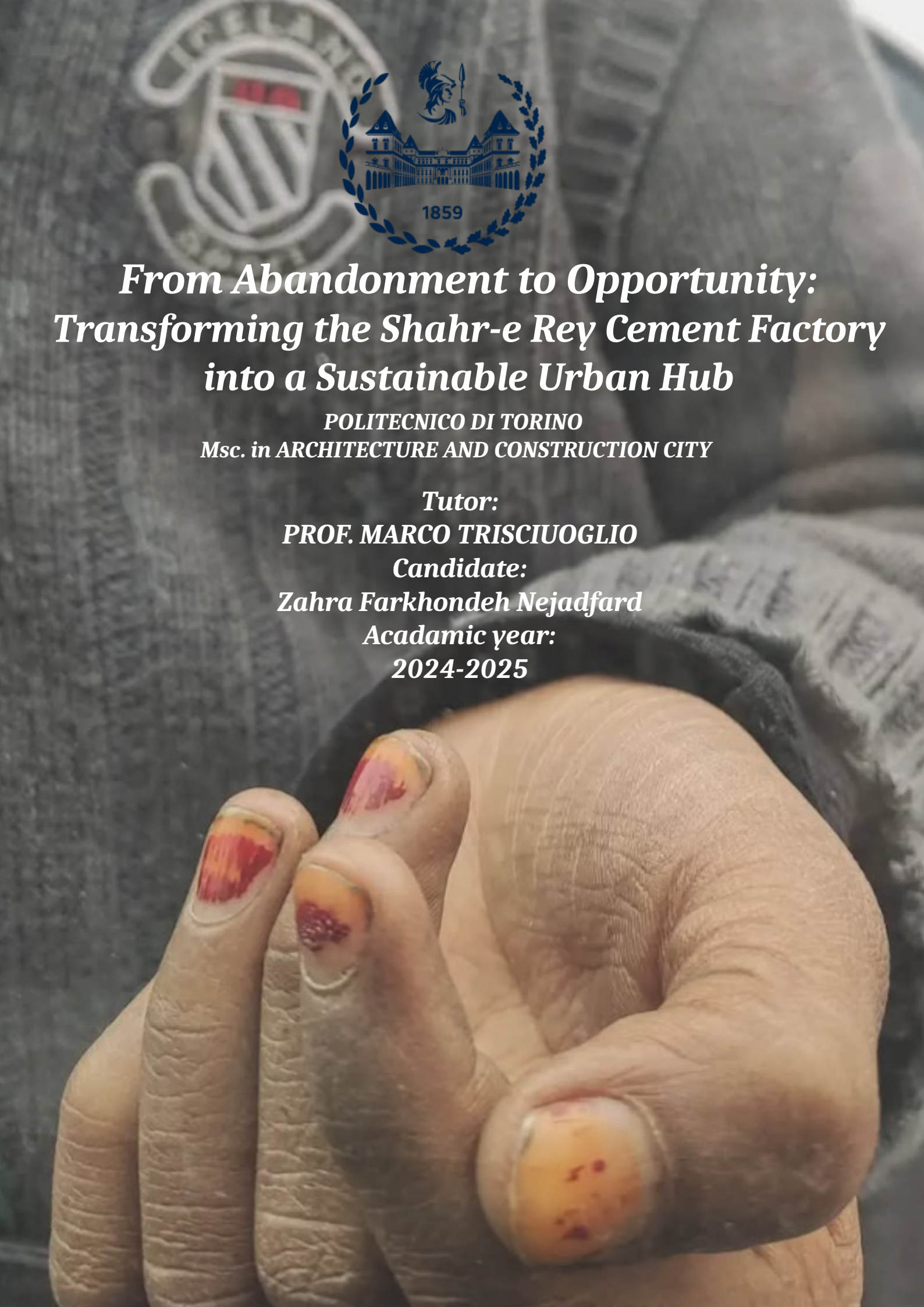

From Abandonment to Opportunity: Transforming the Shahr-e Rey Cement Factory into a Sustainable Urban Hub

POLITECNICO DI TORINO
Msc. in ARCHITECTURE AND CONSTRUCTION CITY

Tutor:
PROF. MARCO TRISCIUOGLIO
Candidate:
Zahra Farkhondeh Nejadfard

Acadamic year:
2024-2025

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Front page: Street Photography, Tehran (Source: Lmimos)

Street Photography, Tehran (Source: Lmimos)

OPENING REMARKS

The Shahr-e Rey Cement Factory in Tehran, built around 100 years ago, was the first cement factory in the Middle East. At first, it was not only a symbol of industrial progress, but also helping thousands of people to have a job, while speeding up the industrialization in Tehran. After the Islamic republic revolution it was abandoned.

Today, it works as a museum — but barely. Few people visit. It's located away in a poorly maintained part of the city, invisible, forgotten. In a part of the city that for many years was outside of Tehran, and year by year with overpopulation in Tehran, it became part of a residential and industrial area. Like many structures in Tehran, it stands as a monument to lost potential.

But to me, this factory is more than a building — it is a metaphor. I see myself in it: a body once full of promise, now struggling not to be left behind, not to collapse.

My project aims to regenerate this site into a community hub, that means a shelter and workplace for homeless people and refugees, where life can grow again with urban farming, crafts, and collaborative programs with the society and especially the university nearby.

It's an effort to bring back not only the agricultural roots of the land — for many years before the cement factory these lands where all agricultural — but also to reimagine the factory as an ambient of healing, for neighborhood, for people, and, in some way, for myself.

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to my professor, Marco Trisciuoglio, for his expert guidance, insight, and constant encouragement throughout the journey of this thesis.

I am also deeply thankful to my family and friends for their unwavering support, love, and belief in me.

Special thanks go to Diébédo Francis Kéré, whose work and philosophy have been a profound source of inspiration for me for many years, ever since my bachelor studies. I have learned a lot from his approach to architecture and community.

Finally, I dedicate this thesis to all Iranians who work hard towards building a better homeland and a brighter future.

Thank you

ABSTRACT

This thesis proposes the adaptive reuse of the abandoned Shahr-e Rey Cement Factory in southern Tehran, transforming it into a vibrant and inclusive urban hub. The factory used to be a symbol of industrialization — now, throughout this work, the site is reconceptualized into a space that fosters collective growth across physical, social, and ecological dimensions.

This project brings together university students, agricultural experts, and homeless individuals to collaborate on regenerating the land, making use of urban farming, soil regeneration, water collection systems, and sustainable reuse strategies. The goal is to establish new forms of shelter, employment, and education, while restoring dignity and opportunity to both the people and the place.

Driven by a deep academic and personal passion for Persian architecture and cultural memory, this thesis regards the factory as a microcosm — a single 'molecule' of Tehran's DNA. By healing and reintegrating the building complex into the city's fabric, the project offers a model for how forgotten industrial sites might be revitalized. The chosen architectural approach here focuses on sustainability, urban morphology, and the important role of community, reflecting a broader vision of social equity and environmental care.

All this is not merely a design proposal, but a statement of hope: that through thoughtful reuse and inclusive engagement, architecture can repair the past while shaping a more just and regenerative future for cities like Tehran.

Fall, gentle rain,
Quench the thirst of this dry earth.
Fill the hearts of these people once more
With kindness, overflowing with affection and purity.

Fall, gentle rain,
You come with love, you come with hope.
Our thirsty land
Soothe it softly, gently, with your tears.
With every drop, with every smile,
With songs like whispers of dewdrops,
Revive the lifeless tree in the garden,
Bring it back to bloom.

Fall, gentle rain,
Even in sorrow, you are beautiful.
With the restless sobs of night,
With a kiss, with a cry,
With joy, with grief again
You shower the earth with another kind of life.

Fall, O tear of the longing cloud,
For the eyes of the earth are dry.

Rain's Prayer – Fereydoon Moshiri

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"Every ruin carries a sign of hope if you have the eyes to see it."

***Kamran Diba**, Architect and Urban Designer*

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Chapter 1: Introduction

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1.2.2 Climate conditions

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Chapter 1: Introduction

1.1 Background and Motivation

From an early age, I was deeply intrigued by the richness of Persian architecture, its harmony with nature, philosophical symbolism, and deeper meaning. My previous master's degree focused on this heritage, supporting my goal to maintain and creatively renew it for people in the future.

It saddens me to see that magnificent architectural history is often ignored today. To me, this brings with it a deep responsibility to keep it alive and share its beauty and spirit with others.

The idea for this thesis emerged during my last visit to Iran, when I discovered the abandoned Shahr-e Rey Cement Factory, a forgotten industrial space that felt like a silent museum. The moment I entered, I sensed a connection that inspired me to tell its story and propose its revival through design rooted in Persian values.

I am grateful for the opportunity to pursue my studies in this field, which is a privilege not available to many, and I carry with me the hope of representing the spirit and resilience of Persian artists and architects.

May we one day walk freely and safely through all the corners of Iran, rediscovering the places built by the hands of those who never stopped believing in the future of our culture.

Methodology

This research uses a mixed method, combining various disciplines and methodologies of architectural design, social engagement, ecological systems thinking, and urban history.

1. Qualitative Research

Field observations comprise of site visits and photographic documentation of the Shahr-e Rey Cement Factory and the surrounding neighborhood.
Interviews add new perspectives to these observations. They include conversations with Tehran-based architects, professors, and social workers on urban transformation and homelessness, and with Mr. Farahahi, the museum manager, who is himself a witness to the factory's history.
Archival research dealt with the study of industrial architecture in Iran, and prior development policies in the Shahr-e Rey district.

2. Design Research

Speculative design research took architectural and landscape design proposals based on adaptive reuse, urban agriculture, and social integration.
Ecological modeling included the analysis of water circulation, soil regeneration strategies integrated into the site design.
Community-based scenarios were elaborated by visualizing how local actors, including university students and homeless residents, can participate in the site's long-term transformation.

1.2 Geographical and Historical Context

1.2.1 Geopolitical importance of Iran

The geopolitical significance of Iran comes from a complex interaction of its geographic position, natural resources, historical legacy, and contemporary political partnerships. Located at the crossroads of Asia and the Middle East, Iran shares borders with several important nations, including Afghanistan, Pakistan, Turkey, and Iraq, acting as a bridge that connects multiple cultural and economic spheres. This geographic position increased its role in trade and transit and strengthens its geopolitical significance due to the strategic corridors that pass through or near its territory, which have become key issues in local and global politics (Partowazar & Soltani, 2016).

Iran's rich natural resources further boost its regional influence. It holds some of the largest oil and natural gas reserves in the world, making it an important player in global energy markets. This has bold outcomes for its foreign relations, as countries reliant on energy imports often engage in diplomatic relationships that can afford Iran considerable advantages.(Partowazar & Soltani, 2016; Onderčo, 2014). Beside that, Iran has the ability to influence oil prices through its strategic participation in organizations such as OPEC, adding another layer to its geopolitical clout (Partowazar & Soltani, 2016).

Fig.1, World map (Source: Author)

1.2.2 Climate conditions

1.2.2.1 Iran

Iran's climate is complex and has many different aspects because of its location, land features, and the main effects of climate change. To have a better understanding of the climate of Iran, it needs a close look at different climate factors in its many regions, which show a significant range of climatic conditions, ranging from very dry to moderately dry regions (Daneshvar et al., 2019; Araghi et al., 2018). This difference is important when considering the impacts of climate change and the connected challenges that Iran faces as a mainly dry and semi-dry nation.

Iran's landscape is mostly made up of tall mountain ranges, such as the Zagros Mountains and Alborz Mountains. These mountains strongly affect how much rain falls and how temperatures vary throughout the country. The western areas get moist air, while the eastern and central areas experience a much drier climate because of orographic effects that hinder moisture-laden winds (Alizadeh et al., 2022; Araghi et al., 2018).

The Zagros Mountains effectively block the movement of humid air from the Mediterranean, and thats why there is a big difference in climate between the western and eastern parts of the country. Eastern Iran has a very dry climate, with little rain and very hot summers (Alizadeh et al., 2022; Ghaedi & Ali, 2020). The north and south however, because of being close to the Caspian sea and Persian Gulf, are more moist, warm in summer and moderate in winter.

Climate change, especially the increase in greenhouse gases from large oil and gas production, makes Iran's climate problems even worse. As temperatures rise and rainfall decreases, severe droughts are happening more often in Iran's big cities (Afsari et al., 2024; Araghi et al., 2018). This is especially worrying for managing water, because less rain causes problems for farming and food supply (Ghaedi & Ali, 2020; Nouri & Homaee, 2020).

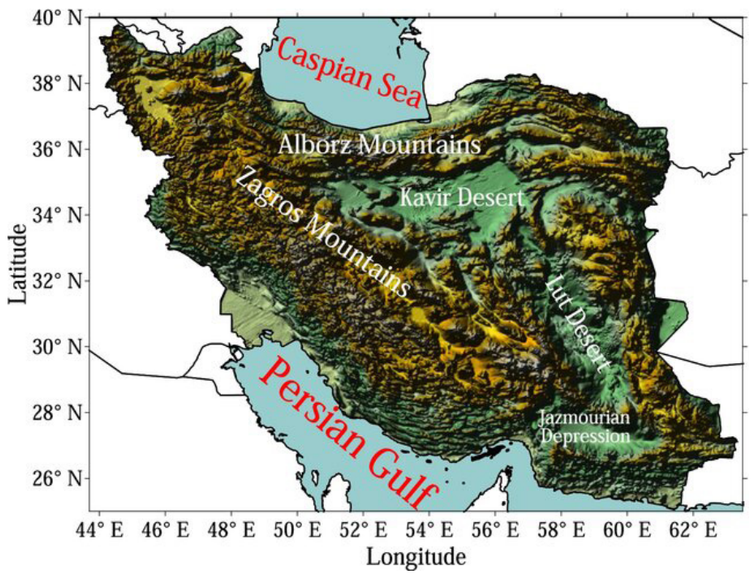


Fig.2, Iran topography map (Source: Climate zones of Iran based on Köppen-Geiger classification)

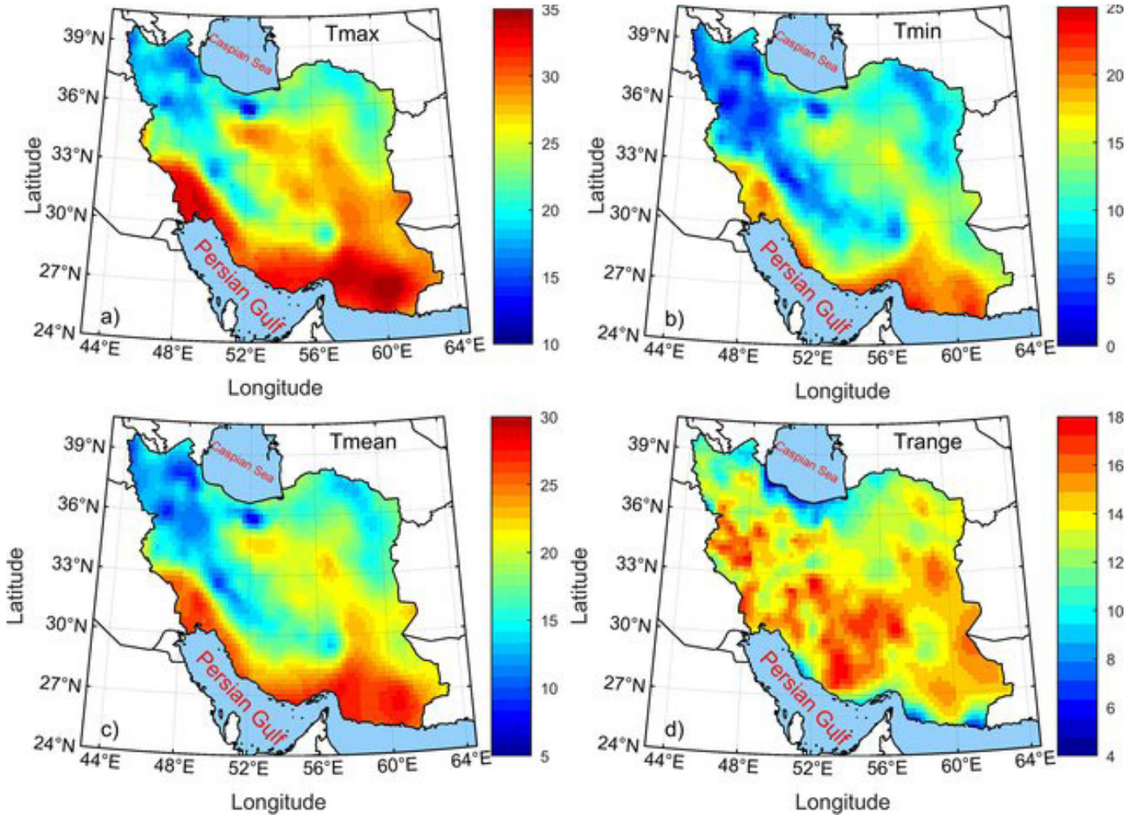
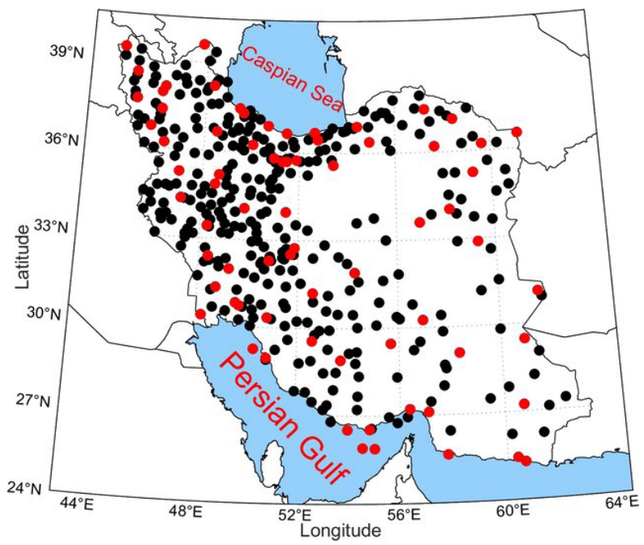


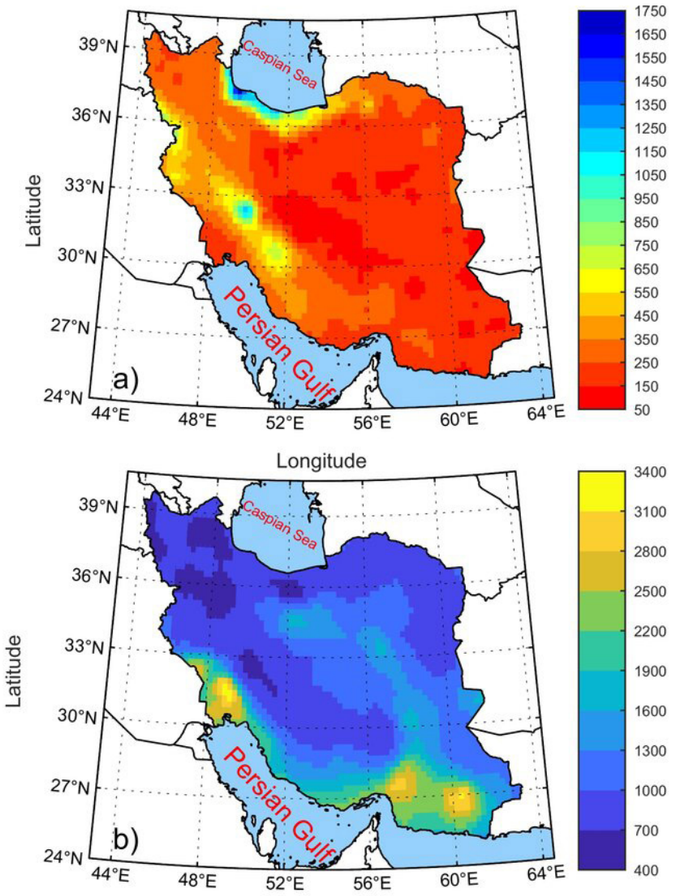
Fig.2, Iran annual temperature (Source: Climate zones of Iran based on Köppen-Geiger classification)

Spatial pattern of the long-term mean of a) annual maximum temperature, b) annual minimum temperature, c) annual average temperature, and d) annual temperature range over Iran for the period 1985–2017.



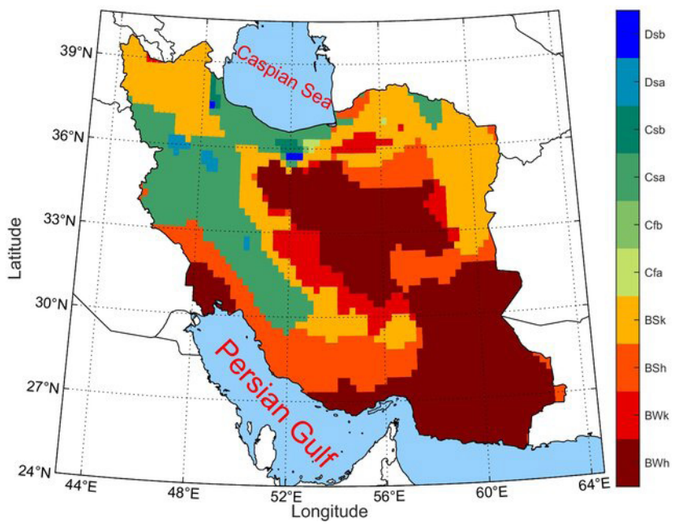
Spatial distribution of the stations used for gridding daily total precipitation and daily minimum and maximum temperatures over Iran for the period 1985–2017. The red circles correspond to 70 stations possessing data in the whole data period and the black circles denote to the stations with varying year of initial data records.

Fig.3, Distribution of meteorological stations in Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)



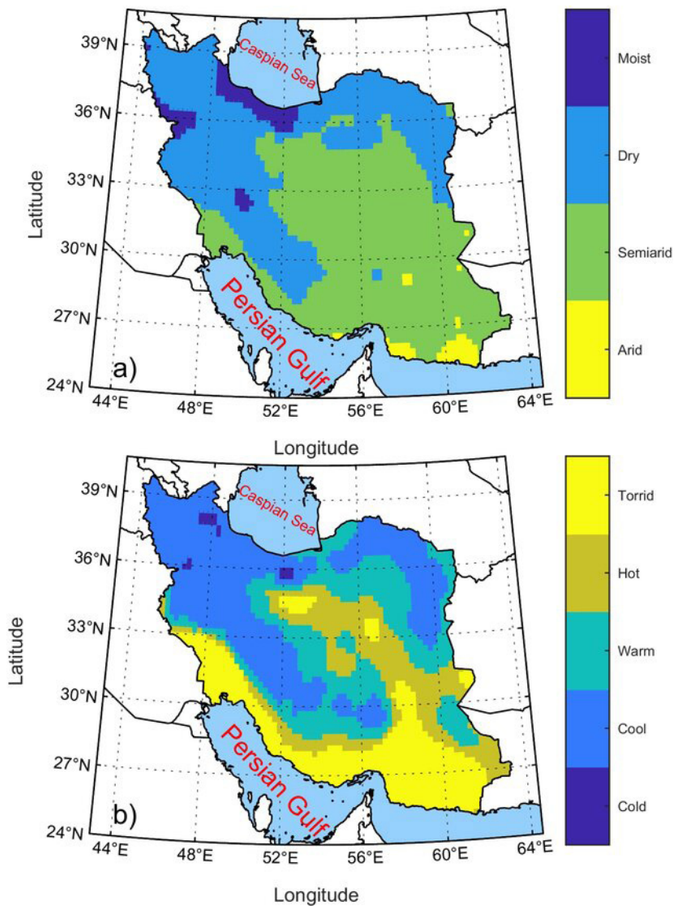
Spatial pattern of long-term mean of annual a) precipitation and b) PET (annual total potential evapotranspiration) over Iran for the period 1985–2017.

Fig.4, Mean annual precipitation and PET in Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)



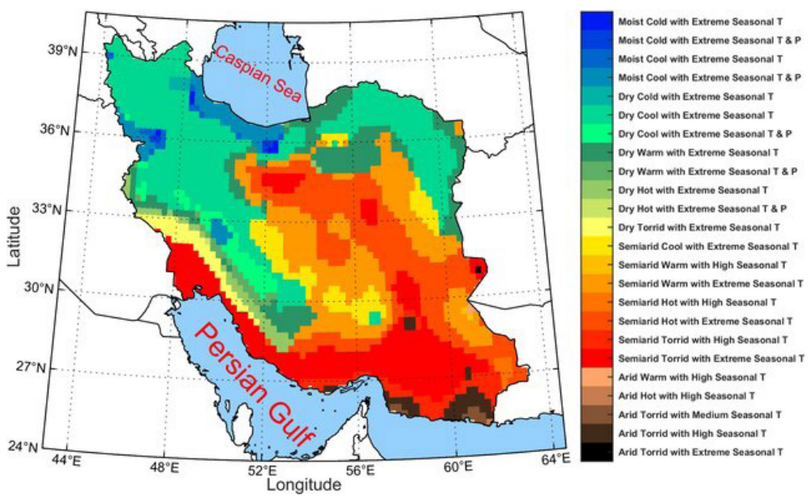
Climate types of Iran according to Köppen-Geiger climate classification, determined for the period 1985–2017.

