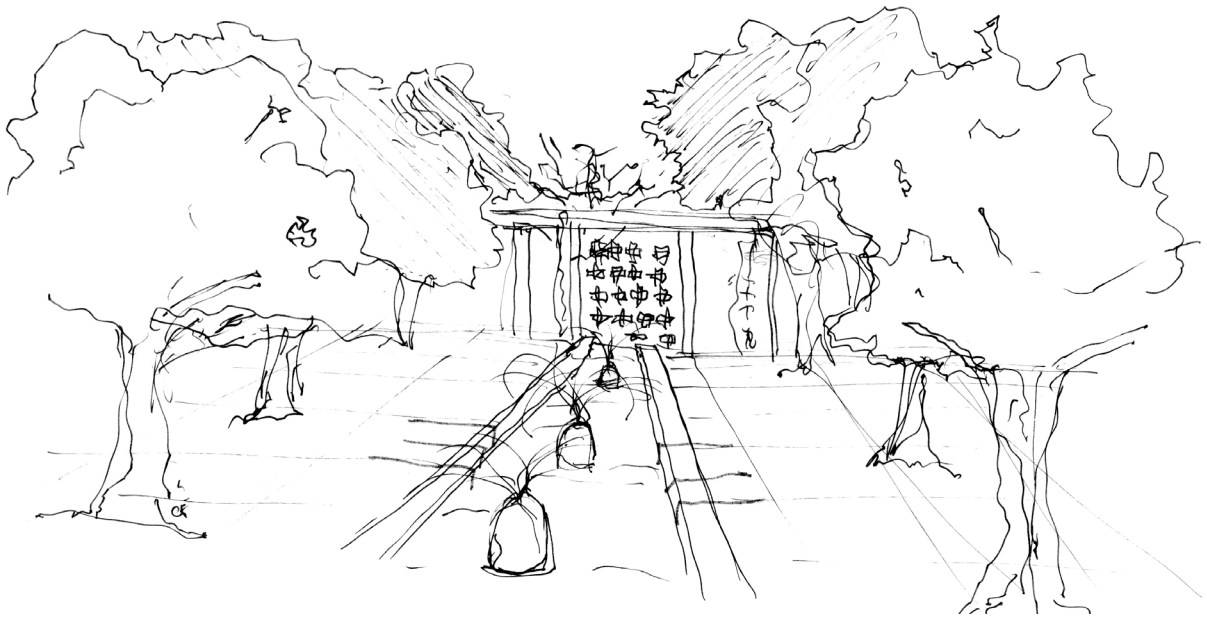


Figure 34 A sketch by author done in the early stages of design

Figure 35 Section A-A

Figure 36 The Courtyard

The water stream gurgles into the ground behind you before you step into the arcade and see more of the tree and the building. Ancient and bare, the tree is standing in the middle of the courtyard surrounded by the arcade all around, with the tree being the gem of this ring. You walk into the courtyard and change your direction, enter through the doors across the yard and you

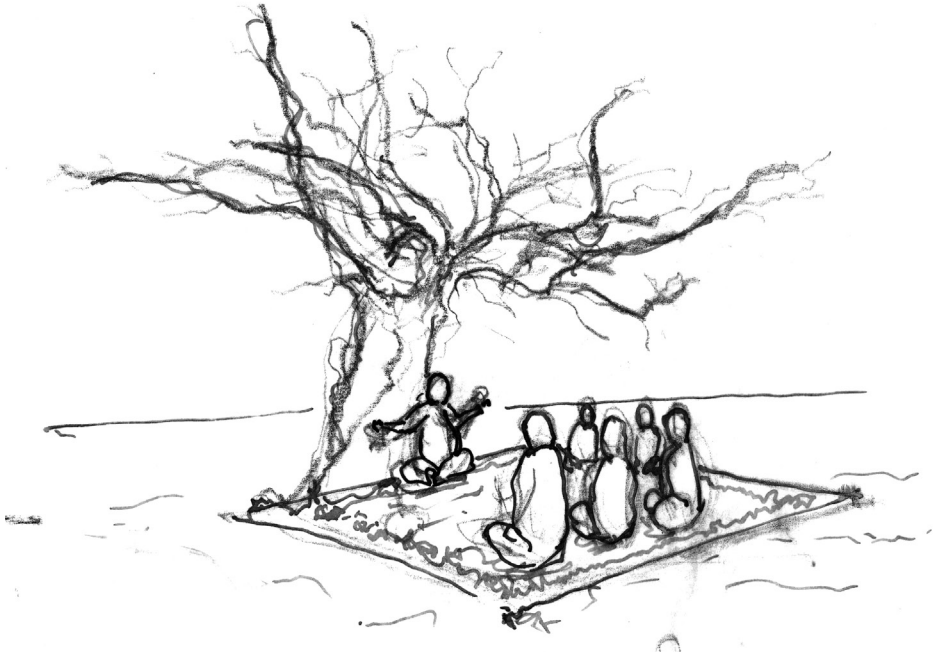


Figure 37 A sketch by author done in the early stages of design

arrive at the teahouse. As you walk in, you hear it again: the sound of water. The water stream reappears here and leads you to the centre. The teahouse is an octagon, with columns and arches all around that separate the peripheral platforms from the middle. The arches carry the vaults that cover the platforms. On top of the platforms in each bay, locally woven carpets create a soft surface for you to sit.

