

AFFORDABLE AND SUSTAINABLE HOUSING SOLUTIONS FOR IRAN'S  
LOW INCOME CITIZENS

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# Affordable and Sustainable Housing Solutions for Iran's Low income Citizens

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## **ABSTRACT**

This paper studies the architectural implications of the economic and social needs and challenges of Low-Income and Iranian families in Tehran. The attempt is to answer the following question: what strategies can be used to address the problem of low income families, while providing sustainable mixed-use affordable housing. The housing topology that becomes building that generates energy, and can provide jobs.

The argument is based on a case study in London that reveals architectural attempts to help low-income families while also relying on sustainability. Although this case study might not be successful in all aspects, it starts a new trend to help families struggling with poverty. This paper also discusses the problems and opportunities that sustainability provides in terms of creating a higher level of life quality for low-income residents with respect to life in Iran.

I will also investigate "Mehr housing" in Iran, project which ultimately shows the negative side of government solutions to low income housing. Although case study had its own governments' support, it has failed to fulfill the needs of its residents. After studying the sustainable and architectural solutions promoted in different projects in question, and considering the problems that each case study had in terms of approaching the quality of living and energy saving, I believe, in the long term, sustainable design projects have the potential to decrease the poverty. That is one of the effective ways architecture can provide living opportunities for poor families and benefits both the government and poor population of Iran.

**Key words:** Iran, Affordable Housing, Low income, Sustainability, Renewable Energy

## INTRODUCTION

Iran, my homeland, is a rich country that relies on its massive oil income. The transformation of small agricultural economy to modern oil driven economy state has taken place in less than a century. After the 1979 Iranian revolution,<sup>1</sup> the country has undergone major social and economic changes. The economy is still affected by the recent eight-year war with Iraq, as well as global oil market growth, but also by trade sanctions inflicted by the west countries.<sup>2</sup> Since Iran is dependent on oil revenue, the country's economy is vulnerable to any price fluctuations occurring on international oil markets. After 35 years, however, the economic records show that many Iranians are experiencing considerable economic problems in their lives. Despite Iran's oil revenue, the gap between rich and poor is widening. The government benefits from the oil income, and the rich population is mostly connected to the government. Based on the report presented by the central bank of Iran in 2013, the poorest Iranian urban families spent 64,420,000 IRR for life expenses, and the richest urban families spent 877,110,000 IRR. During Mahmud Ahmadinejad presidency, from 2005 to 2013, poverty and unemployment became a growing issue. According to the report titled "Measurement and Economic Analysis of Urban Poverty"<sup>3</sup> at least 44.5 percent of Iran's urban population lives under the line of poverty. This number was 18.7 percent in 2007. Inequality in wealth distribution, political issues, corruption, low monthly salary, high cost of housing and the 2010 sanctions,<sup>4</sup> has had undeniable and harmful effects on Iranian families. Changes in household income, housing prices, and the amount of rents have caused a situation in which there is no balance between income and life expenses. Average family in Tehran spends around 48 percent of their annual income on housing costs. Records also show that in 2011 less than 60% of families in Tehran owned their houses<sup>5</sup>.

Iran is a state with an export based economy; the primary export is gas and oil. Since the 1979 revolution, the population increased by almost 250% resulting in increasing domestic demand for energy consumption<sup>6</sup>. Iranian Ministry of Energy states that approximately 97% of the total energy consumption in Iran, and 98.98% for built environment energy consumption comes from fossil fuels: oil and natural gas. Residential and commercial buildings consume more than 40% of the total energy consumption in Iran.<sup>7</sup> However, the government is becoming more concerned about the energy use and alternative energy resources that can supplement or even replace oil and natural gas as means of energy production. According to Iranian officials, there are two ways to progress in this situation. First is to reduce the energy consumption rapidly (as of now, Iran consumes more than 6 times more energy than the global average). This is directly connected with the cultural lifestyle. Secondly, more effort has to be put forth towards the use of alternative sources of energy<sup>8</sup>. Since one of the reasons for high energy

consumption in Iran is the low price of fossil fuels, the government has recently used is to eliminate energy subsidies. Eliminating energy and food subsidies caused even more economic problems for low-income and very low-income families, since they had to pay much more for food and energy.

With respect to energy consumption, finite use of fossil fuels, income disparity, and housing problems in Iran, architecture can play a creative and important role by proposing a typology of sustainable mixed use housing complexes that could benefit both low income families, and government by providing shelter, creating jobs, and producing energy as well as saving energy.

## **MEDOTHOLOGY**

Through literature reviews, scholarly articles, and historical research, I will explain the situation of low-income families in Iran and their problems. By using statistical information I will explain the income and living costs of Tehranians. I will also discuss why a mixed-use housing typology could be a solution to improve the living conditions. Moreover, a case study, the Beddington Zero Energy Development in London, will set up the initial question in this paper: What sustainable strategies could help to improve housing in Iran? This paper will argue how mixed-use sustainable designs are increasing productivity and decreasing use of fossil fuels and carbon footprint. I will also investigate one unsuccessful project for low-income families in Iran: Mehr Housing. I propose an affordable architectural solution, with consideration of climate, and using sustainable strategies.

## **AFFORDABLE HOUSING IN A NOT VERY AFFORDABLE CITY**

Housing is important for every family. Shelter has been one of the first priorities for people throughout the history. According to the article 31 of the Iranian constitution, the government has to provide housing for each Iranian family. Based on government's definition, poverty in Iran means the monthly income of 600\$ or less for a family of five. By considering the average monthly income of 400\$ and the average monthly rent of \$600 for a one-bedroom apartment, it is impossible for low-income families with one or two employed members to afford housing and other living costs. Therefore, this is the government responsibility to support these families and provide affordable housing. Home expenditures shouldn't exceed 30% of income of the family to consider a house affordable<sup>9</sup>. The term "affordable housing" is sometimes associated with the construction cost and use of materials. However, trying to reduce the construction costs, by using cheap non suitable materials, and executing unprofessional designs will increase the maintenance cost over time.

## **MEHR HOUSING, A GOOD IDEA THAT WAS CONDUCTED BAD**

In 2009 the Iranian government started an affordable housing project in order to meet the high demand for housing over the past five decades. The program offered affordable units to families who were not homeowners. In Mehr-housing project applicants paid a part of construction costs in advance and the rest was financed by the government. However, most low-income families were not able to afford houses even with loans and those who used the loans later faced many financial problems. The interest rates were substantial and unaffordable, and utilities and maintenance also had to be covered by the residents. Improper location of houses, inconvenient design, and lack of safety forced many families to move out after few years. Nevertheless, reaching out to low income families was a worthy act. But the lack of participation of banks, improper management of projects and in some cases applicants' failure to provide their parts of construction costs, made Mehr housing a serious problem for the government<sup>10</sup>.

In Iran, land is tremendously expensive. The main part of construction costs, especially in big cities like Tehran, is associated with securing the land. Rent rates are high and based on the housing price only, not the people's income. To solve this problem, in Mehr housing project the government eliminated the price of land by using its own. Low price lands are located in the suburbs, therefore, the government had to spend a lot of money on providing infrastructure. The Minister of Roads and Urban Development criticized Mehr housing project and stated that the problem was that the units were built in the places that were not habitable. The integration of low income population was also an issue. The maximum allowable area was 800sq.ft. For bigger apartments families had to pay the current land price. Many low income families couldn't afford larger apartments and the small ones were not suitable for them. Therefore, they had to move out after a while. To use the land as much as possible, houses were built too close to each other without considering the privacy of residents<sup>11</sup>.

Mass production of housing in a short period of time imposes significant amount of money to the housing sector, yet causes economic problems and raise inflation. The project also lacks architectural value. Mehr housing was rather a student campus than Iranian housing typology. Incorrect assessment and acceptance of people in need and only 15 year life span of housing posed other difficulties. The Mehr housing project was not successful in its promise of economic upgrade for poor families. However, we shouldn't slow down and dwell on what has happened. We have to start from the beginning and provide a new perspective<sup>12</sup>.

## HOME OWNERS WITH NO HOME

President Ahmadinejad claimed that the government would provide five million affordable housing each year all over the country, whereas it in fact did not come true. The first year the government started to build around two million houses all over the country and after five years still many constructions left unfinished. Many families who paid for the construction and had registered the first years are still waiting for their apartments. Parand's Mehr housing is one of these housing projects that have been under construction since the beginning of the program in 2010. Due to the lack of proper management of the project, and higher prices for materials because of inflation and sanctions the government was not able to finish the project. For Mehr housing project in Parand (a small industrial town in Tehran province near Tehran city), owners have to pay an additional amount of 150,000,000 IRR for completion of buildings. Although applicants paid some increased costs and the major numbers of houses are completed, the government hasn't released the houses to the applicants yet. Ahmad, one of the applicants, registered for this housing project in 2011. His house is complete now, but the building doesn't have any utilities yet. Ahmad lives in a small house with his family to this day. His monthly income is less than 500\$ and he has to pay 250\$ for rent as well as 100\$ the loan installment. "How can my family and I survive with 150\$", Ahmad says. There are many families like Ahmad waiting for their house.



Figure1. © Mehr Housing project, Parand, Tehran <sup>13</sup>

Nevertheless, not all large low income housing projects fail. Mehr failed because of government's inability to understand the needs of its people. The project that thrives where Mehr have failed is the Beddington Zero Energy Development project.

## THE BEDDINGTON ZERO ENERGY DEVELOPMENT, BEDZED

Completed: 2002

Developer: Peabody Trust

Architect: Bill Dunster Architect

Environmental consultant; BioRegional Development Group

Location: Wallington, south London

Total project costs: £ 15.7m

Housing units' prices: From £102,500 for a one bedroom unit to £238,500 for a four bedroom unit

The project has various financing options such as shared ownership, at-cost rent schemes, and an affordable rent scheme to attract different type of residents, especially low-income families.<sup>14</sup>



Figure 2. © A high level view of BEDZED<sup>15</sup>

“BedZED was initiated by BioRegional and developed by Peabody in partnership with BioRegional and designed by Bill Dunster Architects (now BDa ZEDfactory). BedZED is owned and managed by Peabody. Located in Hackbridge, south London, BedZED comprises 100 homes, community facilities and enough workspace for 100 people. Residents have been living at BedZED since March 2002”<sup>16</sup>. The project is very energy efficient. It includes 82 one to four bedroom units. Town houses, apartments and workplaces are laid out in five rows. In upper level rows are connected by walkways. Residents have access to gardens via these walkways.

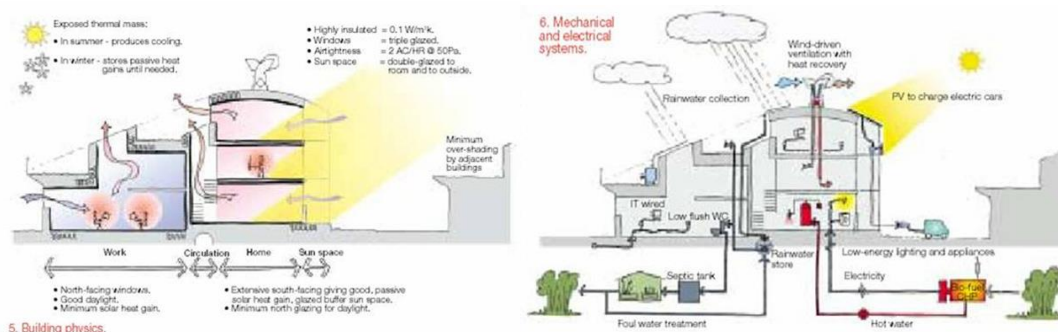


Figure 3. © Building Physics<sup>17</sup>

Bed ZED is well known in UK as an example of zero energy building. Residents use 45% electricity and 81% hot water in compare to average consumption figures in UK. Bed ZED is a good example of both socially and environmentally sustainable living. This project tried to



change the lifestyle of its residents to a more sustainable one. 86% of residents buy organic food and 39% of them grow their own food. 60% of waste is being recycled.

Bed ZED attempts is to minimize its ecological impact on environment from the construction phase all the way to operation. Some of the aims were as follows: reduce water consumption by 33% compare to UK average, reduce electricity consumption by 33% compare to UK average, reduce space heating needs by 90% compare to UK average, and eliminate carbon emission.<sup>18</sup>

One of sustainable strategies was the use of photovoltaic panels. The electricity that these panels produce is used in building and the surplus supplies the grid. Other useful strategies are rain water harvesting which saves 15 liters of water per person per day, and water treatment system that was designed to collect all the waste water in the site and use that to flush toilets and irrigate gardens.



Figure 4. © Sky garden and Bed ZED allotments<sup>19</sup> Figure 5. © Green water treatment plant, David Triggs

In Bed ZED high level insulation is used. This helps the building to stay cool in summer and store heat gains in winter. Located on the south side of the site, houses benefit from the south-facing large windows therefore providing passive solar heating and daylight. An interesting space is the working area that is located on the north side of the site that has minimum solar heat gain. North windows provide good daylight for work purposes. Wind cowls on the roofs help with passive ventilation. To produce hot water and electricity for the building, BedZED burns the waste and of-cuts of plants and trees. This system though doesn't seem very efficient, and many residents complained about the heating problems and the temperature.<sup>20</sup>

I consider BedZED a successful project not only because of being one of the most promising zero-energy design with lots of innovative strategies regarding the sustainability and energy saving, but also because of its attempt to change the living style of its residents. Some examples of educational aspects of BedZED are to provide spaces to grow food, making meters available for residents to monitor and observe the use of energy every day. Although BedZED is not low-income mixed use housing, it is one of the most successful green housing projects and a valuable example in the aspect of sustainability, health and lifestyle.

## **COST IMPLICATIONS**

According to Buckley and Jerry: "Nowadays, housing and its related issues are considered as a global issue and planners and policy makers in different countries are trying to solve its problems."<sup>21</sup> Iran is one of the countries which struggle with the lack of suitable housing. Although, the government started the Mehr Housing project in hopes of providing houses for Iranians who were not house owners, still many of Iranian households live below housing poverty line. This means that they are not able to provide the minimum: a safe shelter. While the previous government claims that the implementation of Mehr Housing has caused no increase in housing prices, studies indicate that during years 2005 to 2012 the housing sector has experienced 459% increase in prices<sup>22</sup>. Subsidies' elimination was another incident that happened during these years that caused 500% increase in energy costs. Higher energy cost resulted in higher price of materials, therefore, increase of the production costs. Subsidies' reform reduced households' purchasing ability. Before subsidies' reform, 60% of families were able to purchase houses. This number decreased to 35% afterwards<sup>23</sup>. In such cases, low-income families are the most vulnerable group. A low-income household in Iran have to save 100% of its monthly income for the average of 32 years to be able to afford shelter. It is clear that low-income families won't be able to buy houses in this situation. They also spend more than 50% of their income on housing expenses.