Fig.5, Climate types of Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)



Spatial variation of a) moisture factor and b) thermal factor of Feddema's climate classification over Iran, determined for the period 1985–2017.

Fig.6, Spatial variation of the moisture factor and thermal factor across Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)

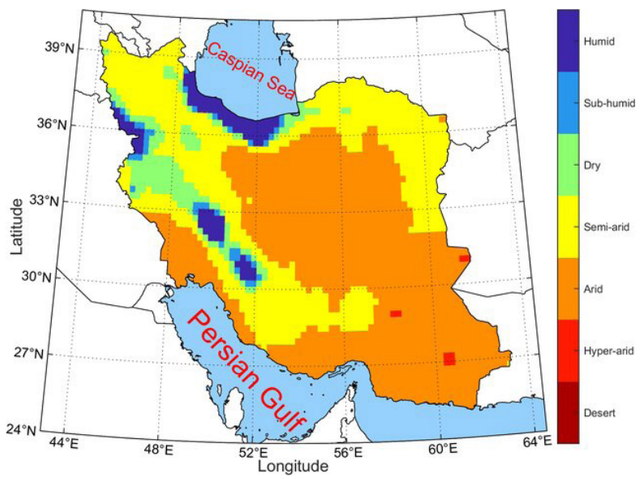


Climate types of Iran according to the exhaustive Feddema's climate classification method, determined by combining the moisture factor, the thermal factor, and the magnitude of seasonality in the variable(s) possessing the seasonality.

Fig.7, Climate types of Iran according to the exhaustive Feddema classification method (Source: Climate zones of Iran based on Köppen-Geiger classification)

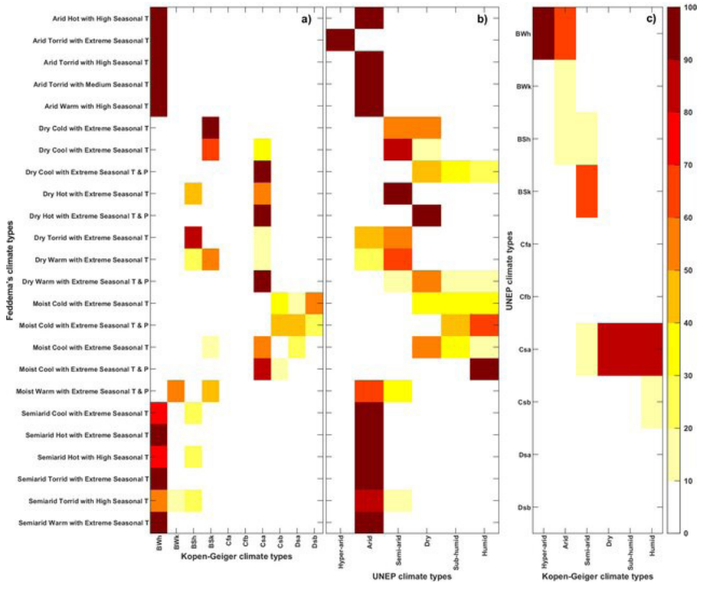
a) Climate types of Iran according to the simpler Feddema's climate classification determined by combining the moisture and thermal factors, and b) the magnitude of seasonal variation in the thermal and/or moisture characteristics, determined for the 1985–2017 period.

Fig.8, Climate types of Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)



Climate types of Iran according to the UNEP climate classification determined for the period 1985–2017.

Fig.9, Climate types of Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)



Cross-tabulations of the climate types of Iran determined by Feddema (the exhaustive approach), Köppen-Geiger, and UNEP climate classification methods

Fig.10, Climate types of Iran (Source: Climate zones of Iran based on Köppen-Geiger classification)

1.2.2.2 Tehran

Tehran, Iran's capital, has a semi-arid continental climate with clear seasons, mainly shaped by its location and landscape. This climate affects the daily lives of people in the city and has a big impact on its economy and environment (Mirzaei et al., 2019). Knowing Tehran's climate is important to tackle problems caused by climate change, especially as the city grows quickly and its population rises.

Fig.11, Iran map (Source: Author)

Mozaffar ad-Din Shah

1896–1907

Mohammad Ali Shah

1907–1909

Ahmad Shah Qajar

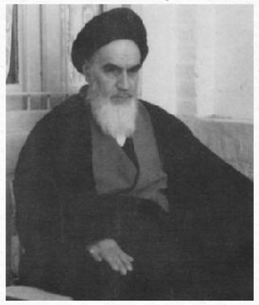
1909–1925

Reza Shah

1925–1941

Mohammad Reza Shah

1941–1979



Ruhollah Khomeini

1979-1989

Ali Khamenei

1989-Present

Qajar Dynasty

- World War I: Iran occupied by Russia & Britain
  1914–1918
- Constitutional Revolution & Constitutional Monarchy
  1905–1911

Pahlavi Dynasty

- World War II: Allied invasion of Iran, exile of Reza Shah
  1941
- Nationalization of the oil industry
  1951–1953
- 1953 Coup (CIA & MI6-backed overthrow of Mossadegh) 1953
- Iranian Revolution, overthrow of monarchy
  1979

Islamic Republic

- Iran-Iraq War (8-year war with Iraq)
  1980–1988
- Periodic protests and internal unrest
  1999–Present

Tehran has hot, dry summers and cool, humid winters. In summer, temperatures can reach over 40°C (104°F), while in winter, it decreases to around 0°C (32°F) or even lower, especially in the regions nearby mountains (Mirzaei et al., 2019). Every year, it rains about 250-350 mm in Tehran, mostly from November to March. But the rain doesn't fall evenly, causing dry periods and making water shortages issue worse (Baylis, 2017).

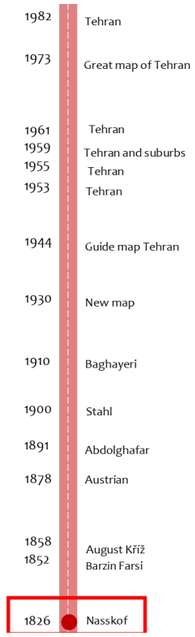
One big problem Tehran faces because of changing climate is that groundwater levels are going down. The central and eastern provinces, including Tehran, are seeing big gaps in groundwater level, losing about 1 meter each year on average.

This is worrying to everybody, because future predictions show it will get hotter and drier, making water shortages worse in a region that already has little water (Mirzaei et al., 2019). Because farmers and cities depend on groundwater, nowadays there are urgent demands for improved water management. Running out of groundwater threatens food supply and water availability in the area.

Valuable buildings of the city of Tehran, 2015. Collected by Tehran Beautification Organization.

Fig.12, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

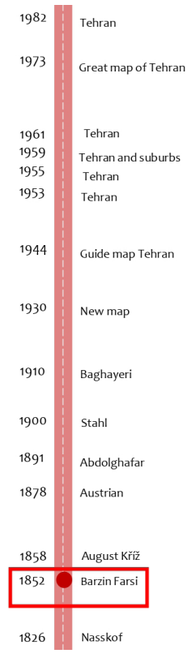
Map location relative to the current situation of Tehran city



- Made by a Russian surveying group during the late Qajar period.
- It was prepared in the year 1834.
- It is considered one of the oldest and most precise maps of Tehran.
- The city wall (fortification) is depicted in the map.

Fig.13, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

Map location relative to the current situation of Tehran city



- Cartographer: Ilya Berezin (Russian orientalist, aka Elyas Barzin)
- Date: around 1852–1853
- Era: reign of Naser al-Din Shah Qajar
- Commissioned by: Royal decree of the Shah
- Language: Russian (original), with a Persian version also available
- Printing location: Russia
- Notes: a Persian version exists: simplified, black & white, not colored

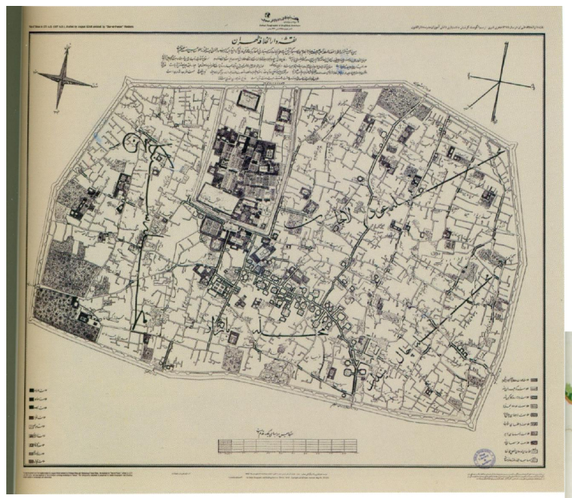
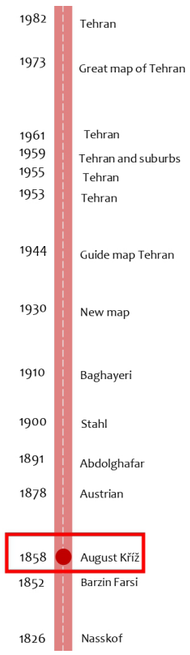


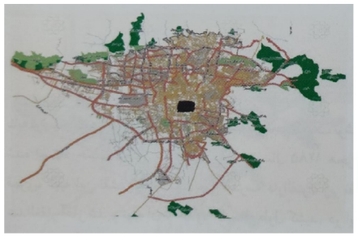
Fig.14, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

Map location relative to the current situation of Tehran city



- Created under the supervision of Prince Seyyed Nawab and notable Qajar officials.
- Collaboratively drawn with the help of Dar al-Fonun students.
- Depicts Tehran's wall and gates.
- Produced during Naser al-Din Shah's reign, in 1858.
- Written in Persian and drawn with traditional tools.
- Includes scale in Zar' (traditional Iranian unit).

Fig.15, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

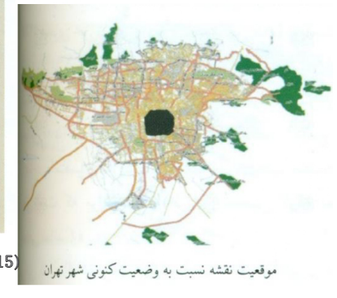


Map location relative to the current situation of Tehran city

1982 Tehran
1973 Great map of Tehran
1961 Tehran
1959 Tehran and suburbs
1955 Tehran
1953 Tehran
1944 Guide map Tehran
1930 New map
1910 Baghayeri
1900 Stahl
1891 Abdolghafar
1878 Austrian
1858 August Kříž
1852 Barzin Farsi
1826 Nasskof

- Era: Naser al-Din Shah Qajar
- Cartographers: Seven Austrian military officers
- Path surveyed:
- From Naseri Palace – Dolab – Do-Shan-Tappeh
  Through Saltanatabad – Tajrish – Evin – Vank
  Amirabad – Imamzadeh Hassan
- Scale: 1:25,000
- Language: German
- Notable contributor: one officer was of Iranian-Austrian origin
- Focus: outskirts of Tehran in Qajar era, many now part of the modern city

Fig.16, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

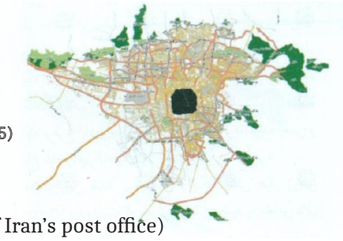


Map location relative to the current situation of Tehran city

1982 Tehran
1973 Great map of Tehran
1961 Tehran
1959 Tehran and suburbs
1955 Tehran
1953 Tehran
1944 Guide map Tehran
1930 New map
1910 Baghaiery
1900 Stahl
1891 Abdolghafar
1878 Austrian
1858 August Kříž
1852 Barzin Farsi
1826 Nasskof

- The map was commissioned by Naser al-Din Shah Qajar.
- It was prepared by engineers from the Dar al-Fonun School under the supervision of Abdolghaffar Najm al-Molk.
- The mapping process took about 20 years to complete.
- Multiple survey teams from Dar al-Fonun worked on mapping Tehran.
- The map was finalized in 1891 and reflects Tehran's urban condition as of that year.
- Known as the "Dar al-Khilafah" or "Abdolghaffar's Map."
- Recognized as the first complete map of Tehran from the Naserid era.

Fig.17, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)



Map location relative to the current situation of Tehran city

1982 Tehran
1973 Great map of Tehran
1961 Tehran
1959 Tehran and suburbs
1955 Tehran
1953 Tehran
1944 Guide map Tehran
1930 New map
1910 Baghayeri
1900 Stahl
1891 Abdolghafar
1878 Austrian
1858 August Kříž
1852 Barzin Farsi
1826 Nasskof

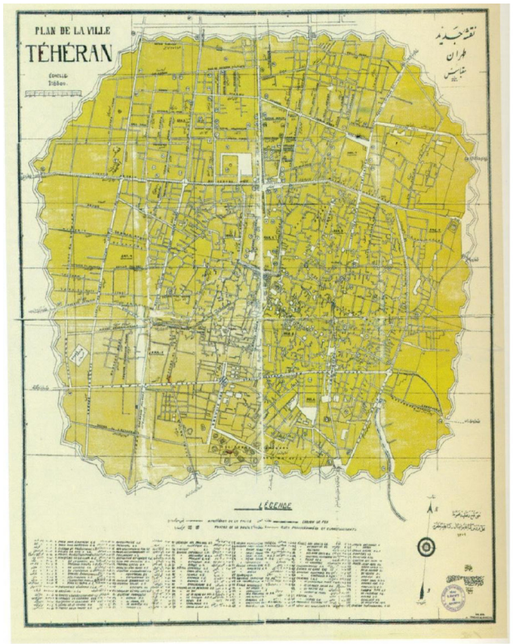
- Cartographer: Alexander Friedrich Stiehl (German, head of Iran's post office)
- Year: 1901
- Era: reign of Mozaffar al-Din Shah Qajar
- Language: German
- Scale: 1:21,000
- Tehran inside the Naserid fortification
- Many old place names within modern Tehran
- Surrounding areas outside the Naserid wall
- Qaleh Damavand in the upper right corner
- Saujbolagh in the bottom left corner

Fig.18, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

Map location relative to the current situation of Tehran city

1982 Tehran
1973 Great map of Tehran
1961 Tehran
1959 Tehran and suburbs
1955 Tehran
1953 Tehran
1944 Guide map Tehran
1930 New map
1910 Baghayeri
1900 Stahl
1891 Abdolghafar
1878 Austrian
1858 August Kříž
1852 Barzin Farsi
1826 Nasskof

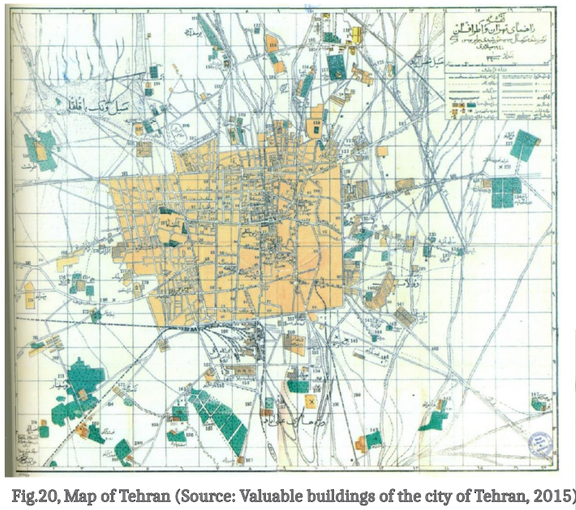
- Made by Abolghasem Mo'nes Baghayeri in during Ahmad Shah Qajar's reign.
- Based on previous walking route surveys for postal roads between Tehran and Rey.
- Covers key locations: Shah-Abad, Dowlat Gate, Bagh Shah, Amir-Abad, and the old citadel.
- Scale: 1:20,000; distances marked in farsakh (6 km) and half farsakh units.
- Includes detailed info on qanats and names of landowners.
- Focuses on southern Tehran, which was more significant at that time.

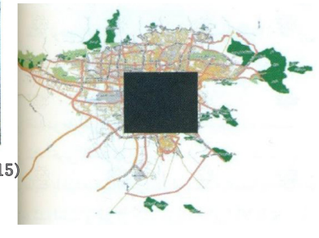


Map location relative to the current situation of Tehran city

Fig.19, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

- Cartographer: Francis Dumoulin (French)
- Year: 1930
- Location of creation: France
- Languages: Persian & French (bilingual)
- Scale: 1:6,500
- Features:
  - Depicts Tehran inside the Naserid fortification
  - No street names shown (intentional omission)
- Contains notes on elevation and terrain at the bottom

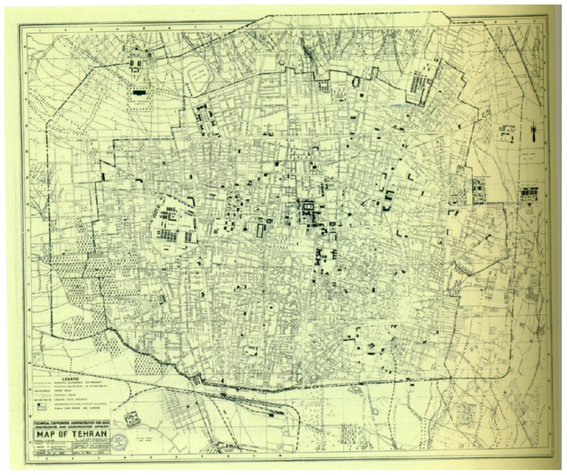




Map location relative to the current situation of Tehran city

Fig.20, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

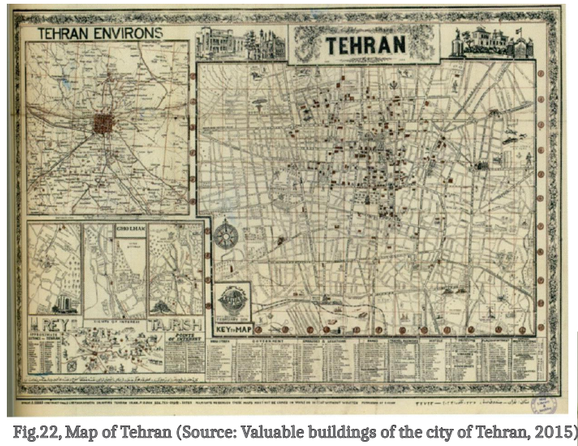
- Printed by the Army Printing House.
- Cartographer: Colonel Mohammad Reza Atafi.
- Year: 1944
- A guide map of Tehran and surrounding areas.
- Scale: 1:30,000.
- Guide map Tehran
- Written in Persian.
- Illustrates Tehran's condition and urban layout at that time.



Map location relative to the current situation of Tehran city

Fig.21, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

- Year: 1953
- Prepared by: Engineering Division of the Point Four Program
- Base map by: Army's Geographic Department
- Shows Tehran's urban boundary in 1953
- Predicts suburban boundary for 1981



Map location relative to the current situation of Tehran city

Fig.22, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

- During Mohammad Reza Shah's era.
- Produced by the Sahab Geographic Institute.
- Shows Tehran, Karaj, Shemiranat, and Rey together on one sheet.
- Uses visual symbols for data representation.
- Includes cartographic decorative elements.

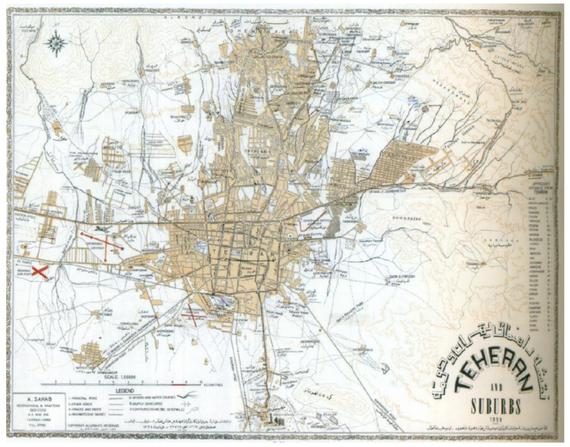
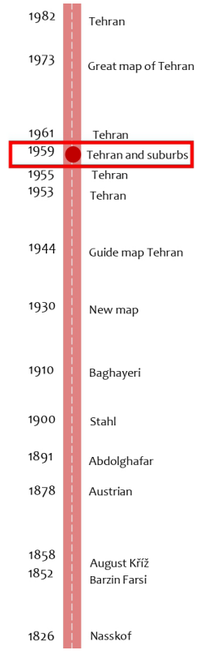


Fig.23, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

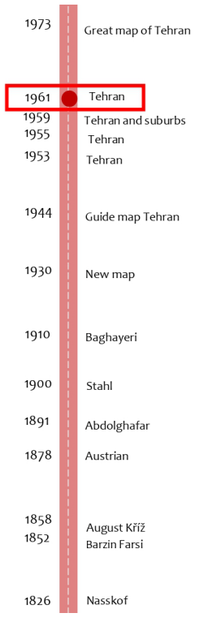
Map location relative to the current situation of Tehran city



- Reign: Mohammad Reza Shah Pahlavi
- Produced by: Sahab Geographic and Cartographic Institute
- Scale: 1:15,000
- Features:
  - Highlights built area by showing them with darker color
  - Uses color coding to show population density
  - Reveals Tehran's social-spatial structure
- Languages: Persian with English place names

Fig.24, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)

Map location relative to the current situation of Tehran city



- During Mohammad Reza Shah's reign.
- Prepared by the Sahab Geographic and Cartographic Institute.
- Scale: 1:15,000.
- Bilingual: Persian text with location names also in English.

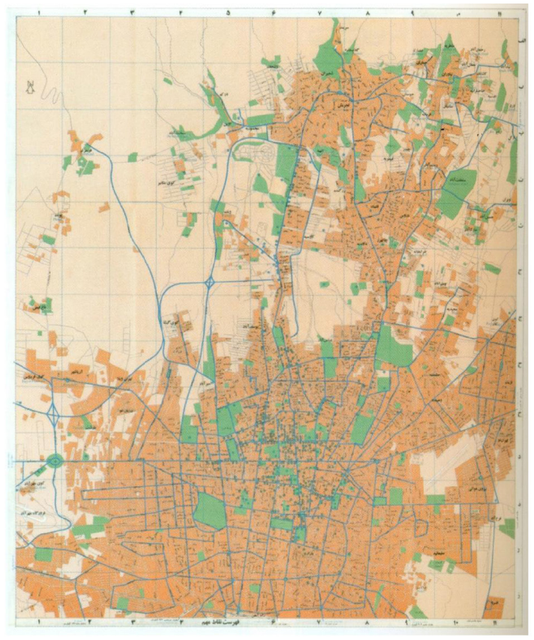
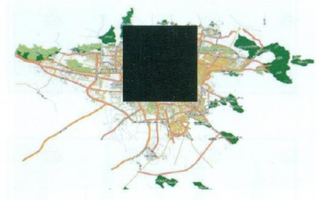
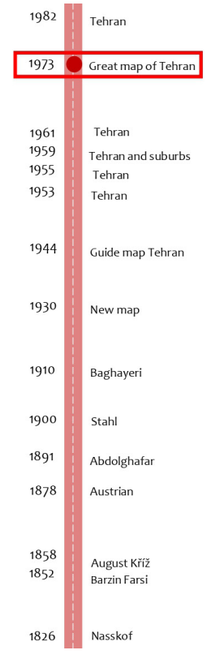


Fig.25, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)



Map location relative to the current situation of Tehran city



- Scale: 1:250,000
- During the reign of Mohammad Reza Shah Pahlavi, a time marked by rapid modernization and expansion in Iran, especially in Tehran.
- Based on a foundational map prepared earlier by the Geographical Department of the Army Headquarters, indicating a formal, possibly strategic approach with military-grade cartographic accuracy.
- Tehran was undergoing intense urban transformation due to oil revenues.
- There was a growing emphasis on infrastructure, military logistics, and central planning.
- Urban sprawl was becoming a pressing concern, hence the interest in projecting future boundaries.