The columns and arches that are closer to the centre, are holding up a dome that opens up at the top to let the sunlight in. In the middle, tables and chairs have been set as well and in the centre, the spot at which all the walls and platforms are facing, a small pool reflects the light from above back on the dome, creating mesmerizing effects that go so well with the gentle sound of the fountain.

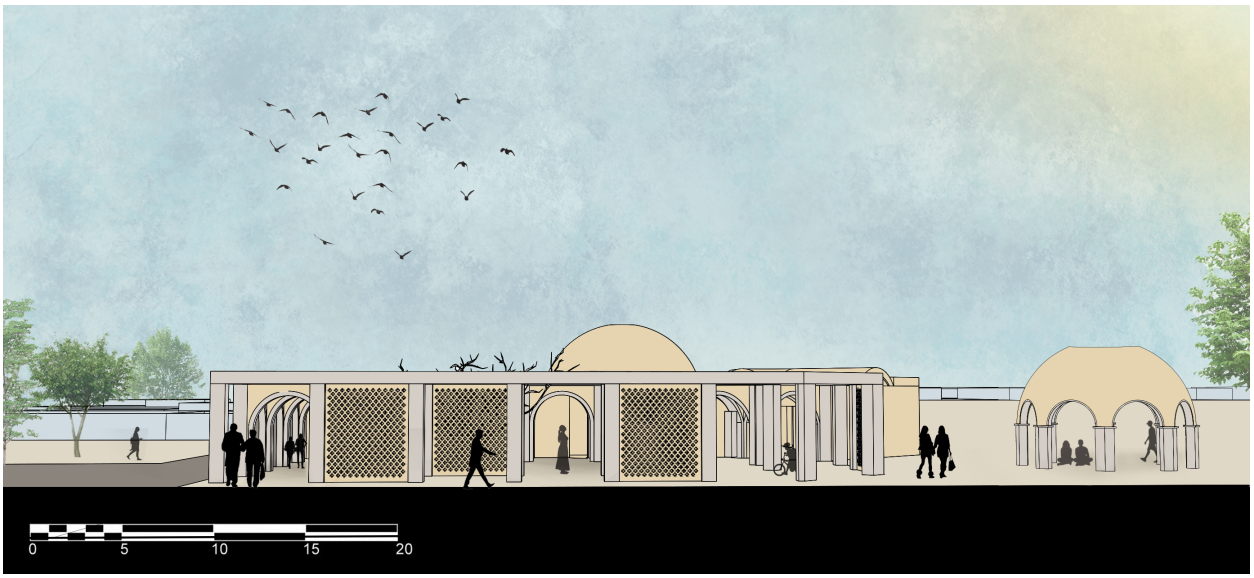


Figure 38 Section B-B

The Builder's Yard

If you happen to enter the site from the right side of the water stream, you might be able to see the Builder's Yard behind the trees where the builders are learning, the students are experimenting, and the people are making. By the time you reach the end of the stream and before you enter the arcade, you can choose to turn right instead, towards the pavilion. Walking on the gravel path you stop under the dome of the pavilion, which is used mainly as a gathering space but also showcases the builders' first endeavours.

But as you continue through the gravel path, you start to see more of what happens in the yard. There are mud mixing stations as well as spaces for molding and drying adobes. You notice the trial walls, arches, and vaults that the builders have made. Structures are put to test here; the builders watch the walls and how they erode, test the results of their methods, and learn more as they make more. There are no curbs, you can simply step out of the path and as the sound of the gravel skittering beneath your feet stops, you step into the earth. You approach the structures, the mud, the adobe. You touch the walls and feel the texture of the cob plaster. You might even take a handful of the mud and let it drip down through your fingers. Maybe you are feeling playful and lean two blocks against each other to create a tiny triangular arch. You are a builder.