## **WHAT IS THE SOLUTION?**

Affordability and sustainability are two main issues in housing sector<sup>24</sup>. When it comes to low-income housing, construction costs and land prices will become so crucial that most of the time developers and designers prefer to have the buildings as efficient as possible to minimize the costs rather than having sustainable buildings. But in fact, all these issues are interconnected and there should be a balance between efficiency, affordability and sustainability of a building. For instance, to have an energy-efficient building we need to have better insulation and leak-proof windows. Although these strategies reduce energy consumption, they will affect indoor air quality. If there is poor indoor air quality because of cheap, toxic and "poorly designed materials" in building, more fresh air will be needed. "No matter how energy and water efficient a building might be, it becomes a waste of resources and a potential detriment to the community if no one wants to occupy it." Building should be loved by its residents and address their aesthetic and psychological needs<sup>25</sup>. What can be learned is that materials have impact on buildings in different aspects. The appeal of a building, its stability and costs all depends on the type of materials that are used in that building. By selecting durable, appropriate local materials and

using strategies to decrease the energy consumption we could provide sustainable building that is safe, healthy, and clean for its residents. Energy and water efficient buildings also reduce the running costs, resulting in lower utility bills for its residents<sup>26</sup>.

Cheap forms of housing need cheap land that is mostly available at the suburbs. These lands are located far away, where there is no infrastructure whatsoever. Therefore, the affordability of these houses will reduce not because of construction costs, but because of the increase in the costs of constructing infrastructure<sup>27</sup>. Higher density of housing where people have access to needed services such as public transportation, work places, retail, schools and parks is the key to have healthier environment. Therefore, designing an appropriate density, size and height as well as choosing an appropriate location are important strategies that need to be applied in designing low income housing<sup>28</sup>. A good site location results in easy access to public transportation that reduces the need for private vehicles. Therefore, less energy is being wasted, less CO2 emission. By producing local food on the location can have a positive effect economic situation of residents. Gardens also provide public places that offer resident interactions. Commercial sector of the building attracts businesses. By using new methods of construction that are faster and more efficient, such as prefabrication, we could reduce the cost of construction and also use unskilled future residents to build some parts of their homes<sup>29</sup>. The last and the most important strategy, is designing a mixed use affordable building. In recent years, mixed use buildings have become more popular. Different types of buildings are concentrated in a bigger scale complex. One of the advantages of these mixed use developments is that the use of private cars will decrease. This decrease, results in less traffic, less pollution, and less fuel consumption.

## **PROPOSED DESIGN PRINCIPLES**

The government should provide a scheme to focus on strengthening the low income Iranians by providing them safe and suitable shelter. The scheme should include some principles such as:

- Design for a mixed use building
- Focus on families with minimum income
- The site location near public transportation and other infrastructure
- Stable rent based on income

Sustainable design reduces energy and water costs. Sustainable buildings have longer life span. This reduces the need for demolishing and constructing new buildings that is much more expensive than constructing a sustainable building<sup>30</sup>. This housing project would be 100% funded by the government. The government would use its lands, pay for the construction costs and remain the ownership. Rents differ based on families' income. The commercial part of the

building provides local jobs as well as income for employees (residents) and employer (government). Using sustainable technologies, the building could generate renewable energy resources that benefit the government.

## **CONCLUSION**

In recent years many Iranian families faced financial problems due to sanctions on oil and decline of the oil export. The government has stopped energy subsidies and Iranians faced five times higher energy rates. All these resulted in high inflation in housing sector that disabled Iranian families, particularly low-income families to provide suitable homes. To solve the problem, the government decided to start affordable housing project that later came out unsustainable and inappropriate.

It is not possible to continue to consume energy and resources for building construction and operation like before, and still have sustainable environment. We need to have economic and social sustainability too. It is easy for rich people to pay for sustainable buildings and benefit “economically sustainable living situation”. But low income families don’t have access to these buildings. They have to pay more for utilities as a result of bad designs. All this causes social inequality. These families live in inappropriate poor quality buildings that can cause health problem. Although sustainable solutions can provide a better quality of living, low income residents have no interest to spend money for sustainable solutions<sup>31</sup>. I believe the government should support low income families to have a better quality of life, but in a right way. My goal is to design a mixed use housing complex for low income families, which is affordable in terms of maintenance costs, rent and utility bills, as well as to create renewable energy source. As studies show this type of housing also improves health and productivity of its residents and creates sustainable community where residents interact with their own surroundings.

Based on the case study findings, I believe architecture can have educational role and change people’s lifestyle. Different parts in the complex I propose, such as a residential zone, retail zone, and farms reinforce the educational and economic notion. Since I’m also facing the problem of parent’s unemployment, the retail zone can provide jobs for the residents. Families can also produce their own fruits and vegetables. This will help to save money and even earn money by selling the products.

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## REFERENCES

<sup>1</sup> The 1979 revolution refers to events involving the overthrow of the Pahlavi dynasty under, Mohammad Reza Shah Pahlavi, who was supported by the United States and its eventual replacement with an Islamic republic under the Grand Ayatollah Ruhollah Khomeini, the leader of the revolution, supported by various leftist and Islamic organizations and Iranian student movements.

[http://en.wikipedia.org/wiki/Pahlavi\\_dynasty](http://en.wikipedia.org/wiki/Pahlavi_dynasty)

<sup>2</sup> Oil, Economic Diversification and the Democratic Process in Iran, Author(s): Massoud Karshenas and Hassan Hakimian. Source: Iranian Studies, Vol. 38, No. 1, Iran Facing the New Century (Mar., 2005), pp. 67-90

<sup>3</sup> <http://Iranian.com>

<sup>4</sup> US sanctions against Iran refer to economic, trade, scientific and military sanctions against Iran, which have been imposed by the U.S. Office of Foreign Assets Control, or by the international community under U.S. pressure through the United Nations Security Council. Currently, the sanctions include an embargo on dealings with Iran by the United States, and a ban on selling aircraft and repair parts to Iranian aviation companies.

[http://en.wikipedia.org/wiki/U.S.\\_sanctions\\_against\\_Iran](http://en.wikipedia.org/wiki/U.S._sanctions_against_Iran)

<sup>5</sup> statistical center of Iran, [www.amar.org.ir](http://www.amar.org.ir)

<sup>6</sup> Cyrus Bina, Petroleum and Energy Policy in Iran, Source: Economic and Political Weekly, Vol. 44, No. 1 (Jan. 3 - 9, 2009), pp. 19-23

<sup>7</sup> Farshad Nasrollahi, climate and energy responsive housing in continental climates, the sustainability of passive houses for Iran's dry and cold climate.

<sup>8</sup> Interview with Yusef Jalali, Press TV. Tehran, [www.presstv.ir](http://www.presstv.ir)

<sup>9</sup> Micaela R. Danko Designing Affordable Housing for Adaptability: Principles, Practices, & Application

<sup>10</sup> Bijan Kalhornia, Mehr Housing Problems

<sup>11</sup> Adrian Lahoud, Hamed Khosravi, A Holey Territory, the case of maskan e Mehr

<sup>12</sup> Adrian Lahoud, Hamed Khosravi, A Holey Territory, the case of maskan e Mehr

<sup>13</sup> Photo credits from left to right: Ghasem Bazyan, Rooholla Vahdati

<sup>14</sup> Adrian Pitts, Planning and design strategies for sustainability and profit

<sup>15</sup> <https://www.flickr.com/photos/tomchance/1008213420>

<sup>16</sup> "About Us | ZED." ZED Factory. Accessed March 2, 2015. <http://www.zedfactory.com/zed/?q=node/36>

<sup>17</sup> <http://www.google.com/imgres?imgurl=http://image.slidesharecdn.com/report-130131043527-phpapp01/95/cochin-island-development-25-638.jpg%253Fcb%253D1359628659&imgrefurl=http://www.slideshare.net/ogustians/cochin-island-development&h=922&w=638&tbnid=wevPJGoGvfaZM:&zoom=1&docid=ExNqs-hpopkyUM&ei=k98lVcfSDM77qwSawIGADQ&tbn=isch&ved=0CEEQMyg5MDk4ZA>

<sup>18</sup> Report Published by BioRegional Development Group, BedZED Centre, 24 Helios Road, Wallington, Surrey SM6 7BZ. Registered charity no. 1041486

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<sup>19</sup> For more information and images of BedZED visit: [www.bioregional.com/what-we-do/our-work/bedzed/](http://www.bioregional.com/what-we-do/our-work/bedzed/)

<sup>20</sup> BedZED Resident Satisfaction Survey Report, Rachel Ellis, Peabody Asset Management, May 2004

<sup>21</sup> Buckley, R and Jerry, K, (2005) Housing Policy in developing countries; conjectures and refutations, 233257

<sup>22</sup> [www.donya-e-eqtesad.com](http://www.donya-e-eqtesad.com)

<sup>23</sup> [www.afkarnews.com](http://www.afkarnews.com)

<sup>24</sup> Architecture Australia supported by James Hardie [www.jameshardie.com.au](http://www.jameshardie.com.au) [www.scyon.com.au](http://www.scyon.com.au)

<sup>25</sup> Paola Sassi, strategies for sustainable architecture

<sup>26</sup> Paola Sassi, strategies for sustainable architecture

<sup>27</sup> Architecture Australia supported by James Hardie [www.jameshardie.com.au](http://www.jameshardie.com.au) [www.scyon.com.au](http://www.scyon.com.au)

<sup>28</sup> Paola Sassi, strategies for sustainable architecture

<sup>29</sup> Paola Sassi, strategies for sustainable architecture

<sup>30</sup> Micaela R. Danko Designing Affordable Housing for Adaptability: Principles, Practices, & Application

<sup>31</sup> Micaela R. Danko Designing Affordable Housing for Adaptability: Principles, Practices, & Application

## **BIBLIOGRAPHY**

1- Hassan Hakimian. Hakimian, Source: Iranian Studies, Vol. 38, No. 1, Iran Facing the New Century (Mar., 2005), pp. 67-90

2- Nicole Jafari, Delayed Psychological Cognition and Social Incompetency of Children Exposed to Child Labor Hardship in Iran. California State University at Fullerton, U.S.A, Newsha Badiee, Baha'i Institute of Higher Education, Iran, International Journal of Social Science & Human Behavior Study– IJSSHBS, Volume 1 : Issue 4 [ISSN 2374-1627], Publication Date: 27 December, 2014

3- [Http.Iranian.com](http://Iranian.com)

4- Wahba, Jackline. Child Labor and Poverty Transmission: No Room for Dreams. Cairo, Egypt: Economic Research Forum for the Arab Countries, Iran & Turkey, 2001.

5- Cyrus Bina, Petroleum and Energy Policy in Iran, Source: Economic and Political Weekly, Vol. 44, No. 1 (Jan. 3 - 9, 2009), pp. 19-23

6- <http://www.sfaa.org/0610shurrell.html>

7- [http://www.dbarchitect.com/project\\_detail/34/Folsom%20%2B%20Dore.html](http://www.dbarchitect.com/project_detail/34/Folsom%20%2B%20Dore.html)

- 
- 8- Carl S. Sterner, Sustainable low-income housing/ case studies and design strategies/ University of Cincinnati- Summer 2006- Professor Virginia Russell.
- 9-<http://www.pbs.org/wgbh/pages/frontline/tehranbureau/2011/03/irans-cities-a-sea-of-poverty.html>
- 10- Maloney, Suzanne. Iran's Political Economy since the Revolution
- 11- Farshad Nasrollahi, climate and energy responsive housing in continental climates, the sustainability of passive houses for Iran's dry and cold climate.
- 12- Massoud Karshenas and Hassan Hakimian, Oil, Economic Diversification and the Democratic Process in Iran, HakimianSource: Iranian Studies, Vol. 38, No. 1, Iran Facing the New Century (Mar., 2005), pp. 67-90
- 13- Bijan Kalhornia, Mehr Housing Problems
- 14- Adrian Lahoud, Hamed Khosravi, A Holey Territory, the case of maskan e Mehr
- 15-[www.ayaronline.ir](http://www.ayaronline.ir)
- 16-[www.mehrnews.com](http://www.mehrnews.com)
- 17-[www.amar.org.ir](http://www.amar.org.ir)
- 18-Joseph Heathcott, The New School, Pruitt-Igoe and the Critique of Public Housing
- 19-Benjamin Alexander Lawson, The Pruitt-Igoe projects: Modernism, Social Control, and The Failure of Public Housing
- 20-Katharine Bristow, The Pruitt-Igoe Myth
- 21- St. Louis City Plan Commission, Comprehensive City Plan (St. Louis, 1947), pp. 27-34; James Neal Primm, Lion of the Valley (Boulder, CO: Pruett, 1981), pp. 472-473.
- 22- "Progress or Decay? St. Louis Must Choose: The Sordid Housing Story," St. Louis Post-Dispatch, March 3, 1950, Part Four in a Series
- 23- Meehan, Quality, p. 71.
- 24- Oscar Newman, Defensible Space (New York: Macmillan, 1972)
- 25- David Steiner, Hallowed Hall
- 26-Architecture Australia Supported by James Hardie, [www.Jameshardie.com.au](http://www.Jameshardie.com.au), [www.scyon.com.au](http://www.scyon.com.au), [www.lookhome.com.au](http://www.lookhome.com.au)
- 27- William McDonough, Michael Braungart, Cradle to Cradle
- 28-Paola Sassi, Strategies for sustainable architecture
- 29- S.E. Seidaiy, Z. Hedayati Moghaddam, E. Fathi, M. Jamshidi, A. Jamshidi Stratification and analysis of housing indicators of rural areas of Isfahan Province Using factor and cluster analysis

---

30- Micaela R. Danko Designing Affordable Housing for Adaptability: Principles, Practices, & Application

31- [www.afkarnews.com](http://www.afkarnews.com)

32- [www.donya-e-egtesad.com](http://www.donya-e-egtesad.com)

33- Buckley, R and Jerry, K, (2005) Housing Policy in developing countries; conjectures and refutations, 233257

34- Adrian Pitts, Planning and design strategies for sustainability and profit

35- Rachel Ellis, Peabody, Asset Management, BedZED Resident Satisfaction Survey Report, May 2004

36- "About Us | ZED." ZED Factory. Accessed March 2, 2015.  
<http://www.zedfactory.com/zed/?q=node/36>

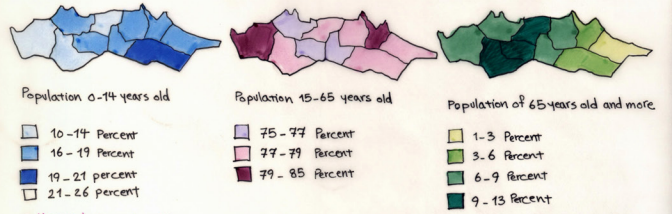


SITE ANALYSIS AND INITIAL DESIGN PROCESS  
FALL 2015

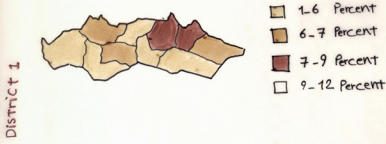
# DISTRICT 1



## Population Distribution in various age groups:



## Unemployment rate:



## Population:

Female: 223456  
Male: 216011  
Total: 439467

## Education:

Population with primary education: 10-14 %  
Population with secondary school education: 9-11 %  
Population with highschool education: 29-31 %  
Population with higher education: 32-46 %

## Population Density:



Person per hectare:

- 1-70
- 70-130
- 130-200
- 200-300
- 300-400

## Average size of families:



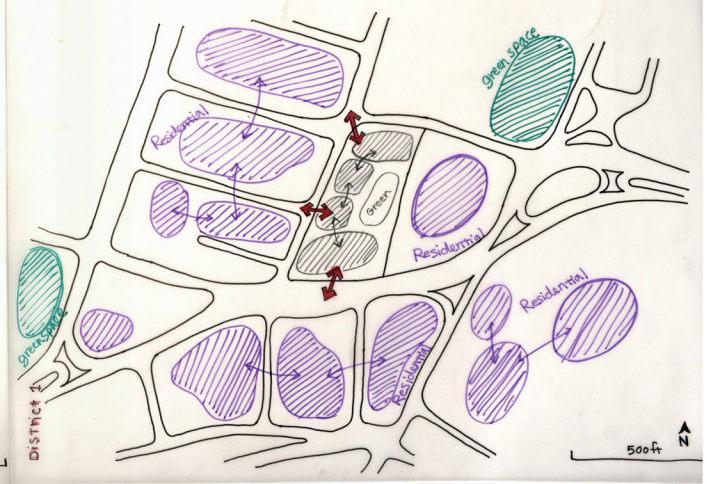
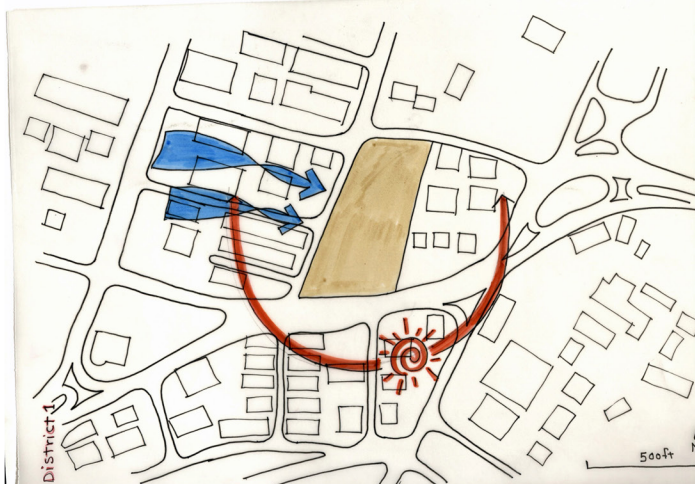
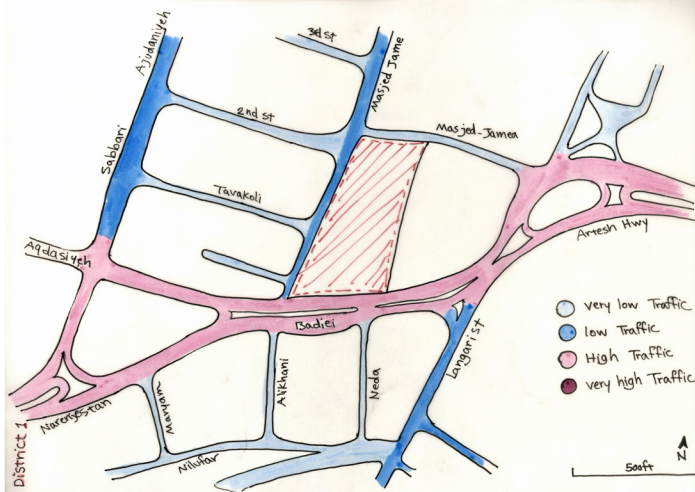
Average size:(members)

- 3-3.3
- 3.3-3.5
- 3.5-3.8
- 3.8-4.3
- 4.3-5



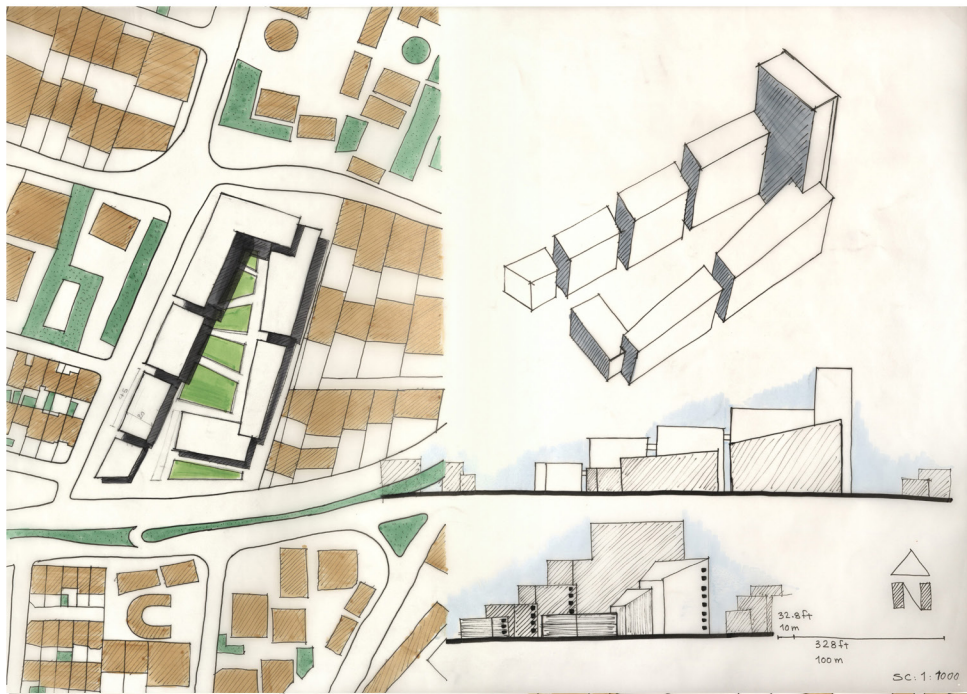
District 1

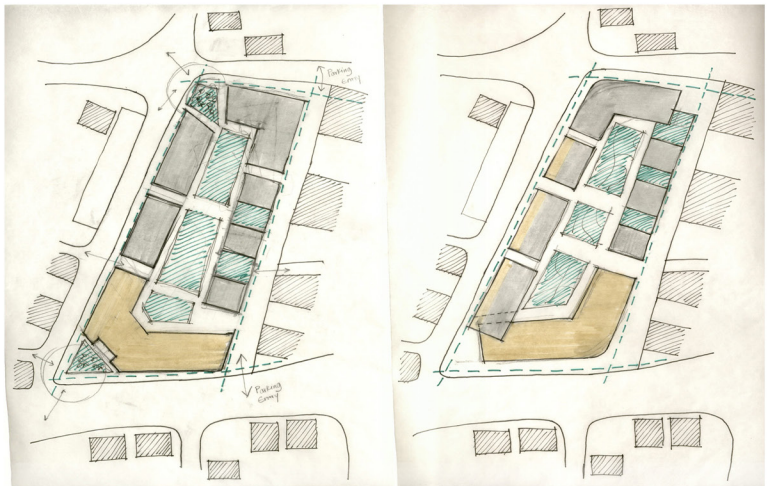
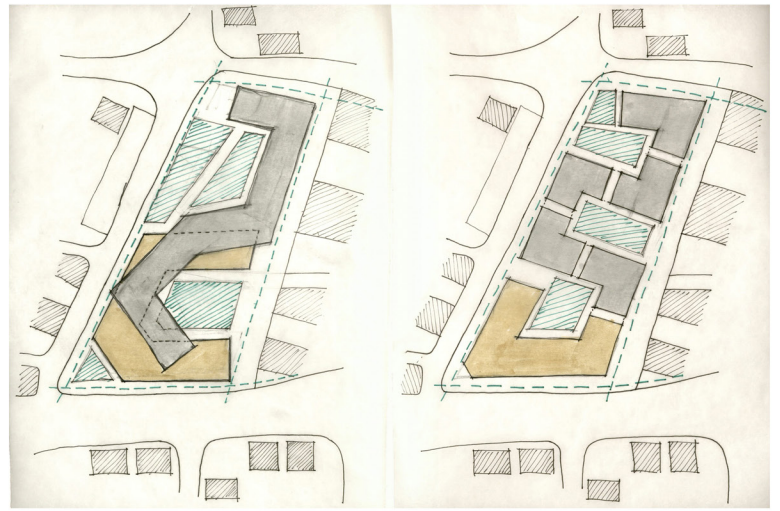
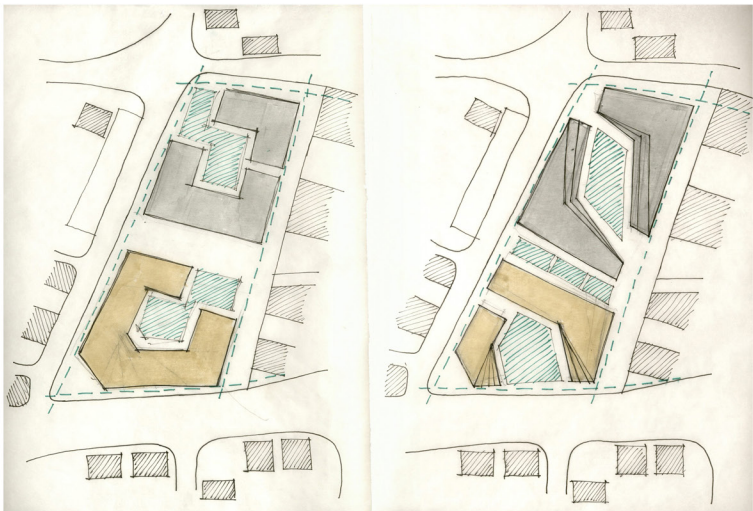
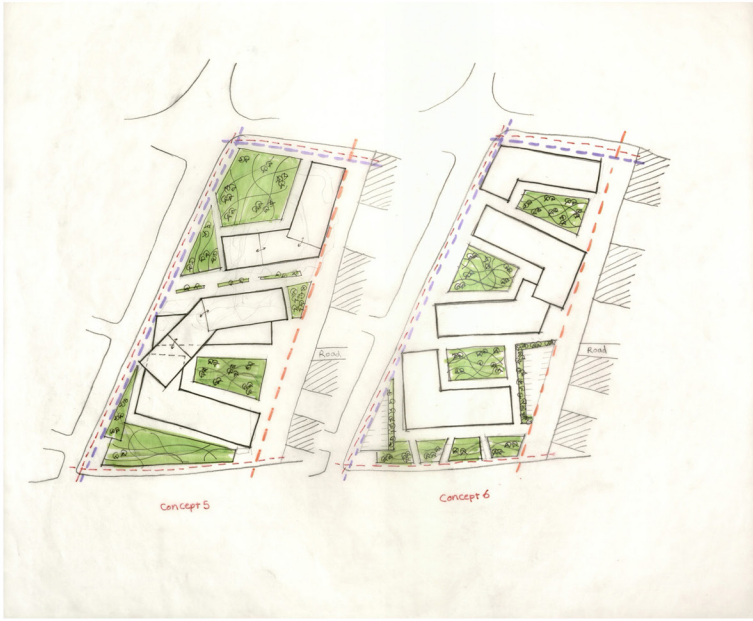
District 1



District 1

District 1







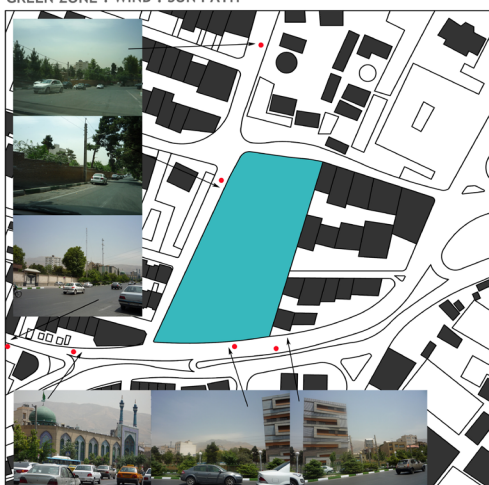
CONTEXT MAP . TRANSPORTATION ■ SUBWAY STATION ■ BUS STOP



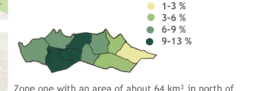
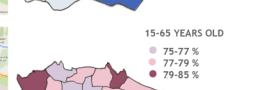
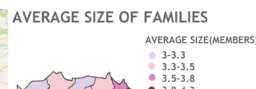
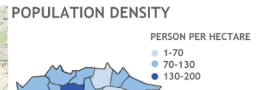
MOVEMENT ● HIGH TRAFFIC ● LOW TRAFFIC ● NO TRAFFIC



GREEN ZONE . WIND . SUN PATH



**Sustainable and Affordable Mixed Use Housing that Generates Energy and Provides Jobs As a Solution to Improve the Situation of Low-Income Iranian families in Tehran**



**AJUDANIYEH URBAN FORM**

Zone one with an area of about 64 km<sup>2</sup> in north of Tehran had a population of 439467 in year 2011. The most important cultural centers of the region are Niavaran Cultural center, Jamaran art gallery, and Mellat cultural center. Also, Saad Abad palace, Mellat Palace, Niavaran palace, and Zahiroddoleh cemetery are in this area

**Climate and Geography:**

Tehran Province with an area of about 14000square kilometers is located between North latitude of 34 degrees and 53 minutes to 36 degrees and 7 minutes and east longitude of 50 degrees 01 minutes to 53 degrees 9 minutes.

Tehran Province has 16 cities, 33 districts, 44 towns, 71 villages, and 1026 hamlets. Tehran province is located on the southern slopes of the central part of Alborz Mountain range. Tehran province doesn't have enough agricultural activities due to the climate limitations as well as development and uneven focus on industrial, commercial, and financial activities.

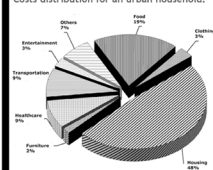
Tehran's climate can be described as continental climate with mild spring and autumn, hot and dry summer, and cold winter. Tehran is a large city with differences in elevation and temperature. The weather is cooler in north of Tehran and warmer in south. The hottest month is July (mean temperature 26 to 36 centigrade) and the coldest is January (mean temperature 3to 8 centigrade degree).

The average annual rainfall is 220 mm. Water sources are important factors in shaping the climate of Tehran. Recently there is not enough water supplies for Tehran, therefore, water treatment and recycling is becoming an important issue to have sustainable development in this metropolis.

**Economics:**

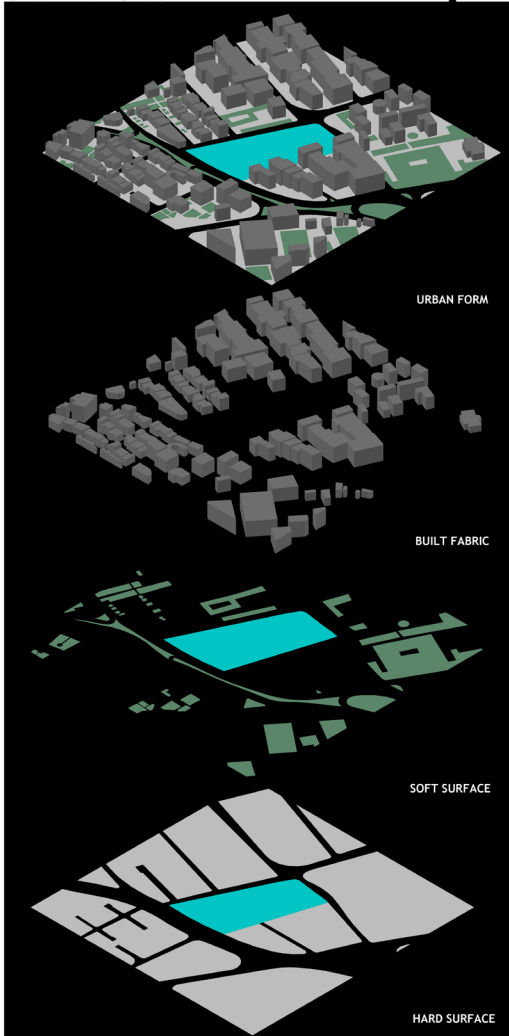
In year 2012 the average annual net costs of an urban family was 217.3 million Rial including 176 million Rial (81%) non-food costs and 41.3 million Rial (19%) food costs. In year 2012 the largest portion of non-food costs was housing costs (105 million) and the smallest portion was furniture costs (3.8 million). In year 2012 the average annual income of an urban family was 221 million Rial.