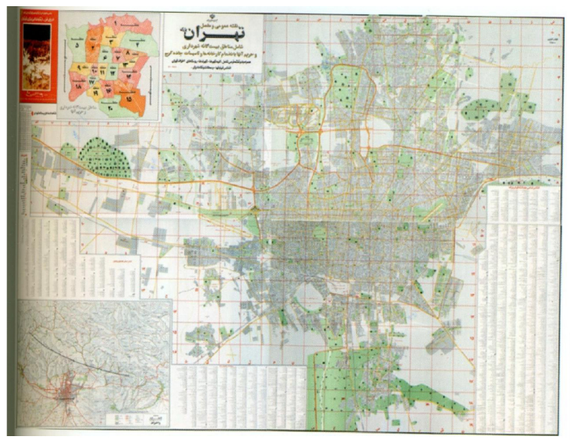
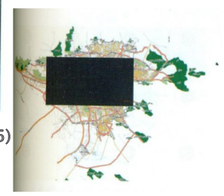
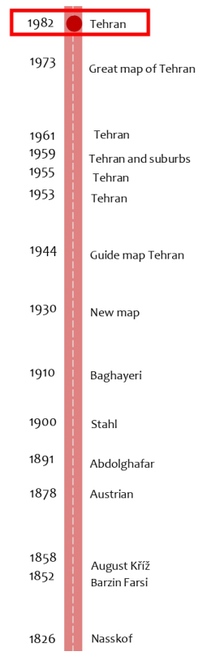


Fig.26, Map of Tehran (Source: Valuable buildings of the city of Tehran, 2015)



Map location relative to the current situation of Tehran city



- During the Islamic Republic period.
- Produced by the Geographical and Cartographic Institute of Sepah.
- Written in Persian.
- Contains:
  - A general map of Tehran.
  - A guide to interpreting the map.
  - A separate map of Tehran's outskirts and suburban zones.

Tehran urban area evolution
from 1892 to 2025

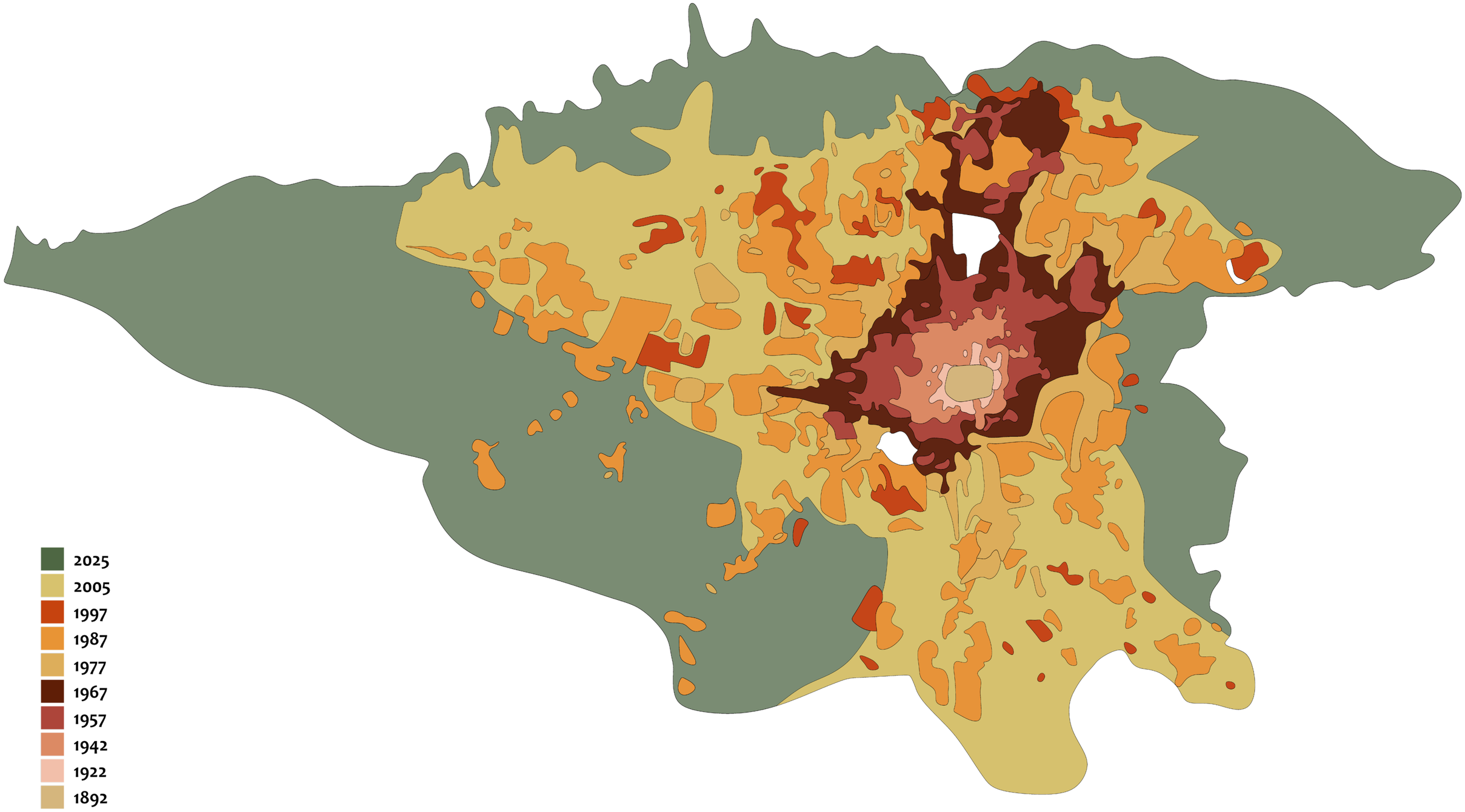


Fig.27, Evolution Map of Tehran (Source: Author)

1.3 Local Context: District 20 – Shahr-e Rey

1.3.1 Rey city and District 20's historical layers and morphology

Background and Historical Transformations of the City of Rey

District 20 is in the southern part of Greater Tehran. The city of Rey, located there, is one of Iran's most important places for archaeology and history, not only in Iran but also in the region and worldwide. Even the history of Rey goes back to before Islam and is considered one of the oldest continuously lived-in cities on the Persian plateau. It is often called the 'mother of Tehran'. The city started near the Ali Spring (Cheshmeh Ali), where many ancient ruins and cultural sites still remain.

In the past, Rey was a rich and important city. Islamic scholars such as Yaqut al-Hamawi wrote that Rey had twelve gates during the Islamic period, underlining how relevant and strategic it was. In a map drawn by Jean Chardin during the Safavid era, the sacred spring of Rey stands out: it is shown surrounded by old buildings that were once used for both religious and public purposes.

In the table on the right, Rey's history from first records until the present is summarized.

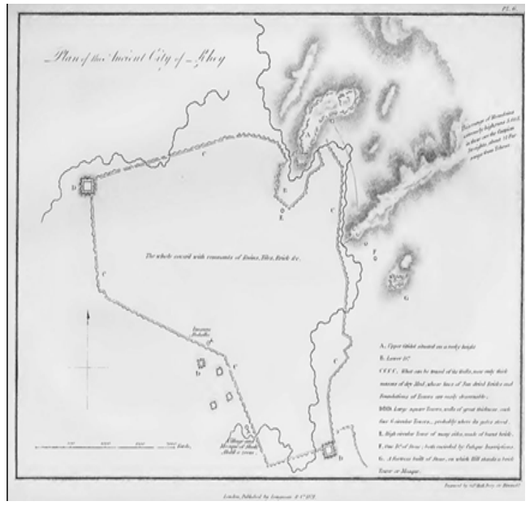


Fig.28, Rey wall (Source:Rokn al-Din Hejazi, 1354)

Map of Rey drawn during the Qajar era, showing the city during the reigns of Shah Abdul Azim and Amir al-Mu'minin. Important features are labeled below:

A, B: Rey's wall and city fortifications
C, D: Ruins of ancient towers
F, G: Locations of the old citadel

Other notes mark the location of the telegraph station, stone bridge, and the shrine of Abdul Azim.

Approximate AD Era	Historical Period	Description
Before recorded history / Prehistory	Mythical and Legendary Foundation	Linked to Adam or the legendary king Pishdād and his family, or to Noah's son and his descendants.
Ancient times, varies (around 2000 BCE - 500 BCE)	Mentioning in the Torah	Referred to as 'Raghes' or a similar name.
~678–549 BCE	Medes	Rey was part of the territory of the Medes (circa 705–625 BCE).
550–330 BCE	Achaemenids	During the Achaemenid period, Rey was on the royal road that linked Hamadan, Rey, and Susa.
312–63 BCE	Seleucids	After an earthquake, Seleucus I Nicator rebuilt the city and named it 'Europos' after his homeland.
247 BCE–224 AD	Parthians	The Parthians made Rey their political and military center and capital.
224–651 AD	Sasanians	The Sassanid dynasty ruled from Ctesiphon, located in present-day Iraq, but Rey stayed an important place to them. In the 3rd century CE, Rey had fires and was damaged, but it remained important.
Rashidun: 632–661 AD, Umayyads: 661–750 AD	Caliphate of Rashidun and Umayyads	Muslims took over the city during Caliph Omar's rule. After some fighting, they reached peace with the locals.
750–1258 AD	Abbasids	The Mahdi Caliph visited Rey in 758 AD. Quran written records were destroyed, new mosques were built, and battles were fought with the Khwarij.
819–999 AD	Samanids	Rey was reconquered from the Saffarids in 910 AD.
934–1062 AD	Buyids	Rey became a big and important city. Many buildings and monuments were constructed.
977–1186 AD	Ghaznavids	Mahmoud of Ghazni took control of Rey from the Buyids.
1037–1194 AD	Seljuks	Tughril the first made Rey the capital in 1051 AD. His tomb is still there today.
1077–1231 AD	Khwarazmian Dynasty	Shah Muhammad of Khwarazm attacked and looted Rey. His son, Sultan Jalal al-Din, killed many people, and the city became less important.
1501–1736 AD	Safavids	Shah Ismail Safavi rebuilt Rey in 1582 AD. The shrine of Shah Abdul Azim became more well-known.
1789–1925 AD	Qajars	In this era Tehran became the capital. The tomb complex of Shah Abdul Azim was made bigger and better.
1925–1979 AD	Pahlavis	Rey got more modernized, with new streets and neighborhoods such as the Rey Bazaar and the Rah Ahan area growing over time.
1979 AD–present	Islamic Republic	The shrine was expanded to be bigger, new religous schools were built, and the city started growing and joining with metropolitan Tehran.

Fig.29, City of Rey timeline (Source: Khani,sh 2016)

Fig.30, Ossuary Holders (Source: Destination Iran)

Rey wasn't just known for its religious importance; it played strong political and military roles as well. The Old Bazaar, protected by walls and home to the Royal market place or Shah's market, was a major center for trade and government affairs. Rey had four main city gates, each facing an important part of the country. The Abdul Azim Gate, in the southeast, led straight to the holy shrine of Shah Abdul Azim.

Rey faced big changes during the time of Nasser al-Din Shah of the Qajar dynasty. As Tehran grew and more people moved in, Rey's historical city walls were expanded to connect with Tehran's 12-gate wall.

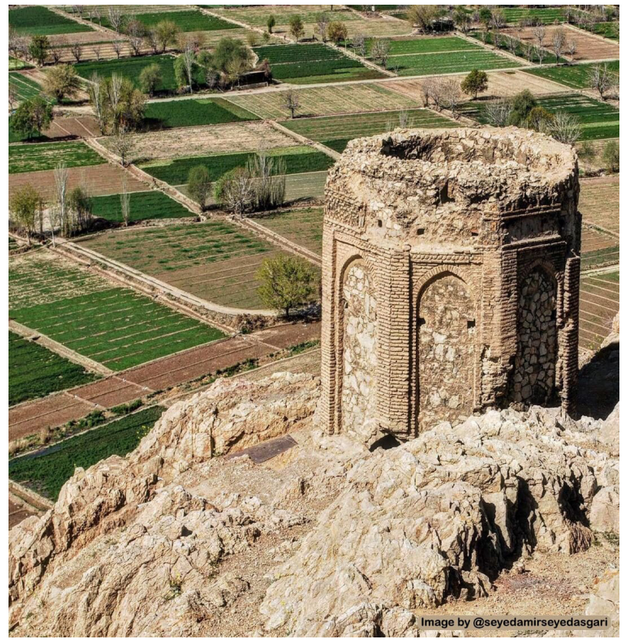


Fig.31, Naqqareh House Tower of Rey (Source: Destination Iran)

This marked the beginning of a new chapter in the city's expansion and its connection to the capital. When the railway came, it completely changed how the city was shaped and connected.

Fig.32, Remainings of a column (Source: ITTO, Iran Tourism and Touring Organization)

Rey Square became the new entry point for visitors, marking a move away from the old gate system toward a more modern, transportation-based city layout. (Jahan Sanat, 1392 [2013]).

"Tehran is a city where a thousand stories sleep within,
one must listen, not just look."

Masoud Kimiai, Film Director

Chapter 2: Site History and Urban Challenges

2.1 Historical and Urban Context

2.1.1 History of the Shahr-e Rey Cement Factory

2.1.2 Evolution of Shahr-e Rey’s urban fabric

2.1.3 Industrialization and fringe belt development

2.1.4 Migration and emergence of informal settlements

2.2 Urban Challenges

2.2.1 Environmental issues in slum neighborhoods

2.2.2 Urban regeneration difficulties in megacities

2.3 Case studies

Chapter 2: Site History and Urban Challenges

2.1 Historical and Urban Context

2.1.1 History of the Shahr-e Rey Cement Factory

Shahr-e Rey Cement Factory

The Shahr-e Rey Cement Factory has a foundational level in the industrial history of Iran as the country's first cement production system and one of the earliest large-scale industrial sites of the modern era, even in the Middle East. Built during the reign of Reza Shah Pahlavi, the factory is a symbol of the beginning of industrialization in Iran and represents the country's early steps toward modernization. Officially opened on December 28, 1933, the factory marked the beginning of local cement production, cooperating and working for the urban and infrastructural development of Tehran and the regions around.

The Origins of Cement Production in Iran

Because of Iran's geographic and geological conditions, especially the mountainous areas, local cement production remained difficult for a long time. Although, with the country's growing need for cement in the early 20th century, the government decided to establish its own production facility in 1927. This decision was both a useful move and a powerful symbol of Iran's push for industrial independence.

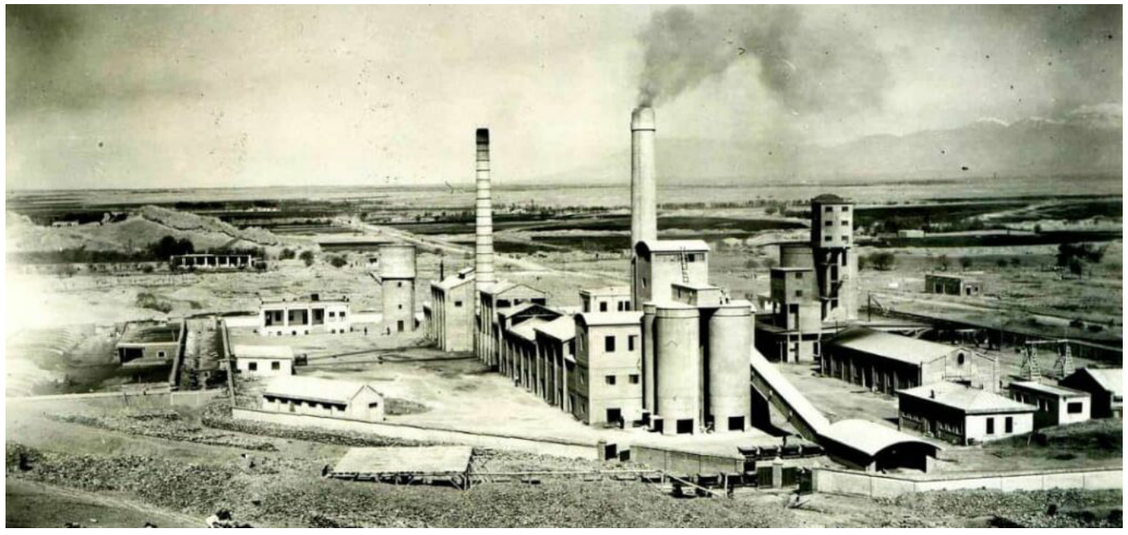


Fig.33, Cement factory urban view (Source: Ciritci, I., & Shadnia, S.)

International experts carried out studies and technical reviews to see if the project was realistic and workable, and finally, on October 31, 1928, an official agreement was signed to start building the Rey Cement Factory. A British company, F.L. Smidth, helped the project. They gave machines and technology worth 2,690,000 rials. At first, the factory was made to produce 100 tons of cement each day. They started building the factory in the year 1930, after they bought the land, and paying local owners, as well as getting permission from the government. One of the reasons they chose the Rey area was because it was close to limestone-rich hills and mineral resources, which are important for cement manufacturing. By August–September 1932, the first part of the factory was finished. On December 28, 1933, Reza Shah opened the factory in a special event himself. Later on, the factory was extended to three production lines and many other buildings. It became one of the most important factories in the area.

The factory was important for the early growth and modern changes in Tehran. It helped the economy and also changed how the city grew. Today, the Shahr-e Rey Cement Factory is known as one of the first industrial heritage sites in Iran, and the Middle East. It is officially listed because of its history and architecture (Jahani-Ghazi, 1380 [2001]).

Geographical Location of the Shahr-e Rey Cement Factory

The cement factory is in the northeast part of old Rey city, inside District 20 of Tehran municipality. The site was chosen carefully because the ground and resources around were suitable, and there were a lot of raw materials in the nearby mountains. It was a good spot for making cement on a large scale. The location also made it easy to send cement to Tehran. This helped with the fast building in the city during the Pahlavi modernization time.

Fig.34, Inauguration of Rey (Source: Ettela'at newspaper dated December 28, 1933)

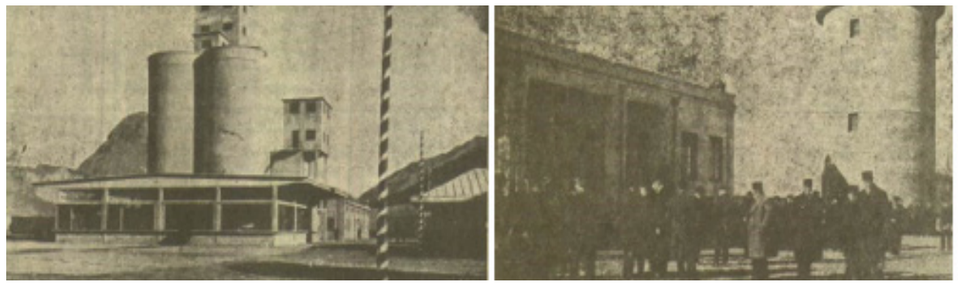


Fig.35, Inauguration of Rey (Source: Ettela'at newspaper dated December 28, 1933)

Fig.36, View of the cement factory (Source: Ettela'at newspaper dated December 28, 1933)

Location of the Cement Factory

The cement factory is located close to Ma'dan Street, Ibn Babawayh Street, and Sasanian Square (also called Gate of Enqelab Square), covering 87,358 square meters of land. Safaiieh Square is northeast of the factory and links the east and southeast to Shahrbanu Hill. Ibn Babawayh Boulevard is on the north side of the factory. The south side of the factory touches the old city of Rey. On the north and east sides, there are gardens and farms around it. The city's water canal is east of the factory and passes through the area.

Original pictures of factory workers during the time of cement production

Fig.37, Pictures of workers (Source: Author)

Introducing existing historical monuments along the main axis and urban structure of Rey

Old Rey Citadel (Hesar-e Qadim-e Rey)	One important Islamic monument was on a hill made of many layers from the old city. The citadel was from the Abbasid time and was one of the main forts in old Iran. Some experts think that this place is where the Shrine of Shah Abdul Azim al-Hasani is now. Others say the citadel was on that hill. Mehdi Malekzadeh says the citadel is from 12th century AD, based on excavations. It was destroyed by the Mongols in 1241 AD and was never rebuilt. Later, a cemetery was established there (Source: Negahban, 2002).
Rashkan Castle (Qal'eh-ye Rashkan)	It is near the "Safah" neighborhood, south of Rey, close to Ali Spring. This place was a military fort that helped protect Rey from enemies. From the building style and objects found there, experts say it is from the Parthian time. Even if some parts are broken because of time and earthquakes, still it can be seen what is left. It was mostly built with stone and mortar. People regard it as a military and defense place.
Toghrol Tower	This monument is from the Seljuk time and was built by Sultan Tughril. It is 20 meters tall and has a round shape. The building is still standing today. Experts think it was used as Sultan Tughril's tomb. Some archaeologists also say it worked like a solar clock, because the light and shadows inside show the time.

Fig.38, (Source: Khani.sh 2016)

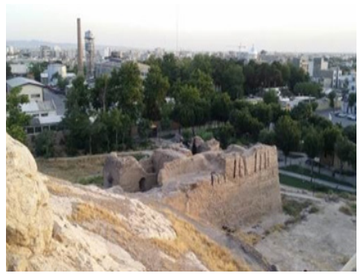


Fig.39, (Source: Khani.sh 2016)

Fig.40, (Source: Khani.sh 2016)

Qajar Caravanserai	The Qajar caravanserai in Dolat Square is one of the few left in Iran. It was built in the Qajar time with two floors. It has two main parts, each around a courtyard. People also call it the Abbasabad Caravanserai. It was used by travelers and merchants for staying and keeping goods. Later, the building was used for city services and was active until a few decades ago. Because of its design and location near Rey's old bazaar, it was important for trade and the city's economy.
Abbasi Caravanserai	This caravanserai is next to the shrine of Shah Abdul Azim and it opens to the shrine's yard. It was used as a market and is from the Safavid time. It has a large yard with rooms around it, where traders and craftsmen at the time stayed and worked. It was one of the main places for trade and where merchants came together.
Cheshmeh (spring) Ali	This spring flows from a large rock and then the south. Ali Spring is one of the oldest and most important natural places in Rey. Old texts from the Sassanid and early Islamic times mention it by the name 'Cheshmeh Ali'. Because it always had water and was in a practical place, it helped with the city's water system, and this climate water is really sacrade. It also has religious meaning: it is written about in pilgrimage paths and old records as a healing place. Archaeologists found writings and objects from different times near the spring.

Fig.41, (Source: Khani.sh 2016)

Fig.42, (Source: Khani.sh 2016)

Fig.43, (Source: Khani.sh 2016)

Bi Bi Zubayda Tomb	This tomb is in a high land area in Hossein Abad, Tehran, near a street in Rey, west of the Kahrizak Cement Factory. Local people say it belongs to Bi Bi Zubayda, but old texts do not prove this. The building itself is not very old, but it is said that it was built on an older grave from many years ago. It stands on a rock base and has been rebuilt many times. The building architecture itself is simple, but it is important for local history.
Shah Abdul Azim Shrine	This shrine is for Hazrat Abdul Azim al-Hasani, a family member of Imam Hasan ibn Ali. He came to Rey during the Abbasid time. The shrine is from the 14th century AD, and it contains wood and tile decorations. Some Kings like Nasser al-Din Shah Qajar ordered repairs and new tiles. In the Safavid time, more religious buildings were added. Today, it is one of the main holy places in Tehran and a spiritual center for many muslims.
Ibn Babawayh Tomb	This tomb is on Ibn Babawayh Street, named after Sheikh Saduq (also called Ibn Babawayh), a famous Shiiaa scholar buried in Rey. He was an important religious teacher in the 16th century and wrote many books, like Man La Yahduruh al-Faqih. The cemetery also has graves of known people like Ghaem Magham Farahani and some activists from the constitutional time. The place was expanded during the Pahlavi period.

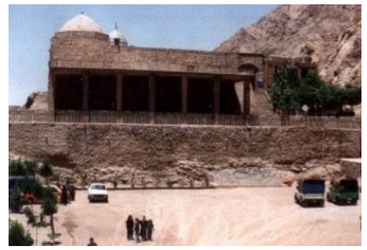


Fig.44, (Source: Khani.sh 2016)

Fig.45 (Source: Khani.sh 2016)

Fig.46 (Source: Khani.sh 2016)

Shrine of Bi Bi Shahrbanu	This shrine is on the side of Mount Gharin and has the same name. People say Bi Bi Shahrbanu was the wife of Imam Husayn and the mother of Imam Zayn al-Abidin. Her main tomb is in this shrine in Rey. Archaeologists claim people have prayed here for more than 1100 years. It is in the south part of the city, in a place called Bi Bi Shahrbanu, about 5 km from the city center.
Imamzadeh Abdullah	Imamzadeh Abdullah is one of the most visited shrines in Rey. It has many graves from the Qajar time and later. There are several domes and tomb rooms with decorations. The tiles and calligraphy are important in the building's design. People from Rey and other places regard it as a holy place. Because of its history and the famous people buried there, it became a national heritage site in Iran in 1999.

Fig.47 (Source: Khani.sh 2016)

Fig.48, (Source: Khani.sh 2016)

2.1.2 Evolution of Shahr-e Rey's urban fabric

Location of the Factory in Relation to Historic and Cultural Landmarks

The Shahr-e Rey Cement Factory is in a special location inside the old city of Rey. It is close to many historical and architectural sites. The factory's location shows that it was a practical choice for industry, but also placed it in a cultural area. It shows how new industrial work and old history can exist side by side.