Figure 39 Section C-C

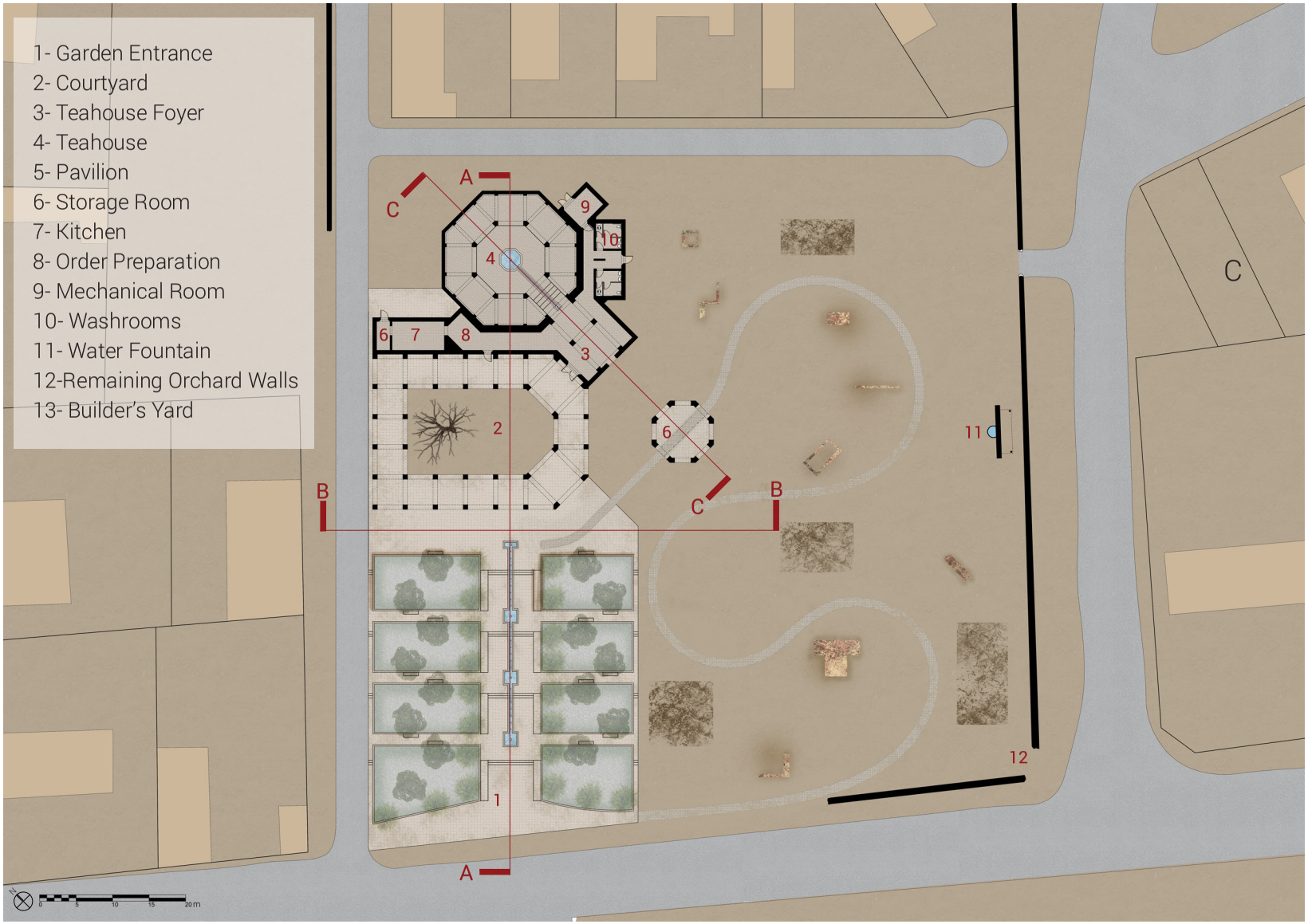


Figure 40 Plan

Figure 41 The Teahouse

ON BUILDERS

In a project so heavily focused on construction and the concept of learning through making, the process is the main concern. To have designed the building, one would have only taken half of the necessary step towards a successful project. The actual design, is the process.

The Process

To build the Builder's Yard, is the first step. As the builders gather at the site and learn about the project, they also start experimenting with earth and different methods of earthen construction. With a strong belief in "learning through making", the builders learn how to build as they lay the first bricks in the first trial walls and as they remove the formwork from the first arches.

One of the most important resources of the Jazan project, is an abandoned brick kiln located in the north of the village. The areas surrounding the kiln, are filled with stacks of unfired bricks. Although a small percentage of the bricks have eroded past the point of usefulness, the rest is a cornucopia of ready-made adobes. These adobes would be perfect to use in the project as they are made of an earth and clay mixture that is appropriate for building. Moreover, the builders would save a considerable amount of time and energy in reusing the unfired bricks.

At the Builder's Yard, the crew would build and destroy several trial items, in order to learn about the different techniques in building with earthen adobes. Here they can try different patterns of laying blocks, test different mixtures for mortar, and practice the process of building vaults. They can also experiment several roles in the building process and choose the role they feel the best at. With the supervision of the architectural team and the local masons, the builders must gain enough knowledge and expertise to build all of the structural elements used in the project before moving on to the next step, prototyping.