**Costs distribution for an urban household:**

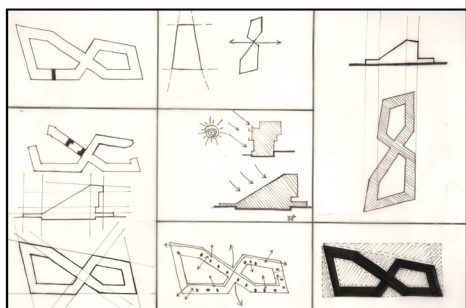
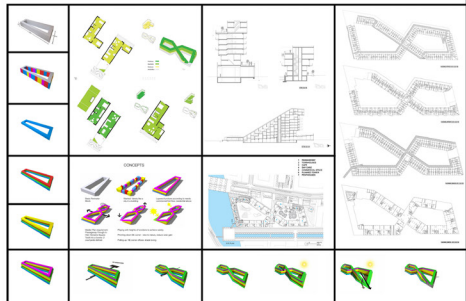
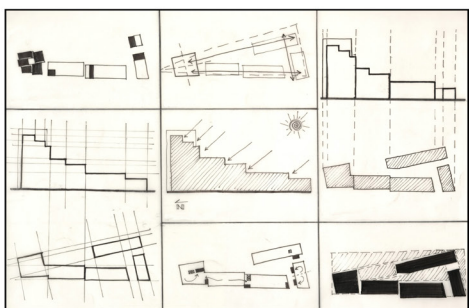
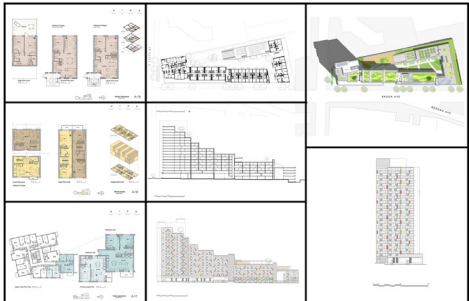


**Reasons for choosing site:**

- 1- Government's land: The government can use the land for free.
- 2- Lower price for land: residents will be able to pay for lands.
- 3- Access to subway stations
- 4- New urban context
- 5- Good transportation system (bus station and Taxi station near the site)
- 6- Shopping centers
- 7- Easy access to religious sites
- 8- High safety
- 9- Easy access to the highways and other parts of the city



POROOSHAT AKHGARI  
**SITE ANALYSIS**



**PROGRAM**

**RESIDENTIAL**

- 1, 2 AND 3 BEDROOM UNITS
- LOBBY
- GYM
- COMPUTRE CENER
- COMMUNITY GARDENS
- TOTALLY 242 UNITS
- 95 ONE BEDROOM UNITS
- 66 TWO BEDROOM UNITS
- 81 THREE BEDROOM UNITS

TOTAL AREA 34100 sq.m  
365000 sq.ft

**OFFICES**

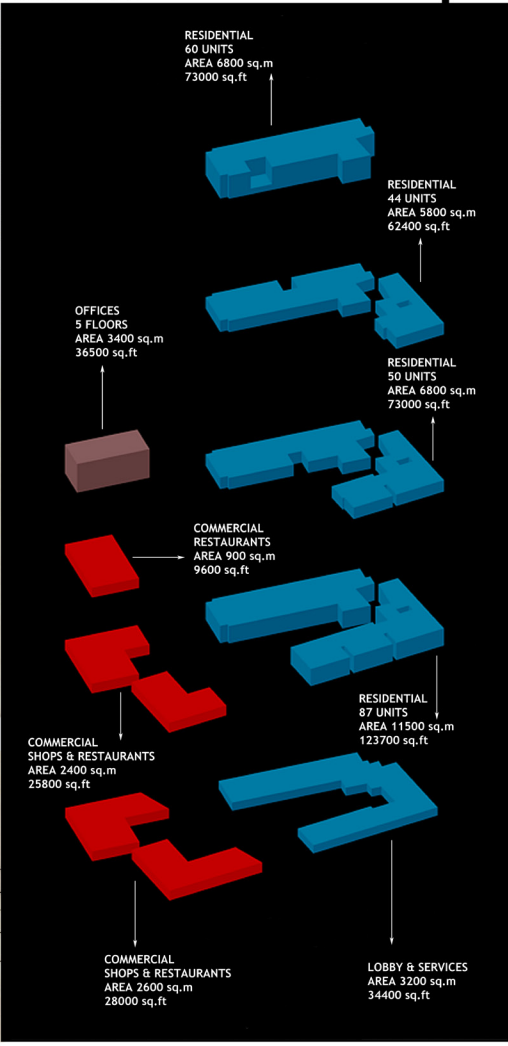
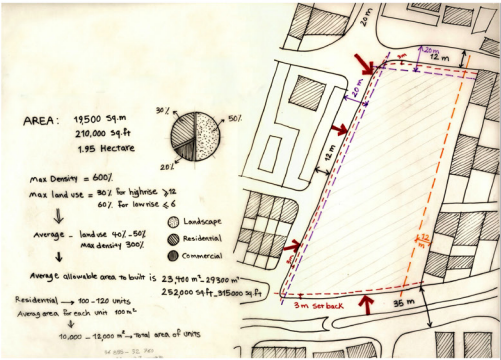
- 5 FLOORS
- TOTALL AREA 3400 sq.m  
36500 sq.ft

**COMMERCIAL**

- RETAIL
- RESTAURANT
- TOTALL AREA 5900 sq.m  
63500 sq.ft
- BEAUTY SHOP
- SECOND HAND SHOP
- HANDCRAFT SHOP

**SITE LIMITATION**

**PRECEDENT**



**AFFORDABLE SUSTAINABLE HOUSING, IRAN**

REDEFINE ENERGY USE  
- TRANSPORTATION  
- SOLAR PANEL  
- ORIENTATION  
- MATERIAL  
- CONSTRUCTION METHOD

LOWER UTILITY BILLS  
STABLE RENT  
GOVERNMENT LAND  
LOCAL JOB  
LOCAL FOOD  
MIXED USE HOUSING

**RESIDENTIAL**  
1, 2, 3 BEDROOM UNITS AVERAGE AREA 100 sq.m (1076 sq.ft)  
100 UNITS → TOTAL AREA FOR UNITS = 10,000 sq.m  
PARKING = 100 x (95 sq.m) = 9500 (102600 sq.ft)  
TOTAL AREA FOR RESIDENTIAL SECTOR = AROUND 20,000 sq.m  
PRIVATE GARDENS (215,000 sq.ft)  
TOTAL ALLOWABLE AREA TO BUILD = 35,000 sq.m (377,000 sq.ft)

**COMMERCIAL**  
RETAIL 7000 sq.m (75,000 sq.ft)  
SECOND HAND SHOPS  
CAFE SHOP  
SUPER MARKET  
BANK  
LAUNDRY  
BARBERS SHOP  
SEAFOOD SHOP  
RESTAURANT  
OFFICE 8000 sq.m (82,000 sq.ft)  
WORKPLACE / PARKING  
FACILITY 5000 sq.m (54,000 sq.ft)  
GYM  
COMPUTER CENTER  
HOUSE TREASURE  
PARKING FOR COMMERCIAL 100

**TEHRAN MUNICIPALITY**

Highrise > 12 Floors  
Up to 6 Floors is Free  
more than that you have to pay the government (Tehran municipality)

High rise buildings > 35 m<sup>2</sup>  
Residential units > 35 m<sup>2</sup>

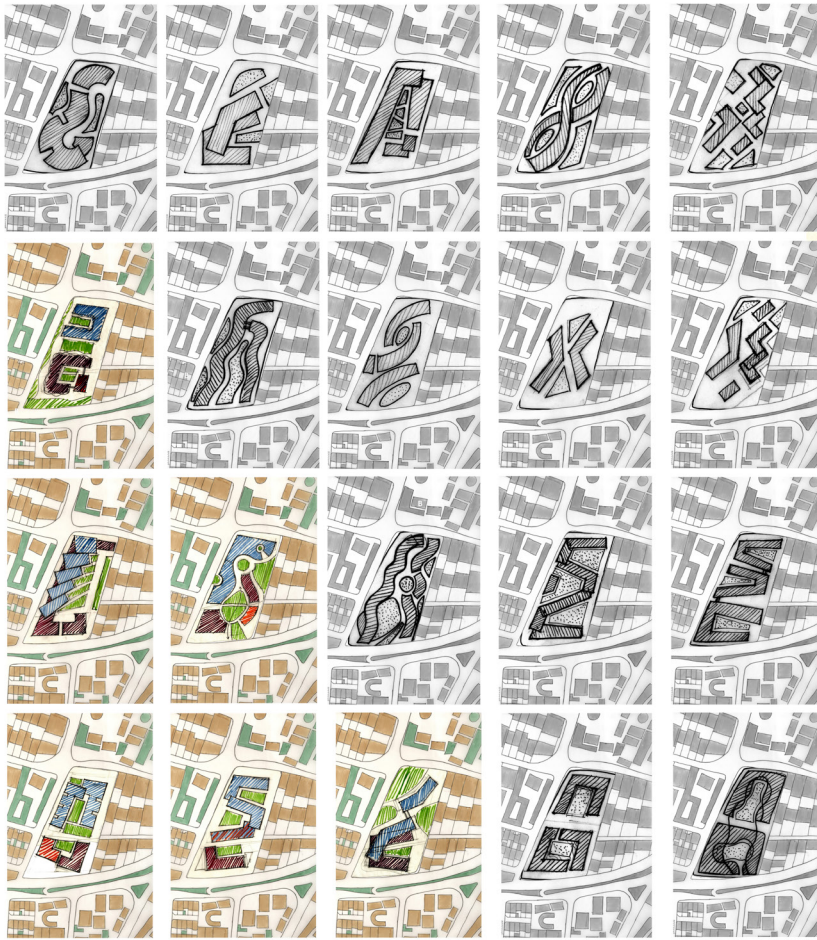
Flors	TWR	Load use	maximum Load area	minimum coverage ratio	
Residential	6	30%	60%	300	15
Highrise Residential	12 level	60%	30%	3000	20
mid-rise Residential	7/8	200/15/1	40/35%	750/300	15

High rise: Load Area > 8000 m<sup>2</sup>  
Renovation of Tehran municipality is needed.

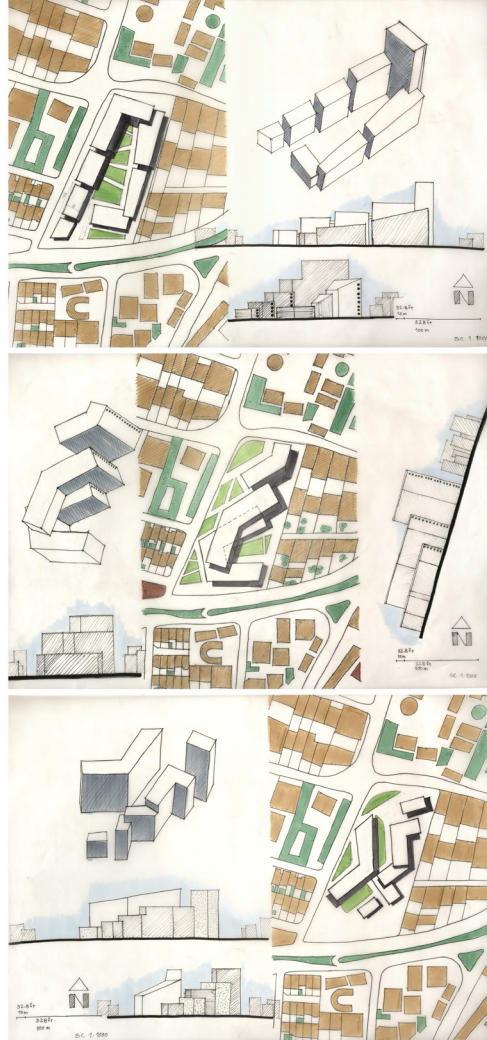
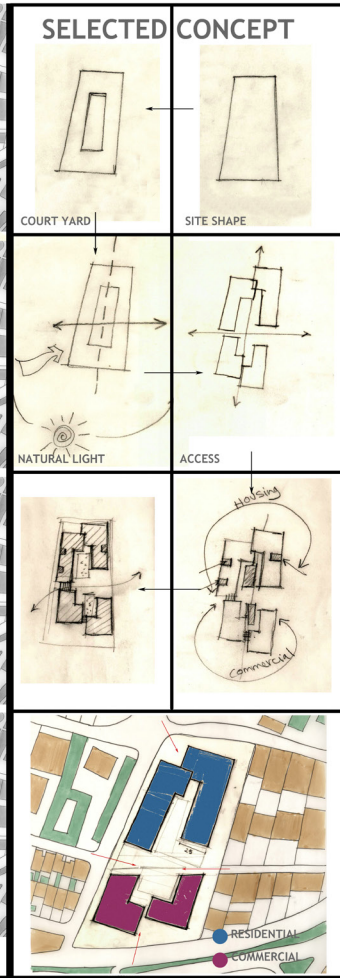
Residential buildings: 60-70% depends on area  
Highrise complex: minimum use 80% Floor and ground floor 90% higher floors