To the east, the factory is located close to two old mounds and the ruins of Rashkan Fortress, an important archaeological site from the Parthian time. It helps understanding the military and city history of old Rey. To the north, the factory is near Toghrol Tower, a famous monument from the Seljuk time and one of the main symbols of Rey. The tower is easy to see and important for culture, which makes the area around the factory even more valuable in history. To the south, the factory is close to the Shah Abdul Azim Shrine, one of the most important religious and pilgrimage places in south Tehran.

Close to the factory are the Abbasi Caravanserai and a busy area with shops and religious places. Together, they create a culturally rich part of the city that is still important for both spiritual and economic life. Being in the south and close to famous heritage sites makes the factory area easier to reach and better for tourism.
The factory is at the south edge of Rey, near the Kahrizak Cement Complex. This puts it into a larger area that mixes old industry, historic buildings, and the city's past memories. Having the Shahr-e Rey Cement Factory next to these cultural sites gives a special chance to reuse it in a new way. It can help connect the old industrial past with the modern city and culture of Rey.

Fig.49, Important historical sites (Source: Author)

Viewscape and Environmental Context of the Factory Site

The Shahr-e Rey Cement Factory is in a special natural and historic area. The view around it is defined by hills, water paths, and the edge of the city.

On the northeast side, the factory faces Sasanian Hill, an elevated location of archaeological relevance. It can be seen clearly from the factory's southwest side. The hill improves the view and connects the factory to Rey's historical roots.

To the east and southeast, Bi Bi Shahrbanu Hill is in the field of view as seen from the higher parts of the factory. This hill is important in terms of religion and stories. It being visible from the factory shows how in the same place industry and culture coexist in Rey.

The city of Rey further spreads to the south and west of the factory. This creates a boundary between the factory and the modern city. On the other hand, hills and farms to the north and east keep a more natural and village-like atmosphere in comparison to the busy city side.

The Sorkheh Hesar Canal adds to the site's natural value. It is an old water path from the Sasanian Hill area, passing along the east side of the factory and helps with the water flow. This canal can prove useful in future plans to reuse or advance the area.

All these important places and features constitute a special belvedere and ambient around the Shahr-e Rey Cement Factory. They show that the factory is part of both nature and culture, and its relevance as an old industrial site and good place for future city renewal.

Fig.50, Viewscape from the factory (Source: Author)

The Cement Factory's Important Location on Rey's Main City Line

Studies of history and city shape show that Rey's main structure follows a clear line. This line starts in the south of the old city, near Sasanian Square, and goes southeast through the Ibn Babawayh area. This line links many important historical and cultural places. Together, they form a path that has helped shape how the city of Rey was built and changed over time.

This main street was not only for moving around. It also helped shape the city's structure, guiding how old and new parts of Rey were planned and built. Today, city planners call this route the main structure line of Rey. It helps decide where major roads, services, and public buildings should go. Going north on this old city line, it passes important cultural and religious places such as the Shrine of Shah Abdul Azim. Then it passes by Bi Bi Shahrbanu Hill and the Ibn Babawayh area, and finally reaches the north industrial part of Rey, where the Shahr-e Rey Cement Factory is.

Choosing Iran's first modern cement factory at the north end of this line is very important. The factory's place follows the old shape of the city and brings it into the modern industrial area. This shows that this kind of planning was done on purpose: it meant to connect industry with the city's old structure and roads. The factory is also close to main roads like the Tehran–Qom Highway. It is also near important sites like the Rey Hospital and the energy distribution networks of Tehran. This connects it even better to the city's larger system.

Besides good transport links, the factory is easy to reach, easy to see, and big in size. These aspects make it a strong symbol in the city. Its placement shows a clear link between Rey's old layout and its modern growth. As said by Mehraban Consulting Engineers (1381 [2002]), this smart location makes the factory useful now and also gives good opportunities to reuse it in new ways. The factory has strong potential to connect history, old industry, and future city renewal.

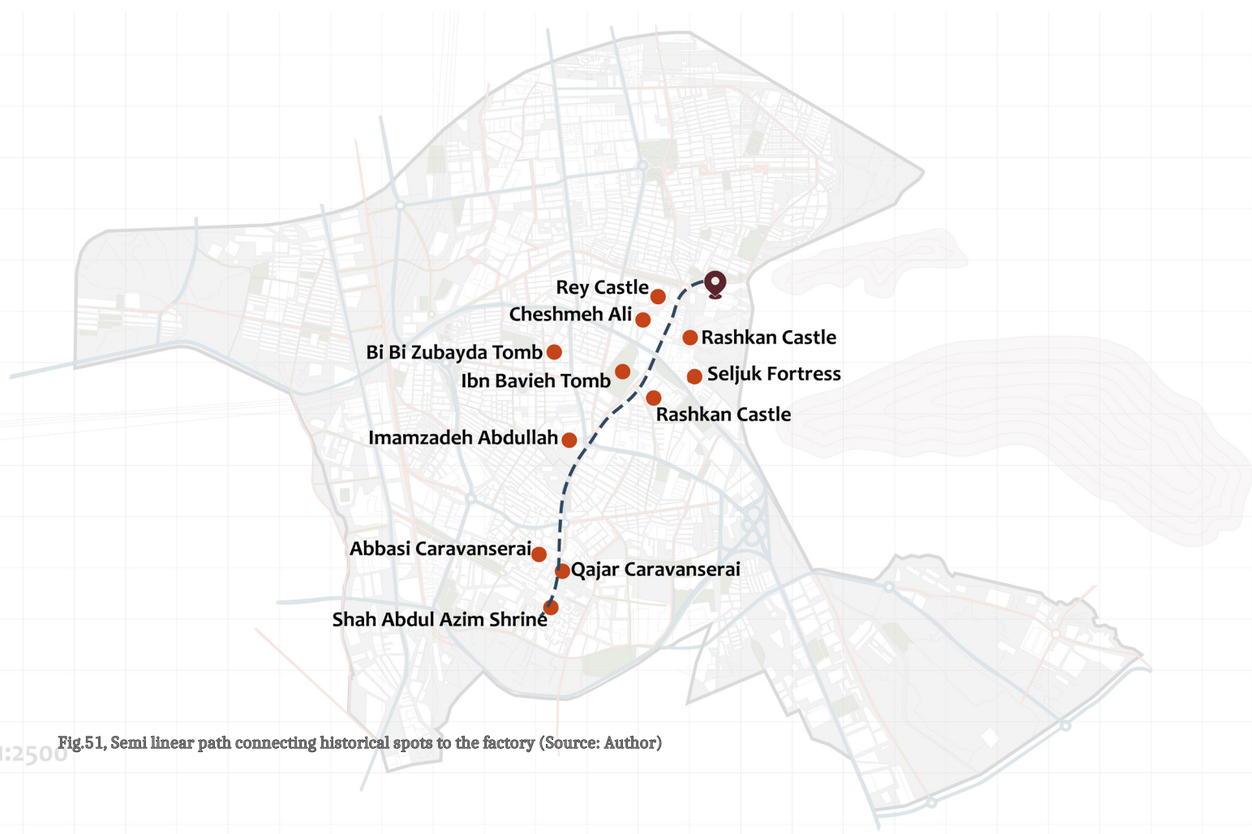


Fig.51, Semi linear path connecting historical spots to the factory (Source: Author)

2.1.3 Industrialization and fringe belt development

The fringe belt idea results from the fact that cities don't grow evenly. A city grows in steps — residential areas spread out, then stop for a while, and then grow again.

A fringe belt forms at the edge of the city when the city is not growing or growing very slowly. It usually has open spaces like parks, sports fields, public service areas, and land around schools or other institutions (Whitehand 2007a, b). In his study of Alnwick, Conzen found three fringe belts: one inner, one middle (both inside the city), and one outer belt at the edge of the town.

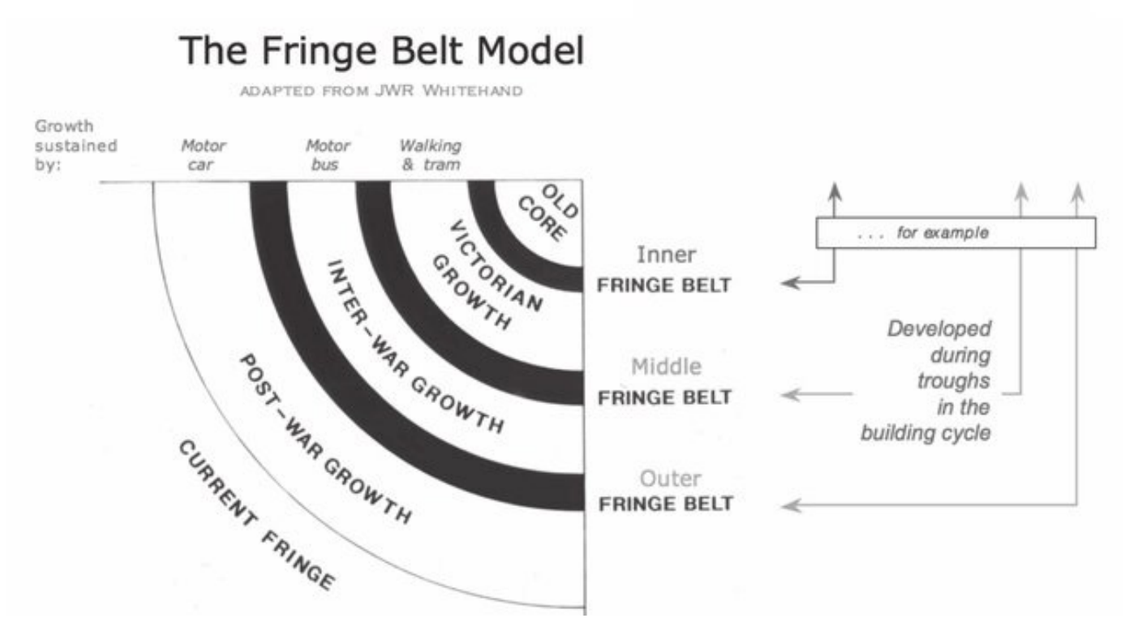


Fig.52, Fringe Belt Model (Source: Kropf, K., and Siksna, A., 2017)

The Inner Fringe Belt grew around the 'fixation line', which is a term Conzen used for the area near the old town wall. Conzen's main idea was to include fringe belts in a bigger theory to see how cities change and grow. He showed how different forces shape city structure and space over time using detailed maps to explain how cities physically change.

As part of his study and work, Conzen created a detailed list of how fringe belts form and change as time passed. He first studied this in Alnwick, then in Newcastle upon Tyne. Later on, he used the same idea in other British places like Ludlow, Conway, and Manchester (Conzen 2009b).

2.1.4 Migration and emergence of informal settlements

Walker and Leitner (2011) say that local immigration rules in the U.S.A. are strongly influenced by how many immigrants live in certain places. They found that places with fast-growing immigrant numbers often lead in changing policies in the area. This means the speed of immigrant growth can affect local politics.

This is important because different states have different rules, showing how each place reacts to immigration in its own way. Fast population growth shows the need for flexible policies that can match these changes. Local politics, shaped by the local economy and people, have a significant effect on immigration rules. This is why different places have different immigration policies.

Beside that, people's views on immigration are also connected to local rules. Hainmueller and Hiscox (2010) state that what people think about skilled or unskilled immigrants is not always based on money or jobs. It also depends on social and cultural beliefs.

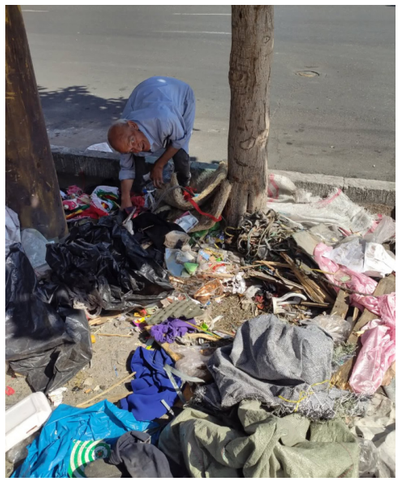


Fig.53, City photography (Source: Lmimos)

People having doubts about immigration often come from both financial worries and cultural fears, not just personal gain. So, in other words, even if immigration grows quickly, public opinion may not always match what is good or bad for the economy. This challenges the idea that people support policies only for economic reasons. Living conditions in informal settlements are often very bad. These places are crowded, and many people don't have access to clean water or toilets. Winter et al. (2019) claim this makes life harder for the people living there.

Fig.54, City photography (Source: Behrouz Mehri)

These slum areas are a major problem all around the world. In sub-Saharan Africa, about half of the city's population live in these areas now, and Winter et al. (2019) say this number could become three times bigger by 2050. Fast city growth makes it hard for local governments to provide people with basic services. Many times, they cannot keep up. Without good waste and sewage systems, harmful germs can grow and harm public health (Abia et al., 2017). Therefore, both government and non-governmental groups say it is important to improve toilets and give people clean water (Nixon, 2020).

2.2 Urban Challenges

2.2.1 Environmental issues in slum neighborhoods

Some people see self-built and unplanned slums as a good way for the poor to find homes and jobs. This idea comes from the belief that cities and governments cannot provide these, so the poor solve it themselves. People usually think that moving to cities is for a better life, with jobs, schools, and basic services. But research by UN-HABITAT (2008) shows a different city reality when looking at slum and non-slum dwellers as well as people in villages.

The term ‘urban penalty’ means that people living in slums die younger, are hungrier, have less education, fewer job opportunities, and have increased health problems, compared to people who live in cities. In some countries, slum dwellers live in worse conditions than people in the countryside. Deadly diseases in slums are mostly caused by bad housing and living conditions, not just low income (Jay, 2001). Cities around the world also face many other problems (Blair, 1974).

Fig.55, City photography (Source: Lmimos)

Some of the problems are slum growth, damage to nature, traffic jams, water shortage, and pollution (Clinard, 1966). Other issues include loss of farmland, bad housing, poverty, waste issues, too few jobs, and poor public services. Urban slums neighourhoods are bad for people and the environment. In these areas, housing is poor in both quality and number, rents are low, buildings are not well structured, and sanitation is very bad (Hick, 1974).

To have a better and lasting life in cities, people need to change how they treat the environment, especially in keeping it clean. Strong environmental laws should be made and followed. Other ways to fix slum problems include building more houses, clearing slums, reducing poverty and crime, managing waste better, and keeping the environment clean. More steps include creating jobs, taking care of public services, reducing pollution, and having good city management (Charles, 1979).

We should stop slums from growing to help reduce damage to the environment in cities (Strauss, 1961). Because city problems and the environment are getting worse, many different groups of people in cities need to get involved. To reduce the problems of slums in cities, the people, professional groups, governments, NGOs, and community groups should work together with international organizations (United Nations [UN], 2001).

2.2.2 Urban regeneration difficulties in megacities

Urban regeneration in megacities is challenging: they are huge, have many different leaders, and complex social and spactial problems. Sorensen and Labbé (2020) state that megacities often spread beyond normal city limits. They have many centers and large surrounding areas, which makes planning and managing them harder. Governance is split between many authorities such as local, regional, national, and international, making it complicated to work together. This problem becomes increasingly worse because global groups and private businesses often care more about profit than fairness.

Big cities face many challenges like needing more infrastructure, lack of lands and informal housing, risks from natural disaster, and running out of resources. Also, people often see megacities as ‘monsters’, meaning that they are too chaotic to manage, which affects how the public and leaders think about them and thus making it harder to plan fair and lasting improvements. In these kinds of situations, small local neighborhood are more important and bold. Even if often ignored, they are important for fairer city renewal (Sorensen & Labbé, 2020). The growth of neoliberal city policies, especially in countries like China, shows conflicts between government and local groups in city redevelopment.

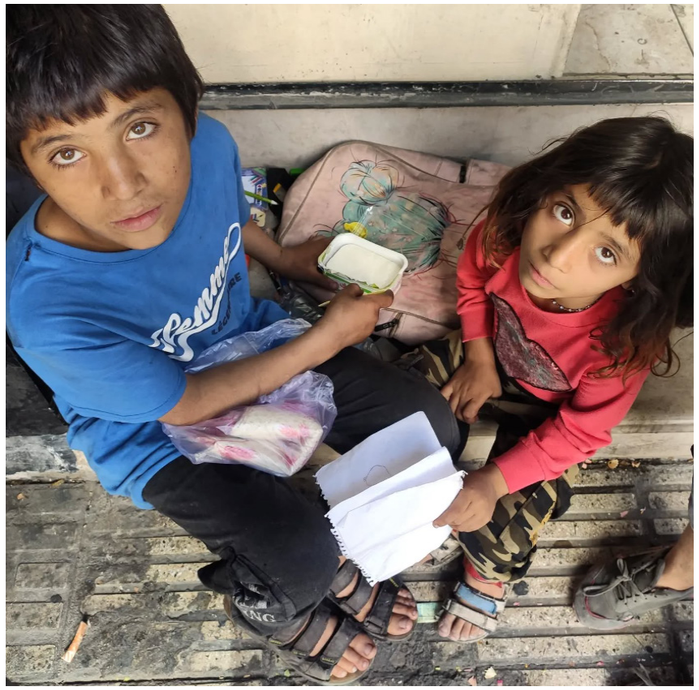


Fig.56, City photography (Source: Lmimos)

He and Wu explain that local governments act like businesses to create and sell city spaces. At the same time, they deal with budget changes and governmental rules that sometimes clash with what communities demand (He & Wu, 2009). This means that even though national rules guide renewal projects, local situations and the people or civils involved have a big impact on what actually happens. In cities like Shanghai, government-led gentrification causes changes in social and physical spaces. These changes often focus more on making profit than on including everyone (Wu, 2016).

Protecting the environment is important when it comes to cities getting renewed. Building parks and using green designs and infrustructure show how to balance new buildings with nature. Many people nowadays ask for this in big cities. But these green plans are often delayed because governments tend to work slowly and money is a big factor in this matter. Gillespie claims that by using land to make money can hurt the environment and break communities (Gillespie, 2015). Hence, it is important that city renewal finds a good balance between making profit and helping people.

2.3 Case studies

La Fábrica – A Cement Factory Reimagined

Architect: Ricardo Bofill | Location: Barcelona, Spain | Started: 1975

La Fábrica is a former cement factory transformed into the home and studio of architect Ricardo Bofill. What was once an industrial ruin became a poetic blend of architecture, landscape, and reuse.

Key Concepts:

- Adaptive Reuse: 8 silos preserved
- Mixed-Use with includes living spaces, studios, and gardens
- Design Approach: a sculptural, surreal reinterpretation of raw industrial forms
- Legacy: a global icon of creative reuse and the power of transformation

Fig.56, La Fabrica by Ricardo Bofill (Source: Archdaily 2023, July 3)

Fig.57, La Fabrica by Ricardo Bofill (Source: Archdaily 2023, July 3)

Fig.58, La Fabrica by Ricardo Bofill (Source: Archdaily 2023, July 3)

Fig.59, La Fabrica by Ricardo Bofill (Source: Archdaily 2023, July 3)

Fig.60, La Fabrica by Ricardo Bofill (Source: Archdaily 2023, July 3)

Landschaftspark Duisburg-Nord – Duisburg, Germany

Location: Duisburg, Germany | Design: Latz + Partner | Years: 1990–2002
Site: Former Thyssen steelworks | Area: 200 hectares

This iconic project transformed an abandoned steel mill into a multifunctional landscape park as part of the IBA Emscher Park initiative. The design weaves together industrial remnants with green infrastructure to create a new kind of urban nature.

Key Features:

- Reuse of industrial structures: blast furnaces, rail tracks, bunkers
- Layered park zones: water park, garden fields, promenade network
- Minimal intervention: vegetation grows into and around the ruins
- Community-focused: co-designed with locals, open for public use

Fig.61, Landschaftspark Duisburg-Nord, De - Post-industrial landscape (Source: Latz+ Partner)

Fig.62, Landschaftspark Duisburg-Nord, De - Post-industrial landscape (Source: Latz+ Partner)

Fig.63, Landschaftspark Duisburg-Nord, De - Post-industrial landscape (Source: Latz+ Partner)

De Ceuvel – Amsterdam, Netherlands

Location: Amsterdam, Netherlands | Design: DELVA Landscape Architecture & Urbanism
Year: 2012 (Design & development began) | Site: Former polluted shipyard

A former shipyard (1919–2000), de Ceuvel transformed a contaminated industrial site into a sustainable, off-grid creative hub using circular design, green technology, and repurposed architecture.

Key Features:

- Sustainable Innovation: solar power, compost toilets, heat-exchange systems
- Soil Regeneration: phytoremediation gardens clean the polluted ground
- Reused Architecture: old houseboats turned into offices/studios
- Community-led: temporary yet impactful model of ecological urbanism

Fig.64, View of the sustainable architecture and repurposed houseboats at De Ceuvel (Source: De Ceuvel)

Fig.65, View of the sustainable architecture and repurposed houseboats at De Ceuvel (Source: De Ceuvel)

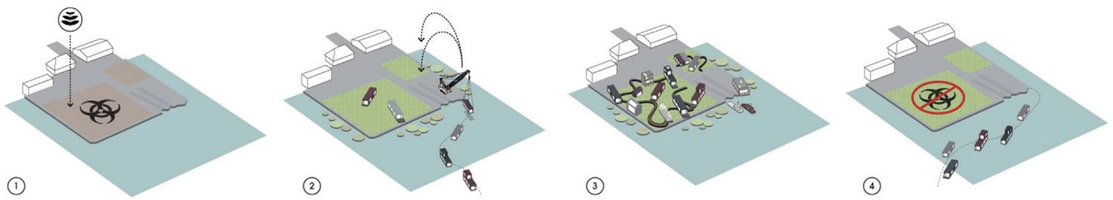


Fig.66, View of the sustanaible architecture and repurposed houseboats at De Ceuvel (Source: De Ceuvel)

Parco Dora – Torino, Italy

Location: Turin, Italy | Built: 2010–2014
Design: Latz + Partner

Parco Dora is a 45-hectare urban park created on the site of the former Vitali steel mill, part of the historic Fiat Ferriere complex built in the early 20th century. The factory closed in the 1990s, leaving behind large industrial structures.

Key Features:

- Preserved factory structures (e.g., stripping shed with red steel columns)
- Repurposed industrial forms as sports areas, event spaces, and water gardens
- Five distinct zones integrating green space, concrete, and steel
- Strong contrast between post-industrial memory and urban ecology

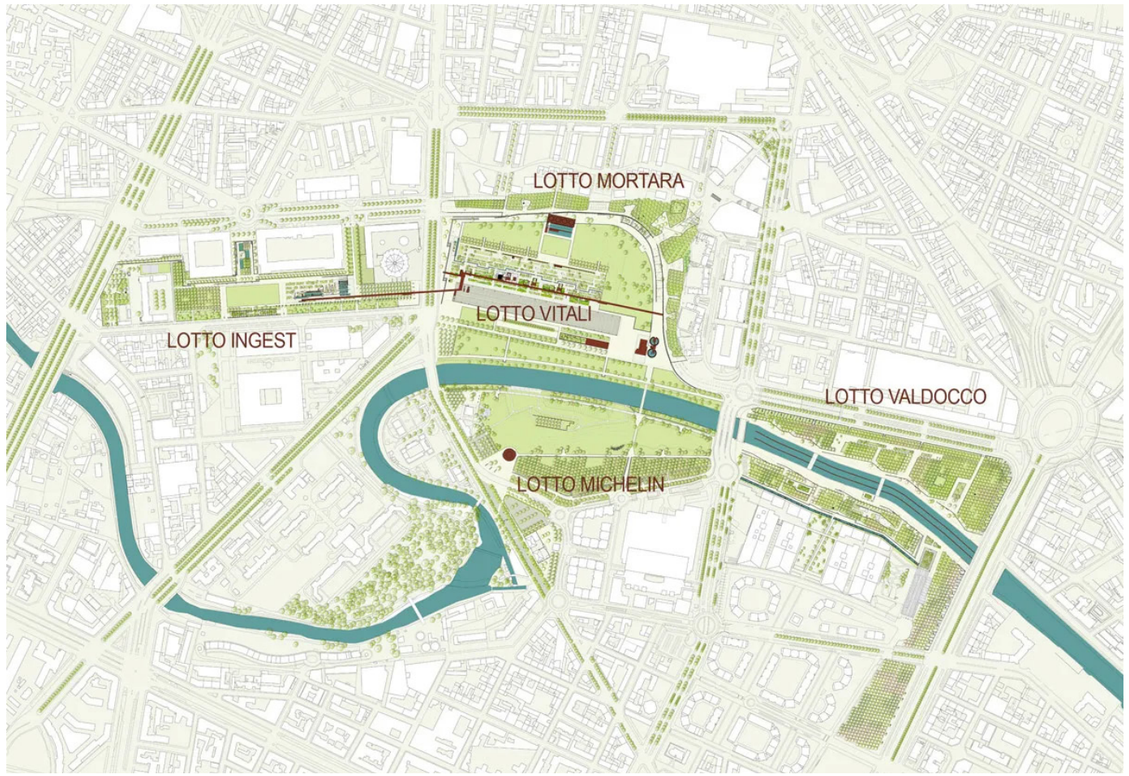


Fig.67, Parco Dora by Latz+Partner (Source: Landezine)

Fig.68, Parco Dora by Latz+Partner (Source: Landezine)

Fig.69, Parco Dora by Latz+Partner (Source: Landezine)

"In good architecture, the human being is never forgotten."