The prototype, later becoming the pavilion, is a testing ground for the skills the builders have developed. The builders make a smaller replica of the central dome and the arches that bear it, and the architectural team can observe how the crew performs in terms of skillfulness, accuracy, and teamwork. Should the pavilion be built successfully, the crew would move on to the main building and together build their teahouse and its garden.

The Vocabulary

The teahouse is built using a few elements that together form the vocabulary of the building. These elements include foundations, walls, arches, vaults, domes, and flat roofs.

Figure 42 Traditional construction in Jazan - Wet Forming: Wet Loam is mixed with hay and processes to create cob. A team of two can then build the wall row by row, with one person sitting on the top layer and forming the next using lumps of cob handed to them by the other person.

Figure 43 Traditional construction in Jazan - Adobe: Earthen blocks are formed by hand in wooden molds and dried in the sun. The blocks are then laid to form the wall with mortar in horizontal and vertical joints. A coating of cob may be applied as the finish layer.

Figure 44 Traditional construction in Jazan - Flat Roofing: Beams transfer the weight of the roof to the walls. The beams are covered with wooden slabs or shrubs and then coated with cob, which is extremely prone to water erosion and should be covered with more modern types of water-proofing membrane.

Figure 45 Traditional construction in Jazan - Dome/ Vault: Earthen blocks are laid shaping curved forms that transfer compression forces to the supporting walls. To prevent rain erosion, the blocks must be fired into bricks or coated with protective finish.

In this project, the foundations are built with concrete, using conventional ways, as the local masons are not familiar with other materials. Also, reinforced concrete has the ability to create a solid base that would both stabilize the whole structure and minimize the absorption of ground water. The foundation must be built on suitable soil and protected against damp and frost[22].

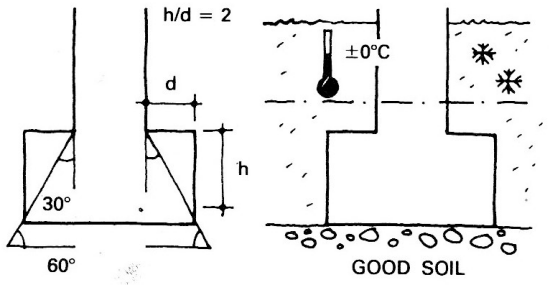
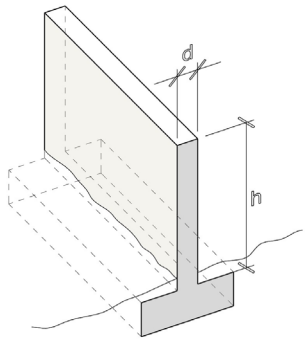


Figure 46 Foundations

The walls, depending on the use of the space and whether or not they bear loads, are built in different thicknesses throughout the project. However, as a rule of thumb, the builders must keep in mind that walls should be built with a thickness that is at least 1/8 of their height[23]. The walls must also be reinforced with piers at every 4 meters[24], which is the span length in this project.



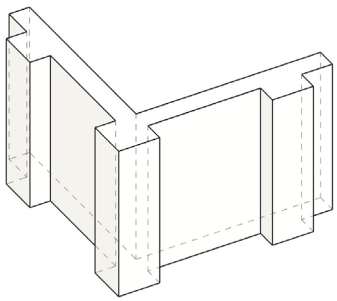


Figure 47 Wall construction considerations

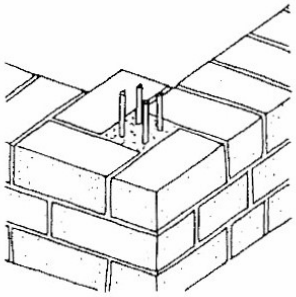


Figure 48 Connection of piers to the foundation

To maximize stability, the piers must be connected to the foundation by vertical reinforced concrete posts. At the highest point in the wall, a concrete ring beam must be built that encircles the building, making a sturdy structure that holds each unit stable and in unison.

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22 Hugo Houben, *Earth Construction : A Comprehensive Guide* (London : Intermediate Technology Publications, 1994).