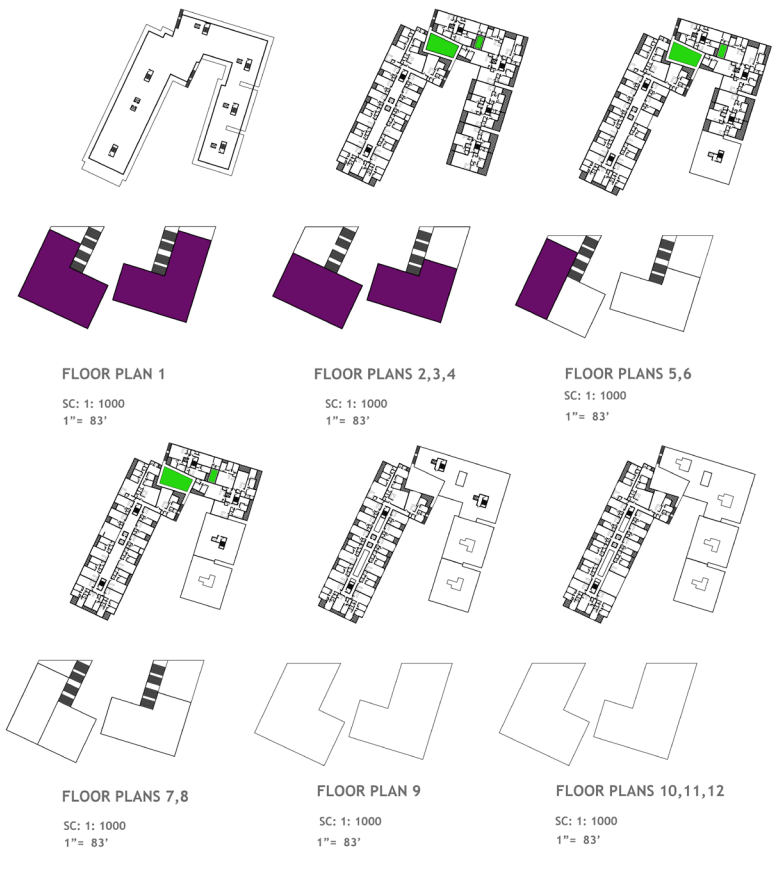
**PROGRAM / PRECEDENT**  
 POROOSHAT AKHGARI



CONCEPT DEVELOPMENT



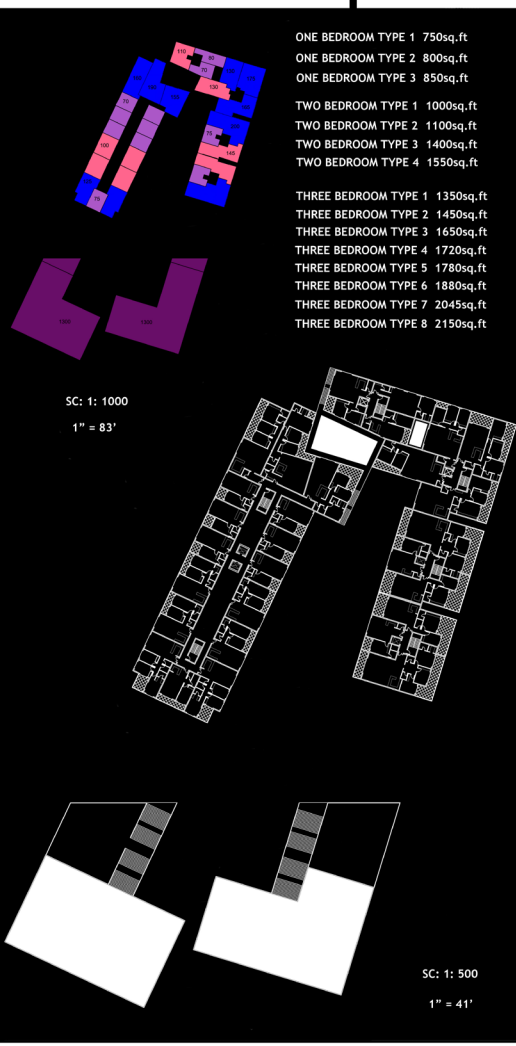
  
**POROOSHAT AKHGARI**  
**DESIGN PROCESS**



UNIT PLANS 1,2 AND 3 BEDROOM



SITE PLAN ACCESS LANDSCAPE  
SC: 1: 2000 1" = 168'



- ONE BEDROOM TYPE 1 750sq.ft
- ONE BEDROOM TYPE 2 800sq.ft
- ONE BEDROOM TYPE 3 850sq.ft
- TWO BEDROOM TYPE 1 1000sq.ft
- TWO BEDROOM TYPE 2 1100sq.ft
- TWO BEDROOM TYPE 3 1400sq.ft
- TWO BEDROOM TYPE 4 1550sq.ft
- THREE BEDROOM TYPE 1 1350sq.ft
- THREE BEDROOM TYPE 2 1450sq.ft
- THREE BEDROOM TYPE 3 1650sq.ft
- THREE BEDROOM TYPE 4 1720sq.ft
- THREE BEDROOM TYPE 5 1780sq.ft
- THREE BEDROOM TYPE 6 1880sq.ft
- THREE BEDROOM TYPE 7 2045sq.ft
- THREE BEDROOM TYPE 8 2150sq.ft

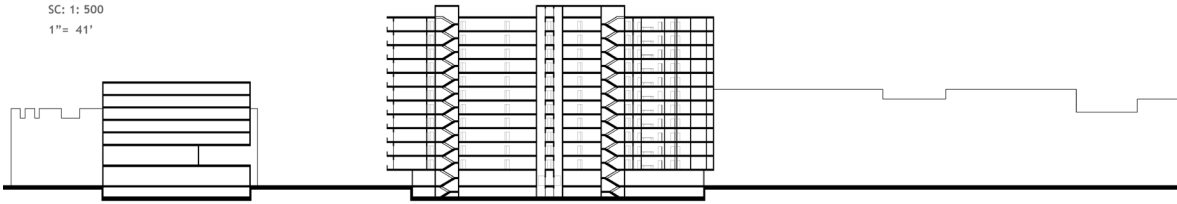


POROOSHAT AKHGARI  
**DESIGN DRAWINGS**



SECTION A-A

SC: 1: 500  
1"= 41'



SECTION B-B

SC: 1: 500  
1"= 41'



EAST ELEVATION

SC: 1: 500  
1"= 41'

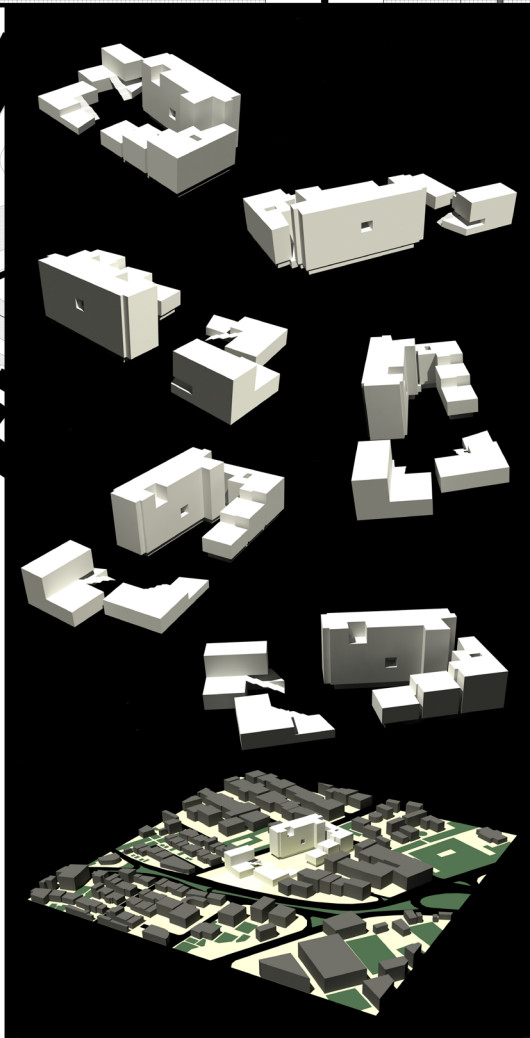


SOUTH ELEVATION

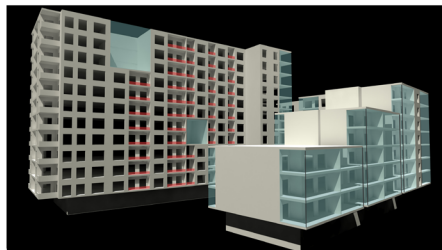
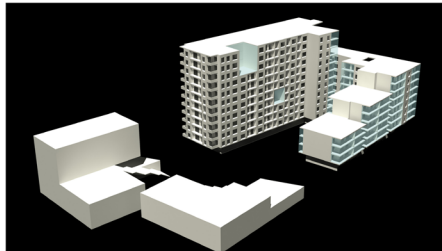
SC: 1: 500  
1"= 41'



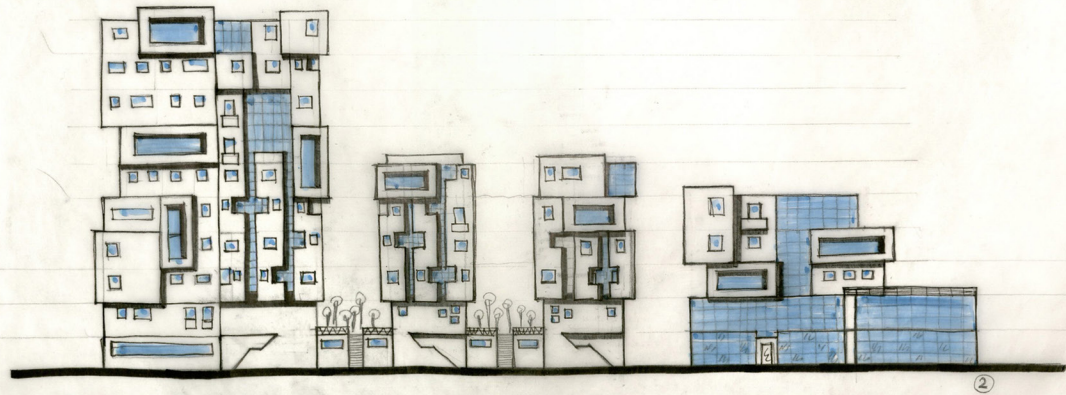
SC: 1: 2000 1"= 168'



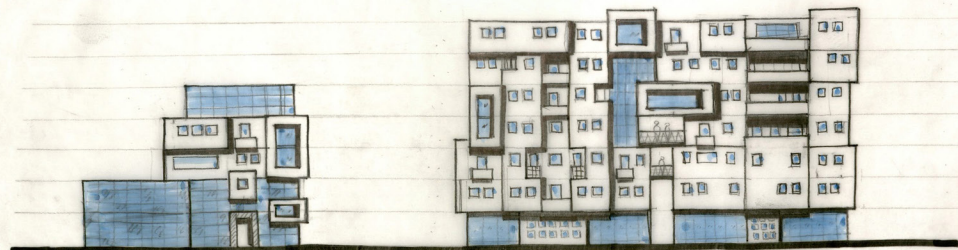
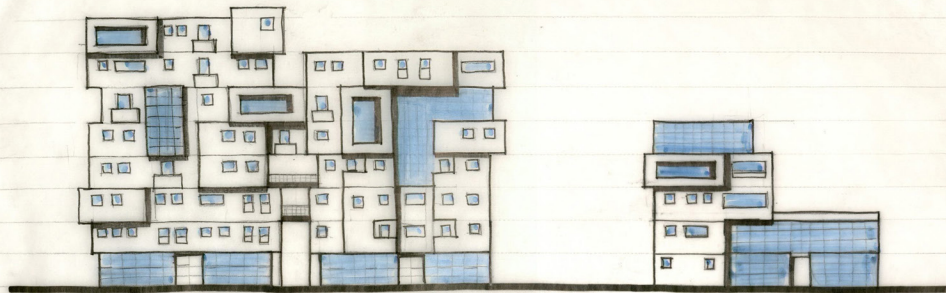
POROOSHAT AKHGARI  
**DESIGN DRAWINGS**



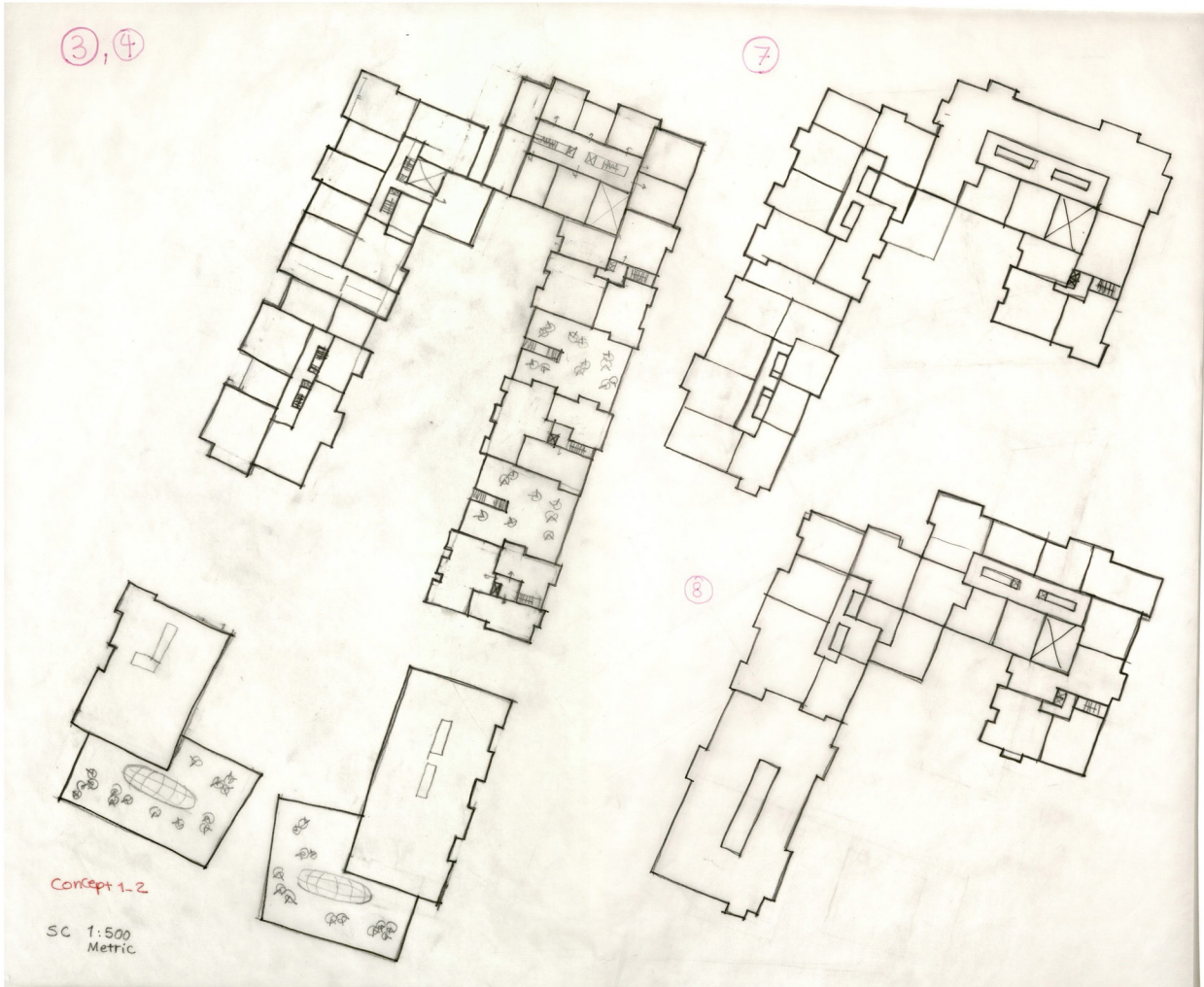
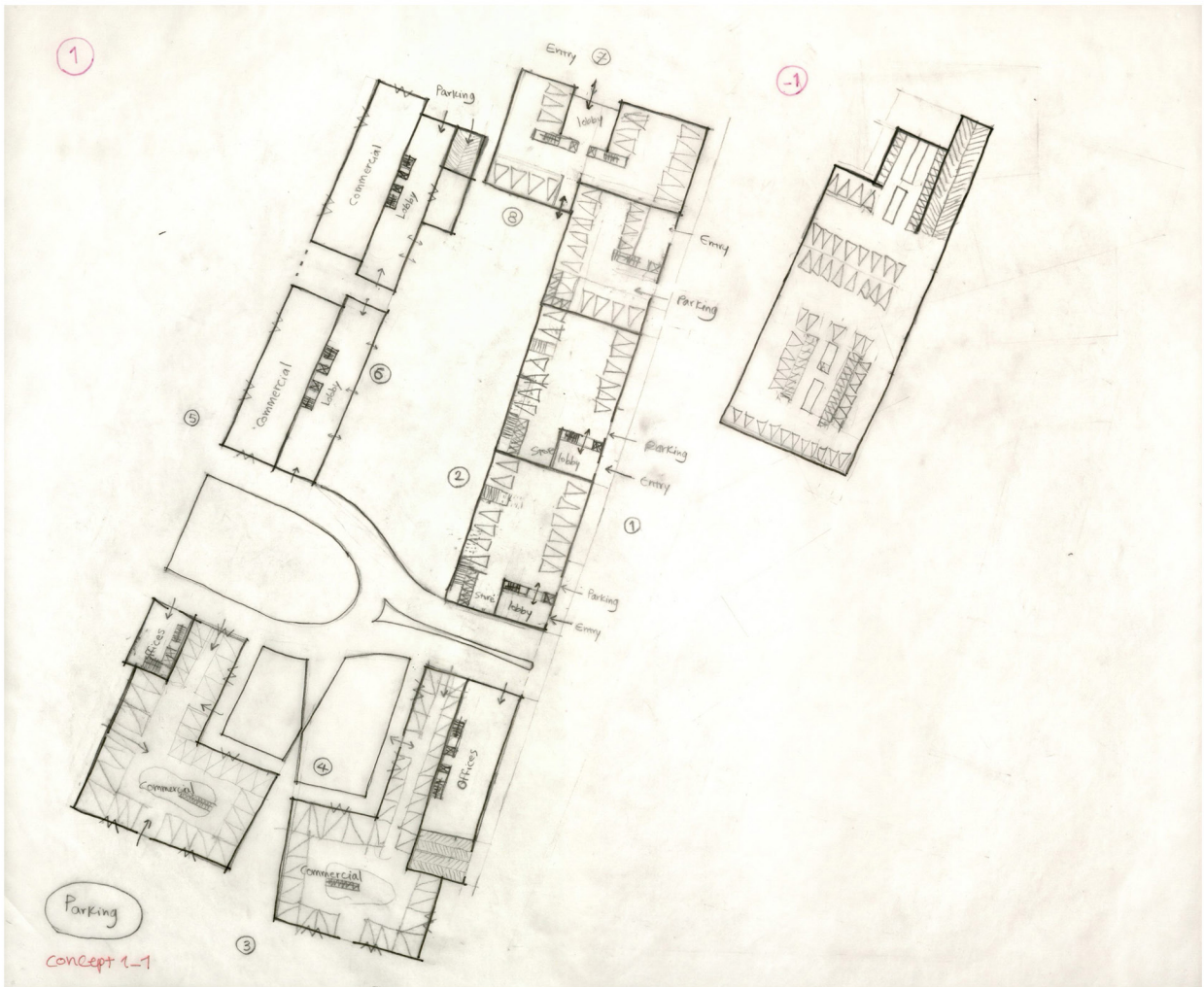
DESIGN AND FINAL BOARDS  
SPRING 2016