Houshang Seyhoun, Architect and Professor

Chapter 3: Design Ethics and Urban Vision

3.1 Urban Vision and Values

3.1.1 Socio-cultural regeneration in modern cities

3.1.2 Urban well-being and pillars of healthy communities

3.1.3 Architecture as a platform for reintegration

3.1.4 Inclusive planning and social engagement

3.1.5 Adaptive reuse as an urban repair tool

3.2 Ecological and Economic Design Strategies

3.2.1 Adaptive reuse in post-industrial architecture

3.2.2 Nature-based solutions (NBS)

3.2.2.1 Nature-based solutions (NBS) in Persian Architecture

3.2.3 Urban agriculture and food systems

3.2.4Water harvesting and clean water infrastructure

3.2.5 Soil and air regeneration

3.2.6 Educational engagement: students, refugees, locals

3.2.7 Empowerment through job creation and skill-building

Chapter 3: Design Ethics and Urban Vision

3.1 Urban Vision and Values

3.1.1 Socio-cultural regeneration in moedern cities

City management is more complex when big social changes occur, like the growth of night-time activities. Seijas and Gelders (2020) say that adding a lively nightlife to city renewal can help attract creative people and boost the local economy. But these changes need careful study because they can cause gentrification and change the culture of neighborhoods. This might make long-time residents feel left out.

City renewal plans must deal with migration as well, especially how immigrants fit into the community. Fokkema and de Haas (2011) mention that migrants often face problems like discrimination and being left out, which makes it difficult for them to join society.

To tackle these problems, city renewal plans need to consider all cultures and help both new immigrants and longtime residents who already live in city together. This supports building a stronger community where everyone feels they belong. Metzner (2000) criticized these split approaches and their impact on social sustainability. He claims social sciences and policy studies generated many strategies and tools, but they did not pay enough attention to sustainability.

So, even though there are many social studies and policies, they rarely look at sustainability. Using a sustainability point of view could help combine development and fairness for both current and future generations, and also involve people in the research. Even when different fields work together, like the ones using the ‘ecological footprint’ idea to include environmental and social parts of sustainability (Wackernagel & Rees, 1996), these efforts only partly use a fully connected approach to sustainability.

From a housing and building view, Chiu (2003) found three ways to understand social sustainability. The first way is to see social sustainability as the same as environmental sustainability. This means social sustainability depends on social relationships, customs, rules, and values, which set limits on development. The second way, called ‘environment-oriented’, means social rules and values can change to help and protect the environment. It is a fact that people need to live within the planet’s limits. The third way, ‘people-oriented’, focuses on improving people’s well-being, by sharing resources fairly, and reducing social problems. In her study about housing, Chiu (2003) used the second and third concept to show that social conditions, good housing, and fair access to homes are important for sustainable housing.

3.1.2 Urban well-being and pillars of healthy communities

An important part of healthy communities is social capital, the connections between people who live and work together. These relationships build trust, help, and teamwork, which encourage people to have healthy habits. In neighborhoods with strong social capital, people have less food insecurity and better health (Nosratabadi et al., 2020).

Also, social connections help people support each other's health efforts, making it easier to live healthy lives (Alvarado, 2016). Studies show that communities with strong social ties improve both individual health and overall well-being by building good support networks (Nosratabadi et al., 2020).

Fig.70, The Seven Pillars of Wellness as presented by Nourish Root & Soul (Source: Nourish Root & Soul)

The built environment also affects community health. How easy it is to reach parks, grocery stores, and clinics helps create healthy living. Studies show that neighborhoods without parks or healthy food places often have more obesity and health problems (García et al., 2016).

For example, some areas don't have parks nearby, so people have fewer chances to exercise, which is important for health (García et al., 2016). Also, studies show that the quality of neighborhood spaces affects how much people do healthy activities like exercise (Mohnen et al., 2019; Saadati et al., 2023).

One other important aspect of healthy communities is understanding that health unfairness is happening because of systemic issues and unequal resource sharing. Past and current racism and discrimination created large gaps in health access and results, especially for marginalized groups (Prather et al., 2018; Young & Hawthorne, 2019).

Community-based participatory research, also known as CBPR, is an important method to tackle health unfairness by involving community members in health studies and actions (Prather et al., 2018). It looks at how major social factors affect health while helping to create health plans that fit local culture and their needs (Prather et al., 2018). Many studies show that people with lower income have more trouble to access health services(Young & Hawthorne, 2019).

Mental health problems are growing everywhere, in both rich and poor countries. An increasing amount of people experiences anxiety, depression, and PTSD, caused by more violence, disasters, political conflicts, and human rights abuses (Patel et al., 2018).

Fig.71, Illustration of The Restorative City (Source: Farr and Jones 2021)

The major global health research groups show that depression is the main cause of disability worldwide (Vos et al., 2015). One in four people will have a mental health problem at some point in their life (WHO, 2001). But data is not complete, especially in poorer countries. Mental illness costs the world a lot of money, estimated to reach $16 trillion by 2030 (Patel et al., 2018) — mostly because it affects adults' capability to work.

At the same time, research on the biology of mental health problems and new medicines has slowed down (Bulleck and Carey, 2013). Many people around the world don't receive the right psychiatric care (Patel et al., 2018). While city life has health benefits, especially for older people, living in cities raises the risk of serious mental illnesses like depression and schizophrenia (Lederbogen et al., 2011). This is thought to be because city life brings a higher level of social stress, caused for example by crowding, violence, and crime.

3.1.3 Architecture as a platform for reintegration

Social inclusion in building design is highly important. Being left out causes harm to mental health, especially for marginalized groups. Research shows that we need places that help people to connect and support each other – a key for successful reintegration (Morgan et al., 2007).

The built environment can help people meet and form social connections, which is important for particularly those who come from difficult backgrounds (Beyens et al., 2020). If places are well-designed, they can bring people together and make it easier for them to support one another.

Innovative architectural solutions show how important it is to make spaces accessible and inclusive. For instance, research shows that involving military families early in planning their return to civilian life helps families to stay strong and build better social ties (Pedro et al., 2011).This means buildings should have shared spaces for families to spend time together as well as places for mental health support nearby. So, designs that focus on family and community support need to make sure spaces are easy to use and encouraging people to connect.

Also, architecture that cares about the needs of different groups helps people feel like they belong and own the space. For example, Chinese students returning home feel more connected when community buildings show their culture (Gu & Schweisfurth, 2015). Spaces that offer support and access to familiar resources can reduce loneliness and help people adjust better in new places. A group design workshop or a design charrette is a focused group meeting, where people like residents, designers, and planners work together to create ideas for community spaces. Over several days, they share ideas, show their plans, improve them, and build a sense of shared ownership.

How does this help reintegration?

Control & confidence:
People help design their spaces, making them feel that they belong and have an identity.

Talking & trust:
Different groups work together, building trust by sharing ideas.

Strength & change:
Communities work together to solve problems, like rebuilding after disasters (e.g., East Nashville 1999).

Long-term care:
Results include groups like “town teams” that keep supporting projects over time (e.g., Scarborough’s Renaissance Charrette 2002).

3.1.4 Inclusive planning and social engagement

Urban planning has supported mixed-use development for a long time so far. This means combining homes, shops, and places to settle in one area. This helps to make neighborhoods lively and fair by letting different people meet and access what they need (Yue et al., 2016).
The feedback of mixed-use design fits well with ideas about sustainable development and New Urbanism. It focuses on forming communities that meet people’s needs (Yue et al., 2016). In this matter, trees, for example tree canopies, are very important, because they show how unevenly cities spend money and share resources in different neighborhoods (Landry & Chakraborty, 2009).

In *City of Well-Being: A Radical Guide to Planning* from 2016, Hugh Barton shows the Stroud Town Centre Neighborhood Plan as a good example of fair, health-focused city planning. This project turned big ideas about well-being into real results by involving local people closely in the planning. Instead of forcing ideas from above, planners worked with the community to find real needs and priorities and turning words into action.

The process used repeated, participatory steps or, as some say, “baby steps”, starting with workshops where local people shared their worries and hopes. Then, together they wrote drafts, showed them to the public, got feedback, and made final changes after further review. With having this cycle, they built trust, openness, and real community control. The planners did not act as bosses but as helpers, running meetings, sharing expert knowledge like health data or street design, and working with residents to create the plan.

The final plan put two important factors of health and well-being at the heart of the place. It focused on social connection, mental health, and fair access to public spaces instead of just land use. The plan used Barton’s Settlement Health Map to link how the place looks with social empowerment. A key part of the Stroud plan was fairness and shared power, making sure all voices, especially from marginalized groups, were heard and included. Because of this, the plan became more than just a technical paper, it became a shared goal for a healthier, closer, and fairer community.

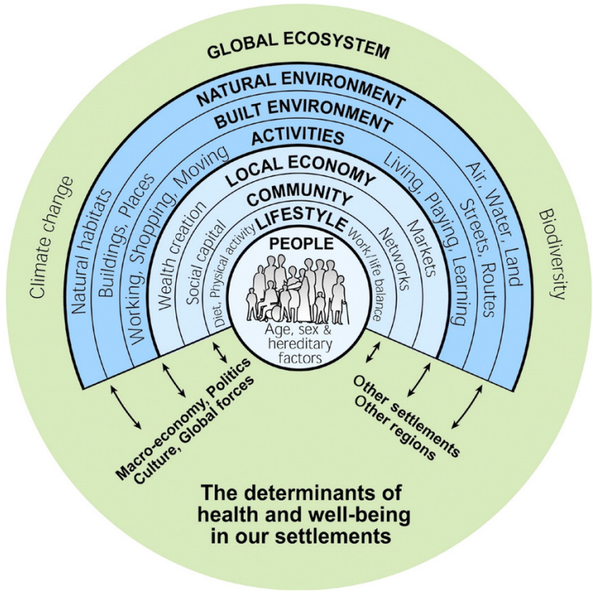


Fig.72, City of well-Being, a radical guide to planning (Source: Hugh Barton2016)

3.1.5 Adaptive reuse as an urban repair tool

Adaptive reuse comes from being resourceful. It has happened in many ways from ancient times to today. People reused materials when resources were scarce, used parts of conquered buildings in new structures, and took architectural pieces to faraway cities. Today, this is like updating old offices or turning old schools into apartments.

Architectural reuse was an unnoticed part of design work in the 20th century. It was a normal and steady part of fixing buildings for architects everywhere. But in the 2010s, adaptive reuse became very popular, with famous architects creating award-winning projects that changed old buildings significantly (Wong, 2017).

One big benefit of adaptive reuse is saving time and money compared to building new one. Studies show fixing old buildings can take 50% to 75% of the time and cost 50% to 80% less than new construction (Juan et al., 2016). These savings make adaptive reuse a good choice, especially in cities where space is limited and people seek for sustainable options (Zandiatashbar et al., 2019).

Good examples of adaptive reuse display its many advantages. Old or empty buildings are redeveloped into active places that support the community and at the same time keep the history alive (Juan et al., 2016; Fitri et al., 2023). Some case studies present warehouses turned into spaces with different uses or schools changed into health centers. By studing them, we can see how these projects can be both useful and bring social benefits at the same time (Juan et al., 2016).

3.2 Ecological and Economic Design Strategies

3.2.1 Adaptive reuse in post-industrial architecture

Adaptive reuse is an important method in post-industrial architecture. It assists to bring old industrial buildings back to life for modern uses while keeping their historic value.

Adaptive reuse helps sustainable development by reducing waste and saving resources. It brings new life to old buildings, turning them into lively city centers that serve the community. Studies show it is important for saving cultural heritage, with many successful examples of city renewal (Plevoets & Cleempoel, 2011; Loures et al., 2016).

The approach is popular because cities need new ways to grow, especially with environmental challenges. Many communities struggle between using new green spaces or fixing up empty old sites. Research shows most people prefer redeveloping empty brownfield sites instead of building on untouched land (Loures et al., 2016).

This sentiment emphasizes the environmental and aesthetic dimensions of redevelopment projects, aligning with the principles of sustainable urban planning. Furthermore, the integration of adaptive reuse in urban development enhances community identity and preserves the local heritage narrative, leading to a stronger communal bond, as these spaces often resonate with collective memories and historical significance. This feeling highlights how important the environment and look of redevelopment projects are, matching sustainable city planning ideas. Also, using adaptive reuse in city growth helps keep community identity and local history alive, making people feel closer because these places hold shared memories and meaning.

3.2.2 Nature-based solutions (NBS)

An key part of Nature-based Solutions or NBS is the mental health benefit from being around nature. Studies show that spending time in natural places helps people feel better and supports their mental health (Keniger et al., 2013).

Adding Nature-based Solutions (NBS) to cities can bring many ecological and economic benefits. These include lowering city heat, cleaning the air, and allowing more plant and animal life in the city (Wei et al., 2025; Poudel & Duex, 2017).

It is very important to fight climate change using Nature-based Solutions, especially in areas where climate change is the biggest threat. Using local plants and animals can help communities to stay strong against climate problems while keeping their culture and nature safe (Poudel & Duex, 2017).

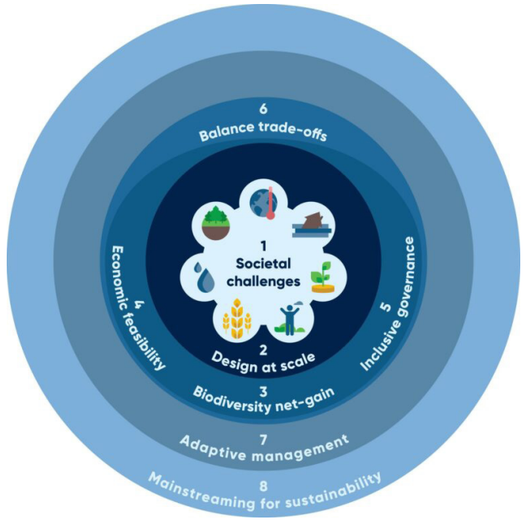


Fig.73, Nature-based solution concept (Source: NBS Climate)

3.2.2.1 Nature-based solutions (NBS) in Persian Architecture

As the famous architect Pirnia described in his book, Persian architecture doesn't copy nature but understands and respects it. Builders don't try to copy nature's shape, but they use its ideas. The house welcomes the sun, lets the wind in, and protects from heat. Walls are thick to keep the house warm in winter season and cool in summer. Windcatchers are designed to bring fresh air inside. Courtyards with pools and trees create a microclimate that balances dry and fresh air. Pirnia regards himself as a bridge between people and nature, not someone who controls it, for his life (Pirnia, M. K., Memari-Irani (Persian Architecture), 2005).

Key Elements of Persian Architecture

Courtyard: open space in the center, with rooms arranged around it

Iwan: covered, vaulted space open to the courtyard, like a balcony

Entrance Sequence: steps like vestibule and hallway for smooth entry, spatial order and division

Public and Private Zones: separate areas for guests and family

Fig.74, Persian Architecture elements (Source: ReisenIran)

Fig.75, Persian Architecture elements (Source: Tabatabaei house)

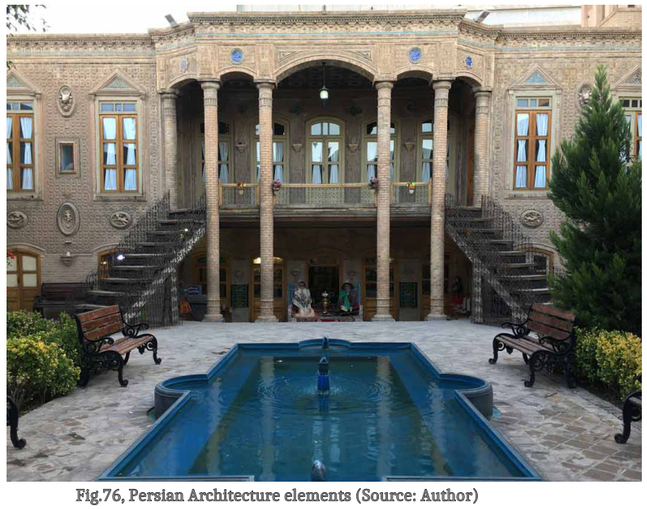


Fig.76, Persian Architecture elements (Source: Author)

Qanat: underground water channels for irrigation

Columned Hall (Talar): open-sided space with columns for receiving visitors, works as a pause space

Underground Chamber (Shabestan): cool room used in hot weather

Dome: roof with climate, pushing out hot air from the room. Symbolic as centrality of life.

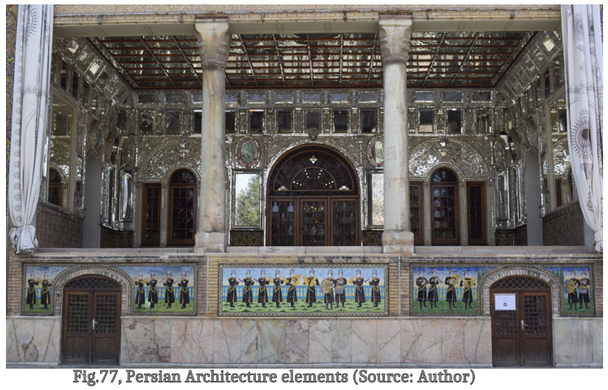


Fig.77, Persian Architecture elements (Source: Author)

Fig.78, Persian Architecture elements (Source: Author)

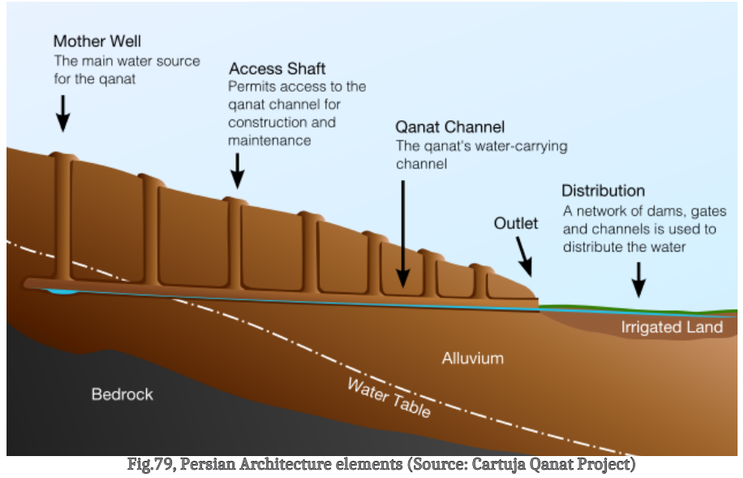


Fig.79, Persian Architecture elements (Source: Cartuja Qanat Project)

Decorative Niches: small wall spaces used for decoration, often holding books or mirrors

Sash Windows (Orsi): wooden windows with lattices and colored glass, for beauty and light regulation

Raised Platform (Soffeh): place to sit or gather at entrances or gardens

Thick Load-Bearing Walls: walls that keep the temperature inside steady and support the building

Fig.80, Persian Architecture elements (Source: Iran Destination)

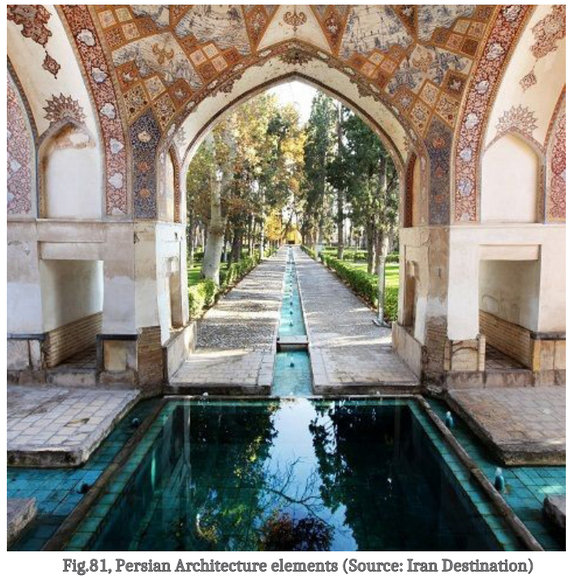


Fig.81, Persian Architecture elements (Source: Iran Destination)

Geometric and Floral Ornamentation: patterns matching the building's design logic

Introverted Layout: design facing inward for privacy and better climate control

Axial Symmetry: balanced, often it is a mirrored layout

Human-Scale Proportions: size made for comfort and familiarity

Use of Local Materials: earth, brick, wood, plaster used honestly and naturally

Fig.82, Persian Architecture elements (Source: Iran Destination)

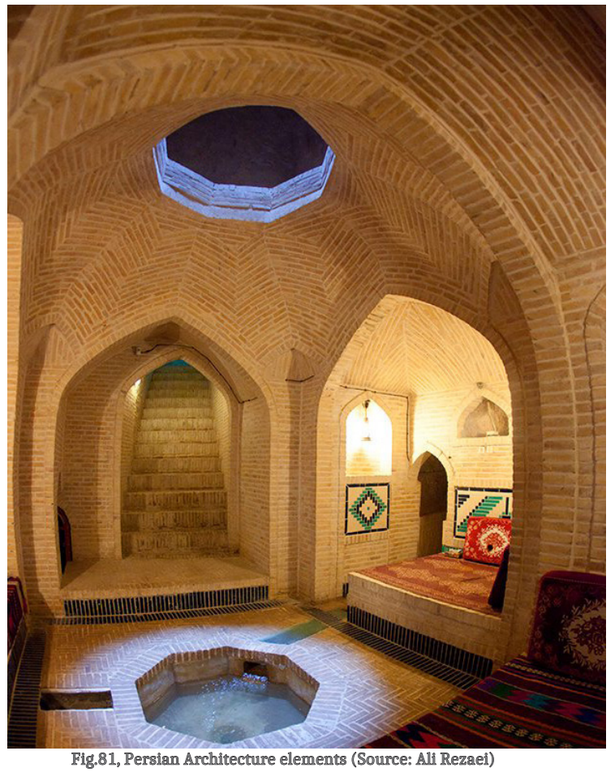


Fig.81, Persian Architecture elements (Source: Ali Rezaei)

Courtyard Garden (Charbagh): garden with water, plants, and shade creating a cool space

Geometric and Floral Ornamentation: patterns matching the building's design logic

Muqarnas: decorative ceiling with stalactite shapes

Windcatcher: tower that brings cool air inside naturally

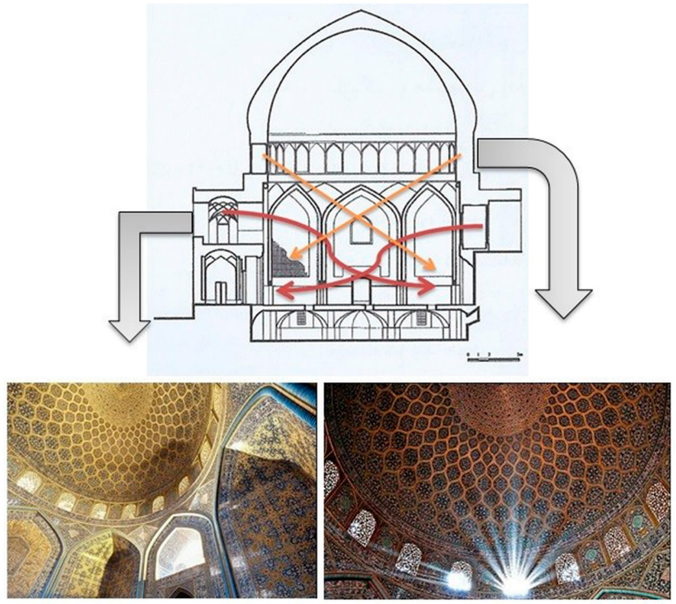


Fig.82, Persian Architecture elements (Source: Yaghmaian 2022)

Fig.83, Persian Architecture elements (Source: Yaghmaian 2022)

3.2.3 Urban agriculture and food systems

One main benefit of urban farming is that it helps people to get more food, especially in poor communities and areas. Studies show urban farming can improve access to healthy food and protect against food shortages.

For example, a study in Tanzania found that urban farming helps children eat with more varied diet, which improves their health, especially in poorer families (Wagner & Tasciotti, 2017). This evidence matches other ones showing that urban farming can improve food security by providing more kinds of food like dairy, meat, and vegetables (Lowe, 2014).

Urban farming is now a key part of today's cities. It supports food systems, helps the environment, and brings people closer together. Solutions like rooftop gardens, vertical farms, and shared gardens are all part of it. They help to make sure people have enough food, make cities more pleasant, and get the community involved.