23 Minke, *Building with Earth: Design and Technology of a Sustainable Architecture*

24 Minke, 137.

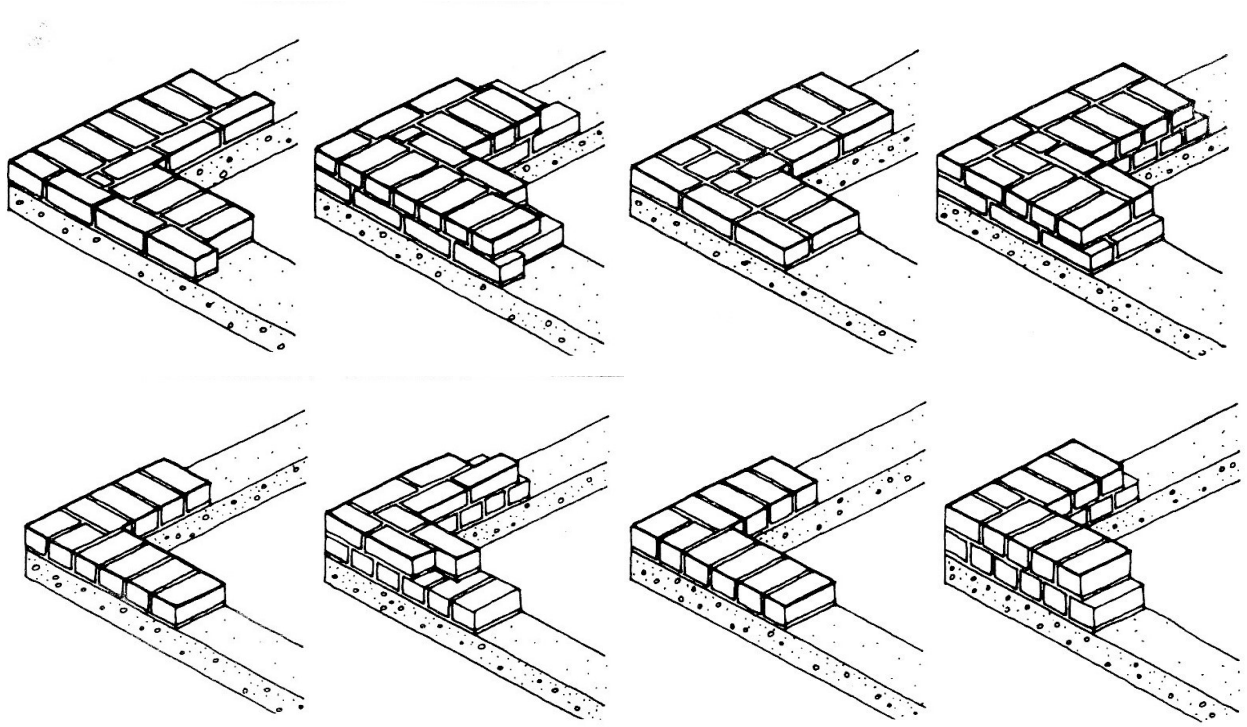

Figure 49 Different brick-laying patterns

Depending on the thickness of a wall, different brick-laying patterns can be used to ensure desirable bond between the blocks[25].

To ensure minimum erosion and water permeation, the joints and the blocks should have the same resistance against erosion and the same strength in compression[26].

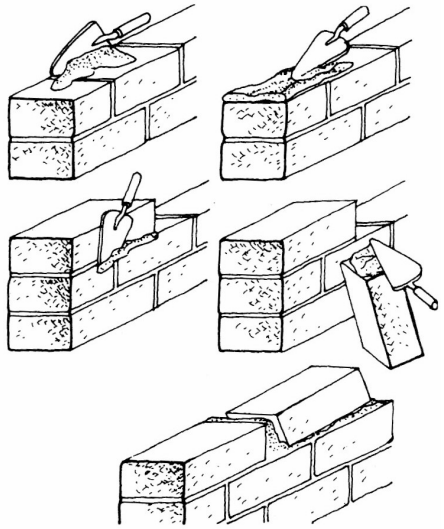

Figure 50 Proper bonding

25 Houben, *Earth Construction : A Comprehensive Guide*, 261.

26 Hugo Houben, *Earth Construction : A Comprehensive Guide* (London : Intermediate Technology Publications, 1994), 259.

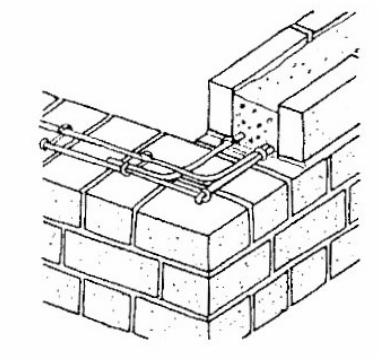

Figure 51 Ring beam

Rigid ring beams with proper tensile strength can minimize cracks and breaches in walls[27].