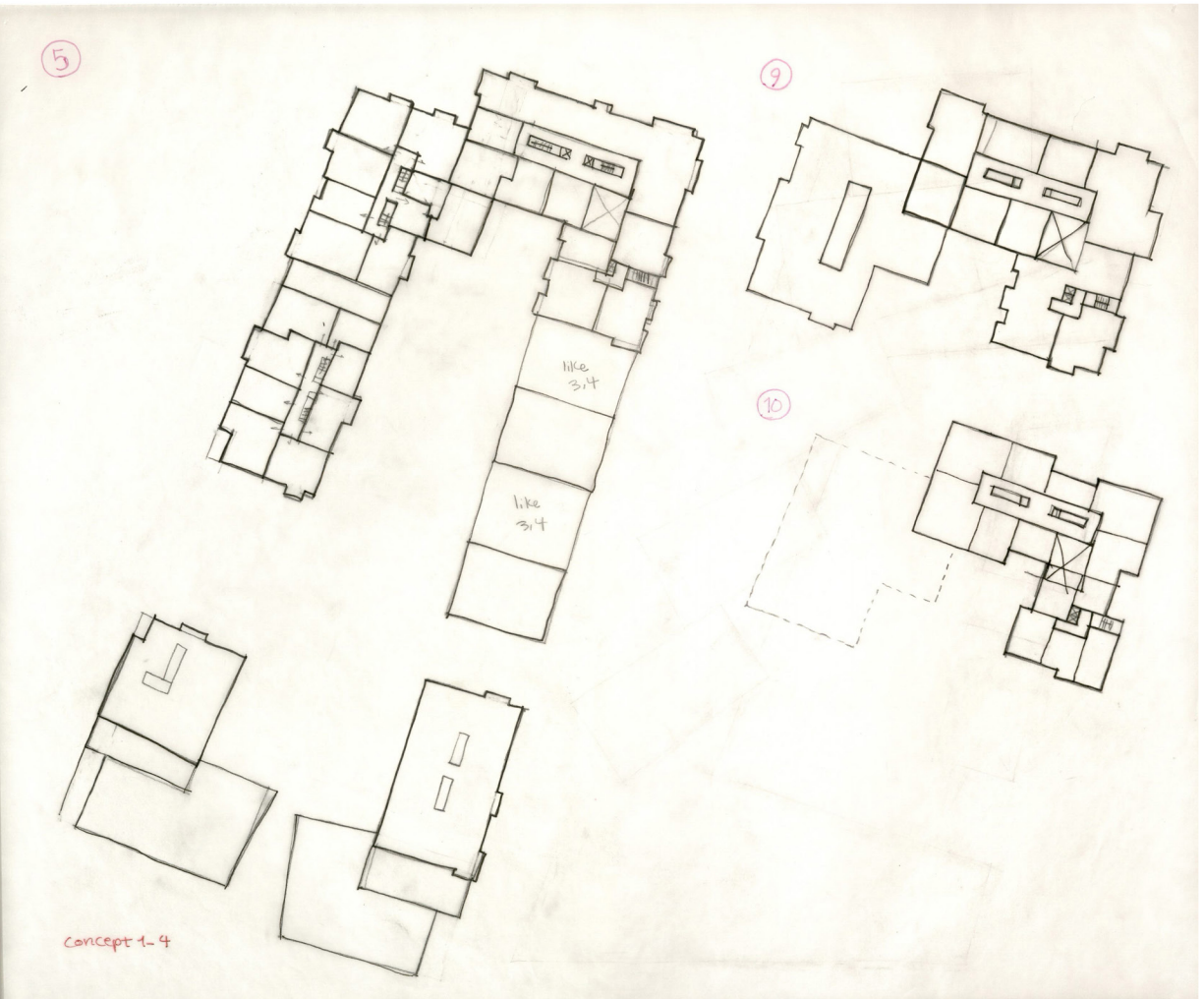
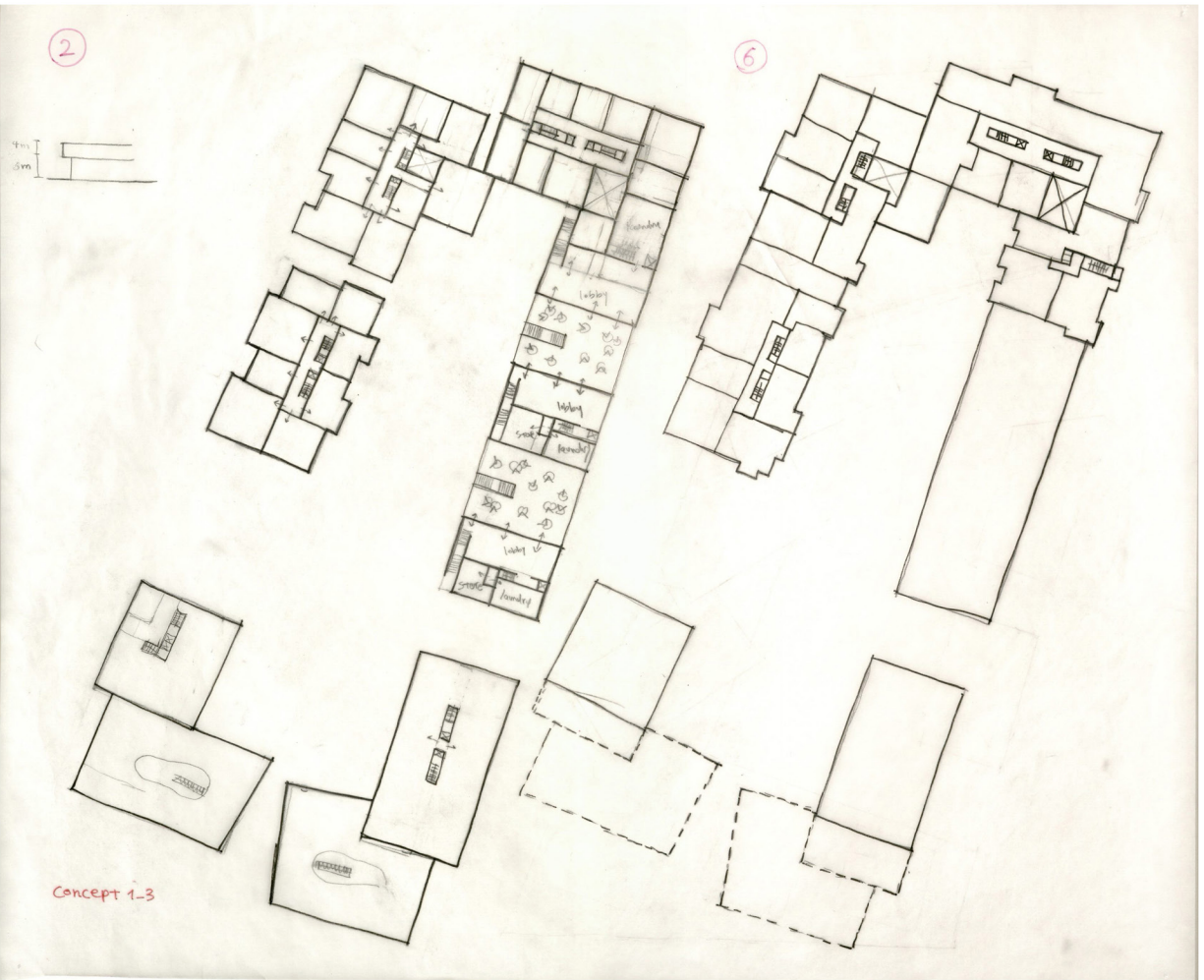


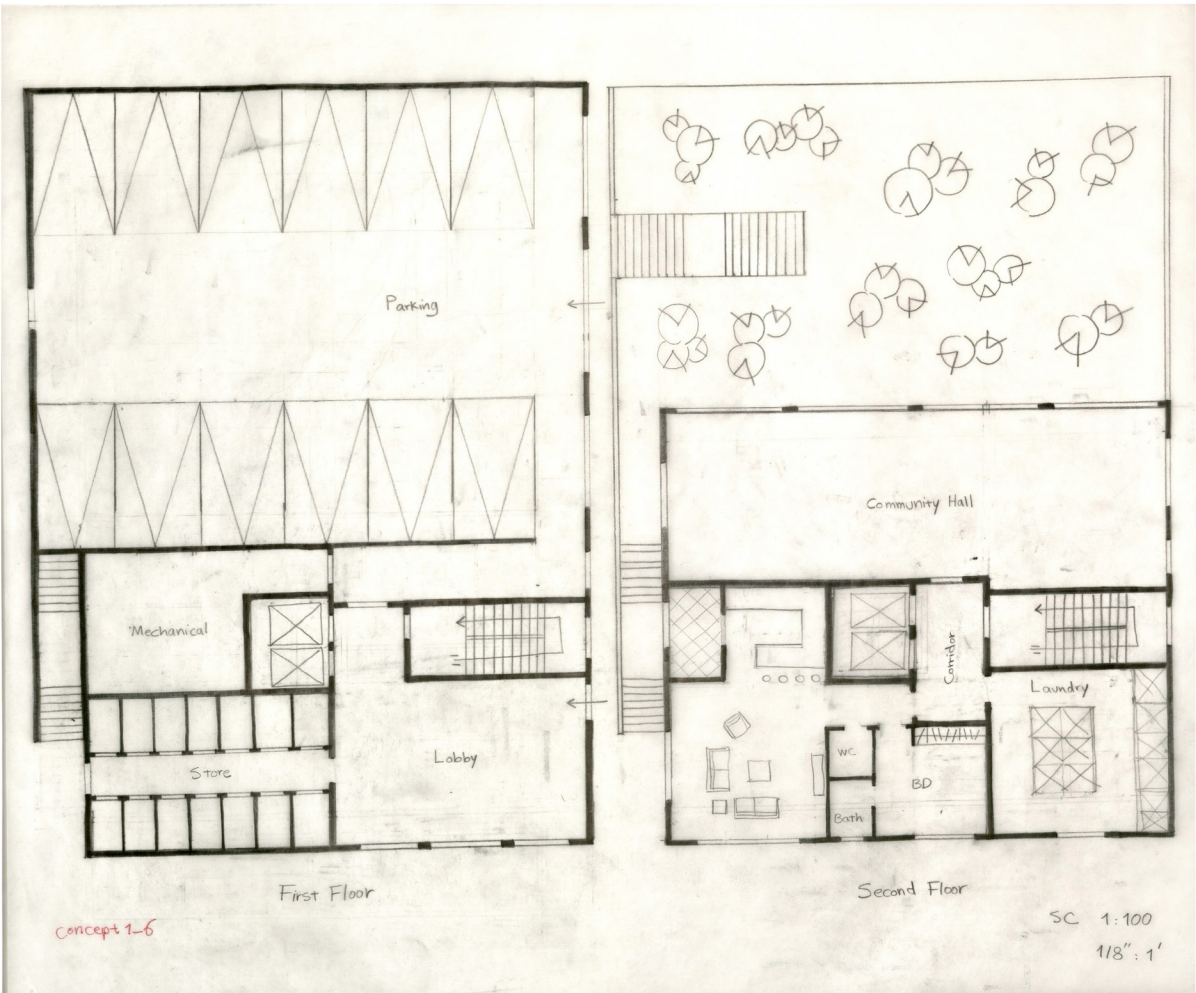
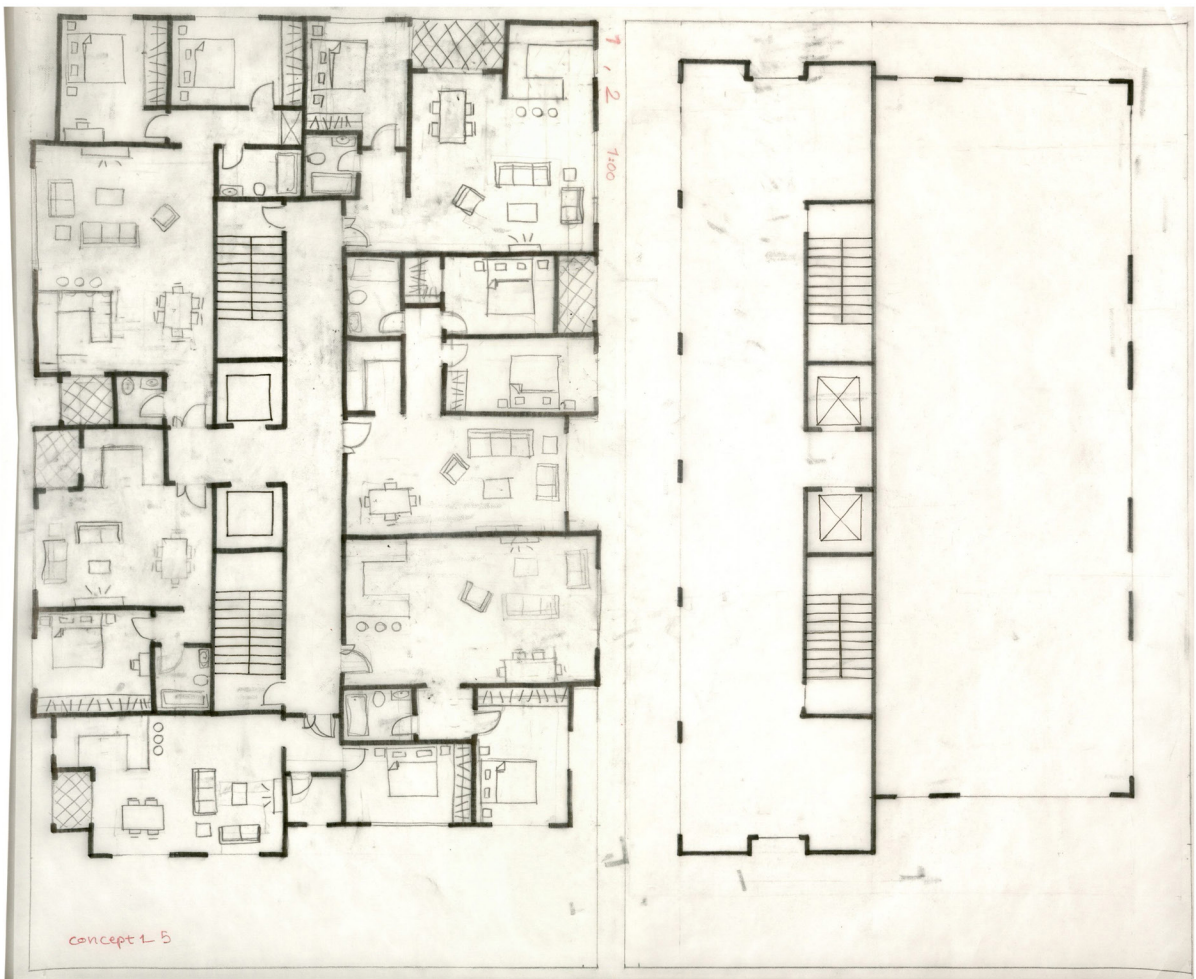
concept 1-10