The need to use urban farming grows stronger because of an increasing number of people living in cities, as well as climate change posing challenges. The COVID-19 pandemic showed this clearly by breaking usual food supply chains (Priyadarshini & Abhilash, 2021).

Evolving food systems need more focus on sustainable methods. Organic farming is seen as greener but has limits in changing the whole food system. Seufert and Ramankutty state that organic farming mainly focuses on growing food and does not fully fix issues like workers' rights, farmers' incomes, and access for consumers (Seufert & Ramankutty, 2017).

They argue that food system's environmental benefits could come from big plans like cutting food waste and changing what people eat. They stress that major changes in how we produce and eat food are a necessity for lasting improvements (Seufert & Ramankutty, 2017).

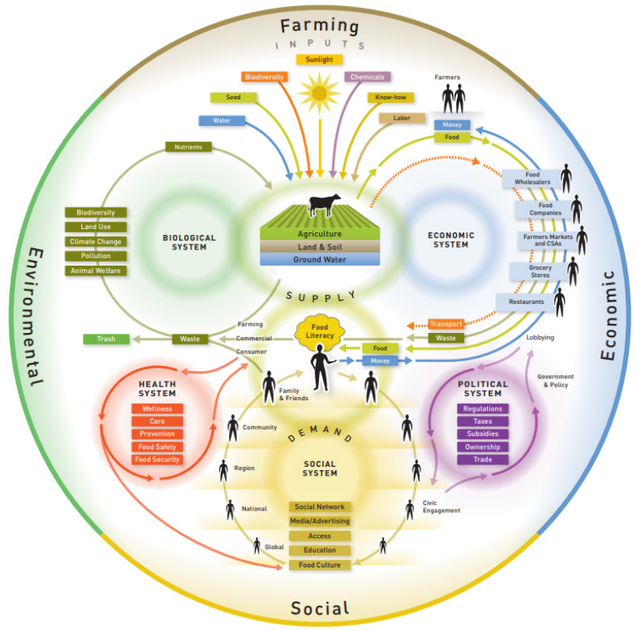


Fig.84, What are food systems? (Source: TABLE)

3.2.4 Water harvesting and clean water infrastructure

City growth not only increases competition for water but also changes local ecosystems. D'Amour et al. explain that in densely populated areas like the Ganges-Brahmaputra Delta, urban spread causes loss of important wetlands and water bodies. This changes water flow and puts the area more at risk from climate problems (d'Amour et al., 2016).

Sustainable city water management must also consider social and economic issues. Chamberlain et al. say that giving fair water access in dry cities to everyone can help biodiversity, but needs careful consideration to avoid harming local ecosystems (Chamberlain et al., 2020).

The link between social and economic status and access to water means we need to understand city populations and their needs well. This shows why involving people in decision-making is important to share water fairly (Morinville & Harris, 2014).

Rainwater harvesting systems work by collecting, storing, and reusing rainwater. Usually, rainwater is collected from roofs and moved through pipes to storage tanks. From there, the water can be used for things like watering plants, flushing toilets, and washing. If treated properly, it can also be used as drinking water (Coppola et al., 2019).

Rainwater harvesting systems, or in short RWH, are flexible and can be made to meet local needs, helping secure water supply in cities and countryside (Pravin et al., 2021). For example, in dry areas, RWH can be a backup during long droughts, lowering the need to use rivers and groundwater, which may be running out because of overuse (Wunderlich et al., 2021).

As cities grow and population numbers increase, adding RWH to city planning is very important. Cities have water problems in particular because hard surfaces cause more runoff and floods. Using RWH with green infrastructure projects helps cities to adapt to climate change and lowers stormwater managing costs (Xie et al., 2021). Systems to watch and control stormwater with RWH can help cities use water in a sustainable way (Xie et al., 2021).

3.2.5 Soil and air regeneration

Farming methods have a big effect on soil health and recovery. Research highlights the need to use better land care practices, like those in the FAO's Voluntary Guidelines for Sustainable Soil Management (SSM). These practices include choosing better crops or more optimized ones and animals, changing how soil is worked, and turning some farm land into grazing land. Together, they help fix soil and stop land from land degradation (Smith et al., 2019). Using cover crops to keep the ground covered also helps repair soil and protect it from wind and water erosion caused by climate change (Smith et al., 2019).

SSM methods, like conservation farming and holistic care, are becoming popular in places like the UK. A recent survey shows farmers are moving towards ways that focus on improving soil health as a main goal (Jaworski et al., 2023).

People using these soil methods often have strong ties to local farming groups, which share knowledge and support using sustainable soil management in different farms (Jaworski et al., 2023). This local focus makes sustainable practices more visible and helps create a social system where farmers learn from each other (Rust et al., 2020).

Soil regeneration is highly important for sustainable agriculture. It actually helps soil to stay healthy, improves crop growth, supports biodiversity, fights climate change, and keeps food supplies secure as well. With more people and climate problems, practices that make soil better and more fertile are more important than before. Improving the soil's structure and life makes farming more sustainable and able to handle environmental changes (Expósito et al., 2017).

Air regeneration means cleaning and improving air quality by using sustainable methods that actually reduce pollution and help ecosystems to recover. In agriculture specially, it is important because traditional methods often cause air pollution from fertilizers, pesticides, and livestock (Pai et al., 2022; Amann et al., 2020; Pourhashem et al., 2017).

As climate change and loss of biodiversity worsen, sustainable agriculture becomes more important. This makes finding strong ways to improve air quality a key focus for research and policy. Air regeneration is linked to public health because clean air helps people stay healthy. Farming methods that lower pollution can reduce breathing and heart problems caused by dirty air (Pourhashem et al., 2017; Romero Estévez et al., 2020).

3.2.6 Educational engagement: students, refugees, locals

Refugee education is very important in order to help other refugees fit into new communities. It's not just about learning facts but also about getting ready for future challenges and becoming part of the wider society.
Dryden-Peterson et al. mentioned that including refugee education in national schools helps both refugees and local students, improving education for all (Dryden-Peterson et al., 2019). Kaysılı et al. agree and argue that teachers should change their methods to support refugee students better and make sure they are not left out (Kaysılı et al., 2019).

Effective collaboration starts by understanding the special needs of homeless people and refugees in education and housing. Murdie explains that helping refugees in finding housing in Toronto works well when there is help before they arrive, continuous support, help to move on, and fighting racist harassment (Murdie, 2008).

Kreichauf states refugee housing can help bring marginalized people into the community again, so it's important to create homes that support connection, not isolation (Kreichauf, 2018). These ideas show that schools can work with local authorities to give important support, making sure homeless people receive help when they move into housing and join society.

3.2.7 Empowerment through job creation and skill-building

Job creation programs help vulnerable people by improving their social and economic lives. By giving fair chances to them, these programs improve the well-being of marginalized groups, build community connections, and support the economy not only among them, but also to the bigger picture of the city. We can see their impact in rural social businesses, community projects, and sustainable development that aims for fair growth.

According to Twuijver et al. (2020), rural social enterprises are important for helping poor or struggling communities grow economically. They do this by offering basic services and creating jobs, which also supports local businesses and makes the area more attractive to tourists. This kind of social entrepreneurship not only helps the local economy, but also makes development fairer and lasting by closing social and economic gaps.

They are also connected to more local infrastructure like affordable housing, and they support group efforts that help start small local businesses. In addition, these social enterprises usually put their profits back into the community, which has a bigger economic impact and helps people become stronger and more independent (Twuijver et al., 2020).

Community-based programs are another way to create jobs and support people in difficult situations. As Martos-Casado et al. explain, actions such as offering small loans or job trainings are very important to help people who have been treated unfairly or left out, eventually improving their lives in societies. (Martos-Casado et al., 2019).

These projects not only help people find jobs, but also give them the training they need to learn useful personal skills for today's job market. By helping people grow their abilities, communities can slowly move out of poverty and stop relying too much on outside help. This creates a more independent and lasting future for them.

"Beauty lies in regeneration, not in meaningless new construction."

Kamran Diba, Architect and Urban Designer

Chapter 4: Site Strategy and Architectural Proposal

4.1 Analytical Framework

4.1.1 Site analysis and diagnosis

4.1.2 SWOT (Strengths, Weaknesses, Opportunities, Threats)

4.1.3 Mapping current conditions and access points

4.2 Proposal Development

4.2.1 Urban and architectural strategies

4.2.2 Spatial programming and phasing

4.2.3 Technical drawings and key concepts

Chapter 4: Site Strategy and Architectural Proposal

4.1 Analytical Framework

4.1.1 Site analysis and diagnosis

As mentioned before, the cement factory site is located in one of the historical districts of Tehran. In addition to its long history, the area over time also became one of the industrial parts of Tehran: at first outside of the capital, through an increasing population year by year it merged into the urban morph of Tehran. In this area you can find residential, historical, educational zones beside the huge and incredible history that lies under the land of this district. Access routes to the cement factory are two well-connected main roads passing the factory. And with public transportation, most notably two main stations of the metro and numerous bus stations, the factory can be accessed easier.

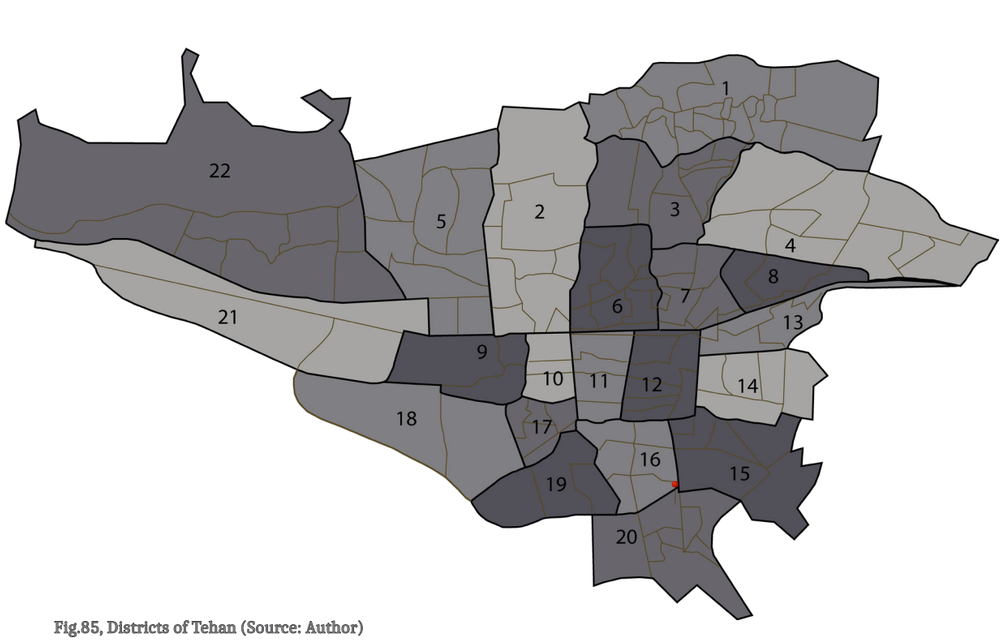


Fig.85, Districts of Tehan (Source: Author)

Detail Map of District 20 Tehran

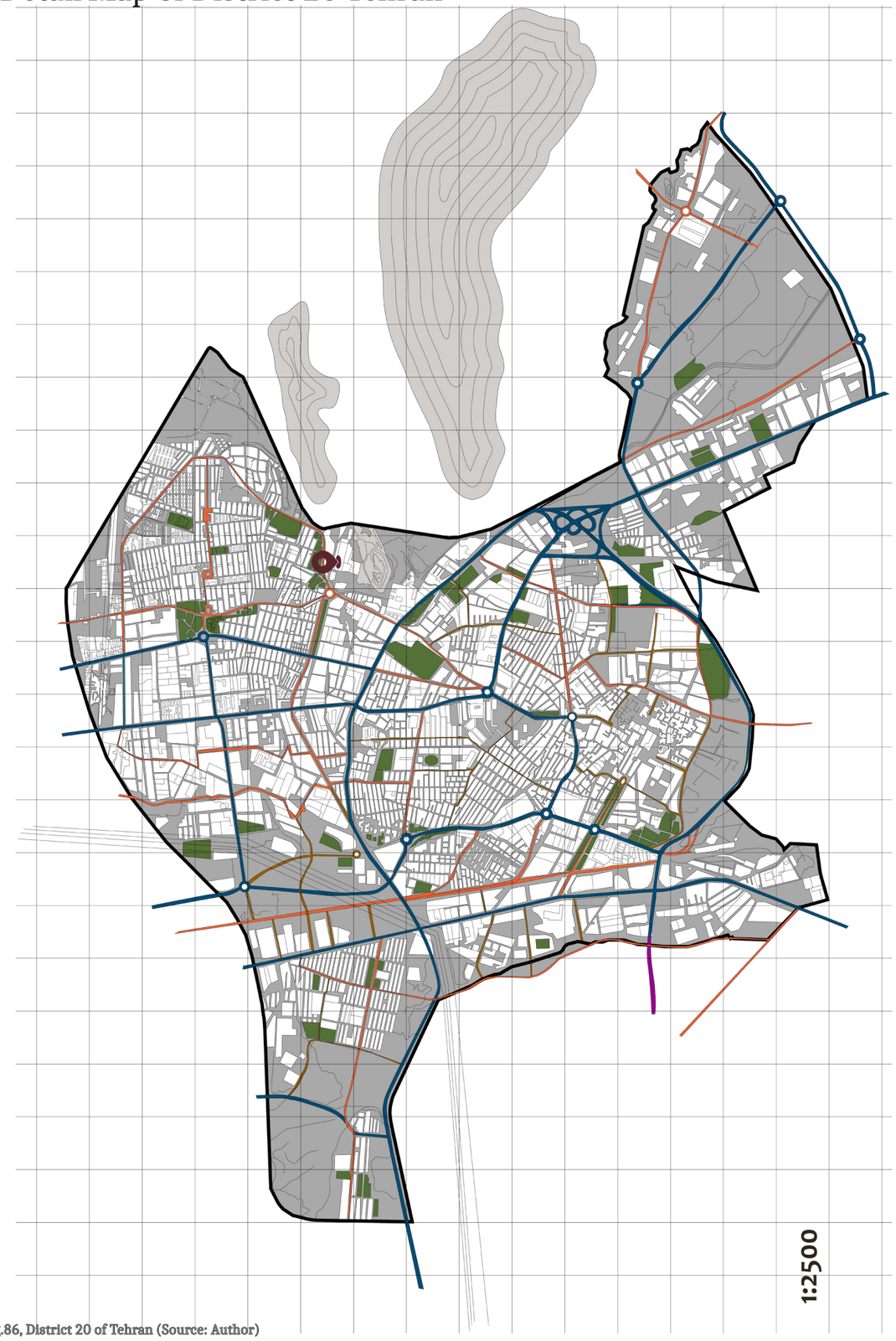


Fig.86, District 20 of Tehran (Source: Author)

4.1.2 SWOT (Strengths, Weaknesses, Opportunities, Threats)

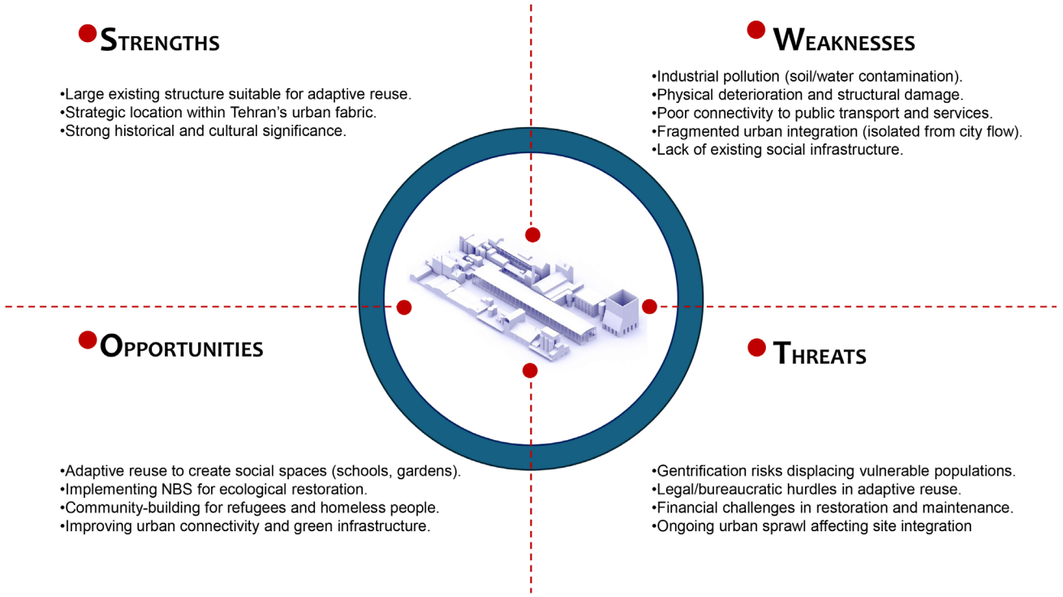


Fig.87, SWOT analysis of the factory (Source: Author)

4.1.3 Mapping current conditions and access points

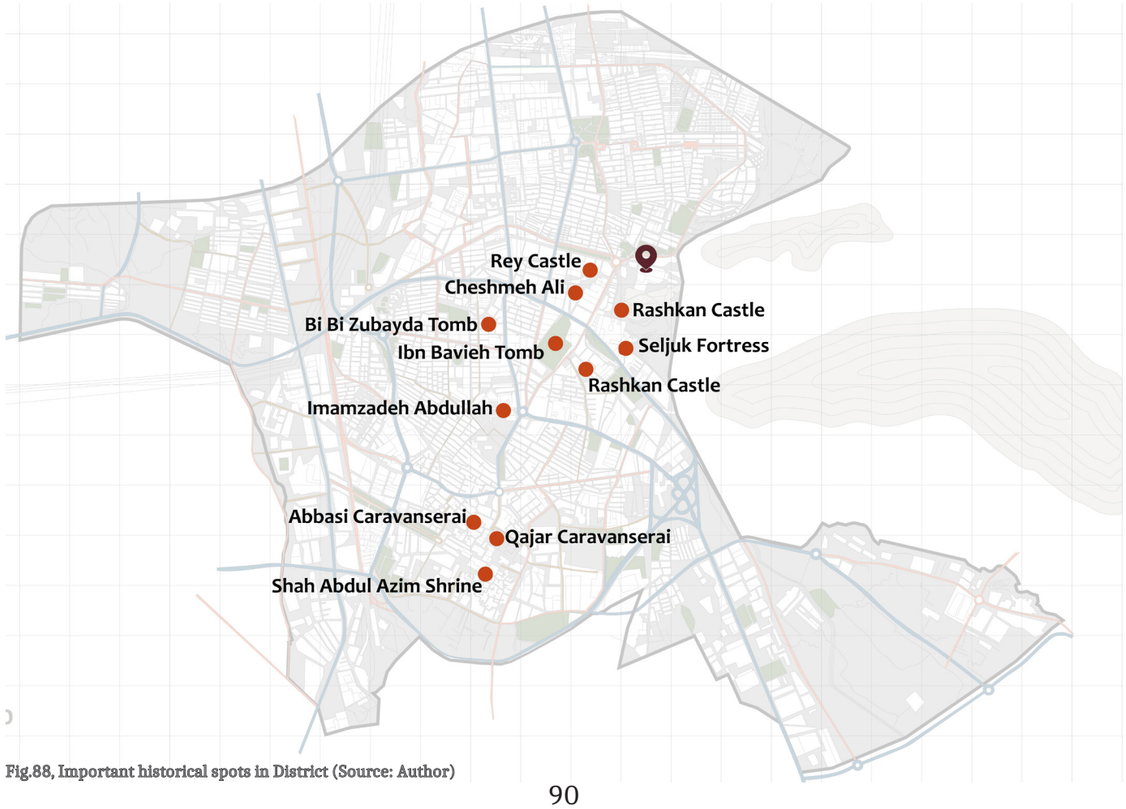


Fig.88, Important historical spots in District (Source: Author)

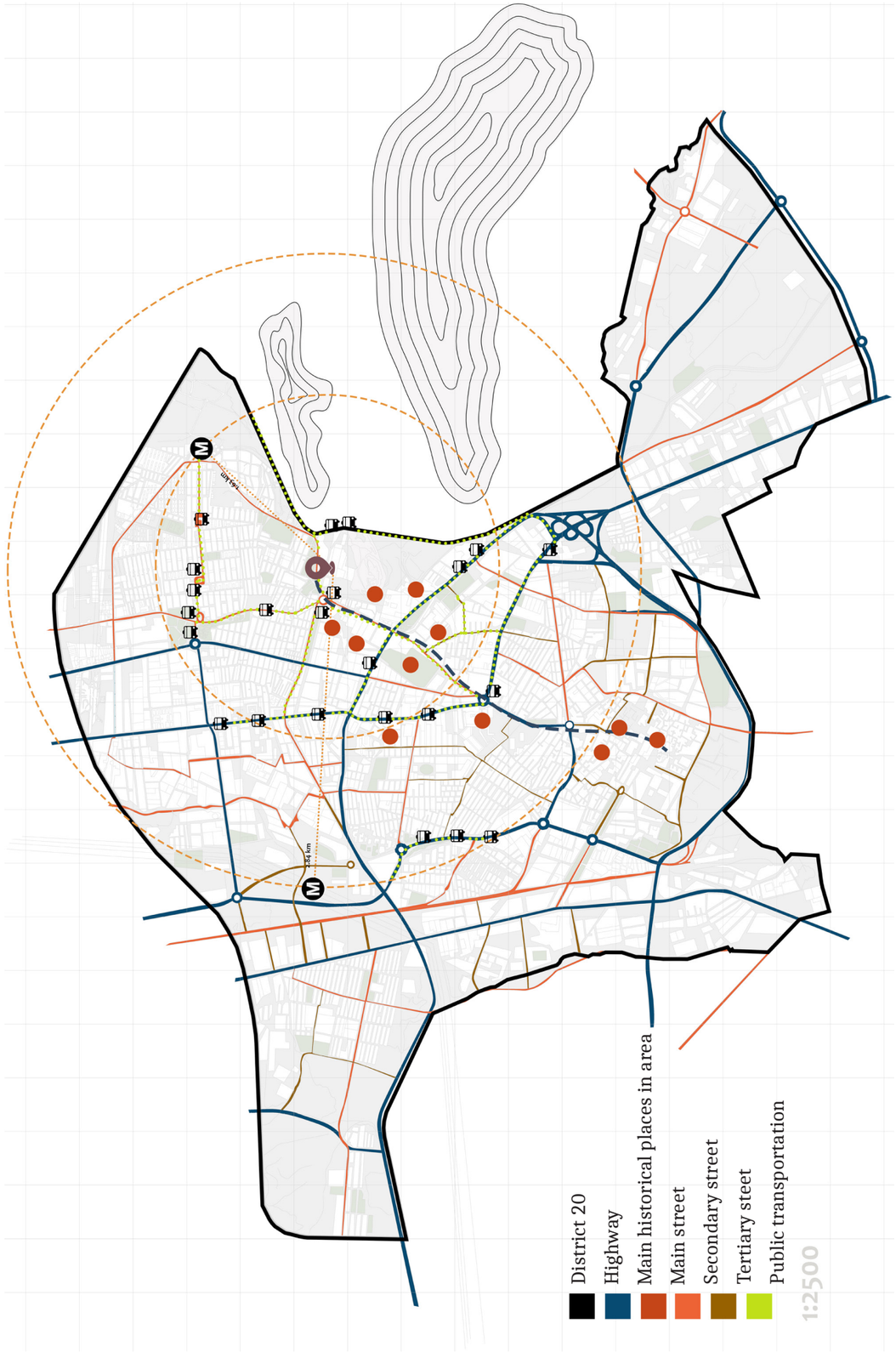


Fig.89, Transportaion in District 20 (Source: Author)

Land Use Proportions in District 20
Industrial area

Fig.90, Industrial area in District 20 (Source: Author)

Land Use Proportions in District 20
Residential area (updated 2017)