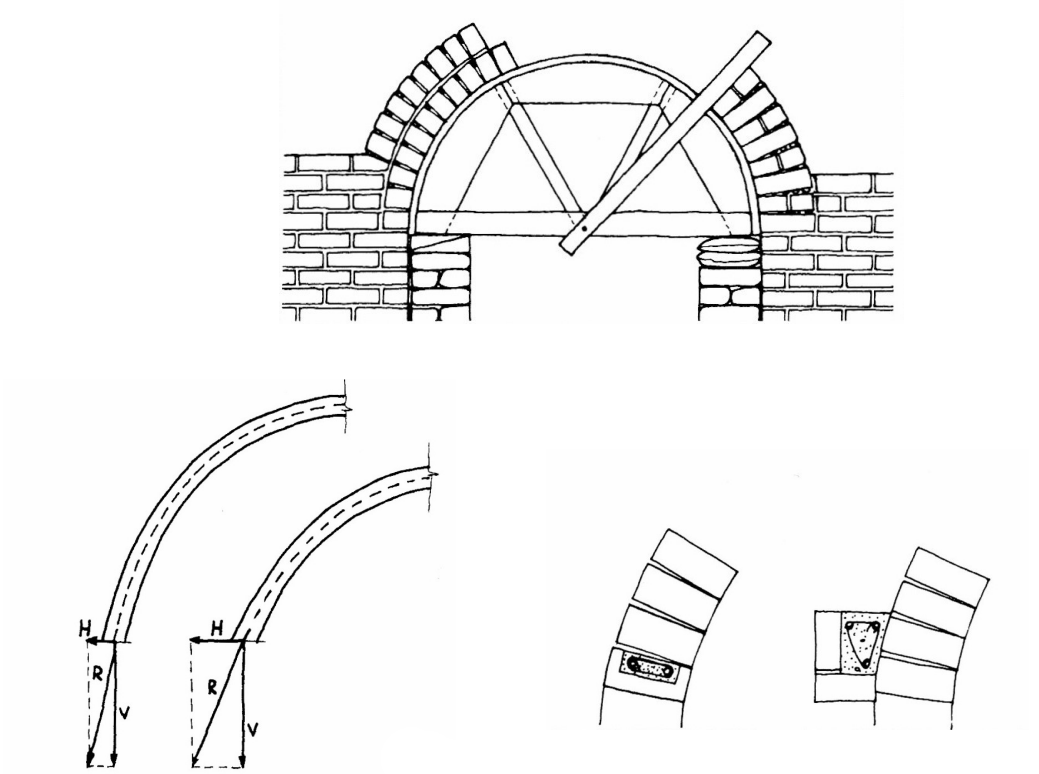

Figure 52 Arches: Execution and considerations

Arches in the project all follow a semi-circular form. While not the best option structurally, semi-circular formworks for the arches are easy to build using hand-made compasses. A compass could be built with a piece of rope or a rod fastened at the centre of the circle.

27 Hugo Houben, *Earth Construction : A Comprehensive Guide* (London : Intermediate Technology Publications, 1994), 265.

Transferring the lateral thrust at the base of arches and domes is the main concern in these forms[28]. Horizontal forces are minimum when the forces are steeper[29]. Beams or ring beams can also help transfer the load to the foundation easier as well[30].

The structure of the roofs above the sitting platforms in the teahouse is constructed by intersecting barrel vaults which connect arches that face each other, creating cross vaults. The vaults can be then covered with soil and flattened where a flat roof is desired and plastered as usual where the curvature is to be exposed. A few types of vaulting are shown here, with A being the cross vault used in the teahouse.

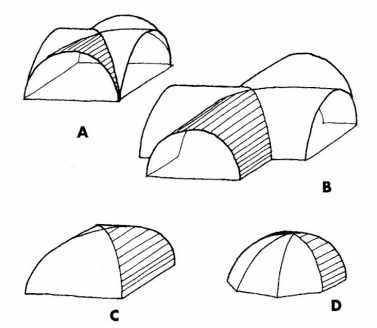

Figure 53 Cross vaults

Following the same reasoning used in the design of the arches, the dome is a semi-spherical cap that can be constructed using a three-dimensional compass. This compass can be built using the same way as in the arches, only with a base that allows the radial constant (the piece of rope or rod) to swivel radially on the horizontal plane as well as rotate in the vertical plane.

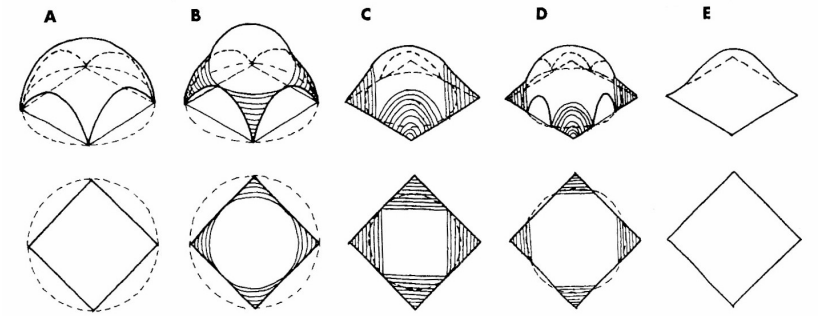

Figure 54 Domes, Squinches, Arches, and Walls

Different types of engagement between a dome and arches (or walls) that bear its load are shown here. In the teahouse, an octagonal variation of A is used, the octagon being a symmetric shape that resists seismic forces much better than a square would.