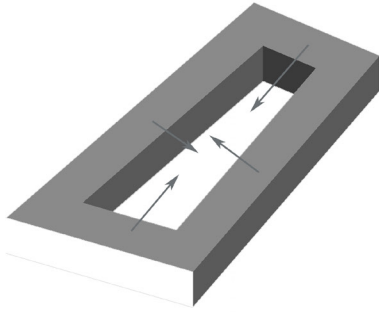
concept 1-11



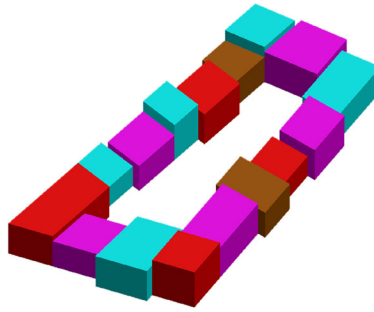




# CONCEPTS



Basic perimeter block  
Courtyard  
Introversion



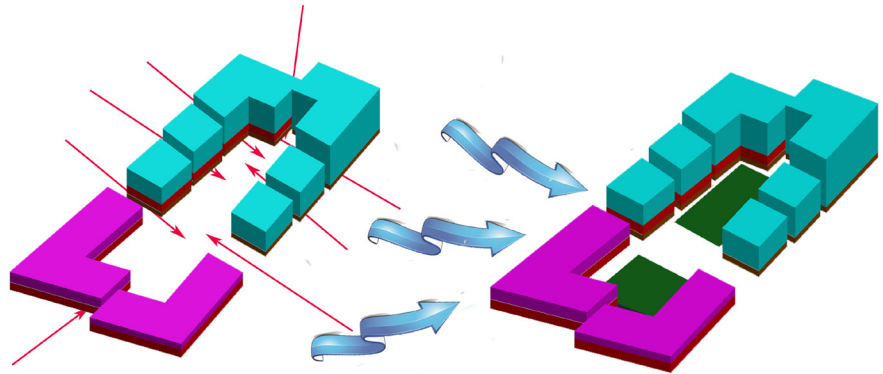
Different uses  
Building like a city



Scale down the building  
by dividing it into smaller pieces  
Layered functions according  
to the needs and site limitations



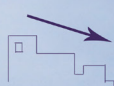
Step down the building in  
respect to the neighborhood  
and to receive more natural  
light for residential



Access to the site  
Providing multiple entries  
as well as dividing building  
to smaller blocks

Courtyard as a place for residents  
to meet, communicate, relax,  
and play

# SUSTAINABLE STRATEGIES



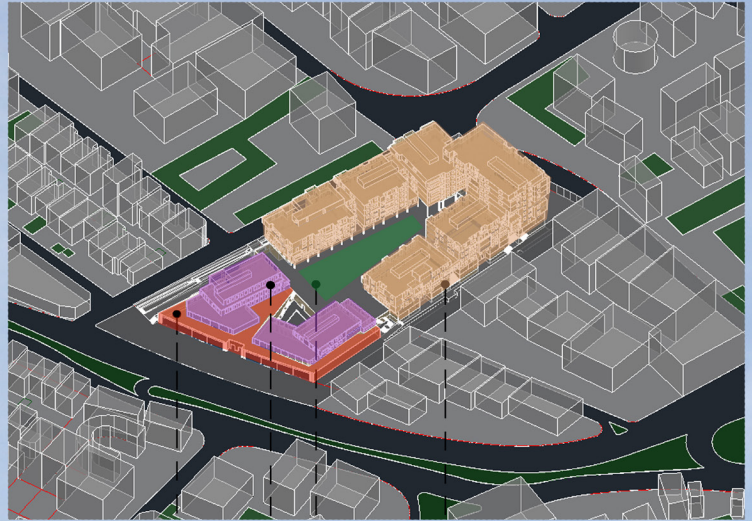
## SKYLINE TRANSITION

Buildings height steps down towards neighborhood in addition to provide more natural light for residential units



## MIXED USE COMPLEX

Compact urban development facilitates access to district amenities and promotes walkability. Mix of uses reduce trips outside the district



MEET	WORK	PLAY	LIVE
SHOP	CREATE	ENGAGE	RELAX
DRINK		MEET	MEET
EAT		COLLABORATE	

## PUBLIC OPEN SPACE

Recreational amenities improve health and wellness



## LOCALLY OWNED RESTAURANTS

Locally owned restaurants and cafes support local economy and provide jobs for residents



## ENERGY GENERATION

Solar collectors to provide hot water to support the energy demand



## URBAN AGRICULTURE

Small Gardens for residents to plant vegetable for their personal use or to sell



## GREEN ROOF

Help to insulate the building roof in addition to reduce stormwater run off while providing pleasant exterior spaces



## GREYWATER RECYCLED

Reduce water use by separating grey water for flushing and irrigation use



# SUSTAINABLE HOUSING SOLUTIONS FOR IRAN'S LOW INCOME CITIZENS

The government started Mehr Affordable Housing Project in 2009 to improve the condition of poor families in Iran.



MEHR HOUSING PROJECT NEAR TEHRAN

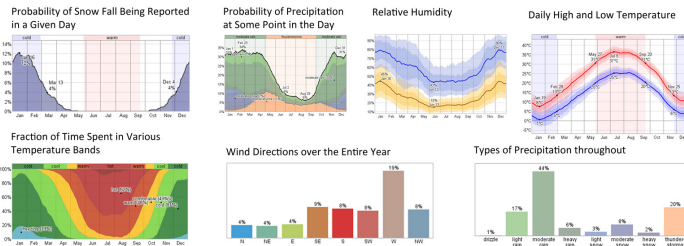
What caused Mehr-housing project failure can be summarized in five major titles

- 1- Location
- 2- No mixed use
- 3- Construction costs
- 4- Energy costs
- 5- Leasing-owning model

Proposed Design Principles

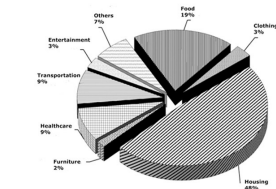
- 1-Mixed use design
- 2-Focus on families with minimum income
- 3-The site location near public transportation and other infrastructure
- 4-Stable rent based on income
- 5-Reducing energy consumption
- 6-Sustainable techniques to generate energy
- 7-Food garden on location
- 8-Creation of local jobs thus helping the families' economics

## CLIMATE:



## GENERAL INFORMATION:

Tehran Province with an area of about 14000square kilometers is located between North latitude of 34 degrees and 53 minutes to 36 degrees and 7 minutes and east longitude of 50 degrees 20 minutes to 53 degrees 9 minutes. Tehran Province has 16 cities, 33 districts, 44 towns, 71 villages, and 1026 hamlets. Due to low rate of rainfall, vegetation in south areas of Tehran province is not appropriate. Tehran province also doesn't have enough agricultural activities due to the climate limitations as well as development and uneven focus on industrial, commercial, and financial activities.



Cost Distribution for an Urban Household

### CONCEPTS

### URBAN FORM

### BUILDING FORM

1100 sq.m
11800 sq.ft
1100 sq.m
11800 sq.ft
1700 sq.m
18300 sq.ft
3250 sq.m
35000 sq.ft
4000 sq.m
43000 sq.ft
4900 sq.m
52700 sq.ft
520 sq.m
5600 sq.ft
5100 sq.m
54900 sq.ft
1200 sq.m
12900 sq.ft
4050 sq.m
43600 sq.ft
2100 sq.m
22600 sq.ft
3000 sq.m
32300 sq.ft
3700 sq.m
39800 sq.ft
7900 sq.m
85000 sq.ft

### SUSTAINABLE STRATEGIES

The structure will include reinforced rectangular concrete columns with maximum size of 18" \* 18" with 12" two way reinforced concrete slab with the span capacity of 26'. The elevator walls are load bearing concrete.

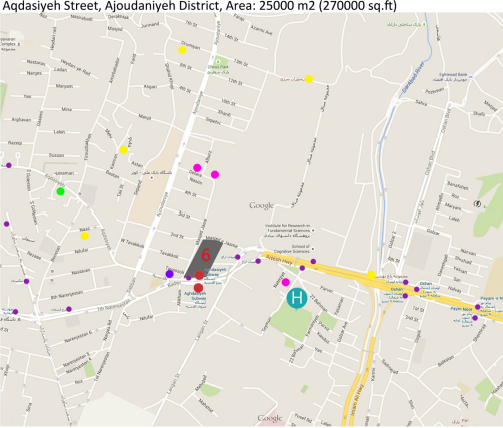
Steel Mounting Profile
Metal Wall Channel
AISC Angle Shape L4x3/8
Steel screw
Exterior Wood Panel
1" Plywood Sheathing
3" Rigid Insulation Barrier
4" Batt Insulation
3/8" Air Brake
5/8" Gypsum Board

3" Precast Concrete Panel
1/2" Air Barrier
3" Rigid Insulation
Metal Wall Channel
Metal Water Barrier
AISC Angle Shape L4x3/8
Concrete Floor Slab

4" Batt Insulation
3/8" Air brake
5/8" Gypsum Board



# SITE ANALYSIS



## REASONS FOR CHOOSING SITE:

- 1-Government's land: The government can use the land for free.
- 2-Lower price for land: residents will be able to pay for lands.
- 3- Access to subway stations
- 4-New urban context
- 5-Good transportation system (bus station and Taxi station near the sites).
- 6-Shopping centers
- 7-Easy access to religious sites
- 8-High safety
- 9-Easy access to the highways and other parts of the city

Zone one with an area of about 64 km<sup>2</sup> in north of Tehran had a population of 439467 in year 2013. The most important cultural centers of the region are Niavaran Cultural center, Jamaran art gallery, and Mellal cultural center. Also, Saad Abad palace, Mellal Palace, Niavaran palace, and Zahirodoleh cemetery are in this area

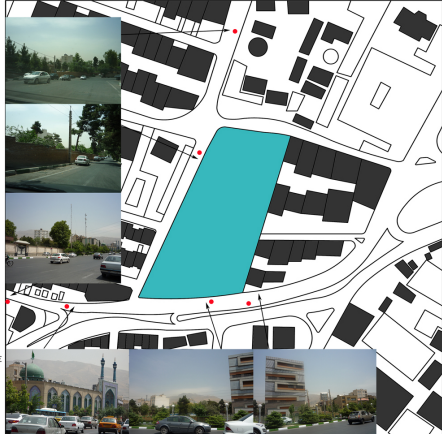
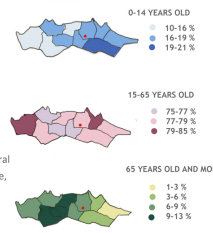
## POPULATION DENSITY