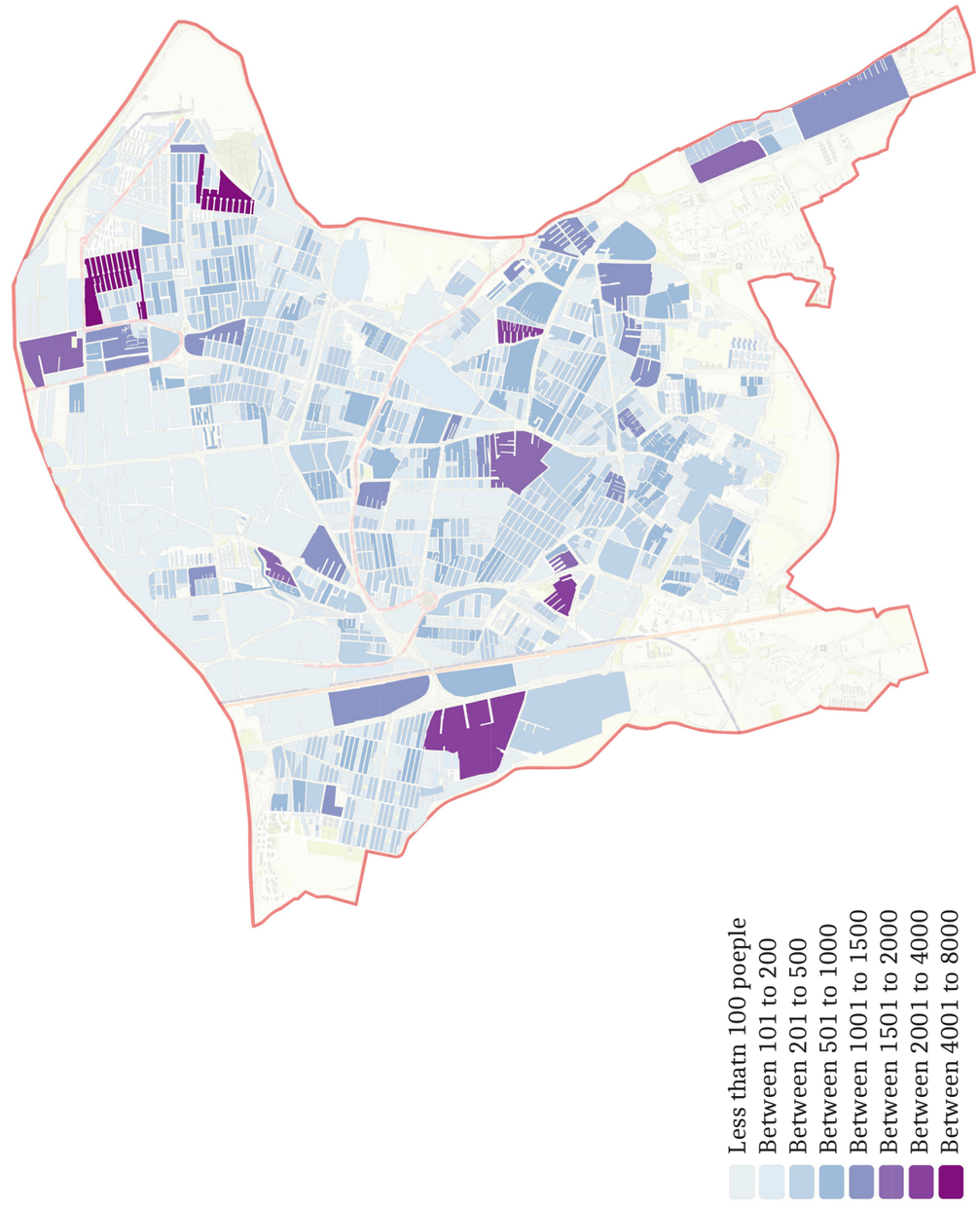


Fig.91, Residential area in District 20 (Source: Tehran Municipality, 2017)

Factory distance from important locations in the area

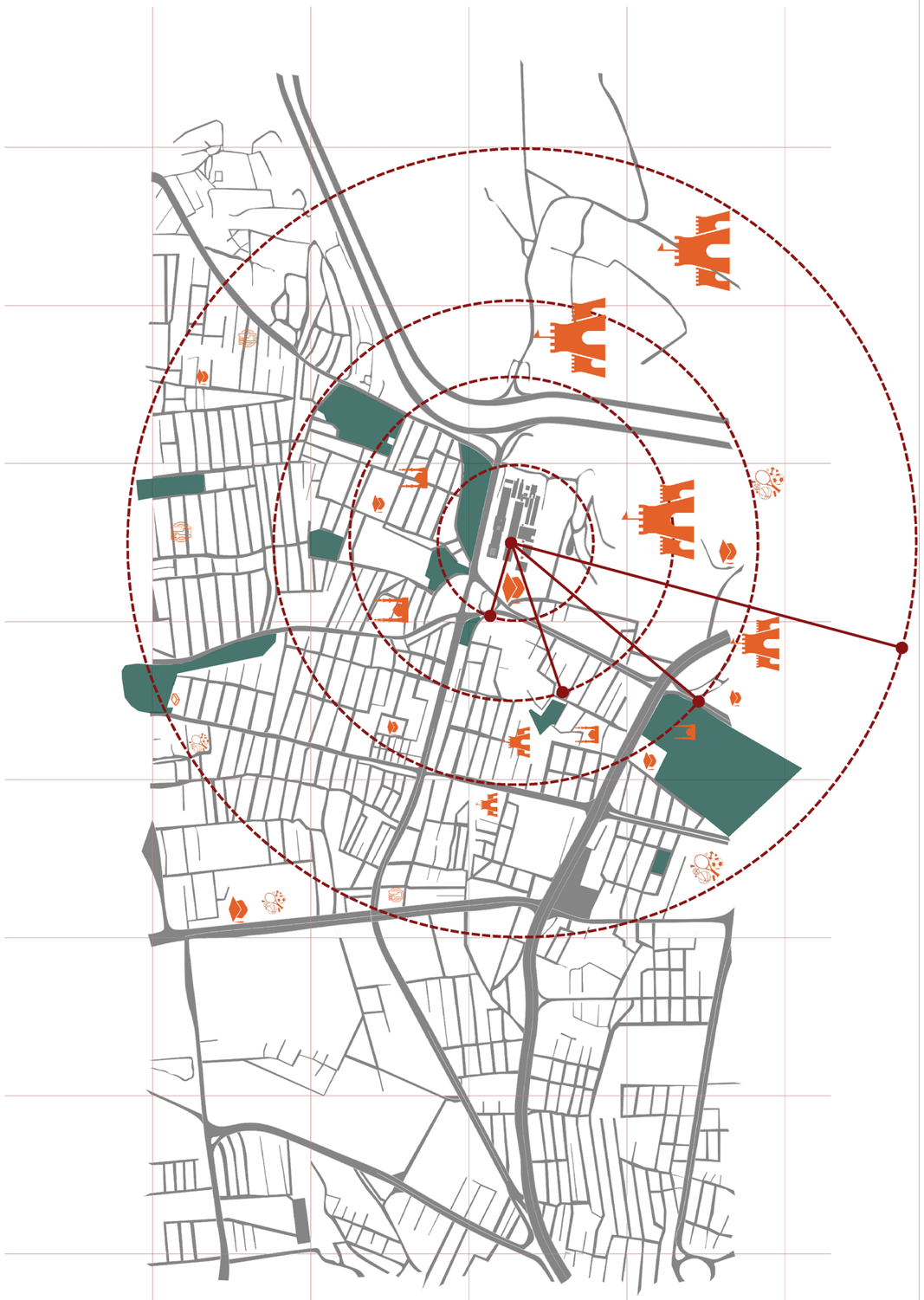


Fig.92, Distance to important locations in District 20 (Source: Author)

Land Use Proportions in District 20

Fig.93, Land use District 20 (Source: Author)

Silhouette Map of District 20

Fig.94, Sillhoutte map of District 20 (Source: Author)

Fig.95, View of the factory (Source: Tehran Picture Agency.)

Important places in Tehran

In the heart of Tehran, one can find a lot of historical places from the Qajar and even more ancient times, different parks, mountains in the north for hiking, which make the city full of contrast and layered character.

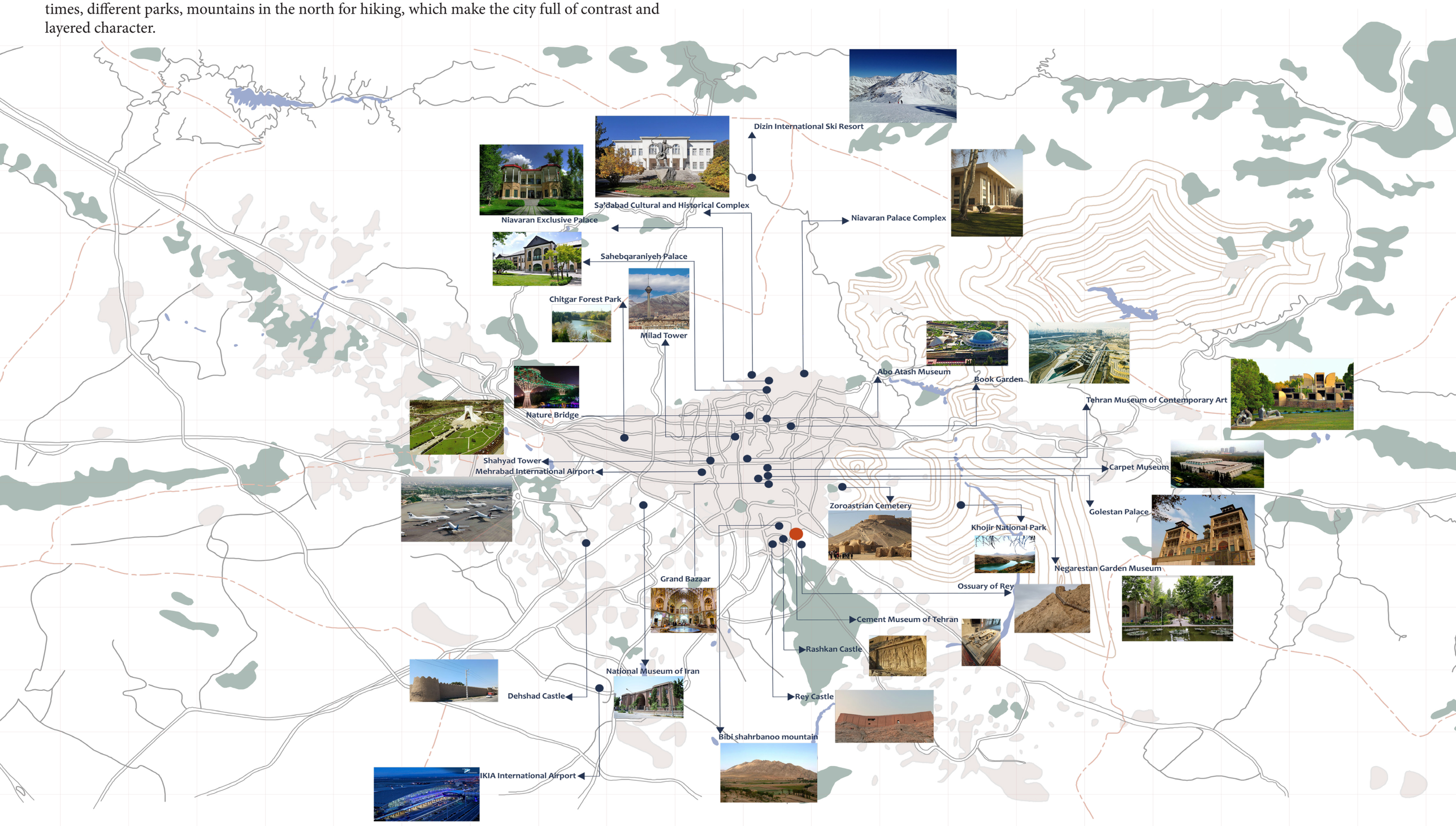


Fig.96, Tehran map with important places (Source: Author)

4.2 Proposal Development

4.2.1 Urban and architectural strategies

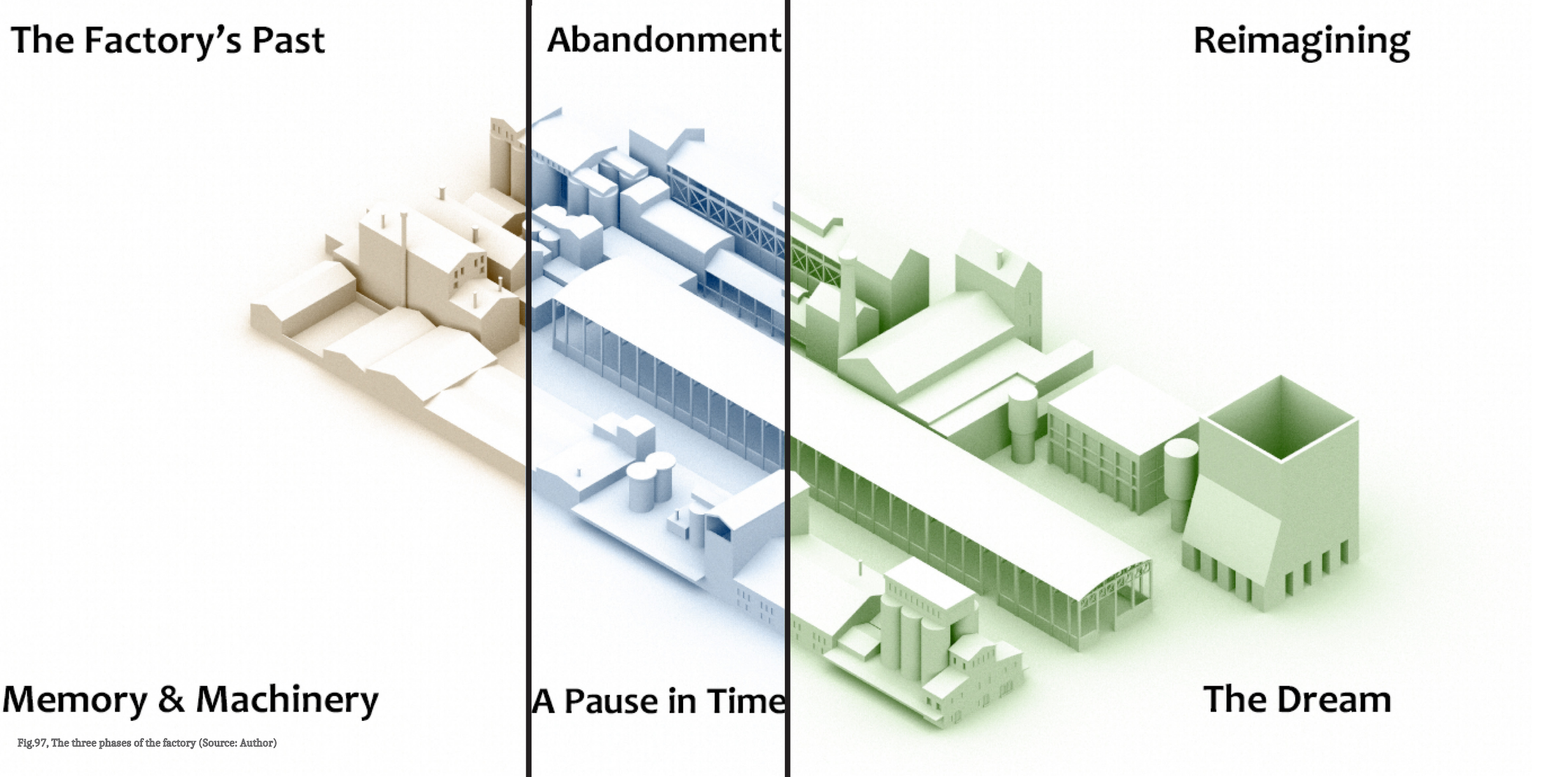


Fig.97, The three phases of the factory (Source: Author)

4.2.2 Spatial programming and phasing

The relation between factory, neighbourhood, district, and city

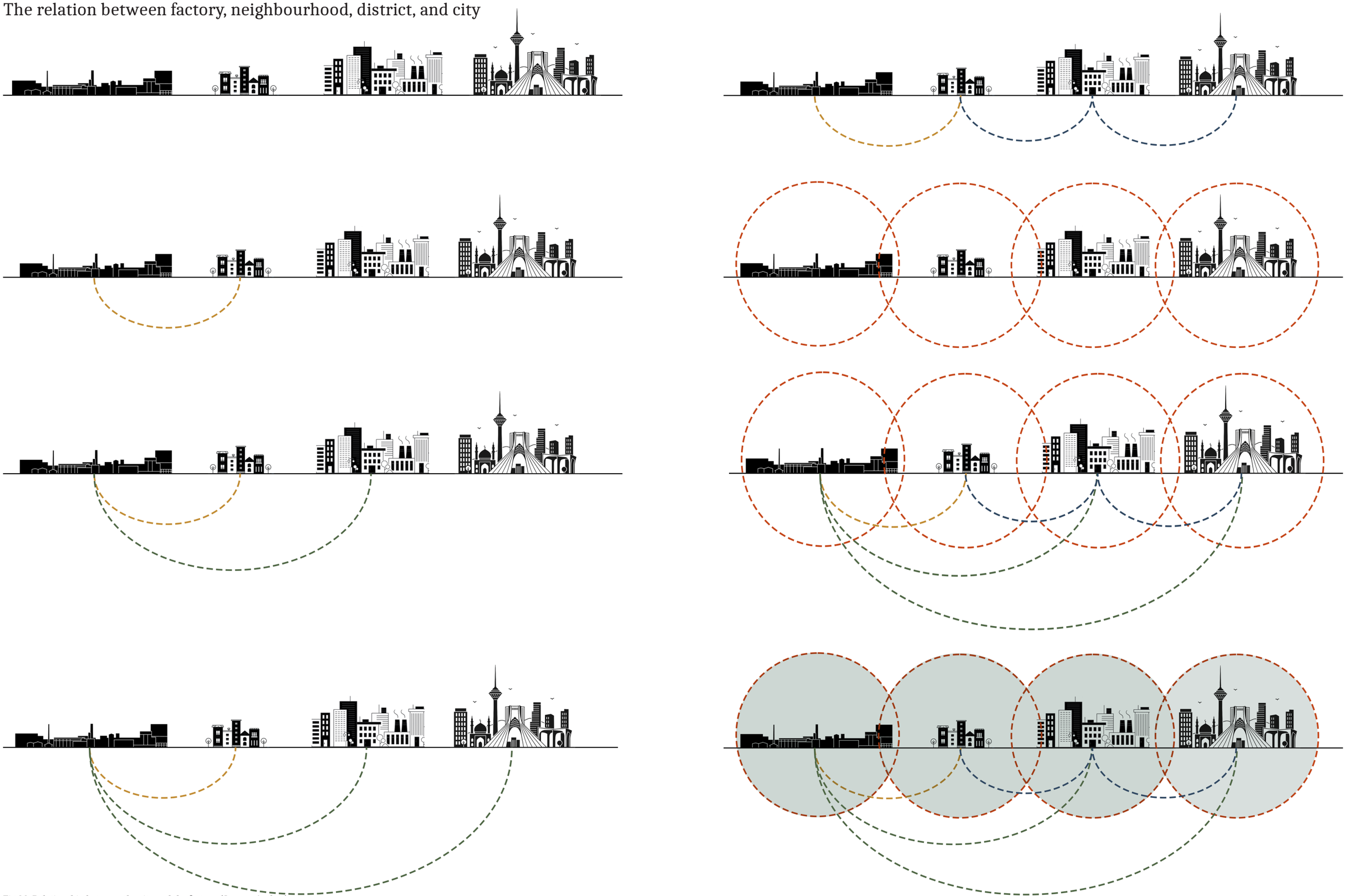


Fig.98, Relationship between the city and the factory (Source: Author)

4.2.3 Technical drawings and key concepts

Every building has a story.

This the story of Rey.

Past, Abandonment, and the Future.

Memory and Machinery, Pause, and the Dream.

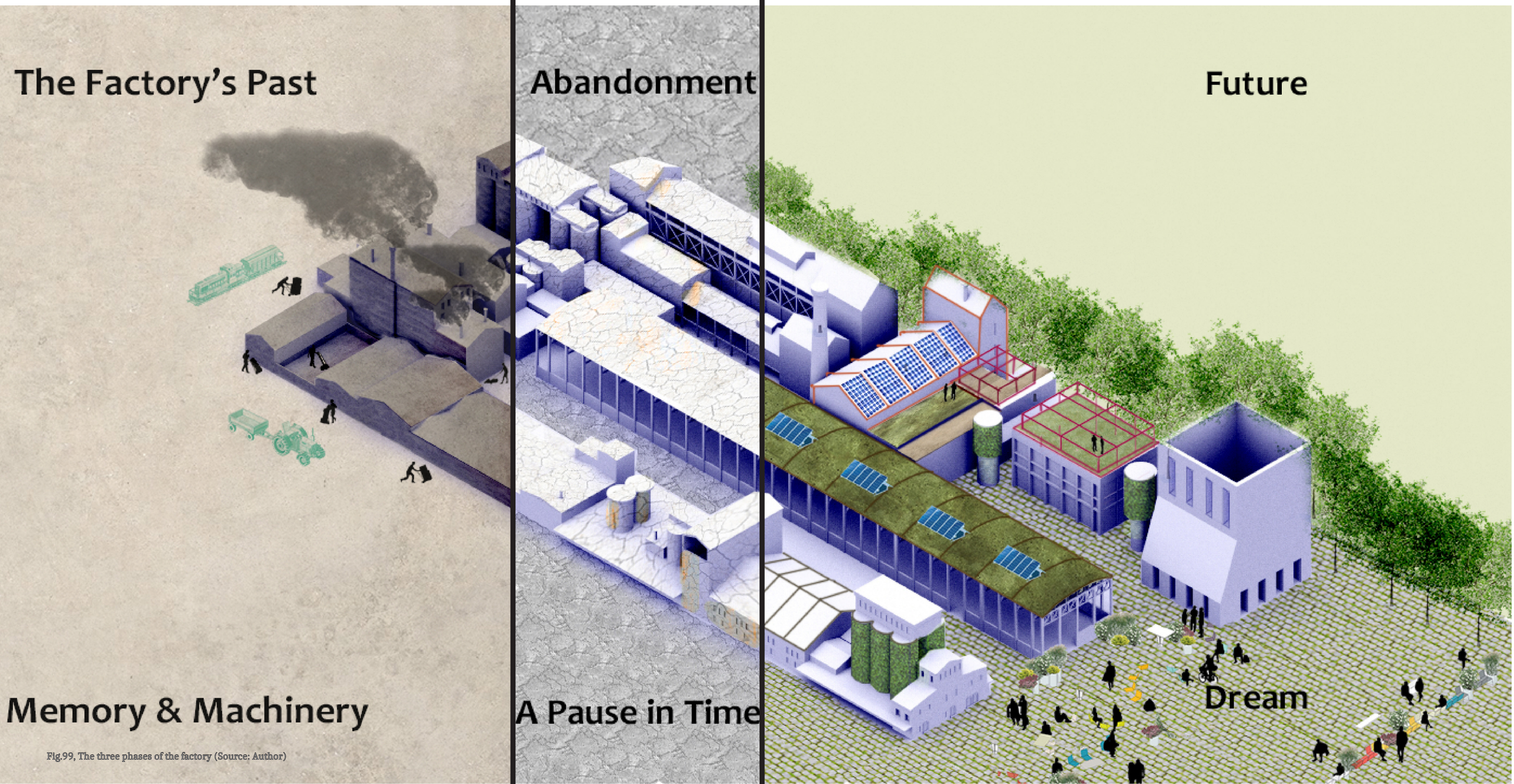


Fig.99, The three phases of the factory (Source: Author)