28 Minke, *Building with Earth: Design and Technology of a Sustainable Architecture*, 119.
29 Minke, 119.
30 Houben, *Earth Construction : A Comprehensive Guide*, 295.

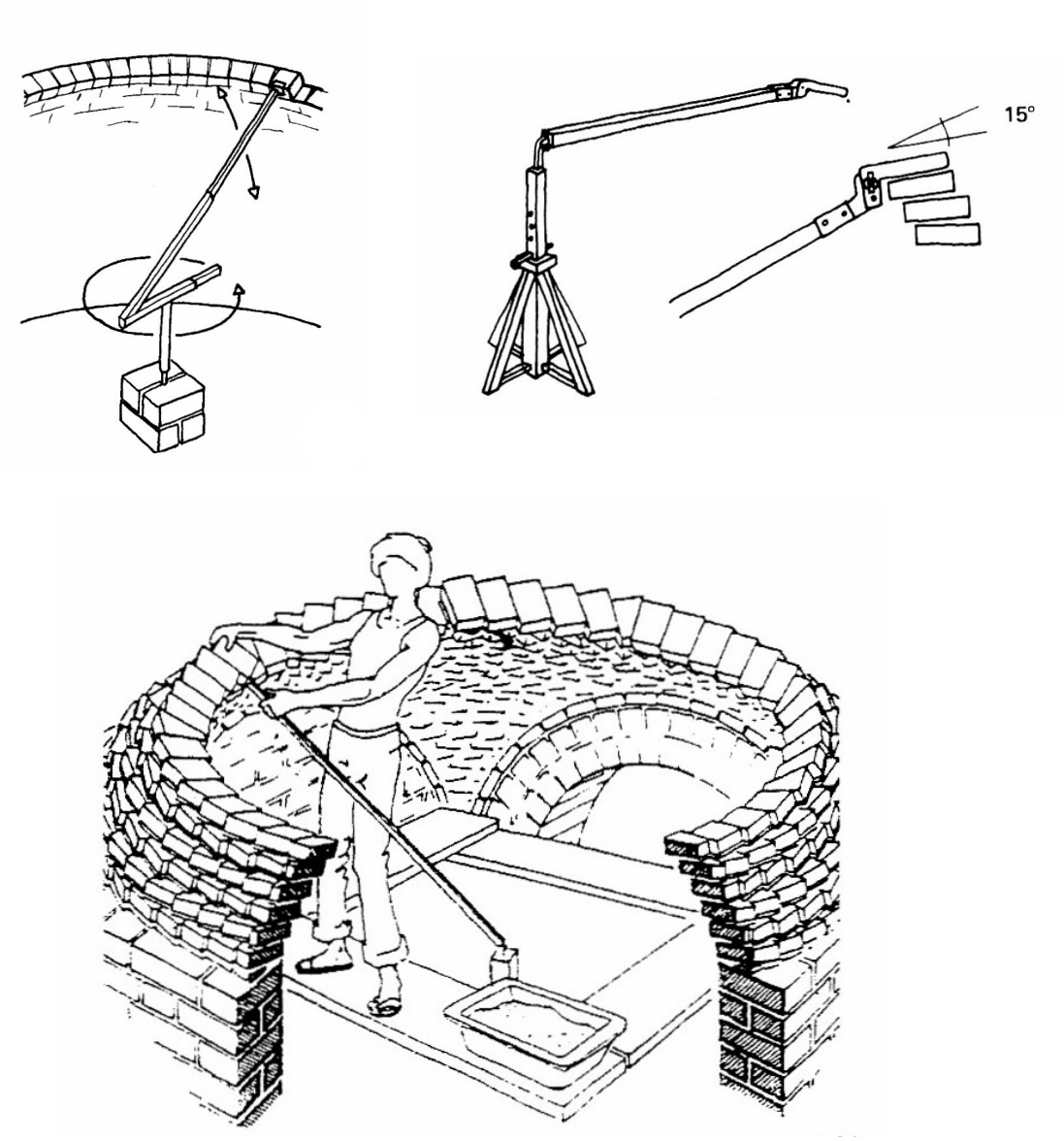

Figure 55 Execution of domes

If blocks are slightly inclined at the edge, alternating direction in each layer, we can avoid blocks slipping while the dome is being built[31].

Where flat roofs are built in the project, the load bearing walls hold beams that are then covered with brick vaulting method. These shallow vaults are easy to execute and are familiar to the local masons. The roof is then covered with earth, the earth is leveled, and then covered with earthen tiles to form a flat surface.