## AVERAGE SIZE OF FAMILIES



## POPULATION DISTRIBUTION IN VARIOUS AGE GROUPS



CONTEXT MAP . TRANSPORTATION  
 SUBWAY STATION . BUS STOP ENTRY  
 CAR ACCESS . COMMERCIAL . RESIDENTIAL

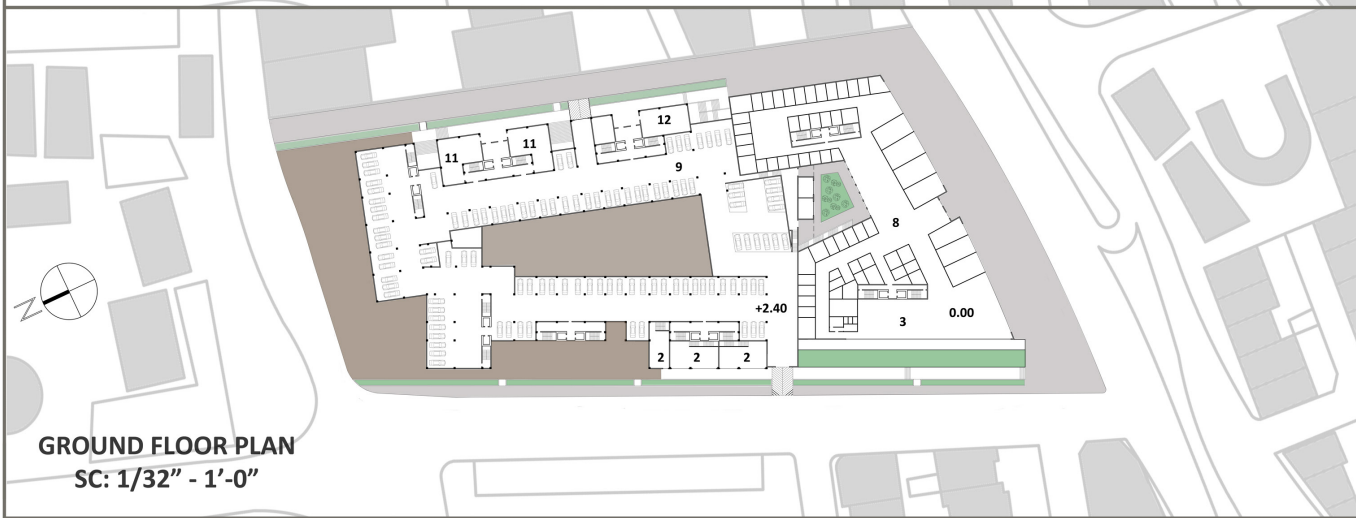
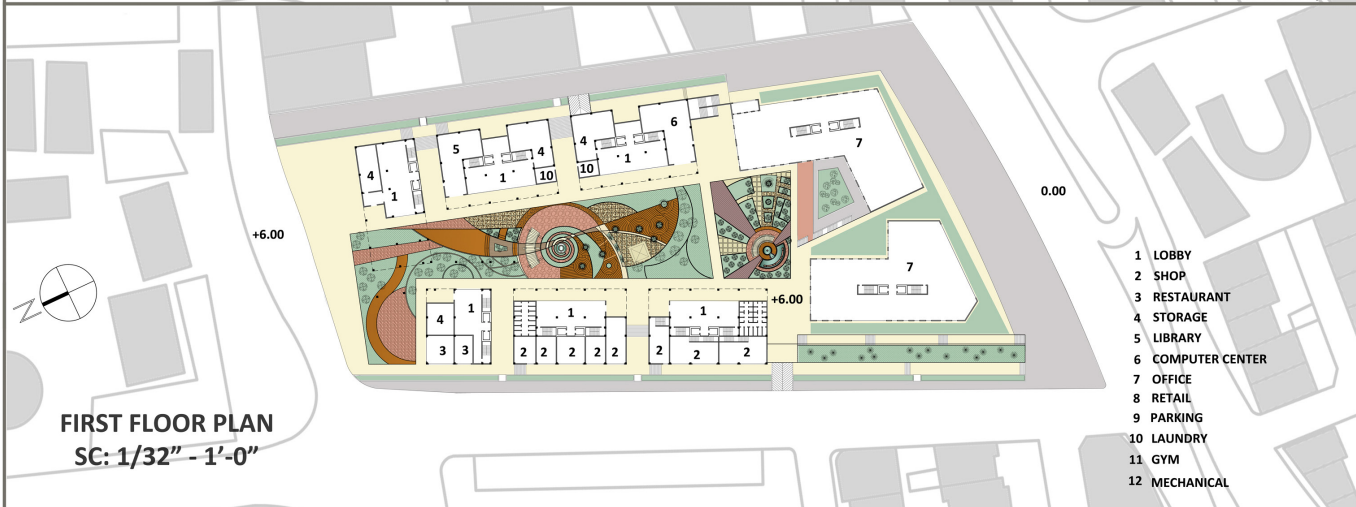


MOVEMENT  
 HIGH TRAFFIC . LOW TRAFFIC . NO TRAFFIC



GREEN ZONE . WIND . SUN PATH





- 1 Two Bedroom Unit  
104 M2 / 1120 sq.ft
- 1 Three Bedroom Unit  
150 M2 / 1610 sq.ft
- 1 Two Bedroom Unit  
111 M2 / 1190 sq.ft
- 2 Two Bedroom Unit  
122 M2 / 1310 sq.ft
- 2 Two Bedroom Unit  
114 M2 / 1230 sq.ft
- 1 Two Bedroom Unit  
118 M2 / 1270 sq.ft
- 1 Three Bedroom Unit  
133 M2 / 1430 sq.ft
- 3 One Bedroom Unit  
80 M2 / 860 sq.ft
- 1 One Bedroom Unit  
83 M2 / 890 sq.ft

**SEVENTH FLOOR PLAN**  
SC: 1/32" - 1'-0"

13 Units  
One Bedroom 4  
Two Bedroom 7  
Three Bedroom 2

- 2 Three Bedroom Unit  
155 M2 / 1670 sq.ft
- 1 Two Bedroom Unit  
118 M2 / 1270 sq.ft
- 1 Two Bedroom Unit  
111 M2 / 1190 sq.ft
- 2 Two Bedroom Unit  
122 M2 / 1310 sq.ft
- 4 Two Bedroom Unit  
114 M2 / 1230 sq.ft
- 1 Three Bedroom Unit  
150 M2 / 1610 sq.ft
- 2 Two Bedroom Unit  
84 M2 / 900 sq.ft
- 2 Three Bedroom Unit  
133 M2 / 1430 sq.ft
- 1 Three Bedroom Unit  
133 M2 / 1430 sq.ft
- 3 One Bedroom Unit  
80 M2 / 860 sq.ft
- 1 One Bedroom Unit  
83 M2 / 890 sq.ft

**SIXTH FLOOR PLAN**  
SC: 1/32" - 1'-0"

20 Units  
One Bedroom 4  
Two Bedroom 10  
Three Bedroom 6

- 2 Two Bedroom Unit  
118 M2 / 1270 sq.ft
- 3 Two Bedroom Unit  
84 M2 / 900 sq.ft
- 1 Duplex Unit  
100 M2 / 1075 sq.ft
- 1 Two Bedroom Unit  
111 M2 / 1190 sq.ft
- 1 Three Bedroom Unit  
150 M2 / 1610 sq.ft
- 2 One Bedroom Unit  
55 M2 / 590 sq.ft
- 1 Two Bedroom Unit  
120 M2 / 1290 sq.ft
- 2 Three Bedroom Unit  
155 M2 / 1670 sq.ft
- 1 One Bedroom Unit  
90 M2 / 970 sq.ft
- 1 Three Bedroom Unit  
126 M2 / 1350 sq.ft
- 2 Two Bedroom Unit  
122 M2 / 1310 sq.ft
- 1 Two Bedroom Unit  
114 M2 / 1230 sq.ft
- 1 Two Bedroom Unit  
121 M2 / 1300 sq.ft
- 2 Three Bedroom Unit  
121 M2 / 1300 sq.ft
- 2 Three Bedroom Unit  
126 M2 / 1350 sq.ft
- 1 Three Bedroom Unit  
133 M2 / 1430 sq.ft
- 3 One Bedroom Unit  
80 M2 / 860 sq.ft
- 1 One Bedroom Unit  
83 M2 / 890 sq.ft

**FIFTH FLOOR PLAN**  
SC: 1/32" - 1'-0"

28 Units  
One Bedroom 7  
Two Bedroom 9  
Three Bedroom 12

- 1 Two Bedroom Unit  
118 M2 / 1270 sq.ft
- 4 Two Bedroom Unit  
84 M2 / 900 sq.ft
- 1 Duplex Unit  
100 M2 / 1075 sq.ft
- 1 Two Bedroom Unit  
111 M2 / 1190 sq.ft
- 1 Three Bedroom Unit  
150 M2 / 1610 sq.ft
- 2 Two Bedroom Unit  
120 M2 / 1290 sq.ft
- 2 Three Bedroom Unit  
155 M2 / 1670 sq.ft
- 2 Three Bedroom Unit  
135 M2 / 1450 sq.ft
- 2 Three Bedroom Unit  
126 M2 / 1350 sq.ft
- 2 Two Bedroom Unit  
122 M2 / 1310 sq.ft
- 2 Two Bedroom Unit  
105 M2 / 1130 sq.ft
- 2 Two Bedroom Unit  
121 M2 / 1300 sq.ft
- 2 Three Bedroom Unit  
121 M2 / 1300 sq.ft
- 2 Three Bedroom Unit  
126 M2 / 1350 sq.ft
- 1 Three Bedroom Unit  
133 M2 / 1430 sq.ft
- 2 One Bedroom Unit  
80 M2 / 860 sq.ft
- 1 One Bedroom Unit  
83 M2 / 890 sq.ft

**FOURTH FLOOR PLAN**  
SC: 1/32" - 1'-0"

30 Units  
One Bedroom 4  
Two Bedroom 14  
Three Bedroom 12



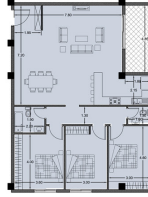
THREE BEDROOM UNIT



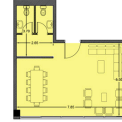
OFFICE



LOBBY



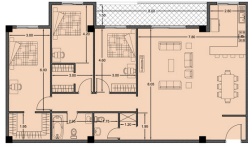
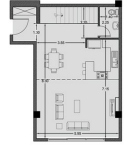
Three Bedroom Unit  
126 M2 / 1350 sq.ft  
Sc: 1/8" - 1'-0"



Community Room  
100 M2 / 1075 sq.ft  
Sc: 1/8" - 1'-0"



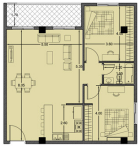
Duplex Unit  
100 M2 / 1075 sq.ft  
Sc: 1/8" - 1'-0"



Three Bedroom Unit  
155 M2 / 1670 sq.ft  
Sc: 1/8" - 1'-0"



One Bedroom Unit  
80 M2 / 860 sq.ft  
Sc: 1/8" - 1'-0"



Two Bedroom Unit  
84 M2 / 900 sq.ft  
Sc: 1/8" - 1'-0"



Two Bedroom Unit  
121 M2 / 1300 sq.ft  
Sc: 1/8" - 1'-0"



Office  
1000 M2 / 10750 sq.ft  
Sc: 1/8" - 1'-0"





# ELEVATIONS



WEST ELEVATION-STREET VIEW  
1/16" = 1'-0"



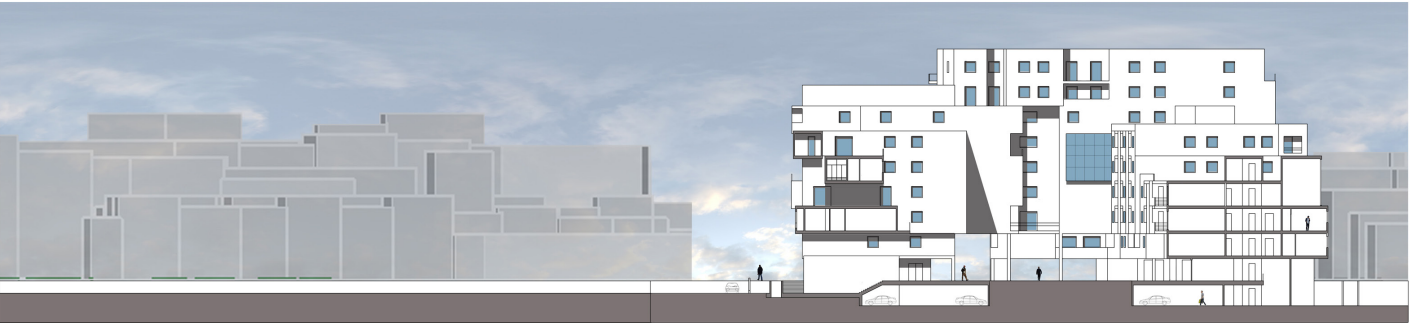
EAST ELEVATION  
1/16" = 1'-0"



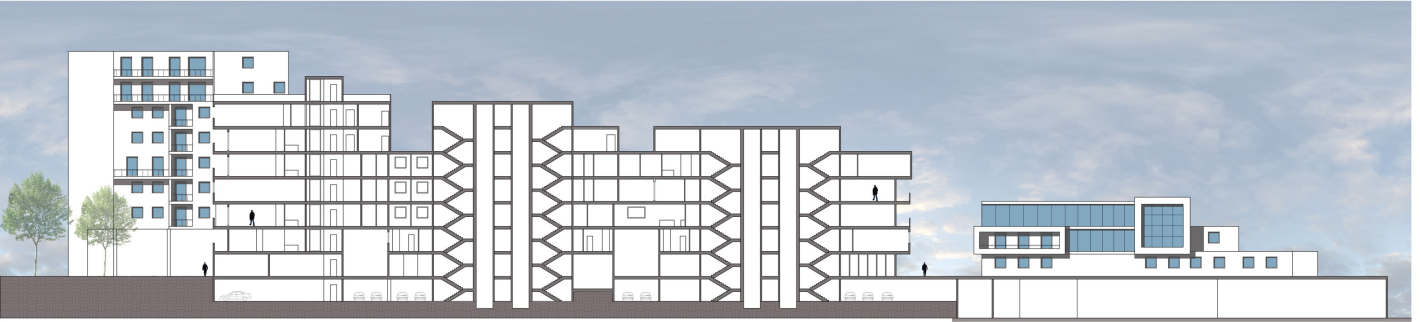
WEST ELEVATION-COURT YARD VIEW  
1/16" = 1'-0"



**SECTIONS**



SECTION B-B  
1/16" = 1'-0"



SECTION A-A  
1/16" = 1'-0"





## ADDENDUM

My thesis process started during the spring semester of my first year of education in 2015. I was asked to provide boards including ideas and topics that I am interested in. Later on, I started to write thesis paper based on research and case study findings. The paper was presented the following fall semester. I have been always interested in sustainability in architecture and this process gave me the chance to explore the topic deeper and gain more knowledge. Moreover, this was a good practice for me to learn how to write an academic paper and how to gather all information in a cohesive way. Symposium presentation also was a good experience for me and helped me to improve my design in some aspects later on. During fall semester we mainly focused on site analysis and schematic design which was helpful for me, since I had different site options and it was important for me to select the best possible one. I believe I had a good progress during fall semester and I received a lot of help and consultation from my committee. At the beginning of spring semester I had my initial design (this was done during winter), but unfortunately because of other responsibilities for my assistantship I couldn't work on my thesis during first few weeks which caused me a lot of problems later. On the other hand, I think I spent too much time on context analysis and the form of building which didn't help that much to have a better project by the end. I had many different forms and it became really difficult for me to pick one. By the end I didn't have enough time to complete the final physical model. Now that I look back at the whole process, I can see where the errors were made and what should I have done to fix them. I had the idea that for Master thesis the building that I design should be large in scale and it wouldn't be appropriate to design a small building. I was completely wrong. Designing 250,000 sq.ft mixed use building, gave me a really hard time. I had to complete the design and at the same time consider different aspects of my project such as sustainability, affordability, material use, and structure. By the end I couldn't finish the model because the building was huge with a lot of details, and I didn't have enough time left to make it. In general for the whole process, I think there should be a better communication between studio professor, committee members and student. My committee members helped me a lot in this process. We had almost the same way of thinking and I could easily understand what they wanted. So I think this is really important to pick the right person at the beginning.