Architectural Documents

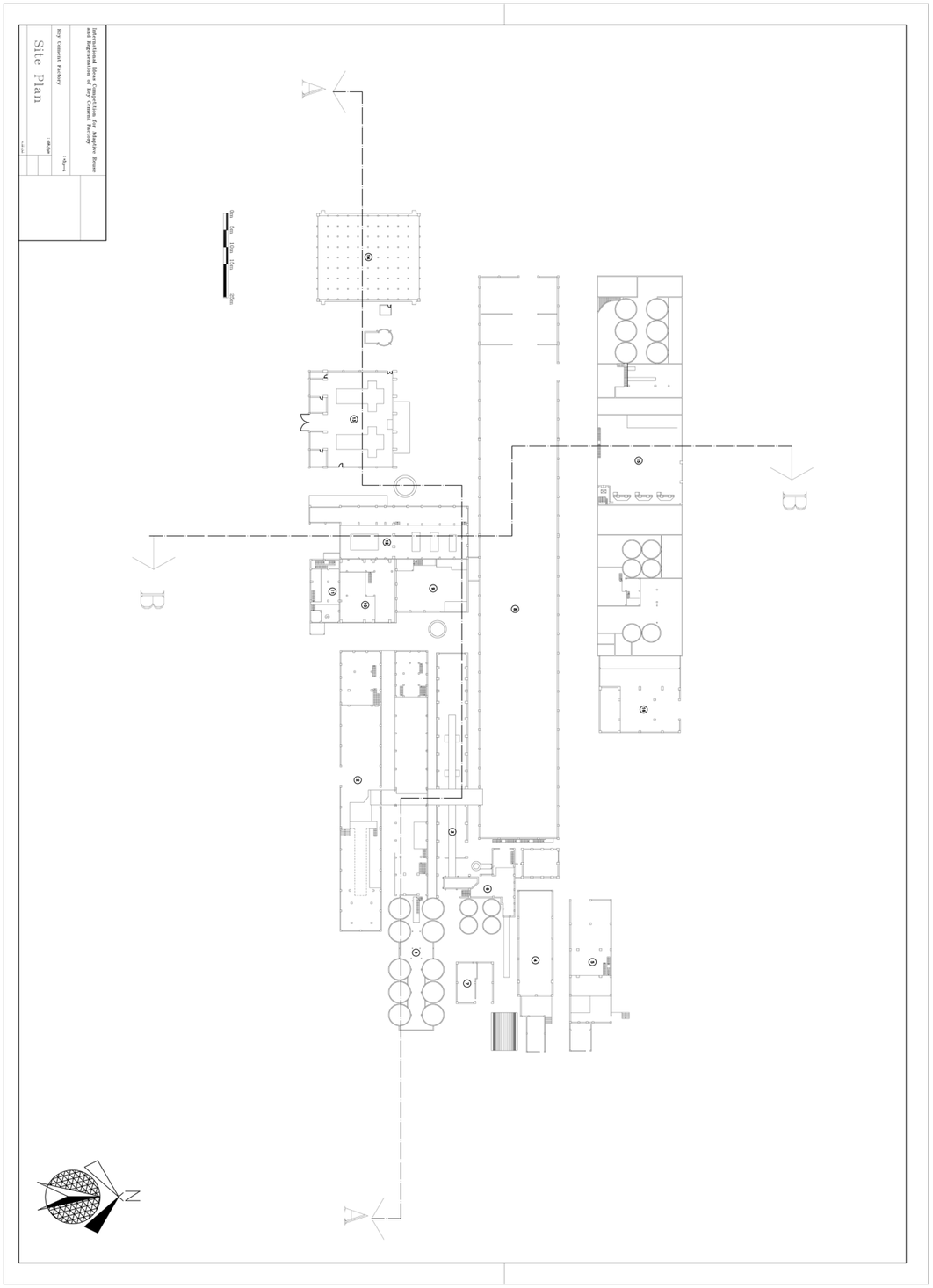


Fig.100, Plan (Source: Shahrdari Tehran)

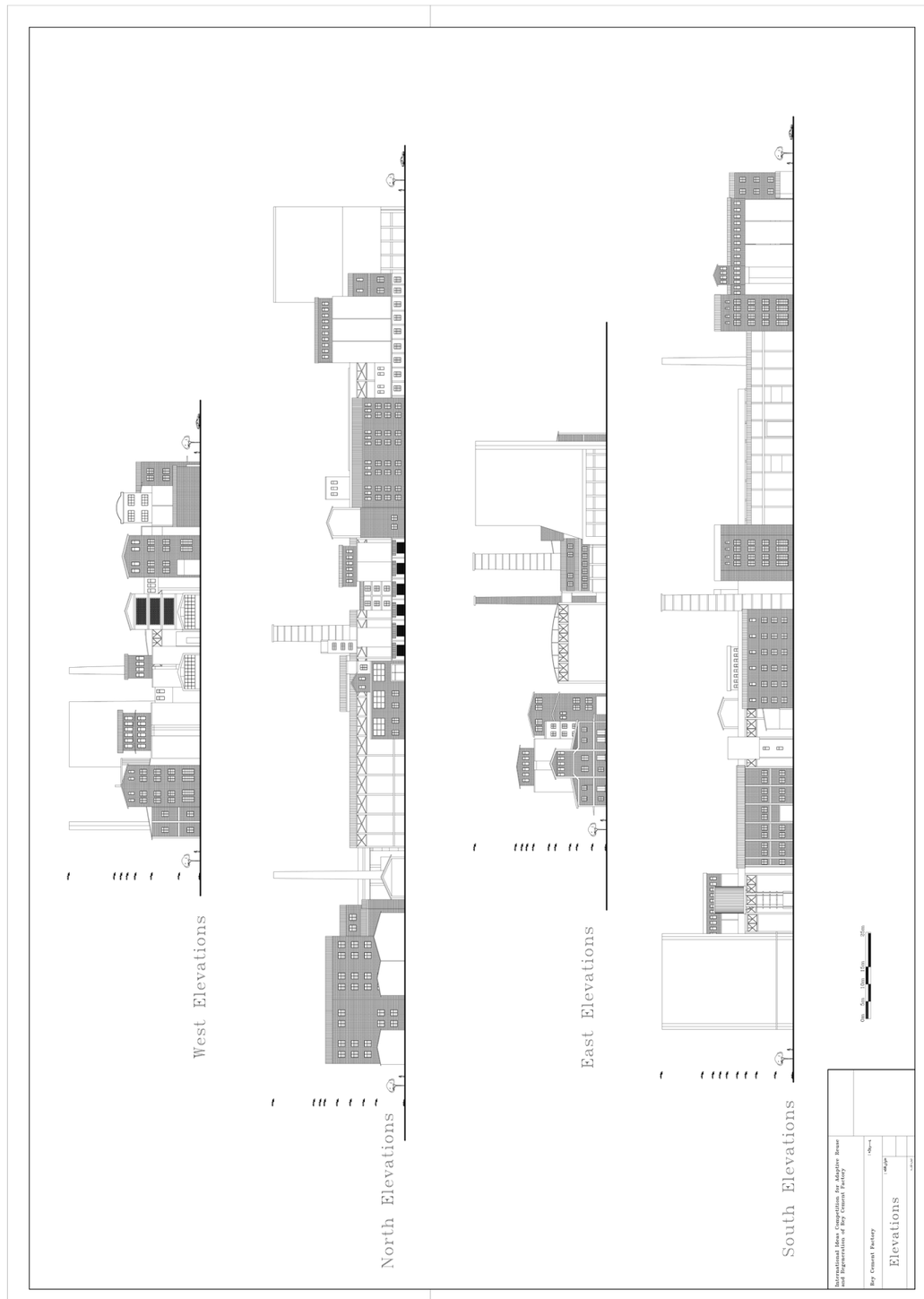


Fig.101, Elevation (Source: Shahrdari Tehran)

Provincial Plan Competition for Adaptive Reuse and Regeneration of Rey Cement Factory

Rey Cement Factory

Sections

SECTION A-A

SECTION B-B

Fig.103, Rey factory (Source: Gharipour 2023)

Fig.102, Section (Source: Shahrdari Tehran)

Fig.104, Rey factory photography (Source: Author)

Fig.105, Rey factory photography (Source: Author)

Fig.106, Rey factory photography (Source: Author)

Fig.107, Rey factory photography (Source: Author)

Fig.108, Rey factory photography (Source: Author)

Fig.108, Rey factory photography (Source: Author)

Fig.109, Rey factory photography (Source: Author)

Fig.110, Rey factory photography (Source: Author)

Fig.111, Rey factory photography (Source: Author)

Site Plan

Fig.111, Site plan (Source: Author)

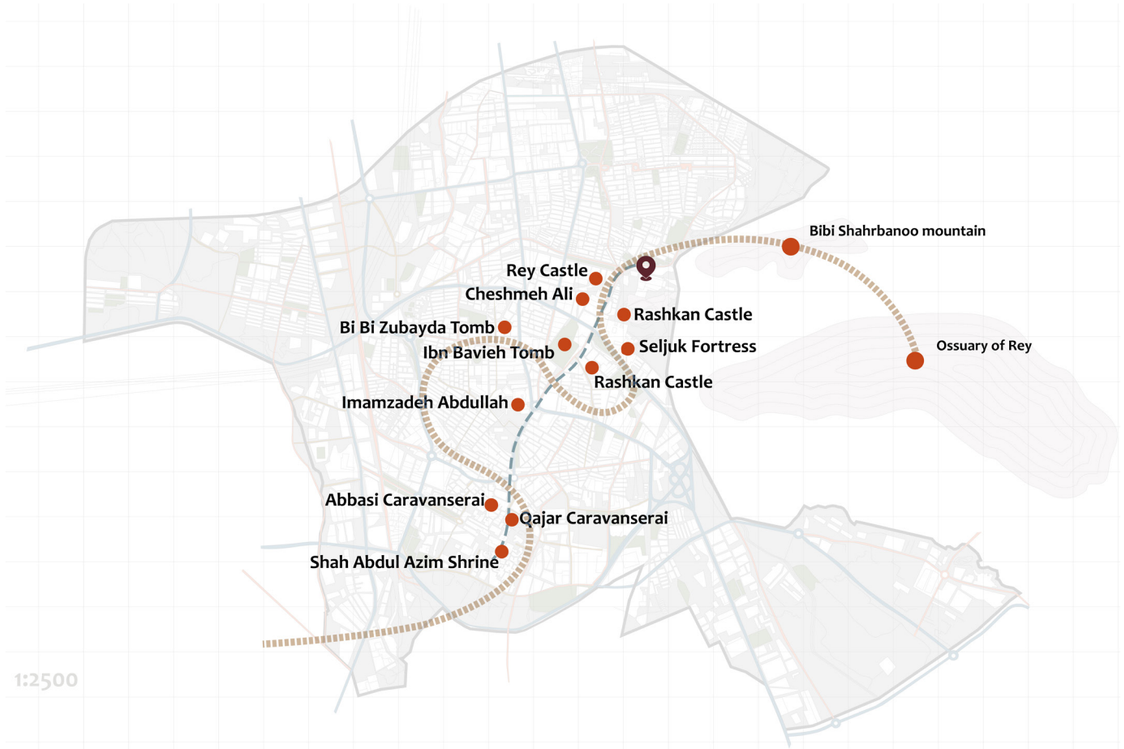


Fig.112, Bike line in the District (Source: Author)

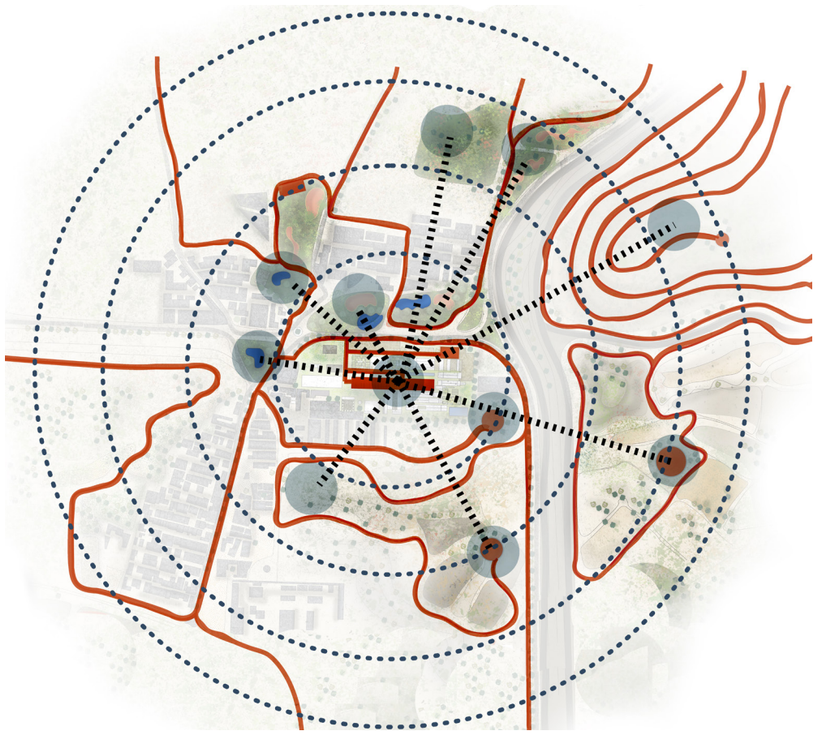


Fig.113, Bike line in the District (Source: Author)

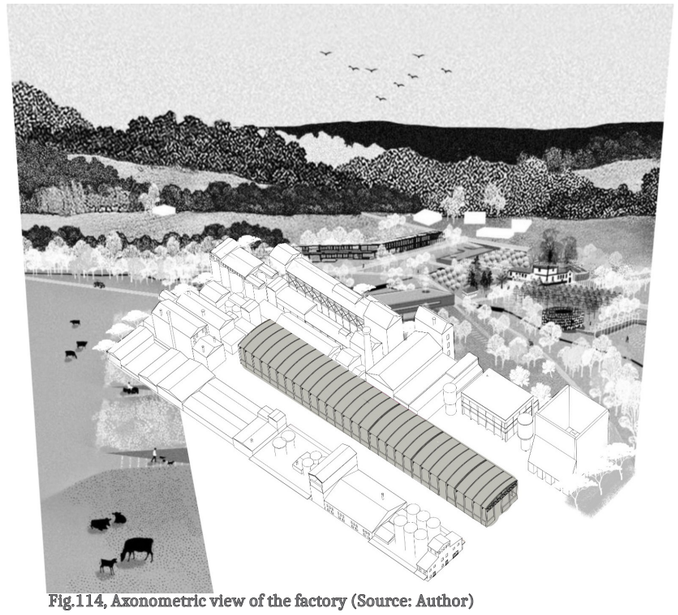


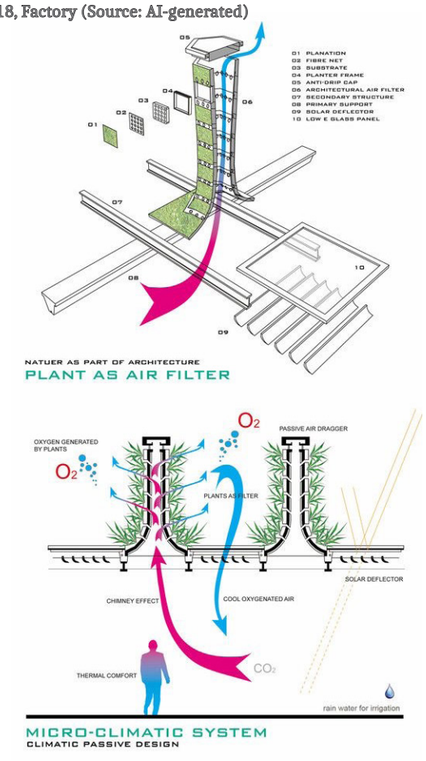
Fig.114, Axonometric view of the factory (Source: Author)

Fig.115, Inside the factory (Source: Author)

Fig.116, Inside the factory (Source: AI-generated)

Fig.117, Factory (Source: AI-generated)

Fig.118, Factory (Source: AI-generated)



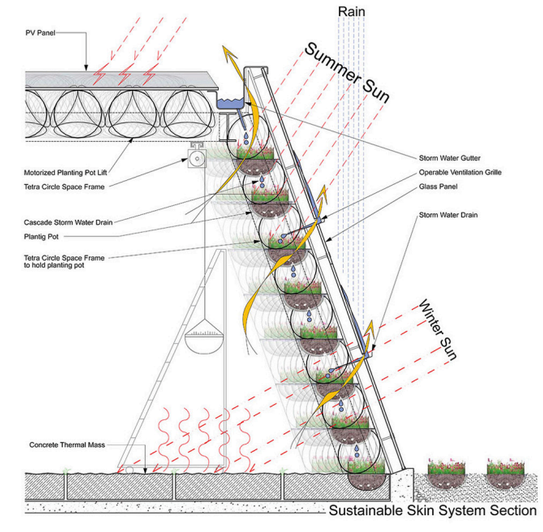


Fig.119, Competition for Liantang-Heung Yuen Wai Boundary control point (Source: Archdaily 2011)

Urban view of the factory

Fig.120, Urban view (Source: Author)

“By building cities, we build ourselves.”

Nader Ardalan, Iranian-American architect and author of The Sense of Unity

Chapter 5: Implementation and Impact

5.1 Environmental Potential and Regenerative Design

5.1.1 Integration of green/blue infrastructure (based on design intentions: green roofs, stormwater reuse, etc.)

5.1.2 Opportunities for future monitoring and improvement

Chapter 5: Implementation and Impact

5.1 Environmental Potential and Regenerative Design

The environmental impact of a system depends on many aspects. It depends on how we use natural resources, if the system is sustainable or not, and how we apply and use technology. One useful method to study this is called Life Cycle Assessment (LCA). It checks the whole life of a product or process, from beginning to end. LCA helps us to see where the most pollution or damage occurs. For example, in dairy production, most of the pollution comes from the farm. In cheese making, around 95% of the greenhouse gases and 99% of the acidification result from activities on the farm. This shows that normal dairy milk systems can even be harmful to the environment (Capper et al., 2008).

As farming methods change, it becomes more and more important to find a proper balance between making profit and protecting nature. One way to make farming better for the environment is to use less pesticides and find and try other ways to control insects and diseases. The I-Pest indicator shows that by using too much pesticide, air and water can be in danger. So, we need smarter pest control methods, which can also help farmers spend less money and cause less pollution (Lechenet et al., 2014). Life Cycle Assessment (LCA) in crop farming helps farmers understand the environmental effects of different growing methods. This can support them in choosing better and more sustainable ways to farm.

Regenerative design is very connected to sustainable ideas. Its main goals are similar to what the circular economy aims to achieve. A circular economy means using materials as long as possible, and then reusing or recycling them, so they keep their value (Liu, 2024). Regenerative design goes even further than just being sustainable. It tries to heal and help nature, not just to protect it. For example, Moreno and others discuss mixing smart design with care for the environment. This can help create stronger communities and make local places more ready for future challenges (Moreno et al., 2024).

This path of thought shows that real care for the environment is not only about doing green actions - no, they are not enough. Care for the environment also needs fairness, social help, and working together with local communities. Regenerative projects need all of these parts to actually function. Also, the idea of the Anthropocene, a time when humans strongly change the planet, shows how important regenerative design is now. Ferreira and others believe that there is clear proof that human activities have caused serious harm to the environment. Because of this, they advocate that we must move to a new version of economies that try to repair and support nature (Ferreira et al., 2023).

This means we need new design ideas that have the ability to change how we think and what we believe in terms of our lifestyle, politics, the environment, and society. Going towards a regenerative design path is not just a small step. It needs a big change in how we see progress, making regeneration the main goal, not just “something extra”. It’s more like a way of living. To make this change, we need creative and complete methods that connect what people need with the health and strength of nature.

Regenerative design is now used in different fields, like architecture, city planning, and materials science. One example in architecture is using ideas from nature, called biomimicry. It means learning how nature works to create better and more sustainable designs. These designs are not only useful, but they also support nature. They bring more plants and animals into cities and create a stronger link between buildings and nature. This shows how important it is to build in a way that helps natural processes, like cleaning water and removing carbon from the air.

5.1.1 Integration of green/blue infrastructure (based on design intentions: green roofs, stormwater reuse, etc.)

Urban green infrastructure, or GI, has many important roles in cities. It not only makes city areas look nicer or just greener, but also brings significant environmental benefits. For example, green spaces can help reduce the heat from the urban heat island effect. They achieve this by providing shade and making the local climate cooler. This also helps to reduce the need for air conditioning in buildings (Gómez-Baggethun et al., 2013). The social side of using green and blue infrastructure is also important nowadys. These spaces help people connect, support community life, and create places for fun and new chances. They can also improve mental health and well-being (Thompson-Spain et al., 2023; Jim & Chen, 2010). Parks and urban forests are important parts of city life. They should be close to where people live and easy to reach (Jim & Chen, 2010). When people can use green spaces, they can do exercise, relax, and breathe cleaner air. This will make public health better (Brown et al., 2018).

In the book Restorative Cities by Jenny Roe and Layla McCay, written in2021, “blue cities” mean any visible water areas in urban spaces. Roe and McCay say that, just like green spaces, blue spaces give people chances to relax, think, have fun, be engaged, and heal. But in city planning, these spaces are often not receiving enough appreciation.
Being close to water can help reduce stress, make people feel better, give more energy to them, and decrease anxiety and depression. These good effects can be even stronger than those from green spaces, or they can work well together.

There are some good examples of blue cities:

- Amsterdam is famous for its canals, where water is a vital part of the city’s life and identity.

- Some cities use Sustainable Urban Drainage Systems (SUDS), making water more visible in public areas.

- Blue infrastructure is also added in urban regeneration projects to bring water back into city life in useful and creative ways.

In the same book, Restorative Cities, the authors also talk about “green cities”. They describe them as cities that bring nature into daily life, not only to help the environment, but also to lower stress and improve mental health. Green cities include parks, street trees, green roofs, community gardens, urban forests, and green paths. The main idea is that these green spaces should have many uses and multiple purposes at the same time. They help nature by managing rainwater and making cities stronger against climate change, but they also support public health and social well-being.

The book also highlights how important equity and inclusion are. It says green spaces should be made for everyone, people of all ages, cultures, religious and income levels. It also warns about “green gentrification,” which can happen when new green areas make housing more expensive and push out low-income people. The goal is to keep housing near green spaces affordable.

The authors give examples from different parts of the world, such as:

- Singapore’s “City in a Garden” plan
- New York’s High Line park
- The restored Cheonggyecheon stream in Seoul

5.1.2 Opportunities for future monitoring and improvement

In the article “Environmental Monitoring for Smart Cities” by Bacco et al. (2022), the authors talk about the SHE system (Smart Healthy Environment), originating from Pisa, Italy. This system is flexible and not expensive, and it helps cities check and manage the environment better. It uses both fixed and moving sensors to collect detailed and reliable data about air quality, temperature, and pollution over time and in different places. The system also includes citizens through an app called SmartCitizen, where people can share comments, photos, and their own observations.

The system offers easy-to-understand factors like Air Quality (AQI), Thermal Comfort (TCI), and Traffic (TI), which help with better decisions in city planning and public health. In the future, using more mobile sensors, like wearables or sensors on public transport, could make real-time pollution tracking even better. Overall, Smart Healthy Environment strenghtens the connection between people and local authorities and gives a model that can grow for building smarter and more sustainable cities.

The SmartCitizen mobile app lets people join the project by sharing comments, photos, and their own experiences. This mix of personal stories and technical data helped build a stronger link between citizens and local authorities, in order for the people to also feel responsible and see themselve as part of proccess. It also made it easier to create policies based on real-life situations.

In the future, the project could grow by reaching more areas, using certified sensors for official use, and working closer with city governments and health researchers. The success in Pisa shows that this kind of system can also work in other cities, as a real-time tool to track environmental impact. It can help create smarter and more sustainable cities.

Conclusion

To me, this thesis started with a fundamental question: How can harmony be re-established between people, buildings, nature, the past, and the future? To answer that question, lets take a look at the case that has been studied in this book. The Cement factory of Rey, located in one of the historical parts of Tehran, a city with so many layers from history. A district that, despite its rich history, is struggeling with complex social problems and modern urban life challenges.

Rey, one of the oldest inhabited places in Iran, dates back to before the Common Era and keeps the layered stories of past civilizations, migrations, and transformations. The cement factory was built as a symbol of modernization and prosperity, but more than that it played a vital role in improving the lives of its workers and helping the city grow and improve. But over time, as the factory shut down and industry faded, the area was left behind. Today, it has become a museum and is occasionally used as a location for films or documentaries, but really not much more than that. The factory has more potenial to just be a museum or movie scene. Beside that, Rey then became a place where some of the most vulnerable people, like the homeless and refugees, found shelter, even in the mountains of Bibi Shahrbanoo.

As an architect who focuses on human and nature-based approaches, the cement factory, both historically and symbolically, is a place to start over. To me, the city works like a living organism, and the factory is like one of its cells - a small but vital part. In this thesis, I treated it as a key element to repair and reconnect with the rest of the urban system to grow.

To achieve this, a number of tools and strategies have been employed:
1) Nature-Based Solutions (NBS) based in Persian architectural traditions.
2) Green and Blue Infrastructure to address environmental damage and bring natural systems back to life.
3) Social justice principles, making sure that the project includes marginalized groups with the access to shelter, education, and cultural participation.
4) Applying urban programming, such as community farming, craft markets, galleries, and educational workshops, with the goal of attracting both locals and city-wide visitors.

There are many challenges: the land, that before the cement factory was agricultural, has suffered from environmental damages for decades through industrial activities and their waste. As air, water, and soil quality have worsened, we need to take action through ecological design and bioremediation. The area that today looks mostly grey and industrial, shaping a dull and lifeless image of the neighborhood, needs transformation by creating inviting public spaces, highlighting historic sites again, and adding safe ways to be mobile for pedestrain, like bike lanes or safe pedestrain zones. Socially, the large number of jobless people, homeless individuals, and refugees in the district seeks inclusive systems that support integration, skill-building, and economic opportunity. Nearby universities and organizations can play an important role by bringing students out of the classroom and into real-life projects, where they not only learn practical skills, but also help others and learn what it means to take responsibility and work together for the good of society.

In the end, this thesis believes that the cement factory must once again become “the” place of unity and purpose. Just as it once brought people together for work and learning to contribute to the service of national progress, it can now bring people together with the aim of a sustainable and humane future. A future where people together work for culture, nature, and society.

Everyone deserves a good life.

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