31 Minke, *Building with Earth: Design and Technology of a Sustainable Architecture*, 126.

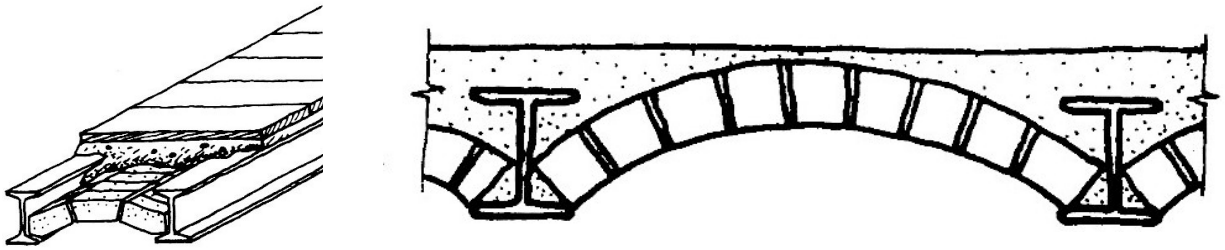

Figure 56 Flat Roofing

Exterior surfaces of walls and columns can be coated using earthen plaster. Cob plaster was being used in the past in the village and has proven to be effective in protecting the walls against seasonal precipitation. For roofs however, bituminous waterproofing along with proper sloping and water drainage are essential. To maintain the aesthetic characteristics of the dome, however, lime plasters can be used as a waterproof alternative to other types of earthen plaster[32]. Interior walls of the kitchen, the washrooms, and the mechanical room can be coated with lime plaster as well.

32 Minke, 101.

FURTHER STEPS

One of the most important things that I learned working on this thesis was the importance of context, even when it comes to choosing materials and methods of building. Deriving from traditional archetypes, local techniques, and regional architecture, I have tried to design a building – and a process – that would serve the people of Jazan the best. It is my hope that the execution of this project, the involvement of the people in it, and the process that leads to a building in front of everyone's eyes would provoke the people to reconnect with their regional materials and the ways these materials want to be used in.

In the course of this project, it was never my aim to merely look back at the traditional conventions and repeat them, but to implement modern knowledge and technologies that would help us revive our local architecture by improving it where it had shown weakness before. I do not believe that vernacular architecture is only a repetition of what has been done before, but that it can be a live being, inhabiting the hearts of the people and changing with them. Vernacular architecture, in my opinion, survives so long as it evolves with the people and their modern lives, maintaining the core concepts.

Therefore, my intention has been to realize this by employing the community and applying their input in the construction, giving them agency in testing materials and methods, and allowing them to influence and even ornament the building with their own hands.

The Builder's Yard remains to be a learning ground for all interested souls and will continue to advocate and nurture "learning through making". But the **process** does not end with the completion of the Builder's Yard, the teahouse, or the garden. The course of reform in the village's future face is merely commenced by this project. The land in the north-eastern part of the site would be dedicated to the builders and their families, to build their own houses in, using what they learned at the teahouse project. More buildings with stronger bonds with their users would be built, and people would observe and learn from each other. One earthen house would be built next to the other, and another next to that.

Once again, the village grows organically.

PHOTOGRAPHY

Figure 57 Abandoned house in Jazan

Figure 58 Abandoned house in Jazan

Figure 59 Abandoned house in Jazan

Figure 60 Abandoned house in Jazan

Figure 61 Old house in Jazan

Figure 62 Old house in Jazan

Figure 63 Old house in Jazan

Figure 64 Old house in Jazan

Figure 65 My father's paternal home

Figure 66 My father's paternal home

Figure 67 My father's paternal home

Figure 68 My father's paternal home

Figure 69 Teahouse in Tehran

Figure 70 Teahouse in Tehran

Figure 71 Old Kushk in Jazan

Figure 72 Old Kushk in Jazan

Figure 73 Brick pattern in Jazan

Figure 74 Ice pit in Jazan

Figure 75 Old house entrance in Jazan

Figure 76 Ice pit in Jazan

Figure 77 Unfired brick storage around the kiln

Figure 78 Unfired brick storage around the kiln

Figure 79 Unfired brick storage around the kiln

Figure 80 The abandoned kiln

Figure 81 IMG_8360.JPG

Figure 82 The abandoned kiln

Figure 83 The abandoned kiln

Figure 84 Unfired brick storage around the kiln

Figure 85 Unfired brick storage around the kiln

Figure 86 Molten earth inside the kiln

Figure 87 The abandoned kiln

Figure 88 The abandoned kiln

Figure 89 The Site

Figure 90 Ruins of the castle

Figure 91 The Site

Figure 92 Ruins of the castle

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